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26 DECEMBER 1979

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AUTOMATION TECHNOLOGY  
(FOUO 4/79)

1 OF 2

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JPRS L/8831

26 December 1979

# USSR Report

CYBERNETICS, COMPUTERS AND  
AUTOMATION TECHNOLOGY

(FOUO 4/79)



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JPRS L/8831

26 December 1979

USSR REPORT  
CYBERNETICS, COMPUTERS AND  
AUTOMATION TECHNOLOGY

(FOUO 4/79)

This serial publication contains articles, abstracts of articles and news items from USSR scientific and technical journals on the specific subjects reflected in the table of contents.

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I. DEVELOPMENT AND PRODUCTION OF COMPUTERS AND CONTROL EQUIPMENT

A. General Treatment

Translations of Articles

USSR

UDC 658.012.011.56

THE PROBLEM OF ESTIMATING THE QUALITY OF COMPUTER SYSTEMS

Moscow VYCHISLITEL'NAYA TEKHNIKA SOTSIALISTICHESKIKH STRAN [Computer Technology of the Socialist Countries] No 4, 1978 pp 49-60

YNITSKIY, A.

[Translated from Moscow REFERATIVNYY SBORNIK. ORGANIZATSIYA UPRAVLENIYA No 2, 1979 Abstract No 2.67.192 by Yu. P. D.]

[Text] The lack of any precisely defined criteria for evaluating the quality of electronic computers and computer systems, which should encompass their most important parameters, is explained by the fact that planners consider the natural trends toward maximum growth of various indices. These trends can be reduced to an increase in the speed of data processing and input/output speed, an increase in memory capacity and more rapid memory access times, an increase in reliability and economy of hardware, and an increase in the convenience of hardware and of representation of the results of processing. However, the speed of processing of data remains dominant, in spite of the fact that estimates based on this parameter are widely known to be ambiguous. For this reason, for example, certain jobs can be more effectively run on machines with significantly lower basic speeds, but better internal organization. The time loss to accessing peripheral storage, in primitive or unsophisticated input/output control, sequential control, etc., has a significant influence on the throughput capacity of the machine. It follows from this that the most precise estimate of the quality of computer systems should be based on precisely defined effectiveness criteria. The more effective system could then be called better, the system with maximum effectiveness for a given area of application would be called optimal. A general

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approach is described to the estimation of effectiveness of computer systems. An attempt is made at construction of a universal quality criteria, considering all the structural, physical, operational and economic parameters.

[426-6508]

6508

CSO: 1863

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B. Unified System or Ryad Series

Translations of Articles

USSR

UDC 681.322

THE YeS 1025 ELECTRONIC COMPUTER

VYBER INFORM. Z. ORGANIZ A VYPOC. TECHN. in Czech 1978 No 6 pp 736-743

Unsigned

[From REFERATIVNYY ZHURNAL, AVTOMATIKA, TELEMEXHANIKA I VYCHISLITEL'NAYA TEKHNIKA in Russian No 6, 1979 Abstract No 6B211 by A. D. Plitman]

[Text] A brief description and the basic characteristics of the YeS 1025 computer, developed in the CSSR as a part of the second series of YeS computers, are presented.

The YeS 1025 processor contains the following relatively independent modules: the service module, connected to the panel and operator's display, as well as the service floppy disc memory; the operating module, which performs arithmetic and logic processing of data; the "disk" module, which performs the functions of a selector channel and controls the magnetic disk drive; the "tape" module, which connects the operating module and main memory to the magnetic tape drive; the module for communication with remote terminals; the multiplex module with 32 subchannels; the 128K byte main memory module with 500 ns read time, 750 ns write time, and the organizing module.

The processor operates at 38000 operations per second. Any peripheral device designed to operate with the first or second series of YeS computers can be connected to the 1025 processor. The YeS 1025 operates under the control of the DOS 3/YeS virtual operating system, designed for YeS 1015 and YeS 1025 computers, although it can also operate with the YeS 1035 and YeS 1045 computers.

[439-6508]

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UDC 681.322

CONCEPTS OF DEVELOPMENT OF THE SECOND SERIES OF YeS COMPUTERS

VYBER INFORM. Z ORBANIZ A VYPOS. TECHN. in Czech 1979 No 6, pp 729-736

KLOUCEK JAROMIR

[From REFERATIVNYY ZHURNAL, AVTOMATIKA, TELEMEXHANIKA I VYCHISLITEL'NAYA  
TEKHNIKA in Russian No 6, 1979 Abstract No 6B210 by A. D. Plitman]

[Text] It is reported that the second series of YeS computers is a further development of the basic principles of logical organization of the first series of YeS computers intended to: achieve higher technical and economic indices (particularly improving the "productivity/cost" coefficient by 2 to 3 times in comparison to the first series of YeS computers), expand the range of functional capabilities and improve the parameters of operating systems, create a well-developed internal structure for the processor and input/output system, based on the use of modern hardware components.

Considerable attention has also been given to increasing the capabilities for remote data processing and utilization of the time sharing mode, increasing the effectiveness of testing and diagnostic equipment and servicing systems, achieving the possibility of organizing multimachine and multiprocessor systems, the formation of problem-oriented programming systems, and processing of data in systems at various levels.

The basic differences between the YeS computers of the first and second series are analyzed; their parameters and the characteristics of the components of which they are made are compared, and information is presented on new types of peripheral devices developed for the second series of YeS computers. Tables 5.

[439-6508]

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UDC 681.322.06

EXPERIMENTAL INTEGRATED DATA BASE, ITS PLANNING AND ACTUALIZATION ON THE  
YeS 1030 COMPUTER

MECH., AUTOMAT. ADMIN. in Slovak 1978 Vol 18 No 12, pp 452-456

LIESKOVSKY PETER and ANTONIC FRANTISEK

[From REFERATIVNYY ZHURNAL, AVTOMATIKA, TELEMEXHANIKA I VYCHISLITEL'NAYA  
TEKHNICA in Russian No 6, 1979, Abstract No 6B162 by I. M. Shenbrot]

[Text] A data base management system run on the YeS 1030 computer at the  
Computer Center of the Statistical Administration of Slovakia in Bratislava  
under the OS operating system is described.

[439-6508]

USSR

UDC 681.322

A HIGH-SPEED FAST FOURIER TRANSFORM PROCESSOR

Kiev VYSTRODEYSTVUYUSHCHIY PROTSSESSOR BYSTROGO PREOBRAZOVANIYA FUR'YE in  
Russian 1979 12 pages

KANEVSKIY, YU. S., MADYANOVA, N. YE., NEKRASOV, B. A. and FEDOTOV, O. A.,  
Kiev Polytechnical Institute

[From REFERATIVNYY ZHURNAL, AVTOMATIKA, TELEMEXHANIKA I VYCHISLITEL'NAYA  
TEKHNICA in Russian No 6, 1979, Abstract No 6B245 DEP by the authors]

[Text] A high-speed processor which performs a non-redundant fast Fourier  
transform in a base two system on N-512 complex readings in T-500  $\mu$ s is  
described. The processor consists of two selected memory units, a main  
arithmetic processor, a control device and a module for the formation of  
weight coefficients.

The specifics of the processor include a fortunate selection of algorithm  
and coordination with memory device structure, as well as organization of  
information interchange with the arithmetic unit, allowing the read/write  
rules in the memory unit to be retained constant for all iterations, thus  
simplifying the control device.

[439-6508]

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C. Hardware

Translations of Articles

USSR UDC 681.327.69'22

DIALOGUE INFORMATION DISPLAYS USING CATHODE-RAY TUBES

Moscow DIALOGOVYYE USTROYSTVA OTOBRAZHENIYA INFORMATSII NA ELEKTRONNO-LUCHEVYKH TRUBKAKH in Russian Statistika Publishers, 1977 184 pp

BATANIST, M. L., GORELOV, V. I., PETROV, G. M., RATNIKOV, A. N., SOROKO, L. G., TARASEVICH, V. M. and TOLMACHEV, A. M.

[From REFERATIVNYY ZHURNAL, AVTOMATIKA, TELEMEXHANIKA I VYCHISLITEL'NAYA TEKHNIKA in Russian No 4, Apr 78 Abstract No 4B531K by V. A. Garmash]

[Text] The book is devoted to two types of CRT information display dialogue devices, developed for the unified series of computers: the YeS-7906 alphanumeric information display and the YeS-7064 graphical information display. The engineering design solutions used in these devices, the operational features and programming principles are treated.

[441-8225]

USSR UDC 681.327.69'22+658:012.011.56

THE USE OF THE "VIDEOTON-340" VIDEO TERMINAL WITH A PRINTER ON-LINE WITH THE BESM-6 FOR ELECTRICAL POWER NETWORK ENTERPRISE DATA PROCESSING

Dubna OB"YEDIN. INSTITUT YADER. ISSLED. in Russian No 10-10850, 1977 7 pp

KADANTSEV, S. G., MAZNYI, G. L., SAPOZHNIKOV, A. P. and SEMASHKO, G. L.

[From REFERATIVNYY ZHURNAL, AVTOMATIKA, TELEMEXHANIKA I VYCHISLITEL'NAYA

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TEKHNIKA in Russian No 4, Apr 78 Abstract No 4B561K]

[Text] The software design for the solution of several electrical power network enterprise problems using the "Videoton-340" display, coupled to a BESM-6 computer, is described. The proposed software is designed for working in the "Dubna" operating system.

[441-8225]

USSR

UDC 681.327.662

AN INFORMATION READER AND WRITER

Moscow USTROYSTVO DLYZ ZAPISI I SCHITYVANAYA INFORMATSII, USSR Patent No 542239 in Russian Cl G 11 C 7/00, Claimed 13 Feb 75 Published 30 Mar 77

DARBINYAN, A. A., AVETISYAN, T. A. and ZAKHARYAN, G. A.

[From REFERATIVNYY ZHURNAL, AVTOMATIKA, TELEMEXHANIKA I VYCHISLITEL'NAYA TEKHNIKA in Russian No 4, Apr 78 Abstract No 4B315]

[Text] An information readout and writing device is proposed, which contains a three winding transformer, the center tap of the first and second windings of which are connected to the outputs of the first and second write switches respectively and through resistors to the power supply. The taps of the third winding of the transformer are connected to the inputs of the read unit. For the purpose of increasing the operational speed and device reliability, two diodes and a resistor are introduced into it. The anodes of the diodes are connected to the center tap of the first and second transformer windings respectively, while the cathodes are connected together and connected through a resistor to the power supply. Figures 1; references 2.

[441-8225]

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UDC 681.325.54

A SCALER

Moscow PERESCHETNOYE USTROYSTVO, USSR Patent No 553749 in Russian Cl. H 03 K 23/02 Claimed 19 Mar 76 Published 13 Jun 77

ZAGURSKIY, V. YA., Institute of Electronics and Computer Engineering of the Latvian Academy of Sciences

[From REFERATIVNYY ZHURNAL, AVTOMATIKA, TELEMEXHANIKA I VYCHISLITEL'NAYA TEKNIKA in Russian No 4, Apr 78 Abstract No 4B219P]

[Text] A scaler containing potential type logic gates is well known. The drawbacks to the known device are limited capacity and a slow operational speed. The device which is closest to the proposed scaler contains two AND gates, an OR gate and an inverter in each stage, in which case, the outputs of the AND gates are connected to the inputs of the OR gate, the output of which is connected to the inverter. A drawback of the well known device is the comparatively slow speed, something which is related to the necessity of employing three-phase synchronization. The purpose of the invention, increasing the speed, is accomplished in that in the scaler, each stage of which contains two AND gates, an OR gate and an inverter, where the outputs of the AND gates are connected to the inputs of the OR gate, the output of which is connected to the inverter, a third AND gate is introduced into each stage, the output of which is connected to the input of OR gate, while the inputs are connected to the first inputs of the first and second AND gates, which are connected to the output of the inverter of the preceding stage and to the clock bus respectively. A fourth AND gate is introduced into one of the stages, where the output of the AND gate is connected to the input of the OR gate for this digit, the inputs are connected to the outputs of the inverters of the two other stages, while the output of the OR gates is connected to the second input of the first and second AND gates of this digit. In the case of an even number of stages, in all of the stages but one, the output of the OR gate of the preceding stage is connected directly to the combined inputs of the first and third AND gates of the next stage, the second inputs of the third AND gates are connected to the paraphase clock buses respectively.

[441-8225]

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UDC 681.323

A COMPUTER SYSTEM

Moscow VYCHISLITEL'NAYA SISTEMA USSR Patent No 551655 Cl. G 06 F 15/36,  
Claimed 11 Aug 75 Published 23 Jun 77

BELOV, V. A. and VETSHEV, ZH. N. [Siberian Physics and Engineering  
Institute at Tomsk University]

[From REFERATIVNYY ZHURNAL, AVTOMATIKA, TELEMEXHANIKA I VYCHISLITEL'NAYA  
TEKHNIKA in Russian No 4, Apr 78 Abstract No 4B160P]

[Text] A computer system containing an electronic computer is proposed.  
For the purpose of expanding the functional capabilities by means of  
providing for the capability of computing the probability characteristics  
of random processes, the computer system contains a series connected code  
to a voltage converter, a comparison unit, a first AND gate, an OR gate  
and a switch. The information input of the system is connected to the  
information input of the comparison unit. Figures 1; references 2.

[441-8225]

USSR

UDC 681.327.21:534.78(088.8)(47)

AN INFORMATION INPUT UNIT

Moscow USTROYSTVO DLYA VVODA INFORMATSII, USSR Patent No 551637 in Russian  
Cl. G 06 F 3/16, Claimed 29 Dec 75, 23 Jun 77

VOLODKOVICH, YE. F., GONCHAROV, YU. P., ZENIN, V. YA., KUDREVATYKH, S. I.,  
MASLYUKOV, V. A., NIKOLAYEV, R. P. and SYCH, V. P.

[From REFERATIVNYY ZHURNAL, AVTOMATIKA, TELEMEXHANIKA I VYCHISLITEL'NAYA  
TEKHNIKA in Russian No 4, Apr 78 Abstract No 4B430P]

[Text] An information input device is proposed which contains: electro-  
acoustical transducers, coupled to linear coordinate microphones, (B)  
controls and to one of the inputs of the pulse-time converters, the other  
inputs of which are connected to the outputs of the B control, the linear  
coordinate microphones and the clock pulse generator; first and second  
coordinate counters (S), the inputs of which are connected to the outputs  
of the pulse-time converters and to the outputs of the B control, the  
input of which is connected to the output of the first decoder, which is  
coupled to the first coordinate counter. Included in the complement of

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the device are two correction coefficient counters and a second decoder, the inputs of which are connected to the output of the B control and the digit output of the first correction coefficient counter, the setting input of which is connected to the output of the B control, while the count input is connected to the output of the clock pulse generator. The digit inputs of the first correction coefficient counter are connected to the digit outputs of the second coordinate counter and the second correction coefficient counter, the count input of which is coupled to the output of the first decoder, which is connected to the inputs of the pulse-time converters. The device can be used, in particular, in acoustical information input devices as well as for the semiautomatic measurement of the lines of a drawing and the coordinates of the points of three-dimensional objects. Figures 1; references 2.

[441-8225]

USSR

UDC 681.325.63

## A BINARY-DECIMAL 12222 CODE TO A UNITARY CODE CONVERTER

Moscow PREOBRAZOVATEL' DVOICHNO-DESYATICHNOGO KODA 12222 V UNITARNYY KOD, USSR Patent No 549803 in Russian Class G 06 F 5/04, Claimed 21 Mar 75  
Published 27 Jul 77

ZHURAVLEV, A. I. and KHAMKO, N. G., Special Design Office for Computer Equipment, Ryazan' Radio Engineering Institute

[From REFERATIVNYY ZHURNAL, AVTOMATIKA, TELEMEXHANIKA I VYCHISLITEL'NAYA TEKHNIKA in Russian No 4, Apr 78 Abstract No 4B230]

[Text] The invention applies to the computer engineering field and can be used in computer and digital automation circuits. A binary-decimal 12222 code to pulse-number code converter is well known, which contains a code storage register, a group of AND gates, OR gates and a delay line. A drawback to it is the large conversion time in the case of the truncated binary-decimal 12222 code format, something which reduces the speed. In this case, the code conversion time, regardless of its format, is measured based on the formula  $t = 4.5 T$ , where  $T$  is the amount of the shift between query pulses. The increase in the operational speed, through a reduction in the conversion time for a shortened (alternating) 12222 code to a pulse-number code is achieved by introducing into the converter circuit an additional OR gate, an additional delay line and a second group of four AND gates, the first inputs of which are connected to the zero outputs of the register flip-flops for writing the parallel code with the weight of

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the 2222 digits respectively. The second inputs are connected to the outputs of the AND gates of the first group, corresponding to digits with a weight of 12222. The outputs of the AND gates of the second group and the output of the AND gate of the first group, corresponding to the lowest order digit of weight 2, are connected to the inputs of the additional OR gate, which is connected to the input of the additional delay line, the output of which is connected to the signal bus of the device. Figures 1; references 1.

[441-8225]

USSR

UDC 681.322-185.3

A DESK TOP COMPUTER DESIGNED AROUND A MICROPROCESSOR

Unknown MERES ES AUTOMAT in Hungarian Vol 25 No 7, 1977 pp 269-273

SAGHEGYI MARTON, LAKATOS IMRE and KAKUK SANDOR

[From REFERATIVNYY ZHURNAL, AVTOMATIKA, TELEMEXHANIKA I VYCHISLITEL'NAYA TEKHNIKA in Russian No 4, Apr 78 Abstract No 4B145 by Z. Kh. Shrago]

[Text] It is reported that the EMG plant (Hungarian People's Republic) has developed a programmable desk top computer for the solution of scientific problems based on MOS circuits. When working with the Hunor 301 calculator, the user can have at his disposal 50 data registers (in an expanded variant, 100 registers) and a program memory with a capacity of 512 words (1,000 in the expanded variant). The operational speeds are as follows: addition and subtraction - 10 microseconds, multiplication 40 milliseconds and division 80 milliseconds. The display has 14 places. Numbers are displayed with 10 decimal digits for the mantissa and two for the exponent. Moreover, the EMG-14902 thermal printer is available with a print rate of three lines per second. The line size is 11 numerals and 4 alphanumeric symbols. The dimensions of the numerals are 3 x 1.6 mm. The data provided for the programming and service capabilities permit the conclusion that the calculator is an efficient computing tool. At the present time, development of the computer software is continuing. Figures 4.

[441-8225]

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UDC 681.326.3

THE REALIZATION OF GROUP EXCHANGE THROUGH THE YER15-02 UNIT ON THE YES-1010 COMPUTER

Dubna SOOBShCH. OB"YEDIN. INSTITUTA YADER. ISSLED. in Russian No 11-10786, 1977 7 pp

VZOROV, I. K., IVANOV, V. V., KUZNETSOV, A. S. and SAMOYLOV, V. N.

[From REFERATIVNYY ZHURNAL, AVTOMATIKA, TELEMEXHANIKA I VYCHISLITEL'NAYA TEKHNIKA in Russian No 4, Apr 78 Abstract No 4B246K]

[Text] A modernized module of the 72854 type (YeR15-02) is described, which permits group exchange in real time using the YeS-1010 computer. The following were introduced into the module: state register for a peripheral, state word readout instruction, and gating circuits for receiving and feeding out state words. The group exchange rate is 24 microseconds per word, which is about four times faster than the exchange rate which the 72854 unit permitted prior to improvement. The described modernization makes the unit more universal and expands the applications area.

[441-8225]

USSR

UDC 681.322.06

SPECIFICS OF THE INSTRUCTION SYSTEM OF ONE MULTIPROCESSOR COMPUTER WITH COMMON CONTROL

Moscow VOPR. KIBERNET. in Russian 1978 No 43, pp 16-25

MEDVEDEV, I. L. and FISHCHENKO, YE. A.

[From REFERATIVNYY ZHURNAL, AVTOMATIKA, TELEMEXHANIKA I VYCHISLITEL'NAYA TEKHNIKA in Russian No 6, 1979, Abstract No 6B48]

[Text] The peculiarities and functions of the control system of a high-speed multiprocessor computer are studied. All of the processors of the computer are under common control. The distribution of functions among instructions of the functional subsystems is described. The structure of instruction formats is described in detail. An example is presented of a program, and the peculiarities of the instruction system of the multiprocessor computer are emphasized. Figures 2; references 1.

[439-6508]

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UDC 681.325.5.01

ARITHMETIC-LOGIC DEVICE FOR A MULTIPROCESSOR COMPUTER

Moscow VOPR. KIBERNET. in Russian 1978 No 43, pp 38-44

ZHUKOV, B. A., MEDVEDEV, I. L. and TOMCHENKO, S. N.

[From REFERATIVNYY ZHURNAL, AVTOMATIKA, TELEMEXHANIKA I VYCHISLITEL'NAYA TEKHNIKA in Russian No 6, 1979, Abstract No 6B398]

[Text] An analysis is presented of the effective use of various types of arithmetic-logic devices for multiprocessor computers, and the variation in the structure of a multiprocessor computer with the type of arithmetic-logic device used is demonstrated. Figures 2; references 4.

[439-6508]

USSR

UDC 681.322.06

GROUP PARALLELISM AND DUAL PERFORMANCE OF PARALLEL COMPUTATIONS

Moscow VOPR. KIBERNET. in Russian 1978 No 43, pp 44-64

ZATULIVETER, YU. S. and MEDVEDEV, I. L.

[From REFERATIVNYY ZHURNAL, AVTOMATIKA, TELEMEXHANIKA I VYCHISLITEL'NAYA TEKHNIKA in Russian No 6, 1979, Abstract No 6B49]

[Text] A study is made of problems of organization of parallel computations in multiprocessor computers with a common flow of control. Conditions and a method are presented for assurance of uniform high-levels of loading of the set of processor elements over a broad range of tasks. The concept of dual organization of computations is introduced and the relationship of such an organization to the properties of the input language is discussed. The possibility is studied of achieving (basically) conflict-free operation of the memory during parallel computation in the group mode. Figures 3; references 6.

[439-6508]

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UDC 681.322.013.2

USE OF ASSOCIATIVE BUFFER MEMORY IN MULTIPROCESSOR SYSTEMS

Moscow VOPR, KIBERNET, in Russian 1978 No 43, pp 90-98

POPOVA, G. M. and STEPANOV, I. V.

XRV AVTOMATIKA, TELEMEXHANIKA I VYCHISLITEL'NAYA TEKHNKA in Russian No 6, 1979, Abstract No 6B69

[Text] A study is made of the specifics of inclusion of type KESH buffer memory with associative addressing in a multiprogramming computer system with modular memory structure. A buffer memory organization is suggested which has a number of advantages over traditional organizations and yields the greatest effect when KESH is used in multiprogramming computers with several independent control modules. Figures 6; references 9.

[439-6508]

USSR

UDC 681.325.5.01

SIMPLE HARDWARE ACTUALIZATION OF ARITHMETIC AND LOGIC OPERATORS IN A HOMOGENEOUS COMPUTING STRUCTURE

Moscow VOPR, KIBERNET, in Russian 1978 No 43, pp 111-121

CHACHANIDZE, V. G., KUBLASHVILI, T. O., SMORODINOVA, O. G., ASATIANI, G. G., MIRIANASHVILI, R. Z. and SKOBELEVA, L. V.

XRV AVTOMATIKA, TELEMEXHANIKA I VYCHISLITEL'NAYA TEKHNKA in Russian No 6, 1979, Abstract No 6B397

[Text] Logic operators actualized in a retunable universal four-directional homogeneous computing structure are presented, as well as a number of arithmetic operators for fixed-point numbers, synchronously arriving in sequential supplementary binary code, in which the sign is contained in the last bit and the low-order bits arrive first. Figures 19; references 11.

[439-6508]

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UDC 681.322.01

METHODS OF INCREASING THE EFFECTIVENESS OF MULTIPROCESSOR COMPUTER SYSTEMS

Moscow VOPR. KIBERNET. in Russian 1978 No 43, pp 163-176

CHUDIN, A. A. and PRANGISHVILI, I. V.

[From REFERATIVNYY ZHURNAL, AVTOMATIKA, TELEMKHANIKA I VYCHISLITEL'NAYA  
TEKHNIKA in Russian No 6, 1979, Abstract No 6B85]

[Text] Methods are discussed for increasing the effectiveness of specialized and problem-oriented multiprocessor computer systems, as well as problems of the construction of such systems on the basis of a universal set of software and hardware modules. References 5.

[439-6508]

USSR

UDC 681.326.34

DIALOGUE REMOTE TASK INPUT

Riga DIALOGOVIY UDALENNYY VVOD ZADANIY in Russian 1978 21 pages

ILZINYA, I. G., Institute of Electronic and Computer Technology

[From REFERATIVNYY ZHURNAL, AVTOMATIKA, TELEMKHANIKA I VYCHISLITEL'NAYA  
TEKHNIKA in Russian No 6, 1979, Abstract No 6B707]

[Text] A study is made of means of remote dialogue input of tasks (DUVZ), allowing the user to input tasks into the normal system job flow from remote YeS-8570 terminals and local YeS-7066 displays. A description of the DUVZ system is presented, providing for input of both programs and data created, altered and saved by the DUVZ hardware. Figures 2; references 3.

[439-6508]

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UDC 681.326.34

A GROUP INTERFACE FOR CONNECTION OF ANALOG-DIGITAL CONVERTERS WITH THE M-400 COMPUTER

GRUPPOVOY INTERFEYS DLYA SVYAZI AMPLITUDNO-TSIFROVYKH PREOBRAZOVATELEY S EVM M-400, Preprint No 14, 1978 21 pages

BEREZIN, F. N., KISURIN, V. A., OFENGENDEN, R. G. and PATLAN', YU. V., Institute of Nuclear Studies, UKR Academy of Sciences Preprint

[From REFERATIVNYY ZHURNAL, AVTOMATIKA, TELEMEXHANIKA I VYCHISLITEL'NAYA TEKHNIKA in Russian No 6, 1979, Abstract No 6B706 Annotation]

[Text] An interface for connecting a group of ADC to the M-400 minicomputer is described. The interface is designed to operate in the external interrupt mode and scan up to 6 ADC and a cycle number coder. The variation of ADC reaction time with method of connection of the ADC to the computer and the structure of the interrupt servicing program is analyzed. The effectiveness of the interface circuit is proven.

[439-6508]

USSR

UDC 681.323

AN INTERFACE BETWEEN TERMINALS AND COMPUTER

USSR AUTHOR'S CERTIFICATE NO 596938, Filed 3/07/75, No 2143901, Published 10/03/78

ANDROSENKO, S. G., BARAN, L. B., DINOVICH, M. V., KOBOZEV, A. A., MIKHAYLISHIN, A. A., MOROZOV, A. A., SKURIKHIN, V. I. and KOBOZEVA, L. S., Institute of Cybernetics Ukrainian SSR Academy of Sciences

[From REFERATIVNYY ZHURNAL, AVTOMATIKA, TELEMEXHANIKA I VYCHISLITEL'NAYA TEKHNIKA in Russian No 6, 1979, Abstract No 6B680P]

[Text] A system is suggested for interfacing terminal devices to a computer, including an arithmetic-logic device, an operational register unit, a memory unit, a microinstruction register, ROM, and instruction address counter. Its first output is connected to the ROM input, the output of which is connected to the first input of the microinstruction register. The second input of the microinstruction register is connected to the first output of the main memory.

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The first output of the microinstruction register is connected to the first input of the instruction address counter. The second output of the main memory is connected to the first input of the operating register module, the first output of which is connected to the first input of the main memory. The second output is connected to the first input of the arithmetic-logic unit, the output of which is connected to the second input of the operational register module. The second output of the instruction address counter is connected to the first input of the operational register unit. Figures 1.

[439-6508]

USSR

UDC 681.325(088.8)

USSRA DEVICE TO CONVERT SHAFT ROTATION ANGLE INTO CODE

USSR AUTHOR'S CERTIFICATE NO 595755, Filed 4/11/76, No 2417743, Published 10/03/78

PRESNUKHIN, L. N., BARKHOTKIN, V. A., NEDOPĚKIN, K. K., TOPIL'SKIY, V. B., BOGOSLOVSKIY, A. P., FROLOV, G. I., KOMONOV, P. S., KOROSTIYEV, V. K. and BEZRUCHENKOV, V. N., Moscow Institute of Electronic Technology

[From REFERATIVNYY ZHURNAL, AVTOMATIKA, TELEMEXHANIKA I VYCHISLITEL'NAYA TEKHNIKA XA in Russian No 6, 6B521P]

[Text] A device is known which contains a series-connected pulse generator, voltage divider, filter, phase splitter connected to a coarse and fine reading phase inverter, the outputs of which are connected through comparators to the control inputs of the corresponding leading read channels. The output of the coarse reading comparator is connected to the input of the lagging read channel.

In order to increase the accuracy, an additional comparator and an additional frequency divider are added to the device, with the input of the frequency divider connected to the output of the pulse generator, its output to the inputs of sections of AND gates, while one output of the phase splitter is connected to the additional comparator to the setting inputs of the additional frequency divider. Figures 1.

[439-6508]

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UDC 681.325.57

A DEVICE FOR MULTIPLICATION AND DIVISION

USSR AUTHOR'S CERTIFICATE NO 6000555, Filed 13/02/75, No 2104691, Published 21/04/78

LEYTAN, Z. YA., MURZIN, V. A., RUGINSKAYA, T. V. and FROLOV, YU. V., State Special Design Bureau for Planning of Computational Machinery, Experimental Plant of the State Special Design Bureau for Planning of Computational Machinery

[From REFERATIVNYY ZHURNAL, AVTOMATIKA, TELEMEXHANIKA I VYCHISLITEL'NAYA TEKHNIKA in Russian No 6, 1979, Abstract No 6B400P]

[Text] A device is suggested for multiplication and division, containing a synchronization unit, the first output of which is connected to the control input of the control unit, while the second output is connected to the first inputs of the first two AND gates, and outputs of which are connected to the inputs of the corresponding operand registers. In order to reduce hardware and increase the speed, the device includes a cycle counter, an operand analysis unit, additional AND gates, OR gates, and two flip-flops.

The first two inputs of the control unit are connected to the outputs of the corresponding flip-flops, the zero inputs of which are connected to the third input of the device. The ones input of the first slip-flop is connected to the output of the first additional AND element, the first input of which is connected to the output of the cycle counter, the first control input of which is connected to the output of the second additional AND gate. Figures 1; references 2.

[439-6508]

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UDC 681.325-416

DEVICE FOR READING INFORMATION ON CYLINDRICAL MAGNETIC DOMAINS

USSR AUTHOR'S CERTIFICATE NO 613403, Filed 24/12/76, No 2433897, Published 15/06/78

KRASOVSKIY, V. YE. and SMIRNOV, S. N., Institute of Control Computers (INEUM)

[From REFERATIVNYY ZHURNAL, AVTOMATIKA, TELEMEXHANIKA I VYCHISLITEL'NAYA TEKHNIKA in Russian No 6, 1979, Abstract No 6B298P]

[Text] A device is suggested for reading information carried on cylindrical magnetic domains, including main and secondary channels for shifting of domains, made in the form of ferromagnetic applications on a plate of magnetically uniaxial material, a magnetoresistive sensor and a device for recording the changes in resistance of the sensor.

In order to increase reliability, the device contains a domain divider and a NOT element. The supplementary domain shifting channel is magnetically coupled through the domain divider and the NOT element to the main domain shifting channel. The main and supplementary domain shifting channels are placed symmetrically in relationship to the magnetoresistive sensor. Figures 2.

[439-6508]

USSR

UDC 681.325.5

THE PROCESSOR OF A DIGITAL COMPUTER SYSTEM

USSR AUTHOR'S CERTIFICATE NO 475897, Filed 14/06/71, No 1668568, Published 26/08/78

LEVIN, V. K., ANTONOV, V. S., SHUL'GIN, A. A., MIKHAYLOV, I. B., ZHUKOV-YEMEL'YANOV, O. D., PEBART, M. D., KHRAMTSOV, I. S., POPOVA, I. A., YEGORYCHEVA, N. V., PAPILINA, G. S., KOKHANOV, YU. A., POCHUCHUYEV, YU. A., KOROLEVA, T. M., PRYAKHIN, B. A. and KLIMOV, V. V.

[From REFERATIVNYY ZHURNAL, AVTOMATIKA, TELEMEXHANIKA I VYCHISLITEL'NAYA TEKHNIKA in Russian No 6, 1979, Abstract No 6B250P]

[Text] The invention is a digital computer device, a central processor for a computer system, containing a set of quasi-independent modules

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operating simultaneously, including a built-in diagnosis module. Digital computer system processors containing quasi-independent modules such as an instruction module, memory control module connected to the memory unit and including input and output registers and a control panel are known.

However, these computer system processors do not have sufficient speed, their diagnostic apparatus is complex, due to its autonomy and universality and, furthermore, they do not utilize local control modules which are available in various subsystems of the system for diagnosis of the processor. The separation of the testing and diagnosis functions of the processor in individual subsystems by the use of local control module hardware in these subsystems is essentially new and a basic distinction between the present processor and all other known devices.

In order to reduce the amount of hardware required and increase the speed of the processor, the overflow and inversion outputs of the diagnosis unit are connected to the third and fourth inputs of the memory control unit. The information output of the diagnosis module is connected to the fourth input of the binary arithmetic unit, while the fifth and sixth inputs of the binary arithmetic unit are connected to the interrupt output and the code conditions output of the decimal arithmetic unit. Figures 3.

[439-6508]

USSR

UDC 681.327.67

CRITERIA FOR OPTIMAL SUBDIVISION OF A SEMICONDUCTOR MEMORY IN MODULES

TR. MOSK. ENERGIYA. IN-TA in Russian 1978 No 380, pp 46-50

BORODIN, G. A.

[From REFERATIVNYY ZHURNAL, AVTOMATIKA, TELEMEXHANIKA I VYCHISLITEL'NAYA TEKHNIKA XI in Russian No 6, 6B459 by S. G. Romanova]

[Text] It is noted that the use of microcircuit memory for long-term storage requires that a number of specific factors be considered, in addition to the usual factors. These include the discrete nature of the memory circuits, the possibility of combining built-in address and bit lines in the same outputs, etc. Various factors are considered in various ways during planning, but selection of the optimal memory unit structure is always necessary.

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It is pointed out that consideration of all factors greatly complicates the task in question and it is frequently sufficient to consider several main factors, including the quantity and complexity of hardware and effectiveness of its utilization. Furthermore, economic requirements must also be considered. A method is suggested for estimating the optimal subdivision of long-term memory into modules considering information capacity and word length during automatic planning of such memory units on computer. Figures 2; tables 1; references 4.

[439-6508]

USSR

UDC 681.3.019

ONE METHOD OF ACTUALIZATION OF A DISCRETE AUTOMATON USING THE M6800 MICROPROCESSOR

AVTOMATIKA I IZCHISL. TEKH. in Bulgarian 1978 Vol 12 No 5, pp 30-36

STANCHEV, V. and GEORGIYEV, TS.

[From REFERATIVNYY ZHURNAL, AVTOMATIKA, TELEMEXHANIKA I VYCHISLITEL'NAYA TEKHNIKA in Russian No 6, 1979, Abstract No 6B96 by A. D. Plitman]

[Text] In the method suggested, the stages of synthesis, related to the formal description of the functioning of the automaton, including the production of a graph of transitions, coincide to the classical stages: the stages of minimization of the number of internal variables and their optimal coding are absent.

The stage of composition of the code table of transitions and outputs is replaced by composition of a file of transitions and outputs, while the stage of production of excitation functions is replaced by the placement of this file and a special automatic program in ROM. The method is applicable to the production of both synchronous and asynchronous Moore and Mealy automata. Figures 2; tables 5; references 3.

[439-6508]

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UDC 621.396.6+539.4.019(07)

MECHANICAL EFFECTS AND PROTECTION OF ELECTRONIC APPARATUS. A TEXTBOOK FOR STUDENTS IN THE AREA OF DESIGN AND PRODUCTION OF ELECTRONIC COMPUTER EQUIPMENT

Kiev MEKHANICHESKIYE VOZDEYSTVIYA I ZASHCHITA ELEKTRONNOY APPARATURY. UCHEB. POSOBIYE DLYA STUD. VYZOV, OBUCH. PO SPETS. KONSTRUIR. I PR-VO ELEKTRON.-VYCHISL. APPARATURY in Russian Vyshcha Shkola Press, 1979, 128 pp

FROLOV, V. A.

[From REFERATIVNYY ZHURNAL, AVTOMATIKA, TELEMEXHANIKA I VYCHISLITEL'NAYA TEKHNIKA in Russian No 6, 1979, Abstract No 6A253K]

[Text] This textbook presents a general analysis of mechanical effects, mathematical models and methods of computer processing. The properties of electronic elements which operate under conditions of vibration load are described. Problems of modeling of the dynamic status of an object using electronic models are studied. The basic elements are studied and methods of their design are presented.

The book is intended for students studying the specialty "Design and Production of Electronic Computer Hardware," but may also be useful to electronic equipment designers. Figures 84; tables 9; references 19.

[439-6508]

USSR

UDC 681.327.67

SEMICONDUCTOR INTEGRATED MEMORY CIRCUITS BASED ON BIPOLAR TRANSISTOR STRUCTURES

Moscow POLUPROVODNIKOVYYE INTEGRAL'NYYE SKHEMY PAMYATI NA BIPOLYARNYKH TRANZISTORNYKH STRUKTURAKH in Russian Sov. Radio Press 1979 296 pages

VALIYEV, K. A. and ORLIKOVSKIY, A. A.

[From REFERATIVNYY ZHURNAL, AVTOMATIKA, TELEMEXHANIKA I VYCHISLITEL'NAYA TEKHNIKA in Russian No 6, 1979, Abstract No 6B454K Annotation]

[Text] Design and technological peculiarities, circuitry and problems of planning of semiconductor IC bipolar transistor memories are studied.

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The basic principles of planning and selection of operating modes of integrated-circuit memories and their control circuits are outlined. The prospects for further increases in the capacity and speed of bipolar IC memories are analyzed. The book is designed for engineers, students and graduate students specializing in microelectronics.

[439-6508]

UDC 681.32 : 65.012.1.122

ANALYSIS OF ALGORITHMS FOR THE COUPLING OF LARGE AND SMALL ELECTRONIC COMPUTERS IN TELEAUTOMATIC QUEUEING SYSTEMS. I

Moscow AVTOMATIKA I TELEMEXHANIKA in Russian No 3, 1979 pp 150-152

[Article by V. M. Vishnevskiy, V. A. Zharkikh, V. A. Zhozhikashvili and N. V. Petukhova, Moscow]

[Excerpt] The striving to increase the effectiveness of the application of computer technology in systems with time-shared servicing of a large number of users has led to the creation of multimachine structures that include machines of two levels: preprocessors and central processing electronic computers. Small computers are used as preprocessors, as a rule, whereas data are processed on large and medium-sized computers. Included in the functions of the preprocessor are the reception and issuance of data to lines of communication, the formation of messages from arriving data, headline analysis, the editing and monitoring of messages and also, if necessary, the establishment of queues and control of priorities. Central computers are thus relieved of the execution of routine procedures connected with input and output, and this makes it possible to use with maximum effectiveness all their resources for practical data processing programs.

In such systems preprocessors are connected to the selector or multiplex channel of the central processing computer through adapters--specialized devices that match the input-output interfaces of those computers.

An upper-level machine perceives a preprocessor in an aggregate with an adaptor as an external triggering device. A small computer, working in accordance with its algorithms, at a certain moment of time forms the signal "attention," which is analyzed by the supervisor of the central computer. A simplified scheme of the interaction of two computers is presented on Figure 1. Input into the exchange system on the part of the preprocessor is accomplished by means of special requests that evoke sequences on the mnemonic code and are generated by the user's program.

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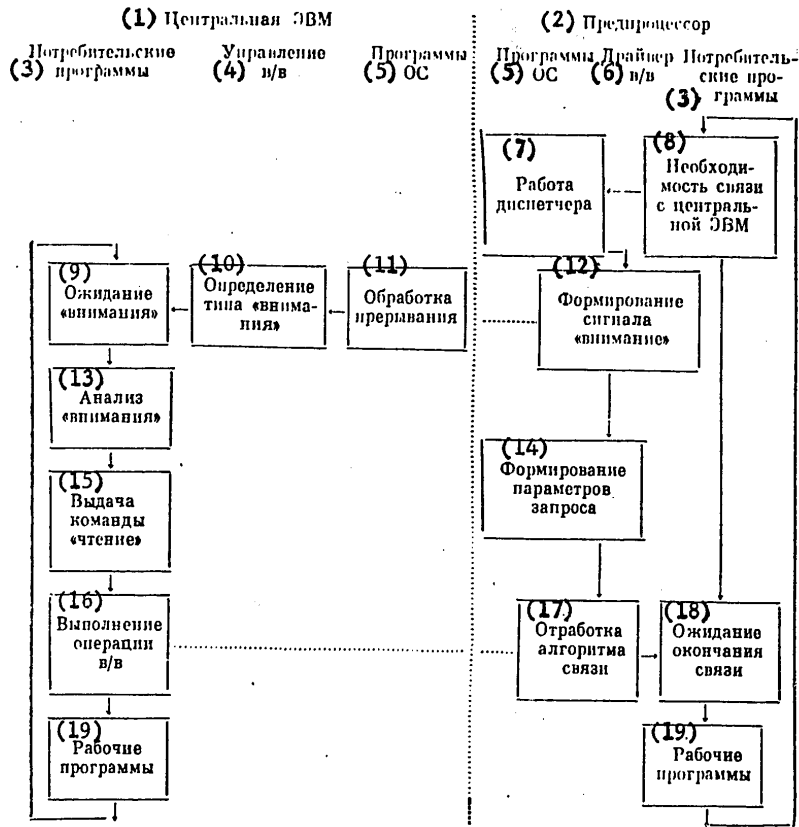


Figure 1

- |   |   |
|---|---|
| Key: 1 - Central computer                     | 10 - Determination of "attention" type      |
| 2 - Preprocessor                              | 11 - Processing of interruption             |
| 3 - User's programs                           | 12 - Formation of "attention" signal        |
| 4 - Control of input-output                   | 13 - Analysis of "attention"                |
| 5 - Operating system programs                 | 14 - Formation of request parameters        |
| 6 - Input-output exciter                      | 15 - Issurance of order "read"              |
| 7 - Work of dispatcher                        | 16 - Performance of input-output operations |
| 8 - Need to communicate with central computer | 17 - Handling of communication algorithm    |
| 9 - Expectation of "attention"                | 18 - Expectation of end of communication    |
|   | 19 - Working programs                       |

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Those requests are directed through the input-output control program to the driver of the adapter, which triggers the adapter and transmits the parameters of the request to the data processing computer. In response to the triggering the data processing computer sends the order to read, after which the algorithm of communication and data transmission is accomplished.

The data can be received in the central computer simultaneously with data processing according to the user's programs. However, operations on the organization of a communications session require certain expenditures of the processor's time, henceforth called the registration time; the size of those expenditures will depend substantially on the adopted algorithm of interaction. Listed below are a number of measures that appear to be technically and algorithmically accomplishable:

-- data input from the preprocessor to the data processing computer is accomplished for each message assembled preliminarily in the preprocessor, with interruption of the work of the main computer;

-- messages from the preprocessor are inserted only after completion of the current program by the central computer;

-- the "attention" signal is produced in the preprocessor according to a timer after given time intervals, as a result of which all the messages accumulated during that time are entered in the main computer;

-- the central computer reads information from the preprocessor after all the messages inserted in the preceding communications session have been handled.

The present work has the goal of solving the question of the advisability of conducting group measures of interaction of preprocessors with the central computer. The variant with interruption of the computer for each message evidently is the worst in lengths of queues and time the messages remain in the system under consideration. Consequently, comparison of it with the case where there is no preliminary registration permits giving an estimate of the amount of gain that can be obtained from carrying out the measures with group servicing.

Thus the question of the effectiveness of conducting group measures of interaction of preprocessors with the central computer is reduced to investigation of the characteristics of a two-stage queueing system in which the first stage is registration of the message and the second is direct servicing in the main computer.

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"Avtomatika i telemekhanika," 1979

[424-2174]

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RULES FOR MINIMIZATION OF THE NUMBER OF CONFLICTS IN MULTIPROCESSOR  
COMPUTER SYSTEMS

AVTOMAT. I TELEMIXH. in Russian 1979 No 3, pp 143-149

BRONSHTEYN, I. I., GENINSON, B. A. and TRAKHTENGERTS, E. A.

[From REFERATIVNYY ZHURNAL, AVTOMATIKA, TELEMEXHANIKA I VYCHISLITEL'NAYA  
TEKHNIKA in Russian No 6, 1979, Abstract No 6B95]

[Text] An optimal rule is found for resolution of conflicts in multi-processor computer systems, minimizing the mean number (frequency) of conflicts, in order to increase the effectiveness of parallel computation. References 8.

[439-6508]

USSR

COMPUTERS IN SCIENTIFIC RESEARCH

Moscow VESTNIK AKADEMII NAUK SSR in Russian No 6, 1979 pp 8-12

["Introductory Speech by the President of the USSR Academy of Science  
Academician A. P. Aleksandrov"]

[Excerpt] I wish to say a few words about instrument manufacture and the automatization of scientific research. Two years ago at the meeting of the Presidents of the Academies of Science of the socialist nations a plan for work on the preparation of components of circuits and systems for the automatization of scientific research was accepted. Organizations of the USSR Academy of Sciences and a number of our ministries, especially the Ministry of Instrument Building, Means of Automation and Systems of Control, took part in this work. Today we have already developed and given to industry the computer complexes IVK-1 and IVK-2, which make it possible to obtain and process various types of data from scientific experiments and either send the results to scientists in printed form or give commands for management processes. A system of units which go to make up a complex makes it possible to deal with all types of information. One such system of this sort was shown to the presidium of the academy of sciences. The same one was demonstrated at the Moscow City party conference where it attracted general attention. This year we tried to give some of our

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scientific centers and institutes sets of such apparatus which should restructure the style of experimental work in these scientific institutions.

Imagine that in each sizable institute a library of units of the new apparatus will be established. If the laboratory changes its direction of research or the technological processing of experimental data, it can return some of its units to the library in exchange for new ones. One and the same system can be transferred from research in, let's say, the field of biology to chemistry or to control of industrial processes.

The present organization of scientific research requires broad use of computer technology. It seems to me that we now have entered a period where work on the mathematical support for research has broadened greatly, they are getting ready to put out new machines of great productivity, universal machines. In the Institute of Problems of Control, Academician V. A. Trapeznikov has begun to develop multiprocessors with a reorganized structure which can process information at a rate of up to 100 million operations per second. It seems to me that this is a significant step forward in the development of our computer technology.

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UDC 621.325

DESIGN OF MULTIFUNCTION CELLS IN RECONSTRUCTED MULTIPURPOSE UNIFORM COMPUTING ARRAYS

Moscow AUTOMATIKA I TELEMEXHANIKA in Russian No 7, 1979 pp 146-155

[Article by G. G. Asatiani, T. O. Kublashvili, P. Z. Mirianashvili, L. B. Skobeleva, O. G. Smorodina, B. G. Chachanidze]

[Excerpt] The task of further perfecting cells of uniform computing arrays arises in connection with the fact that at the present time the restructured multipurpose four directional uniform computing array (OVS) is used in computers of various purposes which have been or are being developed, particularly in microcomputers in control logical computers, etc. The main purpose of the development of the proposed cell variants is to decrease the number of combinatorial logical elements\* in an OVS cell of a given base and to decrease the number of sequentially switched on logical elements in asynchronous channels compared to previous variants [1-3] and

\*We will subsequently refer to combinatorial logical elements as logical elements.

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others. This allows the reliability of the cell's function to increase along with its speed. One feature of these cells is the blocking of data input busbars in the interval of time it takes to attain tuning of the potential level in the busbars of the cell. This permits a significant total increase in the reliability of the cell's functioning, since it prevents the spread of "travelling," one and zero logical levels along the OVS cells, which, when allowed, can be registered in cyclic compounds of the circuit, realized in the OVS, constantly causing inaccurate functioning. Moreover, this blocking in the use of busbars with three states as data output busbars and cell tuning busbars allows input and output busbars and tuning busbars to be combined. This permits a decrease in the number of electrical outlets of the cell's circuit.

The first two variants of the OVS cell realized identical base functions, which formed automatic and commutative full bases [4], ensured the universality of the OVS in the class of finite automata and were characterized by an identical number of electrical outlets. These two variants of the cell differed from each other in construction, and also in number of logical elements, number of large-scale integrated microcircuit components, and in Quine coefficients. Although the latter were approximately equal.

The functional circuit of the first variant of the cell is shown in Fig. 1. The circuit is realized with 138 MDP (expansion unknown)--transistors (the number of logical elements equals 37 and the Quine coefficient is 101) and has 20 electrical outlets (4 data input busbars, 2 data output busbars, 9 tuning busbars, a blocking busbar, 2 busbars for diverse time pulses, 2 feed busbars). When the input and output busbars and tuning busbars are combined the cell circuit has 14 electrical outlets.

The functioning of these OVS cells was modeled on a ISL4-70 computer with the help of the method described in [6].

Received 17 May 1978

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[425-9285]

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D. Programming and Software

Translations of Articles

USSR

UDC 681.322.06.01

QUESTIONS OF THE MODULAR CONSTRUCTION OF COMPLEX PROGRAMS

Unknown SBORNIK TR. INSTITUT PROBL. UPR in Russian No 13, 1976 pp 32-42

MAMIKONOV, A. G., KOSYACHENKO, S. A., KUL'BA, V. V. and TSVIRKUN, A. D.

[From REFERATIVNYY ZHURNAL, AVTOMATIKA, TELEMEXHANIKA I VYCHISLITEL'NAYA  
TEKHNIKA in Russian No 4, Apr 78, Abstract 4B104]

[Text] Models are proposed for the synthesis of software systems designed on a modular principle. The formulation and solution of problems of breaking a system of information and software down into functional subsystems are treated, where these subsystems have a minimum number of information links with limitations placed on the overall number of subsystems, the composition and number of internal links between subsystems. Figures 3; references 5.

[441-8225]

USSR

UDC 681.322.066

A BUDGET SYSTEM FOR THE DISPAK OPERATING SYSTEM

Moscow INSTITUT PRIKL. MAT. AN SSSR in Russian 1977 42 pp

BALAKIREV, N. YE., MIKHAYLOV, A. P. and TYURIN, V. F.

[From REFERATIVNYY ZHURNAL, AVTOMATIKA, TELEMEXHANIKA I VYCHISLITEL'NAYA  
TEKHNIKA in Russian No 4, Apr 78 Abstract No 4B72K by V. A. Garmash]

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[Text] The book contains the following chapters: the general operating principle and structure of a budget system, the method of interfacing a budget system, the structure of catalogs, and service programs.

[441-8225]

USSR

UDC 681.3.06:51

SOFTWARE FOR THE UNIFIED SYSTEM OF COMPUTERS FOR OPERATION IN A MULTIPLE MACHINE COMPUTER COMPLEX

Unknown PROGRAMMNOYE OBESPECHENIYE YEF EVM DLYA RABOTY V MNOGOMASHINNOM VYCHISLITEL'NOM KOMPLEKSE in Russian 1977 pp 166-170

KOVALENKO, YU. G. and LARIONOV, K. A.

[From REFERATIVNYY ZHURNAL, AVTOMATIKA, TELEMEXHANIKA I VYCHISLITEL'NAYA TEKHNIKA in Russian No 4, Apr 78 Abstract No 4B83 by M. B. Yevdokimenko]

[Text] The software for large computers is based on the feedback of the YeS [unified system], one of the most powerful and sophisticated of operating systems. YeS feedback has the means of interfacing YeS computers through a common peripheral memory field, for an immediate access memory through direct control units and a channel to channel adapter. For interfacing other types of computers, it is necessary to design only relatively simple equipment and special software or equipment, which in conjunction with the computer being tied in, can simulate one of the indicated pieces of equipment for composing the set. The software of the YeS computers for operating in a multiple machine computer complex will be developed through the refinement of the operating system itself and the creation of additional programs which expand the capabilities of the computer complex.

[441-8225]

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UDC 681.322.068

MODERNIZATION OF THE MADLEN AUTOCODE. METHODS OF TRANSLATOR OPTIMIZATION

Dubna PREPRINT NO 11-10813, OB''YEDIN. INSTITUT YADER. ISSLED. in Russian  
1977 7 pp

POPOV, M. YU. and FEDYUN'KIN, YE. D.

[From REFERATIVNYY ZHURNAL, AVTOMATIKA, TELEMEXHANIKA I VYCHISLITEL'NAYA  
TEKHNIKA in Russian No 4, Apr 78 Abstract No 4B77K]

[Text] The next regular variant of the Madlen autocode has been developed  
for BESM-6 computers. Methods of optimizing the algorithms used in the  
autocode translators are discussed. New language capabilities are  
described.

[441-8225]

USSR

UDC 681.3:002.513.5

SOFTWARE FOR THE "NAIRI-2" COMPUTER DATA PLOTTER

Dubna SOOBSHCH. OB''YEDIN. INSTITUTA YADER. ISSLED. in Russian No 11-10818,  
1977 21 pp

AKSENOVA, YE. K., KOL'GA, V. V. and TREYBAL, Z.

[From REFERATIVNYY ZHURNAL, AVTOMATIKA, TELEMEXHANIKA I VYCHISLITEL'NAYA  
TEKHNIKA in Russian No 4, Apr 78 Abstract No 4B98K by V. A. Garmash]

[Text] The software for the data plotter of "Nairi-2" computers is  
described. The system of "Grafik" subroutines, composed in the "Nairi-2"  
machine language, makes it possible to represent information in graphical  
form which is obtained both directly in the "Nairi-2" computers, and in  
the base computers (of the "BESM-6," SDS-6500 type) through an information  
processing system. A graphical function can be represented with a selected  
scale in the form of a continuous line with programmed linear interpolation  
between the points, or in the form of individual points with the coordinate  
axes plotted in any specified direction. Work with the subroutine system  
is accomplished in the autoprogramming language using a number of new  
operators, introduced into the translator of the "Nairi-2" computers.

[441-8225]

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UDC 681.327.06(02)

THE DOS YES OPERATING SYSTEM. HANDBOOK

Moscow STATISTIKA in Russian 1977 271 pp

BITEL', YU. YU., VOYUSH, V. I., GORBUNOVA, R. V., DASHINSKAYA, YE. I.,  
LYAKH, A. G., MARUK, Z. A. and SKOROMNIK, M. G.

[From REFERATIVNYY ZHURNAL, AVTOMATIKA, TELEMEXHANIKA I VYCHISLITEL'NAYA  
TEKHNIKA in Russian No 4, Apr 78 Abstract No 4B70K]

[Text] Material on the operating system of the DOS YeS [unified system  
disk operating system], which is widely used in the YeS-1020, YeS-1022,  
YeS-1030 computers is generalized. Brief data are given on the assembler  
language, directive formats, operators and macroinstructions of the system  
programs, on the use of such system functions as the design and accessing  
of libraries, editing and translation of programs, etc.

[441-8225]

USSR

UDC 658.012.011.56

SYSTEMS CAPABILITY OF REMOTE PROCESSING SOFTWARE PACKAGES

Moscow VYCHISLITEL'NAYA TEKNIKA SOTSIALISTICHESKIKH STRAN [Computer  
Technology of the Socialist Countries] 1978, No 4, pp 82-86

KPYSTEV, S.

[Translated from Moscow REFERATIVNYY SBORNIK. ORGANIZATSIYA UPRAVLENIYA  
No 2, 1979, Abstract No 2.67.194, by Yu. P. D.]

[Text] The software used in remote data processing systems consists of  
two parts: systems software and applied (processing) programs. The  
systems software controls the remote data processing system and supports  
communication with the applied programs. It is constructed on the basis  
of the operating system used and the corresponding method of access for  
subscriber points or on the basis of a certain remote processing program  
package, expanding the capability of the operating system. Application  
programs are oriented toward various applications. The great variety of  
user requirements and the presence of remote processing program packages,  
together with methods of access for terminals, requires that the connections

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between application programs and remote processing packages be defined. There are 4 types of application programs: for specialized application; for joint use of a data base; for servicing of messages from subscriber points; and for batch processing. The characteristics and functions of the 10 basic remote processing packages are studied, including methods of access developed for the YeS computers.

[426-6508]

USSR

UDC 681.322.01

DETERMINISM OF PARALLEL DIAGRAMS

Novosibirsk VYCHISL. SISTEMY in Russian 1978 No 73, pp 40-52

ANISHEV, P. A.

[From REFERATIVNYY ZHURNAL, AVTOMATIKA, TELEMEXHANIKA I VYCHISLITEL'NAYA TEKHNIKA in Russian No 6, 1979, Abstract No 6B52. Resume.]

[Text] A solution is suggested to the problem of checking of asynchronously interacting processors in a deterministic system, fixed in the form of a parallel diagram of algorithms. The check is performed by analysis of a model of the behavior of the parallel diagram (Petri network) for viability and safety. The rules of transition from the parallel diagram to the Petri diagram are defined.

It is shown that the properties of viability and safety of the corresponding Petri diagram can be achieved by the condition of determinism of the parallel diagram. An algorithm is presented for checking for viability and safety, based on theorems proven earlier in a work of Hack. An estimate of the complexity of the algorithm is derived. Figures 9; tables 4; references 6.

[439-6508]

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UDC 658.012.011.56

A SYSTEM FOR PROCESSING THE RESULTS OF NUMERICAL CALCULATIONS USING A SMALL COMPUTER

SISTEMA OBRABOTKI REZUL'TATOV CHISLENNYKH RASCHETOV NA BAZE MALOV EVM, "OB'YEDIN. IN-T YADER. ISSLED. DYBNA. PREPR," in Russian No R11-1971 1978 18 pages

AKSENOVA, YE. K., GAVRISH, P. P., GORODNICHEV, YE. D., KOL'GA, V. V., POLUMORDVINOVA, N. I. and TREYBAL, Z.

[From REFERATIVNYY ZHURNAL, AVTOMATIKA, TELEMEXHANIKA I VYCHISTEL'NAYA TEKHNIKA in Russian No 6, 1979, Abstract No 6A483. Annotation]

[Text] A system is described for processing the results of numerical calculations, created in the Department of New Accelerators of the Joint Institute for Nuclear Research Using a small "Nairi-2" computer. Information is input through YeS tape drives from BESM-6 and CDC-6500 computers.

A selector channel consisting of a functionally modular system following the "vector" standard has been developed for the "Nairi-2" computer for communication between the small computer, the YeS-5017 tape drive and the O3K-1 graphic display. A discrete plotter developed from a DRP-3 stage is connected directly to the "Nairi-2" computer.

Software supporting the operating modes of the tape drive, display and plotter has been created. The system is now in operation, supporting continuous examination of the results of calculations performed on the large computers, output of information in graphic or tabular form, as well as the performance of various supplementary calculations.

[439-6508]

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UDC 681.3(07)

COBOL. A PROGRAMMED TEXT FOR ECONOMICS STUDENTS

Kiev KOBOL. PROGRAMMIROVANNOYE UCHEBNOYE POSOBIYE. UCHEB. POSOBIYE DLYA STUD. EKON. SPETS. VUZOV. Kiev in Russian 3rd Edition Revised and Supplemented Vishcha Shkola, 1978 407 pages

YUSHCHENKO, YE. L., BABENKO, L. P., ANDRIYEVSKAYA, V. V., BALL, G. A., BERESTOVAYA, S. N., BONDAREVSKAYA, V. M., MASHBITS, YE. I. and ROGACH, V. D.

[From REFERATIVNYY ZHURNAL, AVTOMATIKA, TELEMEXHANIKA I VYCHISLITEL'NAYA TEKHNIKA in Russian No 6, 1979, Abstract No 6B16K by S. G. Romanova]

[Text] A textbook on the programming language COBOL is offered. COBOL is designed for description of a broad class of economic problems and is used as an input language for domestic series-produced computers. COBOL describes algorithms dealing with information elements of complex structure quite naturally, and has means for interacting with the operating system. This is the reason for inclusion of the apparatus of COBOL in a number of newer languages, such as PL/1.

COBOL has modular structure and consists of a nucleus containing the means for processing of data in machine memory, plus 11 modules, each of which perform some processing function. This textbook includes a detailed description of the nucleus and the modules for processing of tables and sequential I/O, allowing programming of a broad range of data processing problems. Standard COBOL is described, which coincides basically with the version which runs in the YeS computer up to 1978. The main differences of this version from the standard are described.

[439-6508]

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UDC 681.322.06

ESTIMATION OF THE TIME REQUIRED TO REACH OPERATORS IN A PROGRAM

Novosibirsk VYCHISL. SISTEMY in Russian 1978 No 73, pp 152-167

ZNAK, V. I.

[From REFERATIVNYY ZHURNAL, AVTOMATIKA, TELEMEXHANIKA I VYCHISLITEL'NAYA  
TEKHNIKA in Russian No 6, 1979, Abstract No 6B50. Resume.]

[Text] A study is made of the task of analysis of the structure of branches of a p-program in order to determine such characteristics as the distribution of probabilities and to estimate the time required to reach certain predetermined operators. The object of investigation used in an operator p-branch system which consists of a set of simple (elementary) paths from the starting operator to the predetermined operator and a set of simple loops.

A procedure is developed allowing the required characteristics to be determined from the length and frequency of running of the simple loops. The method suggested for analysis of systems is used to analyze the p-branch of a program for solution of a system of equations, particularly for determination of the time characteristic defining the time required to reach an arbitrary assigned transition in the system when the branch is started from the initial operator. The basic possibilities for construction of sets of assigned operators are analyzed for modeling of the interaction of branches of the p-program as it is run. Figures 1; references 8.

[439-6508]

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UDC 681.327.4' 21

FORMATLESS INPUT PROGRAMS WRITTEN IN MACHINE- INDEPENDENT FORTRAN

Moscow PROGRAMMY BESFORMATNOGO VVODA NA YAZYKE FORTRAN (MASHINNONEZAVISIMAYA VERSIYA) in Russian, Preprint No 3085 1979 14 pages

VLADIMIROVA, T. M., GORODKOV, S. S. and LIMAN, G. F.

[From REFERATIVNYY ZHURNAL, AVTOMATIKA, TELEMKHANIKA I VYCHISLITEL'NAYA TEKHNIKA XA in Russian No 6, Abstract No 6B547. Annotation.]

[Text] A system of subroutines written in FORTRAN is described, which allows numerical information to be input from punch cards to memory without using formats and allows the files and variables to be input in batches in arbitrary order. Practice has shown that unformatted input greatly simplifies the use of programs designed for repeated calculation versions.

The subroutines were written using the common part of two versions of FORTRAN -- FORTRAN-CERN and FORTRAN-IV. It can be compiled and run on the BESM-6 and YeS computers with no alterations.

[439-6508]

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E. Automated Design and Engineering

Translations of Articles

USSR

UDC 681.327.69'22

THE UTILIZATION OF GRAPHICAL DISPLAYS FOR PLANNING THE TOPOLOGY OF LARGE SCALE INTEGRATED CIRCUITS

Moscow SB. NAUCH. TR. PO PROBL. MIKROELEKTRON. MOSK. IN-T ELEKTRON. TEKHN. in Russian 1976 No 31, pp 31-40

SHAN'GIN, V. F. and OGURTSOV, A. I., Moscow Electronics Engineering Institute

[From REFERATIVNYY ZHURNAL, AVTOMATIKA, TELEMEXHANIKA I VYCHISLITEL'NAYA TEKHNIKA in Russian No 4, Apr 78 Abstract No 4B556]

[Text] The organizational methods and software for operational graphical systems for the planning of LSI topology are analyzed. Figures 2; tables 2; references 3.

[441-8225]

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II. ECONOMIC APPLICATIONS

A. General Treatment

Translations of Articles

USSR

UDC 658.012.011.56

PROBLEMS OF DATA AGGREGATION AND DISAGGREGATION IN AUTOMATIC MANAGEMENT SYSTEMS

Moscow PROBLEMY SOVERSHENIYA SISTEM UPRAVLENIYA PREDPRIYATYAMI (OB'YEDINENIYAMI) [Problems of Improving Automatic Enterprise (Association) Management Systems] in Russian 1977 pp 57-65

BAYRAMOVA, I. P. and PROSKUROV, V. S.

[From REFERATIVNYY SBORNIK, ORGANIZATSIYA UPRAVLENIYA No 6, 1979, Abstract No 6.67.207]

[Text] It is impossible to study a complex object without subdividing it into parts. The fundamental procedure for subdividing an object is extraction and analysis of independent subsystems within it. Following this approach, one can construct a data disaggregation scheme for automatic management systems (ASU). The second problem of data aggregation, if this is regarded as a joining together of information about and for various tasks, has not yet been formulated in general terms by anybody so far. The gist of this problem is to determine the tradeoff between storing in the computer memory either information about each task or information about the entire system as a whole. The main requirement serving as the criterion for selecting the method of data organization is the need to reduce the labor of data processing for computer-aided solution of problems in automatic management systems. The use of automatic data banks with central data storage for all tasks of automatic management systems contributes to appreciable delays, which often amount to half the total machine time needed for the solution of those problems. It is, therefore, necessary to make quantitative estimates and to formulate specific rules as a basis

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for determining whether central or local data storage would be preferable. It can be asserted a priori that a better data organization allows for both central and local storage. One then determines to what degree and according to which criteria data for various tasks must be aggregated.

[435-2415]

USSR

UDC 658.012.011.56

THE ACTIVITY OF COMPUTER CENTERS DURING THE STAGE OF CREATION OF AN AUTOMATED MANAGEMENT SYSTEM

MECH., AUTOMAT. ADMIN. in Czech 1978 18 No 12, pp 476-478

[From REFERATIVNYY ZHURNAL, AVTOMATIKA, TELEMEXHANIKA I VYCHISLITEL'NAYA TEKHNIKA in Russian No 6, 1979, Abstract No 6A447 by S. I. Volchek]

[Text] It is noted that the decisive factor in the intensification of the development and introduction of automated management systems (ASU) and computer hardware to various branches of the economy of the GSSR has been the set of resolutions of the May 1974 Plenum of the CC CPC, indicating the great significance of the scientific approach to management problems and the need for objective evaluation and processing of information (I). By the end of 1976, 406 ASU had been completely developed, using modern computer equipment. By this same date, 52 of these ASU were in operation.

Several pressing problems of further development of ASU and computer centers are discussed: the need for complete compatibility of the information being processed; standardization of indices and methods of their processing, common for most ASU; introduction of common classification principles, including the area of economic indices; standardization of data processing technology, etc.

Significant improvement of information systems is required, including the introduction of obligatory or recommended information text structures, as well as information carriers, to allow exchange of information between different information-computer centers; standardization of algorithms for information processing, etc. The tasks involved in broader introduction of ASU and computer centers and increasing the effectiveness of their utilization are outlined.

[439-6508]

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AUTOMATION OF PLANNING OF MANAGEMENT SYSTEMS. COLLECTION OF WORKS

Moscow AVTOMATIZATSIYA PROYEKTIROVANIYA SISTEM UPRAVLENIYA. SB. STATEY.  
in Russian Statistika Press 1978 198 pages

TRAPEZNIKOV, V. A., Editor

[From REFERATIVNYY ZHURNAL, AVTOMATIKA, TELEMEXHANIKA I VYCHISLITEL'NAYA  
TEKHNIKA in Russian No 6, 1979, Abstract No 6A500K]

[Text] This collection contains articles of both expository and methodologic types, reflecting various aspects of the problem of automation of the planning of management systems (ASU): principles of automation, problems of algorithmic and methodologic support, methods of performance of tasks related to automation of planning, etc.

[439-6508]

USSR

UDC 658.012.011.56

AN ADMINISTRATIVE-TERMINAL ENTERPRISE CONTROL SYSTEM

Perm ORGANIZATSIONNYYE I STRUKTURNYYE PROBLEMY UPRAVLENIYA SOTSIALISTICHE-  
SKIM PROIZVODSTVOM [Organizational and Structural Problems of Administration of Socialist Production] 1978, pp 23-27

BUDOV, A. A. and KISHEV, YU. I.

[Translated from Moscow REFERATIVNYY SBORNIK, ORGANIZATSIYA UPRAVLENIYA  
No 3, 1979, Abstract No 3.67.205 by Yu. P. D.]

[Text] One means of improving automated management systems and increasing economic effectiveness by accelerating the processing and movement of information is the development and creation of an administrative terminal system for management. Such a system allows input and calling of prepared records from a file using terminal devices, editing and formatting of regulation and nonregulation documents as required, with output to the user's display. The administrative terminal management system ATS-10.340, developed by the Leningrad Water Transport Institute on the basis of the YeS-1010 computer and VT-340 "videoton" terminal devices is an interactive dialogue system. The specific tasks performed by the system are defined by the user in the dialogue mode. The data stored in the system can be

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interrogated or altered by several administrative workers simultaneously at different levels of management. Based on this, the system uses two groups of terminal devices - "active" and "passive." The "active" terminals not only display data on the screen, but also allow editing in the operational archives. The operational archives are stored in the system on fixed head magnetic disks. The "passive" terminals output regulation and nonregulation documents in response to information requests. The software for the administrative terminal system features a highly branched system of programs in the form of modules: servicing of "active" and "passive" terminals, an instruction interpreter, a report generating file manager and an executive program. A structural diagram of the interaction of the modules of the ATS-10,340 is presented. Machine-language programs are written in FORTRAN IV and Assembler. The "active" terminals are serviced by means of subroutines of a second type, called by the executive program and assigned to specific terminals. Commands from the "active" terminals call operational documents, enter information into the archives, edit forms, delete document lines, compress documents, insert new document lines, change output forms, copy documents onto blanks, and tabulate output forms. Commands of the "passive" terminal formulate and output finished documents. It should be noted that these commands, reproducible in the administrative terminal system, are single-line instructions, transmitted to the system from the "active" and "passive" terminals. They allow changes to be made in the data base and output of information as formatted documents. The system allows formatting of documents of any type. However, considering the limitations of the display screen of the VT-340 (16 lines, 80 characters), some forms of documented information must be divided into subdocuments to which names are assigned by the system.

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## INFORMATION SUPPORT OF MANAGEMENT SYSTEMS

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[Article by A. Modin]

[Text] Increase of the volume of information in the process of control of production brings about an increase of information work. The information process in a control system predetermines the main expenditures of the labor of specialists in solving tasks of the economic plan. Even simple operations with figures involve expenditures of working time. Thus, 0.45 second of time is required for the comparison of just two signs, and over

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1 second for the writing of one letter or digit. In processing the statistical information of an automated sector control system (OASU), 455.14 million characters a year were prepared. "The total volume of output statistical information (according to the Scientific Research Institute of the USSR Central Statistical Administration) is statistically distributed by sectors as follows: 252.1 million characters to industry, 17.3 to capital construction, 18.0 to the most important construction sites, 34.4 to labor and wages, 57.7 to material-technical support, 6.74 to agriculture, 4.1 to new technology, 11.8 to budgets, 8.5 to trade, and 44.5 to culture, transport, and finances, etc" [1].

The growth of the scale of information work in control systems cannot under contemporary conditions be accompanied by a corresponding increase in the number of administrative personnel, and in recent years this has become the object of centralized planning. At the same time the personnel, not being able to perform the actual volume of informational work satisfactorily, is unable to prepare economic plan decisions that permit more efficient production and economic activity. As a result, reserves are formed that are not mobilized by the actual traditional control systems. Indicative of the dimensions of those reserves is the fact that considerable investments in the creation of automated control systems in all units of the national economy are repaid in 3 or 4 years.[2]. These circumstances have determined the objective need for improvement of information processes in the control of social production and the wide mechanization and automation of administrative labor.

Three main directions have now formed in the improvement of the information support and the process of planning and control of various units of the national economy: redistribution of the volumes of information work among levels of control of social production, having in mind the transfer of a large volume of that work to inferior and primary units of the national economy; the mechanization and automation of information processes through the wide use of new technology and especially of electronic computers; the use of methods of economic information science to improve the supplying of control systems with information.

An important role in improving the supplying of information must be played by methods of economic information science in combination with use of the possibilities of contemporary electronic computer and other technology, and also means of communication.

The establishment of developed organizational structures laid the foundation for the formation and improvement of the supplying of production control systems with information. Moreover, it is accomplished under conditions of invariability of the sources of primary information mainly by ramification of the data flows and the centers of their storage. The development of information support has for a long time proceeded extensively through multiple duplication of data in the channels of its movement and its

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storage centers, and this has found some theoretical substantiation. For example, the construction of forms of statistical reporting was based on the following recommendations: presentation to the specialist of data permitting him to solve problems and monitor the precision of the report; inclusion in the report of information characterizing the plan and the actual dynamics of development of the object in the past; reflection in the report of estimated indicators, that is, the mean and relative values. The situation that has also formed in textbooks on statistics was correspondingly explained: "The main task of our accounting is to monitor the fulfillment of the plan and also to establish the status and development of the economy. In connection with that, many reports include three categories of information: factual data on the report period, the plan established for the report period and factual data for the preceding period. The presence of such indicators makes it possible to monitor the fulfillment of the plan and establish the dynamics of the development of phenomena" [3].

As a result of implementation of those recommendations, in a number of forms of statistical reporting only 20 percent of the new information is contained, and the remaining indicators--reference and estimated indicators and their recording on forms--are redundant expenditures of labor in a lower unit. An analogous situation is also characteristic of others, including intraplant forms of economic plan documentation.

The first attempts to mechanize informational work by means of electronic computers were unsuccessful without improvement of the routing of the forms of documentation; on the contrary, the increase of costs resulting from large time expenditures on data input into the computer in many cases explained the inefficiency of mechanization of information work.

The use of computers in the control of production required new methods of constructing informational support. In our country Academician V. Nemchinov was the first to formulate the basic principles of the construction of informational support of control systems:

- 1) minimize the quantity of primary data. In this connection he wrote "a minimum of initial data, a minimum of primary information and a maximum of derivative secondary information";
- 2) assure on the basis of a single flow of data the servicing of all types of economic management and the satisfaction of all units of control of the national economy. In his opinion it is advisable to combine into one all types of information services and serve them with a single automated processing system";
- 3) use a data processing system to comprehensively characterize economic objects and processes, that is, direction of the information system "not only toward obtaining data on processes and objects which cannot be observed

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directly but also toward data which cannot be obtained by direct observation or calculation";

4) expand the functions of the economic information service. V. S. Nemchinov noted that "the functions of the economic information service have been limited to just a servosystem, but have also been combined with definite functions of regulation and control";

5) provide initial data for tasks of economic mathematical modeling, that is, "the economic information service is called upon to provide the needed volume of information for modeling economic processes" [4].

The principles of informational support formulated by V. Nemchinov have obtained development in the conception of the integrated data processing system in the management of associations and enterprises. The integrated data processing system as the basis of improvement of the information support of production control systems is based on: "efficient distribution of all the technology for planning and control work to creative and mechanical operations; the development of detailed procedures for the accomplishment of mechanical operations that could not be performed by any man without occupational training; the construction of a form flow scheme with passage of documents through a "processing" filter taken into consideration; the release of equipment that prepares initial data (primary documents) from operations connected with the search for and recording of any sort of reference or estimated data on the documents (primary documents); the organization of a single, centralized standard-reference economy in the operation of the technological equipment of the data processing group [5].

Specialists of the Scientific Research Center of the USSR Central Statistical Administration have investigated problems of the use of the principle of deviations in constructing a sectoral system of operative accounting in the USSR Ministry of Chemical Industry. Implementation of that principle assured a sharp reduction of data in the planning and regulation of production. Whereas in the presence of daily reporting upon transition to a year according to the compiled nomenclature 1,947,600 indicators were reported, according to the program of the experiment their number was reduced to 497,100. But if only the data on deviations are taken, that is, the volume of the 5-day reporting is excluded from the program, the number of indicators is 117,000, or 6 percent of the number in daily reporting. The degree to which the management was informed remained practically the same. The cost of transmitting data on deviations is about 7-8 percent of the cost of transmitting daily reports" [6].

The basic indicators of the integrated data processing system as the base of information support have found wide application in the creation of automated enterprise and association systems. The flow of primary control

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data and the volume of labor-intensive information work in control systems have been sharply curtailed. For example, the organization of the storage of standard-reference data in computer memories released personnel of the administration from systematic operations with a card file of 300,000-500,000 cards. The printout of information on the shipment of production to the user by means of computer output devices has eliminated the need for manual preparation of invoices. Thus the development of electronic data processing made it possible to substantially improve the quality of execution of information work under the conditions of growth of production without increasing the numbers of administrative personnel.

In the beginning, when second-generation electronic computers were used in automated control systems (ASU), the memory of a control system was formed on magnetic tapes in the form of specialized files of standards and other reference information. Such organization of the standard-reference base still did not permit excluding duplication of data in different files, but it contributed to improvement of the quality of the calculations of economic plans and itself appeared as a labor-saving factor in systems for the control of production.

The introduction of third-generation electronic computers in the creation of automated enterprise control systems (ASUP) assured new possibilities for the creation of the information base of the system for the control and construction of integrated data processing systems. Random access to data in the memory of third-generation computers as a result of the wide dissemination of magnetic disk storage devices has permitted giving up the former principle of file formation. As a result of that, the concept of construction of universal programming facilities that have received the name of automated data banks has become the basis of the integrated data processing systems.

The development of information support of sector administration has occurred mainly within the framework of the corresponding automated control systems. The creation of automated control systems for sectors of industry brought about a standardization of primary documentation and a curtailment of its nomenclature, the formation of the standard-reference base in computer storages, the merging of flows of rapid and current information, etc. The information support was improved within the framework of the general principles of integrated data processing systems with the use of programming facilities for the construction of automated data banks. At the same time, improvement of information support in the sectoral unit (in the ministries and departments) has a number of principal distinctive features. Firstly, independent associations or enterprises scattered over the territory of the country are the source of primary data (documents) for ASU for sectors of industry. This limits, on the one hand, and expands, on the other, the possibilities of using the methods of information science to improve information processes and support, since the developers of the

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ASU for sectors of industry do not have the right to change the forms of planning and statistical documentation with the exception of the intra-departmental. Moreover, the standardization and rationalization of intradepartmental documentation considerably reduce the labor-intensiveness of the information process.

Secondly, the inclusion of associations and enterprises in a single system of communications permits widely applying within the framework of the ASU for sectors of industry data transmission technology with minimum expenditures of manual labor. In practically all ministries and departments, perforated teletype tapes serve as the source of data for the computers of dispatcher information points. In automated dispatcher information points, information arrives directly at computers from communication channels by means of special apparatus.

Thirdly, in a sectoral unit the possibility appears of direct machine interaction in the information process of electronic computers of the main computer center of the ministry or department and the computers of the automated data processing with minimal expenditures of manual labor.

The mechanized and automated interaction of control systems in the "sector-enterprise" link contributes to the scientific organization of informational processes and support. Automated data banks have found application in the automated control system for the sector as well as for the enterprise. They are used in the automated management systems for the instrument building sector, the chemical industry and a number of other sector control systems. Automated dispatcher information points using technical methods of minimizing data flows are functioning in practically all automated sector control systems. These methods of organizing information processes and support of automated sector control systems reduce to a tenth (if not to a hundredth) the data flow in the "ministry-enterprise" link, and also files of stored information, which in the final account leads to a relative reduction of labor-intensiveness of information work and increase of the quality of control of production.

The principles of scientific organization of information processes and support are used in the creation and development of the automated data processing systems of the central economic planning and functional organs of the country (the automated system for planning calculations of the USSR Gosplan, the automated system for state statistics of the USSR Central Statistical Administration, the ASU-Supply and ASU-Bank, etc.). Sector automated control systems or sector automated data processing systems are the sources of information for those systems. The concentration of both central economic planning and functional organ systems and their information sources within the limits of a single city opens up large possibilities of automating their informational interaction, and this in turn is a reserve for reduction of maintaining the control apparatus and increasing the speed and quality of solution of economic plan problems.

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Thus the automated interaction of the automated management system for the instrument building sector and the automated information-controlling system for standardization and metrology of the USSR State Committee for Standards permitted the saving of 45,000 rubles in the planning and functioning of those systems [7].

In spite of the successes achieved in the introduction of methods of economic information science in information processes and support of control systems, there still are definite shortcomings in the area of economic management. The principles of integrated data processing systems are utilized at far from all enterprises, associations and even ministries and departments. In a number of cases the absence of answers to organizational and legal questions hinders the exchange of information on machine carriers between automated systems. Such a practice not only does not save labor in the sphere of control but, as a rule, increases its expenditures in connection with transfer of data from machine carriers to ordinary forms of documentation. The lack of agreement of classifiers of material resources and the technical and economic indicators for sectors of the national economy hinders the interaction both of sector automated control systems and of labor on the preparation of data for their use outside the framework of the sector. Finally, the planning and reporting documentation is more and more saturated with reference and estimated indicators. "In the indicators of statistical reporting, planning and normative indicators represent 24 percent, indicators for past periods or estimated indicators, that is, those which can be determined from indicators of available reporting, 31 percent, and newly obtained indicators, only 45 percent" [8].

A serious shortcoming in the organization of contemporary information support is the circulation of a large volume of undocumented information in the control system. "Analysis of the support of functional control subsystems at enterprises shows that the standardization functions are 50-70 percent assured and the planning functions almost completely, the accounting and reporting by 70-80 percent (many documents on operative reporting) and functions of analysis and operative control by 20-30 percent. The absence of documented information on the last two functions shows that that part of the information reaches management in oral form, and that considerably reduces its reliability" [9]. This, it seems to us, impoverishes the "memory" of the control system, without permitting it to completely use accumulated knowledge and experience.

The mentioned shortcomings result from both practical and theoretical difficulties in improving information processes and support of systems for the control of social production. The practical difficulties, in our opinion, are connected with two questions. Firstly, improvement of information processes and support is a very labor-intensive measure in the overall complex of work on the rationalization of control systems. As experience in the introduction of automated enterprise control systems

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has shown, just the investigation of the actual form flow in order to rationalize it requires 20-40 man-years of labor expenditures; reorganization of the normative-reference base takes 2-3 years, etc. Of course, the conducting of such measures is not always within the capability of the control apparatus, overloaded with current informational and analytical work. Secondly, habits and skills in the organization of administrative work do not occupy last place in the overall complex of difficulties in improving information support.

The absence of a solution of theoretical questions has a great influence on the practical directivity of work on improvement of information processes and support. These problems still have not found due acknowledgment and place in the science of control of social production. Most often discussed in the economic literature are processes of reducing or increasing the number of planning and report indicators, of the introduction of new methods of calculation, the redistribution of rights and duties of subdivisions of the organs of control, etc. However, in all these investigations, questions of the information process and support remained for a long time and in a number of cases still remain without connection with the measures under consideration to rationalize control of production. What this leads to can be illustrated with examples. This problem developed very acutely on a national economic scale during the working up of an intersector balance of production and distribution of products. The obtaining of information about expenditures on the production of separate types of product in a cross-section of pure sectors required corresponding bookkeeping operations: at enterprises it would have been necessary to have separate analyses of the production of each specific type of product. The great labor-intensiveness of such a measure brought about the development of a procedure for construction of an intersector balance of production and distribution of product on the basis of spot check data. In many cases the requirements for information support are not so obvious.

It is known that the ministries and departments are responsible for studying, determining and satisfying the needs of the national economy for corresponding types of production. What does the practical solution of this problem mean? The information and computational aspects of determining the needs of the national economy for any type of production assumes a quantitative estimate of the consumption standards for the given type of article by areas of its application, that is, in the production of other types of product, and the prospects of development of the areas of application of a given type of article.

In other words, determination of the need of the national economy for a given type of product on the information and computational level in a number of cases is identical to the preparation of a general forecast of the development of interconnected sectors of the economy. At the same time, the ministries and departments responsible for the solution of that problem prove to be isolated from direct sources of information; between

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them and the consumers there can be several intermediate links producing primary data regarding the needs for its activity, which naturally hinders the making of such calculations or substantially lowers their precision.

The further development of information support and processes of the functioning of control systems requires the solution of a number of serious theoretical and practical problems. Above all, the problem of intersector integration of information flows on a countrywide basis becomes more and more acute. The development and creation of "vertical" integrated information systems have determined the scientifically substantiated directions in the improvement of information support of plant and sector management. At the same time those systems do not eliminate intersector shortcomings arising where the activities of ministries and departments abut. In turn they cause redundancy and duplication of data flows that give rise to unjustified loading of communications channels and a need for storage devices for computers installed in the corresponding main computer centers. All this increases expenditures on the creation of automated control systems or automated data processing systems and reduces the effectiveness of electronic computer use in the national economy.

The development of independence of associations in an operative economic respect and the imposition of responsibility on them for the final results and satisfaction of the needs of the corresponding economic units make it necessary for them to obtain information about the character of use of their production directly from the user. In other words, in the long term for planning the activity of separate associations and enterprises it can prove necessary to concentrate intersector information about the consumption of separate types of production in various sectors and regions of the country.

The considered aspects of improving the information support of a system for control of social production are difficult to solve within the framework of systems for automatic control and data processing of separate ministries and departments. An intersector approach is required, and also the creation of a network of data processing equipment.

"The effectiveness of data processing integration," notes L. M. Volodarskiy, "is determined by the fact that it provides complex informational depiction and analysis of economic processes, reduces to a minimum duplication of the processes of gathering, processing and transmission of data, and also permits minimizing specific expenditures to obtain a unit of output data. Integration of data processing on the scale of the national economy requires the solution of a number of complex problems, but it is the only real path that will permit satisfying the growing needs for control in the area of information at allowable dimensions of expenditures" [10].

An important way to solve that problem is to create interdepartmental automated data banks. Those banks, based on use of electronic computers of the

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state network of computer centers, have the task of concentrating intersector information and presenting it to the users, which relieves separate associations and organizations of gathering data, transferring it to machine carriers and expending electronic computer resources on the storage of information. The automated interaction of banks with sector automated control systems, automated data processing systems and enterprise automated control systems will also contribute to a curtailment of the data flow along communications channels. For such purposes it is necessary to preliminarily investigate the advisability of creating intersector automated data banks based on very widespread information or information-connected sectors of the national economy. The conducting of such investigations can serve as a stimulus to the scientific solutions of problems of information processes and support of various sector and enterprise automated control systems and a considerable increase in the effectiveness of their functioning.

An important direction in the improvement of information support in the system of control of the national economy is rationalization of horizontal flows of data between primary production economic units. The process of the preparation and organization (the main thing) of the fulfillment of plans causes an intensive exchange of information among producers, suppliers and users. That exchange of data, in contrast with vertical flows of planning, reporting and other documents, is practically unregulated and is accomplished in the form of indirect connections between associations in the form of telephone conversations, telegraph messages and all sorts of letters. As a rule such communications have the character of refinements, reminders and all sorts of complaints in connection with the non-fulfillment of contractual obligations. "According to data of the All-Union Scientific Research Institute of Standardization, 4 billion administrative documents are compiled in the country in a year. Of them about 2 billion are letters, half of which are duplicates. For each letter 3 or 4 standard sheets of paper (a rough draft plus copies) are expended on the average. Consequently, on all letters, 6-8 billion sheets, or over 30,000 tons of paper" [11].

Rationalization and standardization of the process of informational interaction of associations and enterprises must contribute to a sharp reduction of labor-intensiveness and expenditures of other resources on data preparation. The establishment of intersector regulation of informational interaction of various organizations with consideration of the new possibilities can considerably reduce horizontal information flows.

The introduction of regulatory conditions for the accomplishment of horizontal informational connections is impossible without scientific methodological substantiation. It is necessary to clearly distinguish objects with respect to which various associations enter into the informational interaction, the situations determining the character of the interaction and also the degree of informational significance of the interaction of

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subjects. Within the framework of separate associations and enterprises some experience has already been accumulated. Thus, at a number of associations and enterprises of the country the documentation used to reflect mutual claims among various economic units has been formalized and standardized. However, those questions require careful investigation and proper methodical presentation.

Together with general problems in the improvement of informational processes and support of control systems, particular questions occupy a place of no little importance.

Emerging especially sharply is the problem of raising the level of consistency and comparability of the technical-economic and planning-report indicators, which support the planning and control of social production. In solving questions of information support in the process of ASU creation the developers often encounter an absence of due comparability of the indicators reflecting separate aspects of the production and economic activity and recorded in documents relating to various functions. This results from both deviations in the accuracy of the recording of information and the procedures of their presentation. Most of such disagreements take place between indicators expressed in value terms and in kind.

A need has developed for standardization of the nomenclature of the technical-economic and planning-report indicators and, what is the main thing, the procedure for their formation. Standardization of the nomenclature and procedures for calculation of indicators has to do not only with the system in effect. It must take into consideration the development of the control system and provide for the introduction of indicators that still are not used in the practice of planning and reporting. Preparation of separate indicators in advance will simplify later on the introduction of new methods of planning and control.

Standardization of the nomenclature and procedures for calculation of indicators requires the nationwide introduction of a single information language. In existing control systems one and the same indicator within the limits of an association is expressed by different combinations of words, the names of indicators are replaced, etc. True, in traditional controls systems all this is compensated by the universal possibilities of man and his work habits. The situation is different in an automated control system or an automated data processing system, in the creation of which the developers are required to introduce formalized information languages. However, the development and introduction of information languages into operation are limited by the frameworks of the creation of automated systems of the corresponding organizations or associations. As a result there is a lack of coordination of the introduced information languages with one another and a preservation of existing languages where electronic computers and other equipment are not yet being used.

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Moreover, an information system unified on a national scale must be used even before the introduction of electronic computers and other hardware everywhere.

At the present time within the framework of developments of automated control systems for planning calculations and sector automatic control systems a number of formalized information languages have been proposed, and so it is an important task to verify their relative effectiveness and select the basic variant. Delay in solving this question will result in the development of a number of additional "company" languages, increase their variety and draw off resources from practical tasks in improving information processes and support of systems for the control of social production.

Integration of information flows and the establishment of a single information language is the basis for improving forms of documentation, one that permits eliminating from documents of any kind reference and estimated (that is, redundant) indicators, and also is a prerequisite for a sharp curtailment of forms of documentation and of the indicators contained in them, and in the final account a reduction of the labor-intensiveness of the formation of a documented data flow. The question arises of whether it isn't possible to accomplish that measure immediately before integration of information flows. It was said above that the data flows are already being integrated within the framework of the creation of enterprise and sector automated control systems. Redundant indicators are being eliminated from the forms of intraplant and intrasector documentation. However, the main part of the redundant indicators results from their intersector character. Elimination of this redundancy does not seem possible without integration of the information flows on the scale of the national economy.

The introduction of a single information language raises the level of consistency of indicators in all areas of their subsequent application and improves the conditions of interaction of different automated control systems. This also must assure uniform formulation of the technical-economic, planning-reporting and accounting indicators in all links and sectors of the national economy and operations in obtaining and subsequently using them. In that case a unique standard (of nomenclature and values) of all indicators used in the system for control of social production ought to be introduced first. That standard will become the basis of the formulation of forms of documentation and methodical materials on the organization of information processes and support of systems for control of all links of the national economy. It is precisely the presence of such a standard that can regulate subsequent work on improving the information support of control systems.

Solution of the above-considered questions far from exhausts the problem of improving information processes and support of a social production

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control system. An important measure in that area is the development of a scientifically substantiated technology for performing information work. Especially important will be standardization of technological processes as the basis for assuring comparability and consistency of all technical-economic, planning-reporting and accounting indicators.

The technology for making technical-economic calculations--the formation of indicators and documents--must become an inseparable element of all materials on methods of solving tasks in the planning, calculating and control of production. When there is a precise technology for the performance of economic work, in the development of production control systems a new property emerges--the possibility of verifying the influence of the procedure for plan development on its precision and the adequacy of regularities in the production and economic activity of enterprises, associations and sectors of the economy. Correspondingly, elements of self-instruction and self-organization obtain a strict quantitative base in the development of control systems.

The information process in a social production control system accumulates a considerable portion of the labor resources. It is one of the most labor-intensive in the entire cycle of social reproduction. The task of increasing the effectiveness of control is also connected to a great extent with improving the quality of execution of information processes and support, with improving the use of the activity of manpower employed in that sphere.

Improvement of information support is of great importance in the planning and control of sectors of the national economy and production associations and enterprises. Therefore it is necessary to more widely use all the possibilities of scientific information science and also of means of automation of data processing and transmission. Rationalization of the information support must be accomplished in an organic combination with processes of improvement of the control of production and the creation of automated control systems.

It should be borne in mind that curtailment of the volume of information work by reduction of the number of planning and accounting indicators does not always improve the results of production and economic activity of sectors of the national economy, associations or enterprises. The fact is that the nomenclature of technical-economic indicators to a certain degree stipulates the quality of plans and operational administrative decisions. The absence of necessary indicators in the planning and reporting documentation lessens the organizing role of the plans, increases indeterminacy in the making of administrative decisions and in a number of situations brings about a need to expend resources on the retrieval or the obtaining of lacking information. This is clearly manifested in material-technical supply: in many cases a shortage of material resources in production is explained, not by the absence of

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materials or articles making up sets, but by an extreme aggregation of information about the state of stocks or the places where they are disposed.

Information is becoming more and more a very important resource of planning and control. It is precisely on the level of detail, precision and timeliness of arrival of technical-economic data that the quality of planning and operational administrative decisions depends. Questions of the improvement of the planning procedure and the mechanism of cost accounting and correlation of the centralization of planning and economic independence should be solved in a complex with the organization of information support of control systems.

Thus the task arises of optimal agreement of the level of detail of the nomenclature of indicators of planning and control with the quality of the planning decisions and expenditures on data gathering and processing. Correspondingly, it is advisable to consider measures to improve the organization of control of sectors of the national economy, production associations and enterprises jointly with questions of their effective information support. In other words, expenditures on the implementation of the information support of new methods of planning and forms of cost accounting must be taken into account as a component part of expenditures on the introduction and carrying out of the proposed measures.

Unfortunately, at the present time problems of information support remain an area of investigations of "narrow" specialists in the organization of electronic data processing or clerical work. There are practically no examples of complex solution of problems in improving planning and control together with questions of corresponding information support. Measures on the introduction of new methods of planning or forms of cost accounting are carried out first, and an additional flow of necessary data, which complicates the already existing information support system, is organized later.

At the same time the problems of information support have gone far beyond the framework of narrow technical questions and are being linked more and more closely with the general complex of measures to improve systems for control of sectors of the national economy and production associations and enterprises. Large planning and research collectives are working in that area, and on the results of their activity depend not only the current but also the long-range effectiveness of the organization of control. In addition, automation of information support presents new and broader possibilities of rational planning and control as well. Serious attention has been turned repeatedly toward the importance of development of that direction of science.

In view of the organizational connection of information processes and support with the corresponding subdivisions of social production, at the



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present time it is hardly possible to separate the information industry into an independent sector in its traditional sense.

However, the problem of the development of a network of time-sharing computer centers, which also form the material basis of a new sector of industry--data processing, is on the agenda. The development of the new sector makes it necessary to develop on a priority basis the economic principles of its construction and functioning. The main parameters of automated control systems and methods of forecasting and planning have now been theoretically substantiated and worked out by the scientific institutions of the country, the methodology of their construction has been formulated and a procedure for determining economic effectiveness has been adopted. In addition, the introduction of computer technology and the methods of mathematical economics into the control of social production, the creation of automated control systems and, what is the main thing, tasks in the further improvement of information processes and support are establishing a need for the development and formation, within the framework of the general theory of scientific control, of questions of the economics of the information industry as an independent scientific discipline.

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TECHNIQUE PROPOSED FOR FIGURING AUTOMATIC MANAGEMENT SYSTEM EFFICIENCY BY STAGES

Moscow VOPROSY EKONOMIKI in Russian No 7, 1979 pp 135-137

[Article by A. Kovalev, Omsk: "Changes in Economic Efficiency of ASU's Over Time"]

[Text] The current stage of scientific-technical progress in machine building is characterized by a high rate of development of automation of production management. Expenditures to set up automated enterprise management systems (ASUP's) have reached significant dimensions, and this requires improvement in methods of economic substantiation of planning decisions.

During economic substantiation a choice must be made of the type of ASU and variations of solutions to problems of automating management to insure maximum possible impact in light of the specific conditions for introducing the ASUP at the particular site. The quality of planning calculations of the efficiency of the ASU is determined largely by the extent to which the following characteristics are taken into account.

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It is common knowledge that the expenditures for and impact of an ASU are related to different spheres of the production system. Expenditures are formed in the management system, while the result appears primarily in production. Introduction of an ASU by stages affords a gradual increase in the economic impact until the system is entirely launched. The complexity of the system and close ties with the concrete parameters of the objects of automation predetermine the need to take account of many factors that influence the level of efficiency. Finally, the functioning ASU is developed and refined and this means that there will be an additional impact without additional capital investment. While the first three characteristics have been reflected, to one degree or another, in existing methodological schemes to determine the economic efficiency of ASU's, this is not true of the latter, fourth characteristic of such systems.

Practical experience shows that a definite progression of efficiency indexes corresponds to the nature of development of the ASU at each enterprise. The progression of indexes may vary, but in general we can identify the following stages in the process of functioning of an ASU. In the first stages of introduction expenditures often rise for both past and live labor in certain sub-headings of operations expenditures, which tends to decrease the impact of the ASU. As the phases of the ASU are launched the impact grows. Refinements of the ASU, adjusting it to the enterprise, and broadening the sphere of influence on its economical operation promote growth in the impact obtained without additional capital investment. Then the system "grows old" and, if appropriate measures are not taken, a tendency for the impact to decrease may appear.

Because of the variable nature of the ASU impact, already in the stage of economic substantiation the dynamic factor must be taken into account in determining annual results. Given the condition that the impact of the ASU in year  $t$  is not equivalent to the impact in years  $t+1$ ,  $t+2$ , ... $t+n$ , we may conclude that it is advisable to determine the annual results of the functioning of an ASU as the average amount for a definite period of time:

$$\bar{z} = \frac{\sum_{t=1}^T z_t}{T} \quad (1)$$

where  $\bar{z}$  is the average annual impact of the ASU,  $z_t$  is the impact in year  $t$ , and  $T$  is the interval of calculation. In this case the period  $T$  may be taken as equal to the time interval, obtained by forecasting methods during which the projected system will not depend substantially on physical wear and obsolescence.

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Let us take a hypothetical example. Suppose that there are two variations of the plan of an ASU for the same object of automation of management and that they differ by planning decisions that envision, for example, variations in the distribution of jobs by subsystems. Suppose that the two variations A and B afford the same annual economic impact ( $\mathfrak{I}_0$ ) of 220,000 rubles in the year of introduction of the last phase of the system. However, because variation A has coordinated the range of jobs more rationally to provide an opportunity for greater use of intermediate results of calculation and owing to various other factors, the annual growth in the economic impact will, according to expert estimates, be 10 percent (of the magnitude of impact  $\mathfrak{I}_0$ ) for 5 years, whereas variation B insures an average annual increase in the impact of seven percent. According to formula (1) the annual economic impact according to variation A (average magnitude with due regard for change over time) will be equal to

$$\mathfrak{I}_n = \mathfrak{I}_0 + \frac{\sum A\mathfrak{I}}{2} = 264,000 \text{ rubles,}$$

while for variation B the figure is 250,800 rubles. Thus, variation A is the better of the two.

Thus, consideration of dynamic aspects in evaluating the efficiency of an ASU fosters a sounder choice of variations. Indeed, if, for example, the annual growth in enterprise profit from an ASU is determined in planning calculations as  $N_{ave}$ , this is no longer an isolated amount in year  $t$  (the year of introduction or the following year), but is a more or less realistic parameter of the system determined with due regard for the rate of its development in period  $T$ . Needless to say, nothing said above negates the advisability of determining the impact as a concrete annual magnitude also.

Calculations taking account of the dynamic factor are based on the use of a system of forecast estimates of the impact of an ASU. It is not possible today to formalize the process of measuring this impact with a high degree of precision because we do not have adequately complete studies of the actual results of ASU introduction or analysis of the actual influence of various efficiency factors on the amount of the impact. For this reason, forecasting the economic indexes of systems may be done in practice by the method of expert estimates. However, an analysis found in the special literature concerned with ASU designs, the logic of system behavior, and certain relationships leads to the conclusion that in principle the character of the process of change in the impact of an ASU may be expressed by the following functional relationships:

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$$\mathcal{J} = \mathcal{J}_0 + ate^{-\frac{t}{c}}, \quad (2)$$

where  $\mathcal{J}_0$  is the magnitude of the impact in year  $t$  (the year of system introduction according to the technical specification;  $a$  and  $c$  are parameters that characterize the magnitude of capital investment related to setting up the system ( $a$ ) and the given level of system reliability ( $c$ ).

Taking the derivative and solving the equation relative to  $t$ , the extremal values of  $\mathcal{J}$  are determined. Then  $\mathcal{J}_{\max} = \mathcal{J}_R$  for  $t = t_R = c$ , considering that:

$$\begin{aligned} \mathcal{J}' &= 0 + ae^{-\frac{t}{c}} - \frac{at}{c} e^{-\frac{t}{c}}; \\ ae^{-\frac{t}{c}} (1 - \frac{t}{c}) &= 0; \\ 1 - \frac{t}{c} &= 0; t = c; \mathcal{J}''(c) < 0. \end{aligned}$$

In the process of forecasting it is necessary to determine not just the impact but also the period  $t_0 - t_K$ , which is the period of growing impact. This is necessary specifically to calculate the average annual value of  $\mathcal{J}$  (that is, for the calculation taking account of the dynamic factor).

Study of possible changes in impact and (other economic parameters of ASU's) over time is very important for economic substantiation of system design. The principal factors that will make such research effective are the accumulation and systemization of information of the actual economic results of the functioning of automated management systems.

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A METHOD OF CALCULATING THE PERSONNEL INVOLVED IN PLANNING AND INTRODUCTION OF AUTOMATED ENTERPRISE MANAGEMENT SYSTEMS AT A COMPUTER CENTER

MEKHANIZATSIYA I AVTOMATIZATSIYA UPRAVLENIYA NAUCHNYY-PROIZVODNYY SBORNIK  
No 4, 1978, pp 45-50

[Translated from Moscow REFERATIVNYY SBORNIK, ORGANIZATSIYA UPRAVLENIYA  
No 3, 1979, Abstract No 3.67.199]

[Text] A method is presented for calculation of the computer center labor resources required for functioning of enterprise automatic management systems in the Instrument Building Ministry. The method is based on the use of the factors of economic expediency of selection of a personnel table allowing the planned volume of work to be performed in the required time considering the completeness of loading.

[426-6508]

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B. Bloc-NonBloc Cooperation

Translations of Articles

USSR

UDC 681.3:001.18

THE CURRENT STATUS AND PROSPECTS FOR FUTURE UTILIZATION OF COMPUTER EQUIPMENT IN THE ECONOMY

VYBER INFORM. Z ORGANI A VYPOC. TECHN. in Czech 1978 No 6, pp 644-646

KUNAU, HANS

[From REFERATIVNYY ZHURNAL, AVTOMATIKA, TELEMEXHANIKA I VYCHISTEL'NAYA TEKHNIKA in Russian No 6, 1979, Abstract No 6B2 by I. I. Slyusarenko]

[Text] The use of computers for the control of production, service and transportation processes, planning and accounting is described, and it is reported that this significantly increases the effectiveness of various sectors of the economy and decreases the cost of administration, due to the introduction of electronic data processing. The joint activity of East Germany, the USSR and Bulgaria in the area of development and manufacture of YeS computers is stressed.

A further task of computers is operational planning and control of production in automated management systems for technological processes (ASUTP) and increasing the quality of planning, design and technological preparation of processes; improvement of supply and transportation operations; planning and balancing at the level of the central state organs responsible for planning the economy.

In the GDR, there are over 600 computers, operating an average of 15 hours per day, plus about 2100 small and control machines. There are almost 70,000 operators and programmers. It is planned in 1981-1986 to increase the level of management and produce equipment with improved parameters, plus an increased of I/O and communications equipment. The cost of data collection is to be decreased by decreasing the human labor

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involved and increasing the use of machine - readable information carriers. The quality of automated management systems is to be improved by increasing standardization, organization of shared use of computers, and remote processing of data. Devices connecting man to machines, multiprogramming systems and computer networks are to be developed.

USSR

UDC 658.012.011.56(100.2)

ECONOMIC AND LEGAL ASPECT OF OPERATING INTERNATIONAL COMPUTER NETWORKS

Moscow PROBLEMY MSNTI: INFORMATSIONNYE I UPRAVLYAYUSHCHIYE SISTEMY  
[Problems of the International Council on Scientific and Technical  
Information: Information and Control Systems] in Russian No 3, 1979  
pp 3-10

BUTRIMENKO, A.

[From REFERATIVNYY SBORNIK, ORGANIZATSIYA UPRAVLENIYA, No 4, 1979, Abstract  
No 4.67.184]

[Text] Economic and legal aspects of operating computer networks in data transmission systems in West Europe and in the United States are considered. Problems are defined which arise in the development of international computer networks.

[435-2415]

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C. Over-all Planning Methods

Translations of Articles

USSR

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THE IMPROVEMENT OF THE ORGANIZATION OF COMPUTATIONAL PROCESSES IN AUTOMATED MANAGEMENT SYSTEMS

Moscow NAUCHNYYE TRUDY MOSKOVSKOGO INSTITUTA UPRAVLENIYA [Scientific Works of the Moscow Institute of Control] No 141, 1978 pp 113-116

SAMUSENKO, YU. G.

[Translated from Moscow REFERATIVNYY SBORNIK, ORGANIZATSIYA UPRAVLENIYA No 3, 1979, Abstract No 3.67.195 by Yu. P. D.]

[Text] At the present time, one of the most pressing problems is that of improving the organization of functioning of automated management systems (ASU) in order to increase their effectiveness. A key problem in this area is that of increasing the throughput and effectiveness of the computer system which is the core of any ASU. It is necessary to study the process of functioning of computer systems (VS) and assure that the process flows correctly by running machine models of the operations which occur in the VS and analyzing the changes in the status of VS resources during processing of tasks. The purpose of the first part of this study was to perform an experiment on the organization of simultaneous operation at 3 ASU subsystems. The basic computer used for the studies was a model YeS-1022; therefore, the first initial parameters corresponded to the basic YeS-1022 system, running under the DOS/YeS operating system. The set of tasks for simultaneous processing was selected on the basis of the criterion of utilization of the maximum number of VS resources with the minimum competition for resources between various tasks. Thus, it was unnecessary to perform the task of scheduling, and the simplified research task became one of determining the number of partitions in the DOS/YeS which achieved the maximum VS utilization efficiency.

[426-6508]

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UDC 658.012.011.56(47+57)

THE ECONOMIC ANALYSIS SUBSYSTEM OF AN AUTOMATED ENTERPRISE MANAGEMENT SYSTEM

BUKHGALTERSKIY UCHET, No 11, 1978 pp 27-30

[Translated from Moscow REFERATIVNYY SBORNIK. ORGANIZATSIYA UPRAVLENIYA No 2, 1979, Abstract No 2.67.200 by Yu. P. D.]

VELICHKOV, T. R.

[Text] Measures related to the introduction and development of automated management systems (ASU) of enterprises, unions and branches occupy a special position in the system of measures designed to improve the control of the national economy. The introduction of ASU is an important factor in increasing the effectiveness of administrative labor, relative reduction in the number of workers involved in this field, and qualitative solution of the new and increasingly complex problems related to the administration of public production. At the present time, over 3,500 automated management systems of various types are in operation in our nation, including 2011 ASU of associations and enterprises. At many enterprises, the ASU are fully functional. During the Ninth Five Year Plan, the savings resulting from the introduction of ACS of all types, considering the savings carried forward from previous years within the five year plan period, reached 4.33 billion rubles, while the total cost of development and introduction of such systems was 5.12 billion rubles. During the Tenth Five Year Plan, the savings are to exceed the total costs by 2.18 billion rubles. In machine building alone, the use of ASU will increase the productivity of labor by up to 6 percent, materials inventories will be reduced by 2-4 percent, and the volume of production realized will be increased by 2-3 percent. At the "Uralktrotyazhmash" Plant, the introduction of the first section of the ASU has reduced the time required to process standards documentation for new products, has increased the timeliness and accuracy of planning and accounting operations. The transition of calculations to computers has liberated 84 employees and engineering/technical workers; the annual economic effect of the introduction of the ASU is 387,000 rubles, and the entire cost of creation of the system was amortized in 1.7 years. Computer centers are currently performing between 60 and 120 tasks per enterprise, encompassing the entire range of basic functions in the area of production and economic activity. However, the existing scientific and technical level of ASU does not yet stimulate the conduct of combined measures for improvement of administration of production sufficiently. Existing automated management systems are mostly equipped with second generation computers with a limited range of peripheral equipment. The software provided by computer manufacturers does not fully satisfy users. ASU and computer centers do not have complete sets of applications programs,

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particularly programs for the performance of tasks in the area of current and future planning. The mean daily load on computers for the country as a whole is 11.7 hours. All of this requires that a combination of steps be taken to increase the technical level of ASU, provide newly created and developing ASU with third generation computers, which can reduce the cost of information processing by 3 to 4 times, eliminate the disproportion between the throughput of processors and the throughput of peripheral equipment, increase the quality and reliability of computers produced, create progressive methods and equipment for programming automation, and also mobilize underutilized reserves in existing ASU. Steps of this nature have been developed by the USSR State Committee on Science and Technology. If these steps are taken, the economic effect achieved from the use of computer technology in the economy can be more than doubled during the Eleventh Five Year Plan.

[426-6508]

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D. Economic Control at National Level

Translations of Articles

USSR

UDC 002.63[621 + 629 + 669]

AUTOMATED SYSTEM FOR SCIENTIFIC AND TECHNICAL INFORMATION IN THE HEAVY  
AND TRANSPORT MACHINE-BUILDING SECTOR--ASNTityazhmash

Moscow INFORMATSIONNYYE PROTSESSY I SISTEMY in Russian No 7, 1979 pp 1-9

[Article by V. S. Zhukov, Yu. A. Sokolov, V. A. Palochkin and N. P.  
Tumanova]

[Excerpts] ASNTityazhmash is an integrated automated system of scientific  
and technical data processing based on the use of electronic computers,  
microfilming and means for the mechanization of technical and administrative  
work.

The system constitutes a unified mechanized and automated organizational  
and technical complex in which are combined:

- the gathering, systematization and completion of a unified sector  
information-reference bank with documents in a form convenient for auto-  
mated processing;
- the creation and conducting of a unified terminological service;
- information reference services of specialists of the sector on con-  
stantly recurring and one-time questions;
- publication of abstract and bibliographic information;
- exchange of information within the sector on machine-readable carriers,  
the preparation and printing of local information collections for ex-  
change with other systems;
- the preparation of information materials on trends in the development  
of science and technology in the directions of the sector;

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-- the study, generalization and distribution of advanced experience in the sector;

-- planning and record-keeping of scientific research and experimental design work done in the sector.

In a breakdown of the system of functions, nine subsystems were distinguished:

-- the gathering, processing and input of information;

-- storage of information;

-- retrospective retrieval of information (RP);

-- selective dissemination of information (IRI);

-- preparation and determination of the circulation of local information retrieval systems (LIPS);

-- issuance of signal information;

-- statistical processing of factographic information;

-- transmission of information;

-- control of ASNTItyazhmash.

The software of ASNTItyazhmash is being developed by subsystems. For the document retrieval system, which assures effective servicing of specialists in a regime of selective dissemination of information and retrospective retrieval, the applied program package ASPID (Automated system of information retrieval by descriptors) was selected. ASPID is intended for information retrieval systems with descriptor information retrieval languages and with manual indexing. By means of ASPID programs, document files are created, stored and renewed in direct-access memories, documents are searched for according to a retrieval prescription and found documents are issued. The package has a simple modular structure and includes seven programs which function under the control of a YeS disk operating system. ASPID programs are written in the ASSEMBLER algorithmic language. The required volume of the main storage is 32 kilobytes. Needed for work of the system are three basic files (the thesaurus, bibliographic and retrieval) and several auxiliary ones (files of statistical data, of withdrawals from the thesaurus, etc.).

All the files are recorded on magnetic tapes, each of which is in a separate volume (disk package), but all except the bibliographic can occupy not more than one volume.



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The hardware complex consists of an aggregate of computer equipment, apparatus for data reception and transmission, copying and duplicating equipment and microfilm equipment.

The basis of the ASNTItyazhmash hardware consisted in a computer complex of compatible equipment that had to assure the following:

- the possibility of aggregate increase of capacity of the complex;
  - the possibility of data processing in real time and in a regime of package processing;
  - the possibility of maximum automation of data processing;
  - accessibility in circulation and high reliability, and also maximum standardization of elements, units and equipment;
  - standardization of the software, which permits effective use of electronic computers;
  - apparatus compatibility with the GASNTI [expansion unknown] hardware.
- The indicated requirements are realized by a complex of computers of the series YeS-1022. The composition of the basic complex of YeS-1022 computers is presented in the following table.

Composition of the basic complex of the YeS-1022 computer

Item	Number	Storage Number	Quantity
Processor	YeS-2622		1
Processor power pack	YeS-0823		1
Main memory	YeS-3222		1
Magnetic tape store	YeS-5017	YeS-5012	4
Magnetic tape store control unit	YeS-5517	YeS-5511	1
Magnetic disk store	YeS-5056	YeS-5052	2
Magnetic disk store control unit	YeS-5551	YeS-5561	1
Device for input from punched cards	YeS-6012		1
Device for output of punched cards	YeS-7010		1
Device for input from punched tape	YeS-6022		1
Device for output to punched tape	YeS-7022		1
Alphanumeric printer	YeS-7032	YeS-7033	1
Panel typewriter	YeS-7077	YeS-7070	1
Device for preparation of data on punched tapes	YeS-9022	YeS-9020	1
Device for preparation of data on punched cards	YeS-9011		2

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E. Economic Control at Local Level

Abstracts of Articles

USSR

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ORGANIZATION AND MINSK-32 COMPUTER SOLUTION OF TASKS RELATED TO THE  
COMBINED MODEL FOR PLANNING THE ECONOMY OF THE TSSR

Ashkhabad AVTOMATIZIROVANNYYE SISTEMY PLANIROVANIYA I UPRAVLENIYA  
[Automated Planning and Control Systems] No 4, 1979, pp 40-47

[Translated from Moscow REFERATIVNYY SBORNIK. ORGANIZATSIYA UPRAVLENIYA  
No 2, 1979, Abstract No 2.67.187]

[No Abstract]

[426-6508]

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F. Manufacturing and Processing Industries

Translations of Articles

AUTOMATION OF FERROUS METALLURGY

Moscow METALLURG in Russian No 6, Jun 79 signed to press 22 May 79 pp 1-3

[Article by V. I. Petrikeyev and V. M. Vinogradov, USSR Ministry of Ferrous Metallurgy, All-Union Scientific Research Institute of Automation of Ferrous Metallurgy: "CEMA Cooperation in Automation of Ferrous Metallurgy"]

[Excerpts] Metallurgy is the leading sector of heavy industry, and has been and remains the basis of the economic might of the socialist community countries.

The pay-off period on setting up an ASU [automated management system] for technological processes is as short as 2 to 3 years; for an ASU for production, it is about 3 years. This is 2.5 to 3-fold less than the normative pay-off period for capital outlays in ferrous metallurgy. With that it should be stressed that outlays for development and design of ASU can be reduced by using standard structures, programs and algorithms.

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AUTOMATION OF TECHNOLOGY AND MANAGEMENT OF PRODUCTION IN FERROUS METALLURGY

Moscow METALLURG in Russian No 6, Jun 79 signed to press 22 May 79 pp 3-4

[Article by I. A. Rylov and L. S. Fridlyand, All-Union Scientific Research Institute of Automation of Ferrous Metallurgy]

[Excerpt] In recent years, along with the further development of ferrous metallurgy--the increase in the unit capacities of technological aggregates and intensification of processes--the problems of automated management have expanded and become more complicated, and the requirements for precision and reliability of automatic machines have been made more demanding.

Characteristic of automation development in recent years is the transition from the partial automation of technological aggregates and objects to the complete, based on third-generation computers, and the development of the first models of automated production control systems.

More than 6500 local systems of automation of technological processes are now operating in this sector's enterprises; more than 450,000 industry-wide instruments and means of automation have been assembled. Many new special instruments and means of automation have been developed for ferrous metallurgy, in particular, such highly efficient ones as a gas analysis system for blast furnace and converter production, high temperature controls for blast furnace production, an instrument for determining the percentage of manganese content in raw ore and concentrates, et al. There are 120 automated systems for management of technological processes (ASU TP) operating with computers.

The tasks of these systems include: acquisition and primary processing of information; calculation of optimal parameters for running a technological process; distribution of jobs to local control systems, and in some cases, direct digital control of the process; signaling about deviations in the parameters for a technological process; printing a log; and communication with a shop ASU. Highly automated aggregates and objects, on the level of the best modern units of this type, are operating today in every subsector of ferrous metallurgy. The technical capabilities of the automated equipment and the effectiveness of the introduction of them into ferrous metallurgy are very great. An ASU TP for preparing and feeding the charge for blast-furnace smelting was developed and introduced by the VNIIAchermet [All-Union Scientific Research Institute of Automation of Ferrous Metallurgy] and plant together with other organizations at blast furnace No 9, with a capacity of 5000 m<sup>3</sup>, of the "Krivorozhstal'" plant. The ASU TP handles the following tasks: adjusts the proportioning of charge materials taking into account the preciseness of the batch of the previous dose and changes in coke moisture; controls the rate of loading of the blast furnace which varies with the rate of descent of the charge; keeps a shift-daily account of expenditure of charge materials.

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Adjustments to the mass of the dose and clearance to unload the next charge portion when processing control responses are executed in the direct digital control mode from the UVM [process control computer]. Control tasks are handled in real time which indeed predetermined the necessity of using a computer.

The ASU TP is made up of a specialized control computer complex of two M-6000 computers due to the stringent requirements for system reliability: one is connected for operation when the other goes down.

Operation of the ASU TP for preparing and feeding the charge for blast furnace No 9 since March 1975 has shown that the system has sufficient reliability and enables maintaining the prescribed mass of dose of charge materials and stockline level at the blast furnace top. Introduction of the ASU TP resulted in a coke savings of 5.35 kg/t of cast iron. Consequently, taking into account the additional capital and operating outlays for the ASU TP, the savings on cast iron production costs were 460,000 rubles.

The first phase of an automated system for management of oxygen-converter shop No 2 (ASU KKTs-2) was developed and introduced by the TsNIIKA [State All-Union Central Scientific Research Institute of Complex Automation] and the plant together with other organizations /at the Western Siberian/ [in boldface] Metallurgical Plant. This integrated system performs the functions of an ASU TP as well as those of production control. It has three subsystems: melting control (ASU TP "Plavka")--formulates recommendations on melting and issues them to the converter operator; information--formulates and prints the certificate of melting and melting log, displays information on parameters of pouring floors; production accounting--formulates and prints reports on shop operations: daily shop report, daily report on rejects by brigades, shift reports.

The ASU KKTs-2 structure consists of a three-machine specialized complex based on M-6000 computers.

Operation of the ASU TP "Plavka" since December 1975 has shown that the system has high reliability. It issues recommendations for 97 to 98 percent of the total number of meltings of which 50 to 55 percent are accepted by the converter operator for execution. The total share of meltings discharged from the first tip is now 66 percent compared to 48 percent under manual control. The introduction of the ASU TP of converter melting has resulted in a savings of 231,000 rubles.

An ASU for converter melting was put into industrial operation in the converter shop of the /"Azovstal"/ Metallurgical Plant/ [in boldface] in 1978. It has a control computer complex of two M-6000 computers as well as local systems for automatic control of consumption of friable materials and ferroalloys, position of oxygen lance, and oxygen consumption.

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The introduction of elements of dynamic control of converter melting into the system is scheduled for 1979. This will include a measuring probe for control of temperature, carbon content, and selection of a metal sample in the blowing operation, as well as facilities to monitor the composition and amount of flue gases for control of decarburization and slag formation.

An ASU for high-capacity curvilinear machines for continuous casting of billets (ASU TP MNLZ) was introduced in this same shop in 1978. The basic task of this system, built on a base of a computer complex of two M-6000 computers, is the stabilization and optimization of technological and thermotechnical processes of metal casting by controlling secondary cooling conditions, slab reduction rate and ingot cutting.

Introduction of the ASU TP MNLZ has led to an increase in quality and a reduction in rejection of cast slabs, etc.

An ASU TP for a broad strip 2000 mill of hot rolling was set up at the /Cherepovetskiy Metallurgical/ Plant [in boldface] under a contract with the FRG firm of Siemens. This system, the basic task of which is to increase productivity and raise product quality, provides automated management of the entire technological process of hot sheet rolling.

The system is built in a hierarchical bi-level structure. The lower level consists of local systems made up of standard digital and analog modules. They are installed directly on mechanisms in the mill line and at the technological process control posts throughout the entire mill line.

The upper level consists of the Siemens-305 and Siemens-306 control computers installed in the computing and data processing center which ensures optimal control of the entire technological process of sheet rolling.

Introduction of the ASU TP of the 2000 mill led to a 2 percent reduction in standard fuel consumption, a 2 percent reduction in metal losses from oxidation and scale, and a 1.6 percent increase in mill productivity which has saved 750,000 rubles annually.

Today, 30 automated production management systems (ASUP) are operating in the sector. Operational accounting of production, accounting of shipments and sales of finished products, processing of the portfolio of orders, calculation and analysis of basic indicators of enterprise production activity have been automated using computers in the majority of enterprises.

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G. Transportation System

Translations of Articles

USSR

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KEYBOARD COMPUTERS. DESIGN AND MAINTENANCE. A TEXTBOOK FOR RAILROAD  
TRANSPORT TECHNICAL SCHOOLS.

Moscow KLAIVISHNYYE VYCHISLITEL'NYYE MASHINY. KONSTRUKTSIYA I  
TEKHNICHESKOYE OBSLUZHIVANIYE. UCHEBNIK DLYA TEKHNIKUMOV ZH.-D. TRANSP.  
in Russian Statistika Press 1978 456 pages

BOBROV, A. G., DUMOV, V. N. and KASTERIN, V. I.

[From REFERATIVNYY ZHURNAL, AVTOMATIKA, TELEMEXHANIKA I VYCHISLITEL'NAYA  
TEKHNIKA in Russian No 6, 1979, Abstract No 6B709K by V. T. Mitroshina]

[Text] The principles of design, operating principle, technical-operational  
capabilities and problems of servicing of mechanical and electronic key-  
board machines made of discrete KVM and EKVM elements, as well as electronic  
type EFM billing machines are analyzed. General information and elements  
of computation on the SDV-107 and SDK-133, VMP-2 and VMM-2 machines are  
presented. Basic principles of operation for computing machines of this  
type are suggested.

The arithmetic and logic principles of design of EKVM and EFM machines  
are studied, elements of the arithmetic unit and power supply are described,  
as well as the arithmetic unit and control unit, information input and  
output units. Magnetostriction delay line and ferrite core memory units  
are studied. In the section on EFM machines, the input and manual control  
devices, information printout and control units, and tape puncher are  
described.

[439-6508]

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## H. Construction

### Translations of Articles

#### NEW INDEX OF USE EFFICIENCY OF COMPUTERS IN CONSTRUCTION NEEDED

Moscow VOPROSY EKONOMIKI in Russian No 7, 1979 pp 137-139

[Article by M. Al'brut, Chelyabinsk: "Experience Using Computers for Control of Capital Construction -- the Example of Georgia"]

[Excerpts] One of the important levers for raising the efficiency of construction management is widespread use of mathematical methods and modern computers. In the last 10 years a far-flung network of computing and information-computing centers has been established in capital construction. About 200 different computers are now working in the capital construction field. Their use has had a significant impact on raising the efficiency of planning and managing construction production. Many construction ministries and departments are successfully using automated management systems (ASU). The economic impact from the introduction of computer technology in construction management at certain ministries runs into tens of millions of rubles. The annual economic impact at the Ministry of Construction of the Georgian SSR alone is 1.5 million rubles. For several years now this ministry has been taking key steps to improve construction management by using computers. A system of planning by the week and the day has been introduced in all trusts and home-building combines. It is the starting point in organizing work to improve construction management. The use of slow methods in housing construction has insured regular fulfillment of plans for construction and installation work and introduction of projects at established times.

The computing center of the Georgian SSR Ministry of Construction has a Minsk-22 computer and two YeS-1022 machines with an average daily workload of about 14 hours. Automated systems for daily operational records and monitoring of fulfillment of construction and installation plans for priority projects, construction administration, trust, and the ministry as a whole have been set up and are working successfully on the basis of

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the computing center for automated construction management systems. Other successful systems now in use are the Super; ASU-Zhelezobeton [Reinforced Concrete]; monitoring delivery of materials, articles, and construction vehicles and machines; calculation of material-technical resources.

Experience has demonstrated that it is impossible to evaluate the efficiency of computer use with the index employed by the Central Statistical Administration today: number of hours of work. This approach might have been acceptable in the first years of introduction of computers when it was necessary to master elementary procedures for the use of electronic equipment and it was impossible to determine the economic efficiency of the use of such equipment accurately. In principal the use of this index was ineffective because a computer can work for many hours but produce nothing of value at all. In our opinion, the use of computers should be evaluated not by the number of hours of work but rather by the impact measured in quantitative or qualitative indexes.

In the late 1960's the computing and information-computing centers were used primarily to mechanize and automate the collection and processing of data and to perform jobs to provide the data necessary for the management to make management decisions. Electronic equipment was scarcely used at all in the process of managing production. This situation is typical today also, and not just for construction but also for many other sectors of the national economy. This results in a situation where computing centers develop and set up automated management systems but do not take part in the functioning of these systems during the process of managing production. The computing centers for production control remains unconnected.

This situation can be illustrated with some examples. The Super automated system for control of centralized delivery of concrete, mortar, and asphalt is used extensively in many construction organizations. The system works out schedules, calculates wages, and performs mutual payment transactions among suppliers, customers, and vehicle transportation organizations. A need arises not just to insure performance of the functions of managing this process but also to centralize such functions.

The problem is made more complicated by the fact that vehicle transportation is usually managed by a different ministry. Therefore, participation by the computing center of construction and vehicle transportation organizations is not enough for the Super system to work efficiently. There must be a single body responsible for organizing operational control of the system based on the use of computers. However, introduction of the Super automated system permitted a savings of 0.35-0.5 rubles for each cubic meter of materials shipped by optimizing transportation alone. Considering the reduction of worker downtime at construction sites and at supplier plants and also the decrease in vehicle and machine downtime, the savings per cubic meter is 0.9-1.3 rubles. For the Georgian SSR

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Ministry of Construction as a whole the economy is calculated to be 900,000 rubles.

ASU-Zhelezobeton, the automated system for planning the production and managing the delivery of prefabricated reinforced concrete items may be given as a second example. Because this system functions within the framework of a single ministry, its operational management should be exercised by a special body. Therefore, when we are speaking of the entire system of management of a ministry, there is no question of the need to concentrate the functions of development, setting up, and controlling automated systems in a single body. The annual economic impact from introduction of the automated system ASU-Zhelezobeton, resulting from comprehensive delivery of articles, is calculated at 320,000 rubles.

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[418-1176]

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CSO: 1863

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I. Financial System

Translations of Articles

USSR

UDC 658.012.011.56

ONE METHOD OF ESTIMATING THE INDIRECT SAVINGS FROM THE USE OF COMPUTERS  
FOR PROCESSING OF BANK INFORMATION

EKONOMICHEFSKIYE I MATEMATICHESKIYE METODY [Economic and Mathematical  
Methods] Vol 14, No 6, 1978 pp 1211-1215

ROMANOV, A. A., GUZHEV, B. P. and PANFILOV, A. V.

[Translated from Moscow REFERATIVNYY SBORNIK. ORGANIZATSIYA UPRAVLENIYA  
No 2, 1979, Abstract No 2.67.191 by Yu. P. D.]

[Text] The intensive application of computers to the operations of institutions in the USSR construction bank, the broad utilization of methods of mathematical economics in the performance of a number of tasks related to financing and capital investment credit operations and the creation of the ASU-Stroybank (automated management system-Construction Bank) which has resulted is one important means of seeking additional resources for increasing the effectiveness of capital investments. ASU-Stroybank is a man-machine system which automates the collection and computer processing of planning, reporting, standards-reference and other bank information, reflecting the development of the process of capital construction in the nation. The creation of any automated management system, including ASU-Stroybank, requires relatively large one-time expenditures for system planning, setting up of computer rooms and acquisition of the necessary hardware, as well as continuous operating expenses to support normal functioning (operation) of the system. These costs, obviously, must be compensated in the process of functioning of the ASU. In other words, the introduction of an ASU should yield an economic benefit. Many studies of the problem of estimating the economic effectiveness of an automated management system have shown the expediency of using for this purpose the index of amortization time of the cost of

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creation of the ASU, defined as the ratio of adjusted cost to the annual savings achieved due to its use. Calculation of costs represents no basic difficulty, and can be performed using the universal system, regardless of the type and sphere of activity of the organization for which the ASU is planned. However, the methodology of calculation of the savings due to the use of an ASU has only been worked out to date for organizations in the area of material production. Construction banking institutions do not participate directly in the production of material goods. However, by regulating capital construction and constantly checking for proper and effective utilization of funds allocated for this purpose, these institutions directly facilitate an increase in the quality of construction, a decrease in the time required to complete projects and bring new production facilities in all branches of the economy on line. Therefore, construction banking institutions indirectly, but very effectively influence the process of material production, particularly in the field of construction. Therefore, the savings to be achieved by the introduction of an ASU can be divided into two parts: the direct savings, resulting from a decrease in the expenditure of labor in the processing of information by institutions of the Construction Bank as a result of the use of computers; and the indirect savings, formed in various branches of the economy (particularly in capital construction) by improvement of the operation of the Construction Bank as a result of the use of computers for processing of information by its various institutions. Calculation of the direct savings, though not simple, is a basically solvable problem. The indirect savings represent a significantly more complex calculation problem. This problem has not only not been solved in principle, but essentially has not even been studied. A study is made of the problem of calculation of the indirect savings resulting from the use of computers in the operation of construction bank institutions.

[426-6508]

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26 DECEMBER 1979

AND  
AUTOMATION TECHNOLOGY  
(FOUO 4/79)

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JSSR

UDC 658.012.011.56

COMPUTER-AIDED DATA PROCESSING IN A FINANCIAL-CREDIT SYSTEM

Moscow FINANSY [Finances] in Russian 1979 56 pp

LITVINENKO, A. F.

[From REFERATIVNYY SBORNIK, ORGANIZATSIYA UPRAVLENIYA No 4, 1979, Abstract No 4.67.186]

[Text] Under consideration are problems in the application of computer technology to data processing in financial-credit institutions. Analyzed are data processing systems which use keyboard, punch card, and electronic computers. The technology of data processing is described with which most important problems are solved in the State Bank, the Construction Bank, the Foreign Trade Bank, in saving banks, and in State Insurance and financial organs. The facilities have been designed for use by personnel of financial-credit institutions, but can also be used by students at higher educational institutions and technical schools.

[435-2415]

USSR

UDC 658.012.011.56

DIALOG AUTOMATED SYSTEM OF REMUNERATION FOR WORK

Riga DIALOGOVYYE SISTEMY in Russian No 2, 1978 pp 32-47

OBNOSOVA, L. L. and ROMANOVITSEV, V. V.

[From REFERATIVNYY SBORNIK, ORGANIZATSIYA UPRAVLENIYA No 4, 1979 Abstract No 4.67.195 by Yu. P. D.]

[Text] With the appearance of third-generation computers together with equipment for storing, processing and displaying large data arrays in a small physical volume, it has become feasible to construct automated management systems (ASU) for small enterprises. Such ASU differ from sector-wide ones in that they are, as a rule, considerably limited to the specifics of a given enterprise but then also require much less material and human effort for construction and maintenance. Each automated production management system (ASUP) contains as its main component an accounting subsystem, where an important place is assigned to payroll processing. Because of the large amount of labor involved in payroll

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processing, this task has a top priority in the setup of such a system. Here the construction of a dialog automated system for remuneration of work (DASOT) is described. The system must meet the following requirements: 1) it must be universal, which means capable of performing all operations possibly encountered in a payroll; 2) it must be simple and convenient to handle, which means involve comprehensible procedures with an indication of mistakes and recommendations on their correction; 3) it must provide for further modification of computing programs with new instructions in an expandable system; and 4) it must be realizable in a compact and inexpensive package. These requirements do, of course, imply certain constraints on the entire system (e.g., on the volume of issued documents and on the number of employees covered). To this list should be added the necessity of reducing the preparation process and, particularly, eliminating any data preparation on intermediate machine carriers. Information is presented about the development and the construction of an automatic payroll system on the basis of a "Wang-2200" small computer. The operator's work with this system is described, the software features are shown and the data organization is examined.

[435-2415]

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III. SOCIOCULTURAL AND PSYCHOLOGICAL PROBLEMS

A. Planning, Management, and Automation of Scientific Research

Translations of Articles

USSR

UDC 658.012.011.56

THE PROBLEM OF INTEGRATION OF SCIENTIFIC AND ADMINISTRATIVE INFORMATION SYSTEMS

Moscow NAUCHNOYE UPRAVLENIYE OBSHCHESTVOM [Scientific Administration of Society] No 12, 1978 pp 194-211

RYZHOV, V. S.

[Translated from Moscow REFERATIVNYY SBORNIK. ORGANIZATSIYA UPRAVLENIYA No 3, 1979, Abstract No 3.67.191 by Yu. P. D.]

[Text] Scientific and technical information systems (SNTI), which are essentially information retrieval systems (IPS), document, data retrieval, logical and other types of systems, are created to process the information arising during scientific activity. Information reflecting the practical advantages of production activity is processed in administrative information systems (ISU) -- automated management systems (ASU) and automated data processing systems (ASOD), integrated and specialized information systems, etc. Since essentially two unified All-Union Automated Information Systems are being created, the problem of integration of these systems into the information system of the entire society is a pressing one, which must be solved not only for administration of production, but also for administration of the society as a whole, economic, social-political and morale processes. Combined processing of both types of information makes fuller use of the capabilities of the information systems, based on computer technology. In this case, the IPS and ASU, which are currently passive means of separate recording of the facts reflecting activities and results in science (books, articles, etc.), can be converted into an instrument for actively influencing the process of introduction of the achievements of the scientific and technical revolution

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to practice in the building of socialism. By comparison of scientific discoveries and inventions with equipment in use of technologies in operation, these systems can develop information of a new type, which cannot be generated if these two types of information are processed separately (calculation of the gain which could be achieved by the economy, a branch of the economy, a union or an enterprise by replacement of obsolete means of production and old-fashioned method of organization of labor; information on the benefits of transition to improved methods of operation; different possible versions of improvement of conditions of labor and life by investing the savings thus achieved, etc.). This type of information could doubtless become a powerful impetus for scientific and technical progress. The creation of this type of combined information system requires preliminary study of many problems. This article is dedicated to an analysis of the relationship between SNTI and ASU, their composition, some of their features of similarity and differences. This is of great significance for establishment of the means of integration and combined activity of these information systems.

[426-6508]

USSR

UDC 658.012.011.56

PROBLEMS OF DEVELOPMENT OF AN AUTOMATIC MANAGEMENT SYSTEM FOR A BRANCH  
SCIENTIFIC RESEARCH AND PLANNING-DESIGN ORGANIZATION

Kiev NAUKOVEDENIYYE I INFORMATIKA No 19, 1978 pp 24-28

BELIKOTSKIY, A. N., LAPUSHONOK, LEVIN, B. I. and LEVINA, A. B.

[Translated from Moscow REFERATIVNYY SBORNIK. ORGANIZATSIYA UPRAVLENIYA  
No 2, 1979, Abstract No 2.67.204 by Yu. P. D.]

[Text] The automated management system (ASU) of a sector scientific-research and planning-design organization (ASU-NII) is a combination of organizational-administrative and mathematical-economics methods, computer hardware and organizational and communication equipment, intended to automate the most difficult calculations and output of information necessary for prediction and planning of the operation of the organization, timely control of scientific-research planning developments, as well as accounting, analysis, estimation and expedient stimulation of the activity of both individual workers and subdivisions, and the organization as a whole. The ASU-NII studied here is intended primarily for organizations specialized in the development and introduction of automated management systems for enterprises, organizations and branches of both industrial and nonindustrial

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areas of the economy, as well as the conduct of scientific research work to support an increase in the scientific and technical level and effectiveness of ASU developed. All of the control tasks performed in the ASU-NII are combined into the following subsystems: formation and introduction of a library of standards reference information; prediction of the activity of the organizations; planning of activity of the organization for the future; annual planning of the activity of the organization; timely calendar planning; operational accounting; bookkeeping; planning, accounting and analysis of personnel; testing and evaluation of administrative discipline; testing and stimulus of the activity of subdivisions in the organization.

[426-6508]

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B. Artificial Intelligence

Translations of Articles

USSR

UDC 681.322.068

THE PLENER-BESM PROGRAMMING LANGUAGE

Moscow YAZIK PROGRAMMIROVANIYA PLENER-BESM in Russian State University Press 1978 107 pages

PIL'SHCHIKOV, V. N.

[From REFERATIVNYY ZHURNAL, AVTOMATIKA, TELEMEXHANIKA I VYCHISLITEL'NAYA TEKHNKA in Russian No 6, 1979, Abstract No 6B195K by V. A. Garmash]

[Text] A textbook on a programming language for performance of artificial intelligence tasks. A complete description of the language, examples and recommendations for its use are presented.

[439-6508]

USSR

UDC 681.322.013

ACHIEVEMENT OF GLOBAL CONTROL IN A GROUP OF PROCESSORS

Vladivostok REALIZATSIYA GLOBAL'NOGO UPRAVLENIYA V KOLLEKTIVE VYCHISLITEL'NYKH PROTSESOV in Russian Preprint 1978 36 pages

BOYAROV, O. D., Institute of Automation and Control Processes, Far Eastern Scientific Center, USSR Academy of Sciences

[From REFERATIVNYY ZHURNAL, AVTOMATIKA, TELEMEXHANIKA I VYCHISLITEL'NAYA TEKHNKA in Russian No 6, 1979, Abstract No 6B73K from the Annotation]

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[Text] Asynchronous decentralized control of a group of independent computer processors is discussed. The group of processors is considered an overall model of artificial intelligence systems.

Using a standard discipline for messages which the processors can exchange, specific methods are suggested for achievement of explicit and implicit control, when the address is established by name and associatively by the function it performs, and possible forms of static and dynamic parallelism are described. The linguistic and algorithmic structures needed to support the types of control are described.

[439-6508]

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IV. NATURAL SCIENCE RESEARCH

A. Biology and Medicine

Abstracts of Articles

USSR

UDC 62-50

AN ANALOG-DIGITAL ATTACHMENT TO AN "ELCAR" ELECTROCARDIOGRAPH

Kiev AVTOMATIKA in Russian No 4, Jul/Aug 79 pp 80-82 manuscript received  
13 Jan 78

PEKHTEREV, A. G., DZHUGAN, F. K. and VAYSMAN, I. M., Vinnitsa Institute  
of Medicine imeni N. I. Pirogov

[Abstract] An attachment for use with an "Elcar" electrocardiograph has been built which converts primary information for recording on punched tape and subsequent processing on a digital computer. It converts a.c. voltage to an 8-digit binary code and the latter to a d.c. voltage proportional to that code. Up to 150 bits/s can be put on tape, the maximum conversion time is 50  $\mu$ s when the input signal varies at a rate of 600 V/s and the output signal has 256 gradations. The analog-to-digital converter together with the punch operates in the continuous-tracking mode. The system included a 2 MHz quartz oscillator with frequency division down to 62.5 kHz through a forward counter, a controlled reverse counter for addition or subtraction, a comparator at one input for amplitude control and linear conversion, a matching amplifier followed by a threshold device at another input for punch synchronization, a sync generator. The punch is a PL150P one and the analog-to-digital converter is built essentially with series K155-K140 integrated microcircuits. The attachment has been tested in recording ballistocardiograms, it is simple to manipulate and requires hardly any adjustments. Figures 2.

[16-2415]

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V. INFORMATION SCIENCE

A. Information Services

Translations of Articles

USSR

UDC 681.325

A DEVICE FOR DECODING OF CODE

USSR AUTHOR'S CERTIFICATE NO 537450, Filed 23/01/74, No 2070461, Published 5/08/77

DAVYDOV, A. A. and TENENGOL'TS, G. M., Institute of Problems of Control, Automation and Telemechanics

[From REFERATIVNYY ZHURNAL, AVTOMATIKA, TELEMEXHANIKA I VYCHISLITEL'NAYA TEKHNIKA in Russian No 6, 1979, Abstract No 6B339P]

[Text] A device is suggested for decoding of code and correction of batches of errors, including an input register, correction unit, comparison circuit and a modulo 2 addition unit, the output of which is connected to the first input of the unit for comparison with zero. The output of the correction unit is connected to the output of the device.

To increase its speed, the device contains a unit for detection of distortions in the remainder of a weighted sum, a unit for determination of the type distortion, a unit for counting the number of ones, a switch, a unit for calculation of the remainder of lowest absolute value, an iterative adder, an accumulating adder, a division unit and a unit for grouping of characters, the input of which is connected to the output of the input register.

The output is connected to the input of the unit for detection of distortions in the remainder of the weighted sum, with the input of the unit for modulo 2 addition, with the first input of the unit for counting the number of ones, with the first input of the unit for calculation of the remainder

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of the least absolute value and with the first input of the correction unit. The output of the unit for detection of distortions in the remainder of the weighted sum is connected to the first input of the unit for determination of the type of distortion, the second input of which is connected to the output of the unit for comparison with zero. The first output of the unit for determination of the type of distortion is connected to the second input of the correction unit. Figures 1; references 2.

[439-6508]

USSR

UDC 658.012.011.56

THE REMOTE DATA PROCESSING CREATED AT MERA ASSOCIATION

Moscow VYCHISLITEL'NAYA TEKHNIKA SOTSIALISTICHESKIKH STRAN [Computer Technology of the Socialist Countries] 1978 No 4, pp 120-126

[Translated from Moscow REFERATIVNYY SBORNIK. ORGANIZATSIYA UPRAVLENIYA No 2, 1979, Abstract No 2.67.195]

[Text] Hardware and software characteristics of remote data processing systems based on the YeS-8371 remote processor and providing for remote batch processing, dialogue operation, plus data collection and transmission are presented.

[426-6508]

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UDC 658.012.011.56(103)

DEVELOPMENT OF COOPERATION IN THE AREA OF REMOTE DATA PROCESSING. NEW TASKS

Moscow VYCHISLITEL'NAYA TEKHNIKA SOTSIALISTICHESKIKH STRAN [Computer Technology of the Socialist Countries] 1978 No 4, pp 5-9

LAPIN, V. S.

[Translated from Moscow REFERATIVNYY SBORNIK. ORGANIZATSIYA UPRAVLENIYA No 2, 1979, Abstract No 2.67.193 by Yu. P. D.]

[Text] The extensive development of remote data processing is a most characteristic feature of the current stage of development of an information-computer systems and control systems. Remote data processing modes provide new capabilities for the consumer -- development of remote computer information processing services. Remote data processing is the main system of collective use of computers, providing remote access to computational resources for many subscribers, organizing interchange and delivery of data between machines, creating reliable and effective automated data processing systems. The system of hardware used for remote data processing has been created by specialists of a number of organizations and enterprises of the Socialist countries within the framework of the program of operations using the unified system (YeS) of computers and the system of minicomputers (SM EVM). The form of cooperation is multifaceted, the operating organ is the section (council) of "remote data processing" specialists under the council of chief designers of the member countries: Bulgaria, Hungary, East Germany, Poland, Rumania, Czechoslovakia and the USSR. The main task set by the Intergovernmental Commission on Cooperation of the Socialist Countries in the Area of Computer Technology has been to provide for the development and production of remote data processing systems based on the unified system of computers, remote data processing hardware with hardware, software and data compatibility. The new tasks are related to network processing of data. The primary overall task is the creation of open remote data processing systems, by which we mean provision of the capability to a user or program with one computer system to interact with a user or program of another computer system. Open network data processing systems using the YeS and SM EVM computers represent the next important step in the development of computer technology and its systems application in the cooperating Socialist countries; it is expected that they will facilitate a significant expansion of the sphere of application of computer equipment. Most specialists believe that the architecture of information systems should have multiple levels. The network is logically constructed of sequentially located functioning levels. The lower levels correspond to the telecommunication devices of the data transmission subsystem, while the higher levels include

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standard applications data processing equipment (computers, subscribers' points, applied users programs). This network composition calls for 8 functional levels of control: control by the user; control of standard applications; control of functional processing and representation of data, formats, control of the logical connection of users (control sessions); control of delivery; control of data flows; control of data links; control of transmission. The last 4 levels, beginning with the level of control of delivery, represent a subsystem of data transmission. The compatibility and interaction of data transmission hardware and remote processing apparatus for operation through the data transmission subsystem can be assured only if these levels are generated in a logically compatible manner. Together with the data transmission subsystem, the first 4 levels of the model, which perform the functions of conversion and processing of data, form a global model of the architecture of the open system of network remote processing. In accordance with this model, one should develop standards for the transmission of data and communications. When open network remote processing systems are created, the interests and points of view of the users of the data processing systems should be considered, as well as those of the communications administration and data transmission networks, designers and producers of computer hardware and data transmission hardware. The interest of users in network remote data processing systems is explained, on the one hand, by their greater economic effectiveness: standardization improves quality, decreases hardware cost, and users, dealing with more standardized equipment, can increase the effectiveness of their utilization and thereby decrease the cost of remote processing operations. On the other hand, when equipment is compatible, a user has a greater selection of hardware, allowing him to organize his system in an optimal manner, with the minimum dependence on system planning organizations and equipment suppliers. The user is interested in adaptation of the computer system for his specific tasks and organization of operations, but it is difficult, and at times even impossible, to adapt the organization of operations to a centralized collective use system. This difficulty in the architecture of open remote processing network systems can be solved by a transition from centralized to distributed processing of data, while retaining the possibility of performing local processing directly by the user. The Communication Administration is interested in open network remote processing systems since they improve the operational parameters of equipment, i.e., increase reliability; more reliable error protection systems appear, and the spheres and types of services provided to the user expand. Standardization of system design also corresponds to the interest of the Communication Administration. Those involved in the development and production of system hardware are given new possibilities for expansion of cooperation and specialization in the production of this type of hardware by standardization in open remote processing systems.

[426-6508]

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UDC 658.012.011.56

REPRESENTATION OF OUTPUT DATA IN AUTOMATED INFORMATION SYSTEMS WITH  
DIFFERENTIATED ABSOLUTE ACCURACY

MEKHAZITSIYA I AVTOMATIZATSIA UPRAVLENIYA NAUCHO-PROIZVODNYY SBORNIK  
No 4, 1978 pp 9-11

[Translated from Moscow REFERATIVNYY SBORNIK. ORGANIZATSIYA UPRAVLENIYA  
No 3, 1979, Abstract No 3.67.197]

[Text] The shortcomings of known methods of representation of output data from automated information systems (AIS) with constant absolute accuracy are analyzed. It is shown that the transition to representation of output data of the AIS with differentiated ("floating") absolute accuracy not only achieves the identical relative accuracy of results, but also allows a significant reduction in the volume of output tables, consumption of paper and machine time for outputting of results. An algorithm is presented for representation of data with "floating" accuracy which can be run on the Minsk-32 computer in COBOL.

[426-6508]

UDC 681.326.34(088.8)(47)

THE PROBLEM OF CALCULATION OF CERTAIN CHARACTERISTICS OF INTERFERENCE  
STABILITY OF DISCRETE INFORMATION TRANSMISSION SYSTEMS

K VOPROSU RASCHETA NEKOTORYKH KHARAKTERISTIK POMEKHOUSTOYCHIVOSTI SISTEM  
PEREDACHI DISKRETNNOY INFORMATSII in Russian, Preprint, Institute of  
Cybernetics, Ukrainian SSR Academy of Sciences No 48, 1978 pp 3-19

Unsigned

[From REFERATIVNYY ZHURNAL, AVTOMATIKA, TELEMEXHANIKA I VYCHISLITEL'NAYA  
TEKHNIKA in Russian No 6, 1979, Abstract No 6B657 Annotation]

[Text] In the article "Influence of Nonideal Reference Oscillations on Interference Stability of Communication Systems with Phase-Keyed Signals," the interference stability of a communication system using a single-period phase-keyed signal and separating the reference synch signal from the information signal is analyzed. The influence of the Q of the filter which separates the reference signal on the error probability is demonstrated. With a Q which is higher than 10, the interference stability practically does not deteriorate.

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In the second article, "Calculation of the Effective Rate of Transmission of Discrete Information with Matrix Control of Parity," the use of a longitudinal-transverse (matrix) method of coding in communication systems with verification is analyzed. Expressions are derived for the effective transmission rate and the probability of an undetected error. Specific practical recommendations are given concerning the expediency of utilization of the matrix coding method.

[439-6508]

USSR

UDC 681.322.06

DATA BASE SYSTEMS PRODUCED IN THE USSR

MECH. AUTOMAT. ADMIN. in Czech 1979 Vol. 19 No 1, pp 21-27

LACKO BRANISLAV

[From REFERATIVNYY ZHURNAL, AVTOMATIKA, TELEMEXHANIKA I VYCHISLITEL'NAYA TEKHNIKA in Russian No 6, 1979, Abstract No 6B161 by A. M. Ginzburg]

[Text] The basic characteristics of data base management systems produced in the USSR are presented: SINBAD, NABOB, BANK, BASIS and SIOD. The status of development of analogous systems in the CSSR is analyzed. References 23.

[439-6508]

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UDC 681.326.34(088.8)(47)

AN ADAPTIVE DEVICE FOR INFORMATION PROCESSING

USSR AUTHOR'S CERTIFICATE NO 633023, Filed 1/09/76, Published 20/11/78

BOYARCHENKOV, M. A., DUBOVIK, YE. A., Sentyurin, V. M. and KESHEK, E. V.,  
Institute of Electronic Control Machines

[From REFERATIVNYY ZHURNAL, AVTOMATIKA, TELEMEXHANIKA I VYCHISLITEL'NAYA  
TEKHNIKA in Russian No 6, 1979, Abstract No 6B668P]

[Text] An adaptive device is suggested for processing of information containing a memory unit, control unit, first multiswitch, write unit, read unit, arithmetic unit, two registers and four AND elements; the first output of the control unit is connected to the control input of the first multiswitch, the second output of the control unit is connected through the write unit to the first input of the memory unit, the second input of which is connected through the read unit to the third output of the control unit.

The first output of the memory is connected to the input of the first register, the first output of which is connected through the first AND element to the first input of the second register, the second output of which is connected to the second output of the memory. The output of the second register is connected to the second AND gate to the first input of the arithmetic unit, the second input of which is connected through the third AND element to the second output of the first register, the output of the arithmetic unit is connected through the fourth AND gate to the third input of the memory.

The device includes a second multiswitch, four counters, two decoders, three registers and six AND gates, the fourth output of the control unit is connected to the first input of the second multiswitch, the first output of which is connected to the inputs of the first and second counters, while the second output of the second multiswitch is connected to the inputs of the third and fourth counters. The first output of the first counter is connected to the fourth input of the memory. The second output of the first counter is connected through the fifth AND gate, third register and sixth AND gate to the fifth input of the memory. Figures 3.

[439-6508]

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UDC 681.326.34

UPD-6 DATA MANAGEMENT SYSTEM. ADDITIONAL MACROINSTRUCTIONS AND UTILITIES

UPRAVLENIYE DANNYMI UPD-6. DOPOLNITEL'NYE MAKROKOMANDY I UTILITY in Russian, Institute of Applied Mathematics, USSR Academy of Sciences Preprint, No 138 1978 30 pages

YEROKHOV, A. N. and ILYUSHIN, A. I.

[From REFERATIVNYY ZHURNAL, AVTOMATIKA, TELEMKHAMNIKA I VYCHISLITEL'NAYA TEKHNIIKA in Russian No 6, 1979, Abstract No 6B675 Annotation]

[Text] Additional macroinstructions and utilities from the UPD-6 data management system are described. They provide expanded capabilities for operation with sets of data from programs in BEISH autocoder and new capabilities in terms of assurance of data set integrity. The work should be considered a reference for systems programmers, administrators of local data banks and nontrivial users.

[439-6508]

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VI. THEORETICAL FOUNDATIONS

A. General Problems

Translations of Articles

USSR

UDC 681.51:50

RANDOM TRACKING IN OPTIMIZATION PROBLEMS

Moscow VOPR. KIBERNET. in Russian No 45, 1978 pp 3-142

[From REFERATIVNYY ZHURNAL, TEKHNIЧЕСКАЯ KIBERNETIKA in Russian No 5, 1979, Abstract No 5.81.1 by V. A. Garmash]

[Text] This part of the collection of articles "Teoriya Sluchaynogo Poiska" [Random Tracking Theory] contains papers on the following subjects: structural adaptation of random tracking algorithms; a method for constructing randomized optimization algorithms; procedures for random tracking of the drift of the optimal unsteady-state solution of one randomized algorithm for conditional minimization; a search algorithm for finding the approximate extremum of the function of variables measured on different scales; estimation of the distribution limit of random tracking during random walk in the region of the extremum. The Part "Application of Random Tracking" contains papers on the subject of: optimization of the parameters of mechanical systems by an extrapolative search algorithm; computer calculation of a multivariate general global tracking algorithm; use of random search in the determination of the optimal temperature mode of the process of paraffin crystallization; use of adaptive random search in optimal design. The Part "Monte Carlo Methods and Related Problems" contains articles on: solution by the Monte Carlo method of boundary-value problems for equations of the elliptical and parabolic types in multiply connected domains with small-diameter inner boundaries; investigation of a sequential procedure for the construction of probability density in the Monte Carlo method; adaptive algorithms for estimation and statistical optimization in the presence of occasional overshoots; multi-extremal test functions; random

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search as an adequate apparatus for the description of the functioning mechanisms of the nerve cell; and the possibility of utilizing the mechanisms of natural evolution in the solution of global optimization problems.

[31-1386]

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B. Automatic Control and Control Systems

Translations of Articles

USSR

UDC 681.513.4(088.8)

AN EXTREMAL REGULATOR

USSR AUTHOR'S CERTIFICATE NO 625186, Filed 11/05/77, No 2484530, Published 8/08/78

BRAGIN, YU. M., DIDENKO, K. I., YEMEL'YANOV, S. V., ZAGARIY, G. I., KOSTYLEVA, N. YE., KOROVIN, S. K. and UTKIN, V. I., Special Design Bureau for Automatic Control Systems

[From REFERATIVNYY ZHURNAL, AVTOMATIKA, TELEMEXHANIKA I VYCHISLITEL'NAYA TEKHNIKA in Russian No 6, 1979, Abstract No 6A190P]

[Text] Extremal devices are known which are used in control circuits. The known device which is closest to the current invention in its technical essence is an extremal regulator containing a master integrator connected in series with a comparison element and switching element, the control output of which is connected to the first input of the master integrator, and an output integrator.

As is known, the most important indices of any extremal system are the indices of speed and achievement of independent dynamic adjustments. In the known regulator, this is not achieved. The former, due to the fact that the assigned voltage is constant, regardless of fluctuations of the input parameter, the latter -- due to the fact that the assigned voltage and the voltage produced by an additional effect are present simultaneously at the input of the master integrator.

In order to increase the speed and produce independent dynamic constructions, an adaptive filter is introduced to the extremal regulator, with its control input connected to the output of the switching element, and an additional switching element is provided, its output connected to the second output of the master integrator, its controlling input connected to the controlling output of the switching element, is input -- to the output of the adaptive filter.

[439-6508]

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VII. GENERAL INFORMATION

A. Conferences

Translations of Articles

SYMPOSIUM ON SOFTWARE DEVELOPMENT FOR HIGHLY PRODUCTIVE COMPUTING SYSTEMS

Kiev KIBERNETIKA in Russian No 1, 1979 pp 124-126

[Unattributed article: "The Second All-Union Symposium on Development of Software for Highly Productive Computing Systems"]

[Text] A permanent all-Union seminar entitled "The Theory of Language Processes and Uniform Structures" began work in Kiev in 1977. It was organized by the State Committee for Science and Technology of the USSR Council of Ministers, the central board of directors of the All-Union Scientific-Technical Society of Radioelectronic systems imeni Popov, and the Order of Lenin Institute of Cybernetics of the Academy of Sciences Ukrainian SSR.

The Second All-Union Symposium of this seminar was held in Kiev on 6-8 June 1978 with the topic "Development of Software for Highly Productive Computing Systems." Many specialists participated in the work of the seminar, coming from Moscow, Leningrad, Novosibirsk, Yerevan, Vil'nyus, Ufa, L'vov, Donetsk, Saratov, and other science centers of our country. The Academy of Sciences was represented by the Institute of Mathematics of the Siberian Department of the Academy of Sciences USSR, the Computing Center of the Siberian Department, the Institute of Problems of Control of the Academy of Sciences USSR, the Institute of Cybernetics of the Academy of Sciences Ukrainian SSR, the Bashkir Branch of the Academy of Sciences USSR, the L'vov Division of the Institute of Economics of the Academy of Sciences Ukrainian SSR, and others. Representatives from many higher educational institutions also took part in the work of the seminar, for example from the Moscow Power Engineering Institute and its Smolensk Branch, Leningrad State University, Yerevan State University, Kieve State University, and others.

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At the seminar the principal aspects of the development of theoretical and systems parallel programming were reviewed. Considerable attention was devoted to mathematical models of parallel computations, the schematology of parallel programming, the problem of separating out parallel programs, parallel translation and interpretation, operations systems oriented to multiple processing, and others. Studies in this problem area are very important in connection with the development of highly productive computers of the fourth and subsequent generations.

A series of survey reports was presented at the seminar dealing with the following principal areas: the theory of parallel programming; methods of designing software for high-productivity computing systems; systems parallel programming.

There were also several sessions on special subjects: "Theory of algorithmic algebras and parallel computations"; "Models of parallel computations and ways of realizing them"; "Software of high-productivity computing systems."

The material that follows gives a brief survey of the reports and communications presented at the seminar. Many of them are also published in this issue of the journal, which is devoted to the seminar.

The introductory talk was given by Ye. L. Yushchenko, science director of the seminar and corresponding member of the Academy of Sciences Ukrainian SSR. He reviewed the fundamental aspects of the development of domestic programming in their dialectical interrelationship. The methodological analysis he set forth was made the foundation for a description of the primary areas of the theory of parallel programming, the architecture of high-productivity computing systems, and their software.

The following list of questions referring to the subject area of the seminar was brought to the attention of participants for discussion.

1. Reflection of the structure of the problems being solved on the architecture of the computing system;
2. Structural parallel programming;
3. Quality criteria of parallel programs;
4. Combination of synchronous and asynchronous computations;
5. Paralleling programs;
6. Instrumentation of parallel programming;

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7. Architecture of the parallel translator;
8. Operations systems for multiprocessor computing systems;
9. Organization of the parallel computing process;
10. Parallel microprocessing and microprogramming.

The Theory of Parallel Programs

Report [2] surveyed results of a study of the formal apparatus proposed by V. M. Glushkov to solve a number of important problems of cybernetics, above all the problems of automating the design of logical structure for computers and programming. Primary attention was devoted to orienting this apparatus to the formalization of parallel computations.

Report [3] reviewed mathematical models based on the conception of composition programming, the technique of representing more complex programs by comparatively simpler ones. A classification of program compositions into abstract, ordinary, and recursive was given. An approach based on composition programming was outlined for solving a number of important problems related to the formalization of the syntax and semantics of programming languages, optimization of programs, their verification, and so on.

Reports [4-7] were devoted to the schematology of sequential and parallel programming.

The Theory of Algorithmic Algebras and Parallel Computations.

This session heard communications devoted to the problem of automating the proofs of theorems in systems of algorithmic algebra (SAA's) [8], orientation of SAA's to description of data structures [9], and study of the problem of completeness for SAA's [10]. Communication [11] reviewed estimates of the complexity of algorithms for bilateral syntactical analysis. SAA apparatus was used to design a supervisor for a distributed homogeneous computing system based on YeS computers [12] in a model of a conveyor-type parallel translator oriented to multilayer processing of input programs [13]. Communication [14] was devoted to some problems of automating the design of parallel programs formalized in SAA language. SAA apparatus was used to solve economic problems [15] and to formalize analog-digital conversions [16].

Methods of Designing Software for High-Productivity Computing Systems

Report [17] reviewed the fundamental structural models of multiprocessor systems: networks of algorithmic modules; controlled networks; multi-level discrete systems; communications spaces. The principles of designing multiprocessor systems and programs for them were formulated.



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A survey of methods of realizing parallel computations was presented: synthesizing networks using algorithmic modules; paralleling cycles; overlapping instructions; forecasting methods.

Report [18] set forth the basic advantages of interpretation of high-level languages. It was shown that new architectural concepts with distribution of the process of interpretation and specialization of system components are necessary in order to insure high efficiency in systems for interpreting high-level languages. The report outlined the paths of development of the structures of interpretation systems and suggested specific solutions based on microprocessors. It noted the benefit from raising the level of the internal language and the importance of combining the principles of paralleling the computing processes and interpretation of high level languages in the construction of promising high-productivity systems were noted.

Report [19] considered the basic principles of realizing parallelism in a single-processor device. These principles are embodied in the translator developed at Leningrad State University for work from ALGOL-78. This report took up the subject of memory redundancy in three different modes, each of which has its own zone in memory: the "stack" is arranged from one end, the "pile" from the other, with the memory that has been given the name "bubble" located between them. The latter may be expanded in either direction, toward the stack or the pile. When it collides with either one the released cells of the bubble are wiped out and those being used are arranged right next to one another. This process of compacting the bubble resembles the process of "collecting garbage," but it is simpler to accomplish because it does not use information on the structure of the working program, types of quantities contained in the stack, and so on.

Report [20] was devoted to questions of designing a parallel translating system for multiprocessor computers with variable structure based on homogeneous computing media.

Report [21] was devoted to a survey of methods of program optimization. It considered an optimizing conversion based on flowchart theory and used extensively in systems programming for development of optimizing translators and debugging programs.

#### Models of Parallel Computations and Methods of Realizing Them

Communication [22] proposed formalization of a model of a high-productivity multiprocessor system in terms of semigroups of conversions to solve the problems of monitoring and diagnosing such systems. Communication [23] was devoted to a study of a multidimensional model of parallel computations oriented to processing data files. [24] Reviewed the problem of demonstrating the correctness of parallel programs including abstract

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types of data. The problem of breaking down topological models of complex problems in connection with efficient solutions in distributed computing systems was discussed in [25]. [26] Reviewed the problem of breaking down the parallelism of normal Markov algorithms. [27] Described a method of constructing a data flowchart possessing maximum asynchronousness for a given sequential flowchart. The initial and derived charts were shown to be equivalent. Communication [28] was devoted to the paralleling of algorithms in designing computer structures.

[29] Reviewed a subsystem for debugging programs developed within the framework of the translating programming system for ALGOL-68 referred to in report [19]. Communication [30] was devoted to the computational complexity of a column decomposition algorithm because it involved solving problems that arise during segmentation of programs. Communication [31] considered the strategy of mixed Yerшов computations as applied to the problem of breaking down parallelism in zero-investment ["Vlozhennost"] cycles.

#### Systems Parallel Programming

Report [32] investigates an asynchronous model of parallel computations based on homogeneous computer systems. The report formulates sufficient conditions for parallel algorithms to be unambiguous and without dead-ends with various charts of interaction among branches. The concept of structural parallel programming is introduced. The report analyzes dynamic parallel programs adjusted for both the volume of raw data and the dimensions of the subsystems presented for realization. Techniques are suggested for evaluating the effectiveness of paralleling. The report considers questions of automating parallel programming: homogeneous computing system languages and translators, segmentation of the branches of parallel programs, debugging them, and organizing highly reliable computations.

Report [33] proposes a method of paralleling programs based on moving successively deeper into the hierarchical structure of the programs by analyzing the substructures that make them up.

The problem of large-block paralleling of algorithms by cycles was considered in report [34].

Report [35] was devoted to the problem of optimization design of automated management systems. At different levels of designing it is proposed that the languages of algorithmic flowcharts and logic diagrams be used as technological means. The effectiveness of using the apparatus of algorithmic algebras to establish the structure of control algorithms and optimize them is emphasized.

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Report [36] reviewed the principles of constructing an asynchronous, modular multiprocessor collective-use computing system capable of functioning within the State Network of Computing Centers in performing scattered national economic tasks. A structure for such a system is proposed which includes, specifically, a central multiprocessor, a subsystem for data exchange and control, and a subsystem for remote processing and input/output processors. Each autonomous subsystem consists of homogeneous processors interlinked by appropriate switching means. The report considers the technique of hardware realization of semantic memory to insure identification of an object with information on it stored in the system as well as various questions related to the software and circuitry of this system.

## Software of High-Productivity Computing Systems

[37] Proposes a procedure which uses cycle scanning to identify parallelism in the subclass of iterative algorithms. Communications [38] and [39] are devoted to questions of paralleling algorithms and synthesizing parallel programs with a determination of the optimal number of processors for their realization in a homogeneous computing system considered as a mass service system. N. N. Mirenkov presented a brief survey of communications [40, 41, 42, 43], dealing with software for homogeneous computing systems. Communication [44] was devoted to questions of representation and control of the execution in computing systems of the class of parallel algorithms based on a modified computation of functional diagrams (see report [6]). [45] Analyzed heuristic algorithms of computations in high-productivity systems with limited resources. The problem of organizing the computing process in a network of computing centers with centralized control was considered in [46].

The seminar concluded with a general discussion of the issues laid out in the introductory talk [1]. Participants in the discussion included Ye. L. Yushchenko, V. P. Kutepov, N. N. Mirenkov, A. V. Maksimenkov, V. N. Porshneva, G. Ye. Tseytlin, V. E. Itkin, M. S. Burgin, P. S. Sapaty, L. M. Ivanov, S. L. Krivoy, and others. There was a vigorous, creative atmosphere at the seminar which promoted a fruitful exchange of experience, ideas, and views on the basic problems of parallel programming and designing software for high-productivity computing systems. A decision was reached to publish the works of the seminar in a special issue of the journal KIBERNETIKA; the present issue carries out this decision.

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ALL-UNION SEMINAR "THEORETICAL PROBLEMS OF PROGRAMMING" (PROGRAMS AND PROGRAM COMPOSITION)

Moscow PROGRAMMIROVANIYE in Russian No 2, 1979 pp 93-94

[Article by V. V. Byts']

[Text] An All-Union seminar on theoretical problems of programming was held in Kiev from 23 to 25 May. The seminar was organized by Kiev State University imeni T. G. Shevchenko and the Ukrainian House of Economic and Scientific-Technical Propaganda. Professor V. N. Red'ko was the scientific leader of the seminar.

Participating in the work of the seminar were 111 specialists from 54 organizations of 27 cities of the Soviet Union. Twenty one-hour reports were heard and there was a discussion of the pragmatics and semantics of programming languages.

Content of the Reports

Any program semantically represents an operator (function) that transforms one set into another. Therefore the formalization and study of the semantic aspect of programs are reduced to investigating the operators given by them.

In the report of V. N. Red'ko (Kiev) mathematical models were described that adequately reflect the methods of representation of more complex programs through simpler ones. A complete review of those models is given in terms of compositions. The main classes of compositions are distinguished--classes of connotative and denotative compositions. On the basis of them a method of composition programming was developed which was illustrated on examples.

The application of the compositional approach to assign the semantics of programming languages was examined in the joint report of V. V. Byts', Ye. I. Manakova and N. S. Nikitchenko (Kiev). In the report the main attention was given to adequate assignment (oriented to man) of the semantics of different constructions of languages. Forming its basis are such compositions as quasi-multiplication, branching, cycling, etc., representing operations in classes of so-called (A, B)-named, A-named and B-named functions. Also of interest is the treatment of arithmetic expressions of programming languages as A-named functions.

The report of N. S. Nikitchenko (Kiev) was devoted to a survey of possible approaches to the solution of the problem of reorientation of semantic definitions oriented toward man into definitions intended for machine realization.

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The question of constructing an interface between the syntax and semantics of programming languages was examined in the report of V. V. Byts' (Kiev). Investigated was the class of depictions of algebras of operators (semantic algebras) into different algebras of forms of representations of those operators (syntactic algebras).

The report of Ye. I. Manakova (Kiev) was devoted to the construction of algebras of types of data of present-day programming languages. On the basis of the conception of types of data of K. Khoar, N. Virt and D. Scott a solution of the problem of rigorous assignment of types of data in programming languages is proposed.

Questions of equivalent transformations of definitions of programming languages were investigated in the report of V. F. Kuzenko (Kiev). In particular, such transformations of syntactic definitions that require simple redeterminations of integrated linguistic definitions giving the syntax, semantics and interface were studied.

The reports of G. G. Trubchaninov and S. S. Shkil'nyak (Kiev) were devoted to the development of the theory of syntactic definitions of programming languages oriented toward strategies of convolution and evolution respectively. In both reports the main attention was given to distinguishing the basic principles of the construction of such theories. Classes of syntactic definitions known in the literature were described within the framework of two models--parametric grammars of the inverse-recursive and recursive types.

A direction connected with the design of multilanguage processors also was reflected in the seminar.

In the reports of M. G. Gonets and M. N. Marichuk (Kishinev) there were discussions of distinctive features of recent developments being carried out in the Moldavian SSR in the area of the creation of parametric programming systems.

The report of B. I. Boyko (Kiev) was devoted to the question of connecting multilanguage processors to existing operating systems. In the report the main attention was given to the specifics of the connection of processors oriented toward compositional definers and allowing operation in two regimes, translation and interpretation.

In the joint report of V. F. Kuzenko and N. A. Gasanenko (Kiev) traditional questions of adjustment (detection, localization and neutralization of errors) with respect to multilanguage processors were discussed.

The possibility of using composition programming to develop the software of an automated sector management system was illustrated in the report of D. D. Babko (Kiev).

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The report of Yu. A. Beloyev (Kiev) was devoted to the question of the mathematical modeling of complex information and measuring systems and the organization of a special packet of programs.

Three reports were devoted to the theory of program flow diagrams.

V. V. Zubenko (Kiev) presented a survey report on problems connected with solvability in classes of standard and recursive flow diagrams.

Examined in the report of Yu. V. Romanovskiy (Kiev) were questions of the mutual translatability of different subclasses of recursive flow diagrams.

Proof of the equivalence of problems of strict and final equivalence in the class of standard monadic free flow diagrams was given in the report of A. S. Barashko (Donetsk).

The reports of G. Ye. Tseymlin and L. P. Lisovin (Kiev) related to the same area.

Studied in the first of them was the problem of identity for S-algebras that permit assigning some class of parallel calculations. Special processes oriented toward multiprocessing are described in terms of S-algebras. In the report of L. P. Lisovik (Kiev) the introduction of the concept of a rigid subset on subgroups was argued on examples of consideration of the problem of recognizing equivalence for finite-heterogeneous sequential converters and some classes of unary recursive program flow diagrams.

A. V. Anisimov (Kiev) presented a survey of the complexity of combinatory algorithms. Examined as models of machines making calculations were machines with random memory access, machines with list storage and Turing machines. Special attention was given to NP-complete problems. Among specific algorithms the following were examined: the Strassen algorithm for matrix multiplication, the problem of inclusion of a word in another word, Tanzhan's algorithm for the by-passing of graphs and heuristic sorting algorithms.

On the whole the seminar proceeded on a high scientific level. Its participants were able on the basis of reports and in the course of discussion to obtain a concept of the state of research in the area of compositional programming and also of the connection of that direction with traditional areas of present-day theoretical and systems programming.

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NINTH ALL-UNION SCHOOL-SEMINAR ON ADAPTIVE SYSTEMS

Moscow AVTOMATIKA I TELEMEXHANIKA in Russian No 3, 1979 pp 183-187

[Article by E. D. Aved'yan, G. K. Kel'mans and T. I. Tovstukha]

[Text] The Ninth All-Union School-Seminar on Adaptive Systems was held at Alma-Ata from 27 January to 7 February 1978. It was organized by the Scientific Council for the Complex Problem "Cybernetics" under the presidium of the USSR Academy of Sciences, the Order of Lenin Institute of Problems of Control, the KaSSR Ministry of Higher and Specialized Secondary Education, the Kazakh Polytechnic Institute imeni V. I. Lenin and the Kazakh Territorial Group of the National Committee for Automated Control. Participating in the work were 130 specialists from 24 cities of the Soviet Union.

The school was devoted to a wide circle of problems that included various aspects of the theory and practice of adaptive systems. The program consisted of three cycles of lectures, four survey reports and 40 reports read in the sections of adaptive control, algorithms of adaptation, identification, man-machine adaptive systems and applications.

In the cycle of lectures by V. P. Zhivoglyadov (Frunze) entitled "Adaptation and dual control in large systems," distinctive features of the investigation of large systems were discussed, as well as types and levels of indeterminacy, the presence and varieties of information, and single- and multi-level schemes of data processing. Examined were questions of the synthesis of optimal discrete algorithms for the control of a group of continuous objects under conditions of parametric indeterminacy in the presence of noise and limited possibilities of the central administrative agency. A uniform approach was formulated for the posing of various problems of the theory of identification, control and investigations of operations, an approach based on use of a nonparametric method of reducing the probability density.

Ye. V. Markova (Moscow) in a cycle of lectures on the theme, "On the problem of adaptation in planning experiments," briefly described the main problems of the theory of experiment planning and the possibilities of their solution and enumerated the criteria of optimality and the tasks in experiment planning. A very brilliant expression of the idea of adaptation is contained in rotary quadratic evolutionary planning. Problems in experiment planning during the structural adaptation of search algorithms were discussed. Pointed out as a specific example of such adaptation was experiment planning during the development and optimization of the retrieval of relevant documents and an information retrieval system working in a dialog regime. In the discussion of the lecture, similarity and difference of problems of the theory of experiment planning and the theory of adaptive systems were revealed.

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In the cycle of lectures of B. T. Polyak and Ya. Z. Tsypkin (Moscow) on "Optimality, robustness and regularization of adaptation algorithms," it was pointed out that recurrent evaluation algorithms often converge slowly and are unstable. Consideration of the available information permits overcoming those shortcomings. Examined as a model was the task of identifying a linear static object. With very general assumptions the authors succeeded in proving the convergence of estimates with a probability of 1 and estimating the asymptotic rate of convergence. On the basis of that estimate an optimum algorithm is constructed that is a recurrent analog of the method of maximum probability. Its asymptotic effectiveness is demonstrated. If the law of noise distribution is known only approximately, an algorithm can be pointed out that is asymptotically maximal in the given class of distributions. Examples are cited of similar recurrent estimates stable to the type of noise (robust). It is shown that for small values of  $h$  the quality of the estimates can increase substantially on account of a priori information about the solution (recurrent regularized algorithms).

Examined in the survey report of A. A. Krasovskiy (Moscow) entitled "Observability, estimation and identification of nonlinear processes" was the necessary and sufficient condition for complete observability of the process  $x(t)$  described by a determined nonlinear differential equation. Observation of the function  $z = h(x)$  in the course of as short a time as desired containing the moment  $t$  permits in principle determining  $x(t)$  absolutely precisely. However, the corresponding operation containing multiple differentiation of  $z$  in time in the presence of noise cannot serve as an estimation algorithm. The concept of the condition of precise estimation, obtained with reference to specific estimation algorithms, are reduced to conditions of asymptotic stability of the unexcited state of the estimations system. They are used for identification. The structure of an algorithm economical in a computational respect and the sufficient condition of its convergence are shown.

In the survey report of L. A. Rastrigin (Riga) entitled "Contemporary state of the problem of random search" the main directions of development of the problem were presented. Among them are methods of synthesis of random search algorithms modelling and using Monte-Carlo procedures, statistical estimation, automatic machines with purposeful behavior, etc. A special position is occupied here by biological analogies. At present the main task is adaptation of random search algorithms. Two directions--parametric and structural adaptation--are being successfully developed here. In conclusion the reporter dwelt on practical applications of random search algorithms.

Various methods of taking into consideration a priori information about solution in recurrent estimation algorithms were considered in the survey report of Yu. M. Yermol'yev (Kiev) entitled "Application of numerical methods of stochastic programming in tasks of identification." In that

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case, when the set to which the sought solution belongs is known, it is proposed to design the obtained estimation algorithm for that set. If the information about the solution is stochastic and can be given by means of stochastic limitations, application of methods of stochastic programming to solve the task of minimization with stochastic limitations can improve the precision of the estimates. It was noted that those methods permit accelerating the convergence of the estimates, especially when the samples are small in volume.

Questions of the investigation of an adaptive system for control of technological processes of a copper-smelting complex were examined in the survey report of G. M. Tokhtabayev and D. N. Shukayev (Alma-Ata). On the basis of the systems approach, with application of the principles of decomposition a multilevel structure of tasks of control of the complex was synthesized. Modified algorithms of nonlinear and integral programming were proposed for the solution of a number of problems. The quasi-stationary character of the technological processes stipulates the use of adaptive predicting models on all levels of control of the complex. The parameters of the algorithms have been selected. Industrial tests of the proposed algorithms of adaptive control of technical processes have shown their high efficiency.

#### The Adaptive Control Section

In the report of G. S. Aksenov, V. A. Pavlov and V. N. Fomin (Leningrad) entitled "Synthesis of adaptive regulators in the problem of stability of multiply connected linear discrete control systems" was proposed a relatively simple method of constructing stabilizing regulators for multiply connected discrete systems with consideration of possible lag in control. That method permits giving a solution, completed in a certain sense, of the problem of stabilizing a linear stationary system under conditions of a priori indeterminance of the values of its parameters.

The report of A. A. Ashimov, V. P. Morozov and S. P. Sokolova (Alma-Ata) entitled "Adaptive system of direct numerical control of a continuous technological process" was devoted to the task of control of a multidimensional continuous technological process. A multidimensional, multi-circuit adaptive system for direct numerical control was proposed, a variant of which has been introduced into production.

In the report of V. A. Brusin (Gor'kiy) entitled "On some problems of the theory of adaptive control, solvable on the basis of Lyapunov's theory of global functions" the task is examined of constructing a model of a continuous dynamic system. Algorithms for synthesis of a model are proposed that use a priori information of various kinds in both the absence and presence of uncontrolled effects on the object.

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Examined in the report of G. K. Kel'mans (Moscow) entitled "Algorithms of adaptive control of dynamic systems" was the task of controlling discrete nonlinear dynamic objects with parameters known a priori and statistical characteristics of adaptive noise. On the basis of synthesis of methods of "local" optimization and a "variable basis" simple algorithms of adaptive control were proposed and estimates of the quality of a functionalized closed adaptive system obtained.

In the report of V. I. Kukhtenko, V. M. Vozhukhov and V. Ye. Mityurina (Moscow) entitled "Investigation of forced regimes in adaptive systems with stabilization of frequency characteristics," for a definite class of objects a characteristic regime of adaptation was derived, the investigation of which is successfully conducted within the framework of the theory of stationary systems.

A comparative analysis of adaptive systems with stabilization and their systematization by regions of application were presented in the report of N. S. Mel'nikov (Moscow) entitled "Standardization of systems for the control of non-stationary objects on the basis of adaptive systems." An adaptive standardized system of stabilization of the functional unit type has been developed for a wide class of objects of control, including various lethal apparatus with a wide range of variation of characteristics.

Yu. I. Neymark (Gor'kiy), in a report entitled "Automatic models of control and adaptation," examined algorithms for the control of dynamic objects in which the required control is realized by automatic machines and purposeful behavior. Much attention was given to questions of the selection of a criterion of purposeful behavior of an automatic machine and its minimization. Mathematical experiments with various dynamic objects have confirmed the efficiency of the adaptive control systems under consideration.

Proposed in the report of Yu. I. Parayev (Tomsk) entitled "On the application of Kallman adaptive filters in tasks of extreme control" was a method of constructing a searchless system of control of an extreme object subjected to the effect of random excitations, applicable to objects the behavior of which is described by stochastic differential equations of the quasi-linear type. Some transitions to simplification of the obtained nonlinear system of equations on the basis of use of ideas of adaptation theory are examined.

Proposed in the report of A. I. Petrov (Moscow) entitled "Adaptive systems optimal in statistical quality criteria" were algorithms for the synthesis of controls optimal in the criterion of medium risk. The obtained algorithms were compared with those known in the literature.

Examined in the report of A. A. Terekhov, V. B. Yakovlev and A. E. Yanchevskiy (Leningrad) entitled "Adaptive invariance and identification in closed

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pulsed systems" were questions of the synthesis of adaptive invariant discrete systems for control of objects of multiparametric technological processes. Examined were questions about the construction of a standard model of an object of control and the external environment, which can be characterized by a different volume of a priori information.

Adaptive hierarchically organized systems for the control of robots were examined in the report of A. V. Timofeyev (Leningrad) entitled "Adaptation and learning in robot control systems." The results of the modelling of adaptive control systems of certain types testify to their efficiency under conditions of great a priori indeterminacy.

In the report of A. L. Fradkov (Leningrad) entitled "Velocity gradient diagram in problems of adaptive control" a velocity gradient algorithm is used to adjust the parameters of a continuous nonlinear object. The general conditions of stability of the corresponding closed system were obtained. General methods of combatting instability, consisting of regularization of the adjustment algorithm, are proposed and substantiated.

In the report of V. M. Chadeyev (Moscow) "Results of modeling an adaptive control system with an identifier" it was pointed out that in existing systems the switching from a regime of learning to a regime of control is accomplished by an operator who switches on control when the ratio of the dispersion of error in predicting the yield to the dispersion of the yield becomes small. However, the actual error in identification is not observable and, consequently, there always is the risk of obtaining poor control. The results of modeling an adaptive control system with an identifier with automatic transition from one regime to the other were presented in the report.

Widely used in the automation of industrial objects, discrete automated control systems containing elements with discontinuous output variables were examined in the report of L. A. Shirokov (Moscow) entitled "Automatic parametric optimization of discrete control systems." Questions of parametric automatic optimization of discrete automatic control systems were investigated on the basis of sensitivity analysis. Algorithms for automatic parametric optimization of relay and pulsed automatic control systems are formulated. Computational methods of executing the algorithms on a computer were examined.

The report of I. B. Yadykin (Moscow) entitled "Adaptive system of terminal control with a standard model" was devoted to the terminal control of a linear nonstationary object. A new approach is proposed for the construction of an adaptive control system based on the idea of searchless adaptation and structural properties of the Kallman-Bussi filter. The proposed approach permits simplifying the realization of adaptation algorithms.

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## The Section of Adaptation Algorithms

Presented in the report of M. S. Asanov, R. D. Brusilovskiy and Ye. G. Krushel' (Frunze) entitled "Two-level algorithms for estimation of the state of dynamic objects" was a method of constructing algorithms for estimation of the state of an object of control, the model of which consists in an aggregate of interacting subprocesses. Those algorithms were used for the deparallelization of the computational process between small computers with a limited volume of main memory, which accomplish tasks of control and estimation of the state of dynamic highly complex objects.

Examined in the report of A. A. Yerшов and R. Sh. Liptser (Moscow) entitled "Robust filtration algorithms" was the task of filtering an unobservable random process in a Kallman formulation, when the noises of measurement are sequences of independent random values independent of each other with a symmetric distribution function. Presented in the report is a simple non-optimal algorithm of nonlinear filtration, when the dispersions of noise are sufficiently great or even equal to infinity, and cases where that algorithm is more effective than a linear optimal algorithm are pointed out.

The report of A. V. Medvedev and N. F. Novikov (Krasnoyarsk) entitled "On nonparametric optimization algorithms" was devoted to the task of optimization under conditions of nonparametric indeterminacy. Presented were nonparametric algorithms for the construction of a sequence of variables on the basis of which an extremum of the stochastic criterion of optimality is sought. Results of statistical modelling of optimization algorithms on computers are presented.

The report of G. A. Medvedev (Minsk) entitled "On recurrent algorithms for estimation from correlated observations" contained a comparative analysis of two known algorithms for recurrent estimation of parameters linearly connected with observations containing correlated additive random errors. Preferred areas of application of the compared algorithms are pointed out.

Shown in the report of Ye. I. Ronin (Gor'kiy) entitled "Asymptotic optimality of an adaptive automaton with growing memory in some random media" was the asymptotic optimality of one of the simplest automatons--an automaton with a linear tactic that has a variable memory. The behavior of that automaton in nonstationary random media was studied.

In the report of A. A. Sorina (Tbilisi) entitled "One algorithm for the solution of incorrect tasks of measurements," an algorithm based on minimization of the functional of medium quality by means of "sliding control" procedure is proposed for the solution of incorrect operator equations.

The report of G. S. Tarasenko (Riga) entitled "Structural adaptation in the process of search optimization" was devoted to the construction and investigation of randomized algorithms for switching methods of optimization.

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The information for the transition from one algorithm to another is the relative mean measurement of the minimized function. The advisability of constructing such algorithms is illustrated on test examples.

The Section of Identification

In the report of E. D. Aved'yan and T. I. Tovstukhi (Moscow) entitled "Two-level projection algorithms of identification" was presented a method of accelerating convergence of the Kachmazh algorithm for the identification of linear objects under conditions of low noise of measurements and in the presence of a strong time correlation in the input process. A correcting algorithm is introduced. The results of the modelling showed that the proposed algorithm has a higher rate of convergence than the classical.

In the report of A. A. Ashimov and D. Zh. Syzdykov (Alma-Ata) entitled "Estimating the parameters of objects of large dimensions" a procedure was proposed and substantiated for estimating the parameters of an object of control of large dimensions, a procedure that permits increasing the rate of convergence. That procedure is reduced to alternate rearrangement of one general parameter of the model.

A new type of optimal nonlinear algorithms for estimation, based on a combination of ideas of continuous Kallman filtration and the theory of verification of statistical hypotheses, was investigated in the report of I. N. Beloglazov (Moscow) entitled "Continuous analog of recurrent-search estimation."

In the report of A. Sh. Gugushvili and N. G. Kharatishvili (Tbilisi) entitled "The principle of symmetry in identification of nonlinear objects" tasks of determination of the structure of nonlinear objects and the determination of their parameters in the presence of a fixed structure were examined from a single point of view.

In the report of V. A. Kaminskas (Kaunas) entitled "Package of applied programs for identification of dynamic systems and some results of its application" a program package was described that permits constructing discrete mathematical models of linear dynamic systems and nonlinear dynamic systems of the Hammerstein class with one or several inputs and a single output. The program package has been used in various practical problems.

I. I. Perel'man (Moscow), in a report entitled "Adaptation or identification?" presented a comparative analysis of the quality of function of adaptive systems and systems with the use of current identification, on the basis of which the areas of rational use of each approach were established.

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The Section of Man-Machine Adaptive Systems

Presented in the report of V. G. Berlin (Moscow) entitled "The adaptive-dialog approach to synthesis of reliable strategies of network control" was a critical analysis of formalized adaptation algorithms used in the solution of network problems. The factors preventing man from effectively acting on a solution in a dialog regime are thoroughly analyzed. An adaptive-dialog procedure is proposed, the effectiveness of which is illustrated by examples.

Examined in the report of V. N. Grigorenko (Tallin) entitled "Adaptation tasks solved in DISPOR" were tasks of optimization and adaptation in a dialog system of adoption of optimal solutions, tasks closely connected with the formalization of the processes of planning decision adoption.

The possibilities of descriptive representation of vectors in the form of singly connected circuits in the task of constructing descriptions of classes of vectors were examined in the report of V. G. Grushin (Moscow) entitled "Adaptation of descriptive representations of data structure."

Examined in the report of A. S. Krasnenker (Moscow) entitled "Learning in an automated planning system" was the task of adopting decisions according to a vector criterion on the example of the process of designing a tractor.

The Sector of Applications

In the report of V. I. Alekseyev, A. M. Korikov and V. P. Tarasenko (Tomsk) entitled "Questions of the theory of adaptive systems of navigation and control of movement" the principles of construction of correlation-extreme systems and systems of extremum radio navigation were substantiated. A comparative analysis is made of different algorithms of optimization.

In the report of Yu. I. Alimov, V. K. Obabkov, O. N. Merkulov and Yu. N. Tseluyevskiy (Sverdlovsk) entitled "Search parametric systems of extremum control of resonant industrial objects" it was shown that it is advisable to accomplish the optimum control of objects with an "acute" natural extreme characteristic caused by resonance phenomena, by means of self-adjusting systems with search modulation of parameters of the object.

In the report of N. G. Gorelik (Voronezh) entitled "The modular principle of construction of algorithms for processing chromatographic data" a set of module-algorithms was determined that was sufficient for the realization of algorithms for processing chromatographic data.

The task of compiling balanced plans was represented as a task of adaptive control in the report of A. M. Deych and N. N. Koshcheyev (Moscow) entitled "Application of methods of adaptation for the development of balances of

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production and consumption of tires." A natural planning criterion is the reduction of the discrepancy of the balance to zero. An algorithm is proposed for the solution of that problem.

Proposed in the report of Sh. I. Dzharbolov, U. A. Tukayev, B. Zh. Buranbayev, S. A. Boyarchuk, V. A. Yerzhanov, V. Z. Zbdullina and R. M. Solimzyanov (Alma-Ata) entitled "Automated design of an adaptive control system" was an automated design system that assures automated selection of design solutions. The automated design system under consideration is based on a YeS-1022 computer.

A systems approach to the task of investigating the adaptation of man to changes of climatic and geographic conditions was described in the report of V. A. Cochegurov and L. I. Konstantinova (Tomsk) entitled "The systems approach and modelling of processes of adaptation to changes of climatic and geographic conditions.

The uncoiler brake system of the continuous uncoiling unit of a metallurgical plant was examined in the report of I. A. Mochalov, Ye. G. Kleyman, A. L. Vishnyak and Yu. V. Kabatov (Moscow) entitled "Adaptive braking of an uncoiling unit." An adaptive algorithm was synthesized for braking the uncoiling unit with the total length of the band in the coil unknown.

The Ninth All-Union School-Seminar on Adaptive Systems proceeded on a high scientific level and contributed to the further development of adaptation theory and expansion of the area of application of adaptive methods. An outstanding feature of the school-seminar was an active search for connections between the various directions of scientific research in the area of the theory and practice of adaptive systems. Its good organization by the collective of associates of the Kazakh Polytechnic Institute imeni V. I. Lenin contributed much to the success in conducting the school.

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WORK OF THE LENINGRAD SCHOOL ON THE PROBLEM OF BUSINESS GAMES

Moscow AVTOMATIKA I TELEMEXHANIKA in Russian No 3, 1979 p 188

[Article by V. N. Burkov and A. N. Nemtsev]

[Excerpt] From 12 to 21 January 1978 the Leningrad Scientific and Technical School on "Experience in the Application of Active Methods of Learning Administration" was in session near Leningrad. In essence, it was the second all-union school on business games, the first having been held at Zvenigorod, near Moscow, in November 1975. The organizers of the Leningrad school were the ASU [automated management system] section of the Council of Economic and Social Development under the Leningrad CPSU obkom, the Leningrad Oblast Council of Scientific and Technical Societies, the Leningrad Institute for Improving the Qualifications of Workers of Industry and the Municipality in Administrative Methods and Technique and the Institute for Improving the Qualifications of Managers and Specialists of the Ministry of Shipbuilding Industry.

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FOURTH ALL-UNION CONFERENCE ON STATISTICAL METHODS OF CONTROL THEORY

Moscow AVTOMATIKA I TELEMEXHANIKA in Russian No 3, 1979 pp 189-192

[Article by A. S. Mandel']

[Text] The Fourth All-Union Conference on Statistical Methods of Control Theory was held in Frunze from 16 to 19 May 1978. Participating in the work of the conference were over 200 specialists from 13 union republics, representing 67 organizations in 35 cities of the country. The conference was organized at the initiative of the USSR Academy of Sciences, the USSR National Committee for Automatic Control, the Institute of Control Problems, the Kirgiz SSR Academy of Sciences, the Institute of Automation of the Kirgiz SSR Academy of Sciences and Frunze Polytechnic Institute.

The work of the conference was opened by the vice president of the Kirgiz SSR Academy of Sciences, M. M. Adyshev. Two reports were presented at the

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plenary session. The report of V. S. Pugachev, L. G. Yevlanov, I. Ye. Kazakov and N. S. Raybman entitled "Effectiveness of application of statistical methods in solving practical problems of control theory" was devoted to the investigation of various aspects of the effectiveness of statistical methods which, as for any other objects, includes the effect connected with the application of the method, minus expenditures on application. The positive component of effectiveness is reduced to expansion of the possibilities of solving problems, increase of the precision of identification of the investigated object and the direct technical and economic result of solution of the problem on the object. Total expenditures on application are determined by expenditures on mastering the method, the indicator of expenditures, the labor intensiveness of application of the method and expenditures on additional equipment. Also presented in the report is an analysis of existing statistical methods on the basis of which a classification of known methods is constructed and an evaluation is given of the contemporary state of the statistical theory of control and the prospects of its future development.

In the report of V. P. Zhivoglyadov entitled "Dual control in automated systems" some problems of automated control were examined and concepts of the theory of dual control and its possible applications for the investigation of large systems were discussed. Specific examples of control algorithms also were given.

The work of the conference proceeded in eight sections [1]. In the section on "Statistical analysis of systems and processes of control" 14 reports were presented. Examined in the report of L. G. Yevlanov was a procedure for synthesis of an optimum rule for adopting decisions on the basis of the selection of data representing a result of objective and subjective measurements on qualitative scales (nominal and ordinal). Examples of such data are sociological surveys or expert estimates. The work of D. S. Shmerling was devoted to the investigation of methods and models of the ranking of objects in similar procedures. Examined in the report of M. L. Dashevskiy were equations for semi-invariants in a form permitting automation of the process of their compilation by means of digital computers. A method of approximate determination of moment and semi-invariant characteristics of Poisson systems was presented in the work of V. G. Romanov and B. K. Khybryan. Questions of the statistical analysis of systems with a random working time were examined in the report of S. V. Mal'chikov. The reports of L. P. Sysoyev and M. Ye. Shaykin, Yu. T. Oleynik and A. N. Rozenbaum were devoted to the solution of various tasks of estimation theory. Examined were tasks in the construction of sufficient statistics for covariational matrices of special structure to which some tasks in experiment planning lead, some of the approaches to the solution of the task of optimization of selective estimates and the task of constructing minimax estimates of a nonstationary random process not accessible to direct observation. Studied in the work of O. S. Kozhinskiy was the task of extrapolating a certain random function with unknown moment characteristics on the assumption that

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the number of orthogonal functions approximating the components of mathematical expectation is unknown. Devoted to the investigation of various questions in the analysis of pulsed systems and systems with frequency-pulse modulation were the report of V. M. Artem'yev and A. V. Ivanovskiy, V. I. Savchenko and the report of K. Sh. Asaubayev, A. A. Ashimov and Yu. S. Popov. A class of algorithms of random search having a high rate of convergence was proposed in the report of V. N. Krutikov. The work of Yu. V. Sindler and A. M. Kukebayev was devoted to the solution of one class of tasks in the distribution of radiolocation efforts. Investigated in the report of R. I. Rapoport and L. M. Mogilevskiy was the influence of the disposition of random coefficients in the structure of a lineal model on the precision of determination of the optimum.

Thirteen reports were presented in the section on "Optimal stochastic control." Examined in the report of N. I. Andreyev was the task of determining an optimal linear system in the case where the error of the system is not a second-order random process. The question of determining quasi-optimal control in dynamic systems with a random structure even in the case where noise enters multiplicatively in the coefficient during control was the subject of the report of I. Ye. Kazakov and V. A. Bukhalev and the report of V. B. Kolmanovskiy. V. V. Rykov attempted to introduce basic concepts of a controlled random process with continuous time and presented some results of the general theory of controlled random processes. The report of F. L. Chernous'ko and M. Yu. Borodovskiy was devoted to the solution of a task of optimal pulse correction of random excitations during limitation of the resource and the number of pulses. V. V. Vdovin proposed a general approach to the solution of the task of optimal closed nonlinear systems with linear feedback. Random optimal rules for stopping in tasks of optimal stochastic control were examined in the work of A. A. Gak and V. Ya. Katkovnik. Investigated in the report of B. M. Mirkin were questions of the aggregation of information during control of stochastic distributed systems with limitation on sensitivity. Examined in the reports of V. K. Ol'shanskiy and Ye. Ya. Rubinovich and T. G. Abramyants, Ye. P. Maslov and Ye. Ya. Rubinovich in different formulations tasks of determination of optimal controls (strategies) in differential games. V. Z. Aybinder proposed a solution of the task of optimal control of an object with multiplicative noise during control, where concerning the noise it is only known that its absolute value is limited. Examined in the report of Yu. I. Neymark and A. M. Preobrazhenskaya were some modifications of the method of dynamic programming to determine the optimal control of a Markov process with discrete states.

In the section on "Identification and estimation of parameters" 12 reports were presented. The reports of Zh. Shershenaliyev and N. A. Petrovskiy, T. I. Dubenko, and also K. I. Livshits, N. Yu. Margolis and A. F. Terpugov were devoted to various questions in estimation theory. Systematic estimation of the parameters of a process with discrete time was examined in the report of V. Z. Borisov, S. E. Vorobeychikov and V. V. Konev. Yu. B.

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Rozhdestvenskiy and V. M. Shumskiy proposed a solution of the problem of estimating parameters with instrument errors taken into account. Questions of the use of polynomials to find estimates of parameters during equal-point observations were examined in the report of Yu. P. Kunchenko. V. S. Mos'pan investigated questions of statistical analysis connected with mathematical explication of experimentally obtained registograms. In his report I. I. Perel'man proposed a classification of existing methods of control under conditions of a priori indeterminacy and derived algorithms with direct adaptation and algorithms with the use of a current model. The task of identification of the structure of a mathematical model was examined in the work of V. G. Laptev. Ts. Ts. Paulauskas proposed a method of piecewise stationary approximation and identification of non-stationary stochastic systems that leads to satisfactory results in the presence of great a priori indeterminacy of parameters and statistical characteristics. Examined in the report of V. K. Saul'yev was the application of the method of fictitious domains for the identification of systems with distributed parameters. The report of F. F. Pashchenko and I. S. Durgaryan was devoted to discussion of the idea of decomposition of the space of informative variables to reduce the dimensions of the task of identifying a multidimensional statistical object.

In the section on "Adaptation, learning and self-organization" seven reports were presented. Yu. I. Parayev and V. I. Smagin proposed a method of constructing a Kallman-Bussi filter that realizes searchless extreme control of inert objects. E. K. Shpilevskiy examined recurrent classification of partially observable processes of autoregression and a sliding average in control systems. Investigated in the report of L. S. Zhitetskiy was one of the probabilistic iterative algorithms of the functioning of a learning control system of the closed type, using recognition of situations. The reports of A. I. Ruban, A. A. Ivanilov and S. A. Kovyasin, Ye. P. Kebets and the report of A. V. Medvedev were devoted to nonparametric algorithms of identification, adaptation and learning.

Fourteen reports were presented in the section on "Queueing and control of reserves." New results on the use of queueing theory to describe transport flows were presented in the reports of M. A. Fedotkin and A. O. Vaganov. Examined in the report of M. I. Volkovinskiy and A. N. Kabalevskiy were the conditions of existence of a stationary regime and priority queueing systems with losses in switching. Investigated in the work of M. L. Preger and A. F. Terpulov was the task of determining optimal dynamic priorities for some classes of queueing systems. B. I. Vaysblat proposed an approximate method of calculating the characteristics of discharges of water-transport systems. The control of elevator systems was investigated in the work of Yu. K. Belyayev, A. G. Gabzhiyev and T. N. Dugina. Studied in the report of A. M. Gortsev was a bilinear queueing system with transition of requests into a shorter queue. The reports of V. A. Lototskiy and A. S. Mandel' were devoted to the solution of tasks

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in the control of reserves in the presence of partially observed demand and demand that depends on the state of the reserves control system. Investigated in the report of V. M. Vishnevskiy and V. A. Zharkikh was a two-stage queueing system in which registration occurs in the first stage and the servicing of needs properly speaking in the second. Ye. S. Kochetkov presented a solution of the task of normalization (in the sense of V. S. Pugachev) of queueing systems with an arbitrary servicing time of requests and for multiphase systems with an exponential distribution of the servicing time. Examined in the work of A. Kh. Abramov and N. D. Dagkesamanskiy was the formulation of the problem of a controlled queueing system with incomplete information. Ye. I. Shkolnyy proposed a method of calculating the dispersion of estimates of the characteristics of Markov queueing systems with applications to tasks of statistical control. Examined in the report of L. A. Grinspan were questions of the similitude of queueing networks.

In the section on "Statistical methods in systems of automation of scientific investigations" eight reports were presented. Examined in the report of Sh. Yu. Raudis, V. S. Pikyaulis and K. Z. Yushkyavichus was a dialog system of operative development of statistical recognition algorithms. A. A. Sveshnikov proposed an analytical method of processing the results of modelling of systems with distributed parameters. Proposed in the report of S. Ya. Avramenko and S. G. Nemchenko was an approximate method of calculating nonlinear pulsed system of a single class. A. M. Korikov and S. A. Kislitsin presented the results of probabilistic analysis of correlation-extremum systems used in navigation, the automation of technological processes, etc.

I. A. Ivashintsov and V. B. Mysovskiy proposed the development of a computerized seismic data processing system. L. F. Pavlenko proposed an algorithm to determine the content of alloying elements, one that assures the required quality of material. Examined in the report of V. A. Kugas, L. A. Tel'ksnis and K. Z. Yushkyaveichus was statistical classification in investigations of cardiac rhythm. The results of investigations of the precision of antenna measurements over the field in the region of the antenna aperture were presented in the report of S. S. Sarkisyan and R. G. Akopyan.

The largest number of reports (19) was presented in the section on "Statistical methods in control systems with digital computers, automated enterprise management systems (ASUP) and automated systems for the management of technological processes (ASU TP). The report of A. P. Kopelovich, A. K. Kagramanov and I. Sh. Torgovitskiy was devoted to the use of methods of automatic classification to coordinate the work of a production complex. Examined in the work of Ya. A. Kogan were some problems of the statistical theory of computer systems and networks. Yu. M. Bykov proposed an approach to the task of quantitative description of processes in an automated management system (ASU). Examined in the work of A. N. Tsoy was control of a

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process with non-uniform estimates of selections with use of the results to predict the runoff of mountain rivers and fluctuations of reservoir levels. The work of B. V. Kreysman was devoted to an account of the Bayesovskiy approach to the task of planning the work schedule of a steel-smelting shop. Examined in the report of V. A. Bunkin and A. L. Lifshits were statistical methods of selecting the optimal structure of an ASUP.

The report of L. N. Plotkina dealt with questions of statistical analysis of operating information in an ASUP. The application of statistical estimates in the ASU of cement and slate production was described in the report of B. S. Kopytin. The report of V. P. Zhivoglyadov was devoted to a solution of the task of optimizing discrete centralized control of a group of continuous stochastic objects. V. M. Kuntsevich and M. M. Lychak proposed matrix iterative algorithms to control the characteristics of multidimensional random processes realized by means of computers in systems of test automation. Suboptimal algorithms of stochastic control and estimates of the state in hierarchic systems were examined in the report of M. S. Asanov, R. D. Brusilovskiy and Ye. G. Krushel'. A. G. Arkad'yev and Zh. I. Levi proposed an algorithm of optimal extremal grouping and classification in the investigation of production objects of control. The report of A. A. Guseva was devoted to some questions regarding increase of the precision of control of continuous processes. Examined in the report of K. S. Durgar'yan was one approach to identification of a two-level hierarchic object for the case of a quadratic end function. Questions of the identification of objects of concentration production by a statistical model of the balance were examined in the report of V. I. Braun, I. M. Mulin and V. S. Protsuto. Statistical methods in tasks of the control of regimes of electric power systems were investigated in the work of A. A. Nemura and V. A. Kaminskas. In the report of Yu. G. Frenkel', Ya. Ye. Gel'fand, E. G. Shtengel' and L. M. Yakovis there was a discussion of the application of parametrization in the synthesis of multidimensional systems for the control of continuous technological processes on the basis of experimental estimates of random excitations. The report of Ye. Sh. Tultemirova was devoted to the investigation of systems of direct numerical control with adaptive selection of the interval of quantizing of the controlling effect.

In the section on "Reliability, monitoring and quality control" eight reports were heard. Examined in the report of A. N. Sklyarevich and F. A. Sklyarevich was the application of analogy with a multiply restored system in solving tasks of reliability. A. A. Koshcheyev presented new results in investigating the reliability of invariant control systems. The work of V. I. Lutkov was devoted to questions of the application of the method of test functions to estimation of the reliability of stochastic systems. B. Sh. Aranayevichyus reported on the problem of estimating the working capacity of systems by matrix methods. The prediction of random processes with the use of special polynomials for tasks of reliability

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theory were examined in the report of O. V. Abramov and M. Ya. Zinger. The report of V. A. Lopukhin and A. D. Shadrin was devoted to solution of the task of optimizing quality control of a production batch of articles of electronic technology. L. S. Faynzil'ber presented the results of application of the theory of statistical solutions for identification of the process of phase transformations during thermal quality control of the metal. Questions of optimizing the quality of complex systems in various stages of planning were examined in the report of Yu. Ya. Zubarev and M. I. Mal'tser.

At the conference there was a discussion on the theme, "What statistical methods give," which permitted a broad circle of participants in the conference to express their opinions on the urgency and effectiveness of development and application of statistical methods to solve various national economic tasks. In the resolution of the conference it is noted: "The Fourth All-Union conference considers the central task to be the further development of the theory and practice of the application of statistical methods to solve urgent tasks of control in various areas of technology and the national economy. In connection with that the main tasks are:

- improvement of methods of analysis of stochastic systems and processes, especially for automated systems for the control of various objects;
- further development of methods of identification and construction of stochastic models of complex systems;
- the development of methods and algorithms for optimal data processing and estimation of the state of systems;
- the development of statistical methods for the analysis and synthesis of complex hierarchic systems of organized control and adoption of administrative decisions;
- the introduction of statistical methods to construct adaptive automated systems for the control of technological processes and the automation of systems of planning and scientific experiment;
- the development of methods of estimating the technical and economic effectiveness of the application of statistical methods in the control of various objects.

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CALENDAR OF SCIENTIFIC MEETINGS

Moscow VESTNIK AKADEMII NAUK SSSR in Russian No 1979 pp 153-158

[Excerpts] XV algebraic conference. Krasnoyarsk, July, three days. Conducted by the Institute of Mathematics, the Computer Center of the Siberian Department of the USSR Academy of Science Krasnoyarsk University.

V conference "Computational methods in linear algebra" Shushenskoye, Krasnoyarskiy Kray, July, three days. (Computer Center of Siberian Department USSR Academy of Science.)

V conference "Automation of scientific research based on the use of computers" Novosibirsk, June, three days. (Institute of automation and electrical measurement of the Siberian Department of the USSR Academy of Science, Council on Automation of scientific research USSR Academy of Science.)

VIII conference on methods of photoelasticity, Tallin, September, two days. (Institute of Cybernetics, Estonian Academy of Sciences, Scientific Council on Problems of Strength of Materials and Plasticity, USSR Academy of Science.)

IV conference on technical diagnostics, Cherkassy, September, three days. (Institute of Problems of Management, Institute of electrodynamics of Ukrainian Academy of Science, USSR national committee on automated management.)

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B. Personalities

Translations of Articles

70TH ANNIVERSARY REVIEW OF CAREER OF SCIENTIST VLADIMIR IVANOVICH SIFOROV

Moscow PROBLEMY PEREDACHI INFORMATSII in Russian No 2, 1979 pp 109-111

[Article: "Vladimir Ivanovich Siforov - on His 75th Birthday"]

[Text] On 31 May 1979 Vladimir Ivanovich Siforov, corresponding member of the Academy of Sciences USSR, professor, and doctor in technical sciences, will celebrate his 75th birthday and 50th year of scientific, science organizational, teaching, and public work.

V. I. Siforov is an outstanding Soviet scientist in the fields of information theory, statistical communications theory, radio physics, radio engineering, automation, remote control, the theory of reliability of radio electronic systems, the theory of radio reception, and information computer communications networks. He is also an important teacher and public figure whose name is linked with the conception and development of new directions in science and technology.



He has written more than 500 scientific and popular science works, many of which have been translated and published in the leading socialist and capitalist countries.

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V. I. Siforov's scientific studies are always distinguished by the novelty and timeliness of the subject matter, originality of methods, and practical purposefulness. The results of his theoretical works provided a scientific-technical foundation for building anti-interference and efficient radio electronic systems.

V. I. Siforov graduated from the Leningrad Electrical Engineering Institute (LETI) imeni V. I. Ul'yanov (Lenin) in 1929. In 1936, skipping defense of a candidate's dissertation, V. I. Siforov brilliantly defended a doctoral dissertation at LETI. The conclusions of this dissertation are still used extensively by radio specialists. In 1937 he was awarded the learned degree doctor in technical sciences and in 1938 received the academic title of professor in the department of radio receiving devices. V. I. Siforov was elected a corresponding member of the Academy of Sciences USSR in 1953.

Between 1954 and 1966 V. I. Siforov directed the laboratory of radio relay communications and radio reception which he established at the Institute of Radio Engineering and Electronics (IRE) of the Academy of Sciences USSR. His years of work at IRE were a very fruitful period of scientific activity for him. It was then that V. I. Siforov formulated his theory of the accumulation of noise and fadeouts in trunk radio relay lines, studied the noise-resistance of radio lines with correcting codes, and elaborated the theory of the carrying capacity of radio channels with random parameters. V. I. Siforov was a pioneer in scientific research in the theory of complex radio electronic devices and systems.

Since 1966 V. I. Siforov has been head of the Institute of Problems of Data Transmission (IPPI) of the Academy of Sciences USSR. During this time the institute under his direction has performed a series of timely scientific research projects in the fields of data transmission, distribution, processing, storage, and conversion in physical, engineering, and biological systems. A significant part of this work was related to designing the Unified Automatic Communications System (YeASS). Thanks to his scientific and organizational talent, IPPI has formed a strong, creative collective that is capable of solving major scientific problems and implementing research results in various sectors of the economy. V. I. Siforov devotes a great deal of time to science organizational activities which aim at basic solutions to the chief problems of data transmission, distribution, and processing in our country.

During his time at IPPI V. I. Siforov has obtained a number of interesting results in the fields of radio electronics, information theory, code theory, and cybernetics. He has also conducted original studies of long-range forecasting of scientific-technical progress, various aspects of the science of science, philosophical issues of modern natural science and engineering, and methodological questions of information science and prediction.

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V. I. Siforov is an outstanding teacher. He has been training highly qualified research engineers in radio electronics and information theory since 1930. He wrote one of the world's best textbooks on radio receiving devices. It has gone through numerous editions and been translated into foreign languages. V. I. Siforov has trained more than 60 candidates and doctors of sciences. He was a member of the Presidium of the Higher Degree Commission from 1965 until 1975.

V. I. Siforov also does a great deal of useful work in the Scientific-Technical Society of Radio Engineering, Electronics, and Communications imeni A. S. Popov. He has been permanent chairman of its Central Board of Directors for 25 years now.

V. I. Siforov devotes much time and effort to work in the All-Union Council of Scientific-Technical Societies of the USSR, in which he is a member of the presidium and plenum of the Soviet, and the All-Union Znaniye Society, where he is a member of the presidium.

V. I. Siforov is a talented and tireless propagandist and popular writer on the latest scientific, technical, social, and philosophical subjects. He gives many reports and discussions on radio and television and participates in making popular science films.

V. I. Siforov does a great deal of science organizational and public work. He is chairman of the Committee on Scientific-Technical Terminology of the Academy of Sciences USSR, chief editor of the journal PROBLEMY PEREDACHI INFORMATSII, deputy chairman of the radio electronics section for the Lenin and State prizes in science and technology of the USSR Council of Ministers, and chairman of the Central Bureau of Philosophical Seminars in the Natural Sciences for the Academy of Sciences USSR.

V. I. Siforov has made significant contributions to strengthening international scientific ties. Within the Academy of Sciences USSR he is a member of the Soviet National Committee of the International Radio Science Union. In the All-Union Znaniye Society V. I. Siforov is a member of the commission on international ties of the society's board of directors. In the Union of Soviet Societies for Friendship and Cultural Ties with Foreign Countries he is first vice president of the science section.

V. I. Siforov is an official member of the scientific commission on "Signals and Systems" of the International Radio Science Union and a corresponding member of international symposiums on television in Switzerland.

V. I. Siforov has been elected a member of the Academy of Sciences of the Hungarian People's Republic, an honorary doctor of Budapest Polytechnic University, and a full member of the American Institute of Electronics and Radio Electronics Engineer.

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V. I. Siforov joined the Communist Party of the Soviet Union in December 1941 and has performed many important jobs assigned by party bodies.

The party and government have given high praise of the multifaceted activity of the scientist, communist, and public figure V. I. Siforov by awarding him two Orders of Lenin, two Orders of the Labor Red Banner, the Order of the Red Star, the Order of the Patriotic War 2nd Degree, the Badge of Honor Order, and various medals.

On this anniversary day the editorial board and editors of our journal send warm congratulations to Vladimir Ivanovich Siforov and sincerely wish him good health and long years of continuing productive activity for the benefit of the Soviet people, for the benefit of our great Motherland.

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BIOGRAPHICAL SKETCH OF MIKHAIL ALEKSANDROVICH GAVRILOV

Moscow PROBLEMY PEREDACHI INFORMATSII in Russian No 3, 1979 pp 110-111

[Unattributed article: "Mikhail Aleksandrovich Gavrilov"]

[Text] On 29 April 1979 Mikhail Aleksandrovich Gavrilov, an outstanding Soviet scientist, died suddenly. He was a specialist in the fields of discrete automation and telemechanics, corresponding member of the Academy of Sciences USSR, doctor of technical sciences, professor, honored scientist, and member of the editorial board of the journal PROBLEMY PEREDACHI INFORMATSII.

M. A. Gavrilov was born in Moscow on 11 November 1903.

He began his working career in 1918 as a clerk for the lumber procurement committee of the Moscow-Kursk Railroad.

In 1920 he was admitted to the Moscow Higher Technical School imeni N. E. Bauman. After graduation from the school he worked as an engineer in the technical administration of the Moscow Association of State Electric Power Plants. It was there that he began studying questions of automation.

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In 1934 M. A. Gavrilov went to work at the Commission on Automation of the Academy of Sciences USSR, which was converted into the Institute of Automation and Telemechanics in 1939 and later into the Institute of Problems of Control. At this institute he went through every stage from rank-and-file engineer to head of a major subdivision.

In 1938 at the Leningrad Industrial Institute he was granted the learned degree candidate of technical sciences for the totality of his work to that point.

At the same time M. A. Gavrilov began work on formation of the theory of relay contact circuits and its practical applications. He defended his doctoral dissertation in 1946 and was confirmed as a doctor in technical sciences in 1947. His monograph "Teoriya Releyno-Kontaknykh Skhem" [Theory of Relay Contact Circuits], published in 1950 was his first major work and marked the beginning of widespread practical introduction of this theory and continued research in the field of relay contact circuits, followed later by study of discrete devices and finite automata. This monograph has been translated and published in East Germany, Czechoslovakia, and China.

In 1958 M. A. Gavrilov was awarded the Prize imeni P. M. Yablochkov of the Academy of Sciences USSR for development of the theory of relay devices and formulating techniques for calculating and constructing circuits.

Using his theoretical results, M. A. Gavrilov built a series of telemechanics systems. The contact-less remote control units he built were given the Grand Prix at the Brussels World Fair of 1958.

M. A. Gavrilov was a pioneer in application of the techniques of noise-proof coating to increase the reliability of discrete devices. M. A. Gavrilov's last years of work were devoted to the questions of automating the design of discrete systems. He directed the development of a dialogue display system for machine logical synthesis of discrete control systems.

M. A. Gavrilov did a great deal of teaching and science organizing.

He began giving lectures in courses of advanced study for engineers in 1928. Between 1935 and 1940 he was a graduate student, and then later a docent, at the Moscow Power Institute. M. A. Gavrilov organized the department of automation and telemechanics at the Moscow Power Institute and the department of automation at the All-Union Extension Power Institute, which later became the Moscow Institute of Radio Engineering, Electronics, and Automation. He headed this department until 1977.

More than 40 young specialists prepared and defended candidate's dissertations under the direction of M. A. Gavrilov. Some of them have already become doctors of sciences.

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After 1965 Mikhail Aleksandrovich regularly organized and conducted seminars in the theory of relay devices and finite automata. At them leading scientists and practitioners in this field shared their knowledge with specialists who came from every part of the country. Many important problems and unresolved questions were discussed at these seminars on the initiative and under the direction of M. A. Gavrilov.

In March 1979 Mikhail Aleksandrovich held his 20th, anniversary seminar-school.

M. A. Gavrilov became chairman of the Scientific Council on Engineering Cybernetics of the Division of Mechanics and Control Processes of the Academy of Sciences USSR in 1965, and in 1967 he was made chairman of the section on engineering cybernetics of the Scientific Council on the Comprehensive Problem of Cybernetics of the Presidium of the Academy of Sciences USSR. He became director of the group of CEMA specialists working on the topic "Theory of Automata" and head of the composite brigade on reliable synthesis in 1964.

With the death of corresponding member of the Academy of Sciences USSR M. A. Gavrilov we have lost a major scientist who obtained outstanding theoretical and practical results that have been recognized in the USSR and abroad, as well as a remarkable teacher and man who possessed great organizational capabilities and nurtured a large number of students and followers.

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A. A. SAMARSKIY RECEIVES AWARDS, CONGRATULATIONS

Moscow VESTNIK AKADEMII NAUK SSSR in Russian No 5, 1979 p 114

[Article: "Academician A. A. Samarskiy - Hero of Socialist Labor"]

[Text] On 19 February 1979 an ukase of the Presidium of the USSR Supreme Soviet granted the title Hero of Socialist Labor with award of the Order of Lenin and the Hammer and Sickle Gold Medal to Academician Aleksandr Andryevich Samarskiy for major contributions to the development of mathematical physics and computer mathematics, training scientific workers, and in connection with his 60th birthday.

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A. A. Samarskiy is a prominent Soviet scientist and major mathematician whose works are widely known in our country and abroad. He has made a fundamental contribution to mathematical physics and is one of the founders of modern computer mathematics. The modern techniques of mathematical modeling of physical phenomena, processes, and designs on computers which were developed under the direction of A. A. Samarskiy have been used widely in nuclear physics, in solving the problem of controlled thermonuclear synthesis, in studying plasma physics, in the problems of magnetohydrodynamic conversion of energy, and in other problems that are important for the national economy.

A. A. Samarskiy organized a major scientific school in the field of computer mathematics. He devotes much time and energy to training scientific workers at Moscow State University and the Moscow Physico-technical Institute.

A. A. Samarskiy's organizational activities are widely recognized. For many years he has been head of a division at the Institute of Applied Mathematics imeni M. V. Keldysh of the Academy of Sciences USSR. He is chairman of the "Computer Physics" section of the Scientific Council of the Academy of Sciences USSR for the comprehensive problem "Plasma Physics," a member of the Scientific Methods Council for Mathematics of the USSR Ministry of Higher and Secondary Specialized Education, and the organizer of all-Union and international schools of computer mathematics.

A. A. Samarskiy belongs to the generation of Soviet scientists who defended our Motherland with gun in hand during the Great Patriotic War.

In its greeting to the celebrant, the Presidium of the Academy of Sciences USSR wished Aleksandr Andreyevich Samarskiy good health, happiness, and continued creative success for the benefit of Soviet science.

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N. P. FEDORENKO RECEIVES PRIZE FOR OPTIMIZATION ECONOMICS BOOK

Moscow VESTNIK AKADEMII NAUK SSSR in Russian No 5, 1979 p 122

[Article: "The Prize imeni G. M. Krzhizhanovskiy Is Awarded To N. P. Fedorenko"]

[Text] The Presidium of the Academy of Sciences USSR has awarded the Prize imeni G. M. Krzhizhanovskiy for 1978 in the amount of 2,000 rubles to Academician Nikolay Prokof'yevich Fedorenko for his monograph "Optimizatsiya Ekonomiki" [Optimization of the Economy].

The monograph is a profound scientific investigation of the most pressing problems of current Soviet economic science. It is the first time that the problems of economic management in the chain of authority from enterprise to association, sector, and national economy have been considered as one composite unit, on uniform methodological principles. The author presents a detailed study of the questions of organizing automated management systems for production at the enterprise and association level and ways to improve these systems. He devotes special attention to analyzing the problems of optimizing management planning at the sectorial level.

The author has investigated ways to achieve overall improvement in the system of managing the socialist economy by using the latest mathematical economic methods and models and employing computer equipment.

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BORIS NIKOLAYEVICH PETROV, VICE-PRESIDENT, USSR ACADEMY OF SCIENCES

Moscow VESTNIK AKADEMII NAUK SSSR in Russian No 6, 1979 p 41

[Article on academician B. N. Petrov, vice-president, USSR Academy of Sciences]

[Text] Academician Boris Nikolayevich Petrov, Hero of Socialist Labor, recipient of the Lenin Prize and USSR State Prize (born in 1913), is a great scientist and organizer of broad scientific research in automated control of industrial facilities and new technologies. He is a founder of the theory of invariance of automated management systems. B. N. Petrov formulated the principle of two-channelness and proposed a criterion for physical realizability of invariant systems. He and his school developed

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foundations for the theory of terminal control, proposed principles of design used to create new classes of regulatory and control systems for new technology and high-frequency measurement systems, developed methods of the theory of non-retrieval self-adjusting systems and systems with coordinate-parametric control introduced into practice, obtained substantive results in information theory of automated management and management of aircraft energy plants.

B. N. Petrov is academic secretary of the Division of Mechanics and Control Processes, chairman of the Council on Automation of Scientific Research and the USSR Science Council on Problems of Traffic and Navigation Control, chief editor of the journal "Izvestiya AN SSSR. Tekhnicheskaya kibernetika" and the Soviet-Hungarian journal "Problems of Control and Information Theory."



As head of the "Interkosmos" Council since its inception, B. N. Petrov has made a great contribution to the development of international cooperation of the USSR in the study and utilization of space for peaceful purposes.

The scientific services of B. N. Petrov have received wide international recognition. He is a foreign member of the academies of sciences of Bulgaria, Hungary, DDR, Poland, Czechoslovakia; honorary doctor of Prague Polytechnic Institute and an active member of the International Academy of Astronautics.

Since July 1978, B. N. Petrov has served as vice-president of the USSR Academy of Sciences.

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WORK BY VIKTOR MYKHAYLOVYCH GLUSHKOV

Kiev VISNIK AKADEMIYI NAUK UKRAYINS'KOYI RSR in Ukrainian No 7, 1979  
p 92

[Article by academician V. I. Skurykhin, Ukrainian Academy of Sciences,  
on academician V. M. Glushkov]

[Text] Academician V. M. Glushkov is the inventor of one of the primary ideas of computer development underlying the increased level of internal computer language and the arrangement of the dynamic structure of micro-program control. On this basis, the scientist formulated a scientific program whose implementation led to the creation of the small computer industry in our country between 1959 and 1969. Within the framework of this program, several minicomputers that have found wide practical application were developed under the leadership of Viktor Mykhaylovych.

V. M. Glushkov originated the idea of specialization of computer data processing for a problem class; in this context, a computer should not lose its properties of universality. This thought was embodied in the leading wide-purpose computer (KMShP) and in the first domestic solid-state computer, "Dnipro-1"; it was further developed in the "Dnipro-2" complexes.



The idea of implementing in an all-purpose computer both an evolved procedurally-oriented algorithmic language and a stepped arrangement of control was first included in the "Ukraine" computer plan carried out under V. M. Glushkov's leadership in 1966 through 1968.

The scientist proposed principally new methodology of resolving problems of control, planning and prediction using computer hardware complexes. The need to develop these methods was evoked by requirements for automated control systems.

V. M. Glushkov has carried out active research in the ASU field since 1960. First it was work on systems to control technological processes, later it was control of different levels and purposes, including OHAS and ASPR of the USSR State Planning committee. In the Dysplan system, set up on the basis of the methodology mentioned above, it was possible for the first time to tackle problems of design and correction of optimum

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plans, as well as preparation of initial data under the dynamic conditions of continuous control.

During this period, studies produced results on the configuration of problem-oriented general-purpose mathematical software and computer methods in control networks and systems which had a great meaning in the development of programming structures and the technology of realizing future computing systems.

A revision of traditional structures and principles of organization of third-generation computers was made; new principles of organization of computing processes and the architecture of computer complexes were proposed.

In 1977-1978, V. M. Glushkov obtained some real results in the design of multiple-processor systems and their theoretical justification. They are widely used in programs to establish highly-productive domestic systems and small computers.

For the series of studies on theory of promising computers and creation of highly-productive computer technology and control system media, containing research and development results in the discovery and realization of new ideas and principles of computer and control systems design, V. M. Glushkov was awarded the S. O. Lebedev Prize.

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CAPSULE DESCRIPTION OF OLEG MIKHAYLOVICH BELOTSEKOVSKIY; HIS MAIN WORKS

Moscow VESTNIK AKADEMII NAUK SSSR in Russian No 7, 1979 pp 105-106

[Article: "Oleg Mikhaylovich Belotserkovskiy (Engineering Mechanics)"]

[Text] Oleg Mikhaylovich Belotserkovskiy was born in 1925. He is today rector and head of the department of computer mathematics at the Moscow Physicotechnical Institute. He is a specialist in the fields of engineering mechanics, theoretical and applied aerodynamics, and computer mathematics, and has written more than 90 scientific works.

O. M. Belotserkovskiy solved one of the most important problems of modern aerodynamics, calculating supersonic gas flow past blunt bodies taking

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account of the complex chemical processes caused by high-temperature heating. O. M. Belotserkovskiy and his students obtained a series of fundamental theoretical results in the fields of transsonic gas currents, radiation aerodynamics, and the dynamics of a rarified gas. O. M. Belotserkovskiy has developed a number of fundamentally new general numerical approaches for direct modeling of complex nonstationary physical phenomena from the fields of applied and engineering mechanics and plasma physics (the "large particles" method, the "flows" method, the "particles" statistical method, and others).

O. M. Belotserkovskiy has won the Lenin Prize.

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CAPSULE DESCRIPTION OF GEORGIY PAVLOVICH LOPATO, HIS MAIN WORKS

Moscow VESTNIK AKADEMII NAUK SSSR in Russian No 7, 1979 p 122

[Article: "Georgiy Pavlovich Lopato (Computing Machines and Machine Systems)"]

[Text] Georgiy Pavlovich Lopato was born in 1924. Today he is the director of the Scientific Research Institute of Electronic Computing Machines, head of the department of computing systems of the Minsk Radio Engineering Institute, a specialist in the field of computer technology, and the author of 112 scientific works.

G. P. Lopato has concentrated his scientific efforts in the following fields: development of general-use computers and devising control and information systems based on them; developing data input devices for computers and systems for data display, transmission of data by telegraph and telephone channels, and recording and storing data on magnetic media.

G. P. Lopato has been awarded the State Prize of the USSR.

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CAPSULE DESCRIPTION OF NIKOLAY YAKOVLEVICH MATYUKHIN; HIS MAIN WORKS

Moscow VESTNIK AKADEMII NAUK SSSR in Russian No 7, 1979 p 122

[Article: "Nikolay Yakovlevich Matyukhin (Computing Machines and Machine Systems)"]

[Text] Nikolay Yakovlevich Matyukhin was born in 1927. He is a specialist in the fields of computer technology and automation of design and has written more than 100 scientific works.

N. Ya. Matyukhin proposed a two-address structure for small computers (the ATsVM-1 and the M-3), studied the principles of microprogramming in peripheral processes and systems working in real time, and put these principles into practice. He has developed theoretical principles of survivability, modular construction, and increasing the productivity of similar multimachine computing systems.

N. Ya. Matyukhin's scientific ideas have been embodied in the development of various second- and third-generation computers. He advanced and developed the basic principles for constructing systems for automatic design of computer equipment.

N. Ya. Matyukhin has been awarded the State Prize of the USSR.

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SCIENTIFIC PERSONNEL OF SIBERIAN DIVISION OF THE USSR ACADEMY OF SCIENCES: METHODS AND RESULTS OF STATISTICAL INVESTIGATION

Novosibirsk NAUCHNYYE KADRY SIBIRSKOGO OTDELENIYA AN SSSR (METODY I REZUL'TATY STATISTICHESKOGO ISSLEDOVANIYA) in Russian 1979 signed to press 14 Nov 78 pp 2-6, 172-173

[Annotation, introduction and table of contents from book by Romanov, Arnol'd Konsmanshinovich; Androsova, Lyudmila Aleksandrovna; and Felinger, Arno Filippovich, Izd-vo "Nauka," Novosibirsk, 1979 2150 copies, 173 pages]

[Text] A range of characteristics of scientific personnel at the Siberian Division, USSR Academy of Sciences, is examined in the monograph. Investigated are questions of the contingent's formation and the nature and pace of the qualifications and position advancement of young specialists,

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matriculated graduate students and scientific staff members. The authors employ correlation and factor analysis and pattern recognition in analyzing the following: extent and kind of statistical relationship between the basic reporting data on scientific staff members. They examine the methods and results of predicting their numerical strength and qualifications-position structure and they describe methods of data processing and analysis and the associated computer programs.

The book is addressed to directors of scientific establishments, higher educational institutes (VUZ) and to specialists investigating problems of science and to sociologists.

#### Introduction

Personnel are the most important part of scientific and engineering strength. Their numbers, qualifications, age breakdown and other characteristics bear heavily on planning and organizing scientific activity, on founding new establishments and, in the last analysis, on research effectiveness and quality. That is why questions of long-range planning of personnel training, study of personnel qualifications and predicting of indicators characterizing scientific personnel have drawn increasing attention in recent years [1-7]. These questions take on added weight owing to the development of an integrated program of scientific and engineering progress spelled out by the decisions of the 25th CPSU Congress.

One aspect of long-range planning and predicting the qualifications and position structure of scientific personnel is associated with the fact that the "personnel component" of scientific and engineering strength changes more slowly than the other components. According to data [2, 5, 8], training a candidate of science requires 3-15 years, and for a doctor--8 to 25 years after graduating as a specialist from an institution of higher learning. So the age breakdown and qualifications-position structure and the size of the leading personnel that must be formed in 10-20 years is largely determined by the present-day breakdown of scientific personnel and is not amenable to such a fast-shifting change as, for example, in financing or material and equipment support of research. Remote consequences of decisions taken in planning and scientific organizations can be most fully taken into account if the actual annual and 5-year planning of personnel structure could be supplemented with a scientifically valid forecast: underlying this forecast must be adequately representative statistical data.

This calls for, in the first place, large masses of data on scientific personnel, secondly, statistical methods of processing these data and, in the third place, mathematical models.

Qualitatively new possibilities for accumulation, statistical processing and investigation of the rates and proportions of changes in personnel breakdown are coming to light owing to the building of automated information

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systems for control of scientific collectives and institutions of higher learning. Attempts at constructing appropriate mathematical models are recorded in the literature [9-11].

Thus the range of questions stretches widely. Our study is about using the "Scientific Personnel" automated information system and information-theoretical methods of elucidating statistical functions for a retrospective analysis of data about scientific personnel, with the example of a scientific organization--the Siberian division of the USSR Academy of Sciences. Also, several possible approaches to constructing mathematical models and predicting changes in the qualifications of scientific personnel are explored. In spite of the fact that analysis of these data made it possible to obtain, along with general conclusions, a number of specific facts typical of the Siberian division, the procedures and methods of analysis can be useful also in other similar investigations.

The Siberian Division, USSR Academy of Sciences, was founded in 1957. Its roster included the then-limited number of academy establishments in Siberia and the Far East. Since then, forced-pace construction began of the material base of science in the eastern parts of the country, the foundation of scientific research institutes and intensive growth of scientific collectives in Novosibirsk, Krasnoyarsk, Irkutsk, Yakutsk, Ulan-Ude, Vladivostok, Magadan and other cities. The Far Eastern Scientific Center of the USSR Academy of Sciences was founded in 1970 on the basis of Far Eastern Scientific establishments.

About 35,000 persons are working in the Siberian Division, more than 6000 of them are scientific personnel. They include 20 academicians, 44 corresponding members of the USSR Academy of Sciences, about 400 doctors of sciences and more than 3000 candidates of sciences. The scientific establishment of the Siberian Division, USSR Academy of Sciences, are pursuing a large number of investigations in all the main disciplines of fundamental science, as well as many applied studies. They are closely associated with industry and agriculture in the country and with schools of higher learning and are dealing with problems of the growth in Siberian productive forces.

The formation of such a large scientific organization in a short time and the blossoming of research work would not be possible apart from a system of measures aimed at training scientific personnel. Noted in the Resolution of the CPSU CC, "On the Activity of the Siberian Division of the USSR Academy of Sciences on Developing Fundamental and Applied Scientific Investigations, Making Them More Effective, Introducing Scientific Advances into the National Economy and Training Personnel," adopted 11 Feb 77, was the fact that, on the basis of Siberian Division scientific research institutes and Novosibirsk State University, a system has been organized for training scientific personnel for scientific centers, institutions of higher learning, industry and agriculture in Siberia.

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During its first years the Siberian Division, USSR Academy of Sciences, invited to work the graduates of Moscow and Leningrad VUZ and scientific staff members, including doctors and candidates in sciences, from the central establishments of the USSR Academy of Sciences. Following the organization of Novosibirsk State University, the formation of graduate studies in numerous specialties and the organization of learned councils, starting in the mid-sixties, the main demands for scientific personnel, especially in the largest--Novosibirsk--scientific center of the Siberian Division of the USSR Academy of Sciences, were met mainly through local possibilities. Also prominent in bringing together personnel in the Siberian Division, USSR Academy of Sciences, was the oldest university center in Siberia--Tomsk.

Experience in founding the Siberian Division of the USSR Academy of Sciences--noted in the CPSU CC resolution--as a strong association of academy institutes, experience one of whose most important elements is the training of scientific personnel, is of unquestioned interest and can be drawn on in founding other scientific centers. In particular, information about the quantitative makeup of scientific staff members, about changes in their qualifications and about the work inflow of graduates of higher schools and other data given in the book illustrate in detail the process of the formation and growth of scientific collectives of the Siberian Division of the USSR Academy of Sciences.

The survey was made from questionnaire and report data for scientific personnel of the Siberian Division, USSR Academy of Sciences, for 1958-1976.

The authors are grateful to Academician G. I. Marchuk, chairman, Siberian Division, USSR Academy of Sciences, to M. F. Zhukov, corresponding member of the Siberian Division, USSR Academy of Sciences, candidate in physico-mathematical sciences I. I. Geytsi, candidate in philosophical sciences R. G. Yanovskiy, candidate in physicomathematical sciences B. S. Yelepov, I. L. Zaytsev and O. S. Aleksandrova for assistance in the surveys made, and to A. I. Terekhov, staff member, Computer Center, Siberian Division, USSR Academy of Sciences, who jointly authored Section 2 of Chapter Four.

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C. Publications

Translations of Articles

BASIC THEORY OF COMMUTING SYSTEMS

Moscow OSNOVY TEORII VYCHISLITEL'NIKH SISTEM (Basic Theory of Commuting Systems) in Russian 1978 signed to press 1 Dec 77 pp 2-5

[Annotation and table of contents from book edited by Sergey Aleksandrovich Mayorov, doctor of technical sciences and professor, Izd-vo Vysshaya shkola, 18,000 copies, 408 pages]

[Text] This book explores the properties of computer processes occurring in computer systems, methods of building systems serving different purposes, ways of planning the operation of control and computer systems, methods of determining the characteristics of multiprogramming systems and the fundamental properties of multiprocessor systems; the methodology of statistical modeling of systems is outlined. Most attention centers on single-processor systems using in controlling real objects and also used in the mode of operational and package information processing. Systems are analyzed by relying on concepts of queueing theory and, in particular, the theory of stochastic networks. Methods and conceptual framework are oriented toward solving programs of systems designing of computers and automated control systems.

The book is intended for students studying in the specialties "Electronic Computers," "Applied Mathematics" and "Automated Management Systems." It can prove useful also for engineering technicians and scientific personnel who are designing and operating computers and computer-based systems.

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Abstracts of Articles

ABSTRACTS FROM THE JOURNAL "PROGRAMMING"

Moscow PROGRAMMIROVANIYE in Russian No 1, 1979 pp 95-96

UDC 681.3.06.51

TRANSFORMATIONS PRESERVING D-EQUIVALENCE OF YANOV CIRCUITS (THE GENERAL CASE)

[Abstract of article by Khachatryan, V. Ye.]

[Text] A system of D-equivalent transformations of Yanov circuits is presented (D is an arbitrary allowable binary ratio). Completeness of the proposed system of transformations in the entire class of Yanov circuits is demonstrated.

UDC 681.142.2 : 518.5

HETEROGENEOUS SORTING

[Abstract of article by Anisimov, A. V., and Knut, D. Ye.]

[Text] The problem of sorting is examined for sets with repetitions during limitation, when not all the elements are permutable. An algebraic characterization of heterogeneous sorting is given.

UDC 681.142.2

METHOD OF CONSTRUCTING A CORRECT PROGRAM FROM CORRECT SUBROUTINES

[Abstract of article by Nepeyvoda, N. N.]

[Text] The article is devoted to the mathematical apparatus of synthesis of a program from a subroutine. Proposed as the method of synthesis is

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finding intuitive proof of the goal of a created program in axiomatic theory. An algorithm for extracting a program from a proof is formulated in detail and its operation is illustrated on examples.

UDC 681.142.2

ONE TYPE OF CONTEXT CONDITIONS OF PROGRAMMING LANGUAGES

[Abstract of article by Meleshchuk, S. B.]

[Text] The article examines a special type of context conditions that has placed limitations on the quantity of combinations of syntactic constructions simultaneously present in a program text. A simple method is described for including verifications of that type of conditions in a compiler controlled by tables of context rules.

UDC 681.3.06

CLASSIFICATION AND MACHINE REPRESENTATION OF INFORMATION

[Abstract of article by Sheynauskas, R. I.]

[Text] The article examines the separation of information into a large number of elements and the two-place correspondences between them. A unified approach to machine representation of information is presented. Questions of the formalization of data conversion are discussed.

UDC 681.3.06

ONE APPROACH TO ORGANIZING A PROGRAM COMPLEX FOR WORK WITH BINARY ARRAYS

[Abstract of article by Zhanatauov, S. U.]

[Text] The article describes the principles of construction of procedures for work with binary arrays, their algorithms and their realization in the FORTRAN BESM-6 language, which permit performing operations on logical arrays not dependent on the binary form of their representation in the computer storage. Examples are presented. The described principles of constructing procedures are also readily accomplished in other algorithmic languages and computers.

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UDC 631.3.06

THE POLYP PROGRAMMING SYSTEM

[Abstract of article by Mustopf, G.]

[Text] The article describes the main distinctive features of the Polyp (Problem Oriented Language for system software Programming) system and language, intended for operating systems in particular. The system was developed in the FRG in 1973 by Scientific Control Systems for the IBM/370 and Siemens 4004 computers.

UDC 681.142.2

SOFTWARE FOR A TWO-MACHINE COMPLEX, PDP-11/20 AND M-400

[Abstract of article by Gergei, E., Gubarev, Ye. Yu., Yelizarov, O. I., Zhukov, G. P., Mezei, I., Nameray, Yu., Osmaneovich, Yu. M., Ostrovnoy, A. I., Salamatin, I. M. and Khrykin, A. S.]

[Text] The article describes the computer equipment and software developed to connect the lines of communication of M-400<sup>s</sup> and PDP-11/20 computers to install an RT-11 disk operating system in the M-400 computer, which does not have a magnetic disk store. The communications equipment is made to meet the KAMAK standard.

UDC 681.3.06

EXPERIENCE IN MEASURING AND TUNING THE OS YeS OPERATING SYSTEM

[Abstract of article by Vinnichenko, A. I., Gurin, N. N., Kogan, Ya. A., and Lapicheva, N. G.]

[Text] A procedure is described for obtaining information about the work of an OS YeS operating system, the results of measurements obtained with a YeS-1022 computer system are presented, they are analyzed and questions of tuning the OS YeS are examined.

UDC 681.3.06

EXPERIENCE IN THE USE OF THE PRIZ-32 SYSTEM IN CONSTRUCTING PACKETS OF PRACTICAL PROGRAMS OF AUTOMATED DESIGN SYSTEMS

[Abstract of article by Grigorenko, V. P., Saan, Yu. P., and Sotnikova, N. S.]

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[Text] The article examines questions in the construction of software of a system for automated planning of electrical engineering equipment. The software is executed in the form of packets of practical programs for general, special and service use. The PRIZ-32 instrumental programming system was used in constructing the packets.

UDC 681.3.06

THE YaPP LANGUAGE FOR AUTOMATING THE PLANNING OF LARGE SYSTEMS

[Abstract of article by Burgin, M. S., Bratal'skiy, Ye. A., and Belkov, M. S.]

[Text] The YaPP [yazyk paketnogo proyektirovaniya--packet planning language] language is proposed for planning large systems. It permits presenting the planning and operating documentation in a compressed form. Questions of the description of diagram and design documentation on the apparatus of large systems are examined. It is shown that the YaPP language is convenient for both manual and automatic processing.

UDC 681.142.1

SYNTACTICALLY CONTROLLED TRANSLATOR IN AN AUTOMATED PROGRAMMING SYSTEM FOR CONTROL COMPUTERS

[Abstract of article by Serebrovskiy, L. A.]

[Text] The article describes experience in the application of a syntactically controlled translator in a system for automating programming and adjustment for control SAPO YAUZA-6 computers for the formation of a sequence of orders.

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ABSTRACTS FROM THE JOURNAL "PROGRAMMIROVANIYE"

Moscow PROGRAMMIROVANIYE in Russian No 2, 1979 pp 95-96

UDC 681.3.322

VALIDITY OF PROGRAM OPTIMIZATION ALGORITHMS

[Abstract of article by Pottosin, I. V.]

[Text] The article examines an approach to obtaining conditions of applicability of optimizing conversions and investigation of the properties of program optimization algorithms. The approach is based on consideration of linear sequences of operators with axiomatic determination of the arguments and results, and also of the set of interpretations of operators.

UDC 681.3.06:51

EQUIVALENT CONVERSIONS OF PROGRAMMING LANGUAGE DEFINITIONS

[Abstract of article by Kuzenko, V. F.]

[Text] Investigated are some equivalent syntactic conversions connected with not too great conversion of the task of semantics and the programming language as a whole. Examples of the use of such conversions in solving traditional syntactic problems of compilation are examined.

UDC 519.1

PARTIAL SOLVABILITY OF FREE FLOW DIAGRAM NONEQUIVALENCE

[Abstract of article by Niglyan, S. A.]

[Text] The class of all free program flow diagrams is examined. It is demonstrated that in that class the problem of switching off is partially solvable, from which follows the partial solvability of the problem on nonequivalence in it.

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DEPARALLELIZATION OF ARITHMETIC EXPRESSIONS BY SUCCESSIVE INTENSIFICATION

[Abstract of article by Khalilov, A. I.]

[Text] The mechanism of the method of successive intensification is described. The application of that method to deparallelize arithmetic expressions is discussed. In considering the mechanism of the method as a parallelization algorithm scheme it is shown how that scheme is made specific for arithmetic expressions. Comments of a general character are presented with respect to both the method and its realization.

UDC 519.1

ONE RESULT OF FUNCTIONAL EQUIVALENCE OF PROGRAM FLOW DIAGRAMS WITH UNDEGENERATED OPERATORS

[Abstract of article by Shukuryan, S. K.]

[Text] The author investigates the problem of functional equivalence in the class of all program flow diagrams with undegenerated operators containing only unary predicates and predicates of the entire storage. It is shown that this problem and the problem of equivalence in the class of simpler models of calculations--multitape automatic machines are mutually reducible. The discussion is conducted on models of a discrete converter.

UDC 681.3.06:51

PROCEDURE FOR CALCULATING SEMANTIC ATTRIBUTES

[Abstract of article by Chebotar', K. S.]

[Text] Examined in the article are attributive grammars proposed by D. Knut for determination of the semantics of context-free languages and questions connected with the calculation of semantic attributes. By means of the recursive procedures eval-subtree-left and eval-subtree-right the surveys of the conclusion tree are determined, and the calculation of attributes from left to right and right to left respectively.

UDC 681.142.2

THE CLASS OF GENERALIZED CONTEXT LANGUAGES OF PRECEDENCE

[Abstract of article by Babinov, Yu. P.]

[Text] The class of languages produced by generalized context grammars of precedence is examined.

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REALIZATION OF A DYNAMIC DISTRIBUTION OF THE MAIN MEMORY IN FORTRAN

[Abstract of article by Boyarshinova, I. A., Karpenko, S. N., and Kuzin, S. G.]

[Text] A method of dynamic distribution of the main memory for FORTRAN is proposed, one consisting of corrosion of the table of formal parameters of the FORTRAN subroutine module. Some general recommendations are given that flow from experience in the development and implementation by the authors of a system of dynamic distribution of the main memory for the MS DUBNA [not further identified] BESM-6 computer.

UDC 681.3.06

LOGIC OF TRANSFORMATION OF A NETWORK MODEL OF DATA INTO A RELATIONAL MODEL

[Abstract of article by Kalinichenko, L. A., and Ram'yalg, A. Ye.]

[Text] The article examines questions of construction of the transformation of a network model of data proposed by CODACIL into a relational model in a system of integration of heterogeneous SIZIF data bases.

UDC 681.142.2

SONEYA--A DEBUGGING SYSTEM BASED ON APPLICATION OF A LIMITED NATURAL LANGUAGE

[Abstract of article by Belyakin, A. M., Zan'ko, S. F., Medvedev, B. I., and Yakhontov, V. N.]

[Text] A debugging system is described, the source language of which is a subset of the Russian language. The article discusses questions regarding application of the system in limitations imposed on the input by the region of use, and also work of the system on the morphological, syntactic and semantic analysis of the incoming text.

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Translations of Articles

PUBLISHING HOUSE ANNOUNCES PLANS FOR BOOKS ON CYBERNETICS IN 1980

Moscow ANNOTIROVANNYY TEMATICHESKIY PLAN VYPUSKA LITERATURY IZDATEL'STVA "NAUKA" NA 1980 GOD, KNIGA VTORAYA, YESTESTVENNONAUCHNAYA I TEKHNICHESKAYA LITERATURA in Russian 1979 pp 243-248

[From Izdatel'stvo Nauka 1980 publication schedule]

[Text] 770. "Algoritmicheskiye modeli v avtomatizatsii issledovaniy" [Algorithmic Models in Automation of Research], Leningrad Scientific Research Computing Center, Moscow, Nauka, 1980 (2nd quarter), 18 quires, 2.70 rubles, 2000 copies, 30502. 1502000000.

This collection is devoted to problems in the organization and control of the computing process. Theoretical and practical results are given of the utilization of algorithmic models and algorithms designed for processing large data arrays and for solving different mathematical problems of a theoretical and applied nature. An analysis is made of ways of designing and utilizing automated control systems in various fields of science and engineering.

Designed for scientific and engineering and technical personnel.

771. "Algoritmy i sistemy avtomatizatsii issledovaniy i proyektirovaniya" [Algorithms and Systems for Automating Research and Design], Leningrad Scientific Research Computing Center, Moscow, Nauka, 1980 (3rd quarter), 13 quires, 2.00 rubles, 2000 copies, 30502. 1502000000.

This collection is devoted to the utilization of computing systems for the purpose of improving the effectiveness and quality of design and scientific research. An analysis is made of opportunities for algorithmization of information retrieval systems. The principles are discussed of designing algorithmic models and creating data banks for the control of the development of a region. Questions are discussed, relating to interaction with a computing system in processing experimental data.

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Designed for scientific and engineering and technical personnel.

773. "Asimptoticheskiye metody v dinamike sistem" [Asymptotic Methods in System Dynamics], USSR Academy of Sciences Siberian Division, Siberian Power Engineering Institute, Novosibirsk, Nauka, 1980 (4th quarter), 11 quires, 1.70 rubles, 2000 copies, 20204. 1502000000.

This collection contains material on the application and development of asymptotic methods in various problems in system dynamics. Occupying a central position are studies on the asymptotic quadrupole theory for an airfoil near a rigid boundary and on its applications. A number of articles are devoted to the solution of problems in dynamics for special objects based on asymptotic methods.

This book is intended for mathematicians, mechanical engineers and engineers in the appropriate fields of specialization.

775. Gubinskiy, A. I. "Nadezhnost' i kachestvo funktsionirovaniya ergaticheskikh sistem" [Reliability and Quality of the Functioning of Ergatic Systems], Scientific Council on the Problem of "Cybernetics," Leningrad, Nauka, 1980 (3rd quarter), 17 quires, 1.70 rubles, 3000 copies, 20205. 1502000000.

This book is devoted to methodological, mathematical and applied aspects of the theory and practice of reliability and efficiency in an important class of "man-equipment" systems--ergatic (working) systems. Methods are described of producing quantitative estimates of the reliability and efficiency of ergatic systems for different purposes, as well as practical procedures, and examples are given of estimating reliability and efficiency.

This book is intended for scientific personnel and engineers working in the area of cybernetic and systems research.

776. Zaripov, M. F., Suleymanov, N. T. and Petrova, I. Yu. "Nadezhnost' elementov sredstv upravleniya s raspredelennymi parametrami" [Reliability of Elements of Control Equipment with Distributed Parameters], State Scientific Research Institute of Machine Sciences imeni A. A. Blagonravov, Moscow, Nauka, 1980 (1st quarter), 10 quires, 1.50 rubles, 2500 copies, 30311. 2404000000.

This monograph is devoted to the synthesis of information elements based on the principles of the analogy and similarity of phenomena of a different physical nature. A method is provided for constructing structural diagrams of converters for a required output characteristic, utilizing known physical effects. The estimation of reliability is elucidated at the early stages in the design of elements and devices.

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Intended for scientific and engineering and technical personnel.

777. Lyapunov, A. A. "Problemy teoreticheskoy i prikladnoy kibernetiki" [Problems in Theoretical and Applied Cybernetics], USSR Academy of Sciences Siberian Division, Institute of Mathematics, Moscow, Nauka, 1980 (4th quarter), 25 quires, bound, 3.10 rubles, 4500 copies, 30500. 1501000000.

This monograph includes studies by USSR Academy of Sciences Corresponding Member A. A. Lyapunov on general questions relating to cybernetics, programming and the theory of algorithms, machine translation and mathematical linguistics, and cybernetic questions relating to biology, philosophy and the methodology of science. These studies contain broad generalizations and a description of the lines along which these fields of science should develop in the future.

This monograph is intended for a wide range of readers specializing in the field of applied mathematics, programming and computer technology.

778. "Magnitnyye i magnitno-poluprovodnikovyye elementy dlya pererabotki informatsii" [Magnetic and Magnetic Semiconductor Elements for Information Processing], Institute of Problems of Control, Moscow, Nauka, 1980 (3rd quarter), 15 quires, 2.30 rubles, 2000 copies, 30502. 2405000000.

This collection is devoted to an investigation of new magnetic semiconductor elements and devices for processing analog and digital information, as well as of memory units with information media in the form of cylindrical magnetic domains. Methods are discussed for designing high-frequency reconstruction units and improved-reliability switching elements, prognostic units utilizing magnetic analog memory devices, units employing magnetic semiconductor tolerance monitoring sensors, etc.

Intended for specialists in the field of computers.

779. "Metodicheskiye i tekhnicheskiye voprosy eksperimental'noy psikhofiziologii" [Procedural and Technical Problems in Experimental Psychophysiology], Institute of Higher Nervous Activity and Neurophysiology, Moscow, Nauka, 1980 (4th quarter), 6 quires, 0.90 rubles, 1200 copies, 30501. 0304000000.

This collection is devoted to procedural questions in psychophysiological experimentation and to its technical support. Material is contained relating to studying the characteristics of a human operator in modeling different conditions of operator activity, and on the development of psychometric equipment for tests.

This collection is intended for physiologists, doctors, psychologists and engineers working in the field of engineering psychology.

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780. "Metody peredachi i obrabotki informatsii" [Data Transmission and Processing Methods], Institute of Problems in Data Transmission, Moscow, Nauka, 1980 (2nd Quarter), 10 quires, 1.50 rubles, 2000 copies, 30401. 1502000000.

This collection is devoted to probabilistic statistical methods of solving problems in the theory of data transmission and processing. A study is made of estimates of the correcting ability of step-by-step codes, ranges of permissible transmission speeds are found for a channel with multiple users, and a study is made of methods of statistical processing of data.

Intended for scientific and engineering and technical personnel.

781. Prangishvili, I. V. and Stetsyura, G. G. "Mikroprotsessornyye sistemy" [Microprocessor Systems], Institute of Problems of Control, Moscow, Nauka 1980 (2nd quarter), 15 quires, 2.30 rubles, 3000 copies, 30502. 2405000000.

This book is devoted to the principles of designing multimicroprocessor concentrated and distributed control systems. Aspects are discussed of decentralized systems with a distributed architecture, their feasible areas of application are indicated, and examples are given of designing ASU's [automated management systems] based on microcomputers and micro-controllers. A survey is given of foreign computing systems. Much attention is devoted to the interaction of microprocessor modules in data processing systems and to opportunities for parallel computations.

This book is intended for specialists in the field of computer technology and control systems.

782. "Problemy postroyeniya sistem ponimaniya rechi" [Problems in Designing Systems for Understanding Speech], Institute of Problems in Data Transmission, Moscow, Nauka, 1980 (2nd quarter), 10 quires, 1.50 rubles, 2000 copies, 30501. 1502000000.

This collection is devoted to the design of systems for understanding speech for controlling automata by means of natural language. The levels of systems for understanding speech are discussed, including an analysis of processes of speech formation, an analysis of speech signal parameters, the identification of slurred words, as well as the utilization of syntactical and semantic information for the segmentation of slurred speech and the correction of errors in identification.

Designed for scientific associates, engineers and students at VUZ's specializing in technical cybernetics, man-machine communication systems, and in the processing and conversion of spoken information.

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783. "Razrabotka i issledovaniye graviinertsial'noy apparatury" [Development and Study of Gravitational Inertial Equipment], Institute of Earth Physics imeni O. Yu. Shmidt, Moscow, Nauka, 1980 (4th quarter), 11 quires, 1.70 rubles, 1000 copies, 20802. 1903020000.

This collection is devoted to experimental investigations and theoretical estimates of sensitive elements of gravitational inertial instruments. Also discussed are questions relating to the automation of gravitational inertial measurements. The possibility is discussed of representing field measurement data in the form of a machine catalog.

Designed for scientific and engineering and technical personnel.

784. Rezer, S. M. "Optimizatsiya protsessov gruzovykh perevozok" [Optimization of Load Hauling Processes], VINITI [All-Union Institute of Scientific and Technical Information], Moscow, Nauka, 1980 (1st quarter), 20 quires, bound, 3.40 rubles, 2000 copies, 31802. 3601000000.

In this monograph are presented mathematical models and methods of optimal planning of freight handling processes in transportation in the USSR and abroad. Algorithms are given, along with block diagrams and examples of calculations for selecting the best variants for organizing freight handling, employing methods of system analysis, theory of probability, the queueing theory, linear and dynamic programming and the game theory for the purpose of solving specific problems in the introduction of automated systems for the management of transportation. A demonstration is given of the effectiveness of methods of optimal planning of freight handling operations.

This monograph is intended for specialists and scientific personnel in transportation, teachers, graduate students and students at VUZ's.

785. Savchenko, R. G. "Analiz podobiya v sistemnykh issledovaniyakh" [Analysis of Similitude in Systems Research], Scientific Council on the Overall Problem "Cybernetics," Moscow, Nauka, 1980 (1st quarter), 10 quires, 1.50 rubles, 2500 copies, 30501. 1502000000.

This book is devoted to the development of a modeling methodology based on application of the analysis of similitude and principles of the systems approach. Appendices are given in the form of generalized models of a biological and technical system whose functioning is restricted by quality requirements.

Designed for scientific and engineering and technical personnel.

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786. Safroshkin, Yu. V. "Elektronnyye skhemy s nelineynymi obratnymi svyazyami" [Electronic Circuits with Nonlinear Feedback], Institute of Protein Research, Moscow, Nauka, 1980 (1st quarter), 17 quires, 2.80 rubles, 1500 copies, 30400. 240000000.

This book is devoted to questions in the theory of nonlinear feedback and to its practical employment for improving the properties and broadening the capabilities of electronic circuits and devices. Emphasis is placed on the formation and application of hybrid and analog-discrete properties by means of piecewise linear feedback based on integrated operational amplifiers and switching components. The physical conception of linear and nonlinear feedback in electronic circuits is refined, and the key stages are discussed in the development of nonlinear feedback and modern equipment for implementing it.

This book is designed for engineers, scientific personnel and teachers at VUZ's in the appropriate fields of specialization.

787. "Sistemy upravleniya setyami svyazi" [Systems for Controlling Communications Networks], Institute of Problems in Data Transmission, Moscow, Nauka, 1980 (2nd quarter), 15 quires, 2.30 rubles, 2000 copies, 30401. 1502000000.

This collection is devoted to theoretical and applied aspects of the adaptive control of information flows in communications networks and units, and methods are discussed of analyzing losses in a unit, along with problems in optimal handling of calls in the electronic control machine of a commutation unit. Methods are discussed of selecting the structure and analyzing the reliability of multimicroprocessor control systems.

Intended for scientific and engineering and technical personnel.

788. "Teoriya teletrafika i seti s upravlyayemyimi elementami" [The Teletraffic Theory and Networks with Controlled Elements], Institute of Problems in Data Transmission, Moscow, Nauka, 1980 (1st quarter), 14 quires, 2.10 rubles, 2000 copies, 30401. 1502000000.

This collection is devoted to application of the theory of teletraffic in structurally complex information distribution systems. Discussed are methods of analyzing the effectiveness of transit links on the basis of macromodels, the threshold method of establishing connections in communications networks, and also the optimal distribution of information in networks. A description is given of models of ring-type data transmission networks. A study is made of queueing systems with repeated attempts. The results are discussed of the application of the queueing theory for the purpose of studying disconnected networks with limited bins, multiphase networks of finite capacity, etc.

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This collection is intended for scientific and engineering and technical personnel.

789. "Tsifrovaya obrabotka signalov i yeye primeneniye" [Digital Processing of Signals and Its Application], Institute of Problems in Data Transmission, Moscow, Nauka, 1980 (1st quarter), 15 quires, 2.30 rubles, 2000 copies, 30501. 1502000000.

This collection is devoted to the theory and practice of employing digital methods of signal processing. A description is given of different kinds of discrete orthogonal transformations and their properties, as well as of algorithms for the digital processing of images, interferograms, and automatic integration data, and for the synthesis of holograms, as well as of methods and results of digital modeling of holographic processes and communications systems. Also discussed are questions relating to hardware for digital signal processing.

Intended for scientific and engineering and technical personnel.

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NEW BOOKS ON CYBERNETICS TO BE PUBLISHED IN 1980

Moscow "NAUKA" GLAVNAYA REDAKTSIYA FIZIKO-MATEMATICHESKOY LITERATURY, ANNOTIROVANNYY TEMATICHESKIY PLAN VYPUSKA LITERATURY NA 1980 GOD in Russian 1979 pp 9, 12, 20, 32-33, 41, 67

[1980 publication schedule of Izdatel'stvo Nauka Central Editorial Board for Mathematical Physics Literature]

[Excerpts] 7. Vostrikova, Z. P. "Programmirovaniye na yazyke assemblera YeS EVM" [Programming in the YeS Computer Assembler Language], textbook, Moscow, Nauka, 1980 (1st quarter), 15 quires, bound, 0.65 rubles, 100,000 copies, 20204. 1702070000.

This book is devoted to an exposition of the fundamentals of programming in the machine-oriented YeS computer Assembler language.

In it a brief description is given of the logical relationships between key computer units, a classification is given of the system of commands by types of operation, and the rules are given for writing statements. Major attention is devoted to discussion of the function of commands of

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of the machine-oriented Assembler language in operations with a fixed point, operations of decimal arithmetic, operations with a floating point, and in logic operations and in transfers.

This book is based on lectures given by the author in the computer technology department (Kafedra) of an institute of the USSR Ministry of the Radio Industry Institute for Improving the Skills of Management Personnel and Specialists.

For students at VUZ's studying programming, for graduate students, and also for scientific personnel and programmers working with YeS computers.

14. Marchuk, G. I. "Metody vychislitel'noy matematiki" [Methods of Computer Mathematics], textbook, second edition, Moscow, Nauka, Central Editorial Board of Mathematical Physics Literature, 1980 (1st quarter), 25 quires, bound, 1.10 rubles, 40,000 copies, 20204. 1702070000.

This book is devoted to a description of numerical methods of solving problems in mathematical physics. Major attention is devoted to complex problems of mathematical physics which in the process of solution are reduced, as a rule, to simpler problems permitting the running of algorithms on a computer. In this book are described many modern approaches to numerical methods.

For students in upper-level courses and for graduate students majoring in applied mathematics. It can be of interest also to scientific personnel and other specialists in the field of applied mathematics.

The first edition came out in 1977.

15. Mazurik, V. P., Medvedev, A. Ye., Sushkov, B. G. and Flerov, Yu. A.; Moiseyev, N. N., editor. "Matematicheskoye obespecheniye sistem avtomatizirovannogo proyektirovaniya" [Automated Design System Software], textbook, Moscow, Nauka, Central Editorial Board for Mathematical Physics Literature, 1980 (4th quarter), 25 quires, bound, 1.10 rubles, 40,000 copies, 20204. 1702070000.

In this book are given the elements of the theory and implementation of automated design systems (SAPR's). The first half is devoted to areas of mathematics which are untraditional for technical college courses, making up the foundation of automated design software. In the second half are discussed fundamentals of the theory and problems in implementing automated design systems based on modern computers. Major attention is devoted to software systems aspects of creating SAPR's.

This book was written on the basis of a lecture course for special departments for retraining engineers at MFTI [Moscow Physicotechnical Institute].

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For students in technical VUZ's, as well as for engineers and other specialists with the appropriate background.

34. Golovkin, B. A. "Parallel'nyye vychislitel'nyye sistemy" [Parallel Computing Systems], Moscow, Nauka, Central Editorial Board for Mathematical Physics Literature, 1980 (2nd quarter), 20 quires, bound, 1.60 rubles, 20,000 copies, 20204. 1702070000.

In this book are discussed parallel computing systems (computing systems for parallel data processing), such as multimachine, multiprocessor, mainline (assembly line), matrix, associative and several others. Systems of this type are distinguished by flexibility and have high efficiency and reliability characteristics. A systematic description is also given of the organization of the structure and of the functioning of parallel computing systems, and descriptions are given of a few dozen of these systems.

For engineers and scientific personnel in the field of computer technology, programming and data processing, as well as for students and graduate students in these respective fields of specialization.

64. Bezborodov, Yu. M. "Sravnitel'nyy kurs yazyka PL/1" [Comparative Course in PL/1 Language], Moscow, Nauka, Central Editorial Board for Mathematical Physics Literature, 1980 (1st quarter), 10 quires, "Bibliotekha Programmista" [Programmer's Library], 0.65 rubles, 20,000 copies, 20204. 1702070000.

This course in the general-purpose PL/1 programming language is oriented basically to the reader having experience in programming in Algol-60.

First in this course, by comparing the concepts of the two languages, those concepts of PL/1 are described which are close to the concepts of Algol-60. As a result of this, at the very start of the course the reader gains an opportunity to write real programs in PL/1 within the limits of the language capabilities of PL/1 which cross with the capabilities of Algol-60.

For engineers, scientific personnel and students using computers in their work, in particular, those who are making the changeover to solving problems in YeS computer operating systems.

65. Bondarenko, V. F. "Vvedeniye v slozhnyye informatsionnyye sistemy" [Introduction to Complex Information Systems], Moscow, Nauka, Central Editorial Board for Mathematical Physics Literature, 1980 (4th quarter), 15 quires, "Bibliotekha Programmista," 0.95 rubles, 20,000 copies, 20204. 1702070000.

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This book is devoted to a description of the methodological fundamentals of the engineering design of complex control data systems and can serve as a textbook for students specializing in the field of organization, automation and software of control and computing processes in complex information systems.

For specialists developing information systems for different special purposes.

66. Kozirov, N. I. "Organizatsiya vychislitel'nykh rabot" [Organization of Computing Operations], A. A. Samarskiy, editor, Moscow, Nauka, Central Editorial Board for Mathematical Physics Literature, 1980 (4th quarter), 10 quires, "Bibliotekha Programmista," 0.65 rubles, 30,000 copies, 20204. 1702070000.

In this book is discussed a wide range of problems solved by means of computers and data are given on equipment which are necessary for an understanding of the functioning of computer software (PO). In describing PO facilities, attention is devoted to their functions. Discussed in detail are questions relating to the organization structure of computing centers, such as subdivisions and their purpose, personnel questions and questions of economics and concise technical information is also given on the design of VTs [computing center] buildings, distribution of services, standards for areas, and technical specifications for rooms.

For students in upper-level courses and specialists who by the nature of their work must have an idea of various aspects of the computing business.

67. Lavrov, S. S. "Obzor osnovnykh ponyatiy yazykov programmirovaniya" [Survey of Fundamental Concepts of Programming Languages], Moscow, Nauka, Central Editorial Board for Mathematical Physics Literature, 1980 (1st quarter), 5 quires, "Bibliotekha Programmista," 0.30 rubles, 30,000 copies, 20204. 1702070000.

This book contains a survey of key concepts encountered in modern programming languages such as Algol-68, PL/1, Pascal, etc. Main attention is devoted to the most general concepts taken in simplest form. The purpose of this survey is to broaden the horizons of the reader whose acquaintance with programming languages is limited to Algol-60 and one of the machine languages, and to facilitate for him the study of more evolved languages.

For engineers, programmers and all who are involved in their work in using computers.

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88. Glushkov, V. M. and Valakh, V. Ya. "Chto Takoye OGAS?" [What Is the OGAS [Statewide Automated System]?, Moscow, Nauka, Central Editorial Board for Mathematical Physics Literature, 1980 (4th quarter), 7 quires, "Bibliotekha 'Kvant,'" 0.30 rubles, 300,000 copies, 20205. 1502000000.

In this book, in a form interesting and intelligible to upper-class students, an account is given of the complexity and gradiose scale of modern problems relating to planning and control in the country's national economy. Using interesting examples, the authors describe the ideas and the methods of optimal planning and management, the capabilities of computers, and problems in processing enormous information flows.

Much attention in this book is devoted to automated management systems of different levels. A detailed account is given of the goals, objectives and prospects of the creation of the OGAS--the Statewide Automated System for Gathering and Processing Information for Accounting, Planning and Control.

For pupils, teachers, students and lecturers.

142. Gorbatshevich, V. D. "Modelirovaniye sistem avtomaticheskogo upravleniya na AVM" [Modeling Automated Management Systems with Analog Computers], textbook, Popov, Ye. P., editor, Moscow, Nauka, Central Editorial Board for Mathematical Physics Literature, 1980 (2nd quarter), 15 quires, bound, 0.75 rubles, 20,000 copies, 30501. 1502000000.

In this book, in systematized form, are described key problems arising in analog modeling of automated management systems. Modeling of linear and nonlinear systems is discussed. The necessary information is given on analog computers and on the procedure for solving problems with them. Special attention is devoted to aspects of modeling different slave systems and stabilization systems. Problems in semi-full-scale modeling are elucidated. Methods are given for the statistical investigation of systems. The fundamentals of analog-digital modeling are discussed. This book is simple to read for a wide range of readers familiar with the basics of the theory of automatic control.

For students in technical colleges.

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CONTENTS FROM ZHURNAL VYCHISLITEL'NOY MATEMATIKI I MATEMATICHESKOY FIZIKI

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