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JPRS-ESA-84-019

8 June 1984

East Europe Report

SCIENCE & TECHNOLOGY

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EAST EUROPE REPORT

SCIENCE & TECHNOLOGY

CONTENTS

CEMA COOPERATION IN BIOPHYSICS, MICROSCOPIC OPTICS RESEARCH

East Berlin NATIONAL ZEITUNG in German 19 Apr 84 p 6

/Article by Alexander Drabkin: "Automated Machines for Biologists"/

/Text/ Since 1971, the Scientific Center for Biological Research of the Academy of Sciences of the USSR in Pustchino has been the coordinating center of the CEMA countries and Yugoslavia in the area of biophysics.

Six research institutions of the Academy of Sciences of the USSR belong to the Center. In correspondence with their specific objectives, they investigate physical-chemical principles of life as well as problems of the biosphere. An office for designing biological devices was set up to develop new and one-of-a-kind devices. The devices developed and produced there are known in many countries. Furthermore, branches of biological institutes work in Pustchino.

Pustchino - not far from Moscow - is not a big city. For centuries, the village of Pustchino stood at the shore of the rapid Oka, a tributary of the Volga. It received its name from the word pustcha, which exists in many Slavic languages, and which means a dense large forest. Even now there are magnificent forests here. Against their background, the modern buildings of the research institutes look absolutely exotic.

Jena Participation in the "Morphoquantum"

The Soviet academy member Gleb Frank and the GDR academy member Friedrich Jung stood at the cradle of international collaboration. The initiators were technical people from the GDR. They justly emphasized that engineering is becoming more and more important in biological experiments. In a scientific seminar, the automation of microscopic research in biology, medicine, and agriculture was also elucidated. It here became apparent that the experts from the USSR and the GDR represented the leadership in the automation of biological research, especially the analysis of microscope pictures. The international coordination center was founded, and the socialist countries appointed renowned scientists to its council.

Long years of search for new solutions proved successful. An entire complex of devices was developed. The "morphoquantum" system formed the conclusion - a joint development of experts from the Institute for Biophysics of the Soviet Academy of Sciences and from the VEB "Carl Zeiss Jena". "Morphoquantum" makes it possible to automate the mechanical work in chromosome research. Previously, this was a monotonous and fatiguing labor. The machine accomplishes in 10 to 15 minutes what a qualified laboratory technician requires an entire day to do.

Invention rights and patents for the "morphoquantum" abroad confirm the originality of the system. To this must be added that the joint labor of experts from the USSR and the GDR made possible the industrial-scale production of these new devices. In 1978, academy member Gleb Frank (postum) and a group of experts received the state prize of the USSR for working out the principles for constructing automated scanning systems for optical microscopy and for the development and transfer of a complex of devices for analyzing micro-objects.

A Useful Supplementation Principle

Heinrich Iwanizki, Director of the Pustchino Research Center, ascribes great significance to the coordination of scientific work. He said: "Scientific cooperation, the 'supplementation principle', which we implement in our mutual relationships with our partners in the international coordination center, has a great utility. Not everyone be concerned with every problem. It is necessary to develop the branches where national preconditions exist and where experience has been gained, and to exchange information.

Thus, the researchers in the GDR are excellent systematicians. Their investigations in the area of molecular biology and nucleic acids have international significance. Also of interest is their approach to bioengineering and gene engineering (in this connection see "brief accounts" on this page). The working experiences gained by experts from socialist countries large biological center in Putschino became an argument to creat centers also in other CEMA countries. Here, important biological research takes place: in Berlin-Buch, in Szeged (Hungary) and in Ceske Budejovice (Czechoslovakia). This makes it possible to develop the partnership on the basis of mutual interests."

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1983 LEIPZIG SPRING FAIR MICROCOMPUTER SYSTEMS

East Berlin RECHENTECHNIK/DATENVERARBEITUNG in German Vol 20 No 5, May 83 pp 21-28

[Article signed 'Lo./Pa./Ws.': "Applications Oriented Microcomputer Systems"]

[Text] With the motto "Programmed Efficiency through Microelectronics," the theme chosen for the 1983 Leipzig Spring Fair was quite apropos to progress in science and technology. Microelectronics is the basis of modern information technology and thus data, text or image processing as well. The fair showed once more that progress in microelectronics continues unabated: The amount of hardware equipped with microelectronics is continually growing; with that, the utility of these products is often appreciably increased while their dimensions are reduced. The 1983 fair also shows that hardware and systems built with microelectronic components are being used for ever newer and more practical applications. If just a few years ago, the focus was on computers per se, now attempts are being made to offer more and more clearly applications in which the computer hardware specifically used is a secondary consideration. Indeed, the 1983 fair confirmed that developers invested much effort in expanding and improving existing hardware series and systems. It has once again been shown that the number of possibilities for applications is nowhere near being exhausted.

With about 50 new and improved products, the Robotron Combine VEB, the GDR developer and producer of data processing equipment, exhibited its program to the interested public in hall 15 of the technical fair. Thus, the combine fulfilled the demand in terms of economic policy continually to bring new products to the market and to adapt and improve existing ones to the international standard. Consequently, of the numerous products, those which had not yet been shown at a Leipzig fair should be singled out.

Special attractions were the

A 6471 - A 6473 Image Processing System

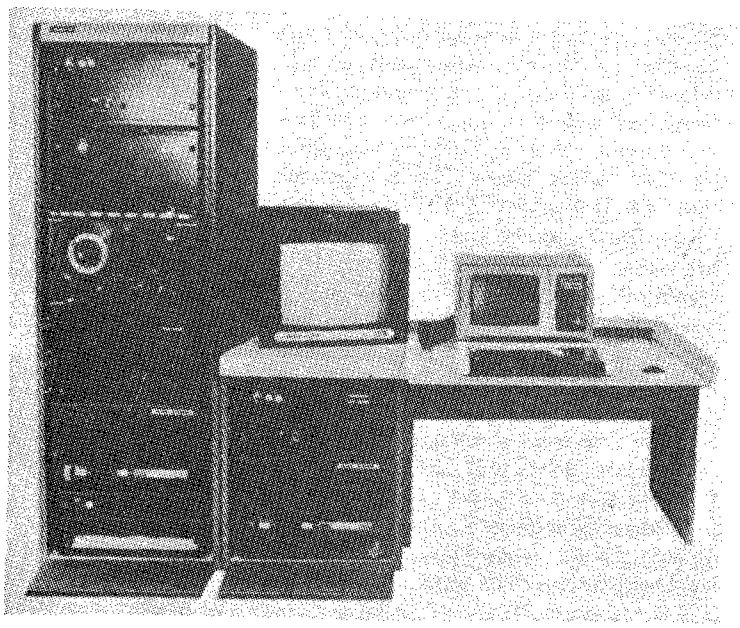


Fig. 1. A 6471 Image Processing System (Werkfoto)

Digital image processing is a form of information processing oriented to the future. It is creating the prerequisites for making traditional research and development and industrial manufacture considerably more efficient. The interactive, digital, Robotron A 6471 - A 6473 Image Processing Systems are used to process image information with high operational speed and enable direct display of intermediate and final processing results on color and black and white monitors (fig. 1). In their three versions, they represent a combination of modern computer systems, special processors and software oriented to the user.

The image processing system offers these applications:
--immediate analysis and interpretation of multispectral, meteorological and cartographic imagery of the earth obtained by camera systems on aircraft, satellites and space ships
--interactive and automatic analysis of thermographic, sonographic and tomographic images and processing of microscopic images
--automatic quality control of materials
--supervision of processes with moved objects
--representation of process flows and control of industrial plants
--basic research, e.g. astronomy, material research, archeology.

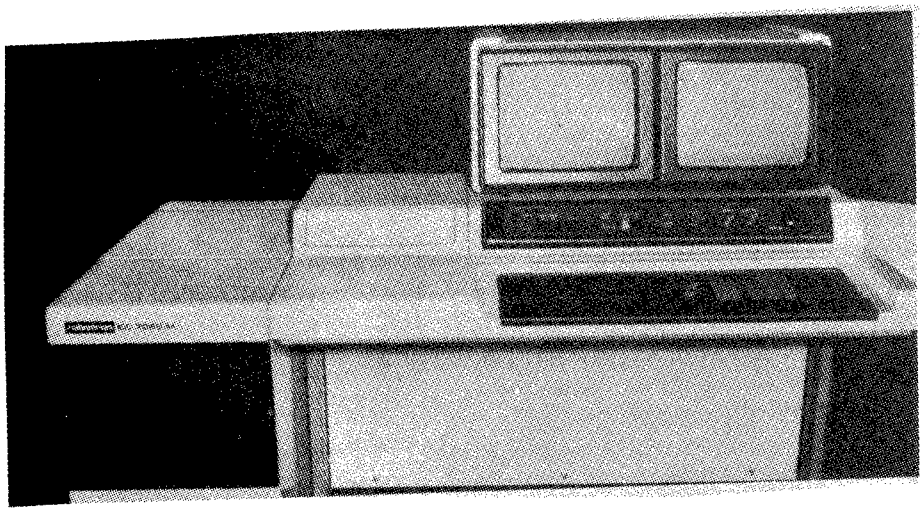


Fig. 2. An on-line system, based on a YeS 1055 M and microcomputer systems, was developed to automate financial transactions and make them more efficient

The image processing system is a product of cooperation in research and development between the GDR Academy of Sciences, the Robotron Combine VEB and the Soviet Center for Remote Sensing, GOSNITsIPR. Image processing was covered in more detail in rd [RECHENTECHNIK/DATENVERARBEITUNG] No 9, 1982.

Strong interest was also shown in the following application.

Computer Applications in Banking

The on-line system for automating and making banking processes more efficient, e.g. in banks, savings institutions and post offices was developed jointly with users in the financial industry. This application is based on a YeS 1055 M (fig. 2)), the K 1520 and K 1600 microcomputer systems and components in the product program of decentralized data hardware. Within the applications line, the Robotron K 8924 terminal for banks and savings institutions was exhibited for the first time (fig. 3). These devices are the data terminals in the EDP system. They are used at counters and at other data entry and interactive locations. They are based on microelectronic components for data input and output, preparation, storage and transfer.

The office computers have been presented several times already with text and illustrations (see EDV-ASPEKTE, No 1, 1982 and No 2, 1983). Multipurpose

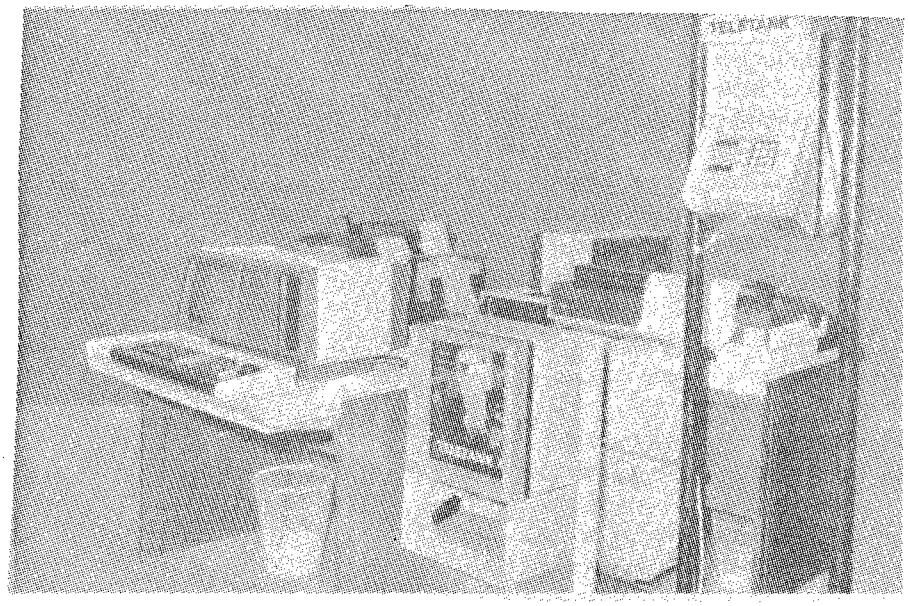


Fig. 4. Service station application based on the A 5120 office computer

application possibilities in this product line were dominant at the 1983 fair. Some new solutions should be featured here:

Improving Efficiency in Service Stations

An application was developed for service station data acquisition and processing featuring (fig. 4):
--use of the proven ALGUN Elektronik Paderborn (FRG) service station data acquisition system
--integration of the service station data acquisition system with the A 5120 office computer.

This system has a number of advantages for both the customer and the service station:
--use of an absolutely practical credit card with safeguards against counterfeiting
--cashless fueling also at unattended service station, deduction from account
--settling of accounts as stipulated, e.g. quarterly
--automatic delivery of information on fuel consumption with maintenance recommendations to customer

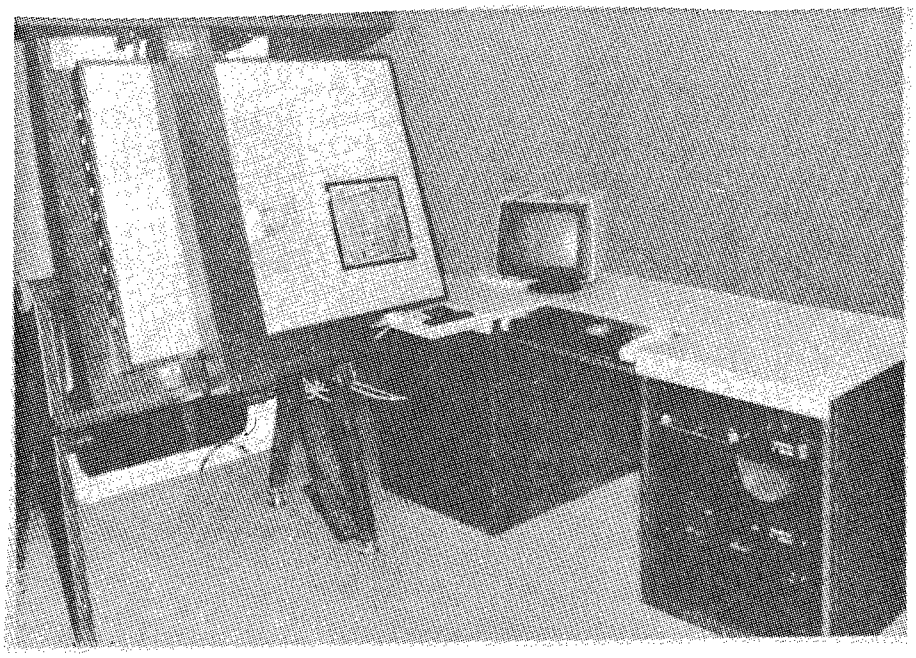


Fig. 5. High-resolution digitizer consisting of a tiltable measuring board, freely movable measuring value pickup, an integrated microprocessor-controlled control unit and the central computer unit with the K 1520 microcomputer

--24-hour operation
--safeguards against unauthorized refueling, counterfeit refueling, exceeding quota and others
--use of the service station also for non-holders of credit card during times the station is open
--security of regular customers to mutual advantage
--continuous control of sales, daily balancing, automatic invoicing, debiting, bank collection lists, sales lists and accounting books
--supplementary use of the computer for all tasks of internal operational cost accounting, sales and text communication.

The high-resolution digitizer is an on-line device. It is used to acquire graphical data. An internal computer preprocesses and packs these data. Besides internal implementation of basic graphic functions, there is the capability of entry of user-specific instructions which are processed on the basis of the graphics system and special user software.

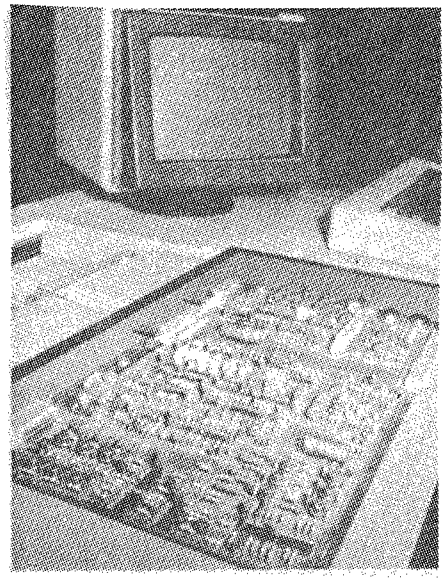


Fig. 6. The PII 3003 printed circuit board [PCB] tester improves the efficiency of testing technology by measuring components and conduction courses on PCBs; a K 1520 microcomputer handles the test run

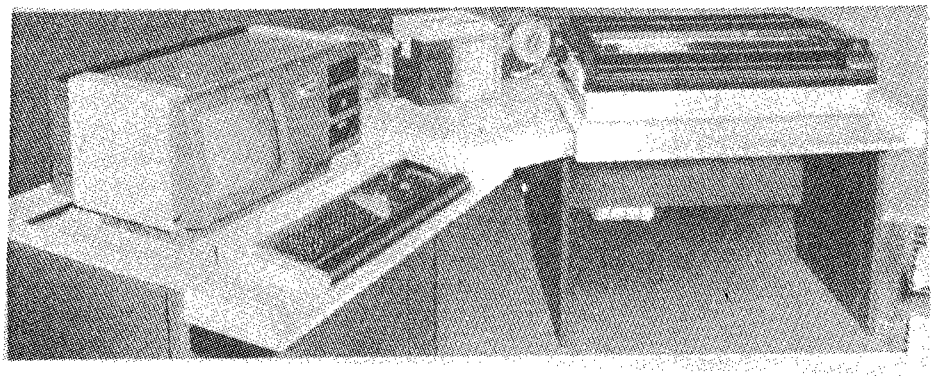


Fig. 7. Process technician workstation for programming NC machines in machine building; based on an A 5120 office computer

The digitizer consists of a tiltable measuring board, an integrated microprocessor-controlled control unit with the central computer unit, the RAM storage of the Robotron K 1520 microcomputer including an interface adapter (IFSS) and a freely movable measuring value pickup (pen or cursor) (fig. 5).

The digitizing method is based on the inductive measuring principle. Dividing the measuring process into coarse and fine measuring yields advantages in reading speed and required resolution. The measuring system implements a resolution of at least 0.01 mm. Over the total working area, the digitized reading values have a precision of 0.01 mm with the cursor or 0.05 mm with the pen.

Various software packages e.g. a micro test routine, function software for the device itself, digitizing software for the base computer, are also available which enable tying into the "Graphics Core System" software package.

Because of the high resolution and accuracy in acquiring coordinates, the internal performance and excellent ergonomic properties, the digitizer is a component in graphics workstations for many areas in science and engineering. Application areas include electrical/electronics engineering, geodesy and cartography, health and construction, and machine building.

Data teleprocessing, which is becoming more and more prevalent, faces at times an inadequate, overloaded or even the lack of a distribution network. At the 1983 fair, the Robotron Combine exhibited as an alternative:

Data Teleprocessing by Directional Radio Links

For the first time, a version of data teleprocessing with the Robotron PCM 10-400/800 digital directional radio equipment was exhibited. This combination opens up applications areas which remained closed to data teleprocessing or had to be implemented only at high cost with previous transmission media, e.g. for
--use in relatively undeveloped areas
--use in building damage reporting systems in industrial plants independent of telephones
--use in natural gas and oil pipeline systems
--use in the meteorological service to transmit weather information from remote observation or radar stations or
--for building data teleprocessing connections within the framework of an automated reservation system, for computer applications in the financial industry or for management information systems.

Up to 10 telephone or data channels are possible in any combination. Transmission distance between two transceivers is about 50 km depending on terrain relief.

The newly developed data teleprocessing system has the capability of sending to relay stations over data channels and unrestricted data switching to node stations whereby any network structure e.g. line, star or mixed, can be set up.

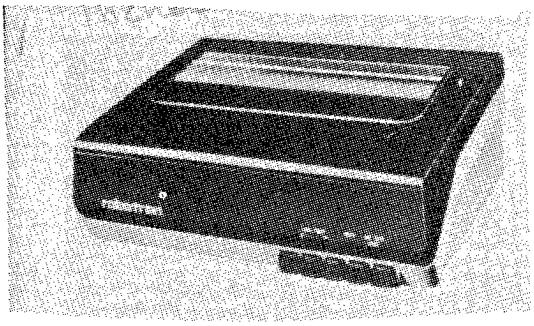


Fig. 9. New 6310 dot-matrix printer

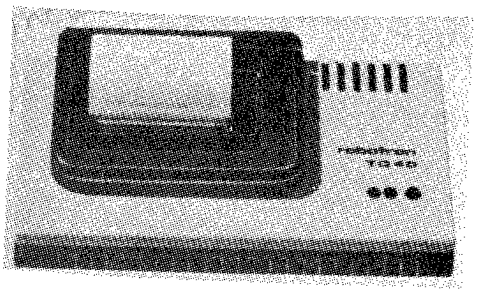


Fig. 10. TD 40 thermal printer with attractive design

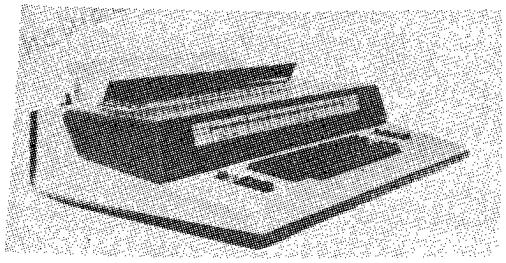


Fig. 11. The model S 6010 opens a new type series of electronic typewriters

Data channel interfaces following pertinent CCITT recommendations and with all common data transfer rates up to 64K bits/s allow connecting the radio equipment to terminals and EDP equipment already available or under development.

To incorporate foreign hardware into the Robotron data teleprocessing systems, software support is required for the specific superordinate computer.

New OEM Components

1152/255 Serial Printer

This attractively designed printer manufactured with the most modern technology has a speed of 40 cps and therefore fine print quality. With the V-24 (RS-232-c) serial or Centronics parallel interfaces, it can be used as a general-purpose output device for mini- and micro- or personal computers.

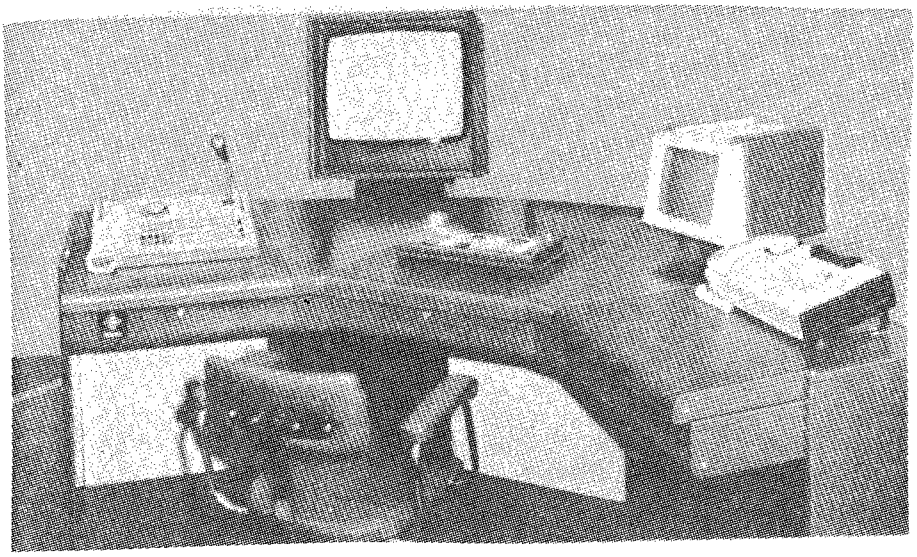


Fig. 12. The Berlin Signal and Safety Equipment Plant VEB exhibited the prototype of a control workstation controlled by a microcomputer. The configuration includes the semi-graphics color and alarm display (in the background) to display track systems in raster format. A maximum of 16 parallel rails can be displayed on the video terminal in a 4 x 7 dot format.

Print quality can be varied with variable character density and proportional spacing. With an attachable sheet feeder, the printer is recommended especially for automatic text processing.

6310 Dot-Matrix Printer Series

The 6311 model is an 80-column printer; the 6312 is a 132-column (fig. 9). The printers are offered for small computer systems, measured value acquisition systems and as an output printer for terminals, micro- and personal computers. The dot-matrix printers offer these functions:
--italics, wide print, bold print
--bidirectional printing, optimized printing
--paper feed by adjustable tractor, pin feed, friction feed
--variable parallel and serial interfaces, compatible with all systems.

TD 40 Thermal printer

The Robotron TD 40 (fig. 10) features small dimensions, alphanumeric printing at one line per second and the SSITT interface. It can be used in any

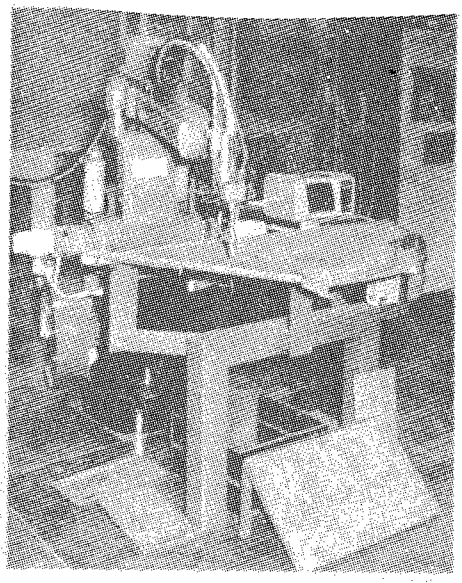


Fig. 14. The IR 10 E industrial robot improvement, process-flexible and freely programmable, from the Impulsa Machine Building VEB demonstrated various welding operations in conjunction with the IRS 650 articular robot controller from the Karl Marx Numeric Control VEB

situation where no copies are required, e.g. with telephone terminals, monitoring and measuring equipment, video display terminals, Telex systems, personal and home computers, scientific and engineering computers.

K 6501 Microelectronic Read/Write Unit

The read/write unit can read/write from/on international standard plastic cards containing magnetic strips for data storage. This unit has already been incorporated into other applications, e.g. the service station application.

Electronic Typing with Comfort

The models S 6100 [sic] (fig. 11) and S 6011 represent a new type series in electronic office typewriters. They have all the typing conveniences. The automatic paper feed to the first line for typing, automatic underlining and spacing and the optional variable flowing text function free the typist of many routine operations. The immediate correction function and correction in conjunction with the relocate function facilitate error-free originals and copies. Easily exchangeable printwheels allow using various type styles.

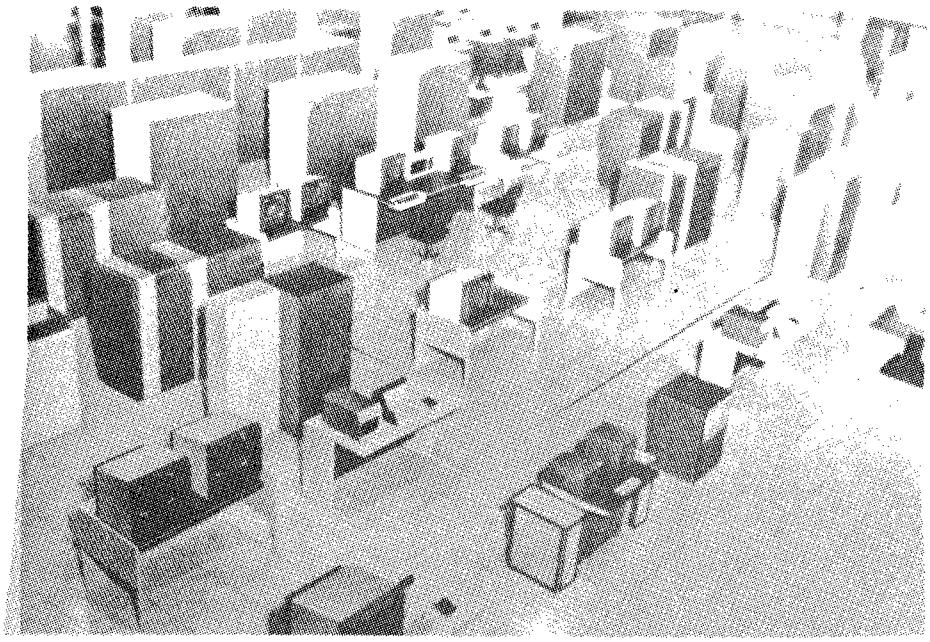


Fig. 15. Model of the YeS 1065 from the USSR

USSR - Computers for Design and Production

The Elektronorgtekhnika foreign trade enterprise demonstrated the productivity of the Soviet computer industry this year too--from microprocessors awarded a fair gold medal to large mainframes. Thus, the model of the YeS 1065, a computer in the Unified System series 2, was shown for the first time. It performs some 4 million operations/second and has a 16M-byte main memory. The unit has virtual storage and operates in the block-multiplex mode (fig. 15).

Displayed from the large number of microcomputers were the NTs 80-20 interactive computer system and the Nairi-41, compatible with the System of Small Computers, the most powerful model in the Nairi family and successor to the Nairi-4 (fig. 16). Unified System peripherals included the YeS 7903 M perforated tape station; It reads tape at 1,500 cps and punches at 150 cps.

An interesting development is the Neva 1 M control complex, developed jointly by the UkSSR Academy of Sciences Institute of Cybernetics, the USSR Central Research Institute for Communication Systems, and the Robotron Combine VEB. It will be used as a centralized controller in local and long-distance exchanges and in message switching. It includes two specialized control computers (based on the YeS 2655) operating in micro synchronous parallel

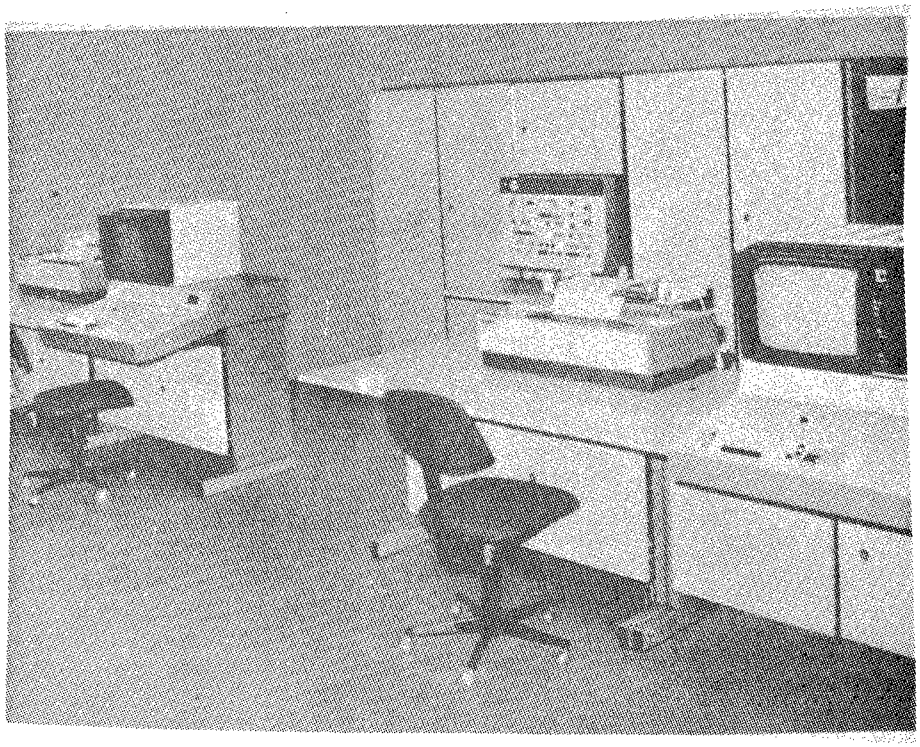


Fig. 17. A USSR-GDR joint development is the Neva 1M control complex

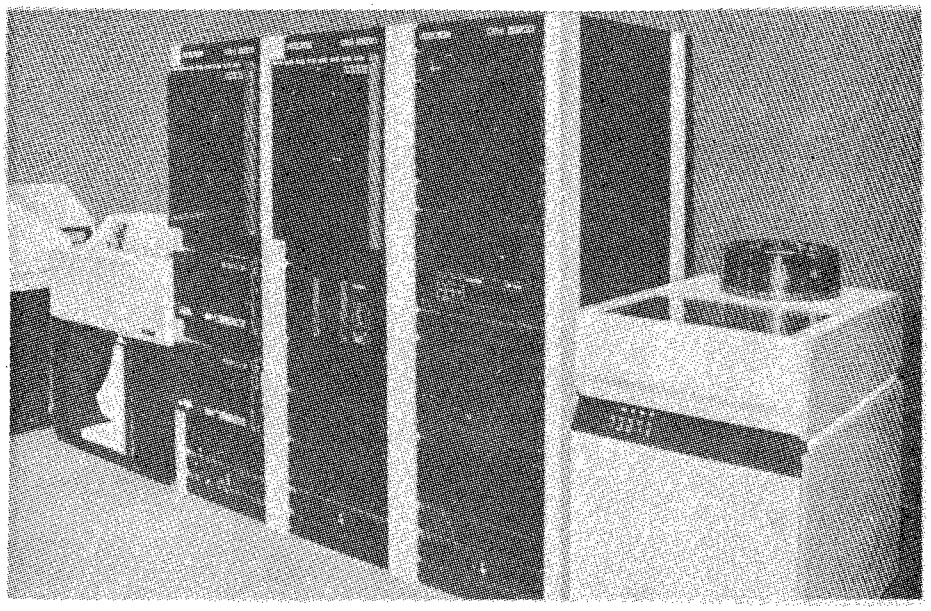


Fig. 18. Videoton SM 52/10 which can run software in two operating systems

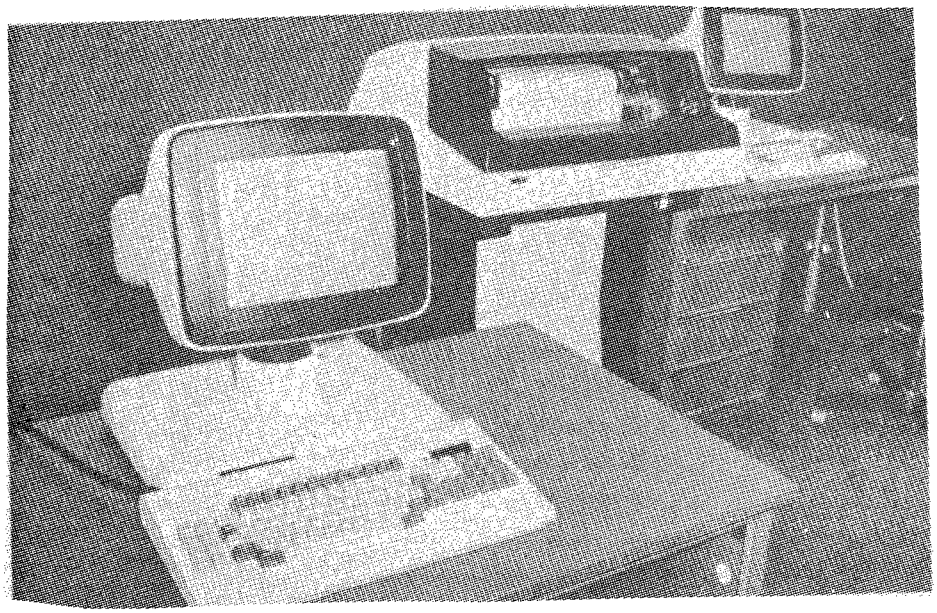


Fig. 19. Four workstations can be connected to a central unit in the VT 20 system

operation and an array of Unified System peripherals. With dual computers, in case of failure of a functional unit, the malfunctioning unit is automatically disconnected and the corresponding system configuration changed; with that, (calculated) system downtime is only two hours in 20 years (fig. 17).

Hungarian Small Computers and Multipurpose Terminals

Videoton from the Hungarian People's Republic exhibited both new and familiar products. The SM 52/10 computer system was shown for the first time at a Leipzig fair; in addition to higher computing performance, it has two operating modes: It can use both YeS 1011 and SM4 software (fig. 18). The SM 52/10 consists of a 16009 central unit with a 16-bit microprocessor supporting multioperation. In operating mode I, it emulates an SM-4; in mode II, it is fully compatible with the YeS 1011. Peripherals include a moving head disk with 50M bytes, a fixed head disk up to 5M bytes, display terminals, floppy disk, magnetic tape unit, line and matrix printers.

Another new product, the VT 20/IV office computer, is an evolution of the VT 20 computer already in use in the GDR (fig. 19). The main difference is the capability of connecting four workstations to one central unit. The multi-station function is hardware supported: Each workstation has its own micro-processor and complete main memory. Four microcomputers can therefore access common background storage. Memory: 64K bytes of RAM and 6K bytes of ROM.

Fig. 20. Computer-aided design with the VDT 52 121 raster graphics video display terminal

Of special interest were, however, two new versions of the VDT 52xxx terminals that are familiar in the GDR. The VDT 52 127/128 is a sophisticated text processing system which is now in use in the Soviet TASS news agency. It holds about 12 pages and has the capability of interchanging Latin and Cyrillic characters. Model /128 has an interface for a floppy disk unit. The screen can be divided for set-up, correction and search operations into four windows maximum; characters can be displayed in reverse video, blinking and underlined format. The VDT 52 121 raster graphics video display terminal with a built-in dot graphics module is used for computer-aided design (fig. 20). It has graphics storage with a size of 340 x 480 points and supports drawing points, vectors and special forms; plotter output is supported.

The Budavox (hall 18) foreign trade enterprise introduced the TAP-34 (YeS 8534) intelligent terminal from Telefongyar; with 64K bytes of RAM, it is designed for local data processing, acquisition and remote data entry (see rd [RECHENTECHNIK/DATENVERARBEITUNG] No 8, 1982). The terminal in the exhibit was linked to the YeS 1055 M in hall 15 by a modem and multiplexer (YeS 8062, installed in the fair booth for the Robotron combine).

Budavox also exhibited the ORion DAta System (ORDAS). ORDAS can be used for data acquisition, packing and preprocessing. The system can be connected to another computer by modem (AM-1201, AM-12TD) (fig. 21). A maximum of eight ADP-2001 display terminals can be connected. Two ADP-2000 video display terminals can be used for console operation. Since data preparation uses only about 20 to 25 percent of central unit capacity, the system can process other tasks at the same time (with the OS/i operating system).

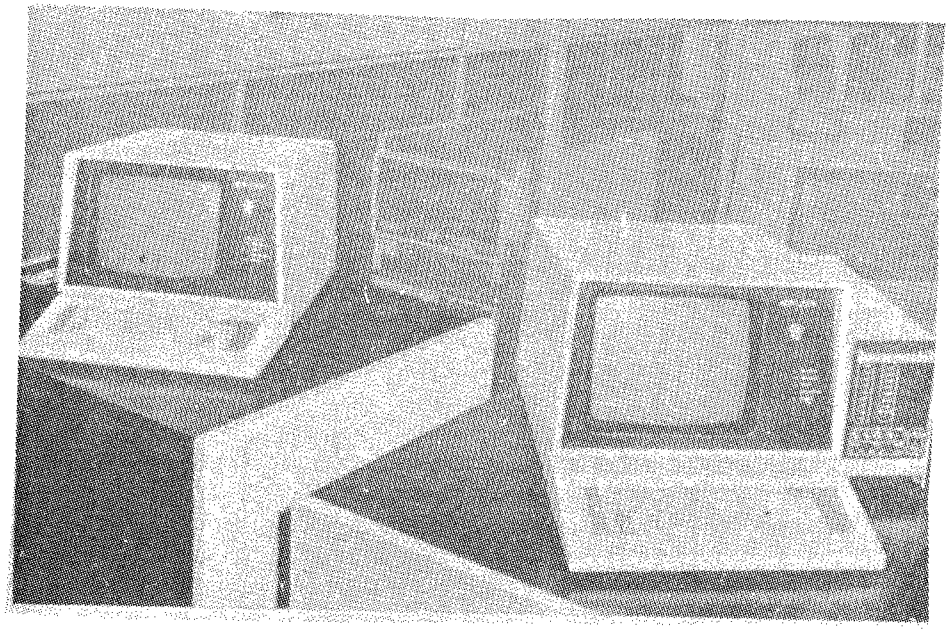


Fig. 21. ORDAS data acquisition system which can be used as a computer at the same time

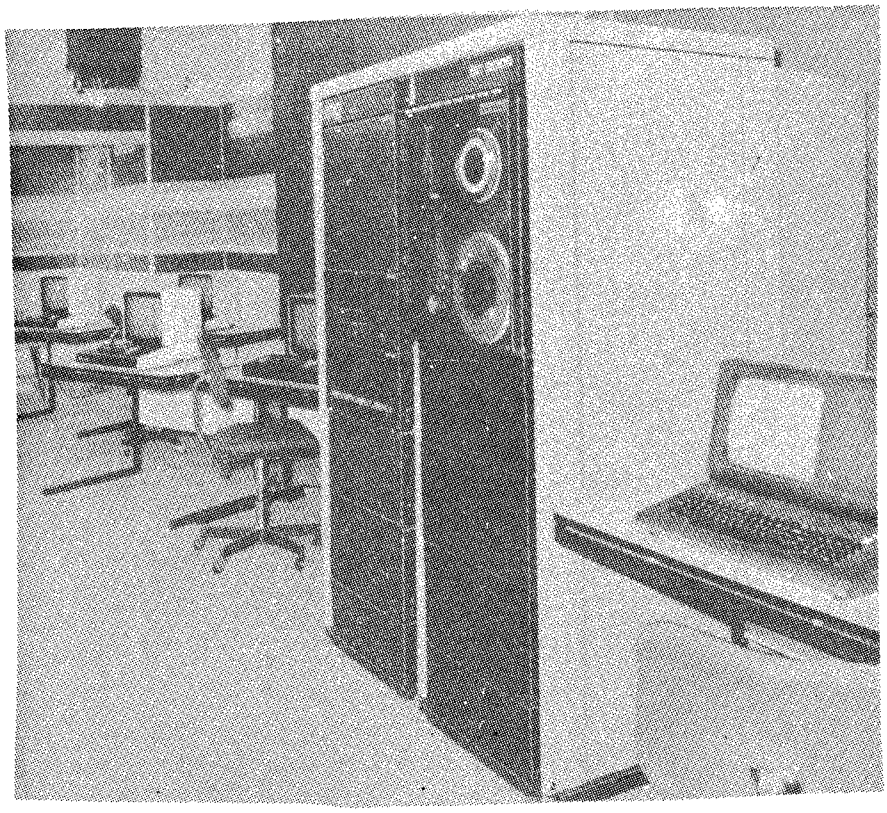


Fig. 22. The YeS 9005 data acquisition system exhibited as a new product by the People's Republic of Bulgaria

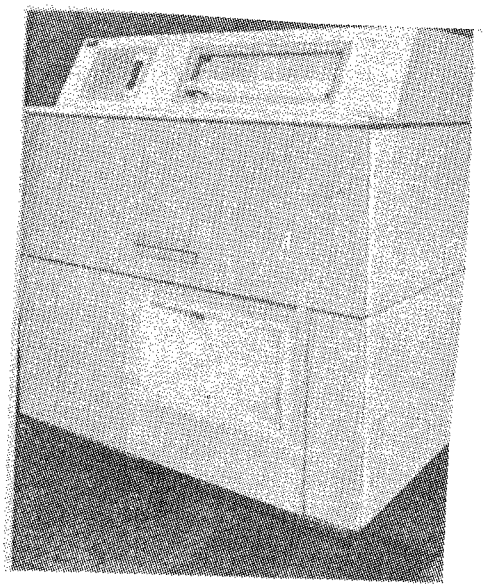


Fig. 23. The YeS 7033 M printer from the Polish people's Republic

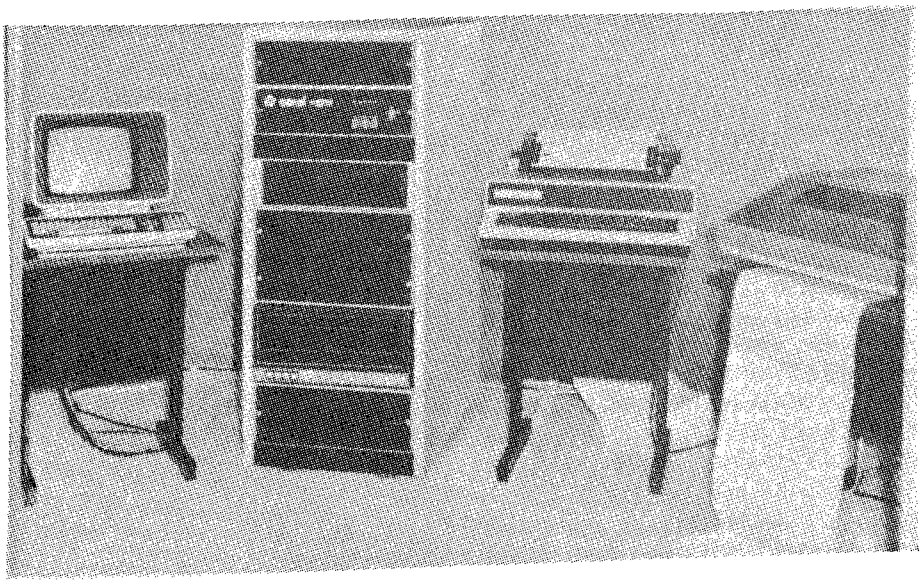
Storage Devices from the People's Republic of Bulgaria

Following tradition, the Bulgarian enterprise Isotimpex exhibited a broad array of storage devices. Thus, there were various magnetic tape devices for the System of Small Computers and the new YeS 5067 200M-byte moving head disk which is also integrated in the YeS 1055 M configuration.

Another focus of Bulgarian computer production is microcomputer and data acquisition systems. Exhibited from the first complex were the IZOT 1024 C (fig. 22) text processing system and the IZOT 1025 C office computer as a bank counter terminal. The YeS 9005 microcomputer based on a 16-bit microprocessor (ZVE SM 2104) is a new data acquisition system. The configuration includes up to 32 video display terminals, a maximum of 4 YeS 5061 WPS [moving head disks], several magnetic tape units and printers. The IZOT 0260 basic computer and a microcomputer for laboratory automation rounded out the Bulgarian exhibit.

Line Printer from the Polish People's Republic

The model 401 (YeS 7033 M) alphanumeric parallel printer from the MERA-BLONIE plant is intended for Unified System computer installations and is also expected to be supplied to the GDR (fig. 23). It prints 160 characters on a line at a maximum rate of 1,100 lines/minute. Lines per inch is adjustable to six or eight. The printer includes the Latin and Cyrillic character set.



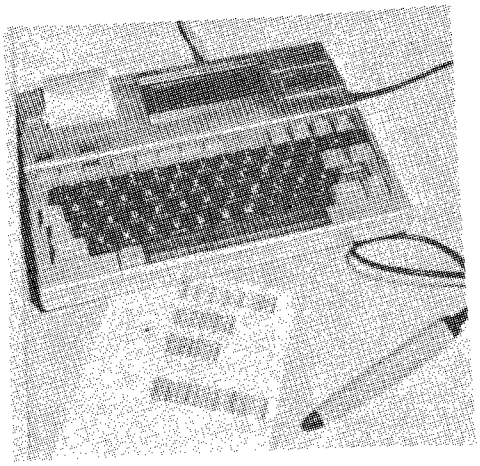


Fig. 24. [top] The CORAL 4011 computer system from the Socialist Republic of Romania

Fig. 25. [bottom left] Siemens displayed the 5511 text processing system. This system enables creation of extensive documents with immediate correction. The screen displays help facilities.

Fig. 26. [bottom right] Epson, subsidiary of the Japanese firm Seiko, was represented for the first time at the Leipzig Fair. The HX-20 microcomputer which contains a mini graphics display, a mini graphics printer and micro magnetic tape cassette, is about the size of an A4 sheet. External peripherals such as a larger monitor, floppy disk and printer can be connected.

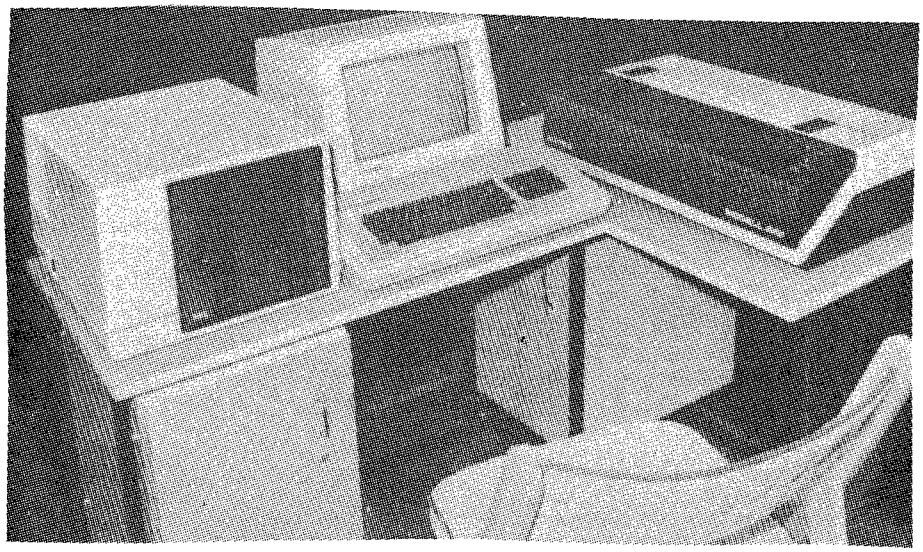


Fig. 27. Rank Xerox exhibited the Xerox 860 IVS microcomputer designed for text processing. The computer was connected to the Robotron 1152 model 255 printer.

Also offered was the MERA-60 microcomputer system, model 26-B, with 28K words RAM, floppy disk storage, the DZM-180 printer, a video control terminal and four video display terminals.

Minicomputer System from the Socialist Republic of Romania

The CORAL 4011, a product of ICE-Felix-Electronum, has 256K bytes of main memory. Word (16 bits) and byte processing are possible (fig. 24). The special bus structure allows a high rate of information transfer, a maximum of 10M bytes/second. The MINOS (MINicomputer Operating System) supports real-time multiprogramming operation. Programming languages available are: MACRO-Assembler, FORTRAN IV, FORTRAN IV PLUS, COBOL, BASIC-PLUS-2 and PASCAL. Computers in the CORAL series are compatible with the Independent 100, a familiar machine in the GDR.

Siemens Communications Equipment

Siemens, the FRG firm, exhibited under the theme of communications equipment featuring telephones, digital switching equipment and fiber optic transmission. Text processing equipment was also displayed. Exhibits in the 5500 text system included the 5505 storage typewriter equipped with a minidiskette drive capable of storing many pages. The 5511 text processing system offers help prompts on the screen in interaction with the user. This system is designed for extensive documents with immediate correction (fig. 25).

The T 4200 text station is used for electronic text communication with the Teletext service (FRG). A finished document can be received within seconds and output on the PT80 print station with a dot-matrix or ink-jet printer. Siemens also exhibited a series of telecopiers (HF 2040 and HF 2055) which can transmit drawings, sketches, handwriting and forms within a few minutes. The HF 2055 can receive automatically and allows sending several pages to the same recipients.

PHOTO CAPTIONS

1. p. 22. Fig. 3. Exhibited for the first time: the K 8924 terminal for banks and savings institutions (Werkfoto)

2. p. 23. Fig. 8. A joint development by the Robotron Combine and the Dresden Engineering University: the K 7823 speech recognition unit

3. p. 24. Fig. 13. The traffic control system (VSM) from Teltow Hardware and Control Plant VEB has been manufactured in series since the third quarter of 1983. Prototypes are in trial operation in the Leipzig, Dresden and Rostock districts. The traffic loads acquired by traffic detectors are displayed on a color monitor in the traffic control center.

4. p. 25. Fig. 16. Designed as a work station for designers and scientists: the Nairi 41 microcomputer

8545
CSO: 2302/26

1983 LEIPZIG SPRING FAIR COMPUTER, COMMUNICATIONS EQUIPMENT

Microelectronics, Semiconductor Components

East Berlin RADIO FERNSEHEN ELEKTRONIK in German Vol 32 No 6, Jun 83
pp 344-351

[Article by Wolfgang E. Schlegel and A. Blodszun]

[Text] GDR. Erfurt Radio Plant VEB.
CMOS series U 4000 has been redesignated V 4000 since its temperature range of -25 to 70°C is greater than the standard of 0 to 70°C. This is not new, but the manufacturer decided a change in type designation was justified. The new series V 4000 includes all the types made to date in the U 4000 series.

The U 125 D four-decade up/down counter should replace electromechanical counters, prevalent up to now, and will be used primarily in measuring and control hardware. It is programmable and has two memories, the contents of which are compared to the counter state. When external drivers are connected, the LED displays can be selected in multiplex operation. The IC can be used as a clock. For this, it has a $1:12^{15}$ divider and logic to generate 100-Hz and 1/60-Hz pulses. The memory contents and counter state can be saved in event of power failures if the U_{DDS} voltage on pin 39 does not fall below 2 V.
The IC is made with n-channel Si-gate technology and housed in a 40-lead DIP [dual in line plastic] package. Supply voltage U_{DD} = 4.75 to 5.25 V; input voltage U_{IL} = -0.5 to 0.8 V; U_{IH} = 2.4 V to U_{DD}; clock input voltage U_{ILC} = -0.5 to 0.45 V; U_{IHC} = (U_{DD} - 2 V) to U_{DD}. Operating temperature ϑ_a = -10 to 70°C; dissipated power P < or = 0.7 W at ϑ_a = 25°C.

The U 126 D four-digit up/down counter is designed for use in service multimeters. In addition to the counter, the IC has a control part for operation as a digital voltmeter. Within a DVM [digital voltmeter], the counter and control sections are switched together by connecting the appropriate pins. Both sections can also be operated independently of each other. The counter section includes the memory, multiplexer, seven-segment and BCD decoder and the polarity indicator. The control section includes the time and bidirectional controls. The IC is also made with n-channel Si-gate technology and

U 125 D Pin Connections

$\overline{LZB}$	leading zero blanking
SY	synchronization
CI/ZI	clock/zero input; SY = H = CI, SY = L = ZI
D0, D1, D2, D3	decimal places 0 to 3
a to g	7-segment outputs
A/LD0, B/LD1, C/LD2, D/LD3	BCD inputs and outputs
COMP0, COMP1	comparator outputs
ZO	zero output
U_{DDS}	buffered supply voltage
U_{DD}	supply voltage
S/OSC	sign output and divisor output
INS	sign input
I1	count input 1
I2/P5	count input 2, program input 5
I3/T	count input 3, divisor test
P1, P2, P3, P4	program inputs 1, 2, 3 and 4
$\overline{UD}$/P6	up/down switch, program input 6
LM1, LM2	load memory 1 and 2
LC	load counter
RESET	reset input
EQUAL	coincidence output
$\overline{CARRY}$	carry output
U_{SS}	reference voltage

U 807 D Pin Assignments

$\overline{SEN0}$ to $\overline{SEN7}$	sensor inputs of key matrix
QCL	oscillator output
QCLS	oscillator or system clock input
REMO	signal output
U_{SS}	reference voltage
U_{DD}	supply voltage
$\overline{DRV0}$ to $\overline{DRV7}$	driver stage outputs for key matrix polling
MOA, MOB, MOC	control inputs to select modes of operation

housed in a 40-pin plastic package. Operating voltage U_{CC} = 4.75 to 5.25 V; input voltage U_{IL} = -0.3 to 0.8 V, U_{IH} = 2 V to U_{CC}; input cutoff current I_I = 10 microamps; output voltages under load (all outputs, a to g) U_{OL} < or = 0.7 V, U_{OH} > or = 2.4 V; current consumption I_{CC} < or = 70 mA; counter frequency < or = 800 kHz. L-width t_L = 0.625 to 10 microseconds; H-width t_H > or = 0.624 microsecond; ϑ_a = 0 to 70°C; P < or = 1 W.

The U 806 D integrated CMOS circuit for a remote infrared receiver is part of a remote system that allows direct transmission of 2 x 64 instructions. Input

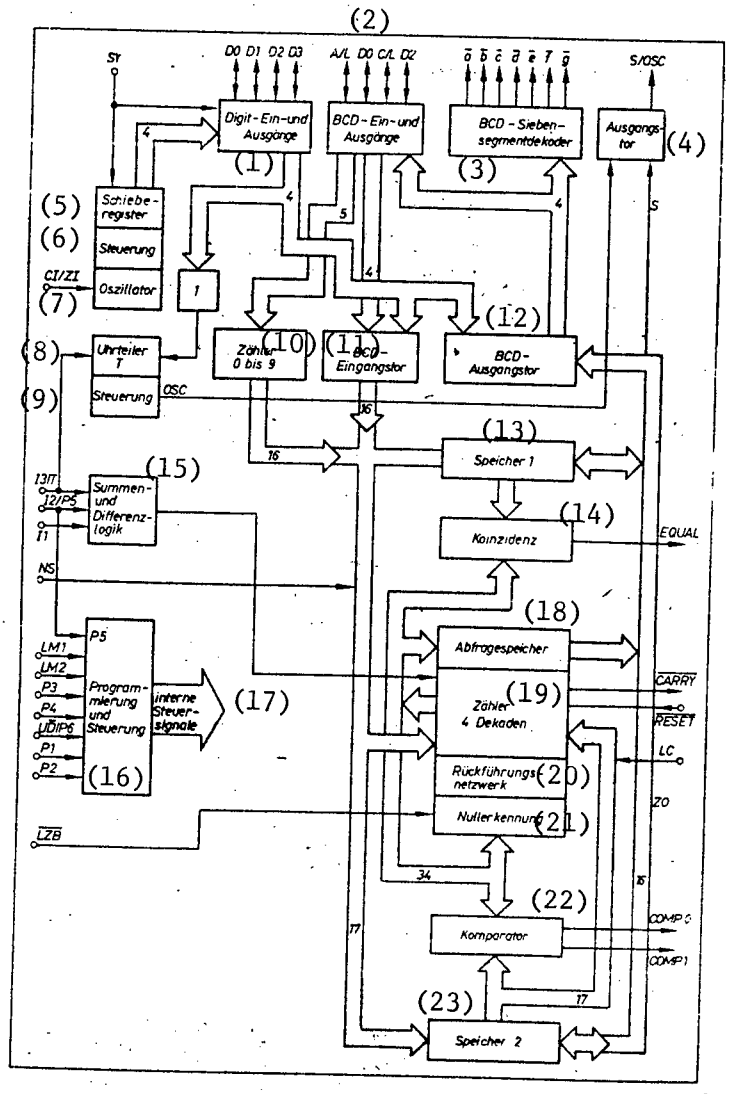


Fig. 1. U 125 D Up/Down Counter Circuit, Erfurt Radio Plant VEB

Key:

1. digit I/O
2. BCD I/O
3. BCD seven-segment decoder
4. output gate
5. shift register
6. control
7. oscillator
8. clock divider 1
9. control
10. counter 0 to 9
11. BCD input gate
12. BCD output gate
13. memory 1
14. coincidence
15. sum and difference logic
16. programming and control
17. internal control signals
18. scan memory
19. 4-decade counter
20. feedback network
21. zero sense
22. comparator
23. memory 2

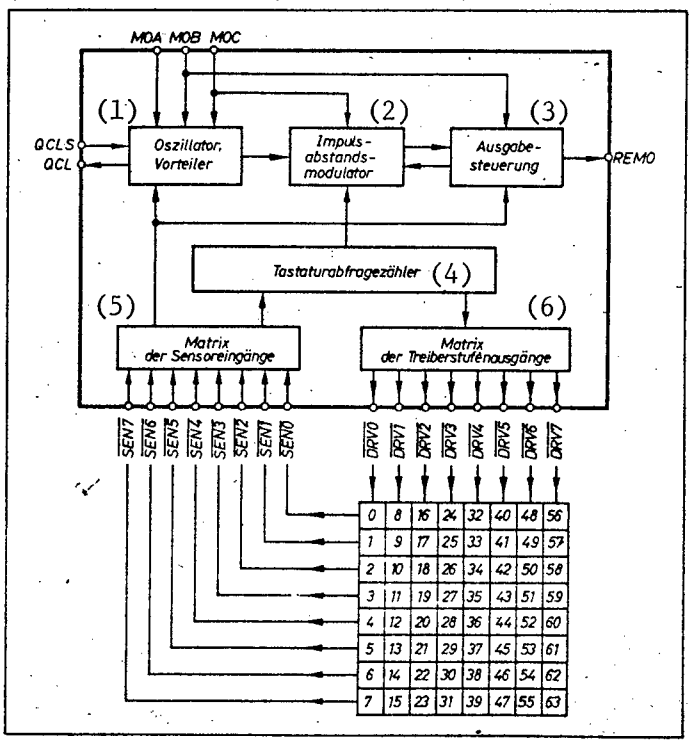


Fig. 2. U 807 D infrared transmitter circuit, Erfurt Radio VEB

Key:

1. oscillator, divider
2. pulse space modulator
3. output control
4. keyboard poll counter
5. matrix of sensor inputs
6. matrix of driver stage outputs

of 31 instructions is possible through a diode-coded interface directly to the circuit; four analog functions are output as the variable pulse duty factor of a frequency. With this IC, 4-bit program memory can be selected. It is housed in a 24-pin plastic package with 15 mm spacing.

Also part of this system is the U 807 D infrared transmitter circuit, compatible with the U 806 D. The circuit has a matrix input unit with keyboard polling counter, oscillator with divider, pulse space modulator and signal output control. Using the capability of addressing the start bit on the transmitter side, two receivers (e.g. radio or television) can be addressed by one transmitter. Information is transmitted in 7-bit words, pulse space modulated. Operating voltage: 7 to 10 V; operating temperature ϑ_a = 0 to 70°C; power dissipation is 300 mW.

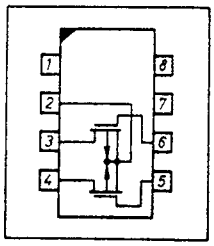


Fig. 3. SMY 62 bipolar MOSFET interior circuit, Erfurt Radio Plant VEB

The SMY 62 bipolar MOSFET is designed for use in electronic reflex cameras. There are two p-channel depletion type MOSFET's without integrated gate protect diodes in an 8-pin flat pack package. It is used in a camera as a difference amplifier in the input stage. Using it, the current produced by the photodiode, which can be in the picoamp to milliamp range, is matched to the bipolar analog amplifier circuit with higher linearity. Both transistor systems have a common source and bulk connection. Drain source voltage U_{DS} = -6 to 0.3 V, U_{GS} = -6 to 3 V (0.2 to 0.9 V at the operating point). Total power dissipation < or = 100 mW; 0_a = -10 to 55°C; drain current per transistor I_D < or = 10 mA; steepness S = 0.15 to 2.5 mS; input offset voltage U_{off} < or = 40 mV; thermal drift of input offset voltage < or = 200 microV/K.

A U 880 microprocessor system variant is the UB 880 type series that differs from the original series only by the reduced clock frequency of only 2.5 MHz compared to 4 MHz. Besides the CPU, this refers to the CTC, PIO and SIO.

Frankfurt (Oder) Semiconductor Plant Lead Sector VEB

An extensive array of new analog and digital integrated circuits [IC's] has come from the firms in the economic sector of the HFO [Semiconductor Production Association] VEB, made up of the Frankfurt (Oder) Semiconductor Plant VEB, the Stahnsdorf Rectifier Plant VEB, the Grossraeschen Rectifier Plant VEB and the Zehdenick "Bruno Baum" Microelectronics VEB. There were 52 new and 9 improved developments shown at the fair besides the standard products.

A version of the familiar A 301 D is the A 301 V initiator circuit in a new package. It is now in an 8-pin, plastic DIP; data and internal switching remain the same.

Three new IC's, the A 3501 D, D 3510 D and A 3520 D, have been produced for the next generation of color television receivers. The A 3501 D has a video combination and allows overlay of linear RGB signals. It also has two electronic potentiometers for white balancing in the green and blue channel and the capability of limiting current peaks. A complete PAL decoder is integrated in the A 3510 D. The IC also has a controlled color mode signal amplifier, a reference and control voltage section, an 8.8-MHz reference oscillator with a divider stage to produce two 4.4-MHz output signals and a demodulator section with two synchronous demodulators for the (B-Y) and (R-Y) signals, the PAL flipflop and the PAL switch. The color cutoff allows controlling the color mode signal output stage for delay line operation. And finally, the A 3520 D IC has a SECAM decoder. Special features listed by the manufacturer are the controlled color mode signal amplifier, the SECAM crossswitch, two PLL demodulators, the pulse processing, the threshold detector,

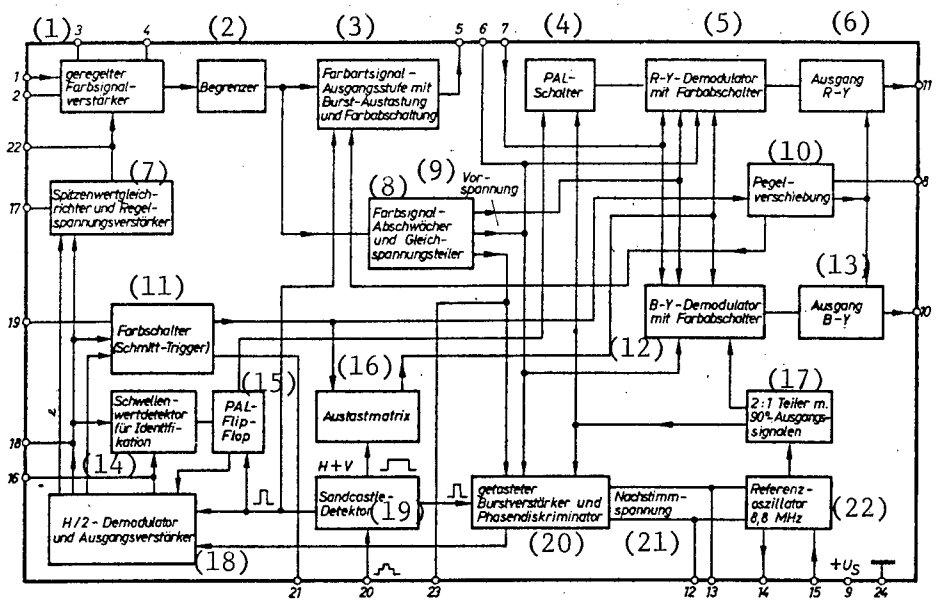


Fig. 4. A 3510 D PAL decoder, Frankfurt (Oder) Semiconductor Plant VEB

Key:

1. controlled color signal amplifier
2. limiter
3. color type signal - output stage with burst-blanking and color cutoff
4. PAL switch
5. R - Y demodulator with color cutoff
6. R - Y output
7. point-contact rectifier and control voltage amplifier
8. color signal attenuator and DC voltage divider
9. bias voltage
10. level shift
11. color switch (Schmitt trigger)
12. B - Y demodulator with color cutoff
13. B - Y output
14. threshold value detector for identification
15. PAL flipflop
16. blanking matrix
17. 2:1 divider with 90° output signals
18. H/2 demodulator and output amplifier
19. sandcastle detector
20. keyed burst amplifier and phase discriminator
21. retuning voltage
22. 8.8-MHz reference oscillator

and the synchronized flipflop. A delayed one-microsecond pulse can be generated for clamping and identification. This IC is used in both SECAM and PAL-SECAM devices together with the A 3510 D, whereby the external wiring remains minimal. With these three IC's, circuit cost has been further reduced compared to the now prevalent MCA decoders and the reliability of the entire circuit has been increased.

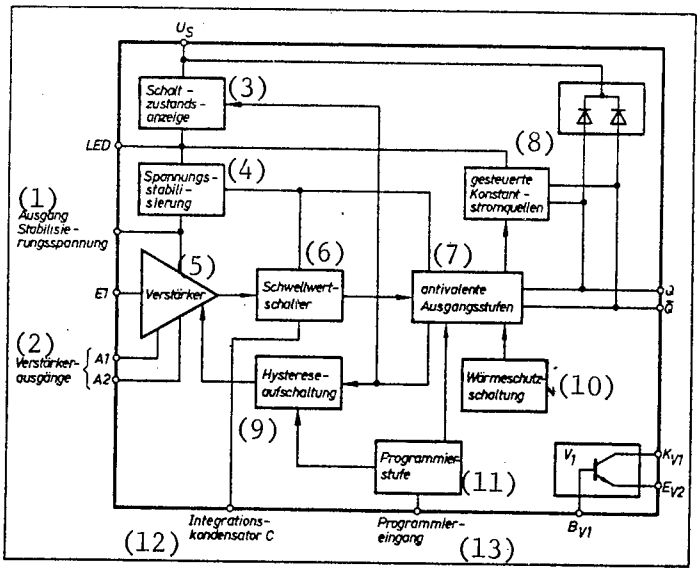


Fig. 5. B 305 D initiator switch circuit, Frankfurt (Oder) Semiconductor Plant VEB

Key:

1. output stabilizing voltage
2. amplifier outputs
3. switch status indicator
4. voltage stablization
5. amplifier
6. threshold value switch
7. antivalent output stages
8. regulated constant current source
9. hysteresis modulation
10. thermal protective switch
11. programmable step
12. integration capacitor C
13. programmable input

Improvements to the A 301 D are the A 304 D, A 305 D and A 306 D initiator circuits; they can be connected together to inductive, capacitive and photo-electric initiators. They have a common basic concept which has been varied. Thus, the circuit with the most features, the A 305 D, has an operating voltage range from 9 to 30 V; it has a switch status indicator circuit with a light emitting diode [LED]. Types B 304 and B 305 come in a 14-pin DIP; the B 306 IC comes in an 8-pin plastic package. Up to the B 305, they have a common supply voltage range from 4.75 to 30 V. Common to all are these values: output voltage U_{OH} = 0 to 30 V, I_{OL} = 0 to 70 mA, θ_a = -25 to 70°C. A thermal protective switch is activated if the depletion layer temperature reaches 150°C. Outputs operate in the H state as constant current sources for 1.5 mA; they are connected internally to freewheeling diodes for inductive laods. Another protective switch limits the output short-circuit current at 100 mA. Types B 304 and B 305 have a tri-state programmable input, used to set defined circuit states. All three components have ten-fold more hysteresis compared to their predecessors; it is infinitely variable for the B 304.

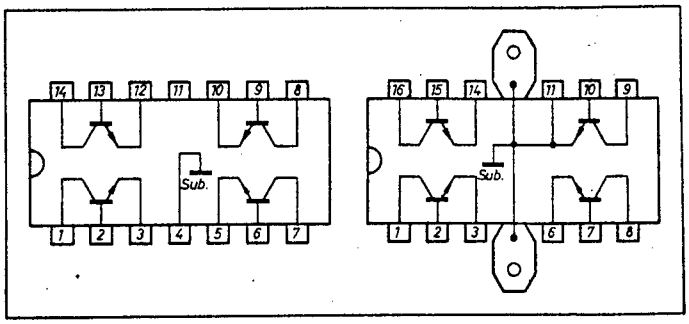


Fig. 6. Interior circuit of B 315 to B 380 transistor arrays, Frankfurt (Oder) Semiconductor Plant VEB
a. without heat sink flanges; b. with heat sink flanges

The B 315 D, B 325 D, B 360 D and B 380 D transistor arrays have four npn-transistors. In addition to the basic design in a plastic package, they are also made as the B 3xx E with heat sink flanges and the B 3xx K with a heat sink package. The maximal collector-emitter voltage is reflected in the array series number: 15V, 25V, 60V and 80V; U_{CBOM} = 20, 30, 90, 100V (limit values). Common to all are U_{EBO} <= 5V, I_C <= 0.5A, pulse crest current I_{CS} <= 1A, I_B <= 0.25A. Total dissipated power is between 1.3W and 4W, depending on type of heat sink surface. ϑ_a = -25 to 85°C, f_T = 60MHz.

The B 555 D timer has been shown before. There are two data synchronization timers of this type in the B 556 D IC.

The B 721 D integrated, switchable, quadruple, precision, current source is designed for building digital-to-analog converters [DAC]. It has a TTL interface section, four precision current sources and a changeover switch as well as the supply voltage unit. B 721 D digital inputs are both CMOS and TTL compatible. Two operating voltages are required: $U_{S+} = -U_{S-} = (15 \pm 1)V$, current draw I_{S+} = 8mA, I_{S-} = -10mA, control current draw I_{St} = 350 microA, SVR > 80 dB, error of current sources among each other < 2 0/00, internal resistance R_i > 30 Mohms, transient time at $\pm$0.5 LSB (8 bits) 1 microsecond, ϑ_a = 0 to 70°C.

The B 390 D integrated control circuit is used to drive electronically switched small DC motors with an internal startup circuit and thus ensure the fastest possible motor run up. Motor revolution is synchronized by a dual control to the 32.768-kHz reference frequency. This IC can be used to change rotational direction. Since the NF [low frequency] can be cutoff so that the motor does not reach its rated rotational speed, this IC will be used primarily in consumer electronic devices.

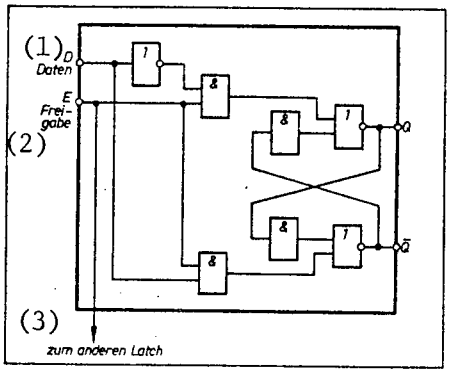


Fig. 7. D 175 D logic circuit, Frankfurt (Oder) Semiconductor Plant VEB

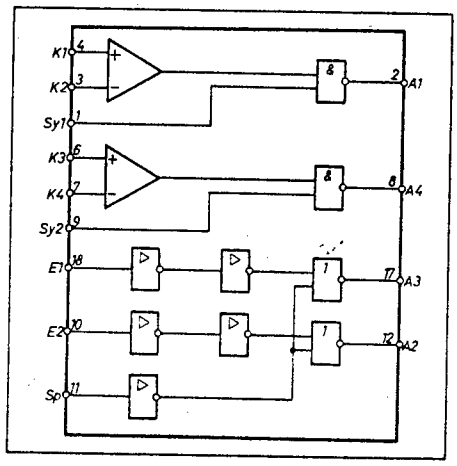


Fig. 8. D 395 D drive circuit logic, Frankfurt (Oder) Semiconductor Plant VEB

Key:

1. data
2. enable
3. to other latch

The standard TTL series, although long obsolete in the GDR too, has been expanded. The type D/E 175 D is a bistable 4-bit clamping circuit applicable to all TTL conditions.

The D 146 and D 147 BCD and seven-segment decoder and driver have now been replaced by the pin-compatible types D 345 D, D 346 D, D 347 D and D 348 D. They are made with I^2L technology and have constant current-output stages. The constant currents are externally programmable to 40 mA for types D 346 and D 348. Their current draw is only 20 mA which is 70 mA less than the previous types required. The inputs are CMOS, TTL and low power Schottky TTL compatible. When the seven-segment LED displays are driven, seven resistances per digit are saved, and the use of pseudotetrads for character representation is possible. Total power dissipation for the D 345 and D 347 is 450 mW maximum; for the other types, 660 mW maximum; the power dissipation per seven-segment output is 80 mW maximum.

The D 395 D IC is a choppered step motor driver for bipolar operation together with external power end stages. In its electrical parameters, to a large extent it matches those for the D 394 D IC, which has been in production longer. Its logic function is:

$A1 = \overline{\overline{K2}\ Sy1}$ with $K2 = \overline{K1}$
$A2 = \overline{\overline{E2}\ Sp}$
$A3 = \overline{\overline{E1}\ Sp}$
$A4 = \overline{\overline{K4}\ Sy2}$ with $K4 = \overline{K3}$

The low power Schottky TTL series shown last year has been considerably expanded and therefore meets application demands to a large extent. Here is a list of the types:

DL 014 D six Schmitt trigger inverter, $Y = \overline{A}$
DL 037 D four NAND power gate with two inputs each, $Y = \overline{A\ B}$
DL 038 D four NAND power gate with open collector and two inputs each, $Y = \overline{A\ B}$
DL 040 D two NAND power gate with four inputs each, $Y = \overline{A\ B\ C\ D}$
DL 090 D decimal counter
DL 093 D 4-bit binary counter
DL 112 D two negatively triggered JK flipflops
DL 123 D two resettable monostable multivibrators
DL 132 D four Schmitt trigger NAND gates with two inputs each, $Y = \overline{A\ B}$
DL 192 D synchronous up/down decimal counter
DL 193 D synchronous 4-bit up/down binary counter

The IC's are all pin-compatible to corresponding types in the standard series, but are superior to them by reduced power draw with the same switching speed.

Other innovations exhibited in the area of digital integrated circuits were the DS 82xx fast interface Schottky TTL circuits, which are used primarily in microprocessor systems. They correspond to the international series 82xx and are therefore easily interchangeable. Within the CEMA, other types in this series are produced in the CSSR, the UVR [Hungarian People's Republic] and naturally in the USSR; thus an extensive variety is available. The circuits can also operate together with MOS systems because of their low current draw.

DS 8205 D 1 of 8 binary decoder
DS 8212 D 8-bit bus driver with memory and tri-state outputs
DS 8216 D parallel bidirectional 4-bit bus driver with tri-state outputs
DS 8282 D non-inverted 8-bit bus driver and memory with tri-state outputs
DS 8283 D inverted 8-bit bus driver and memory with tri-state outputs
DS 8286 D non-inverted bidirectional 8-bit bus driver with tri-state outputs
DS 8287 D inverted bidirectional bus driver with tri-state outputs

The supply voltage is that known from the TTL series; the following technical data vary with type. U_{0H} >= 2.4 to 3.65V, U_{0L} <= 0.45 to 0.6V, $-I_{1L}$ <= 250 microA to 1 mA, I_{1H} <= 10 to 50 microA, output current in the high-ohm state $-I_{0Z}$ <= 50 microA, forward voltage of input diode <= 1 to 1.5V, current draw I_S <= 70 to 160 mA.

The SU 178, SU 179 and SU 180 Si-npn power switching transistors are designed for use in electronic fluorescent lamp ballasts; they switch 35W or 60W, U_{CEM} = 800 to 1,200V, I_C = 5 to 7.5A.

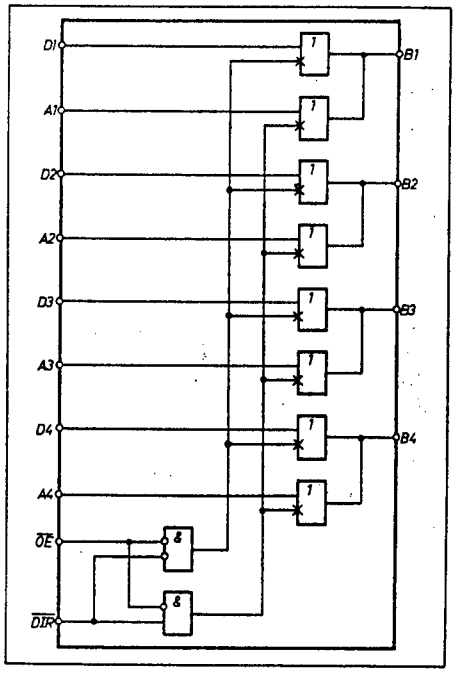


Fig. 9. DS 8216 D interface circuit logic, Frankfurt (Oder) Semiconductor Plant VEB

Berlin Television Electronics Plant VEB

The new L 133 C CCD array is designed for use in electronic television cameras. It has 1,024 image dots, two transient gates and four BCCD analog shift registers.

The MB 125 optocoupler is a miniaturized reflex coupler available with or without assembly aids. The transmitting diode emits infrared light; its reverse voltage is 3V; the forward current is 50 mA. On the receiving side is a phototransistor, the collector-emitter voltage of which can be 16V. Maximum collector current is attained at object distances of 1.5 mm; at 4 mm, it drops to half this value. The IR diode cathode and phototransistor emitter are connected to each other; the base has remained open.

Two new IR emitter diodes, the VQ 121 and VQ 123, were shown. Their power dissipation is 100 mW each; their reverse voltage is 4V; the forward current is 50 mA (VQ 121) or 100 mA (VQ 123). The forward voltage is 1.5V at I_F = 50 mA; both types radiate on the 940-nm wavelength.

Matching these IR emitter diodes in design and parameters are the SP 212 and SP 213 IR phototransistors. They have been designed together especially for making photo sensor assemblies in toys, entertainment electronics and naturally in appliances. P_{tot} = 100 mW, U_{CE} = 50 V, I_C <= 100 nA at U_{CE} = 5 V (SP 212) or 25 V (SP 213), λ = 850 nm.

Design variants of familiar LED's are the VQA 19, VQA 29, VQA 39 and VQA 49 LED's which are of triangular shape. They are available in red, yellow, green and orange colors.

Dresden Microelectronics Research and Technology Center VEB

The new U 40511 D CMOS circuit has a BCD seven-segment decoder with intermediate storage. In addition to the digits 0 to 9, the hexidecimal characters A, b, c, d, E and F are indicated.

The U 214 D is a 4K-bit RAM. It is organized in 1,024 x 4 bits and has random access. Access times are 200 to 450 ns. TTL-compatible signal level; in the unactivated state, the power draw is reduced. Supply voltage is 5V; the chip is made in n-channel Si gate technology and comes in an 18-pin DIP.

The Soviet Union

The Elektrotekhnika Foreign Trade Enterprise was well represented with integrated circuits in all classes. But the focus was on component families for microprocessor systems in the most varied technologies. The KR 580 series is a family of seven nMOS circuits equivalent to the I 8080 A system. (All equivalents listed in our fair report were supplied by the Soviets and are also shown in the corresponding specification sheets.) The word size of this series is 8 bits, cycle time is 2 microseconds and supply voltage is 5V. Following types were shown:

KR 580 VN 59	programmable interrupt control (8259)
KR 580 IK 51	programmable communication interface (8251)
KR 580 IV 53	programmable interval timer (8253)
KR 580 IK 55	programmable peripheral interface (8255)
KR 580 IK 57	programmable DMA controller (8257)
KR 580 IK 80 A	CPU (8080 A)

The K 586 series is made in nMOS technology. Supply voltage is 5V; cycle time is 0.5 microsecond; processing width is 16 bits. Five circuits in this series were shown:

K 586 VYe 1	single-chip microcomputer (16-bit)
K 586 IK 1	single-chip microprocessor (16-bit)
K 586 IK 2	8-bit I/O circuit
K 586 RU 1	static RAM (no further details)
K 586 RYe 1	ROM (no further details)

The KR 588 CMOS microprocessor family also operates with a 5V supply voltage, has a cycle time of 2 microseconds and processing width of n x 16 bits. Of the nine in this series, six were represented:

KR 588 VA 1	line receiver
KR 588 VG 1	system control
KR 588 VO 2	control storage
KR 588 VR 2	16-bit arithmetic expander
KR 588 VS 2	16-bit arithmetic unit
KR 588 IR 1	buffer register for multiplex operation

In addition, these three types are listed in the catalog:

KR 588 IK 1	expanded control storage
KR 588 IK 2	expanded 16-bit ALU
KR 588 IK 3	extended arithmetic expander

The K 1800 ECL microprocessor family is equivalent to the international MC 10800 series. Cycle time is 10 ns; word length is n x 4 bits; supply voltage is -5.2V. Eight types in this series were shown:

K 1800 VA 4	ECL-TTL level converter
K 1800 VA 7	line driver
K 1800 VB 2	synchronizer
K 1800 VR 8	programmable multidigit shift circuit
K 1800 VS 1	arithmetic-logic unit
K 1800 VT 3	high-speed storage controller
K 1800 VU 1	microprocessor controller
K 1800 RP 1	dual address memory

The K 1801 series is a nMOS family; it can be used to build very complex circuits. Word length is 16 bits, cycle time is 2 microseconds, and supply voltage is 5V. An interesting component in this series is the K 1801 VP 1 NOT gate array used to implement various circuits. A chip in this matrix is equivalent to fifty K 155 (standard TTL) series and K 561 (standard CMOS 4000) circuits. It has 300,000 elements, power dissipation of 0.9W and dimensions of 4.4 mm x 4.4 mm. Compared to building a circuit with components in the other series named above, the power draw has been reduced to one tenth and the reliability has been raised 20-fold.

The other components in this series are:

K 1801 VYe 1	single-chip microcomputer
K 1801 VM 1	single-chip microcomputer
K 1801 VP 1-30	interface adapter for RAM interface, RAM control
K 1801 VP 1-33	interface control for floppy disk, parallel inputs
K 1801 VP 1-34	parallel programmable interface, interface exchange, interrupt control, buffer register
K 1801 VP 1-35	interface priority
K 1801 RYe 1-00	(4096 x 16)-bit ROM

Components in this series are used to build the Elektronika NMS 111 00.1, 16-bit, single-board computer. It can be programmed in Assembler, Basic, Fortran, Pascal and Modula 2. Computation speed is 500,000 operations/second; word size is 16 bits, matching that of the components; power draw is 14W. RAM capacity is 28K x 16 bits; system ROM capacity is 4K x 16 bits; expanded memory of the same size can be driven. Peripherals that can be connected include an alphanumeric display, a floppy disk station, and an alphanumeric printer through the byte-parallel interface.

The K 1802 with word size of n x 8 bits is a low power Schottky TTL microprocessor series. Cycle time is 0.15 microsecond. There are now seven types in the series; these six were shown in Leipzig:

K 1802 VS 1	8-bit arithmetic processor

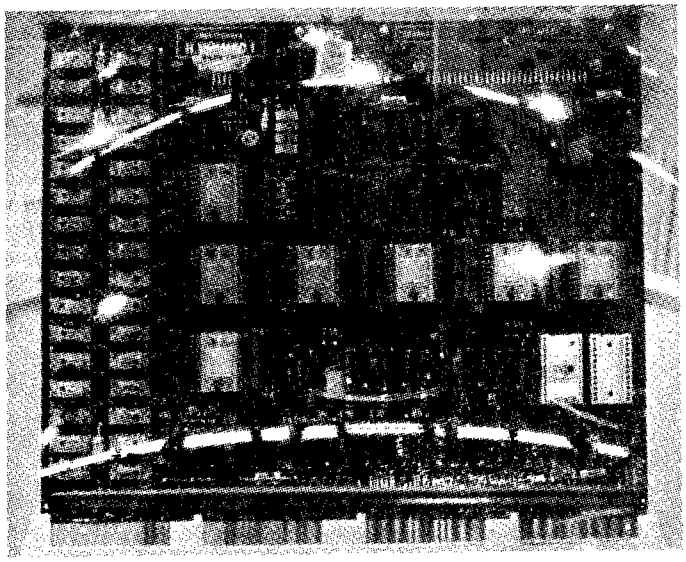


Fig. 10. Elektronika NMS 111 00.1 16-bit single-board computer, Soviet Union

K 1802 VV 1	interface exchange circuit
K 1802 VV 2	interface circuit
K 1802 VR 2	(8 x 8)-bit multiplier and divider
K 1802 IR 1	dual address general-purpose register to 64 bits

The sixth IC in this system is the KR 556 RT 1, a programmable logic array.

The memory circuits exhibited were of great interest to all specialists visiting the fair. Data on them are shown in the table included in this report on the fair.

Another group of modern IC's were those for digital-to-analog [DAC] and analog-to-digital converters [ADC] and the voltage comparators. The technical data were largely not yet in the catalogs, but listing the international equivalents makes up for this.

KR 521 SA 4	high-speed voltage comparator with low supply voltage and complement output, t = 26 ns (SE 525 K)
KR 554 SA 1	voltage comparator, t = 120 ns (microA 711)
KR 554 SA 2	voltage comparator, t = 130 ns (microA 710)
KR 554 SA 3	highly sensitive voltage comparator, input current I_E = 10 nA, U = 3 mV (LM 311)

Typ (1)	Speicherumfang in bit (2)	Auswahlzeit in ns (3)	Verbraucher-leistung in mW (4)	Technologie (5)	Äquivalenztyp (6)
MOS-EPROMs					
КР 558 РР 1	2 048 (256 × 8)	2 000	200	pMOS	BOPAM-6000
КР 558 РР 2	16 384 (4 096 × 4)	800	800	pMNOS	—
КР 573 РФ 1	8 192 (1 024 × 8)	900	1 200	nLISMOS	2708
КР 573 РФ 2	16 384 (2 048 × 8)	900	1 200	nLISMOS	2716
К 573 РФ 11–14	4 096 (512 × 8)	900	1 200	nLISMOS	2704
К 1601 РР 1	4 096 (1 024 × 4)	2 000	800	nLISMOS	ER 2401
MOS-RAMs					
К 561 РУ 2	256 (256 × 1)	600	100	CMOS	CD 4061 A
КР 565 РУ 1	4 096 (4 096 × 1)	200	700	nMOS	2107 A
КР 565 РУ 2	1 024 (1 024 × 1)	450	325	nMOS	2102 A
КР 565 РУ 3	16 384 (16 384 × 1)	200	460	nMOS	MK 4116-4
КР 565 РУ 5	65 536 (65 536 × 1)	150	250	nMOS	—
К 565 РУ 6	16 384 (16 384 × 1)	120	150	nMOS	—
К 573 РУ 1	1 024 (1 024 × 1)	800	30	CMOS	1M 6508
К 573 РУ 2	4 096 (4 096 × 1)	370	500	CMOS	NM 6504-5
bipolare RAMs					
К 155 РУ 5	256 (256 × 1)	7	700	TTL	93410 DC
К 155 РУ 7	1 024 (1 024 × 1)	30	700	TTL	93425
К 500 РУ 148	64 (64 × 1)	15	583	ECL	MCM 10148
К 500 РУ 410	256 (256 × 1)	40	680	ECL	95410
К 500 РУ 415	1 024 (1 024 × 1)	30	725	ECL	95415
bipolare ROMs (nach Katalog)					
К 155 ПР 6–7	256 (32 × 8)	40	560	TTL	SN 74184/74185
К 155 РЕ 21–24	1 024 (256 × 4)	60	630	TTL	SN 74187
К 556 РЕ 6	16 384 (2 048 × 8)	60	800	LSTTL	—
К 596 РЕ 1	65 536 (8 192 × 8)	350	750	TTL	—
bipolare PROMs (nach Katalog)					
К 155 РЕ 3	256 (32 × 4)	60	560	TTL	8223
К 500 РЕ 149	1 024 (256 × 4)	35	710	ECL	MC 10149
КР 556 РТ 4	1 024 (256 × 4)	90	680	LSTTL	3601
КР 556 РТ 5	4 096 (512 × 8)	90	650	LSTTL	3604

Table. List of USSR semiconductor memory IC's exhibted

Key:

1. type
2. storage size in bits
3. select time in ns
4. load power in mW
5. technology
6. equivalent type

MOS EPROMs	MOS RAMs	bipolar RAMs	bipolar ROMs (from catalog)	bipolar PROMs (from catalog)
KR 558 RR 1	K 561 RU 2	K 155 RU 5	K 155 PR 6-7	K 155 RYe 3
KR 558 RR 2	KR 565 RU 1	K 155 RU 7	K 155 RYe 21-24	K 500 RYe 149
KR 573 RF 1	KR 565 RU 2	K 500 RU 148	K 556 RYe 6	KR 556 RT 4
KR 573 RF 2	KR 565 RU 3	K 500 RU 410	K 596 RYe 1	KR 556 RT 5
K 573 RF 11-14	KR 565 RU 5	K 500 RU 415		
K 1601 RR 1	K 565 RU 6			
	K 573 RU 1			
	K 573 RU 2			

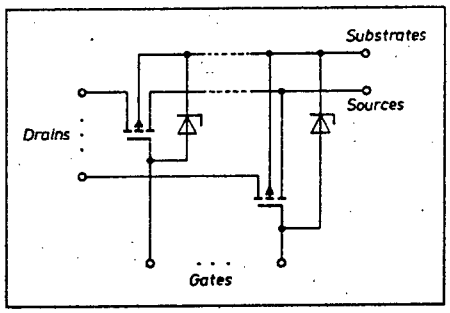


Fig. 11. K 190 KT 1 and K 190 KT 2 switches, Soviet Union

KR 572 PA 1	10-bit DAC, follow-up time 5 microseconds (AD 7520)
KR 572 PV 2	10-bit ADC with LED driver (ICL 7107)
KR 597 SA 1	high-speed voltage comparator with TTL output (AM 686)
KR 597 SA 3	two voltage comparators with low power draw, P = 60 mW (ICB 8001 C)
K 1108 PA 1	12-bit DAC, t = 0.4 ns (M 1562)
K 1113 PV 1	ADC with 8 to 10 bits, conversion time 30 microseconds (AD 571 KD)

According to the fair exhibits, the K 561 CMOS series now has 32 types; some are equivalent to the CD 4000 series and some to the MC 14000. But there are also types which have no equivalent in these two families. The power draw per gate is 0.4 microW maximum; typical delay time is 50 ns; U_S = 3 to 15 V.

Switches and changeover switches are needed for many control tasks. Types K 190 KT 1 and K 190 KT 2 have five or four electronic changeover switches with MOSFET's. Reverse voltage is -6V; a total current of 500 nA or 400nA can flow. Channel resistance is 300 ohms for the K 190 KT 1 and 50 ohms for the K 190 KT 2.

Other changeover switches from the KR 590 series were shown:

KR 590 KN 1	8-channel changeover switch with decoder, U_S = 5V, R = 200 ohms
KR 590 KN 2	4-channel changeover switch with controller, U_S = 10V, R = 100 ohms
KR 590 KN 3	quad 2-channel changeover switch with decoder, U_S = 15V, R = 300 ohms
KR 590 KN 4	4-channel changeover switch, U_S = 15V, R = 75 ohms
KR 590 KN 5	analog changeover switch (4 switches for one-band switching), U_S = 15V, R = 70 ohms
KR 590 KN 6	8-channel changeover switch with controller, U_S = 15V, R = 300 ohms
KR 590 KN 7	analog changeover switch with controller (two-band changeover switching), U_S = 15V, R = 30 ohms
KR 590 KT 1	4-channel changeover switch

There were 15 different op amps, both old and modern types, shown at the fair. Here is a review of them with their international equivalents:

KR 140 UD 1 A, B, V	general-purpose op amp, U = 7 mV, I_E = 5 mA (microA 702)
KR 140 UD 2 A, B	double op amp with internal frequency compensation (microA 747)
KR 140 UD 4 A, B	precision general-purpose op amp (NL 108)
KR 140 UD 6 A	op amp with internal frequency compensation and low currents, U = 5 mV, I_E = 30 mA, SR = 2.5 V/microsecond (microA 741)
KR 140 UD 12	op amp with programmable power draw, U = 10 mV, I_E = 250 microA (microA 776)
KR 140 UD 13	DC preamplifier with a difference input, U = 0.5 V, I_E = 3 mA
KR 153 UD 4	low power op amp, U = 5 mV, I_E = 0.4 mA, SR = 0.5 V/microsecond, P = 80 mW
KR 153 UD 5	precision op amp, U = 1 mV, SR = 3 V/microsecond (microA 725)
KR 153 UD 6	general-purpose op amp, U = 2 mV, I_E = 75 nA (LM 101 A)
K 157 UD 1	middle-power op amp
K 157 UD 2	2-channel op amp, I_E = 500 nA
KM 551 UD 1 A, B	2-channel op amp with low noise, noise voltage 30 microV/Hz, U_A = 10V (TBA 931)
KR 553 UD 1 AM	op amp with external frequency compensation, U = 5 mV, I_E = 0.6 microA (microA 709)
KR 553 UD 2	general-purpose op amp, U = 10 mV, I_E = 500 nA (LM 101)
KR 554 UD 1 A, B	op amp with high input resistance, U = 75 mV, I_E = 0.15 nA (microA 740)

With such a comprehensive overview of Soviet semiconductor components, the Soviet foreign trade firm was able to meet urgent information requirements in the GDR. We must note that the K 155 TTL (standard TTL), the K 555 low power Schottky TTL, the K 531 Schottky TTL, and the K 500 ECL (MC 10000) series were also represented.

Besides the components listed above, the USSR has introduced others, though following the trend, for which the specification sheets or written performance information are to be made available. Since these are surely also of interest to our readers, we want to list here some component families not exhibited.

A large-scale integrated [LSI] gate array, designated the NVM BIS, can be used for the most varied tasks. It is made in nMOS technology and has 520 logic elements, 80 amplifiers and 40 I/O circuits. For special applications, 61 modified logic elements, 5 modified amplifiers and 12 modified I/O circuits can be installed. The chip has a density of 360 elements/mm^2. The operating frequency of the circuits is 10 MHz. There are 7,000 integrated transistors. Power draw is 700 mW maximum. All chip elements can be connected to form a closed LSI circuit.

Following are other microprocessor families. The K 581 MOS series needs two supply voltages of 12V and 5V, has a 0.4-microsecond cycle time and is equivalent to the international CP 1600 series. These IC's belong to this family:

K 581 VYe 1	single-chip microcomputer (no equivalent)
K 581 IK 1	arithmetic-logic unit with memory (CP 1611)
K 581 IK 2	time sequence controller of operations (CP 1621)
K 581 RU 1	microprogram memory for routines (CP 1631-07
K 581 RU 2	microinstruction memory (CP 1631-10
K 581 RU 3	ROM for arithmetic operations (CP 1631-15
K 581 RU 4	high-speed 16K-bit dRAM (MK 4116)

The K 583 microprocessor family is made in I^2L technology. Supply voltage is 1.2 to 5 V; cycle time is 1.0 microsecond. No equivalent family was given. These IC's belong to this family:

K 583 VM 1	logic processor with buffer storage
KR 583 VS 1	universal microprocessor
K 583 IK 1	incremental processor
K 583 KP 1	communications processor
K 583 KP 2	bus receiver and driver with storage
K 583 KP 3	bus receiver and driver with storage
K 583 KL 1	programmable bus

The K 587 CMOS series requires 9V supply voltage and has a 2-microsecond cycle time. These IC's belong to this family:

K 531 AP 2	dual voltage amplifier which enables operation together with IC's in various series
K 587 IK 1	expander for information exchange
K 587 IK 2	serial expanded arithmetic processor
K 587 IK 3	expanded arithmetic unit
K 587 RP 1	expanded control storage

The K 589 microprocessor family is a Schottky TTL series with 5V supply voltage and 100-ns cycle time. Nine IC's belong to this family:

K 589 AP 16	non-inverted bus driver (3216)
K 589 AP 26	inverted bus driver (3226)
K 589 IK 01	microprogram control (3001)
K 589 IK 02	central processor unit (3002)
K 589 IK 03	accelerated data transfer circuit (3003)
K 589 IK 14	priority interrupt (3214)
K 589 IR 12	multiplex buffer register (3212)
K 589 RA 4	associative memory (3104)
K 589 KhL 4	multiplex synchronization (-)

And finally, there is the K 1804 low power Schottky TTL series with 5V supply voltage and 110-ns cycle time. The Am 2900 series was named as the equivalent. Five IC's belong to this family:

K 1804 VR 1	accelerated data transfer circuit (Am 2902)
K 1804 VS 1	4-bit microprocessor element (Am 2901)
K 1804 VU 1	micro instruction control (Am 2909)
K 1804 VU 2	micro instruction control (Am 2911)
K 1804 VU 3	address control.

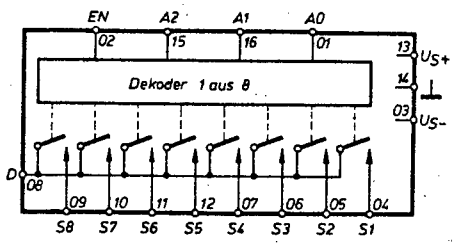


Fig. 12. MAC 08 A analog multiplexer, CSSR

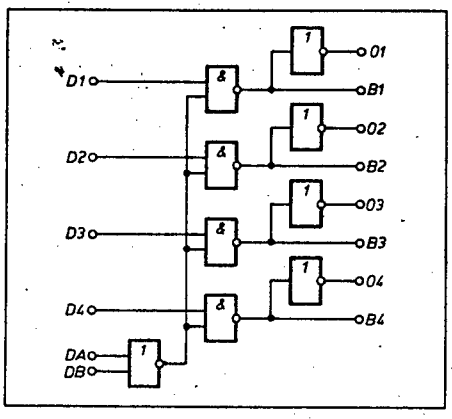


Fig. 13. MH 8641 quad bus driver and receiver, CSSR

CSSR

Tesla Roznov k.p.

The MAC 01, MAB 01 and MAB 01 D IC's are voltage reference circuits for 10V. The MAC 01 is the leading type. The stated output voltage is temperature and short-circuit stable; the stability can be set to $\pm$3%. It is used in ADC's and DAC's. Supply voltage is 10 to 40 V, 0_a = -55 to 125°C, output voltage is 10V $\pm$ 0.05V, stability factor is 0.01%/V and 0.01%/mA, TK_1 <= 25 x 10^{-6}/K, output noise voltage <= 30 microV within 0.1 to 10 Hz.

The MAC 08 A analog multiplexer with the derived types MAC 08 B, MAE 08 A and MAE 08 B requires a typical supply voltage of 15V. Its transient resistance R_{ON} <= 300 ohms or <= 400 ohms (B types). In the quiescent state, the input current is below 0.1 nA.

The MH 100 IC is a high-speed ring interpolator. The MH 102 is an (8 x 8)-bit multiplexer. We have no technical data on either one yet.

The MH 82 S 11 bipolar RAM has 1,024 bits organized as 32 x 32 bits and is made in Schottky technology. The MH 8224 system controller and bus driver belongs to the 8080 microprocessor system. Among others things, it has an oscillator and a 1:9 divider. Another peripheral component for this system is the MH 8228 IC which has several I/O components and memory. The MH 8641 is a high-speed quad bus driver and receiver designed for data transfer systems. Bus resistance is greater than 120 ohms. Transfer times are below 30 ns.

Although neither semiconductor nor microelectronics, the 671 QQ 22 in-line semitoroid color picture tube, which was shown for the first time at the Leipzig Fair, should be mentioned here.

Tesla Piestany k.p.

The MHB 2102 A IC is a programmable serial interface. MHB 2114 is the designation for a static 4K-bit RAM. The MHB 5085 is used for programmable frequency selection. The KF 907 MOS tetrode is intended for use in UHF equipment. Technical data were unfortunately not available.

Hungarian People's Republic

The Hungarian People's Republic was also represented this year by its foreign trade firm Elektromodul with numerous semiconductor components. From the comprehensive catalog, we gather that a large variety of components is being made now in Hungary. Still brand new and therefore without data were the TMX 50 and TMX 18 analog multiplexers. The 74 LSxxx PC low power Schottky TTL series has 44 types; the 74xxx PC standard TTL, 122 types. Available for data transfer, memory control, level conversion and general purposes are 30 interface IC's; the series is designated 75xxx PC. Six op amp types are available: the microA 709 PC, microA 739 PC, microA 741 PC, microA 747 PC, microA 748 PC, and microA 777 PC. The 8080 microprocessor is also manufactured in Hungary under the designation 8080 PC. Besides the 8080 PC CPU, this microprocessor system includes the 8212 PC (8-bit I/O port), 8216 PC (bidirectional 4-bit bus), 8224 PC (clock generator and driver) and the 8226 PC (bidirectional 4-bit bus).

The development of hybrid circuits in Hungary has obviously not been neglected, although there is a good program for monolithic integrated circuits. Numerous hybrid IC's were exhibited; the catalog listed them as precision resistance networks, thyristor controlled power controls, hearing aid amplifiers, attenuators, active RC filters and DAC's.

Passive Components

Electronic Components Combine VEB

Alert fair visitors will note that some of the exhibits marked as new products at the Electronic Components Combine VEB stand are not included in what follows. They were, however, already exhibited last year; see our fair report in issue number 6 (1982).

The Gera Electronics VEB displayed several new capacitors. Capacitors with enhanced electrical and mechanical protection against short circuits are the ceramic, disk-shaped RF suppressor capacitors (Y) which are used especially in entertainment electronics. This round disk, ceramic capacitor with $\mathcal{E}$ = 5,000 has the following technical data:

nominal AC voltage	250V
capacitance range	82 pF to 3.6 nF
raster size	5 mm and 7.5 mm
test class (IEC 68)	40/085/21

Especially suited for applications in which high frequencies occur, e.g. in the VHF and UHF bands, are the TEZ 7/12 trapezoidal ceramic disk capacitors. These low-inductance plug-in components can be used for automatic equipment.

nominal DC voltage	250V
capacitance range	2.2 pF to 1.5 nF
capacitance tolerance	+0.5 pF - 10%
component height	7 mm and 12 mm
thickness	0.9 mm and 1.1 mm
test class (IEC 68)	40/085/10 (storage check)

Especially for high-level signal stability in VHF-UHF tuners in the television industry where high accuracy of capacitance values is required, the Gera Electronics VEB offers ceramic, low-value, disk capacitors, which besides capacitance values under 1 pF have the important advantage of guaranteeing a very small capacitance tolerance.

nominal DC voltage	100V
capacitance range	0.22 to 2.2 pF
capacitance tolerance	+0.1 pF
raster size	7.5 mm
diameter	4.0 mm maximum
test class (IEC 68)	40/085/21

The MKP motor service capacitors from Gera are used to produce torque in single-phase induction motors and for operation of three-phase current motors on a single-phase network. They have a metallized polypropylene dielectric and are housed in a flame-retardant plastic cup, molded with epoxide resin. They have the advantage of spontaneous healing, surge resistance, very low loss, high insulation quality, small dimensions and mass. Design shapes with flat connectors and with connector wires are available, whereby optional housings can be supplied with or without M8 threaded bolts.

nominal AC voltage	240V, 320V, 400V
capacitance range	1 to 25 microF
capacitance tolerance	+10%
dimensions in mm	25 x 53 to 45 x 126
applications class	HPFPU (to 8 microF) HSFNT (from 10 microF)

New in the manufacturing program of the Dorfhain Electronic Components VEB were variable film resistors with a 12.5 mm width. The variety of the variable film resistors has been expanded by

simple variable film resistors for normal wiring,
nominal size 685.127.2 type 250
simple variable film resistors for printed circuit boards,
nominal size 635.127.2 type 255
tandem variable film resistors for normal wiring,
nominal size 705.1213.2 type 261, and
tandem variable film resistors for printed circuit boards,
nominal size 655.1213.2 type 268.

Rated dissipated power	curve: lin 0.05W curve: log.; neg. log 0.03W

temperature range	-10 to +70°C
resistance values	
curve lin., log.	100 ohms to 1 megohm
and neg. log.	1 kilohm to 1 megohm
central strength	M 7 • 0.75
wavelengths	metal waves (12) 20 mm and 32 mm
wave ends	Ø 6 mm knurled, slit
	Ø 4 mm smooth and with face
tandem synchronism	6 dB

Also new are the encapsulated positioning devices of the type series 150 - TGL 39 014. With this series, in the area of carbon colloid film positioning devices, requirements for ease of plug-in and automatically alignable components in the shape of compact modular designs have been realized:
--encapsulated positioning device, width 9.8 mm
--emulsion support laminated paper, T-emulsion
--black plastic package
--versions "P" (raster 2.5 mm by 5 mm) and "S" (raster 5 mm x 10 mm)
--for automatic line up with interior hexagon (key width 2 mm)
--version with set slot also possible (2.5 mm x 0.8 mm)
--versions with and without rotary range limit
--suitable for automatic plug-in and machine soldering
--protected against dust and contamination by flux

Technical Parameters:

--nominal resistance R_N	100 ohms to 4.7 megohms according to series E 3
--nominal dissipated power	0.1W at 40°C
--temperature range (climatic reliability)	-25 to +70°C

The interface plug connection system from the Gornsdorf Contact Components and Special Machine Building VEB is suitable for device coupling and device slide-in technology. It is a male and female connector system and corresponds in its basic conditions to the five standard package sizes of the IEC 48 B secretariat 126.

The set of connectors offers these advantages:
--international standard connectors
--high contact density
--electrical shielding by a metal sheathe
--high reliability
--trapezoidal shape ensures non-reversibility of plug
--hoods and bar accessories for completion.

The male and female connectors are available in these models:
--hand-soldered connectors, 9-, 15-, 25-, 37- and 50-pin for a connector wire cross section to 0.5 mm^2
--cut terminal connectors, 9-, 15-, 25- and 37- pin for a AWG 28 ribbon cable in raster 1.27mm
--crimp connectors, 9-, 15-, 25-, 37- and 50-pin for a connector wire cross section to 0.14 to 0.5 mm^2

--printed circuit board [PCB] connectors, straight line, 9-, 15-, 25-, 37- and 50-pin, 0.65-mm maximum terminal pin diameter, 2-mm maximum PCB thickness, connection pattern of solder pins corresponds to IEC 48 B secretariat 126
--PCB connectors, angular, 9-, 15-, 25-, 37- and 50-pin, 0.65-mm maximum terminal pin diameter, 2-mm maximum PCB thickness, connection pattern of solder pins corresponds to IEC 48 B Secretariat 126.

PHOTO CAPTIONS

1. p 347. MB 125 optocoupler, Berlin Television Electronics Plant VEB.

2. p 347. Light emitting diodes, Berlin Television Electronics Plant VEB.

Photos by Werkfotos (2), K. Schwarzer (1).

Measuring, Data Acquisition Devices

East Berlin RADIO FERNSEHEN ELEKTRONIK in German Vol 32 No 6, Jun 83 pp 357-366

[Article by K. Eckert and G. Raab]

[Text] GDR. The Dresden "Otto Schoen" Robotron Measuring Electronics VEB exhibited the M 2300 clinical dosimeter. It is a radiation monitor equipped with the Robotron K 1520 microcomputer and is used to meter the doses and dose rate of X-, gamma- and high-energy quantum radiation in the energy band from 6 keV to 50 MeV.

This device is used primarily in X-ray diagnostics and radiation therapy. Other applications are measurement of radiation fields, parameter checking for linear accelerators, metrological monitoring of radiobiological experiments, performance of radiation protection measurements, and reference dosimeter for monitoring and calibrating other radiation measuring devices. The user has the advantage of on-line data processing through the microcomputer as well as data and program storage. It has a clear display and control panel and is built in the 19" case system. Use of a thermostat in the electrometer amplifier ensures long-term stability and insensitivity to high humidity.

Operating modes and states are set by switches and lighted pushbuttons and are thereby identifiable at all times. A keyboard is used to input parameter values. When the control switch is put in the start state, measurement of doses and the determination of maximum and minimum dose rates begin. At the same time, the average dose rate is formed from the relation of dose to measuring time. The start-stop switch can be controlled manually or externally.

Some technical data:

Measuring range	
dose	0.005 microGy to 9,999 Gy
dose rate	0.2 microGy/min to 200 Gy/min
quotient	10 to 120%
measuring time	0.01 to 1,000 min
Basic error for dose and dose rate	
calibrated equipment	$<$or = 4%
uncalibrated equipment	$<$or = 6%
Basic error for measuring time	$<$or = 0.1%
Displays	
digital	semilogarithmic with 4-position mantissa
analog	through microamperemeter
Measuring value outputs	
digital	according to SI 1.2
analog	0 to 10 V (R_i = 100 ohms)
Power draw	80 VA
Dimensions	
display section	446 x 252 x 300 mm
probe	106 x 100 x 244 mm
Weight	10 kg

The 05 001 pistonphone is used for acoustic calibration of sound level measuring devices and measuring microphones. It is used mainly in industrial hygiene (harmful noise measurement) and noise abatement (sound emissions and sound absorption measurements). Compared to other calibration aids, the chief advantage of this new pistonphone is that the sound pressure level is largely independent of temperature and aging. The systematic effect of the static air pressure is determined by reading a correction value from the barometer also supplied.

Like its predecessors, this new product is cam driven. Used for drive is a DC micromotor equipped with a pulse generator used to measure speed. The core piece in motor control is a U 4046 phase control IC.

Some technical data:

Unweighted sound pressure level, relative to 2 x 10^{-4} microbar = 20 microPa	about 124 dB (at 1.013 x 10^5Pa)
Frequency	250 Hz
Frequency error under reference conditions	$<$or = 1%
Sound pressure level error (guaranteed error limit) for one-inch measuring microphone under reference conditions	0.2 dB
Sound pressure level error (guaranteed error limit) for 1/2-inch and 1/4-inch measuring microphones under reference conditions	0.25 dB
Harmonic distortion	$<$ or = 3%
Operating temperature range	-20 to 50°C
Relative air humidity	$<$ or = 90%

For efficient use of noise protection facilities, when employees change their workplace, the noise dose, i.e. the time interval of the squared, A-weighted sound pressure, is measured first of all. The noise dose E is indicated in Pa^2h by the 00 080 noise dosimeter, which meets the requirements of the IEC draft, "Personal Noise Dosimeter." Therefore, the measured value is independent of a standard acceptable limit level which can be different and which changes from place to place. The equivalent continuous sound level can be computed from the measured noise dose E.

The new 00 080 noise dosimeter is a small, portable device which can be carried everywhere on the body of the person being monitored. The microphone, which is connected to the electronics by a 1-m cable, can be placed on a protective helmet, ear protector or collar near the ear. Mounting it directly on the device is another option.

A 1/2-inch capacitor microphone is used as the sound converter. After impedance conversion, the signal passes through a weight network (A-filter), is amplified, rectified and squared for measuring with the equivalence parameter q = 3. The signal is digitized in a current-to-frequency converter and fed through a frequency divider to a counter, the contents of which is indicated by a liquid-crystal display [LCD]. Over-peak values, over-modulation and overflows of the display range are stored and identified by marks on the display. The "battery check" mark is also used as an operating status indicator. To avoid manipulations, display of the measured value can be switched off during measurement. In doing so, display of battery voltage check and over-modulation remains visible.

Some technical data:

Display range	0 to 99.99 Pa^2h
	0 to 99.99 Pah
Parameter for division in half	q = 3 or q = 6 (internally switchable)
Frequency range	20 Hz to 8 kHz
Frequency evaluation	A-curve
Microphone	MK 201
Input sound level	
range I	80 to 120 dB(A)
range II	100 to 140 dB(A)
Short-time mesaurement	most possible in range I
Error margins	
basic error at 94 dB	$\pm$10%
error when range is switched	$\pm$0.2 dB
linearity error	$\pm$0.5 dB from 85 to 115 dB(A)
	$\pm$1 dB in total range
temperature error at 94 dB	$<$ 3%/10 K
Operating temperature range	-10 to +50°C
Transport and storage temperature	
range (without battery)	-20 to +70°C
Power supply	9V battery 6F22
Power draw	2 to 3.5 mA (level dependent)
Dimensions (without microphone)	78 x 31 x 166 mm
Weight (with battery and microphone)	420 g

The 00 090 sound level meter standard is a portable unit, independent of power mains. Its metering precision ensures reliable and repeatable meter results. It meets the requirements recommended by the IEC for a precision sound level meter and also the higher requirements for precision class 0. It is used as a standard of comparison for acoustic meters in precision classes 1 and 2, for noise measurements in industry for quality control, product checking and classification and for noise certificates and noise emission permits.

The technical concept of the 00 090 sound level meter standard largely corresponds to the 00 026 precision noise level meter with the enhanced precision requirements in class 0. Following are some different technical data:

Linear frequency range	
electrical	20 Hz to 20 kHz (-1 dB) (-2 dB)
acoustic	20 Hz to 20 kHz
Measureable level with 1/2" capacitor metering microphone KM 201/MV 201	
LIN	55 to 139.9 dB
A	35 to 139.9 dB
C	45 to 139.9 dB
Filter Ext. 1	30 to 99.9 dB
Filter Ext. 2	50 to 119.9 dB
Filter Ext. 3	70 to 139.9 dB
Reference sound pressure	$2 \cdot 10^{-5}$ Pa
Error bounds, basic error of unit at 80 dB and 1,000 Hz	
for L, L_{max}, L_T	<= 0.4 dB
for L_{eq}	<= 1 dB
Error of effective value formation	
to crest factor 5	<= 0.5 dB
to crest factor 10	<= 1 dB

The M 3003 printed circuit board [PCB] tester is used to check components, conductor courses and short circuits on soldered PCB's with components plugged in and to reduce error search time during connection function checking, improve quality of checked products by finding concealed errors and to reduce training requirements for test personnel.

The low test cycle time (about 15 s for an average PCB) meets requirements for use in highly productive electronic manufacturing lines. Dual adaptation eliminates additional adapting time. A special pulse meter system also provides low meter times with very large capacities.

Extensive analysis programs for the circuits being checked and the convenient editor and compiler program produce fast programming and make the use for manufacturing worthwhile too, in which there are many types with an average number of pieces. Additional peripherals (perforated tape unit, alphanumeric keyboard, serial printer and a second magnetic tape cassette unit) are available for programming.

Each circuit node in the unit under test is connected through contact pins in the adapter pin bed to the relay control panel. The needed proof force can be produced by vacuum or compressed air.

The relay control panel allows selecting and electrically isolating components to be measured in the unit under test. The measuring circuit sends the signals needed for measuring and generates them so that voltages U_x and times t_x are measured, from which the component values can be computed, in the analog-to-digital converter and pulse time meter.

The PCB's to be tested can have a maximum size of 300 mm x 500 mm. There are 1,344 adapting points, arrangeable in groups of 336 points each. No special ability is required for operation; training is easy. Data is processed by two K 1520 microcomputers; one operates as a metering computer (144K bytes maximum), the other as a control computer (112K bytes). Input for a measuring operation is exclusively through magnetic tape cassettes. Some 1,500 boards can be tested per shift. The equipment should pay for itself after about 2 years. Measurements possible:

Contact test	all adaptation points with low ohms
Resistors	1 to 10 ohms, basic error 1%
Capacitors	200 pF to 10,000 pF, basic error 3%
Inductors	10 mH to 100 mH, basic error dependent on surrounding circuit
Transistors	npn, pnp, FET
Diodes	to 30V supply voltage
Z-diodes	to 30V decade voltage, supply current from 10 microA to 100 mA
Line breaks, shorts in linear and digital IC's	realized through interchange and misrepresentation in the further development of the LPA 202
DC voltage measuring	range $\pm$0.5V, $\pm$5V, $\pm$50V, range automatic, resolution 12 binary bits, $\pm$0.5mV
Pulse time measuring	range end value 1.6 ms to 16 s, resolution 16 binary bits, in smallest time range 25 ns, evaluation level $\pm$5V, resolution 11 binary bits with sign
Frequency measuring	0.1 Hz to 40 MHz, resolution 16 binary bits trigger level: to 1 MHz as evaluation level, above 1 MHz TTL-level
DC current measuring	3 microA to 100 mA in 10 ranges, resolution 12 binary bits

In repairing electronic components and units with microcomputers, as with other logic circuits, the sizes of voltage, frequency, pulse length, pulse quantity, and pulse spacing have to be measured. In addition, new tasks include testing data streams at any circuit node points, testing program executions and checking bus systems, registers, storage units and I/O facilities.

The 1.6430 microcomputer diagnostic unit is a general-purpose test unit that handles all these tasks. It is used in repairing components and units which operate on the basis of the U 880 microprocessor, especially the K 1520 microcomputer system. The microcomputer diagnostic unit has these operating modes: frequency measurement, counting, time measurement, voltage measurement, signature analysis, event triggering, I/O testing and storage tests, bus checking, register reading, register writing, storage reading, and storage writing. Both PCB's and devices can be connected as the test object. The 1.6430 microcomputer diagnostic unit consists of a control unit, power supply and test object connector. The power supply supplies the operating voltages for the control unit, and the test object if it does not have its own power supply.

Since 1982, the Magdeburg "Erich Weinert" Measuring Equipment Plant VEB has been showing the pyrovar system with the HPN hand pyrometer, measuring range from 0 to 200°C, and the HPM, measuring range from 15 to 45°C, especially for medical applications. Among others, it is used for: temperature measurements on color film during manufacturing processes, temperature measurements on steel casts for reinforced concrete supports, determining the surface temperature of gallates in chemical fiber plants, diagnostics of clamp and bolt fastenings, circuit and separator contacts, conductor rails and fuses in low and medium voltage equipment, finding hot-boxes in conveyor systems, diagnostics of arthropathies and blood circulation disorders in humans.

Other models of the devices, which support additional applications, were exhibited at this year's fair.

Compared to the auxiliary sights used for HPN's until now, the hand pyrometer with a parallax-free, direct-view sight allows adapting the pyrometer to the object being measured more accurately. Since through a mirror reflex system, the pyrometer objective lens is used as the image reflection system as well, the parallax error is compensated for by adjusting the measuring distance. The mirrored chopper vane of the radiation modulation system enables viewing during the measuring process. A section of the object being measured is visible in the field of view of the direct-view sight, and a circle marks the measurement spot size needed for measurement and thus the part of the object being measured, the temperature of which is indicated by the pyrometer.

The HPA hand pyrometer for temperature measurements in the atmospheric window (measuring range is 0 to 200°C) differs from the HPN by the installation of an additional infrared filter in the pyrometer ray path. This limits the spectral sensitivity range of the pyrometer to the 8- to 14-micrometer portion. This part of the spectrum is designated as the "atmospheric window" because the earth's atmosphere is very translucent in this spectral area. This enables measurements unaffected by changes in air transparency and the carbon dioxide content of the air. Also the effect of solar radiation is heavily suppressed, because beyond the 8-micrometer wavelength, solar radiation has practically no effect. These properties enable measurement in the open air free of interference for the first time.

The HPG hand pyrometer is used for measurements on glass (measuring range is 50 to 2000°C). It also has a special infrared filter in the ray path. The working spectral range of 4.5 to 5.5 micrometers was selected for this device because glass has an emission degree near one here and the atmosphere is quite translucent. Thus, this device can measure the surface temperature of glass unaffected by flames or other media behind the glass and by change in the heated air between the pyrometer and the glass.

The HPH hand pyrometer (measuring range is 800 to 2000°C) is a general-purpose device. It is quite different from the other meters listed above. Since it is designed for the high temperature range from 800 to 2000°C, it has a different operating principle. A silicon photo diode operating on the equal light principle was used as the radiation receptor. Thus, this device can be used in the most varied metering tasks in rolling mills, metallurgy, the silicate industry, chemical industry and in the heat engineering processes of machine building.

The Mellenbach Measuring Equipment VEB, a firm in the Treptow "Friedrich Ebert" EAW [Electrical Apparatus Plant] Combine VEB," exhibited the autotest electric meter, which meets a current need for motor vehicle meter equipment associated with practice. It allows measuring some significant parameters for motor vehicles, which are important to optimal operation of an Otto engine. The device is suited for measurement in motor vehicles with one or more cylinder two-stroke motors, but also without restriction for four-stroke motors with vehicle voltage of 6V or 12V. The optoelectronic display elements used are vibration and impact resistant. Measured values can be read quite accurately because of the electrical design of both the DC voltage meter and the

tachometer with a series of LED's. In addition to both voltage and revolution amounts, the contact angle of the breaker is measurable; a built-in flash allows stroboscopic ignition time point measurements. A clearance checker with acoustic indicator is also built in.

Some technical data:	
DC voltage measurement	0 to 18V (precision class 5) 5.4 to 7.6V (precision class 2.5) 10.8 to 15.2V (precision class 2.5)
Tachometer	0 to 1200 min 0 to 6000 min (precision ±5%)
Breaker contact angle	28 to 72% (precision class 5)
Ignition time point setting	stroboscopic
Clearance checking	acoustic indicator, autonomous power 3V (two R 6 cells)
Ambient temperature	0 to 50°C
Dimensions	230 x 70 x 26 mm
Weight	0.5 kg

The Karl Marx Stadt Radio and Television VEB exhibited the AMS 531 antenna level meter. It has a screen for measuring the channel level and operates in the folowing frequency ranges:

UKW	87.5	to 108 MHz
VHF I	47	to 100 MHz
VHF II	174	to 230 MHz
UHF	470	to 790 MHz

Level ranges:

TV	about 30	to 129 dB (microV)
UKW	10	to 129 dB (microV)

In addition to utility power (220V ±10%), it can also be operated from an external 12V DC power source $\binom{+3.6}{-1.2}$V)

Soviet Union

The Soviet pavilion had only metering equipment designed to calibrate and test other meters. These products were developed according to GOST [State Standards] and, judging by the technological design, made only in small quantities.

The UPTU-2 is a device for testing an ultrasound echo pulse width meter. It consists of the S1-65 universal oscillograph and the fluid modeling equipment. The fluid modeling equipment structure includes the IZV-23 length gage with additional equipment for smooth shifting of the length scale. Attached to the bar is an extension with the layout converter and reflector which are housed in a tank with the immersion fluid. The equipment allows determining a number of additional technical characteristics of the width meter: excitation pulse amplitude, excitation pulse duration, duration of leading edge, throughput time of ultrasound pulse in delay lines in the converter, operating frequency of the converter, pulse factor of conversion of the converter.

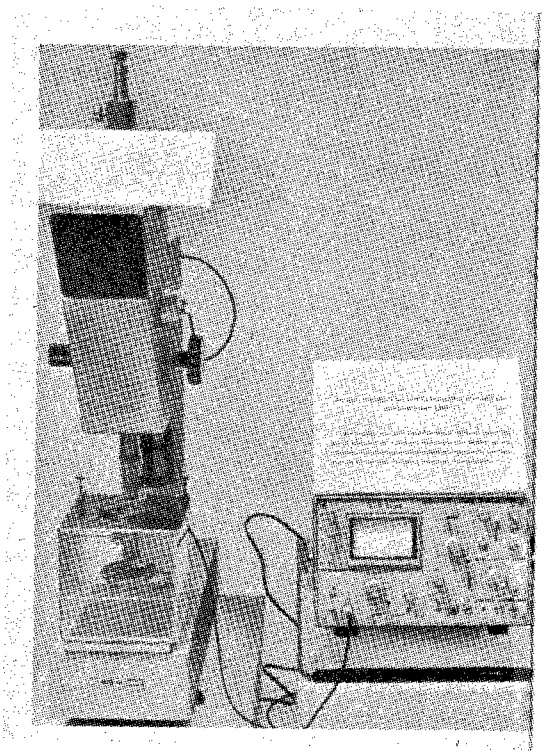


Fig. 2. UPTU-2 unit for checking ultrasound echo pulse width measurements, Soviet Union

Some technical data:

Range of modeled gage in mm	$100 \frac{v_M}{2v_M}$
steel	0 to 200
Displacement range of converter in mm	0 to 100
Ultrasound rate in water at 293 K v_W	1,483 m/s
Ultrasound rate in modeled materials v_M	3,000 to 8,000 m/s
Dimensions	
fluid modeling equipment	360 x 850 x 410 mm
oscillograph	300 x 180 x 420 mm
Weight	
fluid modeling equipment	45 kg
oscillograph	16 kg

The IMO-2N device is used to meter the power of radiation of continuous and pulsing lasers with repetition rate of 5 kHz and laser radiation energy in free operation. It has a display section, meter head with adjustments, power attenuator and sight. A disk attenuator is provided for metering medium power of laser radiation from 1 to 100W. The operating principle of the device is based on converting the laser radiation power, which has been read by the detector head, into thermal EMK [electromotive force] with subsequent amplification and recording of meter results.

Some technical data:	
Meter range of medium power	
with the device directly	10^{-3} to 1 W
with power attenuator	3 to 10 W
Wavelength	0.3 to 10.6 micrometers
Maximum radiation energy	20 J/cm^2
Diameter of laser radiation beam at device input	12 mm
Time interval between two successive measurements	
medium power	2.5 min
energy	1.5 min
Dimensions	
display section	488 x 380 x 135 mm
meter head with table	170 x 184 x 310 mm
power attenuator	165 x 210 x 280 mm
Weight	<= 30 kg

The measurement method and crack meter sensor are intended for investigating how far cracks have spread in assessing cracks in metallic and nonmetallic materials, components and structures in large objects under static and statically distributed stress. Using the sensor allows signifcantly better strength tests of aircraft structures, main gas line pipes, ships and other structures requiring measurement of crack parameters. The crack sensor is made as a continuous layer of conducting material which is attached by an insulation substrate to the test object under investigation. Sensor size depends on the maximum crack length assumed and the maximum amount of deviation from crack propagation in a straight line.

Some technical data	
Crack length	50 to 500 mm
Sensor dimensions	
length	55, 110, 260, 510 mm
width	25, 30, 50, 100 mm
Measuring error	0.2 to 0.5% (depending on measuring area)
Maximum material stress in which the sensor remains operable	> 5%
Operating temperature	-150 to 400°C

The IVS-RM unit for measuring characteristics of highly stable signals is intended for investigating signals from stable and highly stable sources under production conditions, in scientific research, and in state and official

supervisory agencies. It allows metering small frequency variations of less than 0.5 Hz. Advantages are the high readiness for use in performing measurements, the high metering precision and the validity of meter results. It consists of a phase shifter, phase modulator, low-noise amplifier, high-pass filter, and voltmeter for mean quadratic values. Using the IVS-RM together with series-produced standard devices allows producing signal sources that are calibrated to frequency deviations or phase deviations in a broad frequency band.

CSSR

Expanding the VMS-1 selective wobble meter station, the APP 31 sideband analyzer is used for analysis of the TV broadcasting spectrum. It allows fast monitoring or also precise measurements of sideband characteristics of a TV transmitter in the bands from I to V CCIR-D,K (CCIR-B,G). One to three oscillators can be plugged in to match the desired TV band and the frequency shift of the transmitter and to allow switching one to three TV band frequencies and the intermediate frequency. The frequency cycle of the video carrier is measured in the frequency range of 5 kHz to 8 MHz. It can be displayed on the monitor after connecting the ZJ 1 visual display unit. An X-Y recorder can also be used to plot the course represented. The device can optionally be switched to low-distortion or low-noise operation.

Some technical data:

Frequency ranges	band I to V according to CCIR-D, K and CCIR-B, G
Intermediate frequency	38 MHz, 38.9 MHz
Input impedance	50 ohms (75 ohms)
Standing wave ratio SWV	1.05 maximum
FS modulation level range	6 to 60 %
Frequency range	$\pm$8 MHz
Frequency cycle	
-1.5 to +1.5 MHz	$\pm$0.2 dB maximum
-8 to + 8 MHz	$\pm$0.1 dB/MHz
Frequency space from carrier to side band	50 kHz minimum
Power consumption	70 VA
Dimensions	456 x 154 x 411 mm
Weight	14 kg

The MTP 31 television meter receiver is a quality HF demodulator which is primarily required for measurements and checks in TV transmitter operation. It allows metering the transmission properties of the video and audio parts of TV transmitters in bands I to V according to all customary TV standards. Precise tuning to the TV transmitter frequency is produced by interchangeable plug-in oscillators. Each quartz-controlled oscillator is intended for only one TV channel frequency. The video signal is demodulated with switchable envelope curves or a synchronous demodulator. Three independent video outputs are available (unsymmetric 75 ohms). Null signal level keying can be shut off; a peak voltmeter is available for voltage checking at the video detector.

Some technical data:

Model	MTP 31 CCIR-D, K-norm MTP 31-C-CCIR-D, K-norm for the USSR MTP 31-B-CCIR-B, G-norm
HF frequency range	band I to V according to CCIR-D, K- or CCIR-B, G-norm
ZF [intermediate frequency]	
MTP 31	38.0 MHz
MTP 31-G	35.75 MHz
MTP 31-B	38.9 MHz
Input resistance	50 ohms or 75 ohms, SWR <= 1.1
Continuous sensitivity control	>= 2 dB
Video-audio transmitter power ratio	20:1 to 5:1
Audio portion frequency range	30 Hz to 15 kHz
Frequency cycle (without distortion corrector)	linear $\pm$0.3 dB
Harmonic distortion	<= 0.5% at 75 kHz frequency swing
Symmetric output resistance	600 ohms (three separated inputs)
Interior resistance	<= 25 ohms
Output voltage	1.55V $\pm$5% (at 50 kHz frequency swing)
Signal-to-noise ratio of	
audio carrier (operation with auxiliary oscillator)	> 66 dB
intermediate carrier frequency	> 52 dB
Power consumption	150 VA
Dimensions	
desktop and cabinet rack model	456 x 224 x 411
slide-in	482 x 210 x 411
Weight	about 25 kg

The BM 546 programmable generator is designed for precise laboratory measurements. By its frequency precision and stability, it is suited for many measurements in the range from 10 kHz to 110 MHz. Its output signal is spectrally clean; amplitude noise and distortion of amplitude and frequency modulation remain low. The concept of the device enables its use also in IMS. The device is suited particularly for measuring pass curves of filters since its output frequency is adjustable in steps to 1 Hz each in the overall frequency range. It is also suited for various measurements in telecommunication engineering. The low modulation harmonic distortion factor also allows its use in measuring demodulation distortion.

Some technical data:

Frequency range	10 kHz to 110 MHz
Suppression of harmonic waves	> 35 dB, typ. > 40 dB
Suppression of non-harmonic waves	> 70 dB, typ. > 80 dB
Suppression of ripple signal products	55 dB
Signal-to-noise ratio	45 dB
Momentary frequency error after 30 min startup time	$1 \cdot 10^{-7}$

Output voltage	
FM and CW	1 V, 50 ohms
AM	0.5 V, 50 ohms
Modulation (only internally with a 1-kHz signal)	
AM	0 to 90% in stages of 10% each
harmonic distortion	1% at 30% (up to 5% at 80%)
FM	0 to 90 kHz swing in stages of 10 kHz each
harmonic distortion	< 1.5% at 10 kHz swing
	< 1% at 20 to 90 kHz swing
Power consumption	140 VA
Dimensions	435 x 180 x 500 mm
Weight	20 kg

The BP 5461 programmable modulation unit is used as a special accessory to the BM 546 programmable generator for amplitude or frequency modulation of output signals. It is used for precise laboratory measurements and can be operated both manually and by remote control. The IMS-2 was used as the interface.

Some technical data:

Amplitude Modulation	
modulation degree	0 to 90%
modulation degree error	$\pm$1 dB from set value
internal modulation frequencies	100 kHz, 1 kHz, 10 kHz
harmonic distortion	< 0.2%
external modulation frequencies	20 Hz to 20 kHz, R_e = 1 kilohm
level	1 V for 100% modulation degree
harmonic distortion	< 10%
Frequency Modulation	
frequency swing	0 to 99 kHz
frequency swing error	< $\pm$1 dB from set value
temperature dependence of frequency swing	$\pm$0.03 dB
modulation harmonic distortion	< 1%
internal modulation frequencies	100 kHz, 1 kHz, 10 kHz (k < 0.2%)
external modulation frequencies	20 Hz to 20 kHz, R_e = 1 kilohm
level	1 V for 100 kHz swing
Dimensions	435 x 180 x 500 mm
Weight	18 kg

The BM 591 automatic RLCG meter is used to quickly determine important parameters of passive components. It is designed for use in the laboratory, manufacturing and service. The four-terminal connector enables elimination of feed effects. The meter value is displayed on a 3 1/2 place display. The missing portion can be determined after operating a key. The device has an automatic range selector (range switch) and two selectable meter frequencies.

Some technical data:

Meter range	
R	1 m-ohm to 20 M-ohms
L	0.1 microH to 2,000 H
C	0.1 pF to 20 mF
G	1 nS to 20S
D	0.001 to 2
Basic error	0.25%
Range select	automatic or fixed range
Meter frequencies	100 Hz, 1 kHz
Power consumption	25 VA
Dimensions	275 x 95 x 310
Weight	5 kg

The BM 578 signature analyzer is a service unit and can be used for fault localization in complex computer components. It is used for fault analysis to trace a faulty function to defective components. By comparing an erroneous signature to the correct one taken from the documentation enclosed, the defective component can be traced to its operable function. The BM 578 signature analyzer is also used to check functioning of microprocessor circuits where other test methods take too much time or are too costly.

Some technical data:

Input current	1 < 10 microA at 1.4 V
Decision level	U_H >= +2.0V, U_L >= +0.8V
Minimum duration of input pulse	20 ns
Input current	1 < 10 microA at 1.4 V
Decision level	1.5V
Interval indication	1 period
Maximum pulse train	10 MHz
Power consumption	40 VA
Dimensions	275 x 89 x 300
Weight	4 kg

The M1T 290 and M1T 291 digital multimeters are precision instruments used as standalone units or together with meter systems to meter DC or AC voltage. Resistance can also be metered. Both multimeters can be connected as a unit through the JMS-2 main line with the M1T 292 interface unit and thus can be controlled remotely. The analog unified signal is then converted by an ADC to a numeric representation with a 23-bit word length. The numeric representation is stored to form the metered representation on a six-place LED display. The output value is intended for joint operation with external equipment.

Some technical data:

DC Voltage	
meter range	$\pm$20 mV to $\pm$2 kV
meter error in reference conditions	$\overline{0}$.01 to 0.$\overline{0}$2%
input resistance	> 10^{10} ohms (20 mV to 20 V)
	10 M-ohms (200 V to 2 kV)

DC Current	
meter range	±2 microA to ±2 A
meter error in reference conditions	±0.05%
AC Voltage	
meter range	200 mV to 750 V
meter error in reference conditions	±0.01%
AC Current	
meter range	20 microA to 200 mA
meter error in reference conditions	±0.2 to ±0.3%
Resistance	
meter range	200 ohms to 20 M-ohms
meter error in reference conditions	±0.02 to ±0.05%

Polish People's Republic

The AMS-1 digital 3 1/2 place multimeter is used for precision measuring of DC and AC current, DC and AC voltage and resistance. It is intended for use in laboratory testing, but can also be used in service work. It is operated by using the membrane keys; meter size is manually selected; meter range is automatic, or can be manually selected. Error is ±0.1% of the metered value ±1 digit. There can be 6.25 measurements per second. Metered value is processed by double integration and there is full overload protection. For AC voltage the mean value is measured and displayed as the effective value for the sine course. Disturbances by the 50-Hz frequency and its harmonics are suppressed by the double integration.

Some technical data:		
Voltage Measurements		
meter range		20 mV to 1 kV
sensitivity		100 microV
input		symmetric
meter error:	DC voltage	±0.1% ±1 digit
	AC voltage	±0.2% ±4 digits at 50Hz to 10kHz
		±0.3% ±6 digits at 30 to 50 Hz and 10 to 20 kHz
		±0.5% ±10 digits at 20 to 30 Hz and 20 to 50 kHz
input resistance		
ranges 200 mV and 2V		> 1 G-ohm
other ranges		10 M-ohm ±0.5% (DC)
		10 M-ohm ±5% (AC)
input voltage		<= 14V
Current Measurements		
meter range		200 microA to 2A
sensitivity		100 nA
input		symmetric
meter error:	DC	±0.2% ±2 digits
	AC	±0.3% ±2 digits
voltage drop at maximum display		0.2V
response time:	DC	<= 0.3 s
	AC	<= 0.8 s

zul. [safe] current:	in 2-A range	2 A
	other ranges	1 A
Resistance Measurements		
meter range		200 ohms to 2 M-ohms
sensitivity		0.1 ohm
meter error		±0.2% ±2 digits
response time		<= 0.5 s
Maximum output voltage		350V (DC); 250V (AC)
Power consumption		10 VA
Dimensions		240 x 80 x 270 mm
Weight		6 kg

The DI-6T INCO type ultrasound tester is designed for nondestructive ultrasound testing of materials. It enables detecting cracks, layer separations, structural changes and faults in metals, ceramics, plastics, etc.; it also enables measuring the thickness of elements accessible from one side and some properties of materials. It is intended for field use. Power is supplied by gas-tight or dry batteries. The built-in magnifier together with the sensitive input amplifier offers metering possibilities not inferior to fine laboratory test devices. Low power consumption of 2 VA allows long operating time with a battery set.

Some technical data:

Test range in steel	to 10 m with echo method to 20 m with pass through method
Resolution capability	100%
Time base linearity	±5% in range 1 cm and 2.5 cm ±3% in other ranges

The electronic magnifier allows observation of selected ultrasound wave sections with large magnification. Control of distance in the ranges

1 to 5 cm	15 cm
10 to 50 cm	40 cm
100 cm	150 cm
250 cm	300 cm
500 cm	450 cm
Ranges of time base	(1 cm, 2.5 cm, 5 cm) by 10 x 100
Control of amplification	0 to 78 dB in 2 dB steps
Width metering	2 mm to 10 m

The monitor signals acoustically the appearance of any pulse at requested positions on the time base.

Power consumption	2 VA
Dimensions	290 x 265 x 95 mm
Weight	4 kg

The KB 60-01 quad power supply can be used as a universal power supply for laboratories. It has four power supply units, independent of each other, which can be connected in series or parallel. Each unit has a voltage range from 0 to 20 V and can be loaded with 1 A.

Some technical data:

Output voltage	0.5 to 20 V
Error	±1%
Maximum current	30 mA to 1 A
Internal resistance	10 m-ohms
Residual ripple	0.5 mV
Drift: momentary	0.01%/min
long term	0.1%/month
Power supply	220V ±10%, 50 Hz
Power consumption	120 VA
Dimensions	438 x 300 x 84 mm
Weight	7.5 kg

The KZ 3004 multipurpose TTL tester is designed to quickly check integrated TTL circuit serviceability. It is shaped like a pocket receiver and is connected by cable, which fits the DIL-14 or DIL-16 packages, to the meter head. The equipment can be used two ways:
--as a comparator to check for correct IC functions by comparison to a standard model
--as a multichannel tester of logic states and for recording short negative or positive pulses.

Signals at the pins are displayed by 16 LED's.

Some technical data:

Comparator	
response sensitivity	100 ns (pulse); +1.4V (+0.6V)
maximum input voltage	5.5V
State Tester	
L-level	0 to 0.8V
H-level	2 to 5.5V
maximum input voltage	5.5V
pulse rise and fall time	1 microsecond
pulse width	>= 50 ns
pulse train frequency	<= 10 MHz
Power supply	+7V, 400 mA
Dimensions	165 x 85 x 46 mm
Weight	0.5 kg

The KZ-2025 A, B, C and KZ-2026 A, B, C digital frequency meters differ by design, tolerance of mother crystal level and display tubes. The KZ-2025 A is a desktop unit with complete case, intended for general-purpose use as a laboratory device. It performs these functions: frequency determination, time interval metering, also mean value formation, pulse width metering, and frequency ratio determination. The counter can also be used as a crystal-controlled fixed frequency generator. It is supplied by utility power or battery (12V).

Some technical data:

Input A	
Frequency meter	1 Hz to 80 MHz

Meter interval	1 microsecond to 10 s
Meter error	$2 \cdot 10^{-8}$ $\pm$1 digit
Inputs B and C	
Frequency meter	1 Hz to 10 MHz
Meter interval	1 microsecond to 10 s
Meter uncertainty	$2 \cdot 10^{-8}$ $\pm$1 digit
Time interval metering at input C	with mean value formation over 10^0 to 10^5 measurements
Meter range for pulse duration measuring	0.1 microsecond to 10^8 s
Indication range	100 ns to 1 s
Power consumption	40 VA
Dimensions	96 x 444 x 340 mm
Weight	5.5 kg

The KZ 1623 stabilized signal generator is designed primarily for use in laboratories and shops. Frequency ranges match the radio bands.

Some technical data:	
Frequency ranges	50kHz to 50MHz; 82MHz to 108 MHz
Set error	$\pm$1.5%
Instability: short term	$\pm$0.02%/15 min
long term	$\pm$0.10%/3 h
Floating output voltage	1 microV to 1 V
Wave resistance	50 ohms
Frequency response of output voltage	
50 kHz to 3.2 MHz	< 0.5 dB
3.2 MHz to 12.5 MHz	< 1.0 dB
12.5 MHz to 108 MHz	< 1.5 dB
Harmonic distortion	5%
Amplitude modulation: internal	400 Hz, 1 kHz, 4 kHz
external	20 Hz to 20 kHz
Frequency modulation in range 82 to 108 Mhz	0 to 100 kHz
Power consumption	18 VA
Dimensions	175 x 440 x 367 mm
Weight	13 kg

Hungarian People's Republic

The Hungarian export firm, Metrimpex, alternates its exhibits between automatic control products and measuring instruments at the Leipzig Spring Fair, and 1983 is the year of metering equipment.

The leading product was the TV meter rack which includes these meters.

The TR-0755/Q 097 TV test line generator is used to overlay test or also meter signals while running the main program. The test line method allows measuring all major characteristic values of TV transmissions. With this method, meter signals are superimposed on certain lines during image blanking; these signals can be transmitted during main program time and thereby enable active quality

control. The test signals, the place of which is determined by internationally accepted standard recommendations, are superimposed on the video signal by the TV transmitter broadcasting the program. These test signals are produced by the test line generator. It forms the four test signals set by the international standards or any other four test signals. The device enables these measurements: level, group transition interval (at 4.43 kHz), color signal brightness signal ratio, difference phase, differential amplitude, line continuous distortion, color signal brightness signal intermodulation, and harmonic distortion. The test signals appear fitted with standard line and image synchronization signals as well as with PAL burst signals also at a common output. The output series and the number of test signals can be determined by pushbuttons. To test NF [low frequency] stability of the video channel, the generator also produces a 0.2-Hz or 50-Hz black and white rectangular signal through six lines.

Some technical data:

System	OIRT [International Radio Broadcasting and Television Organization], CCIR
Test signals	eight test signals appearing simultaneously and independent of each other; signals of lines 17, 18, 330, 331 (EBU COM, T/M V14-E/1970, CCIR Rec. 473)
Other test signals	noise metering, gray scale, linearity test, pulse jump

Line 17
Reference white pulse, $\sin^2$2T pulse, modulated $\sin^2$20T pulse, staircase signal

Line 18 (Multiburst)
Reference white pulse, switchable to the 0.2-MHz sinusoidal signal

amplitude	700 mV or 80% of this value, switchable
black level	0 V or 20% of the reference white pulse
gray level	50% of the reference white pulse

Line 330
Reference white pulse, $\sin^2$2T pulse, staircase signal
Overlaid 4.43-MHz sinusoidal signal

amplitude	40% of the 700-mV reference white pulse

Line 331
4.43-MHz sinusoidal signal packet or 4.43-MHz sinusoidal signal packet modulated with a staircase signal, switchable

amplitude	700 mV or 20, 60 or 100% of this value, switchable

4.43-MHz reference signal packet

amplitude	60% of the 700-mV reference white pulse
gray level	50% of the reference white pulse

Noise metering signal
noise signal overlaid on the gray test signal

amplitude	-60 to -20 dB, adjustable in 1-dB steps, 0 dB $\hat{=}$ 700 mV (eff.)

Gray metering signal

Ouput level	±0.5% of the 700-mV reference white pulse, adjustable in 10%-steps between 0 and 150%

Linearity test signal

Staircase signal or ramp signal, switchable

number of staircases	5 or 10
amplitude	±0.5% of the 700-mV reference white pulse

Black and white and/or color test signal $\sin^2 2T$ pulse

White pulse

amplitude	±0.5% of the 700-mV reference white pulse

4.43-MHz sinusoidal signal modulated with $\sin^2 20T$ overlaid on the gray level

4.43-MHz sinusoidal signal modulated with the reference white pulse overlaid on the gray level

amplitude	±5% of the 700-mV reference white pulse
gray level	50% of the reference white level

Six line test signal

Black level or gray metering signal, which appear alternately through six lines

signal change frequency	0.2 Hz or 50 Hz
Power consumption	60 VA
Dimensions	440 x 132 x 450 mm
Weight	15 kg

The TR-1380/Q 098 test line feeder feeds test or data communication signals into the information-free lines of the video signal forwarded in any standard TV train during image blanking. The test signals are generated by the TR-0755/Q 097 TV test line generator. The test line feeder can superimpose eight different test signals simultaneously. Position and time of test signal feed are determined by internationally accepted recommendations to which the unit's technical parameters correspond. During the vertical image blanking in a full image time in the 625-line TV system, 2 x 25 TV lines are available, of which 10 test lines can be used per subimage. Test or data communication signals of any type can be merged in the lines selected by the unit's program switch. The data communication signals are: digital signals to transmit written information, to remotely control applicable digital code signals, digital code signals to display the identification number of broadcasting stations, time allocating digital code signals.

By using the unit's program and operating mode switch, besides feeding test signals into the test lines, the video signal which contains the main program can be forwarded unchanged or the information in test lines coming in can be cleared. When the program coming in from the special center also contains international test signals, the unit automatically blocks the clearing of these signals and the feeding of other test signals in their place. A half-line noise metering signal can also be merged into the 22nd and 335th test lines whereby noise level can also be measured by the comparison method.

Some technical data:

Inputs	
Test signal inputs	
input signal	BA [operating mode] test signal
number of input signals	8
amplitude	0.7 V(SS) at 75 ohms
Main video signal input	
input signal	assembled black and white or color video signal
amplitude	1 V(SS) at 75 ohms
Regularity attenuation	> 30 dB up to 7 MHz
Outputs	
Main video signal output	
output signal	main video signal provided with local test signals or main video signal switched directly
Auxiliary output	
output signal	main video signal with test signals fed in
output resistance	75 ohms
Regularity attenuation	> 30 dB up to 7 MHz
Additional DC level	< ±50 mV
Black level stability	> ±5 mV
Interaction of output and auxiliary output	< 46 dB up to 1 MHz, < 36 dB up to 4.43 MHz
Gain frequency response	
between 0 and 6 MHz	±0.1 dB
between 6 and 10 MHz	±0.1 to -0.5 dB
Differential amplitude distortion at rated level	< 0.1%
Differential phase distortion at rated level	< 0.1°
Dimensions	440 x 90 x 450 mm
Weight	7 kg

The TR-0799/Q 148 MIVIMAT automatic test line evaluator meters the following parameters when the four international test lines (CCIR) are present at the same time: white pulse amplitude, line sync pulse amplitude, 2T pulse amplitude, color signal amplitude, evaluated signal-to-noise ratio, differential gain, differential phase, and modulation depth. A line printer or other data processing unit which can interpret ASCII code can be connected directly to the IEC bus 625.

Besides video inputs, the unit also has a DC voltage input. This input can be used also to sample at the site such data as ambient temperature, utility power voltage, output power and others. The unit also has an auxiliary output for the null pulse trigger signal of the metering demodulator.

The MIVIMAT unit meters the individual parameters by the read and store method. Meter results are produced as mean values of 256 submeasurements. This method considerably reduces the effect of random disturbances on the metering results. Cycle duration of a measurement is about 20 s.

Some technical data:

Video input	
Input resistance	75 ohms
Regularity attenuation	40 dB at 5 MHz
Input signal amplitude	0.5 to 1 V(SS), BAS + PZ; 0.15 to 0.5 V(SS), S-part
DC voltage input	
Input resistance	2 x 100 k-ohms, grounded, symmetric
Asymmetric input voltage	0 to ±1,500 mV
DC clock input voltage	±5 V maximum
DC clock suppresion ratio	>= 200
Outputs	
Output signal	TTl
Pulse leading edge	24 H/32
Pulse width	5.5 H/32
Metering precision	
at 700 mv	±3.5 V
at meter limits	±7 mV
Format	±1,999.99; mV, %, DEG, dB
Power consumption	40 VA
Dimensions	405 x 133 x 429 mm
Weight	9 kg

The TR-1854/HO 13 TV wave form monitor is built in as another main unit of the transmitter metering rack. Its line selector allows selecting any TV line by switches. Brightness and color information of the PAL, SECAM and NTSC coded color video signal can be separated by using the filter built into the vertical channel and tested individually.

Some technical data:

Band filter	
Band center	1 MHz
band width (-3 dB)	+500 kHz
	±200 kHz
Band center	3.58 MHz
band width (-3 dB)	±800 kHz
	±300 kHz
Band center	4.43 MHz
band width (-3 dB)	±800 kHz
	±300 kHz
Low pass filter	
Frequency limits	minimum 1.6 MHz, at -3 dB
	maximum 4.43 MHz, at -15 dB
Frequency limits	minimum 500 kHz, at -10 dB
	maximum 1 MHz, at -35 dB
Expansion	1X, 5X, 20X, 25X
External deflection signal input	
Sensitivity	0.5 V/cm
Frequency transmission (relative to 1 kHz)	0 to 100 kHz ±3 dB
Input resistance	10 k-ohms

Line sector	
Input level	TTL
Input resistance	75 ohms
Video signal output	
Frequency transmission (relative to 50 kHz)	25 Hz to 6 MHz +3 dB
Amplitude of output signal	min. 0.5 V(SS) at 75 ohms
Output resistance	75 ohms
Power consumption	65 VA maximum
Dimensions	440 x 132 x 450 mm
Weight	14 kg

The TR-4087 characteristic curve analyzer stores data (operating mode, metering limits) in semiconductor memory and writes out the desired values. Image and metering information are processed by a microprocessor.

The TR-4807-2 basic metering unit can test controlled semiconductor components in both the continuous operating mode (DC current operating mode) and in pulse operation. In the process, the pulse duty factor is 24% or 1.5%. Collector voltage and current ranges are 5mV to 1,600V and 100 pA to 16 A, respectively.

The TR-4807-3 high current meter can extend the current range of the meter power supply beyond 1,000 A and the basic current range to 30 A only in pulse operation. The highest value of the collector voltage can reach 800 V. The characteristic curve is stored by the device. The tested semiconductor is then no longer needed because the display and the computations are performed with the stored data. The reference marks can be set to any point on the family of curves. It is often necessary to select semiconductor pairs and determine the size of the differences between them. These tasks can be handled by using the electronic tolerance field generator.

Some technical data:	
Collector voltage	<= 1,600 V
Collector current	<= 16 A
Basic staircase generator	5 nA to 3 A, 5 mV to 30 V, max shift 15 levels
Error	0.5 to 1%

The TR-0312 word generator is a signal source used to test ECL 10000 and Schottky TTL circuits in a broad frequency range (10 Hz to 50 MHz). The digital word set as desired (16 bits maximum) is available at the standard outputs and the complement outputs with ECL-10000 and TTL levels simultaneously. The unit is also used to generate pseudo random signal series (PRN operation). Operating modes and sync outputs of the oscillator have many applications (e.g. by connecting several word generators together).

Some technical data:	
Internal triggering	
period duration range	20 ns to 100 ms (10 Hz to 50 MHz)
period duration jitter	<= 0.1% + 100 ps
External triggering	
repetition rate	DC to 50 MHz

Direction of trigger edge	positive
Input impedance	500 ohms
Frequency of gate signal	DC to 5 MHz
Word length	2 to 6 bits
Sync outputs	clock sync signal, first bit synch signal, last bit sync signal
Power consumption	65 VA
Dimensions	153 x 266 x 308 mm
Weight	6 kg

The TR-9306 digital capacitance meter is designed for quick testing, individual metering and sorting of capacitors. The device can also be used in these areas: quick check of capacitor decades, calibration of standard capacitors, manufacturing and end control of capacitors, comparison metering for standard capacitors or for a ratio setting, remote metering of quality characteristics (stability, temperature coefficient) and testing of n-poles (through three-terminal input). The device indicates dimension and forward direction of metering range switch for a faulty meter limit, and makes series resistance, inductance and capacitance of the metering line ineffective.

Some technical data:

Metering range	3 pF to 3 microF
Metering error	$\pm$0.02% or $\pm$0.05% in the 3- to 30-pF range
Comparison error	$\pm$1 digit ($\pm$0.001%)
Temperature coefficient	$<= 3 \cdot 10^{-6}$/K
Metering time	7.5 to 75 ms
Dimensions	425 x 150 x 440 mm
Weight	7.5 kg

PHOTO CAPTIONS

1. p 357. M 2300 clinical dosimeter with accessories, Dresden "Otto Schoen" Robotron Measuring Electronics VEB.

2. p 357. 00 080 noise dosimeter, Dresden "Otto Schoen" Robotron Measuring Electronics VEB.

3. p 358. M 3003 printed circuit board [PCB] tester, Dresden "Otto Schoen" Robotron Measuring Electronics VEB.

4. p 359. The 1.6430 microcomputer diagnostic unit, Dresden "Otto Schoen" Robotron Measuring Electronics VEB.

5. p 360. AMS 531 antenna level meter, Karl Marx Stadt Radio and Television Plant VEB.

6. p 360. IMO-2N laser power meter, Soviet Union.

7. p 361. ZJ 1 visual display unit with GSM 1 selective level meter, CSSR.

8. p 361. MTP 31 TV meter receiver, CSSR.

9. p 361. BM 546 programmable generator with BP 5461 modulation unit, CSSR.

10. p 362. BM 591 automatic RLCG meter, CSSR.

11. p 362. M 1 T 290 digital multimeter, CSSR.

12. p 362. BM 578 signature analyzer, CSSR.

13. p 363. DI-6T ultrasound test unit, Polish VR [People's Republic].

14. p 363. KZ 3004 TTL logic tester, Polish VR [People's Republic].

15. p 364. TV meter rack, Hungarian VR [People's Republic].

16. p 366. TR-4807 characteristic curve analyzer, Hungarian VR.

Photos by: Ch. Darre (4), K. Schwarzer (13).

Data Processing Equipment

East Berlin RADIO FERNSEHEN ELEKTRONIK in German Vol 32 No 7, Jul 83 pp 428-431

[Article by D. Henkel]

[Text] GDR. The A 6471/6473 Image Processing System from the Robotron Combine VEB, based on the K 1630 microcomputer, is available as a base computer system for very fast image processing and as a display complex consisting of four display systems for on-line processing of images. Besides the K 1630 or K 1620 microcomputer and its standard peripherals for the real-time display processor, the main components in the system are image storage with capacity of 1M bytes, color monitor for 512 x 512 points, trackball, graphics display and film I/O unit. Application areas range from remote sensing of the earth through medicine, biology and industry to basic research.

Exhibited for applications in the money economy was the K 8924 bank and savings bank terminal--an intelligent, freely programmable and microprocessor-controlled terminal; the control kernel consists of K 1520 microcomputer components and has interface controllers for peripherals and remote data communications. These terminals function in an EDV [EDP] system as subscriber stations, installed at switches and other data entry and interactive points.

A new form of man-machine communication especially suited to people is phonetic input and output of information. Robotron exhibited a SEA 1600 acoustical I/O unit for this purpose. It consists of the K 7823 speech recognition module and a speech synthesis module (the K 7803, for example) which have been implemented with the K 1520 and K 1600 microcomputers. Both autonomous modules are driven commonly through a standard interface by command decoding and control data transfer performed in a control module. The device now has a

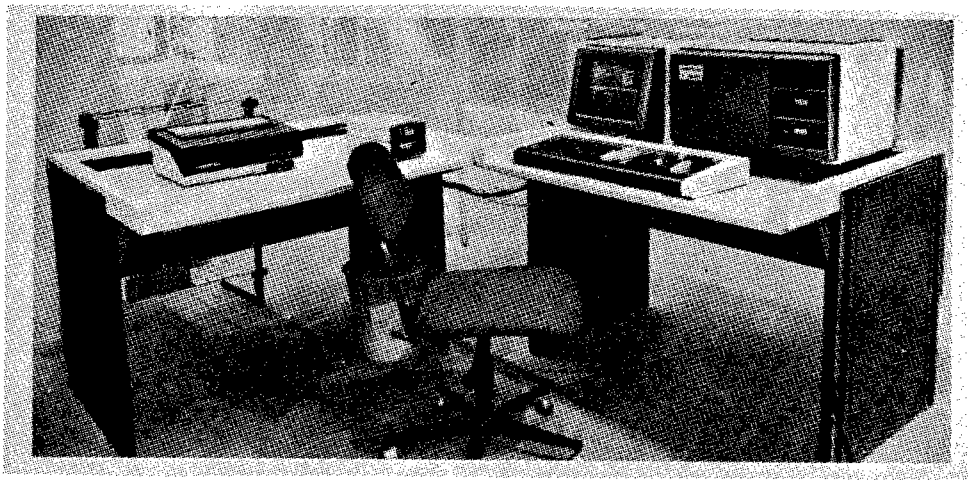


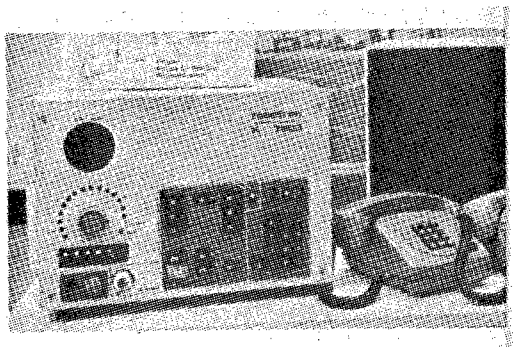
Fig. 1. K 8924 bank and savings bank terminal, Robotron Combine VEB

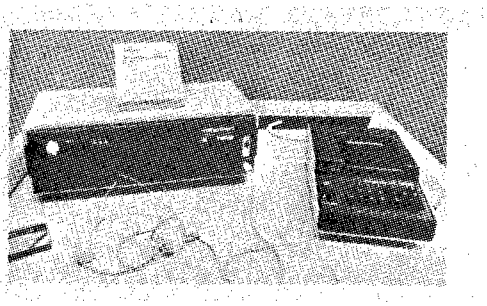
vocabulary of 100 words. This I/O unit can be put to good use primarily where limited sets of data are input or control functions are handled, but a person's hands and eyes are busy with other tasks to be performed at the same time or where service requests have to be transmitted, information received and malfunctions signaled to the operator without burdening eyesight.

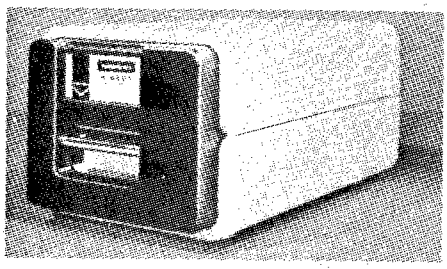
The K 6501 read/write unit is a peripheral for storage and reading of data on plastic cards with magnetic strips. The unit can be connected through a standard interface to data processing equipment as a desktop component in its own case or as a built-in unit. There are three models to match applications: an automatic read/write unit for recording on and reading from plastic cards for an automatic card transport unit, an automatic reader for an automatic card transport unit, and a manual reader for reading in manual card transactions.

The international standard plastic card can store three tracks with 76, 37 and 104 characters plus any three special characters.

The TD 40 thermal printer is a nonmechanical alphanumeric printer available as a component with no case or as a desktop unit. The output medium is a 90-mm wide journal roll of thermosensitive paper. Speed is one line per second of up to 40 characters per line. The printer can be used as an output unit where no copies are required, e.g. in telephone terminals, video text systems, VDT workstations and monitoring and measuring equipment.







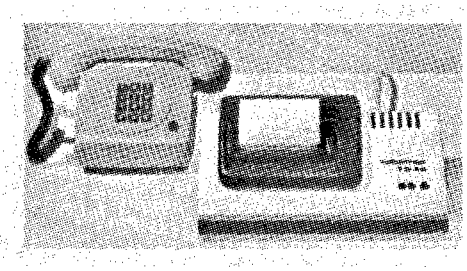


Fig. 2. K 7803 voice output unit

Fig. 3. K 7823 speech recognition unit

Fig. 4. K 6501 card magnetic strip read/write unit

Fig. 5. TD 40 thermal printer

[all four products by] Robotron Combine VEB

Fig. 6. Nairi-41 microcomputer system, Soviet Union

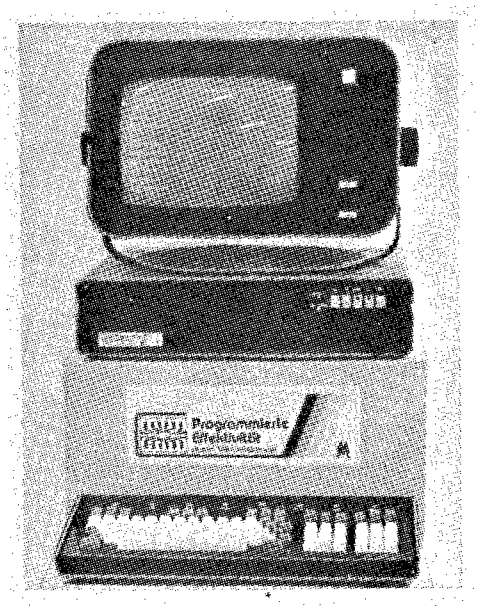


Fig. 7. NTs-80-20 microcomputer system, Soviet Union

Soviet Union

The Elektronorgtekhnika foreign trade enterprise exhibited hardware ranging from the Unified System computers through peripherals to microcomputers and special control computers.

The Soviet Union exhibited a prototype of the YeS 1065, currently the largest Unified System computer with a speed of more than 10^6 operations per second.

Also exhibited was the Nairi-41, a small computer developed in the Armenian SSR which has full program compatibility with the SM-3 and SM-4 small system computers. Main storage size is a maximum of 256K bytes. Its I/O interface is also compatible with the Small Computer System, allowing connection of all peripherals in this system. Featured system capabilities are real-time multiprogramming, time sharing and BASIC, COBOL and FORTRAN compilers. Primary applications include automated workstations in planning and design, process control and as a general-purpose computer.

Successful solutions of compact components are the Elektronika NTs-80-20/1 Elektronika NTs-80-20/2 interactive computer systems. The /1 consists of the Elektronika NTs-80-01 D microcomputer and the 15IYe-00-013-01 VDT. The /2 expands this with floppy disk and thermal printer components. Speed is 5 x 10^5 operations per second for addition; storage size is 56K bytes. Suitable applications are workstations in computer-aided design [CAD] and information systems and for solving mathematical, scientific and technical problems.

The Neva 1 M control complex, used to automate telephone exchanges, was developed in bilateral cooperation between the USSR and the GDR and is a symbol of the advantages of international cooperation. It was implemented as a dual computer for reliability. It has a standard interface for connection of Unified System peripherals and can therefore also handle general-purpose EDP.

Hungarian People's Republic

One of the newest Hungarian EDP products is the SM 5210 small computer which features two operating modes: In mode 1, it implements the SM-4 instruction set; in mode 2, the YeS 1011 set. Thus, all the software already available for these two computers can still be used. The computer is based on a 16-bit microprocessor and has a main storage capacity of 1M bytes. The machine has comprehensive facilities for remote data communication:
--asynchronous adapter for eight lines
--synchronous adapter for four lines
--adapter with four Telex lines
--general-purpose adapter for rapid data transfer with the SM-4 or YeS 1011 type computers with a transfer rate of 600K words/second maximum.

The newest development in the VT 20 office computer series is the VT 20/IV system which has four display workstations. Central unit internal design differs from the VT 20 A system. The integrated connector for disk storage is microprocessor-controlled. It allows several processors simultaneous access

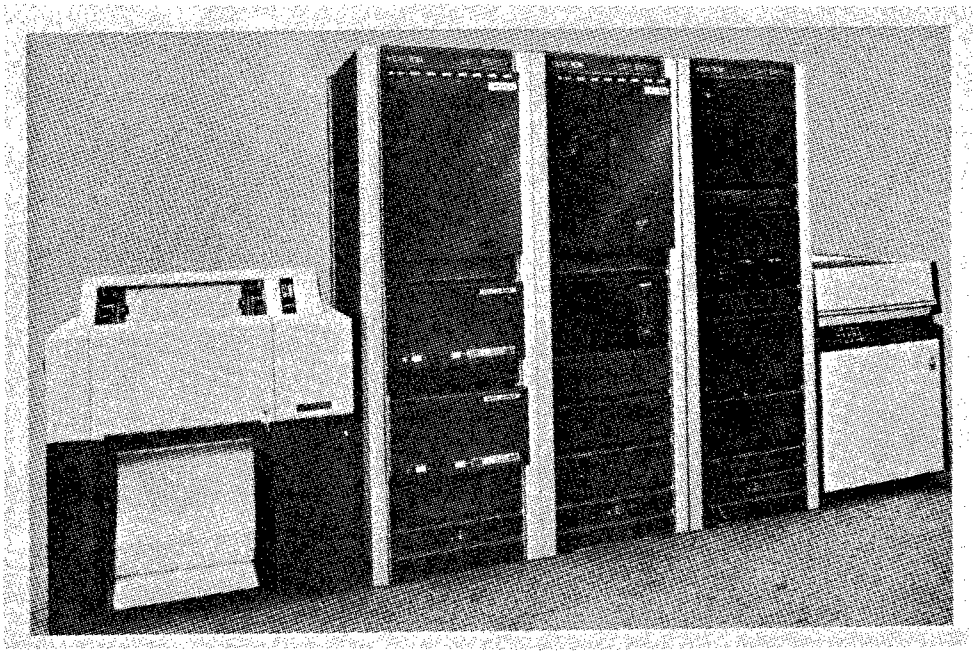


Fig. 8. SM 5210 minicomputer, Hungarian VR [People's Republic]

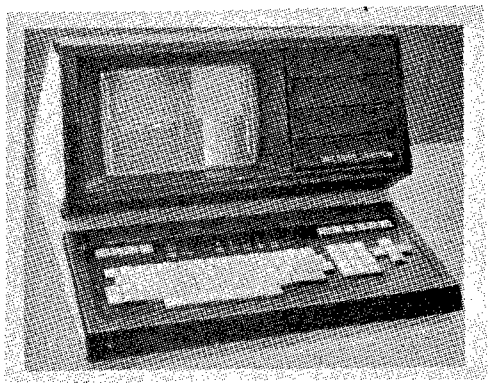


Fig. 9. VDT 52121 terminal, Hungarian VR [People's Republic]

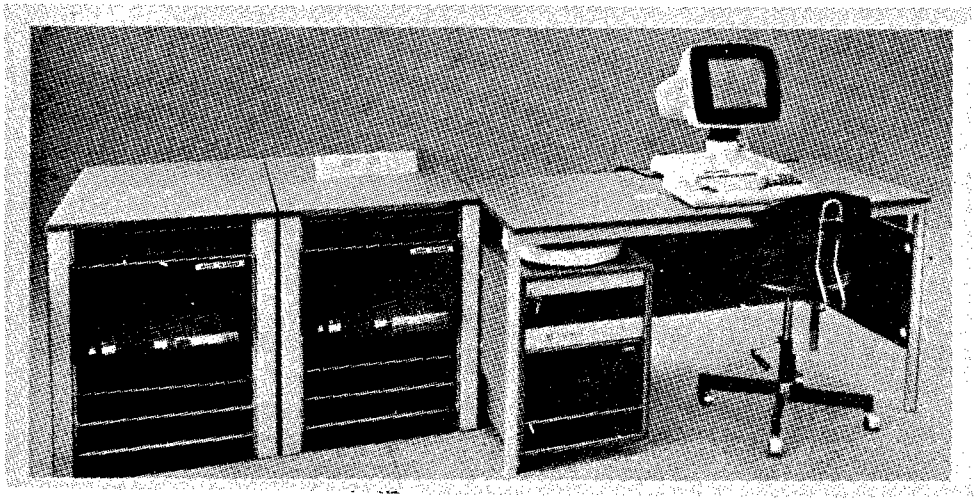


Fig. 10. VT 20 IV Small Computer System, Hungarian VR [People's Republic]

to the replaceable disk storage units. The four work stations are controlled by separate microprocessors, so that actually four microcomputers have been implemented with common background storage.

Among the peripherals exhibited was the VDT 52121 raster graphics display terminal, an alphanumeric terminal with asynchronous interface and a dot addressable graphics module. The alphanumeric section is identical to the VDT 52116. It has a graphics storage of 340 x 480 points. The terminal is operated from the keyboard by using the cursor and special graphics keys. A plotter can be connected to it.

The TMX-2410 (YeS 8410) data communications controller is used in remote data processing. The device has the Unified System I/O interface and can be connected to two Unified System computers at the same time. Connection of remote terminals is supported through a maximum of 32 lines; each line supports a maximum transfer rate of 9,600 bits/s. It is suited for subscriber stations, telephone and teleprinter terminals, and interactive terminals like the TAP-34 intelligent terminal system. Hardware includes a microcomputer based on the 8080 PC microprocessor with 64K RAM, CRT with keyboard, two floppy disk drives with 0.5M bytes each, serial printer and perforated tape reader. System modular design allows simplification to meet requirements. Thus it can be put to good use for data acquisition, local data processing and remote data entry.

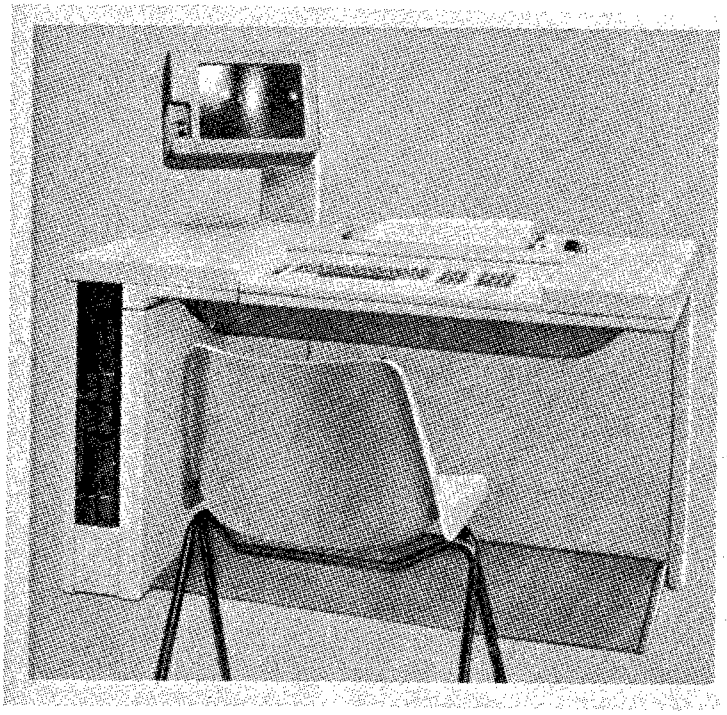


Fig. 11. Izot 1024 microcomputer, Bulgarian VR [People's Republic]

The range of hardware available for remote data processing by Hungarian enterprises has been expanded by a series of data communications devices, e.g. the TAM-300 and TAM-1200. These modems can be connected to switched two-wire and leased two- or four-wire telephone lines. The TAM-300 is for duplex communication of data signals at maximum rate of 300 bits/s; the TAM-1200 handles synchronous or asynchronous communication of data signals at 600 bits/s in the duplex mode or 1,200 bits/s in half-duplex operation.

People's Republic of Bulgaria

With a larger exhibit than what had been usual for years, the People's Republic of Bulgaria displayed microelectronic applications at this fair.

The YeS 9005 data acquisition system is based on the fast SM-4 16-bit computer. It allows data acquisition and preparation from up to 32 display workstations which can be placed up to a maximum of 600 m away from the control unit. The system has adapter controllers for two YeS 5061 (29M-byte)

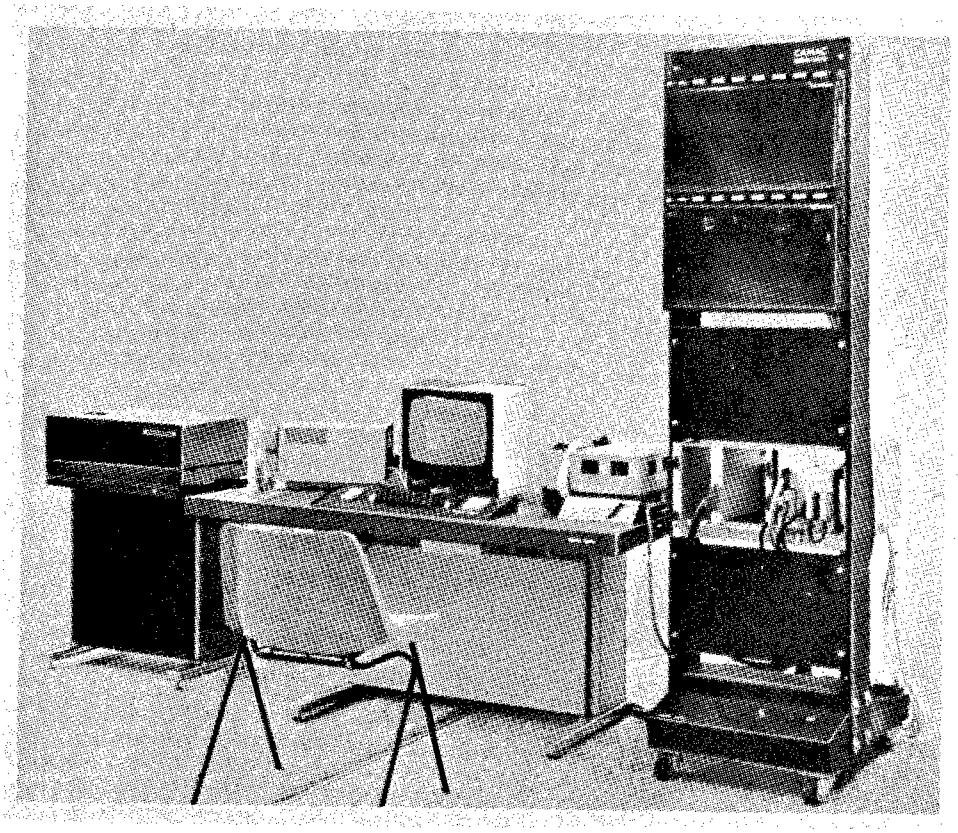


Fig. 12. Izot 0260 CAMAC computer, Bulgarian VR [People's Republic]

replaceable disk units, two SM 5302 magnetic tape units, parallel or serial printer and control console. The data prepared can be transferred to a remote main computer through the DFUe [remote data communications] output.

Other microprocessor applications are the Izot 1024 and Izot 1025 microcomputers. The Izot 1024 is configured as a text processing system. Also of interest are the special solutions like the Izot 0470 PC microprocessor system, designed as a development system for making microcomputer programming more efficient. The system can be equipped with a floppy disk drive, perforated tape reader, serial printer and an EPROM programmer.

Another special microcomputer configuration is the Izot 0260 CAMAC microcomputer system. It features a set of nine special function modules which match

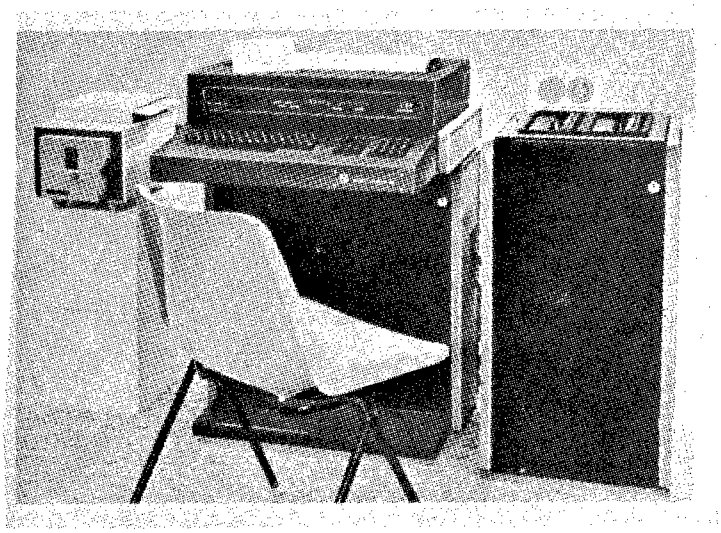


Fig. 13. Izot 0470 PC, Bulgarian VR [People's Republic]

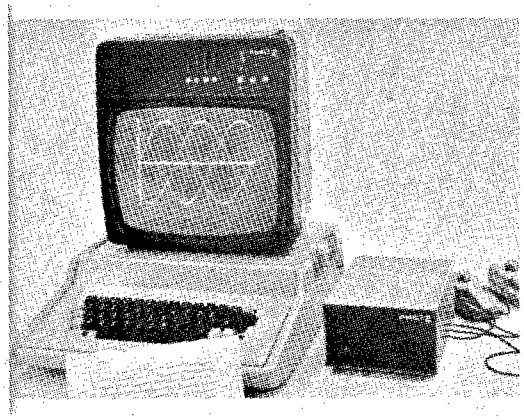


Fig. 14. Imco-2 Personal Computer, Bulgarian VR [People's Republic]

the CAMAC system for nuclear engineering equipment. It is designed for automating nuclear engineering and nuclear measuring processes.

Shown at the stand for the Bulgarian Academy of Sciences, which exhibited for the first time, were microcomputers based on 16- and 8-bit microprocessors. These included the VK 1302 microcomputer and the Imco-2 personal computer which will be covered in a later issue.

Finally, it should be noted that there were also new and further developments in peripherals. The YeS 9114 data preparation unit is used for direct manual drawing of information (letters, numbers. special characters) on diskettes by keyboard entry. In doing so, search, check and correct functions are executable on a data block by using the display monitor.

The People's Republic of Bulgaria competed for fair gold with the new SM 5306 (magnetic tape drive, speed of 2 m/s) and the SM 5410 (magnetic disk drive) for the Small Computer System.

Polish People's Republic

Notable in the Polish exhibit was the Mera 60 microcomputer system, a 16-bit computer with a maximum of 28K words of memory. Based on the modular design typical for the Small Computer System, system models can be implemented for specific applications. The manufacturer offers four models: the Mera-60-10/-15/-25/-30. By implementation of CAMAC interfaces, the latter model is especially suited to nuclear engineering.

Socialist Republic of Romania

The fair program by the Romanian Electronum foreign trade enterprise was also notable for the expanded number of microelectronic products. These included the M 118 minicomputer, the M 18 B and 102 F mini systems, the DAF 2018 alphanumeric display terminal and the SIDM data entry system.

We already reported on the Coral 4001 microcomputer, which is compatible with the SM-4 and the PDP 11, in 1980. In the meantime, a computer family has emerged with two more, larger models: the Coral 4011 and Coral 4030, of which the Coral 4011 was exhibited. The most salient feature differences between these three 16-bit computers are the main memory sizes of 64K, 256K and 4M bytes and the speeds of 3×10^5, 5×10^5, and 5.5×10^5 instructions/s.

Development Trends

In the area of desktop and personal computers, the Hewlett-Packard firm (USA) is setting the trend with their products. That applies not only to the computers per se, but also to the exacting array of peripherals, such as the HP 7470A four-color graphics plotter, for example. With a weight of 6 kg and the dimensions of a small portable typewriter, it can draw 1,000 points with a resolution of 0.025 mm on a 25-mm line and thereby providing higher quality plots. Media formats are 210 x 297 mm (ISO A4) or 8 1/2" x 11" (ANSI A). Reproduceability: 0.1 mm with one pen or 0.2 mm with different pens.

PHOTO CAPTIONS

1. p 431. HP-7470 Four-Color Plotter, USA.

Photos by: Werkfotos (2) and K. Schwarzer (13).

Communications Devices

East Berlin RADIO FERNSEHEN ELEKTRONIK in German Vol 32 No 7, Jul 83
pp 431-433

[Article by M. Tank]

[Text] GDR. The Communications Electronics Combine VEB exhibited as new rural telephone system components the OZ 100 D fully electronic digital telephone exchange, a four-channel offering port in the UHF band and a digital directional radio system with a communications capacity up to 10 channels .

The OZ 100 D telephone exchange, controlled by a microcomputer, is designed primarily for rural areas. It can switch 96 telephone subscribers and can be used as a standalone local switch (rural center), subcenter or satellite center (subcenter) with internal traffic. The OZ 100 D, representing a new generation in telephone exchanges, can be used with no problems in the worldwide communications network.

The main features of the OZ 100 D include the time-shared line switching principle, the modular structure of the software, which allows easy implementation of customer-specific control versions, the space-saving design and others owing to the use of LSI circuits and the high operating reliability through dual microcomputers and power supplies.

Communications are switched through PCM buses. In the process, 32 PCM words are switched in a sampling period of 125 microseconds. The computer contains a U 880 8-bit microprocessor. EPROM's or PROM's are used as background storage and dynamic RAM's as main storage for the program. Codes to call program versions and variable data are written in CMOS RAM's with battery backup. The computer clock is driven like the PCM clock frequency and other counter rates by a crystal-stable and synchronizable oscillator frequency of 12,288 kHz.

The URC four-channel offering port is a low-channel directional radio system for transmission of four telephone channels and a service channel in the UHF band. It was developed for the RFT radio telephone system and replaces the cable connection between the basic URB radio equipment and the URT communication equipment within the system. With that, distances up to about 50 km can be bridged. The URC interfaces meet the conditions for NF [low-frequency] equipment. All channels meet CCITT recommendations. Two devices tuned to each other and their antennas form a directional radio link.

The devices are based on the unified mounting system (EGS), compact and service-friendly. The EGS housing is subdivided into three stages: power supply

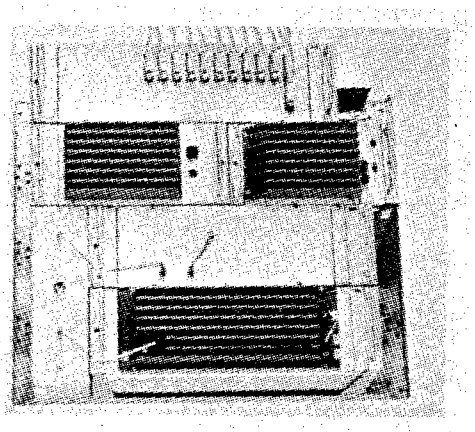


Fig. 1. PCM 10-400/800 digital radio relay

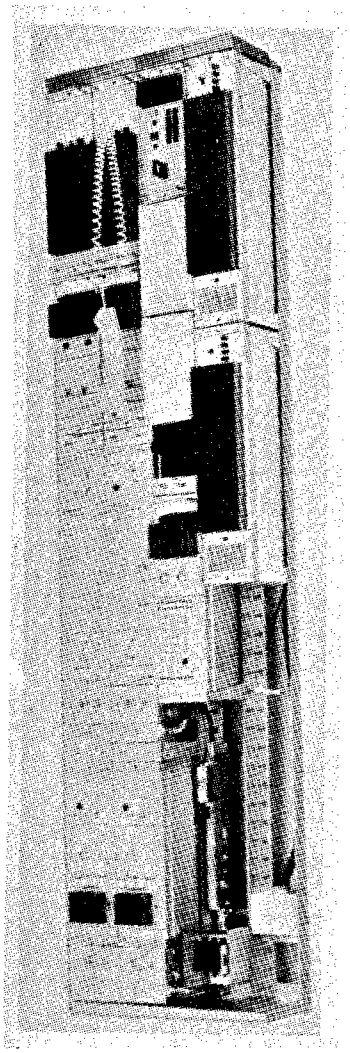


Fig. 2. PCM 120-2000 digital radio relay

[both by] Radeberg Robotron-Electronics VEB, Communications Electronics Combine VEB; photo by Werkfoto.

and metering block, radio unit and multiplexer. The multiplexer provides for the conversion of the fifth channel by using different carriers into a baseband of 0.3 to 20 kHz or for the divison into the fifth channel. It is connected through a four-wire connection to the frequency modulated transceiver, which operates in the frequency range from 440 to 470 MHz. With a programmable oscillator, the transmitter frequency can be adjusted in the 25-kHz raster. Duplex spacing is 10 MHz. The receiver operates on the double heterodyne principle. The intermediate frequencies are 18 MHz and 10.7 MHz.

The PCM 10-400/800 and PCM 120-2000 digital directional radios are used to transfer data and pulse code modulated voice signals. They are especially economical communications devices because of their relatively low hardware costs and the effective noise suppresion.

The PCM 10-400/800 directional radio operates in the 400- or 800-MHz band. It allows transfer of digital information at 704K bits/s. The multiplexer integrated in the radio equipment provides a communication capacity of 2 to 10 digital channels with a bit rate of 64K bits/s each. With the PCM 10-400/800, communication links between switching equipment and line subscriber termination points, network peripheral sections with a low number of channels in areas that are sparsely populated or difficult to access and permanenty connected communication links for remote data communication at different rates in remote data communication networks can be implemented.

The PCM 120-2000 digital directional radio operates in the 2-GHz band. Its communication capacity of 8,448K bits/s corresponds to 120 telephone channels. Field radio distances of about 50 km are feasible for communications in this frequency band. Phase modulation, insensitive to noise, is used for the radio. Direct modulation of the radio frequency enables a simple transmitter design. In the receiver, signal regeneration in the base section follows coherent demodulation in the ZF [intermediate frequency] section.

The new SZT time-shared telegraph and data communication device is designed for transmission of telegraph and slow data signals. It was exhibited in the complex of digital communication hardware which featured the PCM 30/PCM 120 communication system with a photoconductor stage. With the SZT, telegraph and data channels can be transmitted over voice channels in trunk groups depending on rate and code from 50 to 300 baud. The subcriber lead is transparent from 0 to 300 baud through central office lines. All channels are capable of full duplex operation. The time-shared telegraph equipment features high flexibility for various applications as a result of systems programming and the most extensive digitization of all processes. Compared to conventional AC telegraph systems, communications capacity has almost been doubled (46 channels compared to 24) through better use of the transmission path.

The PCM 30/PCM 120 digital communication system allows transmission of secondary series over unloaded symmetric master lines of multipair NF [low-frequency] cable at all network levels, over directional radio channels and photoconductors.

Fot the U 700 UKW [ultra short wave] voice radio system, the Koepenick Radio Plant VEB developed stationary base devices which allow designing base and relay stations in simple and complex radio networks. The devices can be adapted to a broad range of applications through a cassette and adapter system.

The UGZ 75 central unit is a complete transceiver station. It contains the transceiving equipment for a radio station including power supply and control components. It can be operated up to 100 m away from the control panel without a remote control device.

The radio unit is housed in the lower slide-in rack. It is equipped with the U 700 mobile transceiver. However, the device has a higher frequency stability and an improved heat conduction capability to allow continuous operation. The radio unit also contains the duplex separating filter for duplex operation. A maximum of three users can be connected to a UGZ 75 central unit.

The UGZ 75 can be used as a duplex base station in a half-duplex base station network, as a simplex base station in a single-frequency base station network, as a feeder port base station in a relay station network and as a relay station with automatic switching. A local control section allows auxiliary operation from the site of the central unit (e.g. during service).

The UBZ 75 control console and UZZ 75 auxiliary unit are devices for operating and checking stationary transceiver stations. The operating and display elements are housed in the control console, and the circuit components are essentially housed in the auxiliary unit.

Besides the normal operating and display components, the control console has a 10-position LED display. This is used in particular to display call numbers entered and stored.

For the auxiliary unit, EGS technology with interchangeable cassettes is used. Through plug-in variations and switches, the different types of network and operating versions can be implemented (duplex, simplex, WZW, WZW-automatic, telephone transmission, tone sequence call, two-tone call, dispatcher call, one-tone call, etc.). Connection capabilities for remote control hardware, tape recorder, displays, acknowledgment, answerback telephone etc. complement the system character and universal applicability. Matching the limited channel requirements in stationary operation, the number of usable channels is limited to eight.

Development Trends

Among new methods of communicating is the international Teletex service developed for electronic text communication. The T 4200 text station exhibited by Siemens AG has a typewriter, a display screen and typewriter with removable storage media for text processing, an office terminal and a teleprinter for the Teletex service.

The text station is modular in design and consists of these components among others: display screen, keyboard, printwheel printer, automatic sheet feeder, minidiskette drive, send-receive storage, communications controller, and data transmission equipment. Storage capacity is unlimited through the easily exchangable minidiskettes and the stored text can be edited and erased at any time. All text entered for storage goes through the display so that a direct check and correction is possible. Text to be sent and that received is stored in the send-receive storage. This nonvolatile storage has a maximum capacity of 70,000 characters.

The central controller is equipped with a microprocessor and a bus system to the individual components and controls or monitors functions in local operation and during send-receive processes.

The communications section consists of the communications controller and the data transmission equipment. The character set (309 characters) and communications code (8-bit code) meet the CCITT recommendations for Teletex service.

The HF 2055 automatic telecopier transmits and receives any text, drawings and other documents through the Teletex network; both processes can run in parallel. A maximum of three minutes are required for an A-4 document. Documents to be sent (maximum of 80) are placed in the hopper, fed in one after another, sent and then fed out by the device. The reader is optoelectronic; the recording is made by an ink writing mechanism.

PHOTO CAPTIONS

1. p 431. Control panel for the OZ 100 D digital telephone exchange, Leipzig Telecommunications Plant for RFT [Radio and Telecommunications Equipment] VEB, Communications Electronics Combine VEB; photo by G. Seidel.

2. p 432. SZT time-shared telegraph communication unit, Leipzig Telecommunications Plant RFT VEB, Communications Electronics Combine VEB; photo by Foto-Richter.

3. p 432. UGZ 75 central unit, Koepenick Radio Plant VEB, Communications Electronics Combine VEB; photo by Werkfoto.

4. p 433. UBZ 75 control console with UZZ 75 auxiliary unit, Koepenick Radio Plant VEB, Communications Electronics Combine VEB; photo by Werkfoto.

5. p 433. T 4200 text station for Teletex Service, Siemens, FRG; photo by K. Schwarzer.

6. p 433. HF 2055 telecopier, Siemens, FRG; photo by Werkfoto.

East Berlin RADIO FERNSEHEN ELEKTRONIK in German Vol 32 No 7, Jul 83
pp 433-436

[Article by W. E. Schlegel]

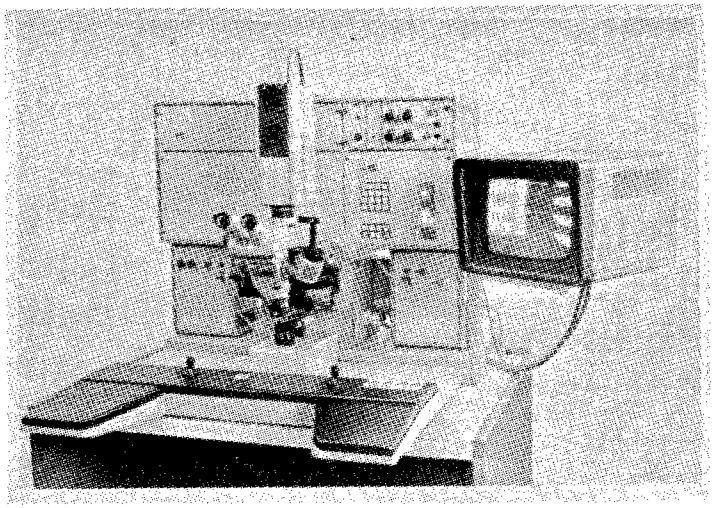
[Text] GDR. Dresden Research and Microelectronics Technology Center VEB.

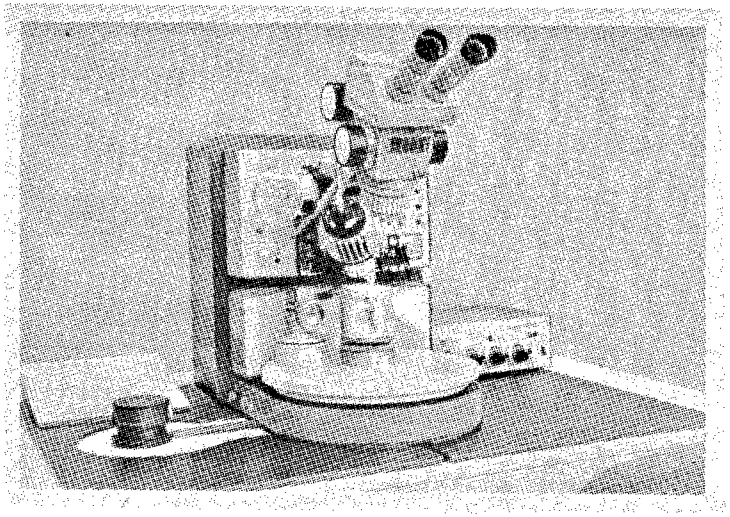
The ADB-50 automatic wire bonder, used for gold-free bonds of various components, is controlled by a microcomputer. AlSi wire with a diameter of 25 to 50 micrometers (125 micrometers) is used here. Bonding is by ultrasound; the ultrasound generator has two channels with automatic frequency following and oscillates at 60 kHz (piezo electric crystal). The ADB-50 locates the chip position on its own by a camera system and then lays the wire bridge. Work with such devices, very strenuous until now, has been made considerably easier by a display screen.

This device features: an image recognition system (two or four-point recognition, expandable), reference positions are input through a self-learning system, automatic bond error checking, automatic or manual component transport, and the device can thus be included in an automatic system.

The ADB-50 is used to bond chips in watch modules, on substrates, on carrier bands, in holow body plastic packages, in ceramic packages, on chip carriers and to bond optoelectronic components. A CMOS buffer RAM is available to hold data for 100 hours. Bond area is 12 mm x 12 mm; bond rate is 400 ms/bridges with 2.5-mm bridge length; 128 bridges can be laid per component; the value is expandable. The cross table operates in 10-micrometer steps and is fully rotatable through 360°. Bond strength is adjustable from 0.15 to 1 N; bond time takes 25 to 250 ms. Dimensions: 820 mm x 820 mm x 900 mm (device), 1,100 mm x 750 mm x 950 mm (table). Total weight is 300 kg.

The AVT 120 automatic multiprobe sensor is used for static and dynamic tests of analog and digital IC's in intermeasurements and for wafer testing. It is also used for measuring at high frequencies together with a suitable tester (TTL level, L active). The cross table can be positioned in x, y, z and φ coordinates. Semiconductor wafers are input/output automatically or manually into/from magazines. The wafer is automatically centered on the wafer supporter and held by vacuum. During subsequent preadjustment, the main bevel is aligned parallel to the x or y direction; this process is controlled by a measuring system operating with no contact. Then follows the manual precision adjustment by making a reference-to-actual comparison at two wafer points; error correction resulting from that is again automatic after the necessary computations. The AVT 120 is controlled by a microcomputer. Component data (diameter, thickness, etc.) can be input by keys or a replaceable EPROM. If errors are found, the component is color coded and removed from further processing. There are 60, 80, and 90 needle carrier positions and a maximum of 4 marking carriers. Adjustability of needle carrier for 60 positions (80 and 90 positions): fine adjustment in z-direction is 200 micrometers, needle





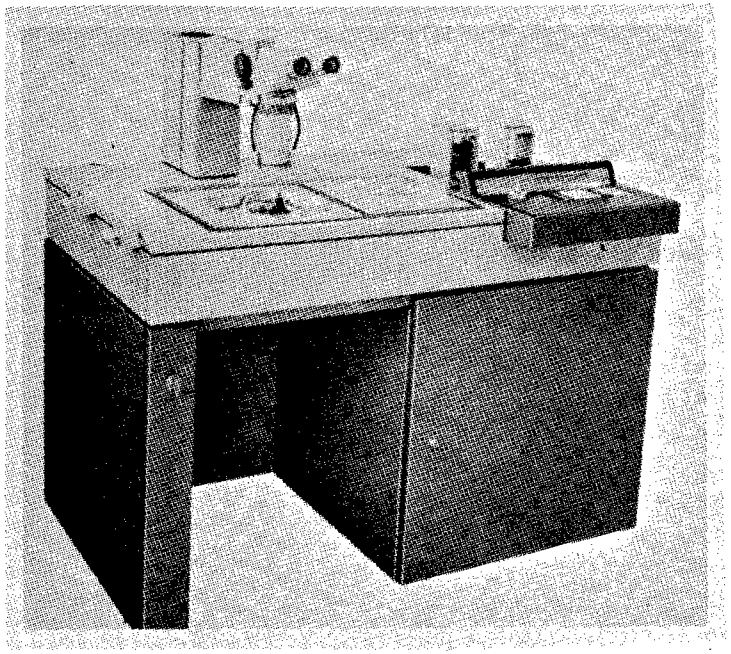


Fig. 1. ADB-50 automatic wire bonder Fig. 2. MDB 10 manual ultrasound bonder

Fig. 3. AVT 120 automatic multiprobe sensor
[all 3 from the] Dresden Research and Microelectronics Technology Center VEB.

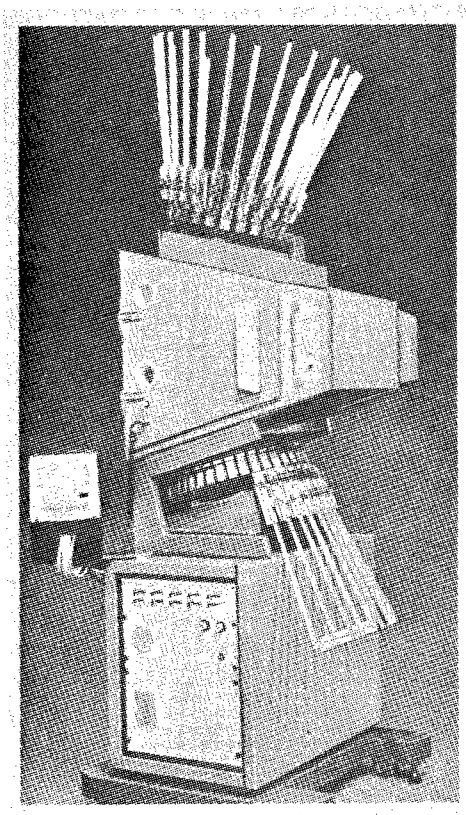
point travel is 100 micrometers (150 micrometers), spring constant is 1.5 N/mm (1 N/mm), point diameter is 0.030 to 0.038 mm. Wafers with a diameter of 76 to 150 mm can be measured. The working area of the cross table is 170 mm (about 400 mm with input/output), and 170 mm in the y direction. Step unit is 5 micrometers, positioning error is maximum of ±10 micrometers (sense range <= 100 mm) or a maximum of ±10 micrometers/100 mm with a sense range beyond 100 mm. Programmable step size is 10 micrometers to 20 mm; the raster of the programmable step width is 10 micrometers. The drive in the x and y directions is by a linear step drive supported by air. A direct step drive is used for the φ direction; the smallest step unit is 20.642 angular seconds. Dimensions are 1,300 mm by 1,350 x 850 mm; weight is 370 kg; power draw is about 600 VA.

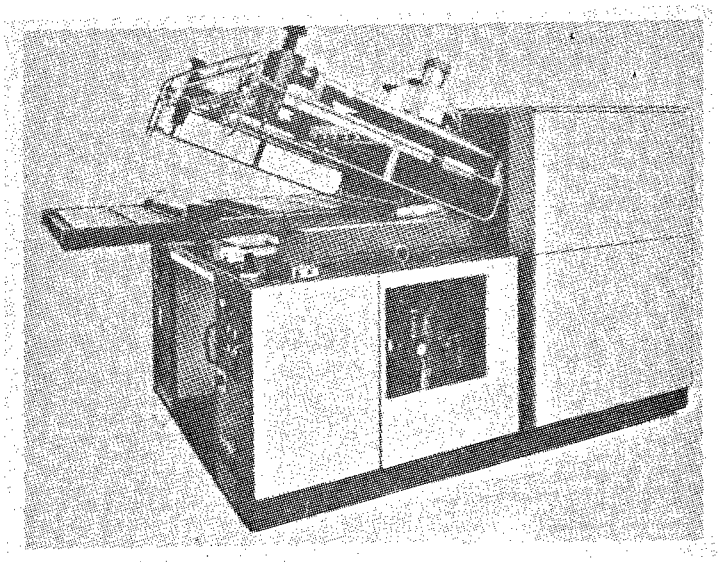
The MDB 10 manual ultrasound wire bonder was exhibited at this fair with the rating "Quality Design." It is a bonder for aluminum alloy and aluminum wire with a diameter of 17.5 to 100 micrometers. It is designed for use primarily in research and development [R&D] and manufacturing in small lots. Through various component adapters, it can be used to process hybrid circuits, carrier strips, ceramic packages and TO sockets. Operating modes are: manual control (instrument movement by manual control), automatic operation (after manipulation of workpiece, further processing steps run automatically), chain bonding (after switching the wire break program off, a continuous wire bridge can be produced). Control is by fixed program and built with CMOS components. The bonding itself is produced by using the USG-60 ultrasound system which has a two channel ultrasound generator with automatic frequency following and a piezo electric crystal with an operating frequency of 60 kHz. The manipulation area covers 100 mm x 100 mm (coarse) and 16 mm x 16 mm (precision); 360° rotation is possible. Bond strength is 0.2 to 1.2 N (continuously adjustable for first to second contact) and the extra bond strength has a value from 0 to 0.5 N (optional for the first and second contact). Bond time requires 25 to 250 ms; ultrasound level is maximum of 1 W (range I), or maximum of 6 W (range II). Dimensions are 324 mm by 488 x 396 mm (device), 225 mm by 185 mm x 90 mm (generator); total weight is 40 kg.

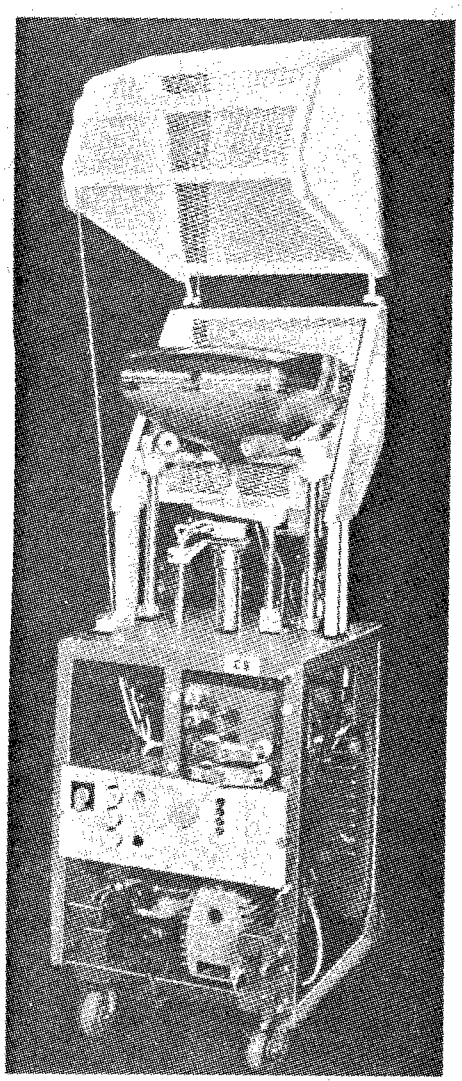
Frankfurt (Oder) Semiconductor Plant VEB

The 6202 automatic circuit grader is designed for connection to a tester in final measurement. IC's in DIP's (7.5 mm and 15 mm row spacing, 10 to 48 pins) are automatically taken from bar magazines, placed in contact in the tester measuring socket and subsequently annealed in the range from -25 to 150°C. In the process, static and dynamic parameters are measured by the tester and the components are classified into 10 classes. The grader converts the class and assigns the component to new bar magazines matching the given classes. Maximum measuring rate is 3,600 components per hour. Transport of components which are carried by gravity is supervised by optoelectronic sensors; the rest of the mechanical processes are pneumatic. After a filled bar magazine reaches the input chute, it is emptied except for one third. One third slides into the storage magazine where the components are annealed; the other third remains in the input chute. Components are annealed by resistance heating for heat grading and by feeding in CO_2 to lower the temperature.

Rated cycle time is a maximum of 2 s; measuring time is a maximum of 1 s; the







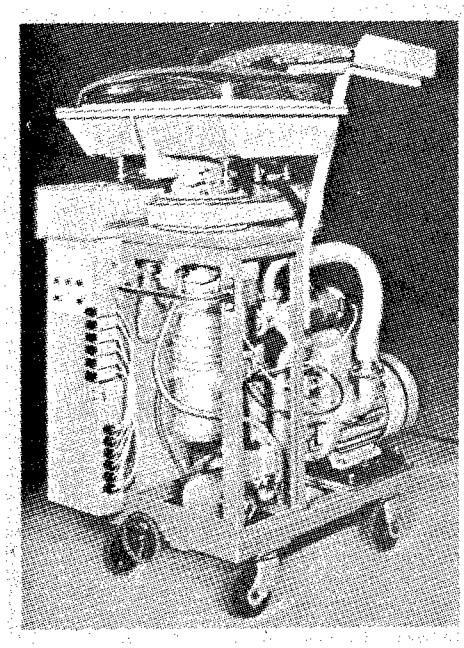


Fig. 4. 6202 automatic circuit grader, Frankfurt (Oder) Semiconductor Plant VEB.

Fig. 5. PCB printing machine with alternating printing table, Gornsdorf Contact Components and Specialized Machine Building VEB.

Fig. 6. Aluminum coating cart [both] for color picture manufacturing,

Fig. 7. Pump stand Dresden High Vacuum VEB.

temperature range can be regulated within -25 to 150°C with a precision of 2 K. All grader functions are controlled by the K 1520 microcomputer. Two graders can be connected to one tester. Dimensions are 850 mm x 850 mm x 1,980 mm; weight is about 250 kg; power draw is about 1.8 kW. Nine work stations are eliminated.

Dresden High Vacuum VEB

The aluminum coating cart is a part of an automatic aluminum coating system used to coat screens for color picture tubes with aluminum. Essentially, it consists of an efficient high vacuum pump set to produce the vacuum required for deposition. For one automatic aluminum coating system, 18 carts are required to enable quasi continuous operation. They are arranged on a carousel and orbit around the automated machines on a circular track. Evacuation and deposition are performed automatically during the orbit and take about 10 minutes. The Al film deposited is then 0.2 micrometer thick. Each cart is continually connected to the overall power supply, waste gas exhaust and the cooling water circulation systems so that in case of malfunction, a cart can easily be replaced during operation. The carts are designed to accomodate various CRT formats: 15" (38 cm), 19" (48 cm), 21" (53 cm) and 25" (63 cm) diagonals are accomodated.

The pump stands exhibited are also used for automatic manufacture of color picture tubes; 198 of them are used in an assembly line. With them, picture tubes are tempered and evacuated to a pressure under 10^{-4}, hermetically sealed and gettered to a pressure of 10^{-6} Pa within a cycle. Then some system functions can be tested. The pump stands feature a brief evacuation time, low final pressure of 10^{-6} Pa and high reliability. They are suitable for two sizes of picture tubes.

Gornsdorf Contact Components and Special Machine Building VEB

The G 11.456 printed circuit board [PCB] printing machine was exhibited with a new type of alternating printing table. The advantage of this table is that the swing frame movement prevalent and required to now can be completely eliminated since two printing table boards are alternately moved from the input and output positions into the printing position. PCB's being printed are input and output during the printing process outside the printing area. Labor productivity compared to conventional screen printing machines is thereby increased by over 20 percent. Labor safety is also thereby increased while physiological and psychological stress on operators is reduced. The printing machine itself is used for screen printing primarily of precision PCB's using precision conduction technology with high conducting line density. Drive and control are pneumatic; electrical power is needed only to produce vacuum and operate the photosensor assembly which monitors the locking area of the locking frame in the interest of industrial safety. Following technical data were given for the machine (values for the alternating table model exhibited are in parentheses): maximum printing format is 500 mm x 600 mm (350 mm x 500 mm), vacuum printing table is 650 mm x 1,100 mm (420 mm x 600 mm), this is adjustable in the x and y directions over $\pm$20 mm and rotatable by $\pm$7°, maximum

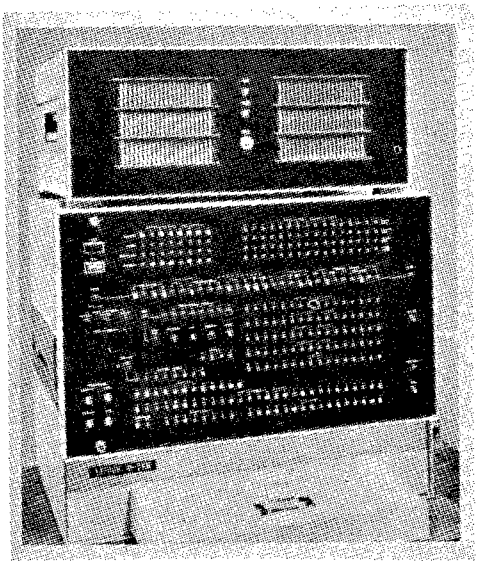


Fig. 8. Elekon F-ZUM semiconductor tester, Soviet Union

screen frame format is 650 mm x 850 mm, maximum doctor blade course is of 630 mm, infinitely adjustable, doctor blade rate is 0.01 to 0.30 m/s, printing repetition error is $\pm$0.05 mm, frame removal delay is 0 to 10 s, air consumption is about 2 m^3 at 5 x 10^5 Pa, power draw is 400 W, mechanical duty cycle is 600 doctor blade courses/h (900 doctor blade courses/h), plus PCB input and output time, practical duty cycle is 300 doctor blade courses/h (500 doctor blade courses/h) including PCB input/output time. Dimensions are 2,000 mm x 1,400 mm x 1,300 mm; weight is 1,000 kg.

Soviet Union

The foreign trade firm Techmashexport exhibited the Elekon F-ZUM semiconductor tester used for functional testing of RAM circuits. It can handle TTL, ECL and MOS LSI circuits. Type n, n^2 and $n^{3/2}$ algorithms are used in testing, where n is the number of memory cells. The memory circuits to be tested can have a capacity of 64K x 16 bits. Tests can be performed in a frequency range from 0.15 Hz to 12.5 MHz. The device has 16 information outputs, 16 information inputs, 16 address outputs and 7 control outputs. The device has internals RAM's with a capacity of 128 28-bit words, corresponding to 3.5K bits, to hold test programs. Utility power required is 220V; power draw is a maximum of 1.5 kVA. The tester requires an ambient temperature of 25°C $\pm$10 K,

relative humidity of maximum of 80 percent and air pressure of (97 $\pm$4)kN/m^2 for operation. Dimensions are 472 mm x 220 mm by 498 mm (power section), 662 mm x 472 mm by 520 mm (algorithm and control unit), 1,000 mm x 660 mm x 660 mm (table); total weight is 124 kg.

CSSR

The Tesla Piestany firm exhibited the Telemet automatic system for measuring small structures. It enables rapid and precise length measurements by using a TV system. It is controlled by a microcomputer based on the MHB 8080 A microprocessor. The signal level profile on semiconductor chips can be observed and measured. An optical microscope is used to localize the structure. The length is evaluated automatically: Each measuring value is read eight times and the arithmetic mean value, rounded to 0.1 micrometer, is written directly to the monitor under the image read. The details to be measured are defined by identifying the distances by a horizontal and two vertical lines on the screen. The space from a fixed vertical (first from left or first from right) to a manually definable can also be determined. Smallest measurable space is 0.1 micrometer. Power draw is 90 VA; dimensions are 400 mm x 400 mm by 250 mm; weight is 12 kg excluding the microscope and camera.

Development Trends

At the Amtest Ass. stand, a British firm, the Amistar Corp., USA, exhibited several automatic PCB component inserters for axial components and for IC's in DIP's. The CI-1200 automatic component inserter has 32 bar magazines for IC's in dual-in-line packages §DIP's] which can have 8 to 20 pins. The PCB to be fitted with components is placed on a cross table which can be rotated 360° and shifted in the x and y directions. The device is controlled by a microcomputer which is programmed according to the teach-in-method. Maximum insertion area is 45 cm x 45 cm (18" x 18"). For more comprehensive system automation, an interface is available for other equipment. Maximum repetition error is 0.127 mm. The device illustrates to what extent productivity can be increased by using microelectronic controls together with precision mechanics; the maximum insertion rate is 3,600 components per hour.

PHOTO CAPTIONS

1. p 436. CI-1200 automatic component inserter, USA

Photos by: Werkfotos (5), K. Schwarzer (4).

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SHORTCOMINGS IN SCIENTIFIC INSTRUMENT BUILDING CITED

East Berlin PRESSE-INFORMATIONEN in German No 28, 6 Mar 84 pp 3-4

[Article by Dr. Norbert Langhoff, Director, Center for Scientific Instrument Development, GDR Academy of Sciences]

[Text] Scientific instrument construction is today both a result of, and a precondition for, meaningful research. It to a great extent determines the quality of basic research in all areas of natural science, medicine, agriculture, and engineering. Solution of problems at the forefront of science require continuous change and expansion of the investigative field of research.

In addition to creativity and willingness of scientists, developers, builders, technologists, and research workers to be productive, extensive reproduction of scientific research instruments is an immediate requirement and an absolute necessity. Today, in the scientific instrumentation construction program of the GDR alone, installations, equipment and instrument modules costing more than M 50 million are created. Knowledge newly won in these efforts is immediately channelled into applied and basic research.

Beyond all this, scientific research instrument manufacture stimulates industrial instrument production and becomes thus, together with manufacture of rationalization tools for combines a catalyst of scientific technical progress in all areas. For this reason the cooperation between appropriate installations of the Academy of Sciences and the universities and trade schools on one hand, and the industrial instrument manufacturers and makers of rationalization tools on the other hand, must be strengthened considerably. Experience in cooperation of our Center for Scientific Instrument Manufacture with the technical institutes of the universities and such combines as Carl Zeiss JENA, Mikroelektronik, Robotron, and Hermsdorf ceramic works reaffirm again and again that cooperation is then most effective, when it is concretely and responsibly reflected in the annual and five year plans.

Because of its catalytic effect on all economic processes, scientific instrument manufacture and its advanced state of the art has become a battle ground for major conflicts in the world markets, and plays an increasing role in the class struggle with imperialism. The policies of the USA with their tighter embargo regulations have considerably limited scientific cooperation.

Scientific equipment products developed at our academy are of great importance for the material-technical basis of research and for scientific work in general. With an annual replacement rate of more than 25 percent we are on the right track. It is the goal of science in the GDR to achieve a world position in major economic areas and in key areas of scientific instrument manufacture, and to become a decisive factor in close cooperation with the socialist countries, especially the USSR. This generally has not yet been achieved in sufficient quantity and quality. Some important areas of analytical measurement technology have not been pursued with the necessary goal orientation during the past years. One of these areas is energy dispersive X-ray fluorescence spectroscopy.

In the meantime we have achieved results in this field, in close cooperation with the VEB Robotron Measurement Technology "Otto Schoen" Dresden, the Central Institute for Nuclear Research Rossendorf of the Academy, and the physics section of the Technical University Dresden. Temporary interdisciplinary cooperation was organized. It was based on already available scientific-technical results. The partners consistently fulfilled their obligations, which were agreed upon in interorganizational competitive agreements. In this connection the assignment of researchers to the Center for Scientific Instrument Manufacture proved useful.

In this way we were able to begin sample production of energy dispersive X-ray fluorescent spectrometers of the type EDR 183, after less than two years. These instruments are initially of great importance as auxiliary equipment for raster electron microscopes used in quantitative and qualitative analysis of chemical elements and for clarification of structures in research on glass, catalysts semiconductors, biology and medicine.

Similarly collectives from several institutions of the Academy of Sciences, together with workers from the VEB Chromatron Berlin are working to accelerate progress in the field of gas and high-pressure liquid chromatography. This scientific method for separation of mixtures of substances, preparation of samples or for the determination of concentration of chemical elements has during the past years been developed into a standard method. This work applies to chemical, medical, biological and pharmaceutical research and also to the corresponding sectors of industry.

7994
CSO: 2302/41

MICROELECTRONIC CONTROL SYSTEM FOR TURBO GENERATORS

East Berlin BERLINER ZEITUNG in German 6 Feb 84 p 1

[Unattributed article: "Better Microelectronic Control System Saves Costs in the Millions"]

[Text] The 9000 workers of the parent plant in the Electro Equipment Works combine Treptow will finish the first month of the 1984 planning year by having fulfilled their quota.

A focal point in competition in the collective is the increase of contributions from research and development, especially in view of the increased pace of development projects which have to meet requirements and the introduction of 18 new products during the course of this year.

At this time a newly developed microelectronic regulator generation "ursamar 5001" is proving itself in the energy economy of the Republic, it was developed by the research center of the parent plant in the Electrical Apparatus Works Combine, Berlin-Treptow, "Friedrich Ebert." The device provides for economic operation of turbo generators in power plants. In the industrial power plant of the PCK Schwedt, for instance, energy valued at M 100,000 is saved each year per microprocessor.

Compared to conventional technology the microelectronic regulator reduces the equipment volume by two-thirds. Utilization of microprocessor computers, for instance, saves investment expenditures of M 1.0 million per power station block during the reconstruction of power plants. The microprocessor regulator "ursamar 5001," which was developed by a youth research collective as an MMM task ["Messe der Meister von Morgen"--Fair of the Masters of Tomorrow] is part of a product line, which among others is planned for use in automation of power stations and for use in agriculture.

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NEW THERMAL STORAGE MATERIAL DEVELOPED

Dresden SAECHSISCHE ZEITUNG in German 2 Mar 84 Supplement p 5

[Unattributed article]

[Text] A new high quality storage material, which replaces conventional products and which is used effectively in heat storage and open hearth furnaces, has been developed by experts of the Brandis silicate factory, jointly with researchers of the Technical Building Equipment Combine Karl-Marx-Stadt. The silicate factory, which is part of the quality and high quality steel combine Brandenburg, which primarily produces refractory concrete for furnaces in the metallurgical, chemical, and ceramic industries, as well as for power plants, has for many years devoted its energies with great vigour to the further development of heat resistant products. It is most important to increase use of local secondary raw materials and to correspondingly decrease the use of expensive imported materials. Thus the refractory products industry of the GDR produced till the mid-1970's magnesite and chromium magnesite brick, a classical heat storage material, which was produced based on magnesium and chromium oxides. These materials possess a high heat storage capacity.

The needed chromium ore and the magnesite, however, all had to be imported. The Brandis experts then discovered that secondary raw materials from the ferro-alloy industries contain up to 45 percent magnesium and that they are highly heat resistant. In the Lippendorf ferro-alloy factory alone, several thousand tons of this useful waste product become available per year. Based on this experience a new refractory concrete was created, which now replaces the conventional, classical, expensive storage material. Since last year the Stassfurt potash industry also produces magnesium oxide.

Further development of the specialized storage bricks, which now, among others, are also used in the metallurgical industry, occurred in steps, similar to the step-wise increased utilization of secondary raw materials used in refractory concrete. Until the beginning of the 80's these bricks already consisted of about 70 percent useful waste products, but they contained an excessive residual amount of water. This limited their area of application.

This problem has now been solved by experts from Brandis together with scientists from Karl-Marx-Stadt. They created within 22 months a new heat storage material consisting exclusively of local secondary materials and having low

residual humidity. Special test procedures indicated high efficiency and an expected useful life of 20 years, which approximates international high quality products. A further advantage is that classical heat storage materials must be manufactured in a very energy intensive combustion process, while the new product hardens with cement at room temperature. Furthermore a smooth transition was made from research into production through close cooperation between the two enterprises; production started already in 1983. The silicate workers will produce about 3700 tons of the storage material during this year, so that demand will be satisfied with local production.

In open hearth furnaces, for instance, the hot exhaust gases are passed over these new bricks, which can tolerate temperatures up to 1500 degrees C.

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MEMBER OF CEMA ROBOT COUNCIL ON FUTURE OF ROBOTS IN HUNGARY

Budapest OTLET in Hungarian 5 Apr 84 pp 11-12

[Article by Gyorgy Foris: "The Robots Are Coming"]

[Excerpts] The following thoughts are based on a conversation we had recently with Dr Otto Jakkel, technical director of the Machine Tool Industry Works and Hungarian member of the CEMA Robot Chief Designers' Council.

Today barely 50 industrial robots operate in our country. Most of them supply work pieces, about 20 percent of them are welders, but there are a few painting and one or two assembly robots also. The picture is improved somewhat by a competition announced jointly by the Ministry of Industry and the OMFB [National Technical Development Committee] for use of robots as a result of which, last year, 22 enterprises received central support--covering not quite half of the costs--to put into operation a total of 27 robots. But this is still just the beginning.

"Can we, in any way, 'employ' more of them?"

"Well, the professionals--the domestic profession, because the judgment differs country by country--understand by robot the relatively easily reprogrammable (CNC controlled) devices, which can do more than the fixed program manipulators. The majority of the robots used in large numbers around the world today weld, paint and assemble. There is a lot of such work in Hungary also, which could be automated and which must be automated sooner or later."

Of course, buying a robot is not just a question of money. More precisely, it is not just a question of the acquisition price. According to Otto Jakkel we must still struggle today with attitudinal obstacles as well as financial limitations. And installing a robot presumes technological and organizational transformations which many leaders are not happy to undertake.

According to the thinking another 30-40 robots will be placed into operation in our country this year, about 50 in 1985, and then 50-80 per year thereafter. For the time being we have not made any big mistakes, because while it is true that we are 4-5 years behind socialist countries and about 10 years behind developed capitalist countries this also means that we have avoided using immature robot technology. At present we are in the favorable situation where even socialist countries are offering more perfect systems.

But one needs not only the machines to acquire experience; one also needs receptivity for the new machines and prepared experts. In large part the fate of all domestic robotization depends on whether we can create the appropriate educational background for it. We must reach the point where it is possible to get not only theoretical instruction in higher education but also practice and testing, even if this means that the robots appear sooner in instruction than they do in production.

In the final analysis the broad spread of robots also depends on whether we can produce the conditions which will make it possible for them to be, among other things, economical in use (thus, for example, paying for themselves within 5 years). For this reason alone it is probable that we can count on the use of robot technology primarily in those areas which produce expensive products, where one can arrange for continual manufacture night and day, or where they will do work harmful to health.

The robot is not a cheap animal. The price of a simpler robot, supplying work pieces, is 1-2 million forints, but a system consisting of several robots can cost 5-10 million forints. The price of a robot doing more complicated work (welding, painting, assembling) can reach 5-8 million. This in itself is a large sum for an enterprise, especially if we consider the present cutback on investment. So central support is certainly justified, at least in the initial stage. (Perhaps it is no disgrace to cast a glance next door. In Czechoslovakia they cover 40 percent of the costs of installing robots, in the form of state support, in order to aid the spread of the new technology.) An effective tool for the necessary aid could be frequent repetition of the competition already mentioned.

It would make things easier if not only 30 percent but rather 100 percent of the wages of manpower replaced by robots were to remain untaxed at the enterprise--for wage development. In reality a large sum is not involved, because as an average one robot frees two people, and even with the planned 50-80 robots per year this is not a large number of people, but still it would make the enterprise leadership feel an interest in the spread of the new technology, from the side of wages too. The question may arise, "If only two people are involved, then what good is the whole thing?" For so much money! This seems to be true, but a robot can work anyplace (even under conditions harmful to health) in three shifts, it doesn't get tired and it doesn't make mistakes, but always produces the required quality.

And finally, support for domestic development is an important condition also. A rising domestic robot industry would represent a driving force which might have an effect on use; in addition it would expand the supply base for robots, whether as a direct acquisition source or as a basis for exchange. Today only a few firms (the Microelectronics Enterprise in Gyongyos, REKORD in Gyor, the Csepel Individual Unit Machine Factory and VIDEOTON) deal with making robots or the idea of doing so.

The Csepel undertaking seems especially promising. They have purchased a foreign license for the manufacture of hot plant, large load robots. At the moment they are just adapting the plans, but if manufacture gets started it will be the only firm in CEMA which will be able to deliver a robot capable of moving work pieces weighing a ton.

The program of VIDEOTON is of similarly great significance. They want to start robot manufacture in large series, satisfying export needs as well.

We need robots, and probably will soon have them--more and more of them. According to the experts only a slow development can be expected until 1990, but by the turn of the century we can count on intensive robotization. By then the robots will be cheaper, the conditions for acceptance will have developed--and at the same time the number of skilled workers is expected to radically decrease, thus increasing the demand greatly. So it does no harm to prepare in time, and the sooner we do so the more perfectly we will learn "robotese"....

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CSO: 2502/53

EXPERIENCES IN ROBOT TESTING, PURCHASE

Budapest OTLET in Hungarian 5 Apr 84 pp 12-13

[Article by Emilia Papp: "They Don't Mind Work"]

[Text] "Developers must put up a fight for the introduction of robots. If you listen to those who only study the conditions for their acceptance and whether the technical development level of manufacture justifies their use you will never get a robot," said Istvan Lepsenyi, deputy chief of the developmental main department at the Ikarus Body and Vehicle Factory.

Ikarus is one of the few Hungarian enterprises which use robots in manufacture. In 1979 they tested the first painting robot, which they bought with the aid of the OMFB [National Technical Development Committee]. They wanted to create on their own an entire painting system based on the robot of Swedish manufacture. But the auxiliary tools did not work out and since then they have disconnected the robot too, and will put it back into operation only after design changes about to be done. By then they will work out the new tools. "The experiment ended with failure," Istvan Lepsenyi confessed, "but it is thanks to the lessons of this that the most recent attempts succeeded."

The factory has signed a contract with the OMFB for support for acquisition of robots used in arc welding, spot welding, surface preparation and serving the stamping machine. The enterprise set aside 40 million forints for the investment; the OMFB provided about one quarter of this. But reality, that is the price of the robots, has narrowed the possibilities. Since the arc welding robot cost 16 million forints and the surface preparation robot cost 23 million practically no money remained for the stamping automat costing 15.5 million forints.

For surface preparation the factory bought two painting gates of FRG manufacture; these paint the side panels and roofs of the autobuses. Before they were installed they clarified the technical requirements with the manufacturer and they entrusted development of the ssytem to the manufacturer. Since August the robot has been working in two shifts, and they have had virtually no trouble with it. The Swedish firm ESAB delivered the arc welding robot and it is used to weld the elements of the side frame. It arrived in January 1983 and was put into operation by the end of February; since January of this year it has been working in two shifts also. But putting it into operation did not go without

trouble. This robot--like the FRG painting robot--is not "intelligent," it does only what it was taught in the way it was taught when the work process is introduced. After that the robot does not correct its work but only repeats it. So it caused a problem that the tubes coming under the hand of the arc welding robot were not always uniform, sometimes even deviating from the cross section of the material coming from Dunaujvaros. At such a time one has to correct the program. Several months passed before primary material of a precise size arrived from the preparation plant (bending, cutting) of Ikarus and it also took a lot of time before the new experts were taught to correct the programs. Because unfortunately this is still needed; even since then they have been getting tube of deviant size from Dunaujvaros.

Despite the difficulties the Ikarus developers are still working on the spread of robots. Istvan Lepsenyi feels that in the future work must be given to robots in every area of manufacture--thus in welding, surface preparation, assembly and serving machines. Discussions are now taking place to buy a Polish spot welding robot based on a Swedish license, for which they have received support on the basis of a Ministry of Industry competition. According to the plans they will also use Puma assembly robots, which would assemble the ceiling lamps of the autobuses. This is being tested now in the Computer Technology and Automation Research Institute of the Hungarian Academy of Sciences--imitating a factory environment. If it works well it will be installed this year in the assembly hall of the factory.

The traditional cost-efficiency calculations do not support--however strange it may sound--the need for robots. Both robots already in operation replace only one person each per shift. If we note that the price of the arc welding robot was 16 million forints and that a welder earns 60,000 forints per year then more than a hundred years would have to pass before the price of the machine was returned. The ratio of the price of manpower and of robots comes out differently in developed industrial countries, but even here broad use of robots is generally economically justifiable in series sizes of more than 100,000. In contrast to this Ikarus produces 13,000 autobuses per year.

"So why are you trying to spread robots at Ikarus?"

"However strange it sounds," Istvan Lepsenyi said, "the small series size is the reason, primarily. The approaching model change means greater variety and more flexible accommodation to the needs of the customers. Extraordinarily flexible robots which can be taught different programs will have a large task in this, because their work is even and of outstanding quality. And finally one cannot ignore the fact that they do difficult physical work, dangerous to health, without getting tired. The factory could not get experts to do these jobs at the present pay."

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CSO: 2502/53

BIOLOGICAL RESEARCH CENTER DEVELOPS ANTI-FROST SPRAY

Dresden SAECHISCHER ZEITUNG in German 4 May 84 p 6

[Text] Members of the Biological Research Center in Szeged have been conducting research aimed at enhancing the frost resistance of plants. Among other things they inquired why winter wheat needs frost to promote development while summer wheat suffers damage at low but above freezing temperatures. Several institutes of the center researched the function of cell membranes according to Academician Lajos Alfoldi, director of the center. They attempted to establish how cells regulate response to temperature changes through the cell wall.

They found that the problem involved cold-triggered changes in the microviscosity of cell membranes which can lead to disturbances of the cell. To determine these, biophysicists of the center made precise measurements thereby amplifying findings of colleagues working in this special field at the partner Institute of Genetics and Biochemistry in the same building. This, in turn, led scientists to explore the role that saturated and unsaturated fatty acids and their melting point play in protection from cold.

Next a search began for a preparation that would keep fatty acids liquid at the lowest possible temperature. Such a substance was found in an industrial byproduct. This source made preparation of a spray from it relatively cheap.

The degree of cold a plant can withstand and how long protection lasts after application varies according to type of plant, according to Alfoldy. In regard to use of the spray on large areas, he stated: "Even if the spray has proved effective under laboratory conditions and in a climate chamber, application in agriculture calls for additional work. Tests must be conducted on areas of 20,000-100,000 hectares. To do this, we must wait for the frosts of May."

Nevertheless, prospects for the preparation are promising. Its use would prevent extensive damage caused yearly by spring frosts. It is also conceivable that through use of the spray, the growing season for cold sensitive plants such as corn could be extended in the north according to Professor Alfoldi.

CSO: 2502/57

BIOTECHNOLOGY RESEARCH, DEVELOPMENTS DESCRIBED

Reorganization of Biotechnology System

Warsaw ZYCIE WARSZAWY in Polish 29 Mar 84 p 2

[Article by B. K.: "PAN Presidium Session; Revolution in Biology; New Technologies in the World; Condition of Biotechnology Research in People's Poland"]

[Text] A PAN presidium had for its main topic a report developed and presented by a panel of scientists from various fields.

The report concerned engineering techniques which are making worldwide advances. Their attractiveness is such that scientists must even be protected from excessive pressures of the industries eager to purchase the right to exclusive use of selected techniques before they even leave research labs. In recent years, several hundred companies have been created worldwide in expectation of large profits resulting from such research and its applications. Most major pharmaceutical, chemical and food processing companies have set up their own research centers and allotted substantial funds to the advancement of fundamental research in this field.

The field in question is an aggregate of science, research, and application referred to as biotechnology. In its contemporary form, the technique of biological engineering has arisen in the last few years. It was predated by the discovery of DNA, a vehicle for transmitting hereditary traits, and the ability to transfer selected portions of the genetic code from one organism to another. As the authors of the report note, this produced a practical capability of constructing live organisms in an arbitrary manner. These capabilities are being utilized even now to some extent. A human gene governing the production of insuline now causes bacteria to produce human insuline for commercial purposes. A growth-regulating gene has been successfully transplanted from one species of mammals to another, thus producing a mouse twice the regular size by means of a rat growth hormone implant. This trait--abnormally large growth--has been transmitted to the offspring and becomes hereditary.

A part of the discussion on the report concerned bacteria's capacity of leaching metals from low-grade ore. Between 10 and 20 percent of the copper extracted in the United States is obtained in this manner from

low-quality ore. Bacteria can be used to extract crude oil from older abandoned deposits, a method used in the Soviet Union. Microorganisms can decompose organic refuse to produce biogas. New techniques have been applied in the pharmaceutical industry to manufacture a number of vaccines and to obtain large quantities of medically needed diagnostic reagents.

It is estimated that the worldwide rate of growth in the output of biotechnology-based industry is matching the rate of growth in electronics.

What possibilities are there for Polish science and industry in this field? PAN presidium members and invited representatives of the biological science, chemical and pharmaceutical industries talked about the need to organize biotechnology in Poland. "The biotechnological revolution," they said, "has found Poland virtually unprepared. This is seen in the low numbers of research scientists in this field, scant support base, and the lack of a suitable system for transfer of research results to industry."

A series of organizational steps were proposed, leading to the selection of several directions in biotechnology which should be developed.

Establishment of Biotechnology Center

Warsaw RZECZPOSPOLITA in Polish 3-4 Mar 84 p 4

[Article by Jadwiga Korzeniowska: "Worldwide Career of Biotechnology; Advantages of Genetic Engineering; Prospects for Farming; Proposals of Polish Scientists"]

[Text] Biotechnological companies now being created in the West obtain the services of consultants, or even employ such distinguished scientists as Nobel Prize winners W. Gilbert and D. Nathans. Particularly in the last 2 years in France, the FRG, Switzerland, the United States, England, Japan, and Sweden, a number of research and development institutes and enterprises have been established to handle the introduction of "useful" genes into cultivated plants in order to develop new valuable types of crops.

France went so far as to establish the ministry-rank office of coordinator of biotechnology problems. Biotechnology specialists are literally snatched from the labor market to become the subjects of special solicitude, in financial terms as well.

Plant biotechnology is of interest to Polish scientists, especially at the Poznan center, where a number of institutes and subdivisions specialize in research on plant physiology and molecular biology, with a solid tradition in integrated fundamental research in this field.

As the interested persons point out, research programs in the natural sciences in Poland have for years allowed for the priority significance of molecular biology. Severan PAN-coordinated domestic centers have attained internationally ranked levels of research. We now have a young cadre of researchers well prepared for this work--investigations in genetic engineering. Domestic development prospects for this field, however, are far from the

best at this time. The necessity to adhere to austerity programs has caused drastic curtailment of foreign currency exchange for purchases of equipment and reagents indispensable for research. This puts a question mark over the prospects of Polish research in genetic biology and engineering.

In an effort to counter these adverse trends, a group of Poznan scientists, including Professor A. B. Legocki, Professor J. Pawelkiewicz, and Professor M. Wiewiorkowski, recently addressed PAN to initiate work leading to the establishment of an International Plant Biotechnology Institute in Poznan, in consideration of the high level of Poznan-area agriculture to be used for pilot projects in the future.

Many countries that appreciate the importance of the "biotechnological revolution" are taking steps to establish international biotechnology institutes. For example, by a decision of the United Nations, an international biotechnology center is to be created in India, employing 150-200 scientists from all over the world, once the matter is ultimately resolved.

As suggested by the Poznan group, the construction of the center and its attendant facilities will be handled by the host country, while equipment and research funds will be provided by UNIDO. The center's annual budget is estimated at 8 million dollars.

In the Polish scientists' opinion, Poland is a country especially predisposed to host an international genetic engineering center specializing in plant production. The originators of this idea in Poznan believe that once Poland advances in the international arena an offer to host an institute of this kind, guaranteeing its construction (pavilion-type laboratory buildings, a set of greenhouses, and a residential facility for temporarily employed workers, including those from other countries), its proposal can be favorably received by international sponsors.

The authors of the letter state in conclusion: "Addressing our message to you, Professor (PAN chairman--author's note), and through your intermediary to the Polish People's Republic supreme authorities, we are fully convinced that the establishment of an International Institute for Plant Biotechnology in our country would be of an importance that cannot be overestimated for Polish science and, in effect, for Polish agriculture."

This initiative of the Poznan scientists has produced no response so far. It should be assumed, however, that it will soon be addressed by the PAN Presidium, once the new PAN authorities are firmly in the saddle. It would be a loss if this important and concrete proposal were to end up being shelved.

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CSO: 2602/20

POLAR RESEARCH, EXPLOITATION OF KRILL DESCRIBED

Gdansk GLOS WYBRZEZA in Polish 2 Apr 84 p 3

[Interview with Piotr Bykowski, the scientific director of the Maritime Fisheries Institute Antarctic expedition, by Tadeusz Mickiewicz: "Krill--Adventure or Future?"]

> [Text] On 20 July, the scientific research ship of the Maritime Fisheries Institute [MIR], the "Professor Siedleki," returned to Gdynia from its last Antarctic expedition. The scientific leader of this expedition was Dr Eng Piotr Bykowski, an MIR worker. Taking advantage of this occasion, we asked him for an interview.

[Question] Doctor, first of all a question about your journey to the sea and to Antarctica.

[Answer] I finished my course in food chemistry at the Gdanski Polytechnical Institute in 1962, and went to sea. I began at the very bottom, as an inexperienced fisherman. In this way I spent 6 years sailing on deep-sea trawlers. I had very good fortune and sailed with the best captains who were making history in Polish fishing. This was the most dynamic and tempestuous period ever in its development.

At the time there were many young men like us, eager for the sea and willing to take on even the roughest work. Later, after having got an idea of the sea and fish, I returned to the Polytechnical Institute in order to earn my doctorate. The general subject was "Enzymes in Sprat." In 1978 I began work in the MIR in Gdynia, and that is where my interests in krill really began, along with an interest in Antarctica, the place where it is found.

[Question] Were there not any more interesting subjects? Where did this interest arise?

[Answer] The Russians, Germans and Japanese had already been working on it for a number of years. In our country the word was not heard until 1976, after the first Antarctic expedition of the "Professor Siedlecki." Protein is more and more expensive, and there is relatively less and less of it

because there are more people. There are more krill than fiish. In the FAO [UN Food and Agriculture Organization] statistical yearbook of 2 years ago, krill was among the first 20 maritime organisms caught by net. Over 500,000 tons of it were extracted, constituting only a small fraction of the enormous resources. Every year an amount equal to half of the fish could be caught without damaging the natural balance.

[Question] What can be done with krill?

[Answer] In United States, the FRG, Japan, Scandinavia and USSR various kinds of meals made of krill are already available on the market. The canned products are very good and taste like crab meat. The Russians are particularly disposed toward the production of canned foods. We are going in the other direction, and want to develop technology for obtaining fodder meal and pure meat free of shells. Both present difficulties, at least today.

For several years MIR has been using machines to get krill meat, and they are constantly being improved. Last year we tested them during an expedition on the deep-sea vessel "Arcturus." On the fishing ground we met Soviet colleagues who made their equipment available to us, and we made a trial batch of canned preserves with it. It was very tasty, and well worth the effort. Our machine is small, and therefore several of them can be installed even on the ships we currently have. A large part of the catch could be converted into meat. This is not all, since the chitin occurring in the krill carapace has great prospects for application in industry, which is why it is called the polymer of the 21st century.

[Question] What about medicine? Are people supposed to eat whale food?

[Answer] It is not only the food of whales, because krill is also eaten by Antarctic fish. The fact is that in this way we have gone one step lower in the food chain. A great deal of extensive toxicological research is being conducted. The Russians, working on these questions much longer than we, have already accepted all krill items for eating. This year in our country we are waiting for the verdict of the State Institute of Hygiene, and I expect it to be favorable.

In my opinion krill will first enter the market as a high-protein fodder for livestock needs. In some countries it is already used for food, e.g., for trout or for fur-bearing animals. Next it will appear as a component in fodder for pigs, and here we will have a transformation into pork chops. Let me remind you that today 30 percent of the fish caught in the world are converted into fodder.

[Question] Are these ideas realistic from the technical and economic points of view?

[Answer] Whether we want to or not, it will soon be necessary to deal with krill fishing. Krill, small crustaceans with an average weight of 0.5-0.8 g, contain about 25 percent meat. The greatest problems are found in separating the meat from the chitinous carapace. The first phase was mastering this

process on an experimental scale. We have achieved this. The second phase is mass production on an industrial scale. Another major problem is learning where krill is found and its habits.

What seems fantasy today will be reality tomorrow. This might seem unprofitable on a mass scale on the ships of today and with the current state of our knowledge and skills, but what about after several years? Times change.

As a student I was taught that the sea is a well without a bottom. Today everyone knows that this is not so. If we could catch as many cod, herring, halibut or mackerel as we wanted to, no one would be interested in species of lesser value. Thus we have to start, if not tomorrow, then the day after, without regard for current circumstances and false starts. Despite the crisis we must try to move forward. We must do this because others have already achieved almost perfection, and still others are at our heels. Sometimes in our country it is said that research in polar areas is an "idee fixe" of a small group of fanatics. Let me say that in 1959 the so-called Antarctic Pact was signed (12 countries). Poland joined the club of countries interested in Antarctica in 1977, and the FRG, for example, in 1979. The world is beginning to look more and more restlessly in the direction of the South Pole. Recently, research was begun in this area by India, South Korea, Taiwan, and also by the countries of South America. It is a good thing that we are there already.

Returning to krill, the Japanese are selling it to the United States in the form of meat, and for hard money. No one knows their processing secrets. However, I presume that they have equipment similar to ours. The scale of technical difficulties in processing krill is unparalleled in comparison to other "food items," but it has always been the case in science that the "unknown" has become "known" and simple after a time.

[Question] What has the voyage of the research ship "Professor Siedlecki" produced?

[Answer] I shall begin with an example. Today a skipper on a definite day, e.g., right after the New Year, sails to sea in a cutter to a place where he knows cod are. He profits from the experience of generations and also from the results of research work. Now it is a matter of acquiring a similar type of knowledge on the subject of what happens in the Antarctic, and we must work very hard on this. Someday everything will certainly be clear, as it is today in the case of cod, herring or flounder. The great waterways of the Far South do not yet have strong traditions and their secrets are jealously protected by nature and . . .by those who have already discovered something. If the "Professor Siedlecki" had not happened upon kergulena in 1976, certainly no one in Poland would have eaten it up to the present time. We have already participated twice in the international "Biomass" programs. These have been extensive investigations of the ecosystem. But in part of the voyage we made fishing reconnaissance for our deep-sea fishing enterprises.

[Box] Krill, Euphausia superba, is also known in some countries as the Anarctic shrimp. It reaches a length of 60 mm and weighs up to 1 g. It is distinguished by its slight mechanical resistance. It forms large schools. It constitutes the basic food for all living Antarctic organisms.

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