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AUTOMATION TECHNOLOGY AND
(FOUO 12/80)

1 OF 2

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JPRS L/9204

23 July 1980

USSR Report

CYBERNETICS, COMPUTERS AND
AUTOMATION TECHNOLOGY

(FOUO 12/80)



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USSR REPORT
CYBERNETICS, COMPUTERS AND AUTOMATION TECHNOLOGY

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HARDWARE

UDC 681.34

RESEARCH AND DEVELOPMENT OF HYBRID COMPUTER SYSTEMS WITH A HIERARCHICAL
STRUCTURE (THE "RUSALKA" PROJECT)

Moscow INFORM. MATERIALY NAUCH. SOVET PO KOMPLEKS. PROBL. KIBERNET. AN SSSR
[Informational Materials From the Scientific Council on Complex Problems of
Cybernetics, USSR Academy of Sciences] in Russian No 2/109, 1979 pp 9-15

KOGAN, B. YA.

[From REFERATIVNYY ZHURNAL, AVTOMATIKA, TELEMEXHANIKA I VYCHISLITEL'NAYA
TEKHNIKA No 3, 1980 Abstract No 3B841 by V. V. Manilov]

[Text] The author describes the new demands made on computer systems by automatic control technology. He gives a brief description of the functional advantages of hybrid computer systems and the prerequisites for realizing these advantages. He also lists the features of third-generation hybrid computer systems produced abroad. There is a detailed explanation of methods for increasing the productivity of hybrid computer systems and the author shows that the single-level structures used in foreign hybrid computer systems are not promising for general-purpose, high-productivity hybrid computer systems. A more effective approach is the creation of hierarchical hybrid computer systems with distribution of the analog computer control functions, the conversion devices, and the external equipment operating in real time between two or several digital processors. The author gives a detailed description of the structure and technical characteristics of the "Rusalka" hybrid computer system, which was developed on the basis of research results and has two hierarchical control levels. The essential feature of this hybrid computer system's equipment is the introduction of additional units for connecting the digital computer's channel to the analog computer and the conversion and coupling unit. A hybrid computer system provides a high operating speed and a comparatively high accuracy of solution for a wide class of scientific and technical problems relating to the modeling of complex dynamic systems. It is possible to connect to it actual equipment and channels of the SAMAS type. The author also points out other features and advantages of the "Rusalka" system. In the digital part, an upper-level M-4030 processor (or an enlarged Nairi-4 complex) and a low-level M-400 processor (or an SM-3, SM-4, or basic Nairi-4 complex) are used. In

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the analog component there are 220 linear and 48 nonlinear solving elements, 80 parallel logic elements, 30 switching elements and other equipment. The author describes several of this hybrid computer system's blocs and its programming facilities. He also lists the problems on which it was tested and its actual advantages. References 7.
[309-11746]

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COMBINATION CIRCUIT REALIZATION BY AUTOMATIC MICROPROCESSOR

Moscow PRIBORY I SISTEMY UPRAVLENIYA in Russian No 3 1980 pp 9, 10

[Article by Candidates of Technical Sciences G. Kh. Novik and V. G. Persheyev; Engineer M. I. Shamrov]

[Excerpts] The problem of utilization of microprocessors (MP)* in control system digital automatic control devices is of great importance today. Of particular interest is the problem of realization of combinational conversions, since they form the basis of any automatic processing.

Usually the law of combinational conversion is specified by the system of Boolean functions (SBF). We shall examine methods of microprocessor realization of SBF.

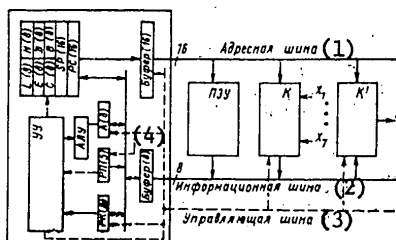


Figure 5.

Key:

- | | |
|---------------------|-----------------|
| 1. Address line | 3. Control line |
| 2. Information line | 4. Buffer |

* Lin, W. C. PROC. OF IEEE, Vol 65, No 8, 1977.

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Figure 5 contains a simplified structural diagram of an automatic MP based on an Intel 8080 MP, where B, C, D, E, H, I. are internal registers, serving for storage of intermediate results and other purposes; АЛУ -- arithmetic-logic unit; А -- accumulator register for storing results of operations performed in the АЛУ; РК -- register for storing instruction code; РП -- tag register for operations performed in the АЛУ; УУ -- MP control and I/O unit; РС -- program counter for forming instruction addresses; SP -- stack pointer. Bit configuration of the units is indicated in parentheses. A more detailed description of the Intel 8080 MP and system of instructions is presented, for example, in the Lin article (see footnote).
[313-3024]

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CSO: 1863

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SELECTIONS FROM THE JOURNAL 'AUTOMATIC CONTROL AND COMPUTER HARDWARE'

Riga AVTOMATIKA I VYCHISLITEL'NAYA TEKHNIKA in Russian No 2, 1980 pp 25, 29, 30, 31, 33, 93-94, 95, 97-98

[Titles and attributions are given below]

[Excerpts] UDC: 621.328.8 -- REALIZATION OF SEVERAL TYPES OF CONDITIONAL OPERATIONS IN MICROPROCESSOR SYSTEMS -- A. V. Brunchenko and Yu. T. Butyl'skiy

In constructing devices for digital processing of signals on the basis of microprocessor systems, there arises the necessity of performance of certain types of conditional operations, whereby the operating speed of these devices is determined in large measure by the mode of their realization. In addition, program execution of conditional operations is impossible in some microprocessors. Urgently needed in connection with this is development of methods of performance of conditional operations which make it possible to obtain device high operating speed when utilizing microprocessors which do not permit performance of conditional operations.

In this article we propose a method of performance of simple conditional operations which makes it possible substantially to reduce the number of program instructions, which leads to higher operating speed. We shall define simple conditional operation as a set of conditions and unconditional operations for which, depending on fulfillment of conditions, one unconditional operation is performed, corresponding to one instruction.

The proposed method is not universal and can be applied in microprocessor systems designed for implementation of devices of a specific class. For a given class variables contained in the conditions cannot enter into unconditional operations, and vice versa. In other words, all variables for devices of such a class can be divided into two types -- information and adjustment, while the operating algorithm of such devices consists in various modes of processing information variables in relation to adjustment values. This class includes many digital signal processing devices, such as digital filters, where input and output signal counts can be the information variables, and filter coefficients -- adjustment variables.

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The proposed method of realization of simple conditional operations can find application in signal digital processing devices based on specialized microprocessor systems. Its employment is warranted in those cases where there is a possibility of a certain increase in hardware costs in order to obtain maximum operating speed. In particular, such a method was utilized in designing digital filters. Four K584IK1 processor circuits as computing device and two K155RYe3 permanent memory circuits as control units were required to construct a second-order filter with 15-bit information signals and 7-bit fixed coefficients. Maximum discretization frequency for such a filter was approximately 20 kHz with a clock frequency of 500 kHz. Six additional K155KP7 switch circuits were required for an adaptive filter with tunable coefficients.

UDC: 681.3 -- TESTING A 4-DIGIT MICROPROCESSOR ELEMENT -- Ya. M. Damatov, T. F. Sapozhnikova, R. Shyussler

This article presents a description both of hardware and software designed for testing a single-crystal 4-digit microprocessor element [1]. This microcircuit is equivalent in complexity to a device containing more than 1,450 gates. It performs all internal functions required for parallel processing of 4-digit binary data in conformity with the given instruction.

The testing program is written in assembler language for a YeS-1010 computer.

1. Belousov, A. I.; Boldyrev, V. P.; Kaloshkin, E. P. Savokin, Yu. I.; and Sukhoparov, A. I. "General-Purpose Single-Crystal Four-Digit Microprocessor," ELEKTRONNAYA PROMYSHLENNOST', No 5, 1977, pp 55-57.

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Yermol'yev, Yu. M. L. A. Rastrigin, K. K. Ripa, and G. S.
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UDC: 62-507. Bul', Ye. S. Switching Functions Realization by Network of programmable Logic Arrays.

The author proposes a method of synthesis of a network of programmable logic arrays (PLM), which perform a specified switching function (PF). The method consists essentially in constructing a code which differentiates all sets in which the specified PF values are not equal. Functions, each of which can be realized on one PLM, constitute the code digits. For the case of a PF specified in sets, the author proposes an algorithm for breaking down a set of arguments with the aim of optimization of the resultant network. Two tables, four illustrations, seven bibliographic items.

UDC: 681.322.05. Kuno, A. Ya. Real-Time Digital Signal Processing on a Low-Speed Computer.

Employment of small computers for solving signal digital processing problems can be effective with maximum utilization of the operating speed resources of these computers. This is achieved by selecting an efficient arithmetic unit (AU) operating mode. In many cases the ideal AU operating mode -- uniform -- cannot be employed due to the necessity of matching computations with the process of signal input into computer memory. This article states and solves the problem of selecting an optimal AU operating mode with computation of a rapid Fourier transform (BPF) and defines the conditions of existence of a uniform mode. A geometric solution illustration is presented. Five illustrations, one bibliographic item.
[313-3024]

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UDG 621.382

EXPANSION OF FUNCTIONAL POSSIBILITIES OF SUPERLARGE INTEGRATED CIRCUITS MEMORY (CAPACITY OVER 4 KBITS) AS A METHOD FOR IMPROVING PARAMETERS OF SEMICONDUCTOR MEMORIES

Moscow MIKROELEKTRONIKA in Russian No 2, 1980 received by editor 20 Sep 79 pp 169-182

[Article by A. G. Aleksenko, V. A. Lapshinskiy]

[Excerpts] One of the basic problems of hierarchic memory systems is to increase the speed of data exchange between the memory (ZU), the central processor (TsP), the peripheral devices and within the hierarchy [1,2].

Along with program and architectural facilities the increase in the speed of the exchange is achieved by using a new component base in the ZU, in particular, high speed acting (selection time $t_B \approx 100$ nanosec) super BIS [Large integrated circuits] with a capacity $N_{is} \geq 4$ kbits) memories made of bipolar and MDS transistors [2-5].

The purpose of this paper is to evaluate the basic parameters (speed, data volume, consumed power) of the ZU using super BIS memories with expanded functional possibilities and compare them with similar ZU made with micro-circuit memories with typical organization [5].

To make the evaluations, a model of the arrangement of the memory space (KPP) was developed and investigated.*

Conclusion

The evaluation of the parameters of the space arrangement of the computer memory with a capacity greater than 4 kbits makes it possible to draw the following conclusions:

*By the arrangement of the memory space in this case is understood the space for implementing the ZU (for example, a printed circuit with the super BIS arranged on it) that includes parameters (electric and geometric) of the main communications lines between the ZU and other computer devices.

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1. Using super BIS memory supercomponents makes it possible to increase, by 2 to 3 times, the data exchange speeds with modular and associative selection compared to super BIS with typical organization of the memory due to a reduction in the number of signal transmissions over the main control lines and improvement in the organization of the super BIS memory that permits special modes for data selection.
2. At the present level of technology ($S_{1s} \leq 50 \text{ mm}^2$, $\xi_3 > 10$, $a_1 \approx 2.5 \text{ mm}$), the permitted number of leads from a super BIS is limited to 18-24 since each additional lead reduces the data capacity of the space arrangement by 4% on the average. With the expected increase in the data arrangement density ($S_{1s} \approx 100 \text{ mm}^2$, $\xi_3 = 2-3$, $a_1 = 1 \text{ mm}$), the number of leads from the super BIS will increase to 48-64. Additional leads will have little affect on the data capacity of the arrangement space of the memory. The increased number of leads for the super BIS will stimulate the expansion of their functional possibilities. In turn, this will lead to a reduction in the cost of developing and designing a broad class of semiconductor ZU with a minimum number of types of universal super BIS memory supercomponents.
3. To increase the efficiency of the memory arrangement space in the mode of storage and data access, it is necessary to use buffer circuits with three states in the output stages of the TsP (or controller) that do not release current to the load, reduce the signal data amplitude to level $\Delta U \lesssim 1 \text{ volt}$, increase the number of memory microcircuits joined by main lines and reduce the coefficient of the active-passive feed of super BIS of the memory to the level $\gamma = 0.01-0.1$. Increasing the efficiency of the arrangement space of the memory in the access mode by 30 to 50% is achieved by utilizing the optimal for a given ZU architecture input-output bit configuration of the super BIS memory.
4. Among the additional functions of the super BIS memory that improve the parameters of the arrangement space of the memory, there must be included modular and associative data input access, rearrangeable bit configuration of the address input and of data input-output, and the organization of the built-in active-passive feed.
[351-2291]

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MODEL OF A SYSTEM FOR THE INTEGRATED AUTOMATION OF LARGE RESEARCH INSTALLATIONS ON THE BASIS OF A NETWORK OF MINICOMPUTERS

No city listed TR. FIZ. IN-TA AN SSSR [Works of the Physics Institute of the USSR Academy of Sciences] in Russian Vol 112, 1979 pp 8-12

No authors listed

[From REFERATIVNYY ZHURNAL, TEKHNICHESKAYA KIBERNETIKA No 1, 1980 Abstract No 1.81.540]

No abstract supplied by source.
[221-11746]

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UDC 621.3.061

AUTOMATING THE DESIGNING OF LARGE-SCALE INTEGRATED CIRCUITS WITH DUE CONSIDERATION FOR THE OPTIMUM DISTRIBUTION OF THE POWER RESOURCE

Moscow MIKROELEKTRON. I POLUPROVODN. PRIBORY [Microelectronics and Semiconducting Instruments] in Russian No 4, 1979 pp 157-167

VOROB'YEV, A. V., RODIONOV, YU. P. and SKVIRA, A. V.

[From REFERATIVNYY ZHURNAL, TEKHNIЧЕСКАЯ KIBERNETIKA No 1, 1980 Abstract No 1.81.375]

[Text] The authors propose a new method for designing BIS's [large-scale integrated circuit] with due consideration for the optimum distribution of the power resource among the circuit's separate stages. They present a mathematical formulation of the problem of the deterministic optimization of a BIS with respect to the energy parameters and develop the "DETOPT" BIS optimization algorithms and program. The method and the program have been approved in a number of semiconducting memory circuits. As an example, the authors present the results of BIS optimization for a main memory with a capacity of 256 bits. Figures 4; references 7.
[221-11746]

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UDC 681.51:681.3

AN APPROACH TO AUTOMATING THE CIRCUITRY-ENGINEERING PLANNING OF MICRO-COMPUTERS

Moscow MIKROELEKTRON. I POLUPROVODN. PRIBORY [Microelectronics and Semi-conducting Instruments] in Russian No 4, 1979 pp 48-56

MASHEVICH, P. R. and ROMANETS, YU. V.

[From REFERATIVNYY ZHURNAL, TEKHNICHESKAYA KIBERNETIKA No 1, 1980 Abstract No 1.81.698]

[Text] The authors discuss one approach to analyzing the functioning of a microcomputer's units. Microcomputer modeling is performed according to a program for analyzing the electronic circuits in which the library elements are interpreters of microprocessor circuits of the KMDP [expansion unknown] BIS [large-scale integrated circuit] complex. Figures 2. [221-11746]

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COMPUTER SYSTEMS WITH PROGRAMMABLE STRUCTURES

No city listed ELEKTRON. MODELIR. [Electronic Modeling] in Russian No 1,
1979 pp 42-52

KORNEYEV, V. V. and KHOROSHEVSKIY, V. G.

[From REFERATIVNYY ZHURNAL, TEKHNICHESKAYA KIBERNETIKA No 1, 1980 Abstract
No 1.81.669]

[Text] The authors discuss questions of the organization of circuit diagrams in multiprocessor systems. They distinguish a class of circuit diagrams that are inherent in computer systems with programmable structures. They also introduce a synchronizing primitive that makes it possible to assign the order of realization of program operators and program interfaces both inside computer modules and between different modules in a system. Figures 4; references 21.

[221-11746]

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SOFTWARE

UDC 681.322.068

STRUCTURE OF THE MAIN TRANSLATOR AND LOADER OF THE TUI SYSTEM FOR DESIGNING TRANSLATORS

Moscow STRUKTURA GLAVNOGO TRANSLYATORA I ZAGRUZCHIKA SISTEMY POSTROYENIYA TRANSLYATOROV TUI [as above] in Russian Institute of Applied Mathematics, USSR Academy of Sciences, Preprint No 156, 1979 15 pp

ARKHANGEL'SKAYA, YE. A., GLADYSHEVA, YE. M., KLENIN, A. S., DUTSIKOVICH, V. V., PASTUKHOVA, L. I. and UKHOV, L. V.

[From REFERATIVNYY ZHURNAL, AVTOMATIKA, TELEMEXHANIKA I VYCHISLITEL'NAYA TEKHNIKA No 3, 1980 Abstract No 3B146 by T. M. Dadashev]

[Text] The authors describe the organization of the TUI system, which is the first version of the TU system for designing translators. Its basic programmed parts are a main translator and a loader, while the ALMO language serves as the working language. Translators designed with the help of the TUI system perform translations from an initial language into ALMO. The main translator consists of a basic section, a system for data exchange with an external memory, a translator adjustment section, and a switch. The main translator's basic section performs the translation and issues the results. The system for data exchange with an external memory insures the allocation of the memory for dynamic data structures. The translator adjustment system is used to issue intermediate results at certain points in the translator. Its operation is regulated by conditions assigned before the initial text is entered for each translator run. The switch calls up different basic units at the appropriate moments of translator operation. The authors describe the structural makeup of the basic units and list those that form the nucleus and the replaceable section. The loader contains seven programs for processing separate parts of the initial language's external description into ALMO and entering them in the archives in the form of library insertions.
[309-11746]

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INFORMATION SYSTEM LANGUAGES

Moscow YAZYKI INFORMATSIONNYKH SISTEM in Russian 1979 signed to press
6 Sep 79 pp 2-8, 302-304

[Annotation, table of contents and foreword from book by Renat Grigor'yevich Potov and Boris Vladimirovich Yakushin, Institute of Linguistics, USSR Academy of Sciences, "Nauka," 2,900 copies, 304 pages]

[Text] Annotation

The book contains an expanded analysis of the problems and methods of construction of linguistic means of a broad class of information systems--documentary and factographic and systems of data processing and control. Questions are examined both on the level of the general methodological prerequisites but also on the level of the solution of particular practical problems with specific recommendations. The materials of the book are widely illustrated with examples, diagrams and tables.

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Foreword from the Editor

At the present time the main direction of application of electronic computer technology is connected with the processing of information. This direction is characterized by rapid growth of the quantity of automated information systems of various types and purposes that are gradually being introduced in all spheres of the national economy. Automated information systems form the basis of automation of processes in the management of the national economy, assure the processing of masses of technical and economic information in solving tasks in planning, production, accounting and distribution, and also serve the purposes of providing specialists with information in the areas of science, technology and humanitarian disciplines. In our country works is being done on the creation of a state-wide data processing system based on sector and departmental automated control systems, the State Network of Computer Centers and the Unified Communications Network of the country, the automated system of scientific and technical information and a number of others. Within the framework of those plans a large number of varied information systems is being created. In essence a new industry of computer data processing is arising.

One of the most important problems of electronic data processing is man-machine communication. This is above all the problem of creating simple and convenient linguistic means of communication--languages for the presentation of information to a machine and referral with requests for its retrieval and processing, programming languages and other sign systems used in the process of operation of computer technology and information systems created on the basis of it.

The range of questions discussed in the book is connected mainly with the problems in the construction of artificial languages for the presentation of information and reference to the machine for the purposes of the retrieval and processing of sought information, that is, the problems of information languages.

In spite of many years of experience in the creation of information languages and their use in existing systems for the accumulation, storage, retrieval and processing of information, work continues on the construction of new, more flexible and convenient languages. The effectiveness of the traditionally developed languages still is inadequate, and so man-computer communication proves to be a very weak spot in the systems.

An alternative to the application of artificial languages is the use of natural languages for communication with the computer. Many years of investigations in that direction, conducted within the framework of information science, applied linguistics, the theory of information systems, programming and, finally, in work unified by the problem of the artificial intellect, in spite of promising results, still are far from practical effect. Therefore, as before, the search for ways to construct effective artificial languages on the basis of limited use of means of a natural language remains an urgent task in the area of means of such communication.

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The authors, like many other developers of information systems and their linguistic means, are convinced that there are possibilities of assuring effective man-machine communication even under the conditions of large limitations on the use of natural language.

The development of information languages, in the opinion of the authors, has been held back to a certain degree as a result of the traditional separation of the "spheres of influence" between the developers of programming systems and specialists on information languages. And differentiation has also gone further in this and in other regions. Thus, information languages have been divided into languages for the presentation of scientific and technical information and languages for the presentation of technical and economic data, that is, according to the purpose of the information systems. The development of those two directions has proceeded to a considerable degree in isolation from one another, and there has not been sufficient exchange of experience and borrowing of achievements. Meanwhile, the developers in each area, as a rule, proceeded on a common principle--limited use of components of a natural language. True, in the case of documentary systems that limitedness was expressed in the fact that the natural language appeared in the role of an intermediary between the area of knowledge (concepts) and an artificial search language.

Analysis of the present state of programming languages shows that they are crowding information languages more and more. Contributing to this is their universality and the possibility of application not only for the compilation of programs (their primary function), but also as a means of presenting information and assuring access of the user to it. It should be acknowledged that in the development of programming languages all the factors determining the effectiveness of a language were taken into consideration to a greater degree than in the creation of information languages. At the same time the lexicon of natural languages was used economically. Use of the lexicon of natural languages gives reason for characterizing contemporary programming languages as artificial languages that approach the natural. Many methods of constructing linguistic means of programming and especially of economic use of natural language components in them could be very useful also in the development of information languages.

Work in the area of information languages was influenced by interest in the problem of automatic processing of texts in natural languages (without any sort of limitation on the formulation of such tasks and the completeness of their solution). This direction of the work is validly regarded by the authors as abstract and still far from the possibility of its direct practical application. At times this has been caused by the limited possibilities of existing computers and other difficulties in the practical realization of such plans. It should also be noted that the main area of use of computers for data processing is administration, where texts in a natural language are not always the main form of presentation of information and where formalized documents with the limited means of a natural language are mainly used. The ignoring of the latter circumstance has at times had

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the result that many questions in the construction of languages for the presentation of this very massive type of information have remained separated from the theory and practice in the development of information languages.

Investigation of the automatic processing of texts, including in the area of the artificial intellect, has clearly shown all the complexity of the problem of use of a natural language as a universal means of man-machine communication. At the same time the appearance of programs "recalling a natural language" has revealed also the inadequacy of many theoretical constructions (especially in linguistics) to solve such problems. This is not surprising, since a satisfactory solution of them can be obtained only as a result of a complex approach, by the efforts of representatives of various disciplines, not only of linguistics. In all fairness it should be pointed out that a positive result of that work was stimulation of the further development of the theory and means of programming, the appearance of non-algorithmic languages for the presentation of symbolic information and its operation and a number of other fundamental directions and theories, including in the theory of abstract grammars.

The connection that exists between languages with different purposes within the framework of information systems has now become evident. That became especially clear in proportion to the transition to integrated data processing systems with the use of third-generation computer systems, characterized by the wide propagation of standardized program-apparatus means, and the construction of common information bases for such systems--automated systems for the control of data banks. Such systems serve as the basis for adjustable information systems and complexes of information-logical and computational tasks. Under those conditions programming languages, information languages of various types and information have proven to be closely connected with one another. Simultaneously in a number of cases incompatibility of given linguistic means has appeared more clearly. From this follows the conclusion that there is a need for complex consideration of the entire circle of questions connected with the linguistic problems of information systems or, more broadly, with the problems of means of man-machine communication.

The authors assume that languages with limited use of components of a natural language have far from exhausted their possibilities as a means of presentation of various information. To improve them it is recommended that use be made of rich experience in programming languages. In that case it is proposed in data processing and factographic systems to become orientated toward the creation of languages, the basis of which is the names of concepts (nominative groups), supplemented by the application of artificial signs. As for documentary systems, their languages represent a form of depiction of a set of names of concepts of a given science or technology transformed in accordance with thematic specifics.

By working in that direction it is possible to obtain languages, effective in the sense of the possibilities of contemporary electronic computers,

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simplicity and accessibility for perception by man, languages for bibliographic information-retrieval systems and languages for the presentation of technical and economic information in automated control systems. In the author's opinion, languages of that type can fairly completely take into consideration specific factors that affect the processes of communication in information systems and control systems.

Taking into account the interconnection of information languages with many aspects of information systems and the instability of the terminology in that area, the authors had to supplement the material with a descriptive determination of the concept of the information, give a qualitative characterization of information processes and systems, present basic information about the typical structure of automated systems and the functions performed by them and apply possible approaches to their classification.

The main content of the book is devoted to a description of semiotic and purely linguistic aspects of the planning and development of information languages for various purposes with consideration of distinctive features of the structure of information in the system in which it is the object of storage, retrieval and processing. Not all the positions formulated in the book are undisputed, and some questions have been examined in it only by way of formulation. It also is natural that not all questions regarding the construction of information languages have been treated to an equal degree. Some of them have only been mentioned, and other have been examined more thoroughly. In their approach to most questions the authors have striven to apply their understanding of problems, based on great experience in their practical work in the area of creation of information systems and on the analysis of available publications.

The material presented in the book will of interest to a broad circle of specialists studying problems of the linguistic and informational support of automated information systems and control systems. That extensive area includes both research work of a retrieval nature and practical work that requires the adoption and implementation of specific decisions on the creation of linguistic means of automated systems. It often is difficult to combine equally the interests of those two areas. In that connection the authors with reason recommend becoming oriented toward the real requirements of users, in the interest of whom systems are created, and finding solutions which in spite of all their labor-intensiveness can be implemented in stages, in an evolutionary manner, with practical verification of the results of each stage.

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PROBLEM-ORIENTED MEANS IN THE KOBOL LANGUAGE

Moscow PROBLEMNO-ORIYENTIROVANNYYE SREDSTVA V YAZYKE KOBOL in Russian 1979
signed to press 1 Oct 79 pp 2, 191-192

[Annotation and table of contents from book by Lyudmila Petrovna Babenko,
Statistika, 20,000 copies, 215 pages]

[Text] Annotation

The book is devoted to discussion of means of problem orientation in the Kobil language. Examined in detail are the possibilities of compiling means of a language of complex accounting forms, summary calculations and the processing of tables, texts and data bases. It proceeds from formulation of a problem through its successive decomposition into subproblems solvable directly by constructions of the Kobil language and is illustrated by examples.

The book is useful for programmers developing data processing programs and managers of programmer subsections which solve problems in the selection of a programming language. It can be used as a textbook by undergraduates and graduate students, engineers and economists interested in modern means of man-computer communication.

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ABSTRACTS FROM THE JOURNAL 'PROGRAMMING'

Moscow PROGRAMMIROVANIYE in Russian No 2, Mar-Apr 80 pp 94-96

UDC 681.3.06.:002.51/52

FUNDAMENTAL STUDIES AND TECHNOLOGY OF PROGRAMMING

[Abstract of article by V. M. Glushkov]

[Text] The author analyzes modern problems of programming techniques and their connection with earlier works on the automation of programming and with the fundamental studies which are traditionally performed in the Institute of Cybernetics of the Ukrainian SSR Academy of Sciences. Urgent problems of the development of domestic programming techniques are formulated. Bibliography -- 17 items.

UDC 681.3.51/6.42:002.51/52

TECHNOLOGICAL LINES OF PROGRAM PRODUCTION

[Abstract of article by I. V. Vel'bitskiy]

[Text] A conceptual description of a new domestic programming technology is given. The author describes all stages of manufacturing a program product according to the R-technology and the principles of forming technological lines for the production of programs. Figures -- 9.

UDC 681.3.06+65.018.21:002.51/52

TECHNOLOGICAL POSSIBILITIES OF PROGRAM OPTIMIZATION

[Abstract of article by V. N. Kas'yanov and I. V. Pottosin]

[Text] The authors examined the possibility of using a technique for the optimization of programs for technological purposes at all stages of the existence of the program -- from its automatic designing to the creation of a program documentation and modification during tracking. Bibliography -- 6 items.

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UDC 681.3.06

FUNDAMENTAL CONCEPTS OF MODULARITY AND ANALYSIS OF SOME DIRECTIONS IN THE DEVELOPMENT OF THE GENERAL PROGRAMMING TECHNOLOGY

[Abstract of article by S. T. Rodionov]

[Text] The author examines the fundamental concepts of modular programming, proposes formulas for determining modularity components, and analyzes some directions in the development of the programming technology from the viewpoint of the concepts of modularity. Figures -- 1, bibliography -- 11 items.

UDC 519.682.1

ON THE SUBSTANTIATION OF THE OPERATOR OF THE ANALYSIS OF DATA STRUCTURES

[Abstract of article by V. V. Bublik]

The author studies an analysis problem -- comparison of composite objects by a model. Analysis of composite objects is done accurate to a strict equivalence. The author proves a strict equivalence criterion based on the comparison of by-pass routes in composite objects. A dynamic semantics of the analysis operator is constructed. The Floyd method is used to prove its correspondence to the axiom of analysis. Bibliography -- 8 items.

UDC 681.142

TECHNOLOGICAL PRINCIPLES OF MODULAR PROGRAMMING

[Abstract of article by Ye. A. Zhogolev]

[Text] The author discusses the problem of lowering the labor-intensity of programming and possibilities offered by modular programming for solving this problem. Bibliography -- 13 items.

UDC 681.3.06

DATA STRUCTURE IN A GRAPHIC PACKAGE OF PROGRAMS FOR PROCESSING TWO-DIMENSIONAL OBJECTS

[Abstract of article by S. B. Dodonov and V. A. Visikirskiy]

[Text] This article examines the problems of the organization of data in a graphic package of programs for SAPR [systems of automated designing] of industrial facilities. Data organization does not depend on the goals of the user and on the structure of the electronic computer. It makes it possible to construct programs of a graphic package effectively and can be easily accomplished on various electronic computers. Figures -- 9, bibliography -- 9 items.

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UDC 681.3.06

MECHANICAL PROCEDURES OF PROGRAMMING

[Abstract of article by O. N. Perminov]

[Text] The author proposes an approach to formal designing of programs based on mechanical procedures of programming. This approach is studied for several classes of programs. Primary attention is given to practical applications. Bibliography -- 8 items.

UDC 681.3.06

A METHOD OF STRUCTURAL PLANNING OF TESTS FOR DEBUGGING EXECUTIVE PROGRAMS

[Abstract of article by B. A. Pozin]

[Text] The author proposes a method and basic algorithms for planning a so-called minimum rough set of tests for checking the structure of an executive program. The method is based on the algorithms of transformation of a structural (graphic) and informational models of a program proposed in this article. Figures -- 5, bibliography -- 7 items.

UDC 681.142.2

ON THE VERIFICATION OF PROGRAMS IN ONE LANGUAGE

[Abstract of article by I. B. Zadykhaylo and I. B. Zadykhaylo]

[Text] A scheme is proposed for verifying programs written in the language of a symbol processor. The author formulates algorithms of the reconstruction of descriptions of the structure of a set of input lines for a given program by the text of the program. Bibliography -- 11 items.

UDC 681.3.03

OPTIMIZATION METHODS IN THE TECHNOLOGY OF THE ORGANIZATION OF DIRECT ACCESS FILES

[Abstract of article by Yu. V. Trifonov]

[Text] The author examines direct access files using indirect addressing of recordings. He determines conditions which have to be satisfied by the algorithm of the transformation of the keys to the address for which the reflection by this algorithm would be effective from the viewpoint of the operational characteristics of the file. Recommendations are given for selecting the intermixing algorithm. Bibliography -- 7 items.

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UDC 681.142.2

ON THE UTILIZATION OF THE METHODS OF DETERMINING SYMBOLS FOR EXPANDING THE CLASS OF SLR(1)-GRAMMARS

[Abstract of article by R. E. Asratyan]

[Text] This article examines the class of M-limited SLR (1)-grammars which strictly include the class of SLR (1)-grammars, as well as the corresponding generalization of the SLR (1)-analyzer with whose aid it is possible not only to expand the class of the processed grammars, but also to reduce considerably the dimensions of the analyzer.

UDC 681.327.12:518.5

ON CONSTRUCTING OF PROGRAM SOFTWARE OF RECOGNITION SYSTEMS

[Abstract of article by V. I. Donskoy]

[Text] The author describes the system RADIUS-222 created for electronic computers M-222 and the experience of its utilization. He formulates the requirements for the system for pattern recognition. Figures -- 1, bibliography -- 8 items.

UDC 681.3.01

A PACKAGE OF APPLIED PROGRAMS FOR SOLVING PROBLEMS OF TOPOLOGICAL OPTIMIZATION OF COMMUNICATION LINES

[Abstract of article by G. N. Ivanov]

[Text] The author examines the structure and basic characteristics of a package of applied programs in the algorithmic language PL-1 intended for designing an optimal topology of communication networks in a dialogue mode of operation. Bibliography -- 2 items.
[321-10233]

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UDC 681.51:007.5

A SYSTEM THAT FORMULATES CONCEPTS AND REVEALS OBJECTS, PROPERTIES AND
RELATIONSHIPS IN COMPLEX CONTEXTS

Moscow IN-T PRIKL. MAT. AN SSSR. PREPR. [Institute of Applied Mathematics,
USSR Academy of Sciences: Preprint] in Russian No 148, 1979 29 pp

KHUKHLAYEV, YE. V.

[From REFERATIVNYY ZHURNAL, TEKHNICHESKAYA KIBERNETIKA No 1, 1980 Abstract
No 1.81.313]

[Text] The author discusses a system that perceives the external world and,
as the result of instruction using examples, formulates concepts of objects,
properties and relationships and uses these concepts to reveal objects,
properties and relationships in complex contexts. He describes the system's
general structure as well as the form of the formulated concepts. Figures.
[221-11746]

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UDC 681.3:002.513.5

LIBRARY OF EDA ARCHIVE PROGRAMS

Moscow BIBLIOTEKA PROGRAMM ARKHIVA EDA [as above] in Russian Institute of Applied Mathematics, USSR Academy of Sciences, Preprint No 163, 1979 32 pp

KOTOV, YU. B.

[From REFERATIVNYY ZHURNAL, AVTOMATIKA, TELEMEXHANIKA I VYCHISLITEL'NAYA TEKHNIKA No 3, 1980 Abstract No 3B172]

[Text] This work completes the description of the EDA archive and is aimed at the programmer who maintains the archive for a group of users. It contains information that makes it possible to use programs from the EDA archive's library for the group of users' own needs (and not only for the maintenance of the archive). The author describes the structure and obligatory elements of the subprograms that carry out the procedures involved in processing selected material. He also presents information about several new capabilities of the EDA archive. Figures 3; references 7.
[309-11746]

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UDC 681.51:519.87:681.322.06

DIALOG APPLIED PROGRAMS IN THE SETL LANGUAGE

No city listed VYCHISL. TSENTR SIB. OTD. AN SSSR. PREPR. [Computer Center of the Siberian Department, USSR Academy of Sciences: Preprint] in Russian No 170, 1979 27 pp

GLAGOLEVA, N. G., VAYNSHTEYN, T. A., VELICHKO, A. V., KIRPOTINA, N. A., PRUZHANSKIY, V. YE. and KHOROSHEVSKAYA, O. V.

[From REFERATIVNYY ZHURNAL, TEKHNICHESKAYA KIBERNETIKA No 1, 1980 Abstract No 1.81.551]

[Text] The authors describe a series of dialog programs for various purposes that have been realized in the high-level language SETL. They demonstrate the possibility of constructing programs for the most diversified areas of application--from biochemical investigations to automation of the teaching process--that are practically valuable and have quite complex logic structures. Figures.
[221-11746]

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MULTIPROCESSOR SYSTEMS WITH A DISTRIBUTED MEMORY, GENERAL-PURPOSE COMMUTATION AND A PROGRAMMABLE MICROPROCESSOR STRUCTURE

No city listed ELEKTRON. MODELIR. [Electronic Modeling] in Russian No 1, 1979 pp 31-42

KALYAYEV, A. V.

[From REFERATIVNYY ZHURNAL, TEKHNIЧЕСКАЯ KIBERNETIKA No 1, 1980 Abstract No 1.81.668]

[Text] The author discusses the principles of procedural and structural modeling. He demonstrates the advantages of synthesizing multiprocessor systems on the basis of the principle of structural modeling and analyzes sets of large-scale operations for microprocessors with programmable structures. He also compares multiprocessor systems of the main line, matrix and hierarchical types with multiprocessor systems having general-purpose commutation. Figures 25.
[221-11746]

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PROGRAMMING IN THE LANGUAGE INKOM

Moscow PROGRAMMIROVANIYE NA YAZYKE INKOM [as above] in Russian Central Scientific Research and Experimental Planning Institute of Automated Systems in Construction 1979 47 pp

ORESHKIN, N. P.

[From REFERATIVNYY ZHURNAL, TEKHNIЧЕСКАЯ KIBERNETIKA No 1, 1980 Abstract No 1.81.679 K by S. G. Romanova]

[Text] The author elucidates on questions of programming in the language INKOM. INKOM is intended for the automation of the processes involved in developing translators for a rather broad circle of languages. Using high-level equipment, in INKOM it is possible to describe the process of the interpretation of phrases in an initial language or the process of the compilation of an object program of any intermediate language from a program in the initial language. The author points out that interpreters and compilers for problem-oriented languages with developed syntax and semantics are programmed in INKOM. The syntax and semantics of a problem-oriented language are described with the help of procedural facilities. Semantics is regarded as a sequence of implemented applied programs (modules) of some package developed for the subject area of the problem-oriented language, and also as a series of auxiliary actions for recognizing the initial program's syntax and semantics. The author points out that INKOM is intended for the description of the processes involved in the translation of specialized languages as they apply to the system of programming facilities and the operating system of the Unified System of Electronic Computers. His basic attention is focused on methods of using INKOM facilities for the solution of specific translation problems. Figures.
[221-11746]

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ON THE QUESTION OF THE MACHINE SYNTHESIS OF TESTS OF DIGITAL LARGE-SCALE INTEGRATED CIRCUITS; MACHINE METHODS OF SYNTHESIZING CIRCUITS

Moscow MIKROELEKTRON. I POLUPROVODN. PRIBORY [Microelectronics and Semiconducting Instruments] in Russian No 4, 1979 pp 167-178

BATALOV, B. V., BEREZENKO, A. I. and TISHCHENKO, O. I.

[From REFERATIVNYY ZHURNAL, TEKHNICHESKAYA KIBERNETIKA No 1, 1980 Abstract No 1.81.714]

[Text] The authors describe the characteristics of the methods used as the basis of a model programming complex for synthesizing check tests for logic circuits of the combined and sequential types. They evaluate the effectiveness of the utilization of the programming complex for BIS's [large-scale integrated circuit] of the combined type, operational memories and micro-processor BIS's. They also present methods for modernizing such a program that make it possible to increase the effectiveness of its use for BIS's, including regulator arrays of memory cells. Figures 4; references 8. [221-11746]

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UDC 681.51:519.713.2

ON ONE APPROACH TO MINIMIZATION ALGORITHMS FOR INCOMPLETELY DETERMINED BOOLEAN FUNCTIONS AND ITS APPLICATION TO THE CODING OF PROGRAMMABLE LOGIC MATRICES

Moscow MIKROELEKTRON. I POLUPROVODN. PRIBORY [Microelectronics and Semiconducting Instruments] in Russian No 4, 1979 pp 33-38

BOBOSHKO, YU. G.

[From REFERATIVNYY ZHURNAL, TEKHNICHESKAYA KIBERNETIKA No 1, 1980 Abstract No 1.81.121]

[Text] The author explains an approach to approximation algorithms for obtaining the shortest disjunctive normal form.
[221-11746]

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DEVELOPMENT OF FRAGMENTS OF THE DESIGN OF ANALOG-TO-DIGITAL DEVICES ON THE BASIS ON A STRUCTURAL-DESIGN APPROACH

Moscow PRIBORY I SISTEMY UPR. [Control Instruments and Systems] in Russian 1979 8 pp manuscript received at Central Scientific Research Institute of Information and Technical and Economic Research on Instrument Making, Means of Automation and Control Systems on 19 Sep 79, No 1183

USMANOV, V. V. and editorial board of the magazine listed above

[From REFERATIVNYY ZHURNAL, TEKHNICHESKAYA KIBERNETIKA No 1, 1980 Abstract No 1.81.377 DYeP]

[Text] The author discusses questions relating to the development of fragments of the design of analog-to-digital devices (ATsU), with classified parasitic parameter values, as well as algorithms for the arrangement and commutation of the outlets of elements on the substrate of a microassembly with a known configuration of the conductors. These questions are discussed with due consideration for modeling of an ATsU's structure. The parasitic parameters of the interconnections and the design as a whole are the cause of noise that affects the numerical value of a device's electrical characteristics and that it is advisable to regard as one of the sources of ATsU instrument error. Figures; references 3.
[221-11746]

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MATHEMATICAL MODEL OF THE STRUCTURAL-DESIGN PLANNING OF ANALOG-TO-DIGITAL DEVICES

Moscow PRIBORY I SISTEMY UPR. [Control Instruments and Systems] in Russian 1979 6 pp manuscript received at Central Scientific Research Institute of Information and Technical and Economic Research on Instrument Making, Means of Automation and Control Systems on 19 Sep 79, No 1184

USMANOV, V. V. and editorial board of the magazine listed above

[From REFERATIVNYY ZHURNAL, TEKHNICHESKAYA KIBERNETIKA No 1, 1980 Abstract No 1.81.376 DYeP]

[Text] The author discusses fundamental questions concerning a cooperative approach to the solution of the structural and design stages of the planning process, as well as the basic propositions and the problem of the structural-design planning of analog-to-digital devices. He develops and describes a mathematical model of the structural-design planning of analog-to-digital devices that is based on the use of the apparatus of the general theory of systems. References 4.
[221-11746]

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HYBRID DIFFERENTIAL METHODS FOR FINDING EXTREMES

Kiev GIBRIDN. VYCHISL. MASHINY I KOMPLEKSY [Hybrid Computers and Complexes]
in Russian No 1, 1979 pp 5-12

GREZDOV, G. I. and GISHCHAK, K. I.

[From REFERATIVNYY ZHURNAL, TEKHNIЧЕСКАЯ KIBERNETIKA No 1, 1980 Abstract
No 1.81.609]

[Text] The authors discuss questions of the realization and utilization of hybrid differential search methods that are notable for a continuous change in the variables and discrete assignment of the search directions and that are used to find solutions for a broad circle of problems on the basis of reducing some auxiliary function to minimization. Figures 6; references 6. [221-11746]

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PARALLEL METHODS FOR SOLVING BOUNDARY-VALUE PROBLEMS IN FIELD THEORY

Kiev GIBRIDN. VYCHISL. MASHINY I KOMPLEKSY [Hybrid Computers and Complexes]
in Russian No 1, 1979 pp 17-21

SPALVIN', A. P.

[From REFERATIVNYY ZHURNAL, TEKHNIЧЕСКАЯ KIBERNETIKA No 1, 1980 Abstract
No 1.81.619]

[Text] The author discusses questions relating to the use of parallel methods for solving the systems of algebraic equations that arise as the result of the finite-different approximation of equations in second-order partial derivatives. He compares the direct and iterative methods and discusses questions of the use of digital and analog computer equipment. Figures 1; references 4.
[221-11746]

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MICROPROCESSOR MODELING OF MULTIPHASE FILTRATION PROBLEMS

Kiev GIBRIDN. VYCHISL. MASHINY I KOMPLEKSY [Hybrid Computers and Complexes]
in Russian No 1, 1979 pp 21-27

MAKSIMOV, M. M., TANKELEVICH, R. L. and TETEL'BAUM, YA. I.

[From REFERATIVNYY ZHURNAL, TEKHNICHESKAYA KIBERNETIKA No 1, 1980 Abstract
No 1.81.534]

No abstract supplied by source.
[221-11746]

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THEORETICAL-NUMERICAL PROPERTIES OF BIQUADRIplex NUMBERS

Kiev GIBRIDN. VYCHISL. MASHINY I KOMPLEKSY [Hybrid Computers and Complexes]
in Russian No 1, 1979 pp 48-52

SIN'KOV, M. V. and VASHCHENKO, V. F.

[From REFERATIVNYY ZHURNAL, TEKHNIChESKAYA KIBERNETIKA No 1, 1980 Abstract
No 1.81.581]

[Text] The authors discuss the basic properties of biquadriplex numbers
and the performance of arithmetic operations on them. They determine the
form of divisors of zero and prove theorems concerning the norms of biqua-
driplex numbers. References 3.
[221-11746]

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UDC 681.51:681.33

COMPARISON OF THE RATE OF CONVERGENCE OF THE SOLUTION OF SYSTEMS OF ALGEBRAIC EQUATIONS ON SEQUENTIAL PARALLEL COMPUTERS

Kiev GIBRIDN. VYCHISL. MASHINY I KOMPLEKSY [Hybrid Computers and Complexes] in Russian No 1, 1979 pp 52-56

KULIK, M. N.

[From REFERATIVNYY ZHURNAL, TEKHNIЧЕСКАЯ KIBERNETIKA No 1, 1980 Abstract No 1.81.681]

[Text] The author shows that the rate of convergence of the solution of systems of nonlinear algebraic equations by the Newton method, on parallel computers with a significant level of instrument error and fulfillment of the introduced realizability conditions, is comparable with the rate of convergence of the solution on computers with a long word format. References 4.

[221-11746]

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UDC 681.327.8.01

ON ONE METHOD FOR MODELING COMPLEX LOGICAL NETS

Kiev GIBRIDN. VYCHISL. MASHINY I KOMPLEKSY [Hybrid Computers and Complexes]
in Russian No 1, 1979 pp 78-85

GOLOVANOVA, O. N.

[From REFERATIVNYY ZHURNAL, TEKHNICHESKAYA KIBERNETIKA No 1, 1980 Abstract
No 1.81.278]

[Text] The author discusses methods for modeling logic functions of units
in models of networks constructed on the principle of temporal analogy.
Figures 5; references 7.
[221-11746]

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LIST OF SOVIET ARTICLES ON ALGORITHMS AND PROGRAMS

Moscow ALGORITMY I PROGRAMMY in Russian No 4, 1980 pp 2-93

[Following is a listing of entries from ALGORITMY I PROGRAMMY (Algorithms and Programs), a bibliographic publication of the USSR State Scientific and Technical Library. This listing is from No 4, 1980; 4250 copies]

[Excerpts]

1156. Analysis and synthesis of high-speed semiconductor devices with negative resistance (negatrons) by computer. Preprinty dokladov seminarov (Preprints of Seminar Reports), No 6-10, USSR Academy of Sciences, Scientific Council for the Complex Problem "Cybernetics." Moscow, 1970, various pages. Bibliography at end of articles.

1159. Bezhanova, M. M. Built-in problem-oriented systems. Novosibirsk, 1979, 30 pages. (Preprint/Siberian Department, USSR Academy of Sciences, Computer Center; No 205). Bibliography: 25 items. Problems of the ideology of built-in problem-oriented languages and systems, their basic principles and distinctive features of systems existing and being developed.

1167. Zadykhaylo, I. B., and Solov'yev, V. V. Problems in the creation of a specialized processor for relative data bases. Moscow, 1979, 31 pages. (Preprint/USSR Academy of Sciences, Institute of Applied Mathematics; No 187). Bibliography: 23 items. Advantages and shortcomings of the relative approach to the construction of data bases. Descriptions are given of the structure and system of instructions of the RAP processor, intended for the support of relative data bases.

1168. Zadykhaylo, I. B., Mel'nikov, B. F., and Sadykhov, Ya. A. Design of an associative parallel digital magnetic disk processor oriented to the support of relative data bases. Moscow, 1979, 24 pages. (Preprint/USSR Academy of Sciences, Institute of Applied Mathematics; No 180). Bibliography: 11 items. Descriptions are given of the architecture of the processor, the structures of data and the instruction sets. Possible methods of eliminating parallel operations are investigated. Some plans for the organization of a number of digital magnetic disk processors are presented.

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1174. Lebedinskiy, M. M. On the possibility of maximum elimination of parallel tasks on associative processors. Zapiski nauchnykh seminarov (Scientific Seminar Notes), USSR Academy of Sciences, Mathematics Institute, Leningrad Department, 1979, Vol 90. Chislitel'nyye metody i voprosy organizatsii vychisleniy, No 3, pp 83-149. Bibliography: 12 items. A certain computational model of parallel calculations is proposed--a three dimensional associative parallel processor. A program for the associative parallel processor is described that consists of a series of instructions and does not contain cycles.

1185. Shpak, V. F., and Pertsev, A. V. Parallelization of the process of syntactic analysis for multiprocessor computing systems based on adjusted logical structures. Gibrid. vychisl. mashiny i komplekсы: Republican Interdepartmental Collection; UkrSSR Academy of Sciences, Institute of Electrodynamics, 1979, No 2, pp 35-39. Bibliography: 3 items. A strategy of parallel analysis that reduces expenditures of time on analysis of the grammars of precedence.

1234. Lyul'ka, N. L., Reznik, L. N., Sedov, N. S., and Skrypnikova, L. B. Automated system for the design of the time-pulse type by computer. In the book: Teoriya i metody postroyeniya impul'snykh vychislitel'nykh ustroystv (Theory and Methods of Pulsed Computer Construction). Tr. rasshir. zasedaniya Nats. kom. SSSR, Mezhdunar. assots. po analogovym vychisleniyam/Ryazanskiy Radiotekh. in-t, Ryazan', 1979, pp 66-71. Bibliography: 2 items. The paper describes an ALGOL program of a system for the design of analog computers. A block diagram is presented, the calculation of 12 variants of which takes 2 minutes.

1235. Agroskin, V. I., Zarkh, A. Z., and Tikhomirova, L. N. Algorithm for determining the characteristics of the lower wall of the "earth-ionosphere" waveguide along the propagation path of signals of the SDB [not identified] range. Voprosy radioelektroniki, Ser. Obshchetekh., 1970, No 6, pp 35-42. Bibliography: 2 items. An ALGOL procedure is presented for finding the electric conductivity of the earth's surface along the path. The memory volume is 560 cells and the time required for calculation of a path with a length of 10,000 km is 10 seconds.

1243. Kutikov, V. Yu., and Tsekhanovich, G. S. Generalized algorithm for estimating the precision of navigational determinations from data of range-finder, doppler and range-finder-doppler measurements. Voprosy radioelektroniki, Ser. Obshchetekh., 1979, No 6, pp 10-17. Bibliography: 7 items. An ALGOL program has been compiled for estimating the influence of independent and systematic errors of measurement of radionavigation parameters, determining the position of artificial earth satellites and synchronization of the generators of satellites and maneuvering characteristics of an object for the precision of coordinates, velocity, course angle and corrections for frequency and phase toward the generator of the object. The length of the translation program is about 3500 cells. The solution time depends on the length of the session, the navigation determinations and the volume of the information to be processed.

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1276. Golub, M. A., Karpeyev, S. V., and Nezhevenko, Ye. S. Investigation of space filters synthesized by computer. Voprosy kibernetiki/USSR Academy of Sciences, Scientific Council for the Complex Problem "Cybernetics," 1979, No 62. Automation of Experimental Investigations, pp 56-63. Bibliography: 6 items. A generalized spectral analysis is made of a coherent optical processor that uses synthesized holographic space filters that realize the basic functions of a Karunen-Loev expansion. A PPP [unidentified] is described in the PL/1 and FORTRAN languages, the interaction of the programs in which is accomplished by means of an input language.

1283. Kuklin, G. N., and Sukhanov, S. V. Simulating model for the synthesis of digital recursive filters. Voprosy kibernetiki/USSR Academy of Sciences, Scientific Council for the Complex Problem "Cybernetics," 1979, No 62, Automation of Experimental Investigations, pp 36-44. Bibliography: 5 items. A description is given of a PPP [not identified] in the PL/1 language for the planning of digital filters and its application for the synthesis and investigation of a set of infra-low-frequency filters.

1284. Kandrashina, Ye. Yu., Ochakovskaya, O. N., and Golubeva, L. A. The VOSTOK-O experimental question-and-answer system. Program realization. Novosibirsk, 1979, 26 pages. (Preprint/Siberian Department, USSR Academy of Sciences, Computer Center; No 200. VOSTOK Plan). Bibliography: 2 items. The VOSTOK-O system includes four processors: a text analyzer, a semantic analyzer, a retrieval processor and a reply synthesis processor. The total volume of the program part is about 1300 SETL lines.

1285. Narin'yani, A. S. ZAPSIB linguistic processors. Parts 1-2. Novosibirsk, 1979. (Preprint/Siberian Department/USSR Academy of Sciences, Computer Center). Part 1. Tasks of the plan, 22 pages (No 199, ZAPSIB Plan, No 1). Bibliography: 6 items. Part 2. General scheme and principal modules, 48 pages (No 202, ZAPSIB Plan, No 2). Bibliography: 9 items.

1286. Numerov, V. S. On expansion of the SETL language with program-determined types of data. Novosibirsk, 1979, 18 pages. (Preprint/Siberian Department, USSR Academy of Sciences, Computer Center; No 207. SETL Plan, No 5). Bibliography: 6 items. A special linguistic construction (type description) is introduced which defines the new types of data on the available set of types.

1299. Vinit'skiy, S. I., Melezhik, V. S., Puzynin, I. V., et al. Program for numerical solution of the partial Sturm-Liouville problem for a system of second-order linear differential equations. Dubna, 1979, 23 pages. (Soobshch. OIYaI; No R5-12787). Bibliography: 10 items. Described is the FORTRAN program SISTEM for solution of the Sturm-Liouville problem for a system of differential equations, that is, the problem of calculating the eigenvalues and eigenfunctions of a system of up to 40 second-order linear differential equations. The text of the program is in the OIYaI program library.

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1361. Boyarov, O. D., Kleshchev, A. S., and Lifshits, A. Ya. Syntax and semantics of the REAL language. Preprint, Vladivostok, 1979, 40 pages. USSR Academy of Sciences, Far Eastern Scientific Center, Institute of Automation and Control Processes. Bibliography: 5 items. Abstract and specific syntax and the informal semantics connected with it of the REAL language for applied artificial intellect systems.
1375. Shkovin, N. Y. Symbolic language for the description of printed circuits "Proza." Dubna, 1979, 11 pages. (OIIYaI Report No 10-12547. Bibliography: 3 items. The symbolic language PROZA is constructed from symbols of the ASC-11 code, and its basis is the representation of a printed circuit in the form of a coordinate X-Y plane. The component parts of the language are described: the rating sheet, technical characteristics and the description of the printed circuit.
1376. Yuldashev, T., and Farkhadov, T. The PREFOR formula language. Voprosy vychislitel'noy i prikladnoy matematiki. Uzbek SSR Academy of Sciences, Institute of Cybernetics with Computer Center, 1979, No 57, pp 36-51. Bibliography: 13 items. The PREFOR (formula conversion) language was developed on the basis of the ALGOL language for the computer realization of algorithms of analytical conversions of symbolic information. A syntactic description of formulas is given.
1391. Gorel'kov, A. L., Rossina, V. A., and Mikhaylov, Yu. M. The INTRA-A system for the construction of dialog translators for the model M-400 computer. In the book: Trudy MFTI, Seriya Astrofizika i prikladnaya matematika. Dolgoprudnyy, 1979, pp 241-243. Bibliography: 1 item. INTRA-A synthesis permits constructing multilanguage dialog translators that provide for the processing of several independent languages in the course of a single session of communications with a user. The structure of the system has been tested on two analogous systems for the M-222 and BESM-6 computers.
1393. Mikhaylov, S. V., and Soyfer, V. A. Analysis of an algorithm for field restoration on the basis of data of multichannel registration. Voprosy kibernetiki/USSR Academy of Sciences, Scientific Council for the Complex Problem "Cybernetics," 1979, No 62, Automation of Experimental Investigations, pp 45-55. Bibliography: 4 items. Investigation of the characteristics of precision of restoration of the field and transmission bands (response time) of the system of experiment automation with use of the M-6000 - M-4030 computer complex.
1400. Petrenko, A. I., Tsurin, O. F., Baranskiy, V., and Soya, Z. Questions in planning the topology of hybrid integrated circuits. Avtomatizatsiya proyektirovaniya v elektronike (Automation of Planning in Electronics), Republic Interdepartmental Scientific and Technical Collection, 1979, No 20, pp 60-64. Bibliography: 7 items. The paper deals with the input and processing of starting data, the formation of the topology and the disposition of components, the tracing of connections, monitoring of each state and derivation of results. The dialog system was realized on an M-6000 computer using the EM-703 graph plotter.

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1405. Gorbunov-Posadov, M. M., Koryagin, D. A., and Krasotchenko, V. V. Realization of systems filling of the SAFRA applied program packet (Version 2.0). Moscow, 1979, 19 pages. (Preprint/USSR Academy of Sciences, Institute of Problems of Mechanics, No 186). Bibliography: 9 items. The paper describes version 2.0 of the SAFRA applied program packet for the solution of problems of mathematical physics.

1422. Markachev, Yu. Ye. Iteration algorithms for calculating the stationary flow of viscous gas in a Lavalle funnel in the vicinity of a narrow channel. Trudy TsAGI, 1979, No 2024, pp 3-16. Bibliography: 17 items.

1500. Laskovoy, V. N., and Maksimov, G. M. Software of the network of controlling PDP-8 mini computers in a multi-machine complex with the DEC-10. Serpukov, 1979, 12 pages. IFBE Preprint No Oea 79-140). Bibliography: 6 items. The paper describes the solution of the connection of PDP-8 mini computers over asynchronous communication lines with a DEC-10 computer, the compatibility of coding and the problem of program loading. The total volume of the software is more than 10,000 language operators of the type of the Assembler at labor expenditures of 2 man-years.

1501. Morozov, B. A., Nomokonov, P. V., and Smionov, V. A. Programs for the reception and processing of data in experiments on small-angle scattering. Dubna, 1979, 10 pages (OIYaI Report No R13-21703). Bibliography: 5 items. In the reception of data in a computer information arrives on the energy of recoil nuclei from eight E-E telescopes constructed of silicon semiconductor detectors. The work of the reception program is controlled according to the operator's orders and the interruption signals from real-time clocks and electronic apparatus. All the programs were created for the PDP-11 computer.

1519. Kureychik, V. M., Kalashnikova, V. A., and Izakson, D. Kh. Construction of a model of a plate during two-layer tracing. Elektronnaya tekhnika. Ser. 10. Mikroelektronnyye ustroystva (Microelectronic Devices), 1979, No 2(8), pp 67-74. Bibliography: 5 items. The paper describes two models of a printing plate oriented toward minimization of the number of intracircuit intersections and interlayer transitions. Models do not depend on the type of outputs of the structures of integrated circuits. A FORTRAN program is described that has about 1500 instructions.

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COMPUTER METHODS AND PROGRAMMING

Moscow VYCHISLITEL'NYYE METODY I PROGRAMMIROVANIYE in Russian
No 29, 1979 pp 2, 191, 196, 197-198

[Annotation, article excerpt and bibliography, and table of contents of the collection of works "Vychislitel'nyye Metody i Programirovaniye" edited by V.V. Voyevodin and V.A. Morozov, Scientific Research Computer Center, Moscow State University, Izdatel'stvo Moskovskogo Universiteta, signed to press 29 May 1979, 2,200 copies, 198 pages]

[Text] ANNOTATION

The articles in this book describe the development of the "Program Generator" automatic programming system, which was developed at Moscow State University's Scientific Research Computer Center and realized on a BESM-6 high-speed computer. (A previous collection of works devoted to this system -- No 22 -- was published in 1974.) The collection consists of two sections. In the first, the articles describe the development of the "Generator" software, which was related to the development of a new input language for the system -- an inquiry language for interrogations -- as well as the realization of a new assignment control language and the improvement of the program generation process. The second section contains a description of inquiry languages for interrogations by individual numerical analysis classes that enable a user unfamiliar with programming languages to obtain the programs he needs for the solution of standard numerical analysis problems in the standard language FORTRAN.

This collection of works is intended for a broad circle of specialists in programming and numerical methods, and will also be useful for students and graduate students in these specialties.

A SYSTEM FOR PROCESSING FILES ON A BESM-6 HIGH-SPEED COMPUTER
[Excerpt and bibliography]

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The storage and updating of files¹ on carriers and the generation from them of the required versions of programs with data is an important component part of successfully completed work on the creation and operation of automated systems. Therefore, editing programs (such as RENUMB*, EDIT) have been widely introduced along with other software into the practice of programming on a BESM-6 high-speed computer [1]. These editors, however, solve only the first problem -- that of file storage and updating -- without essentially touching on the solution of the second and more important problem, which is that of generating the required versions of programs with data from the set available on the carriers.

Recently we saw the appearance of the PATCHY system, which consists of the PATCHY collecting program and the UPPA editing program, which were created in the CERN system [2,3] for a series of international-class computers and have been adapted for the BESM-6 high-speed computer [4,5]. Since it is a convenient tool for the creation and operation of small and medium-sized programs, this system is particularly convenient for the planning of large automated systems.

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1. Volkov, A.I., text editor, IAE PREPRINT 2351 (Institute of Automation and Electrometry Preprint 2351), Moscow, 1974, p 24.
2. Pagiola, E., PROGRAM PATCHY. CERN COMPUTER 6000 SERIES PROGRAM, LIBRARY II, Geneva, 1968.
3. PROGRAM UPPA. CERN COMPUTER 6000 SERIES PROGRAM, LIBRARY II, Geneva, CERN, 1968.
4. Govorun, N.N., et al., TRUDY MEZHDUNARODNOGO SOVESHCHANIYA PO PROGRAMMIROVANIYU I MATEMATICHESKIM METODAM RESHENIYA FIZICHESKIKH ZADACH (Works of the International Conference on Programming and Mathematical Methods for Solving Physical Problems), Dubna, OIYaI [Joint Institute of Nuclear Research], Preprint D10-7707, 1974, pp 555-564.
5. Dorzh, L., TRUDY III MEZHDUNARODNOY SHKOLY PO VOPROSAM ISPOL'ZOVANIYA EVM V YADERNYKH ISSLEDOVANIYAKH (Works of the 3d International School on Questions of the Utilization of Computers in Nuclear Research), Dubna, OIYaI, Preprint 10, 11-8450, 1974, pp 357-388.

¹Here a file is considered to be a sequence of 18-symbol cards.

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6. Zel'dionova, S.A., Zuyev, V.I., et al., POL'ZOVATELYU PO RABOTE S OPERATSIONNOY SISTEMOY DISPAK DLYA BESM-6 (For the User Working With the DISPAK Operating System for the BESM-6 High-Speed Computer), Moscow, IPM AN SSSR [Institute of the Problems of Mechanics, USSR Academy of Sciences], Preprint, 1972.
7. Bokova, I.D., Zel'dionova, S.A., et al., OPERATSIONNAYA SISTEMA DISPAK DLYA BESM-6 (POL'ZOVATELYU) (The DISPAK Operating System for the BESM-6 High-Speed Computer (for the User)), Moscow, IPM AN SSSR, Preprint, 1973.

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UDC 517.9

COMPUTER SOLUTION OF SHELL THEORY PROBLEMS

Kiev RESHENIYE ZADACH TEORII OBOLOCHEK NA EVM in Russian 1979 signed to press 12 Nov 79 p 2

[Annotation from the book "Resheniye zadach teorii obolochek na EVM" by Ya. M. Grigorenko and A. P. Mukoyed, Golovnoye Izdatel'stvo Izdatel'skogo ob'yedineniye Vishcha shkola, 2,000 copies, 280 pages]

[Text] The methods of computer solution of boundary-value problems which describe the stress-strain state of thin-wall shells are outlined in the manual. The main concepts and relations of shell theory are presented and approaches to solution of problems described by or reduced to ordinary differential equations are given. The computation aspects of applying the finite difference method, variation-difference method, the direct element method and the finite element method to solution of various classes of shell theory problems are considered. The problems of realizing these methods on the computer are discussed and examples of solving the considered classes of problems are presented.

The manual is intended for students and postgraduate students of universities and higher technical educational institutions and can be used by specialists involved in calculations of shell structures. 88 figures, 78 tables, 60 references.

[320-6521]

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METHODS OF SPLINE FUNCTIONS (COMPUTING SYSTEMS)

Novosibirsk VYCHISLITEL'NYYE SISTEMY in Russian No 75, 1978 signed to press
9 Oct 78 pp 1-2

[Excerpts from the collection "Vychislitel'nyye sistemy," Institute of
Mathematics of the Siberian Department of the USSR Academy of Sciences, 800
copies, 142 pages]

[Text] The collection is devoted to the theory and application of spline
functions. Splines are used to solve problems of interpolation, smoothing
and approximation of functions and to solve differential and integral equa-
tions.

The second part of the collection is comprised of articles devoted to a
stable methods of a trial run for solving linear difference and differential
boundary-value problems. Application of these methods is determined only
by the correctness of postulating the boundary-value problems.

The materials of the collection are of interest to a wide range of special-
ists engaged in problems of the theory and application of splines and in
computer mathematics methods.

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OPTIMIZATION OF COMPUTATIONS

Kiev OPTIMIZATSIYA VYCHISLENIY in Russian 1979 pp 101-102

[Table of contents from collection of articles published by the Institute of Cybernetics, 650 copies, 109 pages]

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PROBLEMS OF CONVEX ANALYSIS AND THEORY OF EXTREMAL PROBLEMS

Novosibirsk OPTIMIZATSIYA in Russian No 21, 1978 p 3, 153-159

[Table of contents and article from journal edited by V. A. Vasil'yev]

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SOFTWARE SYSTEM OF A LONG-RUN PLAN CALCULATION

S. M. Antsyz and V. F. Fefelov

A software system (SMO) is described in this article for the subsystem "Future planning" of the sector automated system "ASU-Pribor-P", adopted in 1975 for industrial use by the GKNT State Committee of the USSR Council of Ministers. The subsystem "Future planning" is intended for calculation of five-year plans in the instrument construction sector. It is based on DOS/Yes software and may operate under independent conditions regardless of the operation of other "ASU-Pribor/P" subsystems. The State Committee recommends the subsystems "Future planning" for use in other sectors of machine construction.

A certain amount of practical experience is now available in the use of the subsystem for calculating Minpribor plans for the 9th and 10th Five-Year Plans.

A substantive description of the subsystem, the economic formulations and composition of problems tackled are cited in [1-4]. We will therefore confine ourselves here to a brief exposition of the economic and mathematical aspect of the problem, mainly focusing on the structure and operation of the software.

1. Goals of the "Future planning" system and compositions of jobs to be tackled.

This SMO for future planning of development of the machine-construction sector is intended for automation of future plan calculations in a cross section of the sector as a whole, all-union industrial associations (subsectors) forming the sector, and industrial enterprises of the sector. Furthermore, composite documents on territorial and economic complexes will be produced which will describe the total production of sector enterprises related to a given region.

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The central task of the system is to construct equally effective subsector plans which are obtained as a result of the solution of a sequence of optimization problems. The data base for these problems is prepared by the system under automated conditions. It represents the set of variants of enterprise development generated on the basis of a set of simulation models elaborated at Gipropribor (Leningrad). It is assumed that each variant of development may be effected in practice. However, when the sector plan is drawn up on the basis of these variants, several general constraints must be taken into consideration, especially: a) amounts of capital investments of various kinds which are assigned for the sector as a whole; b) volumes of capital investments in the planning period; c) volumes of incomplete construction in the last year of the planning period; d) assignments for production of especially important groups of products; e) constraints on the loading of existing industrial capacities.

The model of construction of the future plan of the sector consists of a set of various kinds of optimization problems. According to user needs and other conditions, a certain specific problem solving sequence is formulated.

Let us list the basic problems comprising these sequences.

A. The problem of finding the maximally possible level of satisfaction by the sector of national economic needs based on constraints (e) alone.

B. The problem of defining the minimum volume of necessary capital investments for the subsector based on all constraints except (a).

Problems A and B are formed for each subsector.

C. The problem of finding the maximally possible level of satisfaction by the sector of national economic needs; requirements of equal effectiveness of future plans of the subsectors and all above constraints are taken into consideration.

D. The problem of defining the minimum volume of capital investments necessary to the sector as a whole, with an assigned level of satisfaction for each subsector of national economic needs based on all constraints except (a).

E. The problem of finding the maximally possible level of satisfaction by the subsector of national economic needs with constraints (a), (b), (c) and (d); only one of the development variants must be used in the future plan for each enterprise.

F. The problem of defining the minimum volume of necessary capital investments for the subsector under constraints (b), (c), (d) and assigned level of satisfaction by the subsector of national economic needs; only one of its development variants is used for each enterprise.

C1, D1, E1, F1. Problems obtained from problems C-E by introducing additional constraints on the percentage reduction in current expenditures.

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C2, D2, E, F2. Problems obtained from problems C-E by introducing additional constraints on the manufacture of goods.

As a result of solving problems A and B it is determined whether or not there exists a plan constructed in the assigned set of variants which satisfies all constraints. If there is none, the system considers national economic needs equal to the volume of product output defined by solution of problems A, while the limits of capital investment are equal to the sum of capital investments from solutions of problems B; thereby the assignment for calculation conforms to industrial resources.

Problems A and B are linear programming problems, while problems E and F (E1 and F1, E2 and F2) are problems of discrete programming with linear constraints. To solve problems C and D (C1 and D1, C2 and D2) the system utilizes an algorithm for redistribution of resources presented in 1, in each of whose iterations the set of problems of linear programming is solved.

In order that the system be able to solve the problems formulated above, the following must be implemented:

1.1) input of information on the composition of the sector and product variety; basic information on the status of enterprises and associations of the sector; information on approved projects of enterprise development in the planned period; standards and reference information; monitoring of all information for completeness and reliability; conversion of information into a form convenient for calculations; organization of compact storage of data and efficient retrieval;

1.2) calculation based on basic information of the set of development variants of enterprises in the planning period, organization of storage and retrieval.

1.3) calculation of the matrices of coefficients of optimization problems based on enterprise development variants.

Then follows:

1.4) calculation of equally effective future plans by associations with delivery to sector management of the basic plan indicators.

It is also possible that sector management will not accept the plan and will decide to alter the control parameters. This involves calculation of a new plan. This dialog between management and the system continues until the management obtains a satisfactory plan for the sector. Then follows:

1.5) direct plan calculation of indicators forming the output documents of the system based on plans obtained and delivery of documents to press.

2. SMO Structure

The SMO structure corresponds to the described process. The system specifies five relatively independent complexes of programs (INFORM, VARIANT, MATRITSA, OPTIMUM, DOKUMENT) which execute stages 1.1-1.5. Complexes of

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the program are related into a single program (system) by the main dispatcher. Work of the complexes is organized by their dispatchers. Each complex introduces information from UWK about parameters which control calculation and are considered in this complex. This makes the complex function independently and produces additional possibilities for calculations.

All information of the system is organized into files which are stored in peripheral memory. The storage unit is the entry, a block which combines indicators uniform with respect to the algorithms which use them. According to this principle, one and the same indicator may be stored in various entries. The entry is stored in compact form. To accelerate retrieval, entries are combined into larger aggregates—forms whose totality forms the file. Catalogs of forms and entries are formulated. The totality of organized files forms the system data base serviced by a special group of modules. Establishment of a system data base with these principles of organization is felt by the developers to be necessary if the system functions as a OASU subsystem with a common-system data base containing all basic information entering into the system.

The data base of the system described consists of four files. The complex INFORM prepares the VARIANT, OPTIMUM, DOKUMENT used in the complexes:

- 2.1) name lexicons of enterprises, associations, territorial and economic complexes, product groups, and
- 2.2) standards and reference data, and
- 2.3) basic information on enterprises using the VARIANT complex.

All INFORM-prepared entries are stored in the INFORMATSIYA file.

The VARIANT complex calculates variants of enterprise development processes in the MATRITSA, DOKUMENT complexes. They are stored in the INFORMATSIYA file. The MATRITSA complex generates matrices of optimizational problems formed into the OPTIMUMY file which is used in the OPTIMUM complex.

The OPTIMUM complex determines various variants of the future sector plan. These plans are entered into the PLANTABLITSA file and are used in the DOKUMENT complex. The system has a RABOCHIY (working) file for storage of various intermediate data which is used by all program complexes and has no fixed structure or permanent content.

The structure and content of each file (except RABOCHIY), each of its forms and entries are previously known. This circumstance underlies the organization of monitoring of file filling. It also permits tracking of the functioning of modules by testing the coincidence of the structure established in the calculation process with the described structure. In addition, relationships are known between discrete indicators or totalities of indicators contained in one or more entries. This provides means for monitoring reliability of information.

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Since the system processes information of economic content and is used under industrial conditions in the GVTs sector, elaborators used the closed system version, i.e., one in which the user has no discretionary control of the operating system. They are premapped and the methods and order of their utilization are arranged by the program. The system contains means which are specially designed for organization of communicating with the user (economists engaged in collection and analysis of data; sector managers responsible for elaboration of the plan; operators organizing SMO function and performing specific calculations) in the language used in their field.

The method of control of SMO function is designed for package conditions, but on-line intervention in the work of the complexes is permitted. The user organizes the execution of the actions he requires by forming the punched-card package. The package appears as follows: fixed control cards of DOS/Yes, calculation headings (set of cards with text containing basic parameters of calculation; this text with addition of file names is used as their markers), sequence of assignments for complexes which contains assignment for one or more complexes. The assignment to a complex consists of a sequence of subassignments where each subassignment either includes the set of control cards of the complex and set of information cards, i.e., cards with initial information; or else it consists only of control card of the complex. The sets of control cards of the complex do not intersect. Each set of control cards has a strictly defined set of system operations. Sets of control and information cards are not arbitrary, but are dictated by the technology of the data processing process in the system.

In conclusion, let us note that the SMO of the subsystem "Future planning", realized on the basis of the principles set forth, includes 12 DOS/Yes modules (about 15 kbytes) and over 100 original modules, six of which assure interface with several devices, are written in ASSEMBLER; others are written in FORTRAN IV. The overall volume of SMO in the library of absolute modules is about 400 kbytes.

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APPLICATIONS

UDC 681.51:53

COMPUTER REGISTRATION AND PROCESSING OF PHYSICAL INFORMATION OBTAINED AT THE TYAN'-SHAN' INTEGRATED INSTALLATION FOR THE STUDY OF EXTENDED ATMOSPHERIC SHOWERS OF COSMIC RAYS

No city listed TR. FIZ. IN-TA AN SSSR [Works of the Physics Institute of the USSR Academy of Sciences] in Russian Vol 112, 1979 pp 49-63

ASEYKIN, V. S., ADAMENKO, V. K., GOLOVANOV, O. G., YERISKOVSKIY, A. P., KRUTIKOV, YU. G., SOLOV'YEVA, M. F., STUPIN, YU. V., SUBBOTIN, B. V., TUKISH, YE. I. and SHAMARO, M. YE.

[From REFERATIVNYY ZHURNAL, TEKHNIЧЕСКАЯ KIBERNETIKA No 1, 1980 Abstract No 1.81.539]

[Text] This system for the computer registration and processing of data contains a unit for collecting data from 2,500 charged-particle detectors and recording the data on magnetic tape, as well as a unit for reproducing the data and entering them in a computer. The data are recorded by the method of resetting to zero on four tracks on tape of the 2,6 and 6D type that is 6.25 mm wide. For a recording density of 7 lines/mm and a tape movement speed of 762 mm/s, the tape recorders are fully compatible. Devices have been developed for entering recorded data in computers of the BESM-4, M-22O, "Nairi" and "Nairi-2" types. Figures 10.
[221-11746]

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MULTIPLE USE OF COMPUTERS

Moscow KOLLEKTIVNOYE ISPOL'ZOVANIYE VYCHISLITEL'NOY TEKHNIKE. NOVOYE V ZHIZNI, NAUKE, TEKHNIKE. SERIYA "NAUKA I TEKHNIKA UPRAVLENIYA" in Russian No 4, 1980 signed to press 3 Mar 80

[Excerpts from the book "Kollektivnoye ispol'zovaniye vychislitel'noy tekhnike. Novoye v zhizni, nauke, tekhnike. Seriya 'Nauka i tekhnika upravleniya'" by V. I. Maksimenko, doctor of economic sciences and I. M. Korostelin, Izdatel'stvo Znaniye, 31,900 copies, 64 pages]

[Excerpts]

A special dispatcher station was developed in 1977 at the VTs [Computer center] of statistical management of Kiev. Approximately 200 different computer centers with a stock of approximately 600 computers functioned in this city. The stock of computers used in Kiev was distributed by different spheres of the national economy: 30 percent for industry, 11 percent for transport, 1 percent for commerce, 3 percent for construction, 7 percent for management, 16 percent for science, 22 percent for education and culture and 10 percent for miscellaneous. Medium- and small-capacity computers comprise a significant fraction in the total city stock of computers. The greatest amount of machine time (more than 50 percent) is used to carry out scientific, engineering and technical and planning-design work and approximately 30 percent is used to process economic information.

The development of multiple-user computer centers for several enterprises of the sector located close to each other contributes to solution of problems of organizational, procedural, information and program compatibility of ASU of different levels, thus providing joining of them into an OGAS [Statewide automated system]. There are now more than 120 multiple-user computer centers of different sectors and agencies in the country. The accumulated experience of design and operation of KVTs [Multiple-user computer center] demonstrated the high economic effectiveness of this form of using computer technology. Capital investments for ASU developed on the basis of KVTs are reduced by 50-60 percent compared to individual computer

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centers of enterprises and organizations and operating expenses are reduced by one-half to one-third.

A new schedule of tariffs for the services of computer centers has become operational since 1979, in which increases (discounts) on confirmed tariffs for performance of additional services have been established, along with unified fees for machine-hour of computer operation according to type. The new list has been distributed to all computer centers regardless of the nature of their work and agency affiliation, as well as to other organizations having and operating computers on the same basis.

Table 1. Increases (Discounts) to Tariffs for Performance of Additional Services

Name of Services	Composition of Services	Increases (Discounts) Percent of Main Rate	Remarks
Maintenance and servicing of software and information support of the customer.	Complete technical maintenance of this support of the problems stored at the computer center on machine carriers	+5	Technical documentation on this support, maintenance of which is carried out according to regulations coordinated with the customer, is transferred to the computer center
Expansion of standard software	Availability of access to systems libraries and applied program packages of centers operating under management of the main operating system	+5	Technical documentation on standard software is made available to the customer free of charge

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Table 1 (Continued)

Performance of urgent operations		+2	
performing calculations within 24 hours from the moment data are presented			
performing calculations and issuing results during daytime (from 0800 to 1900 on the day that input data are presented)		+5	
performing calculations and issuing results during nighttime hours		15	
Remote data processing from terminals (user terminals of customers)	The computer center opens access to customers for software and data transmission devices		
according to previously agreed rate		+10	
free access to computer resources		+15	

Table 2.

Type of Computer	Rates per Machine Hour of Computer Operation According to Schedule, Rubles	
	1977	1979
Minsk-22, Ural-14	30	30
Ural-16, M-222, Minsk-32, M-6000 (three sets)	35	35
YeS-1020	80	70

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Table 2 (Continued).

YeS-1022	85	85
M-4030		85
YeS-1030	90	85
YeS-1033	100	90
YeS-1040	200	110
BESM-6	100	100

A TVTsKP [Territorial multiple-user computer center] is a scientific production organization supplied with a set of jointly operating computers, user stations and data transmission facilities with the appropriate software and information support which permits users, regardless of their agency affiliation, to use collectively (jointly and remotely) the computer capacities to solve accounting, planning and management problems.

VTsKP in the GSVTs [State Network of Computer Centers] are divided into categories as a function of the productivity of computer equipment (Table 3).

Table 3.

Category of VTsKP	Productivity, Millions of Operations per Second
5	0.3- 0.5
4	0.5- 4.5
3	4.5-12.5
2	12.5-25.0
1	25.0-50.0

Prior to 1980, the developed experimental TVTsKP have been equipped with computer complexes consisting of two YeS-1033 computers. A block diagram of this computer complex is presented in Figure 1. The productivity of this computer complex is approximately 400,000 operations per second. The OS 4.1 operational system, the Oka data base management system and the Kama remote processing system were used as the main software.

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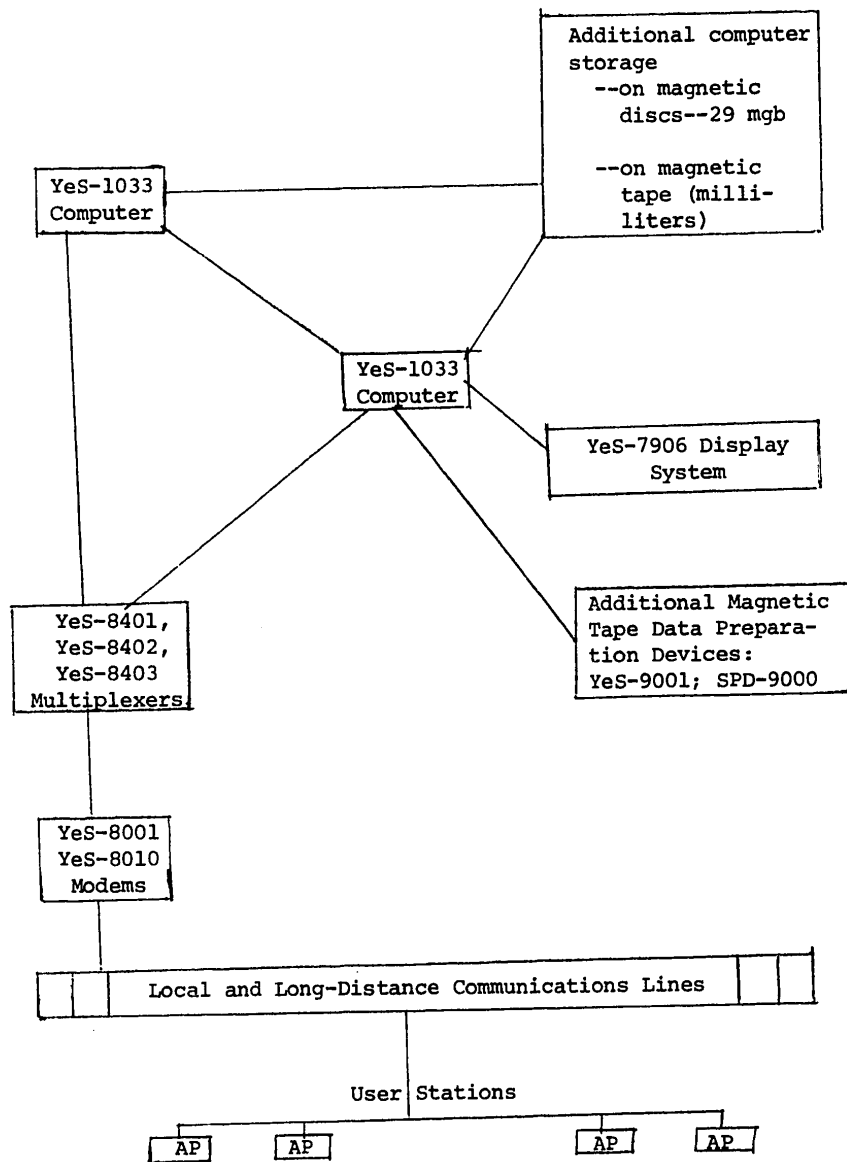


Figure 1. Block Diagram of VTsKP Computer Complex

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The essential difference of the developed TVTsKP from existing computer centers is providing the opportunity to TVTsKP users to solve problems remotely. The central computer complex is connected by communications channels to hardware terminals installed at the users' center.

During the period 1981-1985 the TVTsKP can be realized on a computer complex of older YeS EVM models, for example, two YeS-1060 or two YeS-1065. Moreover, only the central part of the YeS-1033 complex (processors, internal storage and logic retranslator) can be replaced by the central part of the YeS-1060, while the external storage devices, control devices and peripherals can be left as before.

This makes it possible to increase VTsKP productivity up to 2.0 million operations per second or more, to provide reprocessing of a large amount of information and to service a greater number of users.

The All-Union Scientific Research Institute of Problems of Organization and Control attached to the GKNT [State Committee for Science and Technology] is now developing a standard detail plan of TVTsKP with user network.

The multiple-user computer centers enumerated in Table 4 are developed on the basis of the State Statistical Computer Center.

Table 4.

Multiple-User Territorial Computer Center in Cities	Number of Users	Problems (Number)						Total
		Accounting	Planning	Analysis and Forecasting	Checking	Normalization	Statistical	
Minsk	17	10	16	19	5	9	35	94
Tallin	55	18	23	3	8	-	6	92
Tomsk	20	--	18	29	6	2	41	96
Tula	23	28	25	12	12	6	13	96

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A total of 92 problems for 55 users is now solved at the Tallin TVTsKP. The expected annual saving comprises three million rubles. The composition of the main problems of the Tallin TVTsKP is presented in the Appendix.

The AP-2, AP-4, AP-61, AP-63 and AP-70 Yes EVM user stations are used for the initial stage of developing a VTsKP. These stations meet multiple-user requirements and make it possible to provide local and remote pack processing and "interrogation-response" modes.

The work on development of GSVTs is estimated for completion by 1990.

According to approximate calculations, KVTs will be able to encompass up to 18,000-20,000 enterprises and organizations of the country.

Calculations made at the GSVTs have justified the feasibility of developing 200 base territorial multiple-user computer centers for information-computational servicing of approximately 600,000 users (enterprises and organizations) regardless of agency affiliation.
[319-6521]

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CALCULATING NUMBERS OF MAINTENANCE AND OPERATING PERSONNEL FOR AUTOMATED SYSTEMS FOR THE CONTROL OF TECHNOLOGICAL PROCESSES AND PRODUCTION

Moscow PRIBORY I SISTEMY UPRAVLENIYA in Russian No 2, 1980 pp 6-8

[Article by candidates of technical sciences N. A. Shishonok and V. Yu. Lerner and engineers V. P. Karaulshchikov and L. A. Artik]

[Text] Determination of rational numbers of maintenance and operating personnel for ASUTP [Automated systems for the control of technological processes and production] is one of the tasks in insuring technical operation of systems and is done for the purpose of obtaining input data for compiling authorized personnel listings.

In this article the basic content of a method developed for calculating numbers of maintenance and operating personnel is presented.

Formulation of the Problem, Initial Prerequisites.

By maintenance and operating personnel we mean the aggregate of two groups of specialists on which the normal operation of an ASUTP depends, namely maintenance personnel and operating personnel.

Maintenance personnel are used mainly to carry out maintenance on malfunctioning technical equipment and this is done in enterprise repair shops. It is expedient to take the expected annual labor expenditure for carrying out standard repair work as a basis for calculating the numbers of maintenance personnel.

Operating personnel insure correct functioning of the ASUTP by means of monitoring efficiency, technical servicing, and system restoring operations after equipment malfunctions. In terms of purpose and working conditions operating personnel are operational (on watch) personnel. When calculating numbers of operating personnel we proceed from the random nature of requirements for restoring operations after system malfunction.

The method contains a two-contour model for the processes of restoring and repair of ASUTP's. The first includes the ASUTP, operating personnel, and the material-technical store, and the second, maintenance personnel, the

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material-technical store, and the repair shops at the enterprise. In accordance with this kind of structure, the following four demand streams are distinguished: for system restoring operations caused by malfunctions of all technical equipment; for repair of equipment in the repair shops, which is part of the first stream; for technical servicing; and for carrying out major overhauls. The first two streams are random, the two latter are predetermined. The demand streams for system restoring operations and repair of equipment are taken to be the simplest.

Numbers of maintenance personnel are calculated from the specializations of personnel, and these are determined on the basis of dividing the ASUTP into groups of equipment that is the same in terms of design and maintenance operations.

Two levels of training for maintenance and operating personnel are considered for the calculations, namely middle level and higher level. The middle level of training contains all specialties, second through fourth grades, and also technicians and engineers with operating experience of up to three years. The higher level of training includes workers of all specialties at the fifth and sixth grades and also technicians and engineers with more than three years working experience. Taking into account experience in repair of equipment and data from reference documents indicates that the difference in productivity among maintenance and operating personnel with middle level and higher level training is about 40%.

The Method for Calculating Numbers of Maintenance Personnel

At the first stage of calculation of the numbers of maintenance and operating personnel a determination is made of the groups of specialists required in accordance with the groups for equipment of the same kind included in the ASUTP. The number $\tau_{\rho i}$ of personnel is established for each group as a ratio of expected annual labor expenditure $T_{\Sigma i}$ for all kinds of work in which the participation of maintenance personnel is envisaged against the annual amount of working time $T\phi$ for one worker:

$$\tau_{\rho i} = T_{\Sigma i} / T\phi = (T_{\partial i} + T_{tm i} + T_{mo i}) T\phi$$

The main proportion of labor expenditure $T_{\Sigma i}$ comprises total annual labor expenditure $T_{\partial i}$ on equipment maintenance, which does not exceed given probability β . Labor expenditure on carrying out technical maintenance $T_{tm i}$ and major overhaul $T_{mo i}$ of a system is determined in accordance with the proportional participation of maintenance personnel in these operations. These components of labor expenditure are predetermined and can be elicited from known parameters (periodicity and duration) for technical servicing and major overhaul.

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When determining the value of T_{γ}^i it is necessary to take into account the probable nature of requests made for repair of malfunctioning equipment, which depends on the expected gamma-percentage number for repairs to equipment in a given group i .

Assuming the flow of requests for repairs to be the simplest, the value for η_{γ}^i can be found from the Poisson distribution tables;

$\eta_{\gamma}^i = f(\bar{\eta}_i, \gamma)$. Here $\bar{\eta}_i = \lambda_i T_{w_i}^i$ is the average number of malfunctions where λ_i is total intensity of malfunctions in restored, equipment in group i , and $T_{w_i}^i$ the total annual work carried out. It is recommended that the value for η_{γ}^i be calculated for three graduations for a given probability: $\gamma_1 = 0.9, \gamma_2 = 0.95, \gamma_3 = 0.99$.

The value for η_{γ}^i is found from the value selected for γ and the average number for η_i repairs from the Poisson distribution tables. The gamma-percent value for total annual labor expenditure on repair of equipment in group i is determined approximately for specialists with middle level and higher level training from the formulas

$$T_{\gamma}^i \approx \eta_{\gamma}^i T_{p_i}^i \quad (1)$$

$$T_{\gamma}^i \approx \eta_{\gamma}^i 0.6 T_{p_i}^i \quad (2)$$

where $T_{p_i}^i$ is the average labor expenditure on repair of equipment in group i .

For accurate determination of the value for T_{γ}^i it is necessary to find the distribution function for the total duration of repairs which is a convolution of a random number of repair operations of random duration. Comparison of calculations made by the accurate method and from formula (1) indicates that relative error δ in determining the value of T_{γ}^i given $\eta_i > 10$ for the exponential distribution of labor expenditure on carrying out repairs does not exceed 10% and is eliminated as $\bar{\eta}_i$ increases.

By reckoning the annual amount of working time taking into account days off, holidays, vacations and sick days, and the coefficient for the utilization of working time κ_i it is established that the average value for T_{ϕ} is 1,500 hours.

The Method for Calculating Numbers of Operating Personnel

The method envisages two versions for calculating the numbers of operating personnel from different indices for the sufficiency of personnel. In the first version, the operational readiness κ_i of the equipment, as a function of the numbers of operating personnel servicing the equipment of a given group is used as the sufficiency index. In the second version, the sufficiency index is the probability P_{d_i} that the next request arriving for startup of equipment in a given group will be satisfied without delay.

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The first calculation method can be used when the equipment in a group forms a cascade series in terms of reliability. It is based on the use of the dependence of the average time $T_{\Sigma i}$ to restore group i equipment as a function of the number To_i of operating personnel in group i .

$$T_{\Sigma i} = \phi(To_i). \quad (3)$$

When equipment in a group is connected randomly the second version can be used. Figure 1 shows the graph for the dependence shown in formula (3) for a group of electronic equipment. The value for $T_{\Sigma i}$ is determined from the well-known formula for operational readiness.

$$T_{\Sigma i} = \frac{1 - \kappa_{\tau i}}{\kappa_{\tau i}} To_i \quad (4)$$

where $\kappa_{\tau i}$ is the given operational readiness of group i equipment (the value for $\kappa_{\tau i}$ is defined within the limits 0.75-0.99), To_i is the operation on a malfunction in an equipment group.

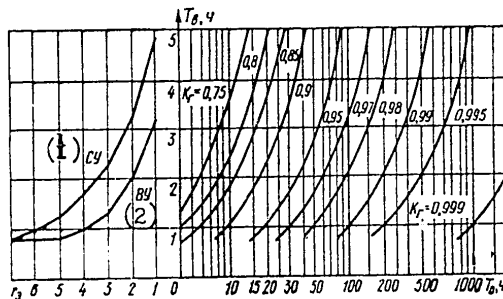


Figure 1. Nomogram for calculating numbers of operating personnel for group of electronic equipment.

Key:

1. Personnel with middle level training
2. Personnel with higher level training

Figure 1 shows a combined nomogram for calculating numbers of operating personnel for a group of electronic equipment, taking into account the dependencies expressed by formulas (3) and (4). With the aid of the nomogram and given known values for $\kappa_{\tau i}$ and To_i , the value of $T_{\Sigma i}$ is determined from the Y-axis. The required number To_i of operating personnel per shift (watch) is established from the selected level of personnel training from the same nomogram. The total number of operating personnel for group i equipment is calculated from the formula

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$$\tau_{0i} = S\tau_{0i}, \quad (5)$$

where S is the number of shifts for insuring continuous work by operating personnel (S=4 to 5).

For convenience in finding values for τ_{0i} , Guiding Technical Material as cited in the bibliography below presents graphs for the dependencies described by formulas (3) and (4), constructed taking into account the level of training for personnel from analytical data from experience in the operation of ASUTP's for three groups of equipment, namely electronic, electro-mechanical and sensing elements.

The second version for calculating the numbers of operating personnel is based on use of the theory of mass servicing. In this case the work of personnel on shift is organized on the principle of "uniform mutual aid" (see bibliography [2]), the essence of which is that when there is a simultaneous occurrence of malfunctions of equipment in group i, in order to restore the ASUTP, operating personnel are organized in such a way that the same number of people participate in each restoring operation. As in the first version, the number of operating personnel per shift is calculated using formula (3), but the value for τ_{0i} is found as a function of the given value for the probability of sufficiency P_{0i} of operating personnel for group i equipment.

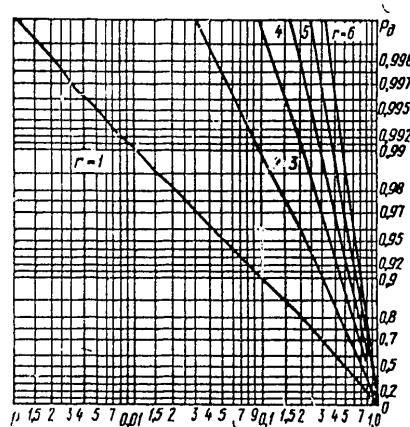


Figure 2. Graph for calculating numbers of operating personnel from probability of sufficiency.

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The procedure for calculating number of operating personnel is as follows: The initial value for the numbers of a duty shift for equipment in group ℓ is taken as unity. From the graphs constructed from formula (3) the value of $T\Sigma\ell$ is determined, and from this values for intermediate coefficients $\rho\ell = T_{i\ell}/T_{o\ell}$ are calculated. With the aid of the graphs showing the function $P_{di} = f(\tau_{o\ell}, \rho\ell)$, shown in Fig. 2, the value of P_{di} is found. If it is less than that given for P_{di3} , then the value of $T_{o\ell}$ is increased by one and the procedures repeated. The value for $\tau_{o\ell}$ at which $P_{di} \geq P_{di3}$ determines the number of operating personnel per shift for a given group.

The total number of operating personnel for group ℓ equipment is calculated from formula (5).

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PROCESSING THE RESULTS OF BIOLOGICAL EXPERIMENTS ON THE "ELEKTRONIKA B3-21" MICROCOMPUTER

Kiev OBRABOTKA REZUL'TATOV BIOLOGICHESKIKH EKSPERIMENTOV NA MIKRO-EVM 'ELEKTRONIKA B3-21' in Russian 1979 signed to press 12 Apr 79 pp 2, 14, 30, 31, 90-91

[Excerpts from the book "Obrabotka rezul'tatov biologicheskikh eksperimentov na mikro-EVM 'Elektronika B3-21' by L. I. Frantsevich, Izdatel'stvo Naukova dumka, 1,550 copies, 91 pages]

[Excerpts] Programs are presented in the book and their use for solution of standard problems of statistical processing of experimental data is described: calculation of distribution parameters, comparison of samples and calculation of difference criteria, finding the correlation coefficient, regression equations and so on. Programs for calculating some important functions are considered. Practical advice on program compilation is given.

Intended for investigators, instructors and also for students of vuzes, and practical workers in the field of biology, medicine and agriculture having no special mathematical training.

Three figures, 5 tables, 27 references.

The B3-21 computer is capable of storing a program of 60 instructions.

Besides registers for storage of numbers 2-8 with independent access to their contents, there is an original storage system in the B3-21 computer consisting of six cells, the so-called stack, which form a closed ring of six registers (Figure 2) together with register X.

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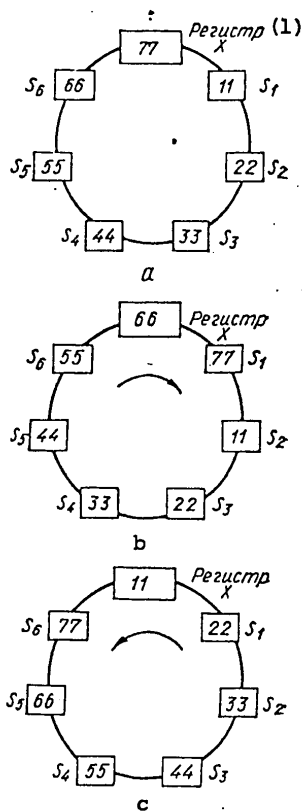


Figure 2. Ring Storage Stack: a--stack registers S1-S6 and register X filled with "discernible" numbers; b--shift of register contents clockwise by instruction P; c--shift of register contents counterclockwise by instruction P

Key:

1. Register X

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MAGNETIC TAPE SERVICE ORGANIZED FOR COMPUTER CENTERS

Moscow NAUGHNO-TEKHNICHESKAYA INFORMATSIYA in Russian No 3, 1980 pp 2, 3, 4

[Article by Ya. P. Shturman and I.S. Duganova: "Magnetic Tape Service of VINITI"]

[Excerpts] Analysis of the technical equipment of the centers making up the SATsNTI [seti avtomatizirovannykh tsentrov nauchno-tekhnickeskoy informatsii; networks of automated centers for scientific and technical information] showed that they, basically, have the appropriate material prerequisites and, particularly, the machine resources necessary for emission of data bases and for work with them:

Out of 47 electronic computers in operation in the AITs [avtomatizirovannyye informatsionnyye tsentry; automated data centers] of the network, only three computers are of foreign manufacture and the rest are of domestic manufacture, and almost two-thirds of them are third generation machines;

There are seven models of electronic computers used by the unified system (YeS; yedinaya sistema): the YeS-1052 (1 electronic computer); YeS-1050 (2 electronic computers); YeS-1040 (4 electronic computers); YeS-1033 and YeS-1030 (1 electronic computer each); YeS-1022 (10 electronic computers) and YeS-1020 (5 electronic computers);

Installed in eight organizations of SATsNTI are 14 Minsk-32 electronic computers, and in six of them there are also YeS electronic computers, and such electronic computers are lacking only in two centers;

In certain AITs of the network up to now there are still electronic computers of the Minsk-22 type, but third generation electronic computers have also been installed in these centers.

Among the automated data centers of the network of automated centers for scientific and technical information, already servicing with their own data bases more than 10 information agencies in the country are the largest, comparatively well-equipped centers with all-union status: VINITI [All-Union Institute of Scientific and Technical Information],

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VNTITsentr [All-Union Scientific-Technical Information Center] and TsNIPI [Central Scientific Research Institute for Patent Information and Technical-Economic Research]. These three automated information centers send the bulk of the data base flow to the network.

The magnetic tape service of VINITI, one of these AITs, was organized in 1976. It arose as an "offshoot" of the publishing process of the existing "Assistent" system, which is an information system of the integral type [11]. At the present time the generation and distribution of data bases on magnetic tapes has become one of the basic functions of this system. Definite practical experience in the transmission of machine-readable carriers has been accumulated in previous years, while in a number of organizations in the country punched tapes have begun to arrive which previously were used in the "Assistent" system. The quality and effectiveness of new information technology increased many-fold after the transition to a more ideal carrier--magnetic tapes. In a short period the data base of VINITI exceeded the level of the "giant" bases and in 1978 it reached a volume of 660,000 information bits.

In 1980 the total magnetic tape flow in the framework of SATsNTI will reach 2.5 million documents. Here a third of it will be VINITI data bases. If we exclude from this flow the data bases coming in through international exchange (including the tapes of INPADOC), this share will approximate one-half. Thus, with respect to volume VINITI generates as much magnetic tape output as all the automated data centers taken together.

Issued in machine-readable form in 1979 were about 2500 information publications of the All-Union Institute of Scientific and Technical Information, including issues of SI [Signal'naya informatsiya; Current-awareness information] (44 in chemistry, 23 in biology, 21 in metallurgy, 12 in automation and radioelectronics, 1 in mining) and RZh [Referativnyy zhurnal; abstracts journal] (5 in automation and radioelectronics and 1 in informatics). Started this year was the issuing of data bases of the BK [Bibliographic description + Key words] type, which should become the basic form of VINITI's magnetic tape production.

In the next five-year period data bases will cover all sectors of science and technology according to the profile of VINITI. Clinical medicine, the organization of agriculture, architecture and construction will be reflected in the data bases of VNIIMI [All-Union Scientific Research Institute of Medical and Medical-Technical Information], VNIITEIS.h [All-Union Scientific Research Institute of Information and Technical-Economic Research on Agriculture] and TsINIS [Central Institute of Scientific Information on Construction and Architecture], respectively. Consequently, in the near future the data bases of VINITI will contain information about 1.3-1.5 million scientific documents published annually in at least 135 countries in the world in 66 languages.

The Central Scientific Research Institute for Patent Information and Technical Economic Research collects patent information for nine CEMA

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countries: the USSR, People's Republic of Bulgaria, Hungarian People's Republic, German Democratic Republic, Republic of Cuba, Mongolian People's Republic, Socialist Republic of Romania and the Czechoslovak Socialist Republic. The prepared magnetic tape is submitted to INPADOC (International Patent Documentation Center), and combined magnetic tape for 46 countries is received in return. The annual content of this tape comes to 750,000-800,000 bibliographic descriptions, that is, 95 percent of all the patent documents published in the world. The names of the inventions, including the Soviet ones, are given on the INPADOC magnetic tape in one of three languages--in English, French or German.

The data bases of VNTITsentr cover two types of documents: reports on scientific-research and experimental-design projects, and dissertations. Used for describing them is a set of 18 data elements. Recorded on magnetic tapes in a year are 120,000 units of secondary information about scientific documents in the form of abstracts and 100,000 in the form of bibliographic descriptions.

Besides the enumerated automated data centers, 10 more centers have embarked on or are preparing in the near future to begin generation of data bases for the SATsNTI. These are the VKP [All-Union Book Chamber], INION [Institute of Scientific Information for Social Sciences], the USSR GPNTB [State Public Scientific and Technical Library], VNIKI [All-Union Scientific Research Institute of Technical Information, Classification and Coding], VNIITEISKh [All-Union Scientific Research Institute of Information and Technical-Economic Research on Agriculture], the TsNIITEI for instrument building [Central Scientific Research Institute of Information and Technical-Economic Research for Instrument Building, Automation Equipment and Control Systems], TsNIITEIlegprom [Central Scientific Research Institute of Information and Technical-Economic Research for Light Industry], VNIIMI [All-Union Scientific Research Institute of Medical and Medical-Technical Information], GOSINTI [State Scientific Research Institute for Scientific and Technical Information], and UkrNIINTI [Ukrainian Scientific Research Institute for Scientific and Technical Information and Technical and Economic Research].

To be put into operation in 1980 is a state communicative format (GKF; gosudarstvennyy kommunikativnyy format) in accordance with the standards of GOST [State All-Union Standard] 7.14-78 and GOST 7.19-79 which regulate the structure of the bibliographic entry.

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ASINIT-2: SOFTWARE AND HARDWARE OF REMOTE PROCESSING CONDITIONS

Moscow NAUCHNO-TEKHNICHESKAYA INFORMATSIYA. SERIYA 2 in Russian No 3, 1980 pp 1-3

[Article by A. K. Aylamazyan and A. V. Veselovskiy]

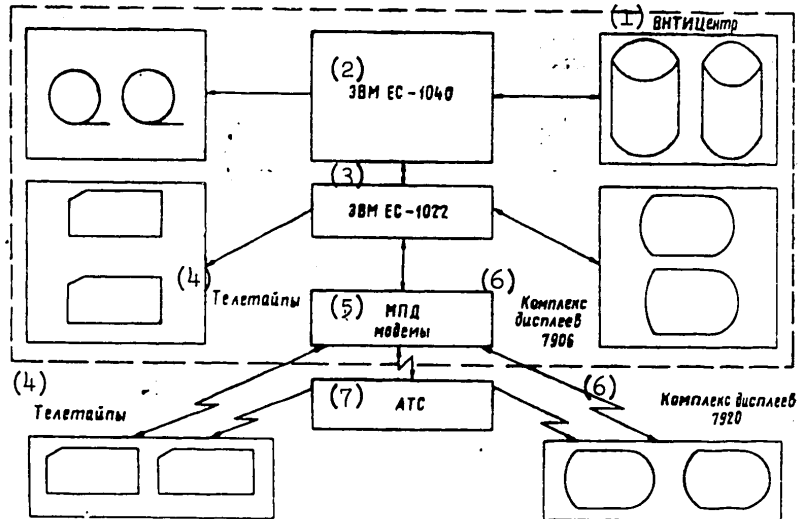
[Excerpts] The All-Union Scientific and Technical Information Center is one of the information agencies included in the first line of the network of automated centers as an automated information center of all-union status. Information exchange over communication channels imposes on a computer complex definite requirements that are taken into consideration in the configuration of the hardware of an automated information system for science and technology according to unpublished sources (ASINIT-2). In accordance with the requirements presented by SATsNTI [unidentified], the ASINIT-2, as shown on the figure, includes the following hardware that assures the functioning of the system in remote processing conditions:

- a connected YeS-1022 computer with an immediate-access store volume of 512 Kbytes;
- external storage devices--YeS-5052, YeS-5061 and YeS-5066 magnetic disk stores;
- computer couplings with communication channels;
- YeS-8403 and YeS-8400 data transmission multiplexors;
- data transmission apparatus: YeS-8010 modems and YeS-8315 devices for protection against errors;
- the YeS-7920 M remote video terminal complex.

The enumerated hardware for the remote processing of data ASINIT-2 must assure reliable exchange of information with other automated centers of the network, and also the remote processing of requests of individual users who have subscriber points at their disposal and, naturally, the functional tasks of the ASINIT in full volume.

The types, quantity and parameters of the remote processing hardware were selected on the basis of a probabilistic model of functioning of the ASINIT-2 in a network and with consideration of the forecast of the growth of data flows.

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Block diagram of information exchange between the All-Union Scientific and Technical Information Center and subscribers over communication channels.

- | | |
|--|---|
| 1 -- All-Union Scientific and Technical Information Center | 4 -- Teletypes |
| 2 -- YeS-1040 electronic computer | 5 -- Data transmission multiplexor modems |
| 3 -- YeS-1022 electronic computer | 6 -- Display complex |
| | 7 -- Automatic telephone exchange |

The average time for the direct handling of a request t_p is determined mainly by the time required to register the request on a magnetic carrier and amounts to 8 milliseconds (when the YeS-5010 magnetic tape store is used). The average time for referring the call to the telegraph station and obtaining an approving signal is about 2 seconds. The time necessary for dialing a number is determined by the number of digits and the working speed of the operator. About 12 seconds are required for dialing six digits of a subscriber's telegraph number by a disk dial. The time for establishment of a connection with a subscriber depends on the distance and the loading of the network and amounts to 1 to 20 seconds. The time for transmission of a message over a communication channel is determined by the ratio of the volume of the transmitted message and the transmission rate. During dialing on a keyboard the transmission rate is 2 characters per second, and during transmission by means of a transmitter it is 6.6 characters per second. The assumed volume of a request is 100-200 characters. Thus the average value is about 2 minutes.

For great precision of estimation it is necessary to calculate the standard time deviation for each component and determine with known [2] formulas for

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the gamma-distribution of the probability that the time of the component is smaller than that given.

The presence of a separate connected YeS-1022 computer permits freeing the central computers of the computer complex (two YeS-1040 computers) from the functions of control of the network channels and buffering of messages and eliminating unjustified interruptions of work of the central processes.

The main functions of the YeS-1022 electronic computer [3] are:
--unified telecommunications input of requests for copies of primary documents;
--reception and transmission of information over communication channels;
--processing masses of information for recording on magnetic tapes before making copies;
--making copies of masses of data on magnetic tapes for transmission in the circuit.

The YeS-8403 data transmission multiplexor used at the present time permits the connection of up to four semi-duplex communication lines (one uncommutated telegraph and three uncommutated telephone lines). In the future it is proposed to connect an MPD-iA (YeS-8400) for the servicing of up to 15 communication lines (commutated and uncommutated telegraph and telephone lines), and the data can be transmitted over telephone channels at rates of 600, 1200 and 2400 bauds/second.

For information exchange between distant subscribers and computers of an automated information center it is proposed to use a group distance YeS-7920-11 display complex, connected to telephone channels and permitting the connection of up to 32 displays and printers in any combination.

The practical implementation and introduction of regimes of multi- and remote access over communication channels require a series of experiments to work out the organizational, technical and program aspects of remote exchange of information.

At the present time the All-Union Scientific and Technical Information center is working on regimes of remote communication with subscribers with computers through teletypes (teletype-computer communication).

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ORGANIZATION AND FUNCTIONING OF A COMPUTER CENTER

Moscow ORGANIZATSIYA I FUNKSIONIROVANIYE VYCHISLITEL'NOGO TSENTRA in Russian 1977 signed to press 21 Oct 77 pp 2, 215-216

[Annotation and table of contents of book by Aleksandr Aleksandrovich Azeyev, Vitaliy Vital'yevich Saprin and Yuriy Alekseyevich Chebotov, Statistika, 14,000 copies, 216 pages]

[Text] Annotation

The book examines the planning and stages in the creation of computer centers, the composition of the hardware and office and auxiliary shop equipment supply, variants of the organizational structure of computer centers and analysis of the results of the work of computer centers with different structures and of the requirements for planning the technology of data processing. It also describes method of operative monitoring of the course of new developments and presents the necessary forms of documents. The book is addressed to specialists in computer hardware and the development of ASU.

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GOVERNMENTAL ADMINISTRATION SIMULATION GAMES AND AUTOMATED CONTROL SYSTEMS

Novosibirsk UPRAVLENCHESKIYE IMITATSIONNYYE IGRY I ASU in Russian signed to press 12 Jul 79 pp 2-6, 10-11, 256

[Excerpts from the book by V.F. Komarov, edited by doctor of the engineering sciences N.B. Mironosetskiy, Nauka Publishers, Siberian Branch, 256 pages, 3,600 copies]

[Excerpts] Questions of the application of governmental administration simulation games to the solution of ASU [automated control system] problems are studied in this book. A procedure is proposed for the development and conduct of experiments using such games, and a description is given of the "Control of Developments" game, intended for a simulation game demonstration of the system tools for operational management of a sectorwide scientific research institute; experience with the conduct of simulation games is presented for the purpose of teaching ASU specialists.

The book is intended for specialists engaged in the development and introduction of ASU's, for system workers improving their skills in control areas and teachers in the economic higher educational institutes.

The introduction of computers and modern data processing tools into the national economy is going ahead at an advanced pace as compared to the development of other sectors of industry. In just the years of the Ninth Five-Year Plan, more than 2,300 ASU's have been designed, six times more than in the Eighth Five-Year Plan. The number of persons engaged in the design and operation of ASU's at the start of the 10th Five-Year Plan exceeded 200,000, as opposed to 20,000 at the start of the 9th Five-Year Plan. As the result of such a wide range of work, the national economy received more than two billion rubles of additional income in just the years of the Ninth Five-Year Plan.

Along with the positive results in the development and introduction of ASU's, there are also deficiencies related both the quality of the systems being designed and the completeness of their utilization in production

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management practice. As a result, the actual efficiency of many control systems is below the potential level³.

An automated control system can be represented in two aspects: as a decision making system, and as a data processing system. The extent of goal attainment (production efficiency) depends substantially on which of these aspects is manifest in the functioning of the ASU. As follows from much of the literature, if there are tasks for making effective planning decisions incorporated in the ASU (optimization of the plans, forecasting the assignments, etc.⁵), then as a result of its introduction, the impact from the improvement in the technical and economic indicators for production amounts to about 18 to 20 percent. However, if in the framework of the ASU only the data processing functions are mechanized, then under best case conditions, an impact of 7 to 8 percent of the level of the economic indicators for production is assured (for example, the income increases or expenses are reduced by 7 to 8 percent).

Thus, increasing the number of ASU's, within the framework of which tasks for making effective plan decisions are introduced, has a direct bearing on the realization of the goal of control automation. Moreover, no more than 21% of all of the ASU's in service right now can be numbered in the class of decision making systems⁶.

Not everything is going well with the practical implementation of data processing control systems either. The opinion exists that of every 10 ASU's developed, only 3 are fully functional⁷. In many cases a minimum set of control functions is automated within the framework of an ASU. Along with this, there are also examples of high quality production control data systems⁸. This attests to the fact that ASU efficiency can be substantially improved if a high level of quality is assured in the project design solutions as well as complete feasibility of system implementation.

A study of ASU efficiency reserves was undertaken during 1976-1977 in the Central Economics-Mathematics Institute of the USSR Academy of Sciences (TsEMI) under the supervision of A.A. Modin⁹. The authors of the study single out the following groups of such reserves: improving the composition of the tasks being performed; refinement of ASU design; improving the organization of the development and dissemination of software; refining the engineering support and operation of computers in the control systems; making time utilization of computers more efficient in the nation; expanding the network for personnel training in the design and utilization of control systems; overall refinement of the management mechanism for the functioning of the economy.

³ "Problems of Improving the Efficiency of Control Systems for Sectors, Enterprises, Associations in Industry" (Conference Materials), Novosibirsk, 1977, p 3.

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. . . governmental administration simulation games can serve as an effective tool for the solution of numerous important problems in the design, introduction and functioning of ASU's. The application of such games creates the conditions for the practical implementation of research on organizational systems for experimental procedures. The wide scale expansion of experiments with organizational-economic systems will undoubtedly promote a better "acclimatization capability" of the new control methods and equipment, and will serve to give impetus to the design of new, more refined control systems.

However, the method of simulation game modeling has clearly been inadequately developed at the present time. Its application to research and project planning goals is of an episodic nature²⁰. Considerable disparities are observed in the opinions of the nature of simulation games, and the theory of this kind of modeling is in a formative stage.

The difference of opinions on theoretical questions of simulation game modeling impedes the creation of a methodology for the development and conduct of games for the purposes of studying the processes of organization functioning. The lack of such a methodology does not permit the expansion of the applications areas of the games, since with these conditions, the quality of the game models being designed as well as the efficiency of the performance of the game experiments depend entirely on the skill, experience and even the talent of the game designers. What has been said here occasions the necessity of developing a constructive procedure for the design and conduct of governmental administration simulation games. The presence of such a procedure would permit shifting the process of game design from the research category to the category of developmental work, and would serve as a basis for the wide scale dissemination of the game simulation method. The creation of a procedure for the development and conduct of the games requires not only setting up the theoretical fundamentals for simulation game modeling, but also for wide scale experimentation.

In connection with what has been presented here, the goals of this work are as follows: a treatment of ASU problems which can be efficiently solved using the game simulation approach; the definition of the basic concepts of an administrative simulation game intended for the laboratory demonstration of control systems; the development of a procedure for the design and conduct of such games; a description of specific games with a generalization of the experience in playing them.

The results offered to the reader here were obtained during the development and conduct of simulation games developed in the State Scientific

²⁰ This circumstance is apparently explained by the fact that the existing simulation games are designed, as a rule, in the higher educational institutes and advanced skill level schools. Moreover, the performance of the research and the development of the appropriate methods for the modeling are not the priority task of the teaching institutions. For this reason, the existing simulation games are predominantly oriented towards the solution of purely instructional problems.

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Research Institute for Automated Planning and Control Systems (NIIsistem, Novosibirsk). The theoretical and procedural viewpoints of the author were shaped in many respects by the influence of the ideas of candidate of the economic sciences V.M. Yefimov²¹. Scientific contacts with doctor of the economic sciences I.M. Syroyezhin and doctor of the economic sciences F.M. Borodkin were quite important in working out these positions.

During the course of the entire period of the work, the author was shown continuous support and attention by candidate of the economic sciences F.I. Solodovnikov and candidates of the engineering sciences A.N. Velikotskiy and G.I. Kaygorodtsev. The results of the work were reported at a scientific seminar headed by doctor of the engineering sciences A.L. Lifshits.

The remarks and proposals of doctor of the engineering sciences N.B. Mironosetskiy, candidates of the economic sciences V.D. Grober, Ye.L. Berlyand, A.R. Anderson and N.V. Syskina aided in improving the contents of the book.

Kh.Sh. Shapiyev, G.L. Pel'man, Ya.S. Ginzburg, P.A. Kalantayev, A.N. Rudnev and V.P. Yatsentyuk did considerable work in the formulation and performance of specific game experiments.

The author considers it a pleasant duty to express his deep gratitude to all of the persons mentioned above.

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PROBLEMS OF DEVELOPING AN AUTOMATED CONTROL SYSTEM FOR THE CHEMICAL INDUSTRY

Moscow VOPROSY SOZDANIYA AVTOMATIZIROVANNNOY SISTEMY UPRAVLENIYA KHIMICHESKOY PROMYSHLENNOST'YU in Russian 1979 signed to press 8 Dec 78 pp 2, 123-124

[Annotation and Table of Contents from collection "Voprosy sozdaniya avtomatizirovannoy sistemy upravleniya khimicheskoy promyshlennost'yu," 600 copies, 124 pages]

[Text] A sampling of articles whose topic is related to solution of the problems of development, introduction and operation of ASU-Khim, ASU VPO and ASUP is provided in this edition of the collection.

The scientific and methodical trend of the material is maintained in the collection: problems of the data processing technique in ASU, problems of developing a system of analytical calculations for utilizing the capabilities to reduce consumption of scarce types of raw material and problems of improving the software of data processing systems and analysis of the experience of introducing individual subsystems and complexes of problems are considered.

The published materials may be of interest to developers of OASU, ASU VPO and ASUP, control apparatus workers, sector scientific research institutes and also specialists in the field of management of economic systems.

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ORGANIZATION OF THE "ASU-STROYBANK"

Moscow ORGANIZATSIYA "ASU-STROYBANK" in Russian 1979 pp 69-70, 101, 103

[Annotation, excerpt and table of contents from the book "Organizatsiya 'ASU-Stroybank'" by Valeriy Anatol'yevich Makhov and Leonard Bronislavovich Popov, Izdatel'stvo Finansy, signed to press 7 September 1979, 6,450 copies, 103 pages]

[Text] ANNOTATION

In this book the authors propose new ways and methods for organizing the "ASU-Stroybank" [automated control system of the All-Union Bank for the Financing of Capital Investments].

They discuss questions concerning the existing organization of information processing by the USSR Stroybank and the structure, functions and purposes of "ASU-Stroybank's" control process in the system development and improvement stages, and also propose a methodology for planning informational support and hardware and data transmission systems.

This book is aimed at workers in the finance and credit system who are concerned with questions relating to the organization of the control process.

EXCERPT

Institutions subordinate to USSR Stroybank make extensive use of telex service in order to transmit information. The final pieces of equipment, which are connected to the automatically switched telegraph station, are T-63 teletypes, which provide the subscriber-station interaction signals that are needed in order to establish normal connections.

According to statistical data that have been gathered, teletype communications had been established with 460 of USSR

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Stroybank's 950 affiliated institutions by the beginning of 1978. For 22 offices, the installation and connection of teletypes was completed in all the institutions subordinate to them.

In 1976 the USSR Ministry of Communications began to use telegraph communication lines with a data transmission rate of 200 bits/s for the transmission of data in automated control systems. The terminal equipment used in connection with this was TAP-2 (YeS-8502) subscriber terminals, which fulfill the basic requirements of the specifications for the development and improvement of "ASU-Stroybank" as far as information transmission reliability (10^{-6}) is concerned. In this five-year plan the USSR Ministry of Communications used the TAP-2 to organize communications in the capitals of the Union republics and the largest oblast centers in the RSFSR, which corresponds to the territorial placement of the USSR Stroybank's republic and oblast offices. TAP-2 subscriber terminals have been installed in USSR Stroybank's GVTs [Main Computer Center] and in its republic and eight of its oblast (kray) offices.

The bank's institutions use bookkeeping machines with perforating attachments for the primary processing and registration of the initial data on punched tape. Facilities for preparing data on punched tape are available in 72 offices and 54 departments belonging to USSR Stroybank.

The information recorded on punched tape is automatically sent by a transmitter into the communication line after a connection is established with the receiving equipment in accordance with the rules and regulations of the USSR Ministry of Communications' Main Telegraph Administration. Information transmission and reception between the bank's institutions is done by schedules.

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PUBLICATIONS

COMPUTER TECHNOLOGY OF THE SOCIALIST COUNTRIES

Moscow VYCHISLITEL'NAYA TEKHNIKA SOTSIALISTICHESKIKH STRAN No 4, 1978
Izd-vo Statistika pp 2-4

[Annotation and foreword of monograph, edited by M. Ye. Rakovskiy]

Annotation

[Text] This international collection discusses questions of research, development, application and operating experience in the use of hardware and software for computer technology designed for the treaty on cooperation in the field of computer technology among socialist countries: Bulgaria, Hungary, East Germany, Poland, Cuba, Romania, Czechoslovakia, and the USSR. The authors are leading professionals in this field, representing the nations participating in the treaty.

This edition concerns problems in the development and application of remote data processing systems. The various systems employed in the different countries are described. Experience is discussed with regard to the planning of systems, applied programs, etc.

This collection is intended for the use of technicians working on the design and utilization of unified series computer systems in the various branches of the national economy.

Foreword

Solution to the problems of developing and applying computer technology as posed by the governments of the socialist countries and reflected in the program of socialist economic integration requires a complex approach to the development of hardware and software systems and takes into account the overall trends in world-wide computer technology development. Analysis of these trends shows that one of the most contemporary trends in computer application is the design of remote data processing systems. In such systems the computer subscriber obtains access to it through equipment that

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is located at some geographic distance from the computer site. This has been given considerable attention in the joint research conducted within the framework of the International Commission on Cooperation of the Socialist Countries in the field of computer technology. It is precisely due to the appearance of such remote processing systems, which are quite widely represented in the Unified Computer Systems, that the design of systems and networks for collective computer utilization has been possible; this has an especially great effect on the socialist methods of guiding the economy.

Questions of the development and application of remote data processing systems have received quite sufficient attention in previous editions of the collection "Computer Technology in the Socialist Countries". These problems are discussed on a regular basis at special symposia, both national and international. However, the achievements and great interest in remote processing systems by the subscriber make it necessary to publish a new edition devoted to the fundamental aspects of this problem. In the selection of materials the editorial staff did not feel it necessary to devote special attention to descriptions of remote processing systems of the various levels and classes that are functioning the various countries. Considerable attention is paid to questions of the development of hardware and software systems of remote processing, the design of remote processing systems and applied programs which function efficiently in remote access modes.

Several of the articles in the collection were based on reports given at the First All-Union Conference on Remote Processing Systems held in 1977 in Riga with participation by specialists from the socialist countries. The editorial staff decided also to include in the collection certain articles that are not directly associated with remote processing, but which are of considerable interest to computer subscribers and designers.

We hope this edition will be of interest to the reader since it will allow him to obtain thorough information on one of the important trends in joint developments.

The editorial staff consisted of: M. Ye. Rakovskiy, Editor-in-Chief (USSR); A. T. Belevtsev, Deputy Editor-in-Chief (Coordination Center of the Intergovernment Commission); Ye. Guk (Poland); N. V. Gorshkov (Council on Combined Servicing of Unified Series Computers); A. M. Larionov (Council of Major Designers of Unified Series Computers); G. Ludwig (GDR); Ye. N. Mel'nikova, Responsible Secretary (Coordination Center of the Intergovernment Commission); B. N. Naumov (Council of Major Designers of SM Computers); L. Nemet (Hungary); P. Popov (Bulgaria); Yu. P. Selivanov, Responsible Editor (USSR); A. Ye. Fateyev (USSR); N. I. Cheshenko (Council of Air Raid Warning Application); I. Shmeykal (Czechoslovakia); and K. Shtuka (Coordination Center of the Intergovernment Commission).

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COMPUTER TECHNOLOGY OF THE SOCIALIST COUNTRIES

Moscow VYCHISLITEL'NAYA TEKHNIKA SOTSIALISTICHESKIKH STRAN No 4, 1978.
Izd-vo Statistika pp 169-173

[Excerpts from monograph edited by M. Ye. Rakovskiy]

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Abstracts of articles in collection.

Lapin, V. S. Development of cooperation in the field of remote data processing. New problems.

This article studies the fundamental operating trends in remote processing systems carried out in the framework of the Council of Major Unified Series Computer Designers, state of the art of this research, and the immediate prospects.

Yakubaytis, E. A. Architecture of computer networks and systems.

Basic concepts are given which are necessary for the study of remote processing networks and systems. The features of the logic and physical structures of the networks and systems and their characteristics are described. A description is given of the experimental computer system of the Latvian Academy of Sciences.

Puzhman, I. State of the art and prospects for remote data processing in Czechoslovakia.

The author shows the features of developing remote data processing systems in Czechoslovakia and gives the parameters for an array of engineering systems for such systems. He briefly describes several different systems operating in Czechoslovakia.

Khorvat, P. Data transmission by the Hungarian Postal Service and plans for its development.

The author describes the state of the art and the prospects for developing data transmission networks in Hungary. He mentions the features of separate stages of the development process. Requirements are formulated for a new data transmission network for designing remote processing systems that are taken into account in developing a data transmission network for the Hungarian Postal Service.

Yulzari, I., and M. Mikhaylov. Conversion from unified series computer remote data processing systems of the first order to network remote processing.

The authors describe the features of converting from a systems to a network principle of remote data processing. They determine the basic functions of network remote processing and problems that must be solved in converting to network construction. They mention ways and means of their solution.

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Nemet, I., and R. Volner. Several problems in designing multicomputer systems for remote processing.

A study is made of information exchange in multicomputer systems of remote processing at the "process" level. A survey is given of the results of studying such systems based on the engineering and programming systems of unified series computers.

Yanitskiy, A. Problems in evaluating the quality of computer systems.

The author describes a general approach to evaluating the effectiveness of computer systems. An attempt is made to construct a standard criterion of quality that takes into account all structural, physical, operational and economic parameters of the systems.

Ercheni, A., P. Bakoni, and Ch. Chanadi. Emulating subscriber points using a YeS-1010 computer based programmable multiplexer.

The authors describe the use of a YeS-1010 computer as a programmable multiplexer and the role of the emulating programs for such use.

Lezer, V., G. Pollender, and Kh. Khazeloff. Remote data processing on a YeS-1040 computer.

The authors describe engineering and program systems developed in the GDR which allow the design of a developed remote data processing system based on a YeS-1040 computer.

Krystev, S. Systems prospects of program stacks for remote processing.

The author gives the characteristics of ten stacks of remote processing developed for the unified series computers, including all methods of access.

Ikauniyetse, B. Dialog input of assignment.

Data are given on a system of dialog remote input of assignments intended to guarantee the possibility of preparing and transmitting assignments for fulfilling an operational feedback unified series system to the user located at a remote subscriber point.

Boguslav, Z., and P. Drbal. Program editing system.

The authors describe the possibilities of a program system for editing texts, methods of working with the text and several commands which determine text structure.

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Formandl, Ya. Automated information-search system ARDIS for a unified series computer.

The author studies the basic properties of the ARDIS information-search system, its structure, the data base parameters, the functional modules of the system, the information-search mode, and the function of the output modules.

Zabunov, L., Ye. Doychinova, Ye. Bozhilov, and Ye. Dmitrov. Dialog terminal system.

The authors give one of the possibilities of a dialog terminal system which allows using a computer in a time discrimination mode. They describe the main components of the system and the basic operating modes.

Shugar, P. Software system for a YeS-1010 computer based programmable multiplexer.

The author describes changes introduced into the program systems of a YeS-1010 computer so that this computer can be used as a programmable multiplexer. He studies the basic functions of the emulator programs and a special supervisor as well as controls in the system and the data structure.

Partyk, P. Using the program system KOMPITA for a unified series computer to design an automatic control system.

A system is studied for programming the KOMPITA for a unified series computer that consists of a language of systems algorithms, a module, a compiler, purposeful programs and an array of parameters. The system expands the possibilities of COBOL on which it is based, and reduces the program debugging time.

Pivovar, B. Remote data processing system designed in the MERA union.

The author gives the characteristics of the engineering and program systems for remote data processing, constructed on the base of the YeS-8371 remote processor and which ensures remote stack processing, dialog operation, and data collection and transmission.

Lugoshi, K., and Z. Uyvari. Control system for the Videoton Comnet-1000 data base.

The authors describe a system based on the YeS-1010 and YeS-1012 computers for controlling the data base in a remote processing mode.

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Utkin, V. I. Analysis of the throughput of units in a remote data processing system.

The author describes the effectiveness of using linear equipment, including communication channels in remote processing systems. He analyzes the throughput and individual time parameters of units in the remote data processing system.

Bodurova, P., and T. Kedreva. Analysis of some results obtained in planning a territorial remote processing system.

The authors study the problem of determining certain basic parameters of territorial remote processing systems, including the average number of messages expected for servicing and the average time for servicing them, the average expectation time for servicing and redundancy of messages in the system. They cite the results of studying the parameters of a specific system.

Byalchik, Z. Magnetic tape data preparation system for the YeS-9150.

The author describes the structure, composition and functional possibilities of a multiconsole system of data preparation on the magnetic tape of a YeS-9150.

Pykhtin, A. Ya., V. I. Gorelov, L. F. Askenko, and R. Ya. Bronshteyn. YeS-7920 arrays -- new terminals with broad prospects.

The authors give the operational-engineering characteristics of the arrays and the individual engineering systems of the YeS-7920, jointly developed by Hungary, the GDR, Poland, the USSR, and Czechoslovakia.

Rayki, P., and I. Fyeldvari. YeS-1010 computer based YeS08550 subscriber point.

The authors describe the structural features and the functioning of a subscriber point for the YeS-8550, its operating algorithms, the software features, and application experience.

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COMPUTER TECHNOLOGY OF THE SOCIALIST COUNTRIES

Moscow VYCHISLITEL'NAYA TEKNIKA SOTSIALISTICHESKIKH STRAN No 4, 1978
Izd-vo Statistika pp 17-19

[Excerpts from monograph, edited by M. Ye. Rakovskiy]

Experimental computer system of the Latvian Academy of Sciences.

[Excerpt] One of the computer systems designed here is the experimental computer system of the Latvian Academy of Sciences. This is a multi-unit hierarchical computer system which combines the specialized computers structurally and by program into a single array that offers engineering resources, information and software for the collective use of all the scientific staff of the Academy. The methodology incorporated into the system allows it to be used not only in scientific centers but also at large computer centers for the processing of economic and engineering information.

The Center is designed for two basic purposes:

- (1) conducting scientific research on the architecture of computer systems and developing standard solutions for broad utilization;
- (2) constructing a base for the overall system of the Academy in automating scientific research and guaranteeing the necessary data bank requirements for theoretical and engineering experiments.

By September 1977 the System included nine computers of three types (Fig. 5), data transmission equipment -- adapters, devices for computer channel commutation -- channel switches and channels (lines between adapters).

The working computers are two YeS-1030's and one M-4030; the OSK.1 operational system, designed jointly with the Scientific Research Center for Computer Technology, is used. The working computers receive, carry out assignments, and output the solutions obtained to the user.

The dispatcher computer is an M-4030, which operates under control of a specially designed OSD 1.0 system, carries out:

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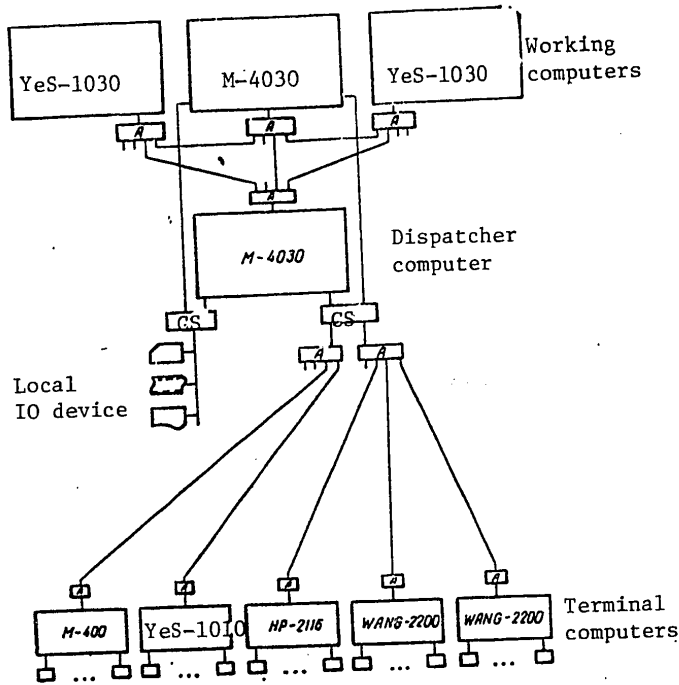


Figure 5. Physical structure of the experimental computer system of the Latvian Academy of Sciences: A - adapters; CS - channel switches.

- (1) channel control;
- (2) control of the flow of information which travels through the local IO device (punch devices, ADC, displays, etc.);
- (3) reception of assignments from the terminal computer user;
- (4) transmission of solutions to the terminal computer user;
- (5) buffering messages in the main memory;
- (6) conversion of formats and codes;
- (7) monitoring the validity of information received and repetition in case of error;

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(8) collection of statistical information concerning computer system operation.

The working M-4030 computer takes over in case of breakdown in the dispatcher M-4030 computer. In this case the number of working computers is reduced from three to two.

Five terminal minicomputers link three of the Academy's institutes to the experimental computer system. These machines carry out:

- (1) collection of information from the experimental facility and control of it;
- (2) dialog between researcher and minicomputer;
- (3) preparation and debugging on the terminal computers of assignments in the algorithmic languages of the working computers;
- (4) remote dialog-stack satisfaction of the assignments transmitted from the terminal computers to the working computers.

The computers interact in accordance with the hierarchy of proceedings of four levels. The proceedings of the first level is characterized by the IRPR-28 (interface, radial, parallel, 28-channel) received at the SM computer. This interface guarantees a symmetrical asynchronous exchange of information between terminal, dispatcher, and working computers at a speed from 0.2 Mbit/sec (at a distance of 2000 m) to 1.5 Mbit/sec (at a distance of 50 m). The second level proceeding determines the control logic of the IRPR channels. The third level proceeding establishes the structure and stack control rules. These proceedings ensure computer "transparency" for all operating modes, types of information transmitted and coding procedures.

The fourth level proceeding is intended for a dialog-stack mode for the remote debugging of programs and the input-output of assignments. Dialog preparation of the assignment is done in this mode at the terminal computer and is then satisfied on one of the working computers. The assignments are transmitted by the stacks. The results are output on command of the user into output devices or to an external memory of either the terminal or the working computers.

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RESEARCH IN COMPUTER TECHNOLOGY

Moscow FIZIKO-TEKHNICHESKIYE OSNOVY VYCHISLITEL'NOY TEKHNIKI. TRUDY MOSKOVSKOGO ENERGETICHESKOGO INSTITUTA (Physico-Technical Fundamentals of Computer Technology. Works of the Moscow Power Engineering Institute) in Russian No 430, 1979 p 2

[Annotation from the collection edited by Doctor of Technical Sciences, Professor Yu. M. Shamayev, 600 copies]

[Text] This collection contains articles by colleagues of the Department of Computer Technology and the Department of the Theoretical Fundamentals of Electrical Engineering and Electrophysics.

A broad range of problems reflecting the physico-technical fundamentals of computer technology are examined. These include research and planning of computer components, and the planning of computer apparatus itself. Problems associated with creating computer memories, the reliability of memories, and memory control are also examined.

The collection devotes a large amount of room to articles reflecting the results of research on various information carriers. Their electrophysical properties and the methods for recording and reading information are examined.

All articles of this collection concern themselves with pressing problems associated with the physico-technical fundamentals of computer technology, and they would be of interest to a broad range of specialists in computer technology.

Editorial board: Doctor of Technical Sciences, Professor Yu. M. Shamayev (editor in chief), Candidate of Technical Sciences, Assistant Professor I. V. Ognev, Doctor of Technical Sciences, Professor A. I. Pirogov, Graduate Student N. K. Ivanova, and Laboratory Assistant A. I. Osipov.

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[249-11004]

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ABSTRACTS FROM THE JOURNAL 'PHYSICO-TECHNICAL FUNDAMENTALS OF COMPUTER TECHNOLOGY. WORKS OF THE MOSCOW POWER ENGINEERING INSTITUTE'

Moscow FIZIKO-TEKHNICHESKIYE OSNOVY VYCHISLITEL'NOY TEKNIKI. TRUDY MOSKOVSKOGO ENERGETICHESKOGO INSTITUTIE in Russian No 430, 1979 pp 96-100

UDC 681.398.727.6

EXPERIMENTAL INVESTIGATION OF INFORMATION STORAGABILITY ON MAGNETIC DISCS

[Abstract of article by Yu. M. Shamayev, I. V. Ognev, V. A. Minin, I. I. Rod'kin, and D. A. Stolyarenko]

[Text] Problems associated with long-term storage of information on magnetic discs are examined. Experimental methods are the principal means for studying storagability of information on magnetic discs. Experimental methods and results show that under certain conditions, information can be stored for a long period of time on magnetic discs without the need of copying.

UDC 681.327.67

A SYSTEM OF OPERATIONAL CONTROL OF MODULAR SEMICONDUCTOR OPERATIONAL MEMORIES

[Abstract of article by I. V. Ognev, K. F. Sarychev, and Ye. A. Shcheglov]

[Text] A test sequence based on experimental investigation of memory microcircuits and an analysis of the structure of semiconductor operational memories, and which can be used to perform quality control of a memory within a short time, is examined. The article presents the results of research on control of a modular semiconductor operational memory made from K565/RU1A memory microcircuits (4096x1 bits) containing single-transistor memory cells.

UDC 681.31

EVALUATION OF THE RETENTION OF A COMPUTER SYSTEM'S CAPACITY TO FUNCTION

[Abstract of article by I. I. Ladygin and T. K. Kvasova]

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[Text] Evaluation of the dependability of a computer system on the basis of the probability of retaining functional capacity is examined. The general appearance of an analytic model of the system's reliability is given. An example of building an analytical model of the probability of functional capacity retention is presented in relation to a system consisting of two components.

UDC 681.398.727

OPTIMIZATION OF BIT ADDRESS CIRCUITS OF A TYPE 2.5D2W FERRITE OPERATIONAL MEMORY ON THE BASIS OF THE SPEED CRITERION

[Abstract of article by N. I. Dikarev and S. M. Kovalenko]

[Text] Problems in the planning of high information capacity ferrite core operational memories are examined. Special circuits for isolation of a useful signal from interference that may be caused by a voltage drop in the active and inductive resistors of the selected bit address line are examined.

UDC 681.142.6

AUTOMATION OF THE CONTROL OF PERMANENT MEMORIES MADE FROM MICROCIRCUITS

[Abstract of article by I. V. Ognev and G. A. Borodin]

[Text] Methods are examined for controlling permanent memories made from memory microcircuits, with a consideration for the word length, m , and the number of words, n , in the memory. Grouping of errors and their asymmetry are inherent to memories consisting of memory microcircuits. It is shown that the program control method (in which banks of numbers are summed), which permits automation of the analysis of memory functional capacity, is convenient.

UDC 681.327.662

MODELING THE CIRCUITS OF AN ADDRESS PROCESSOR WHEN PLANNING HIGH INFORMATION CAPACITY MAGNETIC OPERATIONAL MEMORIES

[Abstract of article by N. I. Dikarev and V. V. Toporkov]

[Text] The working features of an address processor based on a diode decoder circuit, which is used to excite coordinate lines in most high capacity ferrite memories, are examined, and a model for computing the transient process for establishment of current in the selected line is presented. It is demonstrated that when modeling the work of an address processor, emphasis must first be placed on considering the parasitic capacity of unselected lines, since the discharge of these capacities is precisely what strongly influences establishment of the current in the selected line.

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UDC 681.32.00157-505.7.00124

AN APPROACH TO AUTOMATING THE PLANNING OF A CONVEYOR-TYPE MULTIPROCESSOR
COMPUTER SYSTEM

[Abstract of article by Ye. G. Volkov]

[Text] Problems associated with developing a system for automating the planning of conveyor computer systems based on discrete optimization methods are examined. The SPOR-1, a reference solution generating system intended to form a model of the quality of complex objects relative to a large number of discretely varying parameters, is an inherent part of the proposed system for automatic planning of conveyor computer systems.

UDC 681.324.001.2

FUNDAMENTAL CONCEPTIONS OF A SPECIALIZED MODELING SYSTEM INTENDED FOR
ANALYSIS OF A CERTAIN CLASS OF COMPUTER SYSTEMS

[Abstract of article by A. G. Shigin and Yu. F. Gal']

[Text] A modeling system intended for analysis of multimicroprocessor computer systems having a line (mainline) organization is examined. It is suggested that the structure of multimicroprocessor computer systems be analyzed with the help of a representation of the class of problems to be solved enlarged to the level of groups of instructions.

UDC 681.335.8

PULSE-ANALOG COMPUTER DEVICES FOR CONVERTING COORDINATES IN SPACE

[Abstract of article by F. M. Shlykov and V. G. Mayorov]

[Text] Spatial coordinate converters designed for operation on the basis of the phasal method are examined. Use of digital-analog converters improves the weight and size characteristics of the devices and significantly improves the accuracy and speed of phasal pulse-analog devices.

UDC 681.323:621.9-52.001.5

STROBOSCOPIC EFFECT IN DIGITAL-FREQUENCY COMPUTER DEVICES

[Abstract of article by V. P. Danchev]

[Text] The least studied source of error in digital analogs--stroboscopic effects associated with the selective nature of the processing of variables modeling continuous processes and functions--is examined. A technique is proposed for evaluating errors contributed to the integral, given a known analytic form of subintegral function.

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UDC 681.332

ANALOG COMPUTER MODELING OF A PULSE-WIDTH MODULATOR BASED ON A UNIVIBRATOR

[Abstract of article by Ye. G. Titov]

[Text] Problems associated with creating the mathematical model of a pulse-width modulator used in the circuits of constant voltage pulse stabilizers are examined. When creating a model of a pulse-width modulator, it should be considered that the transistor controlling the capacity discharge current of the timing capacitor may operate in three modes--cut-off, active, and saturation.

UDC 681.327

DEVELOPMENT OF A DEVICE MATING THE PERIPHERAL UNITS OF A YeS EVM COMPUTER WITH A SEMICONDUCTOR MEMORY

[Abstract of article by R. A. Popo, T. A. Bondareva, and A. I. Zhakharov]

[Text] Problems associated with developing a device with which to mate a semiconductor memory made from 519RYe2 microcircuits with the peripheral devices of a YeS EVM computer are examined. The proposed device can be used to feed information into the semiconductor memory, check the correctness of recording, introduce corrections, and read information from the semiconductor memory.

UDC 538.61.621.318

A METHOD FOR COMPUTING THE CONTROLLING FIELD OF TsMD STRUCTURES

[Abstract of article by K. Myuller, S. A. Peskova, and Yu. M. Shamayev]

[Text] A method for computing the required parameters of the controlling field for the registers of TsMD [not further identified] structures based on garnet materials, and for determining optimum geometric dimensions of permalloy plating is examined.

UDC 681.323

DETERMINING THE CONFIGURATION OF A SPECIALIZED COMPUTER SYSTEM

[Abstract of article by I. S. Potemkin and N. M. Allekhverdiyev]

[Text] A heuristic approach making it possible to find the configuration of a specialized computer system, based on microprocessors and solving a particular class of problems (multiplication of matrixes, transpositioning of matrixes, two-dimensional quick Fourier transformation, and a number of others), is examined.

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UDC 681.31

OPTIMIZATION OF PROGRAMS FOR CONTROLLING COMPLEX OBJECTS

[Abstract of article by G. G. Danilin]

[Text] Problems associated with optimizing programs intended for functional control of complex objects are examined. Two stages are proposed for the task. In the first stage, in order to reduce the size of the task, the process of writing the program is broken down into sections, in which case the method for breaking the program down is indicated; in the second stage the sections are brought into optimum correspondence on the basis of the developed optimization procedure.

UDC 681.327.001.5

A POSSIBILITY FOR MEASURING MAGNETIC FIELDS AND CURRENTS WITH THE HELP OF MAGNETO-OPTICAL MEDIA

[Abstract of article by A. M. Balbashov, A. P. Gubarev, S. P. Zalysin, and I. Ya. Chervonenkis]

[Text] The possibilities for measuring magnetic fields and currents by the methods of electron optics is examined. A comparative description is given of diamagnetic glass and ordered magnetic substances. The dependencies of the optimum sample thickness and efficiency of the system on wavelength are computed and set up. It is theoretically shown that the sensitivity of measuring systems using ferrogarnet materials is $2^\circ/\text{Oe}$, and for orthoferrites it is $35^\circ/\text{Oe}$, which is four orders of magnitude greater than the sensitivity of Faraday cells using diamagnetic glass. It is shown by computation that a sensitivity of about 100 MHz can be achieved with the use of orthoferrite, while the sensitivity with ferrogarnet is 1 MHz.

UDC 538.61.621.318

DIFFRACTION EFFECTIVENESS OF FERROGARNET FILMS

[Abstract of article by A. P. Gubarev and S. P. Zalysin]

[Text] The effectiveness of diffraction produced by a multilayered ferromagnetic laminar structure consisting of a film of bismuth-containing garnet and ferromagnetic metallic film is examined. An expression is obtained for the diffraction effectiveness of a binary magnetic lattice upon restoration of the image in reflected light.

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UDC 621.318.1

REMAGNETIZATION OF A CORE CONTAINING A PPG BY A SOURCE HAVING FINITE INTERNAL RESISTANCE

[Abstract of article by A. A. Lipman, A. I. Pirogov, and Ye. V. Poznakhirko]

[Text] An analysis of remagnetization of a core containing a PPG [not further identified] in relation to parabolic dynamic resistance and an arbitrary active internal resistance for the oscillator is presented.

UDC 621.382.822

THE RELATIONSHIP BETWEEN STORAGE TIME AND THE RECORDING CONDITION PARAMETERS FOR MNOP MEMORIES

[Abstract of article by A. M. Osipov]

[Text] Experimental investigation of the discharge of MNOP [not further identified] structures based on 519RYel microcircuits showed that the threshold voltages are logarithmically dependent on storage time in passive state. The discharge rate is proportional to the initial threshold voltage, set at the time of information recording. A formula is proposed for describing discharge as a function of time, which is used to obtain an expression for determining the storage time of recorded information. It is demonstrated that storage time is associated with the speed of microcircuits in the recording mode.

UDC 621.382.822

POTENTIAL READ-OUT OF INFORMATION FROM A MEMORY BASED ON MNOP STRUCTURES

[Abstract of article by A. A. Rytov]

[Text] A circuit intended for potential read-out from a memory based on MNOP structures, in which the power line is used as the interrogation line, is described. The circuit is distinguished by lower energy consumption in comparison with circuits based on standard concepts. Experimental data are presented for the limiting levels of the signal, "Log 0" and "Log 1."

UDC 621.382.8

INVESTIGATION OF THE EFFECTIVENESS OF CHARGE CARRY-OVER IN DIGITAL UNITS BASED ON PZS STRUCTURES

[Abstract of article by S. K. Shmelev]

[Text] The temperature dependence of the effectiveness coefficient for charge transfer in a delay line based on PZS [not further identified] structures is examined, and analytical expressions are obtained to describe changes in this parameter in relation to temperature. An expression is

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presented for the coefficient of incomplete charge carry-over with a consideration for the dynamic conductivity of the discharge. Experimental temperature dependencies for the examined parameters at different frequencies are given.

INVESTIGATION OF THE INFLUENCE OF A HAMMING CORRECTING CODE ON THE TIME OF FAULTLESS OPERATION OF OPERATIONAL MEMORY SEMICONDUCTORS

[Abstract of article by O. P. Kovalev]

[Text] Special ways for insuring the required mean life of semiconductor operational memories are examined. One suchway is to build a system that corrects for errors appearing owing to breakdown or failure of semiconductor operational memory components. The goal of this investigation was to evaluate the mean life of semiconductor operational memories with which Hamming's correcting code is employed.

THE SHIELDING OF DIGITAL APPARATUS

[Abstract of article by V. M. Konstantinovskiy]

[Text] Electromagnetic compatibility, which becomes a problem when digital apparatus is located together with other types of electronic apparatus, is examined. This problem is solved by shielding the apparatus from external fields, which are subdivided into low frequency and high frequency fields.
[249-11004]

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MODELING OF TECHNOLOGICAL PREPARATION OF PRODUCTION (METHODOLOGICAL MATERIALS)

Kiev MODELIROVANIYE TEKHNOLIGICHESKOY PODGOTOVKI PROIZVODSTVA (METODICHESKIYE MATERIALY) in Russian 1978 signed to press 15 Feb 78 p 2

/Annotation from preprint no. 1 by Yelena Boleslavovna Bibik, Institute of Cybernetics, Academy of Sciences, Ukrainian SSR, 300 copies, 42 pages/

/Text/ This work presents a technique for designing the organizational structure of a system for control of production based on informational modeling of the control processes. An apparatus of structural matrices is used to construct the informational model.

The technique contains a description of the stages of modeling of the organization and instructions for practical realization of procedures. The example of technological preparation of production illustrates a concrete application of the technique.

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OPTIMAL SYSTEMS

Kiev OPTIMAL'NYYE SYSTEMY in Russian 1978 signed to press 15 Feb 78 p 56

Table of contents from preprint no. 2, Institute of Cybernetics,
Academy of Sciences, Ukrainian SSR, 300 copies, 57 pages

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ALGORITHMIC PROBLEMS OF THEORY OF LANGUAGES

Kiev ALGORITHMICHSKIYE PROBLEMY TEORII YAZIKOV in Russian 1978 signed to press 11 May 78 p 42

/Table of Contents from preprint no. 3, Institute of Cybernetics, Academy of Sciences, Ukrainian SSR, 300 copies, 43 pages/

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APPLICATION OF MATHEMATICAL METHODS AND COMPUTERS TO DESIGN AND OPERATION
OF PIPELINES FOR PETROLEUM PRODUCTS

Kiev PRIMENENIYE MATEMATICHESKIKH METODOV I VYCHISLITEL'NYKH SREDSTV PRI
PROYEKTIROVANII I EKSPLUATATSII NEFTEPRODUKTOPROVODOV in Russian 1978
signed to press 2 Feb 78 p 59

/Table of contents from preprint no. 5, Institute of Cybernetics, Academy
of Sciences, Ukrainian SSR, 300 copies, 60 pages/

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AUTOMATION OF DESIGN, MANUFACTURE AND TEST OF INTEGRATED CIRCUITS

Kiev AVTOMATIZATSIYA PROYEKTIROVANIYA, IZGOTOVLENIYA I KONTROLYA
INTEGRAL'NYKH SKHEM in Russian 1978 signed to press 3 Aug 78 p 30

/Table of contents from preprint no. 6, Institute of Cybernetics, Academy
of Sciences, Ukrainian SSR, 300 copies, 31 pages/

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ANALYSIS AND COMPUTER SOFTWARE

Kiev ANALIZ I PROGRAMMNOYE OBESPECHENIYE VYCHISLITEL'NYKH MASHIN in
Russian 1978 signed to press 15 Feb 78 p 44

/Table of contents from preprint no. 7, Institute of Cybernetics, Academy
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METHODOLOGICAL QUESTIONS IN THE CONSTRUCTION OF AUTOMATED CONTROL SYSTEMS

Kiev METODICHESKIYE VOPROSY POSTROYENIYA ASU in Russian 1978 signed to press 24 Feb 78 p 45

Table of contents from preprint no. 8, Institute of Cybernetics, Academy of Sciences, Ukrainian SSR, 300 copies, 46 pages

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OPTIMAL PLANNING OF CONTINUOUS PRODUCTION

Kiev OB OPTIMAL'NOM PLANIROVANII NEPRERYVNOGO PROIZVODSTVA in Russian
1978 signed to press 24 Apr 78 p 2

Annotation from preprint no. 9, by V. I. Dolya, Institute of Cybernetics,
Academy of Sciences, Ukrainian SSR, 300 copies, 34 pages

Text An attempt is made to examine the complex of problems of optimal
planning of continuous production from the positions of the unified systems
approach to the object of control.

The link between the problems of planning and the disturbances acting on
the object of control is studied; estimates of these disturbances are made.
A general problem of optimal planning is formulated and an approximated
method of solution is proposed in which the interrelationship between
problems of current and operations planning of continuous production is
tracked. The initial problem is divided, in accordance with the suggested
algorithm, into a series of problems of linear programming of relatively
small dimension, solvable in a specific sequence.

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AUTOMATION OF TRANSPORT VESSELS

Leningrad AVTOMATIZATSIYA TRANSPORTNYKH SUDOV. TSENTRAL'NIY NAUCHNO-
ISSLEDOVATEL'SKIY INSTITUT MORSKOGO FLOTA. TRUDY in Russian No 247,
1979 p 68

[Table of contents from booklet, Yu. I. Panin, editor-in-chief, Central
Scientific Research Institute of the Maritime Fleet, Leningrad, "Transport,"
1330 copies]

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AUTOMATED CONSTRUCTION CONTROL SYSTEMS

Kiev AVTOMATIZIROVANNYYE SISTEMY UPRAVLENIYA STROITEL'STVOM in Russian
1979 pp 3-4

[Foreword by Academician V. S. Mikhalevich of the Ukrainian SSR Academy of Sciences, deputy director of the Institute of Cybernetics of the Ukrainian SSR Academy of Sciences]

[Text] At the beginning of 1964 the Institute of Cybernetics of the Ukrainian SSR Academy of Sciences and the Scientific Research Institute of Automated Systems in Construction of the Ukrainian SSR Gostroy, under the leadership of Academician V. M. Glushkov and with the active participation of the author of this book, for the first time applied network methods and computers for the control of such large construction sites as the Burshtynskaya GRES, the Severodonetsk Chemical Combine and the metropolitan bridge across the Dnepr River in Kiev. Still earlier the optimum flow of the construction of heat and electric power stations in the Ukraine was calculated by computer. That work laid the basis of a transition to automated construction control systems in the Ukrainian SSR. In creating them the planners used as a basis a definite theoretical foundation and the considerable experience in ASU development accumulated in industry and other sectors of the national economy.

The main effect given by automated control systems is achieved as a result of the production of complete, timely and optimum solutions. In construction, by virtue of its specific features, this is assured above all by the introduction of tasks in calendar planning, the use of network models for the erection of objects that have positively recommended themselves. And so it is no accident that one of the most important principles in the creation of construction ASU's is the principle of new tasks, the individualizing of which involves the construction of technological models of buildings and structures and the application of effective methods of calendar planning. Such an approach is accepted as the main one in the presentation of material in the present textbook.

Other important principles which have found reflection in the book is the adoption of the integrated system for control of all the main tasks of

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production and economic activity, the wide use of standard planning solutions, the obligation to improve in the transition to ASU's with an organizational structure, material and moral stimulation and legal support.

These questions were also examined in the first edition of the book, which was well received in the periodical press and became well known among all engaged in ASU creation, and also among instructors and students of corresponding courses in construction and other technical VUZ's.

In the second edition the most important scientific principles of the creation of effective ASU's were revealed far more widely. They are revealed in all the pages of the book, which up to now has remained the only textbook on ASU's in construction and, perhaps, the most fundamental work in the area.

In preparing the second edition the author gathered much new material from the works of scientific research, planning and production organizations, creatively processed that material and in the final account combined it into a fairly harmonious system.

The presented text will undoubtedly be useful both for the training of engineers in ASU in construction, which has been expanded in recent years, and also for a broad circle of workers of construction and planning organizations.

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Izdatel'stvo ob'yedineniye "Vyshcha shkola," 1979, s izmeneniyami
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AUTOMATED CONSTRUCTION CONTROL SYSTEMS

Kiev AVTOMATIZIROVANNYYE SISTEMY UPRAVLENIYA STROITEL'STVOM in Russian
1979 signed to press 26 Feb 79 pp 2-4, 7-9, 400, 453-455, 478-479

[Annotation, table of contents, introduction and excerpts from book by V. I. Rybal'skiy, in the series, Educational Aids for VUZ's, 2nd revised and enlarged edition, Kiev, Vyshcha shkola. Golovnoye Izdatel'stvo, 8000 pages, 480 pages]

[Text] Annotation

The principles of the planning and creation of automated construction control systems are revealed in the book, the elements of ASU theory are presented, as are methods and models of optimum planning and methods and examples of the planning and introduction of automated systems in large constructions and associations. The second edition has been substantially revised with consideration of the latest achievements in the area of control of construction. For students of construction specialties of VUZ's.

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[Excerpts] Introduction

In recent years much work has been done on the creation of ASU's in all sectors of the national economy. In the Ninth Five-Year Plan (1971-1975) over 2300 automated and automatic control systems were put in operation in the country, including 195 sector, departmental and inter-sector systems, over 1400 automated enterprise management systems, over 600 automated systems for the control of technological processes and about 100 automated data processing systems (Fig 1). The total saving from the use of ASU's was about 2 billion rubles.

In 1976-1980 the saving from the use of electronic computers and ASU will amount to about 3.8 billion rubles.

The first lines of a number of automated construction control systems are now functioning successfully--the ASU of Glavmosstroy, of the Construction Ministries of the Belorussian, Moldavian, Lithuanian and Estonian SSR, of Glavyuzhuralstroy, Glavzapstroy and Glavpoles'yevodstroy, house-building combines in Moscow, Khar'kov, Minsk, etc. Great successes have been achieved by the builders of industries of heavy industry of the Ukraine, who are using contemporary network models and ASU's on very large construction sites of the Donbass and Pridneprov'ye. Automated information systems are being introduced in all the construction ministries, and the erection of 1500 very important facilities is being monitored with their help. In the USSR Ministry of Construction of Heavy Industry Enterprises, Ministry of Industrial Construction and Ministry of Construction in 1976 40 percent of the organizations used various types of automated systems.

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In all in 1971-1975 15 times more automated systems were introduced into construction than in the preceding 5 years (while the average growth of ASU in the national economy was 6 times). More than 1000 tasks were embraced by those systems, and the total saving from their resolution amounted to more than 100 million rubles in the Five-Year Plan [121]. By 1978 the number of automated construction control systems had reached 480; more than 14,000 specialists participated in their development and introduction.

The greater attention to the creation of ASU's in construction is natural. It is caused not only by the great importance of that sector for the development of all other sectors of the national economy but also by its well-expressed specifics, which is manifested above all in the complexity of the coordination of the activity of numerous construction and specialized subdivisions, at times subordinate to various departments but working together on construction sites, and also in the substantial influence of climatic conditions and the scattering and variety of facilities being erected.

At the present time work has also been expanded on ASU creation in more than 150 large VUZ's of the country. Experience shows that even the introduction of individual ASU subsystems substantially increases the quality of the educational process, assures rhythmic work of VUZ subsections, releases personnel and instructors from laborious routine work and creates the conditions for complex analysis of the activity of a VUZ.

In the Tenth Five-Year Plan, in accordance with the decisions of the 25th CPSU Congress, the further development of ASU's and improvement of their effectiveness is being assured [1].

The implementation of a large program of ASU creation requires a continuous growth of the output of contemporary technical means of the automation of control. In the Ninth Five-Year Plan electronic computer production increased 30 percent each year in our country, and the total quantity of newly created computer centers surpassed 3000. In the Tenth Five-Year Plan the production of computer hardware will increase 4 times. A powerful network of computer centers is being created on the basis of departmental networks of the construction ministries.

Specially prepared personnel are necessary to put into operation and efficiently use automated control systems. Firstly, a large number of ASU engineers--specialists in the planning, creation and operation of systems (there were more than 200,000 of them in 1976, as against 20,000 in 1971), and secondly, all management and engineering technical workers ought to obtain sufficient training in ASU to successfully work under the conditions of the scientific and technological revolution. In connection with that, in a number of VUZ's of the country ASU faculties have already been created and are functioning, and the course "Automated construction control systems" has been introduced for all construction engineering specialties. Much work is being done on the re-training of management personnel, for which a broad network of courses, faculties and institutes for higher qualifications is

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used. Since October 1978 the Academy of the National Economy of the USSR has been functioning, in which the highest managers of the national economy of the country have been improving their knowledge. Special institutes have been created in the Ukrainian SSR and other union republics.

[Excerpts]

The further development of the YeS electronic computers will take place through the creation of two-machine and two-processor complexes, and also by the connection of specialized processors to single machines and complexes. The already operating "E1'brus-1" multiprocessor complex has a capacity of up to 12.5 million operations per second, and the "E1'brus-2" has one of over 100 million operations per second.

About 15 years have passed since the start of the first work on ASU's in construction. Experience shows that the real periods of ASU planning and creation are very long. Eight years passed from the start of work on the ASU Glavmosstroy until the first line went into operation; for the ASU Glavkiyevgorstroy that period also was about 8 years, and for the ASU Glavverkhnevolzhstroy it was 5 years. The creation of the ASU Glavleningradstroy took about 10 years. At least 7-9 years will pass from the start of planning to complete turnover to operation of the ASU of the Ministry of Construction of the Estonian and Moldavian SSR, the Glavmosoblstroy, the "Dneprometallurgstroy" combine and a number of other large production associations, the first lines of which were put in operation during the Ninth Five-Year Plan.

The time required for work on the planning and introduction of automated information systems of construction ministries and glavks is shorter: for the first line of the AIS of the UkrSSR Ministry of Construction of Heavy Industry Enterprises [117] it was 3 years (10 years for the entire system), the Glavbashstroy of the USSR Ministry of Industrial Construction -- 3 years, etc. The creation of an ASU of a house-building combine or trust takes approximately the same time (for example, the ASU of the trusts "Kurganzhilstroy" 4 years and "Mosenergostroy" 3 years).

Consequently, at the present level of development the real times required for ASU creation for large construction associations should be considered to be 5-8 years from the start of development to putting in operation. For individual home-building combines and trusts the real time is 3-4 years. The creation of automated information systems of associations and relatively small construction ministries is possible in 3-4 years, and of union and large republican ministries is 3-5 years. Let us note for comparison that according to a normative document [3] at a labor intensiveness in ASU creation of 100-180 man-years the periods required vary from 3 to 3.9 years.

The total expenditures on creation of a system are composed mainly of the cost of development of the plan and expenditures necessary to acquire equipment and erect the buildings and structures provided for by the plan.

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The total cost of most systems for very large construction associations and republican ministries reaches 5-15 million rubles, including expenditures on planning work amounting to 2-6 million rubles and capital investments amounting to 3-9 million rubles. Thus, according to the plans the cost of the ASU Glavkiyevgorstroy was about 10 million rubles, of the ASU Bratskgesstroy was 14 million, of the Tatneftestroy was 10 million rubles, and of the Moldavian SSR ministry of Construction was more than 8 million rubles. The cost of the ASU's of associations of the type of construction combines, including a number of trusts and enterprises, fluctuates in the range of 4-8 million rubles, including expenditures on planning work of 1.5-3 million rubles and capital expenditures of 2.5-5 million rubles. The approximate cost of the ASU's of large construction organizations (trusts, house-building combines, etc) is 1-2 million rubles, of which expenditures on planning work are 0.4-0.8 million rubles and capital investments of 0.6-1.2 million rubles. Thus the cost of the Khar'kov House-building Combine-1 ASU is 1.6 million rubles, and the planning work on the ASU of the relatively small trust "Kurganzhilstroy" costs about 0.4 million rubles.

According to "Guide for ASU planning and creation in the general construction trusts of the USSR Ministry of Industrial Construction," prepared in 1976 by the Scientific Research Institute of Industrial Construction, the expenditures on the development of a trust ASU are 0.8 million rubles, on the acquisition of equipment and other expenses, 1.4 million rubles, and the economic effectiveness is 1 million rubles a year.

For comparison let us note that the cost of planning work on an automated enterprise management system according to data of the USSR Academy of Sciences Central Economic Mathematics Institute is 0.6-0.75 million rubles, the capital investments are more than 1 million rubles and the annual economic effect is 0.45-0.6 million rubles [102].

According to [3] the expenditures on the equipment complex of an ASU are approximately 0.35-0.4 million rubles for 2,000 workers, 1.5-2 million rubles for about 8,000 men and 3-4 million rubles for over 8,000 workers. Single-time expenditures on the ASU creation amount to approximately 10-20 percent of the cost of the active fixed assets.

The calculated repayment period of ASU's of large construction associations and organizations usually fluctuates in the range of 3-3.5 years (for example, 3.5 years for the ASU's of the Glavkiyevgostroy, the ministries of construction of the Lithuanian and Moldavian SSR and the combine "Dneprometallurgstroy," 3 years for the House-building Trust No 1 in Moscow and Khar'kov, etc). In the better construction ASU's that period is 1.5-2 years. For comparison let us note that in industry the repayment period is 3.2 years on the average.

The above-presented factual results of the functioning of a number of construction ASU's that have been put in operation and their separate parts convincingly affirm the approximate information on the effectiveness and

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repayment periods of automated systems. In the ASU Glavmosstroy alone in the years of the Ninth Five-Year Plan a saving of 30 million rubles was obtained, and in the Belorussian Ministry of Industrial Construction, over 10 million rubles. On the whole for the USSR Ministry of Industrial Construction in 1975 the saving from the automation of control was more than 24 million rubles. According to [121], the annual saving brought by the trust ASU in conducting operations of 50-70 million rubles a year amounts to 500-700 thousand rubles on the average.

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WORKS OF THE ORDER-OF-THE-RED-BANNER INSTITUTE OF APPLIED GEOPHYSICS: TECHNIQUES FOR CONDUCTING ROCKET AND SATELLITE INVESTIGATIONS IN THE UPPER ATMOSPHERE

Moscow TRUDY ORDENA KRASNOGO ZNAMENI INSTITUTA PRIKLADNOY GEOGIZIKI: METODIKA RAKETNYKH I SPUTNIKOVYKH ISSLEDOVANIY V VERKHNEY ATMOSFERE in Russian No 36, 1979 p 151

[Abstracts of two articles from the collection of works "Trudy Ordena Krasnogo Znameni Instituta Prikladnoy Geofiziki: Metodika Raketnykh i Sputnikovykh Issledovaniye v Verkhney Atmosfere" edited by A. Ye. Mikirov, doctor of physical and mathematical sciences, and S. I. Avdyushin, candidate of technical sciences, Moscow branch, Izdatel'stvo Gidrometeoizdat, signed to press 11 March 1979, 430 copies, 151 pages]

UDC 550.3:62-50

MODELING INFORMATION INTERACTION IN A GEOPHYSICAL INFORMATION COLLECTION AND PROCESSING CENTER WITH THE HELP OF THE SPECIALIZED LANGUAGE SOL

KADYROVA, I. M., KOSOV, A. S., KRIVCHIKOVA, V. P., MAGARNU, G. A., and FRISHBERG, F. M., pp 99-108

[Text] In order to investigate automated information and computation systems having a complex structure and functions, it is advisable to use simulation modeling utilizing specialized languages. In this article the authors discuss questions relating to the modeling of information flows in the section of a geophysical information and computation system carrying the heaviest load, which is the geophysical information collection and processing center. The simulation model of the information interaction is realized in the modeling language SOL. Figures 3; references 6.

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MATHEMATICAL MODEL OF AN INFORMATION EXCHANGE SYSTEM

AVDYUSHIN, S. I., DLIKMAN, F. L., DAVYDOV, V. YE., and FRISHBERG, F. M.,
pp 109-119

[Text] The authors discuss the construction of a mathematical model of a system for exchanging information between an information processing center, on the one hand, and information collection and utilization points, on the other. They demonstrate the possibility of formalizing the information exchange process as a queueing process with a limited course. The authors also derive the dependences of the basic servicing characteristics on the system's parameters and the information flows' intensity. Figures 10; references 4.
[296-11746]

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PRINCIPLES OF THE CREATION OF LARGE AUTOMATED CONTROL SYSTEMS

Moscow OSNOVY SOZDANIYA BOL'SHIKH ASU in Russian 1979 pp 2, 3, 4, 4-7, 358-360

[Annotation, excerpts from foreword and table of contents from the book "Osnovy Sozdaniya Bol'shikh ASU" by Valentin Aleksandrovich Baranyuk, Yevgeniy Semenovich Bichugov, Aleksandr Ivanovich Cherkashchenko and Shamil' Umyarovich Urazgel'diyev, Izdatel'stvo Sovetskoye Radio, signed to press 27 November 1978, 10,600 copies, 360 pages]

[Excerpts] ANNOTATION

The authors explain the basic stages of the creation of ASU's [automated control system] and the principles of the development of all types of functional support for such systems.

This book is intended for the supervisors of administrative, scientific, engineering and technical personnel engaged in the development and construction of large ASU's, as well as students and graduate students.

FOREWORD

Controlling economics and a national economy as a whole is an extraordinarily complex and laborious process. It is sufficient to say that more than 10 million people -- about 14 percent of the entire force of workers and employees -- are engaged directly in the control field in various areas of the USSR's national economy at the present time.

The development of a single annual plan in USSR Gosplan requires the processing of several million documents, including tens of millions of indicators. The development of one variant of the plan alone requires more than 80 billion computations. Each ministry processes an average of more than 500,000 documents per year, while the volume of information arriving at

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USSR Gosstab exceeds the amount of information used by USSR Gosplan and the USSR TsSU [Central Statistical Administration]. It is expected that by 1980 the amount of computational work done in USSR Gosstab's organizations will increase by a factor of 2.5 in comparison with 1974.

The years of the Ninth Five-Year Plan saw the accumulation of a considerable amount of experience in planning, building and using automated systems in the sphere of practical control. About 1,500 ASU's and 2,000 computation centers were set up, on different levels and for different purposes, and the production of computer facilities increased by a factor of 2.4, including an increase in computer production by a factor of 2.6. The plan for the 10th Five-Year Plan provides for a further increase in computer hardware production by a factor of 1.6.

The use of modern mathematical-economics planning methods, in combination with the introduction of ASU's and computer technology, makes it possible to reduce capital investments by 10-15 percent, increase gross production output by 7-8 percent, and shorten the planning period for new articles by 67-80 percent while simultaneously improving their technical and economic indicators by 5-15 percent.

It is characteristic that as the scale of automation increases, the overall effect from improving the quality of planning and the operativeness of control that is achieved by the integrated introduction of modern mathematical-economics and ASU's is growing rapidly. According to data gathered by Academician V.M. Glushkov, the introduction of an ASU makes it possible to improve resource utilization by the following amounts: at enterprises -- 10-15 percent, in firms -- 50-60 percent; on the scale of branches and ministries -- at least 100 percent.

There are well known examples where even the partial optimization on a computer of plans that are maximally "condensed" by standard methods makes it possible to increase a branch's production volume by an amount of up to 100 million rubles. In connection with this, if all the necessary calculations were made manually, the control apparatus would have to be enlarged hundreds of times.

According to the most modest estimates, the integrated introduction of ASU's will save this country tens of millions of rubles per year and will make it possible to change over to prospective 15-20 year, continuous, "sliding," average-period and current planning with yearly correction of State, branch and other goals and plans.

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The creation of an ASU is a complicated and expensive process. In the Eighth and Ninth Five-Year Plans, the total expenditures for the creations of ASU's and VTs's [computation center] were 1 and 4.5 billion rubles, respectively.

In this country, more than 800 scientific and planning organizations are engaged in the development of automated systems. The labor-intensiveness of the development of the plan for a single ASU averages 50,000 man-days, which is approximately 4 years of work for a collective of 40-50 people.

During the first 3 years of the Ninth Five-Year Plan, the cost of ASU development for enterprises was halved, from 700,000-800,000 to 300,000-400,000 rubles, and is continuing to be reduced by standardization of planning decisions and centralization of the planning process.

Calculations show that when the optimum structure of the computer pool is achieved, expenditures for the creation of ASU's in the USSR will decrease by a factor of 2-2.5. In addition to this, when progressive areas for the development of ASU's are provided, their amortization periods will not exceed 2-3 years and the efficiency coefficient of capital investments for the creation of ASU's and the introduction of computer technology will increase by a factor of at least 1.5.

The extensive development of control automation projects required the solution of a large number of complex problems related to the rational formulation and organization of projects for the creation and introduction of ASU's; standardization of planning decisions; planning and financing the work; determining the economic effectiveness of the systems being created; observing the principles of organizational, methodological and technical unity.

Two All-Union Conferences on the Use of Computer Technology and Automated Control Systems in Enterprises and Industrial Branches, which were organized by the USSR Council of Ministers' State Committee on Science and Technology, were devoted to a discussion of these problems. A detailed analysis of the work that has been done was given at the conferences and specific recommendations were made for the further improvement of the effectiveness of the utilization of computer technology and automated systems.

A large contribution to the solution of the most important problems involved in creating ASU's was made by the publication of the following basic guidance documents: "Branchwide Methodological Guidance Materials for the Creation of Automated

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Enterprise Control Systems (ASUP)"; "Guidance Instructions for the Development and Introduction of Branch Automated Control Systems (OASU)"; "Unified Order and Specifications for the Development and Introduction of Automated Information Processing, Retrieval, Storage, Output and Transmission Subsystems"; "Guidance Instructions for the Creation and Equipping of Main Computation Centers (GVTs) for Branch Automated Control Systems (OASU)"; "Provisional Techniques for Determining the Economic Effectiveness of Automated Enterprise Control Systems."

In recent years different publishing houses in the USSR have published a number of books and monographs on the subject of the creation of ASU's, hardware and software. The most important of them are: "Introduction to ASU's," by V.M. Glushkov; "Methods for Developing Automated Control Systems," by A.G. Mamikonov; "Principles of Modern Control Engineering," by V.I. Loskutov; "Handbook for the Designer of Automated Production Control Systems"; "Software for Digital Control Computers," by V.V. Lipayev, K.K. Kolin and L.A. Serebrovskiy; "Control Computer Software," by S.Ya. Vilenkin and E.A. Trakhtengerts, and so on. A number of translated books and articles by foreign authors have also been published.

Despite the known abundance of literature on ASU's, until now only a few questions concerning the creation of automated systems have been discussed to some degree or other. At the present time there are practically no sources that have an integrated discussion of all the basic stages in the creation of large, automated organizational and administrative control systems containing a large number of information and computation complexes that are dispersed over a considerable area and connected to each other by a unified data exchange system.

This book is a systematized handbook that is intended to be of assistance to supervisory personnel in making decisions on the creation of large ASU's, evaluating their expected effectiveness and the necessary labor, monetary and other expenditures, and organizing and planning work on the creation of large ASU's.

In this book there are brief explanations of all the basic stages in the creation of large ASU's, beginning with an analysis of control processes that are subject to automation and continuing up to the choice of the hardware, structural layout and operation algorithm of an ASU, the development of software and network schedules for the introduction of an ASU, testing and operation, and evaluating the effectiveness of large ASU's. In accordance with this book's purpose, its basic emphasis is on describing the content aspect of the problems encountered in developing automated systems.

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The material in this book reflects the experiences of a number of organizations and the authors' personal experiences in the practical creation of large ASU's. In some cases the recommendations are of a special nature that are specific for individual ASU's.

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ARTIFICIAL INTELLIGENCE

Kiev ALGORITHMY RAZUMA in Russian 1979 pp 4-7

[Book by N. M. Amosov, academician]

[Excerpts] Is it possible to create an artificial intellect? Will it be capable of doing full-fledged thinking and creating? Whom will he become -- the assistant or the rival of the human intellect? All these questions have been discussed by many scientists for a long time.

N. M. Amosov, academician of the AN Ukrainian SSR, expresses his viewpoint on these questions. The author is well known for his papers in the field of simulating thinking and behavior. This book expresses his ideas on their further development. Possible ways to design an artificial intellect are analyzed. The experience of the Biocybernetics Department of the Cybernetics Institute of the AN Ukrainian SSR on simulating the intellect and personality is summarized.

This book is intended for a wide circle of specialists in the field of cybernetics, psychologists, as well as all those interested in the problems of modern science.

Number of copies printed -- 37,000.

Heuristic simulation by N. M. Amosov, unlike dynamic simulation by J. Forrester, operates basically with nonlinear characteristics of components and not with their differential equations, although the use of the latter is not excluded. This is permissible because only constantly active established relationships are being studied (the limited area of consideration in this book will be discussed below). The undoubted success of using imitation simulation methods and the rapid dissemination observed at present are due to the fortunate distribution of the "duties" between man and machine. Man devises component-by-component characteristics well while the machine correlates them well into a single system of equations whose solution obtains the sought-for results. The weak side of imitation simulating methods is their subjective nature. When the author's concept of the models of the component characteristics of the object changes, the models change also.

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Moreover, there are practically as many authors as there are models. It is difficult to find two authors with entirely the same concepts of objects. It is pertinent here to remind the reader of the existence of other objective methods of simulation such as the method of heuristic self-organization of models, based on processing a small table of experimental data. The difference is that imitation simulating methods, not requiring experimental data, make it possible to obtain models of several correlated objects, while experimental methods produce a model of a concrete personality, a collective and society.

This book considers the imitation simulation of the indicated objects in the stated plan. At first, the artificial intellect may not achieve full coincidence between the model and the object. In the beginning, simulation may solve only part of the urgent problems of interest to us.

The basic limitations are as follows: the dynamics of the target selection process (target assumption) and forming the "set-up" are not considered; the target of the object and the system of behavior rules are considered as given or already developed; emotion is not simulated; only the nonrandom, regular component of the psychological processes is considered; the dynamics are not taken into account inasmuch as the system component equations are considered as steady state characteristics.
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SOVIET DISSERTATIONS ON COMPUTER TECHNOLOGY

Moscow KNIZHNAYA LETOPIS'. DOPOINITEĹ'NYY VYPUSK in Russian No 3, 1980
pp 251, 252, 253, 255

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