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East Europe Report

SCIENTIFIC AFFAIRS

No. 795

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CONTENTS

MEASURES TO INCREASE SEISMIC RESISTANCE OF NUCLEAR POWER STATION OUTLINED

Sofia ENERGETIKA in Bulgarian No 8, 1983 pp 27-29

[Article by Engineer Mardik Papazyan, Kozloduy AETs [Nuclear Power Plant]: "Measures to Increase Seismic Resistance at the Kozloduy AETs"]

[Text] One of the main factors which determines the choice of a site for a nuclear power plant is its seismic data.

During the 1960s, when the Kozloduy 1 AETs was designed, sites for nuclear power plants were categorized in terms of seismicity on the basis of general requirements governing industrial projects. In other words, a site whose seismic characteristics did not exceed the sixth point based on the Medvedev-Sponheuer-Karnik (MSK) was considered nonseismic.

The views on AETs safety changed as experience was gained in the field of nuclear power industry and as the unit capacity of power turbines increased. In particular, according to the current normative AETs documents, the seismic limit is the sixth point on the MSK scale. Furthermore, a specific accelerogram is required on the basis of which the installations are tested for seismic resistance and structural computations are made.

A 4-5-point MSK seismicity was adopted in designing the Kozloduy 1 AETs, on the basis of statistical and geophysical studies.

It was this that determined at that time the main designs for construction and the selection of equipment and technological systems.

A strong earthquake with an epicenter in Vranca Mountain (Romania) was recorded at 21:22 hours on 4 March 1977. It was felt in our territory as well and caused material damages in some areas along the Danube.

According to the specialists the intensity of the earthquake reached 5-6 points at the Kozloduy AETs site. The earthquake caused no damage whatsoever to the power plant buildings and installations. The Kozloduy AETs maintained its full capacity and the operations personnel preserved their full self-control. The capacity of the plant was reduced, since as a result of damages caused to the distribution substations of the power system the full capacity of the Kozloduy AETs would not be exported.

A thorough study of the condition of the two operational units was made after the earthquake. The conclusions of the commission confirmed the operability of the equipment and the safety of the structures.

Nevertheless, the earthquake changed the views on the area's seismicity.

A 7-point MSK scale earthquake was adopted as the maximal estimated earthquake (MRZ), with a probability of occurring once every 10,000 years; the projected earthquake (PZ) was taken as a 6-point earthquake with a probability of once every hundred years.

Based on a technical assignment for our country, a special project was drafted by the TEP [All-Union State Institute for the Planning of Electrical Equipment for Heat Engineering Installations] in Moscow and the Energoproekt NIPPIES [Scientific Research, Planning and Design Institute for Power Projects Construction] on increasing the seismic resistance of the Kozloduy 1 and 2 AETs.

The basic concept of the project is that in the case of an MRZ the capability of the AETs as a power production project does not have to be preserved. What is absolutely necessary, however, is to prevent a nuclear accident and to ensure the protection of the plant's personnel and the surrounding population from radiation.

In this connection, three categories of structures, installations and technological systems have been introduced, depending on seismic resistance requirements.

The first category includes all buildings, installations, structures and their elements the breakdown of which in an earthquake may result in a radiation level affecting the population above admissible norms based on existing planetary regulations.

This applies to elements and systems which ensure nuclear and radiation safety and prevent the uncontrolled emission of radioactive matter in the environment.

The second category includes buildings, equipment, structures and their elements whose breakdown, individually or combined with others, could interrupt the operation of the AETs in excess of 100 hours.

The third category includes all other buildings, installations, structures and their elements.

The project for upgrading the seismic resistance of the Kozloduy AETs covers the reconstruction of the first-category buildings, equipment and systems. It calls for replacing some installations such as the main circulation pumps, safety valves of the volume compensator, batteries, the blast valves of the steam generator box, the pumps for the normal feeding of the first circuit, and others.

The project also includes reinforcing the structures, the technological and electric installations, the control-measurement equipment, the ventilation systems, and others.

All first-circuit systems and the systems which ensure its operation will be reinforced with hydroamortizers. An industrial safety system (SIAZ) which will disengage the reactor at a certain level of seismic effect will be introduced, and others.

A large percentage of these measures were already carried out for the third and forth blocks in the course of their installation, and are currently being carried out on the first and second blocks. A special program was formulated for the overall implementation of the project of upgrading the seismic resistance of the Kozloduy AETs. It calls for completing all the work for the four blocks by the end of 1986.

Following are some of the basic steps to enhance the seismic resistance of the Kozloduy AETs:

Introduction of a Safety System

In the case of movements of the earth's surface with an acceleration of 0.025-0.05g the reactor must be dampened on an emergency basis by activating the first-type safety system (AZ-I type), locking the turbine valves, stopping the movement of the cranes in the machine room and the reactor section and the movement of the machine for recharging the nuclear fuel, and undertaking the cooling of the nuclear steam-generating installation (YaPPI).

The proper "Kinemetrix" equipment was supplied in order to meet this requirement.

The SIAZ are autonomous for each block and have three independent channels each for activating the "two out of three" safety system.

Each channel consists of three data units, an electric signal converter, a power and control panel and connecting cables.

The seismic points (data unit locations) are located at three different places within the energy block at a distance of about 100 meters from each other.

The first data unit includes equipment which records movements in the surface with an acceleration of 0.01g (a 3-4-point MSK scale earthquake).

The second records the three-dimensional movements on the magnetic tape of the recording equipment. It also flashes a light which informs the operators of the event.

The third data unit reacts in ground movements with an acceleration of 0.03g (a force of 5-6 on the MSK scale) and triggers the powering of the AZ-I type system of the reactor, stops the turbines, cranes and recharging machine (if operating at that time).

The safety system is engaged if two pulses of any three seismic points have been received.

These systems have been installed on the third and fourth blocks and will be installed on the other two.

Replacing Main Circulation Pumps

When AZ-I type is activated and a loss in the operating and reserve power supply of the nuclear plant occurs, the residual heat release from the active zone of the reactor must be safely removed during the first few dozen seconds. In the opposite case the nuclear fuel may overheat and become unsealed.

The main circulation pumps (GTsP), GTsN-310 model, currently installed, are glandless and inertialess. They stop virtually immediately with any drop in tension.

That is why a 6-megawatt house supplies generator (GSN) has been additionally mounted on the turbine shaft. Each generator feeds two GTsP. If the turbo generators are disengaged and no emergency power supply is available, the GSN continues to feed connected GTsP with a declining tension and frequency, using the mechanical inertia of the flywheel masses of the turbo generators.

This ensures the circulation of the heat carrier and the draining of the residual heat from the active reactor zone. Additional studies have indicated that in an earthquake, although it is quite unlikely, the shaft of the turbogenerator may become jammed. This would eliminate the possibility of using the energy of the rotating bodies to feed the GTsP.

For this reason, regardless of their high-level reliability, the GTsN-310 must be replaced by GTsP, GTsN-317 model. These pumps have a flywheel which provides the inertial movement and circulation of the heat carrier in breakdowns.

Table 1 shows the changes in heat carrier outlays of one GTsP of the GTsN-317 type when all six GTsP are turned off simultaneously. This feature occurs when there is pressure on the suction side of the pump of 12.5 MPa and a heat carrier temperature of 270 degrees C.

Table 1--Changes in GTsN-317 Pump Flow With Simultaneous Disengagement of All Six GTsP

Ts	0	1	2	3	5	10	15	20	25	30
Qm3/h	7100	6790	6480	6200	5720	4940	4200	3620	3180	2830

The study indicated that the use of the GTsN-317 instead of the GTsN-310 does not worsen the operational characteristics in normal and emergency operations.

In order to ensure the normal operational capability of the GTsN-317, additional systems have been attached to each power unit--an oil system, a system for condensing the water and draining the leaks from the GTsP seals, and a system for water cooling of the consumers of auxiliary systems.

With the exception of the oil systems, additional equipment for the auxiliary systems of the GTsN-317 are installed in the existing premises. This requires the reconstruction of the first-circuit feeding system, the intermediary system of the GTsP, the industrial water and the "pure" condensate system.

The elaboration and implementation of these reconstruction projects is taking place with the direct participation of the plant's personnel.

The replacement of the GTsP is an exceptionally complex operation involving extensive construction and installation work and reconstruction of technological, electric power, measuring instruments and automation systems. A large percentage of these operations can be carried out only on an inoperative power unit, the idling of which is basically limited.

Currently operations are under way to enhance the seismic resistance of the reconstructions and changes in the remaining blocks will take place before the end of 1986.

Antiseismic Strengthening of First-Category Installations and Pipelines

Computations on the seismic resistance of first-category installations and pipelines are based on securing their integrity in the case of additional pressure which could be created by seismic influences.

In order to prevent any increase in stress above admissible levels in the pipes and supports as well as the nozzles of the equipment and the armature a system of hydroamortizers (Fig. 1) has been planned. They will absorb vertical, horizontal, longitudinal and transversal seismic loads, depending on the location and position of the equipment within the technological system.

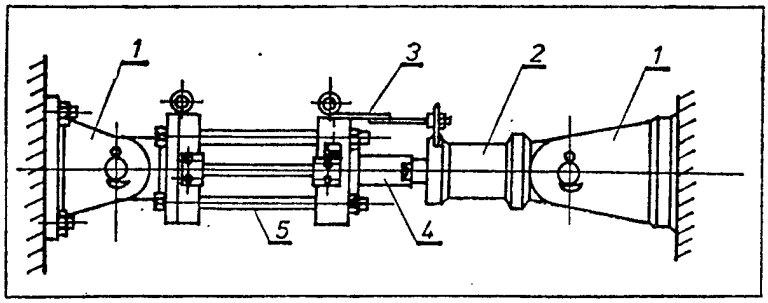

Figure 1--Attaching the hydroamortizer to the system.

Key:

1. Support
2. Connector
3. Retaining bolt and stand
4. Piston lever
5. Hydroamortizer

A system for controlling the level of the fluid in the individual reservoir and the location of the hydroamortizer piston is contemplated.

The control panel is located in the premise of the shield for controlling the apparatus equipment section (ShtAO). It makes it possible to connect the control data units to the 54 hydroamortizers.

The installations which are to be strengthened with hydroamortizers include the steam generators, the main circulation pipelines, the main circulation pumps, the main blocking drives of the "hot" circulation pipe, the pipes leading to the volume compensator, the pipes of the water fed to the steam generators in the reactor section, the pipes for emergency feeding of the first cycle in the steam generator box, the pipes of the sprinkler system and the pipes of the regeneration heat exchange for steam generator flushing.

The steam generators are reinforced with four hydroamortizers weighing 50 tons.

The antiseismic reinforcement of the GTsP calls for attaching three hydroamortizers to each one of them. The same type of hydroamortizer is used to reinforce the main circulation pipes and the breaking drives of the "hot" pipe.

The pipelines leading to the volume compensator and the water fed to the steam generators are reinforced with 5-ton hydroamortizers.

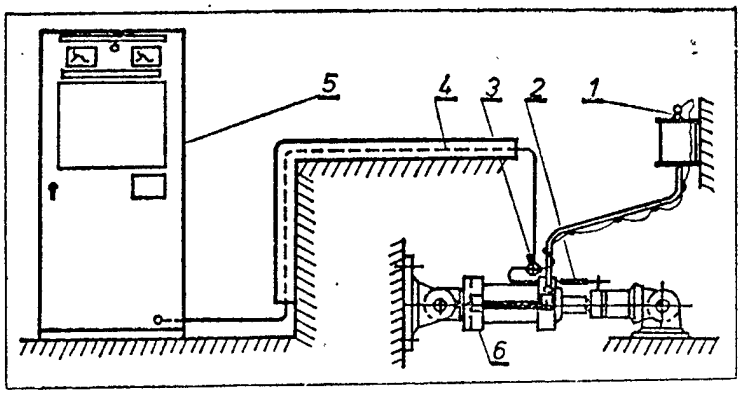

Figure 2--System for remote control of the operation of the hydroamortizer.

Key:

1. Fluid volume indicator
2. Piston position indicator
3. Connecting box
4. Cable link
5. Control panel
6. Hydroamortizer

All other first-category pipes and installations are reinforced with 2-ton hydroamortizers.

In order to strengthen the seismic resistance of the electrical engineering equipment, shields and distribution systems of the first-category control and measuring and automated instruments, they must be further strengthened as well.

All batteries must be replaced with seismic-resistant batteries which must be installed in the existing premises, with additional strengthening of the brick walls.

The structures and technological equipment of diesel generator stations also considered first-category in terms of seismic resistance must be strengthened.

The full implementation of these steps will ensure an even greater degree of seismic resistance at the Kozloduy AETs and ensure even greater safety.

5003
CSO: 2202/1

QUALITY CONTROL OF COMPUTER SYSTEMS IN EXPERIMENTAL STAGE

Sofia OTECHESTVO in Bulgarian No 18, 1983 p 3

[Interview with engineer Rubin Papazov, deputy chief director for production problems at the Central Computer Equipment Institute, by Nadezhda Marinova, date and place not specified; passages enclosed in slantlines printed in boldface]

> [Text] /What do we think about computer equipment centers for control of flights, energy systems, production processes, and, in everyday life -- electronic cash registers and calculators? Our impressions of their qualities? Let us admit it -- our reproaches are directed quite often toward the designers, not those who promote their practical use. Probably because it is difficult for us to connect the complexity of this technology with our slightly obsolete ideas about factory production. But how and when is the quality of computer systems controlled?
>
> Engineer Rubin Papazov, deputy chief director for production problems at the Central Computer Equipment Institute in Sofia, will answer these questions, put by the representative of OTECHESTVO, engineer Nadezhda Marinova./

[Answer] The final control of our production is automated -- a larger machine tests the smaller one, issues reports on the results and a certificate of quality. The subjective factor has been entirely eliminated during the final control and during a number of intermediate operations as well: verification of printing plates, of arbitrary units from the digital machines, the texts, and so forth. The main task now is to cover the production cycle more completely -- to introduce control of various technological stages and to eliminate all defects in a timely way. The idea is that, by 1986, an overall automatization in the basic sectors should be achieved. This, however, requires sizeable investments and re-evaluation of the existing order for standardization of documents.

[Question] Scientific provisions?

[Answer] At the present time, a state and public review of our own production is about to end at the institute. Our leading specialists are participating in work groups at the factories which we are servicing on a scientific basis. We

have analyzed the design and technological documentation of a number of structure-determining acticles. We are improving the parameters of 8 of them, beginning on 1 September, and of 10 to 15 more by the end of the year.

[Question] Are there cases of "innate" errors -- due to gaps in documentation?

[Answer] We have created an information processing system -- for the condition and indices of the devices developed by us. The program for improved quality at the institute also anticipates new design and technological solutions, modifications in the instrumental equipment, and so forth.

[Question] The perception of designers armed with a drawing board and a T-square is out of date . . .

[Answer] Yes. There is a need for personal computers. An engineer should know clearly that today things do not get none anymore with a pen, slide rule, and a calculator. They just do not work this way! It is almost impossible, with the present complexity of the systems, projects, documentation, software, I would even say the technical equipment as well, it is almost impossible to avoid errors even in the most precise execution on the part of engineering and assisting personnel. Experience shows that, in order to obtain a qualitative difference in designing (not only in computer technology, but also in architecture, machine building, etc.), it is obligatory to use systems for automation of engineering labor. We have developed a system for a wide range of applications. It was implemented at the Computer Equipment Center in Sofia, but for the time being it solves only specific problems. The system operates in dialogue with the designer. It is necessary to train a great number of specialists, which is not difficult, it just requires time. It is also necessary to reconsider significantly the existing order in standardizing documents. If we implement the system completely, the results of our developments would not be, for example, 12,000 drawings, but rather 3 magnetic tapes, which would directly control the production processes in factories. This is our goal. This is also a world trend.

12334
CSO: 2202/2

TASKS OF PHYSICISTS OUTLINED

Sofia VECHERNI NOVINI in Bulgarian 5 Oct 83 p 4

[Interview with corresponding member Milko Borisov, director of the Consolidated Center for Physics at the Bulgarian Academy of Sciences, and with other guests, whose names and titles are given in the course of the article, by Vanya Bizheva and Petur Vladev: "Strategy of Bulgarian Physics"; date and place not given; passages enclosed in slantlines printed in boldface]

> [Text] /The reason for our conversation was the First Congress of Physicists in Bulgaria, held from 28 September to 1 October. It turned out to be a factor for giving meaning and evaluating, a place where physicists involved in activities from various areas of our life appeared, a precondition for sharing problems that are awaiting solution./

[Borisov] The congress has been successful. No doubt it will have a great role in determining more precisely the picture of the present state of our physics. It will help to explain more clearly the ways for its development and to outline scientific and selective strategy in the area of physics. It has great importance for the future development of physics, for more active participation by our physicists in the successful solution of some basic social and economic problems. And, last but not least, I would like to point out that the congress is a factor in establishing the necessary link between different contingents of our colleagues in physics.

The Soviet school of physics is of decisive importance for us in achieving our present level. Immediately after establishing the Institute for Physics, the first apparatuses and machines were supplied from the Soviet Union. We received the first electron microscope from there. The relations established with the Institute for Crystallography at the Academy of Sciences of the USSR had a great significance for the development of a fundamental trend in Bulgaria, set by Academician Georgi Nadzhakov -- photoelectrets. Soviet physics has an extremely important role to play in the development of nuclear physics in Bulgaria; the Consolidated Institute for Nuclear Research in Dubna has the most important role in this. Lately, our relations with the Department of General Physics and Astronomy of the Academy of Sciences of the USSR, chaired by Academician Aleksandur Mikhaylovich Prokhorov, have become stronger and stronger. Our relations with the Siberian Department of the Academy of Sciences of the USSR are also solid.

[Question] What are the main tasks of Bulgarian physics?

[Answer] They result from the program of the Eighth 5-Year Plan. They include questions connected with the further reproduction of the science itself. Other questions evolve from practical needs.

[Question] What is the role of physics in the contemporary life of our country?

[Answer] I will express a physicist's opinion; however, I think that people with different specializations have similar opinions about physics. Physics today is an important element of the whole contemporary civilization and culture. It has extremely important significance for worldview. The new physical discoveries in outer space, in the depths of matter structure, are important for creating a correct view of the world among people. In addition, it also has immediate importance in the development of scientific and technical progress. There are whole areas of contemporary industry, such as, for example, microelectronics, which cannot be separated from physics. I was quite impressed by the paper delivered by Professor Frederik Koch from West Germany, entitled "Quantum Mechanics and Microelectronics." The paper pointed out new possibilities for microelectronics in solving some basic questions in quantum mechanics, and vice versa. Academician Davidov showed the ways in which contemporary problems in physics -- selitin physics, non-linear phenomena, powerful conditions of non-equilibrium -- could be transferred into other areas of physics and biophysics as well, and give a big boost to developing and explaining the secrets of life.

[Question] How do you see the prospects for developing Bulgarian physics?

[Answer] Physics of high energy, of elementary particles, is one area; another is physics of high density, some questions from electronic physics, more precisely, microelectronics. Optical electronics, in which we have established some traditions, is considered to have very good prospects. We believe that we have good prospects in these fields, and we should be concentrating our efforts in these areas; here we can achieve results on a worldwide scale. However, the results should not remain within the framework of scientific research and publications, but should be further connected with development and implementation activity, they should reach industry and should have an economic effect. In this respect, there is a lot to be to be expected from physics.

Well known scientists from different countries were guests at this event in Bulgarian physics. We were able to have a brief interview with some of them. Here are their answers:

Corresponding member of the Academy of Science of the USSR, Mikhail Meshcheryakov, director of the laboratory for computer equipment and automation at the Consolidated Institute for Nuclear Research in Dubna.

[Meshcheryakov] Bulgarian physicists play an active role in the work of our institute. They participate in all kinds of research. Many Bulgarian scientists have contributed significantly to its organization. I will mention the names of Academician Georgi Nadzhakov, Academician Emil Dzhakov, Academician Khristo Khristov. A whole array of talented Bulgarian physicists -- Academician Ivan Todorov, Professor Pavel Markov, Ivan Zlatev, Matey Mateev, have worked and continue to work at the Consolidated Institute. The program of the congress of Bulgarian physicists is rich and meaningful. It covers a broad spectrum of questions. Together with the theoretical problems, a number of practical questions related to experimental research -- radiometry, dosimetry, neutron and nuclear reactor physics -- have been included. I would like to mention that the national congress has been splendidly organized, the sessions take place on a high scientific level, and, for us, the foreign participants, we are grateful for this opportunity to participate in the congress.

Academician Aleksandur Sergeevich Davidov, director of the Institute for Theoretical Physics of the Academy of Sciences of the Ukrainian SSR in Kiev.

[Davidov] Our institute has a braad profile, we deal with many theoretical questions in physics. Recently, we began intensively to develop biophysics. Interesting problems have arised today for astrophysics. It opens a new window on the universe. Soviet and worldwide science has achieved great success in research on the properties of elementary particles.

I study biophysics. I am just now coming from the Institute of Organic Chemistry at the Bulgarian Academy of Sciences, where I had a discussion about expanding our collaboration. We have maintained relations with this institute for a long time, as well as with the Institute for the Physics of Solid Bodies.

The work of the congress has been very successful. I have acquinted myself with some interesting and outstanding research, and I have noticed that the Bulgarian scientists work on a very high level. Bulgarian scientists have succeeded in creating a model of myoglobins in which the three-dimensional distribution of atoms is shown; and they have also calculated the distribution of the electric field. This has been achieved for the first time in the world, and it is perfectly unique work.

Professor Peter von Bretano from the University of Cologne, director of the Nuclear Institute in Cologne, president of the Section for Nuclear Physics of the European Physicists Union.

[Von Bretano] Lately nuclear physics is being developed intensively. This is due to the discovery of elementary bosons in the nucleus and of certain significant effects, such as, for example, delta-resonance in the nucleus, extreme conditions of matter in the nucleus.

So far, our collaboration with Bulgarian specialists has been limited to separate contacts only with Professor Andreychev. I think that there is a real basis for developing them further and for expanding them. This is my first

visit to Bulgaria, and I am very glad that I was able to establish scientific contacts with my Bulgarian colleagues.

Professor Frederik Koch, from the Technical University of Munich, chair of the Physics Department.

[Koch] I study specifically the physics of semiconductors. I have now established numerous contacts with Bulgarian scientists. Many Bulgarian physicists have worked in my laboratory under the auspices of the Humboldt stipend.

I am working in the area of microelectronics, and more precisely on the fundamental problems in physics related to research on surfaces and the development of apparatuses. I believe that the introduction of techniques for multilayered structures is something essential which will not be eliminated as a problem in the near future. Such techniques are molecular-radial epitaxis and modern techniques for chemical decomposition. By introducing them, we should not forget that the fundamental research should be conducted in parallel, in order to give ideas for further dialectic development. I have tried, in my lecture, to outline some tendencies which I find important, and to talk a little about this organic relationship.

12334
CSO: 2202/2

DEVELOPMENTS IN MAN-MACHINE COMMUNICATION REVIEWED

Leipzig TG-TECHNISCHE GEMEINSCHAFT in German Vol 31 No 9, Sep 83 (signed to press 20 Jul 83) pp 9-10

[Microelectronics feature by Dr A. Jugel, engineer: "Talking With Electronics"]

[Text] Deivces for voice input and output open up new possibilities for man-machine communication. Jobs can be more effectively structured, especially in those cases where the human operator's hands and eyes are already busy. In this article, another on the 1983 Leipzig ERAM Congress, voice input/output equipment developed by the Robotron Combine will be discussed.

The exponential growth in the world of information generation raises questions concerning our ability to cope with such a flood of information. With just his five senses, speech and writing, an individual is no longer up to the task of mastering the flow of information. A few figures in this connection.

Man is capable of receiving and outputting the following flow of information:

Reading	10 to 150 bits/sec
Hearing	10^4 to 10^5 bits/sec
Seeing	10^6 to 10^8 bits/sec
Writing	1 to 50 bits/sec
Speaking	20 to 150 bits/sec

On the other side is the volume and variety of information offered. The present annual volume of material published in the scientific-technical area is 4,000,000 articles in professional publications; 300,000 new and republished books; 400,000 patent specifications and 1,000,000 dissertations and research reports.

This volume of information doubles every 3 to 4 years. To attempt to assimilate all of this would be purposeless and hopeless. One must be selective. This presents a new problem: How to find something and just the right something?

A Realistic Projection

In addition to taking in information, there are also the problems of processing it and finally of outputting and forwarding it. This can only be accomplished by modern information technology. The nucleus of this technology is the computer and its peripheral equipment for communication, storage and transmission of information.

The notion of a computer conversing with a person and instantly presenting information or fetching it on command or computing it is not unrealistic. Results from basic research in the field of man-machine communication have already demonstrated its feasibility.

Voice communication between man and machine is already a reality in its rudiments of speech recognition (voice input) and speech synthesis (voice output). Talking toys, watches, information systems and voice-controlled vehicles are experiencing an increasing market internationally. On the heels of this is following a developing international market for speech recognition and synthesis equipment with an average annual growth rate of 425 percent.

The Hands Remain Free

This results from the advantages of vocal communication and gives rise to new fields of application. Important advantages which result from using voice communication equipment are:

While doing jobs which require the use of eyes and hands, the user can receive and give information verbally;

the user has greater mobility at the work station;

voice communication is independent of lighting conditions;

As an input medium, voice is about 2 to 3 times faster than a keyboard and is more natural; and the break-in period for new users is shorter;

for transmitting speech information, an available telephone or radio network can be used so that the voice in- and output equipment can also be operated by the user.

Specific disadvantages of speech communication are its sensitivity to ambient noise and its transient nature. Thus, if the original information has to be permanently recorded, then other media have to be brought into play.

Other Fields of Application in View

Another disadvantage which still afflicts present speech-recognition equipment is strong speaker dependence of the result so that each new speaker has to make himself known to the system through a one-time teaching process. This still puts limits on wide public usage.

The listed properties are important for speech input and output equipment and systems devoted to commercial information, booking, warehousing, design work-stations and computer dialog interaction for programming, editing and executing.

The speech output equipment developed by the Robotron Combine is based on a modified DPCM data compression method which produces a high degree of naturalness and understandability in the synthesized speech.

The speech elements (words and syllables) required for speech output are spoken by a trained speaker, digitized and subjected to the special computer data compression process. To retain the speech quality using this process, the information flow is reduced to a minimum of two to four k-bytes/sec. Finally, these data are transferred to EPROMs.

By combining the words in the basic vocabulary, messages can be produced--depending on the application--which occupy most of the time period associated with stored text elements.

The nucleus of the Robotron speech output equipment is the brief announcement module KAM K 7801, a single-board design for storing and synthesizing a message of four-seconds duration.

By adding a maximum of three EPROM plug-in expansion units, the message length can be increased to 16 sec. All other equipment items of the K-780X family use the KAM-K-7801 brief-announcement module as the basic element for speech synthesis.

The equipment of the Robotron K-780X speech-output family was designed primarily for the use as warning equipment in telecommunications. Here the advantages of modern digital information processing--instant addressing, no moving mechanical parts, low failure probability--are combined with those of conventional technology--natural, high-quality speech. In addition, this equipment can be used in industry in situations where it is important to quickly inform workers. Some important cases are:

Control rooms and dispatching centers (for instance, in large chemical plants and energy distribution systems);

computer-based processes;

operator controls;

work stations for the handicapped;

voice information transmission from remote, unmanned monitoring stations.

The single-board speech-recognition unit ESE K 7821 was developed primarily as a built-in module for equipment to be controlled by voice input. On a circuit board measuring 215 mm x 170 mm, a complete recognition unit for a vocabulary of about 50 words was realized. The nucleus of this recognition unit is

a U 880 CPU (analogous to the Z80) which is used for analysis as well as for the recognition and teaching processes.

A specialized bidirectional 8-bit parallel interface (PIO) provides for coupling with the equipment to be controlled by voice input. It is also possible to integrate the single-board speech-recognition unit with the Robotron K-1520 microcomputer system so that equipment based on this microcomputer can be very easily expanded to include a speech input unit.

The achievable word recognition rate with both types of recognition units is about 99 percent.

Considered as areas for speech-recognition applications are the following:

Graphics work stations,

CAD systems,

X-ray and aerial photograph evaluation stations,

Microscopy work stations,

Control and data acquisition units for laboratory equipment,

Sorting work stations,

Quality control,

Operational data acquisition in warehouses,

Programming and controlling NC machines and industrial robots,

Control tasks in monitoring and control rooms,

Work stations for the handicapped.

9160
CSO: 2302/04

BRIEFS

GDR MICROELECTRONICS PROGRAM--The GDR is to double production of microelectronic parts. Within this, fabrication of VLSI circuits will triple. At present the GDR produces over 200 types of IC and several microprocessors. The goal is to met domestic demand for microprocessors entirely through domestic production by 1985. [Text] [Budapest OTLET in Hungarian 20 Oct 83 p 18]

CSO: 2502/9

INTERNATIONAL CONFERENCE ON DATA BASES

Budapest SZAMITASTECHNIKA in Hungarian Jul-Aug 83 p 1

[Article by "Nagy": "Data Base '83"]

[Text] These days we celebrate in sequence 25, 30 and 35 years jubilees and routinely organize 10 year anniversaries. It is a rare exception, especially in the technical area, if we can talk about a centenary. The National Technical Information Center and Library (OMIKK) has not reached this milestone. To survive and stay in the forefront this long amidst historic storms is possible only with a readiness for constant renewal. Proof of this readiness was found in the three day international conference held in the SZAMALK [Computer Technology Applicttions Enterprise] headquarters which provided a review of the most exciting, most modern trends in information affairs and about the use of internationally accessible data bases which can be read by computers. One of the first domestic initators and propagators of this conference was the OMIKK.

If we wanted to characterize the conference with a single word the most appropriate might be "practical." The nearly 50 speakers representing 13 countries and a number of international organizations tried to give concrete information about systems, services, the situation and possibilities of their own countries, international cooperation and the prospects of development.

L. N. Sumarokov (NTMIK, International Scientific Information Center) reported on the creation of the joint data bases of the CEMA countries, the development of the program packages needed for their operation and methodological work connected with an evaluation of the data bases. G. Romanenko (IAEA, International Atomic Energy Agency) described the possibilities and structure of the INIS, one of the oldest and best functioning international information systems, maintained by 81 member countries. G. Rubitschka, of the International Patent Documentation Center (INPADOC), dispelled a number of erroneous beliefs, pointing to the on-line access, multiple use possibilities of the data base which can be found in Austria containing at present about 24 million items.

P. Martin, marketing chief, described the advantages of the European oriented DATA STAR system. The service, operated by Swiss Radio, is trying to fill

the void left by large data bases being prepared in North America by the deficient processing of European data or data of interest to Europeans. In addition to the easy manageability and moderate prices of the system it makes accessible such special German language business data bases as, for example, those of Volkswagen and Hoppenstedt. A practical demonstration, the possibility of free access and an impromptu mini study course underscored the advantages described by the speaker.

Robert M. Hayes proposed a decentralized system based on microcomputers and large capacity optical disk storage as an alternative to large international networks. Microcomputers have brought dramatic changes in computer technology everywhere, with one exception--data base operation. The reason for this has been the lack of cheap mass storage, but with the spread of optical disks this will disappear shortly. This raises the question of a decentralized solution of a number of data base system operations (data recording, modification, search, processing writing and publication). The storage density of optical disks (100,000 pictures or 5 billion bytes per disk), the cost of inscription of 10 dollars per disk and the price of players between 200 and 500 dollars bring within reach the possibility of putting libraries on disk or local storage of entire data bases. The speaker turned in this connection to experiments in the congressional library and national medical library of the United States.

Dr Janos Duzs (OMIKK) gave a review of the history and development of Hungarian use of international data bases. Istvan Kiss (OMFB [National Technical Development Committee]) discussed the organizational and economic problems of on-line access. Among the gratifyingly large number of Hungarian speakers the talk by Dr Peter Jacso showed the other side of the coin. He pointed to those factors which make necessary the creation of domestic data bases in some areas, in addition to use of international data bases. The completeness of the subject, overcoming language difficulties, conserving foreign exchange, ensuring the accessibility of original documents and avoiding the deficiencies of the telecommunications network are the chief viewpoints justifying the maintenance of domestic data bases.

Erik Vajda (OMIKK) represented a similar opinion, adding to the arguments for domestic data bases the problem of the information embargo on the part of developed capitalist countries, which has been increasing again recently. In his opinion the international and national data bases do not compete with one another and in the next 10-15 years both must be maintained and developed further within the framework of a uniform information system in the interest of better service to users.

Istvan Szabo (OMIKK) dealt with the technical side of Hungarian language data bases. He proved with a number of examples that there is a clash between hardware and software tools oriented toward the English or Russian languages and the requirements deriving from Hungarian spelling. He proposed that Hungarian language data bases be developed in such a way that access to them and the formulation of questions be possible using the natural Hungarian language. He recommended use of the telegraph code for querying.

In the recess and after the talks many gathered about the terminals placed in the anteroom of the hall where it was possible to query foreign data bases (INIS, INSPEC, COMPENDEX, SCI, PREDISCASTS, etc.) through the cooperation of the OMIKK, the Central Chemical Research Institute of the MTA [Hungarian Academy of Sciences], the Institute for Scientific Information (ISI) and the IAEA. Those interested could also see the on-line data base of SZAMALK called Babilon. Experts from the MTA SZTAKI [Computer Technology and Automation Research Institute] provided the terminals, projection equipment and other hardware conditions.

The conference included professional film showings and an exhibit in the anteroom of the SZAMALK hall at which one could find publications of the ISI, from the United States, the Industrial Informatics Institute, the Central Library of the MTA and the NTMIK (Moscow), in addition to the OMIKK. The complete text of the talks given at the conference will appear in a separate volume also.

8984
CSO: 2502/1

COMMISSIONER OF MICROELECTRONICS PROGRAM EVALUATES PROGRESS

Budapest MERES ES AUTOMATIKA in Hungarian No 8, 1983 pp 281-283

[Interview with Mihaly Sandory, Govt Commissioner of Microelectronics Program; date and place not specified]

[Text] [Question] The readers of MERES ES AUTOMATIKA had the opportunity to become familiar with the goal of the program, the more important tasks and the necessary organizational problems from an issue published last year, written for a similar purpose. Please give us a brief summary of the progress of the program, what changes occurred relative to the goals set.

[Answer] Recently, the 1982 progress of the microelectronics program was examined by several responsible forums. The common conclusion: progress in 1982 corresponds to the possibilities. I want to add that the opportunities were offered--if not without obstacles and not as assumed in the second half of 1981--at a level necessary for the achievement of the goals. No significant changes have occurred relative to goals set and these will not happen in the foreseeable future. Besides, as far as a few details are concerned, I took advantage of the opportunities offered by rescheduling. The Ministry Council appointed a government commissioner to have him always adjust the implementation of the program to the given circumstances. I had many such tasks and probably will also have next year.

[Question] Comrade Koteles's article in NEPSZABADSAG indicates that the import restrictions slow down the program; if possible, could you explain this a little more in detail to the readers of our magazine?

[Answer] Comrade Koteles--discussing the program--considers the entire program. Regarding microelectronics--as indicated by the answers to the previous questions--there were no restrictions hindering the implementation of the program. It is quite another problem, however, whether in the current state of the world's economy and within it our people's economy, all leaders make every effort--unfortunately it is more accurate to say that they should make every effort--to save convertible foreign exchange necessary for the achievement of the goals set. In the spirit of this--and this is again part of the responsibilities of the government commissioner--last summer, we planned the foreign exchange budget of the second quarter of last year and that of the first quarter of this year. Essentially, foreign exchange consumption has been according to plans.

One must add that the above results were not achieved without day-to-day struggle, often difficult and unpleasant, requiring a great deal of energy--personally the energy of the government commissioner--which could have been used for meaningful technical problems.

The result: the investment program is basically proceeding according to plans; in the preparation and planning of some important aspects (applications, etc.) we are behind relative to our plans and the requirements of the program. In this area, we most move faster.

[Question] Hungarian technical opinion is generally positive on equipment-oriented circuits. Its need is felt, the import stop creates pressures. Can the Microelectronics Enterprise [MEV] preserve this supportive attitude of the users? What circuit types can MEV promise at what level, and when will they become available?

[Answer] The stereotype answer to the first part of the question: I am an electrical engineer not a prophet. MEV attempts to preserve the support provided by an ever-increasing number of users; results are shown in this area. Yet one cannot say more at this point than that we shall see.

The question concerning circuit types recommended by MEV I can answer easier: the complete manufactured products catalog was published at the Budapest International Fair [BNV], and thus the information is available to all those desiring it. To give you a summary (contrary to the almost uniformly pessimistic opinions last year) about 100 equipment-oriented or gate matrix circuits are at some stage of implementation; some of the finished circuits appeared at the BNV, furthermore, a few of these were exhibited as part of an already functional device.

[Question] In what areas do you feel that a change of philosophy of the experts is needed so that difficulties in the acceptance and application of these circuits can be avoided?

[Answer] This is perhaps the toughest question. I am often accused of wanting to degrade our well trained, highly experienced and high level design engineers to think at transistor level after having moved to system level. This "accusation" is true. In our situation, according to the original goals of the program, we can find the missing microns and square necessary for high technology at transistor level; whoever does not want this--or maybe does not know; in my opinion, some members of the young generation simply do not know what a transistor is--will be forced out of this part of the program. The outstanding system designers, however, need not worry about their jobs, provided that they understand that it is impossible to design a system without full familiarity with the components. Thus along with transistor-level thinking, VLSI-compatible architecture level thinking [Very Large Scale Integration]--this is a separate genre and its neglect has long delayed the growth of micro-electronics culture--must also appear. The hitherto developed labor division of designers (parts, logic components, device and system design or a meaningful combination of these) takes a further step. In my opinion, in the Hungarian

electronics industry, the two main points will be in the areas of LSI [Large Scale Integration] and VLSI compatible design (including parts) and architecture (including equipment) design; from these, the first one is more important.

Even disregarding this, I anticipate difficulties in the acceptance of microelectronics tools. I consider the subjective conditions as given or creatable, but there appears to be a series of objective problems. The most significant one is that the other technological environment necessary for the rational application of microelectronics does not exist--and will not exist because of the slow progress of the non-microelectronics branch of the EKFP [Central Development Board for Electronics].

[Question] The contests were enthusiastically received in the circle of electronics experts. This profession was poorer without them, and the experts in this field received the benefits of significantly increased intellectual products, opportunities which they cannot affort to miss in this rapidly developing branch industry. Is a continuation of these contests, the extension of their scope to the tackling of some technological tasks or organizational problems planned?

[Answer] Based on the results achieved up to now, I also judge the contest rather successful. In spite of this, I do not plan to run any in the future. The purpose of the contests was to set in motion forces that were otherwise idle or slow. To keep these in motion is a different task and requires different task and requires different methods. For this local (inner company) means are needed. For my part, I shall support all company initiatives of this kind, both morally and financially, but place emphasis now on company initiatives. To joke about it: I took the easy way out. I took upon myself to stimulate the interest of engineers out in the field but leave the more difficult task to them--breaking through the resistance which may possibly exist at various management levels within the enterprises. In this task, of course, they will receive maximum support from me.

[Question] In large western semiconductor factories catalog circuits are also produced as cost bearers. Does not MEV miss this? What technique will be used to manufacture circuits hitherto produced on block segments?

[Answer] 90 Percent of the MEV circuit piece work program will be catalog circuits. In our country, however, the production of catalog circuits--mostly because of the cost structure shaped by our economic management system and to a lesser degree as a result of our less efficient work--is not "cost bearer" but rather it is subsidized by profits in other areas according to MEV price policies so far as I envision them. Proof: our amortization and productive material costs are higher than those of the competitors, and the rest of the expenses in the manufacturing of catalog circuits are almost negligible.

In spite of this, catalog circuits must also be manufactured for economic reasons. Essentially, the technology installed can only be used in continuous operation with acceptable economic parameters, and if the production lines must

already be continuously operated because of the manufacturing of equipment oriented circuits, it is a smaller loss to possibly sell the products below cost or trade them at a more favorable price within the goods structure of the socialist market than to---lightly exaggerating--throw them in the Danube.

Furthermore, the large western semiconductor factories involved in the manufacturing of catalog circuits are beginning to feel the competition of equipment oriented circuits and strive to make up for the loss caused by their unused catalog circuit capacity by participating in the equipment-oriented circuit and gate array markets.

[Question] We hear that it will be possible to create CMOS technology based on national resources. Is this true?

[Answer] The domestic development of CMOS [Complementary Metal-Oxide Semiconductor] technology has been achieved by KFKI at the laboratory level. This along with the CMOS manufacturing know-how bought from the GDR allows the mass production of CMOS devices as early as 1984 instead of 1985 and at a smaller scale in 1983. Taking advantage of this opportunity, we can significantly expand the MEV product line to meet demands.

[Question] Currently the Telecommunications Cooperative undertakes the production of circuits using import segments. What made this possible?

[Answer] The management of the Telecommunications Cooperative must be credited with the initiative. The idea came up already in 1981 and has been supported from the very first minute of OMFB [National Technical Development Committee], IPM [Ministry of Industry] and myself. I am convinced that "Hungarian-based" electronics industry cannot survive without these ventures. The situation is highly analogous to that experienced during the installation of printed circuit board technology. During that time, it was demonstrated that completely centralized supply from one single enterprise is impossible both from an economical and technical viewpoint. A similar situation will arise in the area of microelectronics. Besides MEV, in a division of labor with MEV, several other bases must set up for the implementation of a part (i.e., the user specific part) of the final operations of gate matrix circuits.

The necessary investment is not extremely large. Within the framework of organized action, each one of the electronics enterprises having a production capacity of several billion forints (this kind of production can already bear investment) could be prepared for the final operations of partially completed segments. The right question to ask about this is why only to the Telecommunications Cooperative did it occur to take this step which appears inevitable to professionals who objectively follow the development of electronics industry.

[Question] The program is proceeding according to plans. Do the goals set today allow us to maintain or maybe improve our not so good position relative to the world leaders? How does it look today?

[Answer] To answer I would summarize the objective of the program in this regard. From the three essential subtechnologies (design/master mask; segment;

mounting/housing/testing) the first one was planned according to 1985 world level; the implementation level of segment technology should correspond to the third or fourth level in 1985; with the development of mounting/housing/testing, we wish to maintain our current, better than average position also in the seventh Five-Year Plan.

In one of the areas, we have suffered a defeat. In spite of very high quality preparatory work, we had to give up the goals of world level master mask manufacturing because of financial reasons. This does not have any bearing on the 1985-86 product line; however, it makes the development of the seventh Five-Year Plan extremely difficult using sports language, we achieved the well-timed creation, preparation and condition of a research team, which undoubtedly could have tackled this task. It remains to be seen if we can keep them together until the middle of the seventh Five-Year Plan, or put together a new group which is up to this task.

[Question] What concrete steps are needed for the widening of applications?

[Answer] Training is in good hands in the area of applications. The work being performed in the area of gate matrix circuits also appears to be reassuring: we can provide the users with better technical and economical conditions than those allowed by import possibilities. This--after a few positive experiments--seems sufficient to turn the users to us. Here we have a clear-cut task: some experiments must be undertaken which produce positive results.

We have a similar task in the area of equipment oriented circuits which are considered important, but here out conditions are not yet as favorable as in the case of gate matrices. According to our plans, the disadvantage must be made up by the middle of 1984.

Another task: the main directions and thrusts of industrial policy must be determined. To make it quite simple we must indicate which one of the five or six industry branches should the microelectronics investment program "make great". The answer is not trivial; those industry branches which according to the present situation should be made great can hardly be made great.

I also consider progress in the area of non-microelectronics technologies. The "passive and other" branches of EKFP are not moving forward at a desirable speed. The means of progress this year were taken from industrial management; this greatly increases the significance of work conducted in this area.

I would like to note that we wish to coordinate the implementation of the above tasks within the framework of a subprogram of the A/4 (microelectronics) program of the National Intermediate-Range Development Plan.

[Question] Finally, could you say a few words about the rules used to judge the contests?

[Answer] The contests were judged according to the rules provided with

their publication. I would emphasize three main points: completeness, the possibility of national implementation and national applicability. Because of the enormous interest, the third ("youth") contest will probably be judged using less subjective methodology, But I note that I consider the work of the judges of the former contest to be at a very high level. Essentially, I know only of one--in my opinion, completely unfounded--complaint. It is worthwhile to note that circles outside the contests accepted the running of the contests with suspicion and a lack of understanding. The reason was that the work invested in the contests temporarily and seemingly slowed down the execution of nicely defined central goals. The planning system proves better than anything else that the final balance is positive. The two year development program of the system was somewhat slowed down because a few colleagues spent a few hours on "other projects." But it is thanks to these "other projects" that we could and still can design and produce components in a satisfactory if not the most efficient manner, and the experience gained through those other projects significantly contributed to the development of the final specifications of the system.

9901
CSO: 2502/4

PURCHASE OF BRITISH PROGRAM PACKAGE

Budapest SZAMITASTECHNIKA in Hungarian Jul-Aug 83 p 1

[Unsigned article: "Small Computer Enterprise Guidance Program Package Acquired From the SZAFA; MAS-M Contract Signed"]

[Text] The Central Statistics Office has purchased, out of the Computer Technology Development Fund [SZAFA] with the right of national propagation, the MAS-M [Modular Applications Systems] enterprise guidance program package from the English Hoskyns firm. The program package was acquired in the interest of satisfying the ever more strongly appearing needs of small and medium size enterprises.

The MAS-M program package embraces in full enterprise commercial and management functions (order processing, accounting, inventory management, list break-down, fixed assets records, book-keeping, etc.). It has a modular construction and its elements can be used independently, making it possible to introduce the several subsystems at different times as a function of enterprise application needs. It consists of 11 modules with the possibility of on-line data input and checking and querying.

The MAS-M can be used on the TPA 1140, 1144 and SZM-52 computers of Hungarian manufacture and the SZM-4 from socialist import.

The system organization method [SDM-Systems Development Methodology] supporting its introduction was acquired together with the progam package; it can be used independently from the MAS-M program package to design other enterprise applications systems, for example those using large computers.

In the interest of permitting introduction of the program package by several users at one time the KSH [Central Statistics Office], deviating from the practice developed thus far for SZAFA program products, will make it possible for every institution which has the suitable capacity to participate in the distribution of the program package.

A demonstration of the program package and a report on conditions connected with its distribution and introduction will be held in the second half of August, organized by the KSH and SZAMALK [Computer Technology Applications Enterprise], the institution charged with acquisition and domestic use of the program package. We will report in detail on the program package in an upcoming issue of SZAMITASTECHNIKA.

BULGARIAN SYSTEM, SZM-1613, IZOT

Budapest SZAMITASTECHNIKA in Hungarian Jul-Aug 83 p 2

[Article by Mrs Nagy, Bozena Piestrzynaska: "SZM-1613 (IZOT 1003C), A Microprocessor Warehouse Management System"]

[Text] The SZM-1613 is a microcomputer system developed in Bulgaria for economic purposes serving primarily to perform financial accounting, work organization and accounting, material and commodity movement and marketing and statistical tasks.

With the SZM-1613 and its applications program package the Bulgarian developers have created a system for warehouse management for industrial, agricultural and commercial enterprises. This special purpose system serves operative, accounting and statistical materials recordkeeping. It keeps records on acquisition, sales and daily inventory by product number, quantity and value and provides information on materials use by branch, bookkeeping column, factory unit and product. It gives information about deviation from minimal and maximal stockpile norms, facilitates the taking of inventory and accelerates bookkeeping for materials and the preparation of reports. The processing programs use standard acquisition and sales slips, warehouse transcripts, orders, etc. as input documents. The result of processing is a chronological certificate invoice; in the course of processing data are entered on the bookkeeping cards for the materials also.

Application Areas For The SZM-1613

Local data processing; on-line systems; off-line systems

In on-line systems the SZM-1613 can be a terminal for large information systems, connected to a larger computer. In this case it serves to perform tasks connected with data preparation (recording, collecting and pre-processing of data). It can be connected to ESZR [Uniform Computer Technology System] computers through a multiplexer or communications processor and can be connected to SZM type computers through a common bus.

In off-line systems--if we are talking about a connection between the IZOT 1003C and an ESZR computer--it is necessary to use an ESZ 0113 converter, or an SZM-0113 converter in the case of SZM-4 computers.

The Parts of the System

Microprocessor; 24 K bytes operational memory; 18 K bytes permanent memory (to control peripherals); alphanumeric, numeric and functional keyboard; numeric and functional display; ESZ 7187 alphanumeric printer--with electro-mechanical carding device (speed, 30 characters per second); three ESZR compatible floppy disk units (ESZ 5074); and an ESZ 8003 modem with a data transmission speed of 600/120 baud.

Operating Modes of the Operating System

1. TST (serves to test the system). There are ten tests available with which one can check the resident disk, all commands of the microprocessor, operational and permanent memory, the modem and all peripheral equipment belonging to the system.

2. FRM (formatting disks).

3. DUP (transcribing or duplicating disks). This mode makes it possible to transcribe any disk (even a foreign one!) to another.

4. COP (to copy individual data files, programs or entire disks).

5. EDT (program input and editing).

6. BAL (translating programs).

7. EXC (running programs).

A key on the functional keyboard corresponds to every operating mode.

BAL

The programiing language of the system is a special problem-oriented language, the so-called BAL. In addition to the customary commands (assigning valued, arithmetic, control, I/O commands, etc.) the language contains special commands--to control the carding unit and line printer (movement of paper, etc.); to control the display; and commands controlling the modem.

With the tools of the language one can realize direct commands (READ and WRT) and sequential access (PUT and GET) to the data (data files) on disk.

The BAL language also contains a command (ON) serving to process program interrupts, which makes possible the correction of certain errors in the user program.

Advantages of a Microprocessor System Suitable for Processing Economic Data

It makes possible the creation of efficient off-line systems for solving economic tasks and for operative guidance of individual economic units and the creation of hierarchic information systems. One can create high speed and reliable preliminary data collection and processing systems. It frees the large computers of data collection tasks, thus decreasing the general costs of data processing. The equipment was developed in 1980; it is not yet available in Hungary.

8984
CSO: 2502/1

USE OF IDMS PROGRAMS

Budapest SZAMITASTECHNIKA in Hungarian Jul-Aug 83 p 3

[Article by "P": "IDMS Users Day"]

[Text] The SZAMALK [Computer Technology Applications Enterprise] held the second IDMA Users Day on 2 June. Miklos Havass, development and education director of the SZAMALK, presided over the program. He reviewed the development in Hungary of data management and of data management software supply and outlined the trends to be expected.

The experts present received information about the spread of IDMS programs and guarantee, maintenance and follow-up activities, about IDMS instruction, about distribution and use in Czechoslovakia, about user experiences, about the possibilities of on-line applications, about the new aspects of IDMS DB 5.7, IDD 3.0 and CULPRIT 6.1, and about technology supporting development and operation of data base applications systems.

Pal Poloskei informed the participants about the spread if IDMS programs.

1)
A terjesztés helyzete

Program \ 2) Gép		ESZ 1015	ESZ 1022	ESZ 1032	ESZ 1035	ESZ 1040	ESZ 1055	IBM	3) Összesen
DB	4.5	1	16	1	6	12	1	1	38
	5.0	—	—	—	—	1	—	—	1
	5.5	—	—	—	4	—	4	2	10
	össz.	1	16	1	10	13	5	3	49
IDD	1.2	1	16	1	6	12	1	1	38
	2.0	—	—	—	4	1	4	2	11
	össz.	1	16	1	10	13	5	3	49
CULPRIT	4.5	1	16	—	4	9	—	2	32
	5.0	—	7	1	6	4	6	3	27
	össz.	1	23	1	10	13	6	5	59
OLQ	1.2	—	5	1	3	7	1	1	18
	2.0	—	—	—	4	—	4	2	10
	össz.	—	5	1	7	7	5	3	28
Összesen		3	60	4	37	46	21	14	185

1) Status of Spread 2) Computer; 3) Total

In connection with maintenance and follow-up activities connected with the programs it was emphasized that although SZAMALK has not rejected a single user request in this regard this activity could be improved further. It would help if the users turned to the experts of SZAMALK with their problems more courageously than heretofore. It is certainly necessary to make broad use of user experiences now--after the passage of two and a half years. A framework for this might be provided by the IDMS Users Club, whose programs might be made more frequent, primarily for the purpose of reporting on applications case studies. This will require the active cooperation of users also.

Katalin Horvath gave a report on IDMS instruction. She described the educational experiences thus far and the ideas for the future. An IDMS training film was shown as part of the report.

Ivan Toser, of Data Systems in Bratislava, gave a report on the spread of IDMS in Czechoslovakia. Thus far IDMS DB and CULPRIT have been used in Czechoslovakia (since 1979). Programs have been generated in a total of 120 computer centers (117 IDMS DB and 113 CULPRIT). The computers are series 1 and 2 ESZR [Uniform Computer Technology System] computers, IBM 360 and 370 and Siemens. In the beginning the computers had 212 K bytes of central storage but at present have 1-2 K bytes in general, using 29 M byte disks. The data bases which have been developed can be regarded as of medium size (0.5-120 M bytes). The programs are written, half and half, in COBOL or PL/I. In general they use the IDMS 5.0 version. Thus far they have generated the newest 5.7 version only for testing purposes.

The most essential part of the program was reporting on experiences acquired in the course of using IDMS. In the center of this stood the report on experiences acquired in the course of developing and operating the Zahony border traffic system (ZAIR) of the MAV [Hungarian State Railways]. (We will not turn to this here because in an up-coming issue of the journal the speaker--Matyas Feher, MAV--will summarize his most important observations pertaining to IDMS.) Supplements to the talk were voiced in the form of a co-report. Gyorgy Gal of JATE [Attila Jozsef Science University, Cybernetics Laboratory] spoke of physical data base design considerations used in the course of developing an IDMS based national university admissions system. Within this he described a special storage method which makes possible efficient access to data for a large number of applicants. An article about the method will appear in INFORMACIO-ELECTRONIKA. Bela Pulai and Andras Saad of EGSZI [Institute of Construction Management and Organization] described experiences in development of an IDMS based book-keeping system. They called attention to the necessity of manysided and careful testing of the programs prepared. They said that they experienced favorable running times in the course of testing the system. Mrs Szekely, Klara Szmrecsanyi, reported on applications experiences acquired in the SZAMALKA She reported on cases where use of IDD and CULPRIT proved useful and efficient. She also reported on how a given physical data base reorganization task--increasing area size--was solved with the use of UNLD and DBLU auxiliary programs.

Gabor Pados and Laszlo Varro spoke of software possibilities for on-line use of IDMS. They pointed out that in Hungary today use of the SHADOW TAF [remote data processing] monitor is most useful for developing and operating on-line data bases.

Mrs Szekely, Klara Szmrecsanyi, summed up the possibilities of the newest versions of IDMS programs (DB 5.7, IDD 3.0 and CULPRIT 6.1). The new versions of data base management make possible the management of VSAM files in addition to data base files. An essential new possibility is the creation and management of logical records without the physical transformation of files. It is also possible to use several data dictionaries simultaneously. The most important new property of IDD 3.0 is that it becomes possible to use the system in the conversational mode. It makes it easier that commands can be given in an essentially free form. It is also possible to store the load modules of user programs in the dictionary. It is possible to prepare 69 standard tables or lists from the dictionary. The 6.1 version of CULPRIT ensures automatic handling of decimal numbers. It is no longer obligatory to line number the commands. The JCL commands can be given in one step, as contrasted to the earlier five, and procedures can be called in the CALL form.

Peter Major spoke of the technology of developing and operating IDMS based user systems. In the course of this he described how software tools now support technological processes and what tools should be developed. He noted that the development of the first version of software suitable for IDD based computerized production of ARDOSZ documents will be finished soon. Andras Vero added a co-report to the report, describing the IFRA (data dictionary for integrated users systems) program package.

About 70 invited guests participated in the one day program. This does not give a complete picture because 18 (!) of the 43 institutions using IDMS were not represented. But those present apparently considered what was said useful because--with a few exceptions--they stayed to the end.

8984
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EXPERIENCE WITH USE OF MERA 9150

Budapest SZAMITASTECHNIKA in Hungarian Jul-Aug 83 p 4

[Article by Bela Szijjarto, Industrial Informatics Center: "Use of the Mera 9150 at the Industrial Informatics Center"]

[Text] In the summer of 1981 we put a new computer technology device system into operation in our institute, the Industrial Informatics Center. This included the MERA 9150 magnetic grouped data recording small computer.

Its configuration is: one metrix printer, two 5 M byte magnetic disk units, two magnetic tape units, eight Latin letter alphanumeric data input terminals, two Cyrillic/Latin variable alphanumeric data input terminals and one 32 K word central unit.

As basic software we are using the 7EMTO sperating system delivered by the manufacturing firm, expanded with routines for the Cyrillic terminals. The system--in regard to both hardware and software--is compatible with REDIFON data recording systems. The basic software makes possible the handling of one 5 M byte disk. The great majority of users in Hungary use this, thus we regard the second disk unit as a reserve. The situation is similar in regard to the two magnetic tape units, in practice the second tape unit is a reserve, since the system is a single channel one and an I/O operation initiated from a second terminal must wait for the completion of an issued I/O operation.

To a crucial extent we use the matrix printer only for program preparation; we have six items which prepare small lists as well, so this print speeds satisfies our needs.

We record data in two shifts. Each shift is led by a shift leader trained in machine operation and he is also the data recorder. A group leader guides the work of the shifts; he is an active programmer and also performs the tasks of the leading machine operator. The group has one other programmer and a person trained as leading machine operator. We receive numeric and text tasks in equal proportions and, due to the needs of the ministry, the time limits are usually short, one hour for some jobs.

Prior to installation of the MERA 9150 our institute had punch card ARITMA type data recording and checking machines. Operation and use of the MERA

demanded an entirely new attitude and body of knowledge. For this reason, about half a year prior to putting it into operation, we participated in a data recording leading machine operator and programmer course at computer technology enterprises where we could get practice on REDIFON machines. Following this there were courses organized by the supplier, however, these were organized just prior to and after installation.

Thus we were professionally and in time ready to receive the MERA. In the preparatory period our chief task was to rewrite for MERA the material organized for punch cards. This, however, did not mean reorganizing the material; it only served the goal of permitting the recording on MERA on the basis of punch card specifications. Thus we did not write so-called record and batch end programs; so the "reprogramming" meant writing input formats and a simple output probram. The reason for this was that the programmers for the large computer were occupied with OS conversion to the ESZ 1055 computer installed at the same time, and rewriting the acceptance programs was not an urgent task; what was of primary importance was that our system, previously operating in a DOS environment, should operate in the new OS operating system.

In the time of preparation it was also necessary to organize and develop the operational, technological system for MERA data recording. In addition to establishing procedural rules this meant preparing a performance accounting system and billing program which could be run on the MERA. The performance accounting system is a program system following the existing performance and wage regulations which automatically processes stroke count and time entries by worker number using MERA software. The billing program totals the character number unit price products according to input format by job number broken down by document and record, which gives the billing total.

After putting into operation and when planning the new systems the goal was an ever fuller exploitation of the specifics of the MERA. This is why, in our first systems, we made the error of programming every check which the organizer prescribed for the MERA. The result of this was that either recording slowed down, if there was an end of record check, or the output program had a very long running time. A well specified data recording, data preparation program is not aimed at performing more and more checks on the MERA but rather at producing error-free files with a correct recording technology with short through-put times. Fitting these four viewpoints together, optimally satisfying them, which in most cases involves contradictory requirements, is the result of the joint work of the organizer and the MERA programmer.

Data recording from a small number of long documents is characteristic in the Industrial Informatics Center. In our concrete case a long document means a record length of 400 bytes, or 3,600 bytes for another document type. Naturally not every field of a document is filled; the degree of filling varies. Thus the record, if the task is solved at one program level, occupies a large area on the disk. The solution might be to break down the documents to program levels, selecting individual program levels to have as

many fields as are commonly filled or empty. Thus we would occupy on disk only as much room as there are valued data by program level. We could take out the fields of the empty program levels with an output program. But this solution could not be used in the case of long records where the sequence of fields in the output record is not identical with the sequence of fields given in the input format.

There are probably few MERA users who process such gigantic record lengths as described in the above example, so we are not talking about a general problem. Fut the following example is not so special; its significance is greater because it may cause difficulties for more users.

A typical task is to have to study a file for certain conditions and, depending on the condition occurring, the record goes into the output tape or the error list. The records on the error list are then re-recorded in a correction pass. This is not possible in one step on the MERA because only one output unit can be specified for a standard job. In such cases we run with two standard jobs, the magnetic tape unit is defined as the output unit for one and the printer for the other. The two standard jobs refer to the same output program. The difference between the two output programs is that in the magnetic tape standard job we take out the good records with an output instruction and "allow" the bad ones; just the opposite being the case in the output program given in the other standard job. Thus, because of this limitation of MERA, we must do double processing.

The problems outlined do not decrease the utility of the MERA, but the limitations mentioned must be taken into consideration when designing the system as a whole and, with a knowledge of the concrete requirements, the tasks must be divided between the MERA and the large computer.

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ROBOTRON PRINTERS, AVAILABILITY IN HUNGARY

Budapest SZAMITASTECHNIKA in Hungarian Jul-Aug 83 pp 6, 7

[Article by K. Mader, R. Zeth and E. Hoffman: "Robotron Printers"]

> [Text] Printers are among the most important devices for information processing. They are used in virtually every area of the economy and are manufactured in many versions. Their form is determined by performance requirements and applications conditions. In accordance with their significance we intend to produce a series to describe printer manufacture and offerings of several countries. As the first part of this series we will deal with printers in the GDR. The printers which can be obtained in domestic trade are the Robotron 531/529, 1154, 1156, 478, 1152/251 and 1152/252. (The Editors)

Character printers are used in data recording, in electronic billing and bookkeeping machines, in terminals and as output units of small computers in Telex and in numeric control technology. Large capacity line printers are used to print the large volumes of data processed by computers, on the basis of a line or page printing principle. Ribbon or roll paper writers are used to print very small volumes of date.

Within the Robotron firm the plant for the development and manufacture of printers was built in Sommerda, a small city in Thuringia--the VEB Robotron Buromaschinenwerk. More than a quarter million printers have been manufactured since the Sommerda plant was established.

With its printers the Sommerda plant follows international developmental trends, and offers a comprehensive product program for the most varied applications.

Character Printers.

The Robotron 529/531 is a letter bar typewriter (maximum of 10 characters per second); the Robotron 1152 is a letter wheel printer (maximum of 40 characters per second); the Robotron 1154 is a column mosaic printer (maximum 50 characters per second); the Robotron 1156 is a complete mosaic

printer (maximum of 100 characters per second); the Robotron 1157 is a column mosaic printer (with a maximum of 180 or 360 characters per second).

Line Printers.

The Robotron 478 is a line printer (maximum of 1,200 lines per minute).

Ribbon and Tape Typewriters.

The Robotron 1132 is a block printing device (maximum of 300 per minute); the Robotron TSD is a thermal paper printing device (maximum of 120 lines per minute).

A line of special printers has been developed from these basic types according to the desires of customers. For example, ribbon and roll paper printers which record measurement data frmm the control units of ships in accordance with the classification of the navigation registers of the GDR, Soviet Union and FRG; and character printers for the scintigrams of medical equipment. Printers and partial printing units traded as auxiliary units (OEM). For example, mechanical printing units--units to move and advance paper.

Mechanical Character Printers

In accordance with the needs of the most varied users about 60 percent of the mechanical character printers are mosaic printers and 40 percent create closed sketched figures. One third of the latter are typewriter type and two thirds use print wheels. The principles of the mechanical printing in use are exploited to the upper limit of their possibilities; recently these have been supplemented by use of non-mechanical printing principles.

It is estimated that by 1985 about 30 percent of the character printers used will write printed characters in the non-mechanical way (that is, without striking). Non-mechanical printing will not force out printing principles based on the mechanical principle for some time. By about 1990 it is expected that mechanical (striking) and non-mechanical printers will be side by side with equal rank.

A new generation of printing devices, the Robotron 1152 and 1157, will replace the Robotron 531, 1154 and 1156 printers based on traditional techniques (summarized in Table I with their parameters).

The Robotron 1152 and 1157 are a new generation of printers with their own microprocessor control coordinating and optimizing the complex movement processes within the printer. With a stepping motor combined with microprocessor control one can substantially reduce the number of mechanical units, thus increasing the reliability of the printers.

For example, about 5,000 mechanical parts are built into a traditional typewriter, but the Robotron 1152 letter bar printer consists of only 800 mechanical parts.

Table I.

I. táblázat

(1) Műszaki jellemzők (5)	Típus		
	Robotron 531 529 (ESZ 7183 ESZ 7173)	Robotron 1154 (SZM—6307)	Robotron 1156 (SZM—6301 ESZ 7183)
A nyomtatás elve	(2) betűkaros	(3) oszlop-mozaik-nyomtatás	(4) komplett mozaik-nyomtatás
Nyomtatási sebesség (karakter/s)	10	50	100
A raszterpontok száma	—	8×5 (10×5)	7×5
Karakterkészlet	92	96	96
Sorhossz (sor/karakter)	120	132	178
A függetlenül vezérelhető papírpályák száma	1	1	2
A másolatok száma	10	5	7

Key:

1. Technical characteristics
2. Letter bar
3. Column nosaic
4. Complete mosaic
5. Printing principle
   Printing speed (characters per second)
   Number of raster points
   Character set
   Line length (lines/characters)
   Number of paper paths which can be controlled independently
   Number of copies

The Robotron 1152 and 1157 printers (as basic units) serve universal applications purposes. The paper handling and paper advancing techniques are specific to the applications area according to the purpose. The chief application areas of the Robotron 1152, giving a continuous written form, are: data recording, bookkeeping, billing and accounting equipment, text processing and operating units of small computers.

The chief application areas of the Robotron 1157 fast column mosaic printer are: output units for small computer systems and computers, terminals, data recording, bookkeeping, billing and accounting equipment, text processing.

The Robotron 1152 and 1157 Character Printers

To illustrate the many varieties and versions of character printers we will describe here the 251 and 252 basic versions of the 1152 model and the 265 and 267 basic versions of the 1157 model.

Table II. Chief Characteristics of the Printers

[2 inches]

II. táblázat. A nyomtatók főbb jellemzői

(1) Műszaki jellemzők	Típus			
	Robotron 1152		Robotron 1157	
	251	252	265	267
(4) A nyomtatás elve	(2) betűkerekes nyomtató		(3) oszlop-mozaik-nyomtató	
Nyomtatási sebesség (karakter/s)	max. 40		max. 360	max. 180
A raszterpontok száma	—		7×7	9×7
Karakterkészlet	96	96	96(192)	96(192)
Sorhossz (sor/karakter)	132	210	132	210
A függetlenül vezérelhető papírpályák száma	1	2	1	2
A másolatok száma	6	6	3	5

Key:

1. Technical Characteristics
2. Letter wheel printer
3. Column mosaic printer
4. Printing principle
   Printing speed (characters per second)
   Number of raster points
   Character set
   Line Length (lines/characters)
   Number of paper paths which can be controlled independently
   Number of copies

The 1152 letter wheel printers write characters by having an electromagnetically driven print hammer strike the tongue of the letter wheel onto the ink ribbon and the paper. The letter wheel (daisy wheel) is made of a flexible synthetic, it is easily exchanged and ends in tongues. The letters are placed on the ends of the tongues. In contrast to a traditional typewriter--where the paper moves--the paper stays in one position in a letter wheel printer and the letter wheel moves along the paper.

A character set consisting of 96 characters is placed on the letter wheel. The letter wheel can be exchanged in seconds by the operator if, for example, he wants to use another type of letter in some place of the text. The ink ribbon (a 13 mm by 20 meter ink tape or metal film tape) is placed in an ink ribbon cassette (it is also possible to use the rolls of ink ribbon available commercially).

The 1157 column mosaic printer prints characters with the aid of a printing head consisting of 9 or 14 pins. The printing pins create one column of a character, moving in a line in seven steps. In the course of the seven steps the desired character is written by raising the necessary printing pins in the given column with the aid of an electronic character generator.

The magnets moving the printing pins have a maximum frequency of 1,000 Hz, which results in a printing speed of about 180 or 360 characters per second.

If we write at maximum printing speed the characters are first written into a line store. The microprocessor coordinates paper advance and the direction of printing a line (forward or backward) with a time optimizing program.

In order to emphasize titles or selected portions of text one can switch from normal to broad or slanted writing.

Comparing the new character printers of the Sommerda plant with products on the international market we can say that they succeeded in developing two model families which belong to the technical-scientific front rank.

In accordance with prescriptions contained in international standards the new printers can process roll paper and pre-printed forms. This makes it possible to use these printers in automatic bookkeeping and billing machines and in text processing equipment.

The microprocessor control of the Robotraon 1152 and 1157 printers makes possible the use of highly organized controls. If the user desires the equipment can be provided with an interface suitable for parallel connection. For example, with the delivery of suitable standardized connectors one can realize near peripheral connection (PIO), Centronics connection, IFSP connection for the MSZR small computers or even V.24, RS 232 or IFSS connections.

Paper Advance and Handling Techniques for Character Printers

For the Robotron 1152-251 and 1157-265

With a character division of 1/10" these printers can print 210 character lines. If an undivided writing drum is used it is possible to process paper 590 or 600 mm wide (roll paper or fanfold). A drum divided for simultaneous processing of four standing and lying forms can be used also, with a division ratio of 1:2 or 2:1. The divided drum makes possible the use of two paper paths moving independently of one another, using either two paper rolls or two paper fan folds. By using the 1161 accounting card loader one can also write accounting cards in addition to a two-path paper roll. The 1164 individual form loader makes possible the processing of individual forms and multiple copy blocks of forms.

The paper advancing and paper handling units can be removed easily for both types of printers and exchanged. These operations can be done by the machine operator also.

Non-Mechanical Printers

In mechanical printers mechanically moving parts or the traditional mechanical striking is used for printing. These have a number of advantages which

continue to justify their use--good character formation, especially in the case of continuous writing, many copies can be prepared at once with one strike, various types of paper can be used, different paper formats and paper thicknesses and widths can be processed, it is possible to process different combinations of forms (for example, accounting cards with a journal behind them) and the printed character can be seen immediately.

But mechanical printers also have a number of disadvantages which do not appear in the non-mechanical printing process (without striking).

The advantages of the non-mechanical printing processes are: practically noiseless printing, thus improving the working conditions of operators (in accordance with international prescriptions); small specific energy need, thus further reducing the energy used by the printers; a further reduction in the number of mechanical parts, thus incressing the reliability of the printers and reducing manufacturing costs; new possibilities for individually formed characters, thus facilitating the exchange or variation of characters with the introduction of graphic character sets and form masks.

The general disadvantage of the non-mechanical printing proceedures used thus far is the lack of multiple copy printing. This limits the applications possibilities. This disadvantage can be counterbalanced by copying techniques following printing, but in a few areas of data processing--for example, in billing, bookkeeping and accounting--this is partially excluded by valid legal prescriptions.

Thermal Paper Printers

In accordance with international developmental trends the Sommerda plant is offering thermal paper printers as a new development in the area of non-mechanical printing.

The Robotron TSD 16 thermal paper printer is a non-mechanical paper ribbon printing device which can replace mechanical paper tape printing where copies are not needed. Applications areas are: control and measuring equipment; microcomputers; desk and pocket calculators; and simple data recording equipment.

It writes the data to be recorded with a speed of two lines per second, line by line one under another, on roll paper 57 mm wide made of a heat sensitive material.

The units of the TSD 16 printer are: thermal writing head; control electronics; a stepping motor to advance the paper; and a holder for the paper roll.

By using a thermal writing head which writes an entire line data can be written in parallel without the mechanical movement of the printing elements. In its basic version the printing is of a raster form consisting of 5 by 7 points. Numeric and alphanumeric printing are both possible.

The stepping motor used ensures reliable, precise and silent paper advance. Manual advance is possible also with a hand wheel. The electronics which can be connected to the TTL level and the structure of the printer require no maintenance. It is reliable, easily handled and can be repaired advantageously. The printer has a specific TTL connector. The minimal dimensions and light weight satisfy international miniturization expectations.

Using several printers one beside the other--for example, five thermal writing units placed side by side--offers the possibility of creating a page printer which can produce so-called hard copy of the content of picture screens. This solution represents a realistic economical alternative as compared to mechanical printers.

Developmental Goals

Electronic data processing is entering more and more special applications areas where printed output is necessary. This affects especially such applications as large numbers of cashier terminals, printing tickets, labels, etc. The data recording and measurement result writing needed in medical, chemical industry, energetics and numeric control technology influence the requirements being made of printing devices, especially in regard to chemically prepared papers.

Paying attention to international developmental trends the further development of printers is taking place primarily in the following directions and with the following goals: reducing operating moise; increasing reliability parameters; reducing maintenance expenses; simplifying operation; and improving repair and service possibilities.

The 6310 Model Series Mosaic Printers

The mosaic printers belonging to the Robotron 6310 model series are high performance, reliabel, good quality items which can be used in many ways.

Table III

III. táblázat

(1) Műszaki jellemzők	6311 típus	6312 típus
(2) Nyomtatási sebesség	100 karakter/s	100 karakter/s
Raszter	9×7	9×7
Karakterosztás	1/10", 1/12,5"	1/10", 1/12,5"
Karakterkiemelés	(3) minden karaktert kettős szélességgel, ferdeírással ír (opcionális)	
Soronkénti nyomtatási pozíciók	80 (1/10") 100 (1/12,5") 120 (1/15")	132 (1/10") 165 (1/12,5") 190 (1/15")
A nyomtatás iránya	(4) előre és hátra, nyomtatási út optimalizálása	
Sortávolság	1/6" (féllépés)	1/6" (féllépés)
Papírfeldolgozás (5)	tekercspapír, egyedi lapok hátsó behúzással vagy külön igény esetén leporelló	(6) leporelló, tekercspapír és külön igény esetén hátsó behúzással egyedi lapok
Formátumvezérlés	programmal vezérelhető (7)	

Key:

1. Technical Characteristics
2. Printing speed
   Raster
   Character separation
   Character emphasis
   Printing positions per line
   Direction of printing
   Line distance
   Paper processing
   Format control
3. Writes every character double width or slanted (optinal)
4. Back and forth, optimizing printing path
5. Roll paper, rear loading of individual sheets, or fan fold in special cases
6. Fan fold, roll paper, or rear loading of individual sheets in special cases
7. Can be controlled by program

Characteristics of the 6310: slanted writing, wide writing, thick writing; two direction, optimized printing; international character sets--can be filled optionally; parallel or serial connection according to user needs, can be connected to every electronic system; an advantageous price/performance relationship; its own built-in test program.

Applications areas: professional printing applications; small computer systems; measurement data collection systems; terminal printers (can be delivered with special paper handling techniques also).

The New 255 Model of the 1152 Character Printer

The 255 model of the Robotron 1152 character printer has modular construction and is characterized by especially good service possibilities. It uses a modern letter wheel printing principle, letter wheels with optional characters can be exchanged simply, it has outstanding writing quality, can be connected in parallel or in series and can be handled rationally thanks to automatically controlled functional processes.

The printer provides comfortable single sheet processing and can be used for fan fold processing also. The variable network connection possibility and minimal energy use are especially advantageous.

The 255 model is especially suited as a writing unit for personal computers or as a unit for measurement and control technology or text processing.

Technical Characteristics

Printing principle--letter wheel; letter wheel--96 characters per character set; printing speed--40 characters per second, 35 characters per second in the case of standard text; form of writing--optionally variable forms and character sets with the following line divisions, 1/10" and 1/12", and

proportional writing; writing quality--suitable for letters; smallest division--1/60"; printing positions--132 or 158; maximum paper width--380 mm; direction of printing--back and forth; margins--fixed left margin, variable left and right margins, controllable with software; ink ribbon--standard ink ribbon cassette, 13 mm endless black ink ribbon or black/red ink ribbon, 6.35 mm endless black ink ribbon, single use or multiple use metal ribbons (carbon ribbons); ink ribbon height setting--red/black switching with a light gate; paper control--tractors to advance paper with edge holes (fan fold), manual sheet feed with automatic positioning; optional equipment--mechanical connection for automatic feeding of individual sheets; end of paper signal--with light gate; character buffer--512 bytes; connection points--V.24, RS 232 C serial or 8 bit Centronics parallel connection.

The TD 40 Thermal Printer

The TD 40 thermal printer is a non-mechanical, alphanumeric printer. It can be used as an output unit wherever copies are not needed. It writes the data to be recorded continuously, line by line, one under another on roll paper made of heat sensitive paper 90 mm wide. The TD 40 can be delivered as a unit to be built in, without a housing, or as a desk unit. The parts of the printer are: printing unit, including heat printing head; control electronics; and power unit.

Stressed applications areas: telephone terminals, control and measuring equipment, work sites equipped with picture screen terminals, telecommunications text handling systems, personal and household computers, computers for technical-scientific purposes.

Technical Data

Printing speed--one line per second (with average character density and alphanumeric printing consisting of 5 by 7 points); printing principle--closely placed 240 raster points; raster field--6 by 10 point printer raster; 5 by 7 upper case and 5 by 9 lower case; character set--G0, G1, G2 and CCITT standard; the G0 character set is fixed; the G1 and G2 can be exchanged optionally; number of characters per line--40; raster distance--0.3 mm horizontal and 0.3 mm vertical; paper type--heat sensitive roll paper; paper width--90 mm; paper diameter--60 mm.

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MICROCOMPUTER SYSTEMS BY MICROKEY

Budapest SZAMITASTECHNIKA in Hungarian Jul-Aug 83 pp 12-13

[Unsigned article: "SYSTER, VARYTER"]

[Text] MTA SZTAKI [Computer Technology and Automation Research Institute of the Hungarian Academy of Sciences], the Sarisap Producer Cooperative and Elektromodul [EMO] have formed a research, development and applications association called MICROKEY, Microcomputer Research, Development and Applications Association. Its developmental efforts are aimed at delivery of turnkey microcomputer systems, shifting applications from the direction of large computers toward microcomputers, and doing all this at the lowest possible price.

Within the MICROKEY association MTA SZTAKI deals with developmnnt of equipment, basic software and applications software; the Sarisap Producer Cooperative deals wihh manufacture, final testing of systems and acquisition of hardware elements; and the EMO deals with foreign marketing and market research, with coordination of the association activities of MICROKEY, signing contracts, instruction, organizing demonstrations, marketing and providing service. According to their purposes the beneficiaries of their developments can be small and medium size enterprises.

The association has developed two systems which were shown at the Budapest International Fair--the SYSTER and the VARYTER 8 bit microcomputers.

The SYSTER is a one card microcomputer. The microprocessor, operational memory, floppy disk connection unit, parallel interface and V.24 serial interface are placed on a single circuit card.

The VARYTER is a further developed, multi-card version of the SYSTER, and has modular construction. The assortment of circuit cards makes it possible to create a configuration corresponding to the given task. The capacity of its operational memory can extend from 60 K bytes to 256 K bytes. Floppy disk units provide background storage. It is possible to connect four units. This can increase maximum capacity to 2 M bytes. The peripherals which can be connected are: punch tape equipment, card reader, audio cassette magnetic tape, and digital/analog and analog/digital transformers. The V.24 interface makes possible use of the VARYTER in the terminal mode. A digital graphic unit (NE 2000) can be connected also.

Recommended Applications Areas

SYSTER: commerce, billing, data recording, warehouse records, text editing and office mechanization.

VARYTER: in addition to the above, systems integration and creating links to larger systems (ESZR, TPA, IBM).

Series manufacture will begin in 1983 but individual applications exist already.

Approximate Price and Performance Values for the Computers

Basic machine: central unit (Z80, 16-128 K bytes RAM), keyboard, picture screen (price, 60,000-100,000 forints).

Auxiliary equipment: floppy disk storage, one to four mini or normal units, recommended storage capacity, 100 K bytes to 1 M bytes (price, 25,000 to 200,000 forints).

Printers: corresponding to the Epson type, printers in the category up to the DZM 180 (price, 60,000 to 200,000 forints).

Other possibilities; normal cassette tape recorder, NE 2000 graphic unit, punch tape I/O, line code reader, serial line interface meeting CCITT standards and LAMP local network control.

Software: GP/M compatible basic software and special applications oriented software such as laboratory systems.

Sandor Moricz, director of the MICROKEY association, has said that the SZTAKI 16 bit microcomputer with a 1 M byte direct address possibility is under development already. This equipment can satisfy even more demanding expectations. The PDP operating system of the system is UNIX compatible.

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VIDEOTON COMPUTER-BASED, DISTRIBUTED PRODUCTION GUIDANCE SYSTEM

Budapest SZAMITASTECHNIKA in Hungarian Jul-Aug 83 p 14

[Article by Peter Lorincz and Rezso Szentes: "Operational Test of a Distributed Production Guidance System Based on a Computer Network"]

[Text] On 1 July 1981 a worker of the materials management department of the Videoton Computer Technology Factory used a terminal in the department to call the VNS network; then, with the aid of the host computer located at the warehouse base, he selected, via its data base management transactions, the inventory records subsystem of the computer technology warehouse. This moment represented the end of the developmental phase of the zero version of the VNS and the beginning of testing under operational conditions of the prototype of the system--the first domestically developed packet-switched computer network.

The Videoton Computer Technology Factory and the Computer Applications Research Institute (today the Computer Technology Applications Enterprise) decided on the development in 1978 with the goal of joint development, based on hardware equipment manufactured by Videoton and obtainable commercially, of a complex data base/data transmission system which would be suitable for support of a production guidance system for multi-site large enterprises. The development started from the idea that a data base of data necessary for production guidance can be broken down into part data bases corresponding to functional organizational units which are used with great intensity by individual user groups. The part data bases thus realized should be located at those organizational units where the data are generated and where the need for their use arises most frequently. At the same time, in most cases a knowledge of the data of the local part data base is not sufficient for the decisions needed for production guidance, so one must ensure access to any part data base from any point also. They wanted to satisfy this general need with a communications data network.

This idea coincided with the reconstruction aspirations for computerized production guidance at Videoton. This led to the goal of having Videoton--as a multi-site large enterprise--realize through this product the elements of its own production guidance system parallel with the nucleus of a data

base/data transmission system, simultaneously testing the idea, the product and the practical utility of it.

To carry out the data base management functions the VNS system uses the DMS-60 data base manager, with the modification that local terminal operation of the original DMS-60 is replaced by virtual terminal operation via a network.

Developing the communications subnetwork had a crucial role in realizing the goal they had set--considering also the volume and novelty of the development work. The communications subnetwork of the VNA is a computer network using the packet switching technique operating with virtual calling.

The communications subnetwork has been described at a number of conferences and in a number of professional journals, so we will publish here primarily a description from the user side and the most important experiences of the experimental application.

Test

The operational test of the zero version of the VNS began in July 1981 with three data base management host computers and three nodes in the Computer Technology Factory of the Videoton Electronics Enterprise in Szekesfehervar. The host computers were ESZ 1012 models with MTM operating systems, with DMS-60 data base managers and the user transaction sets based on them. The node computers were ESZ 1010M models with 128 K bytes of memory. The link between host and node was realized via a channel-channel adapter with a speed of 100 K words per second.

The link between nodes uses their own medium speed (9,600-2,400 b/s) telephone lines with base band transmission in the synchronous mode. The terminals are linked to the node computers by low speed (1,200-600 b/s) asynchronous lines. The terminals--at varying distances from the node computers--are placed in those offices from which they want to run the transactions. In the operational test installation eight terminals are connected to every node.

After calling up the network the terminal user can select the data base manager he wants to access, giving symbolically the location and the service address therein. If the selected data base manager has a free entry point the terminal operator can run the transactions of the given part data base. After completion of running the transactions and breaking contact with the data base manager it is possible to contact a new data base manager or to leave the network.

When selecting applications to be based on the data base management hosts we took into consideration the basic principles mentioned in the introduction. In the interest of eliminating possible errors in the communications subnetwork we used systems which has been in operation separately earlier. It was the task of the experimental leadership distributed processing system

thus developed to supply the operational (logistic) level of the information system with data of suitable volume and quality.

Our goal with the operational test was very complex. It included among other things a testing of the hardware and software tools and a test of the user systems.

The subsystems included in the operational test--after careful consideration--were the following: warehouse inventory records, material acquisition and commodity arrival records; and the technological data base.

Warehouse Inventory Records

The primary goal of the warehouse inventory records subsystem is to provide up-to-date data about the quantity and value of materials stored in the site warehouses of the parent factory for the warehouse guidance, materials management and operational production organs. It also makes it possible to attach stockpiles and to inform users about these attachments.

The subsystem achieves these goals with the aid of the following modules:

--Updating stock data in connection with enterprise or factory centralized batched mode processing, maintaining the possibility of on-line changes as well. In the course of this technical and economic specifications data pertaining to materials purchased by the factory and assemblies and parts manufactured by it go into the data base, or are modified in case of need.

--Some of the movement data for daily updating of inventory data come on magnetic cassette from the warehouse bookkeeping sybsystem and the inventory file is updated in the batched mode. Another part of the movement data is put into the data base in the conversational mode.

--Users have the possibility of attaching stockpiles in the warehouse. Making use of this possibility any authorized user (in the present system, the operational leaders of production) and the materials managers can establish logical attachment of any material up to the current inventory. In the course of this procedure they can give the target of the attachment (for example, product identification, series identification, theme number), the time of its validity and, naturally, the quantity attached.

--The query module (transaction group) creates the most direct link with users, because these transactions--applications programs initiated by the user--provide data on-line, in the conversational mode (about quantity and value of materials by warehouse, status of attachment, target and organization or person making the attachment and the time it is valid, and about the technical, economic specifications of the materials).

Material Acquisition and Commodity Arrival

The material acquisition and commodity arrival subsystem was developed in order to offer computer support to following material orders from the

appearance of the need to the arrival of the goods in the warehouse. The life cycle of purchasing orders is quite long, on the one hand, and on the other hand can be broken down into many phases (status of order) each presuming another. The administrative process accompanying material supply and commodity arrival uses many data and includes many procedures, but an algorithm for it can be prepared easily. The long through-put time and large volume of administrative work justified the development of a computerized subsystem which would free the work time of officials dealing with material supply and commodity acceptance so they could do higher level supply work.

The recorded status for every material ordered is maintained by the subsystem--material need, order issued, orders confirmed (or rejected), notice of shipment, commodities accepted quantitatively and commodities accepted qualitatively.

Taking into consideration that materials management, acquisition of materials, and the quantitative and qualitative acceptance of goods takes place in a decentralized organization and that ending or changing an attachment is the task of individual economic units the subsystem must also play a coordinating role among the organizational units. The coordination, scheduling and auditing of the business activity of the users are realized via a common data base. Creation and maintenance of the data in the data base take place exclusively in the on-line, conversational mode.

Technological Data Base Management

The technological data base management subsystem creates and updates the technical data file which constitutes the "nucleus" of the factory production guidance data base. The technical data can be partitioned in the following way: stock data (catalog), structure file, operations data and place of work data.

With conversational mode maintenance of the data base--due to the decentralized technological organization--the subsystem must carry out coordinating and auditing tasks also. It follows every phases of manufacturing planning and technologization activity for assemblies and parts being produced together with every technologized item recorded. It is intended to reduce the technical administrative work by collecting data in the conversational mode, and is limited to those data which were not put into the system earlier.

Users are supplied exclusively with the data needed from the current data base, primarily on picture screen terminals. In contrast to batched processing it is possible to get an answer quickly in regard to so-called inverse links (what is being built into what, what is being manufactured at a given work site, etc.).

To sum up, on the basis of the idea for an applications system described in the introduction and examining the briefly described subsystems included in the operational test, we can establish that:

--The separation of a data base used in complex production guidance into part data bases (warehouse, orders, technology) without a common part is

not possible either theoretically or practically. It follows that the common part (in this case the stock file) must be updated jointly on a periodic basis;

--Taking into consideration the foregoing point, the data bases and the applications subsystems linked to them should be separated into "individual" part data bases beign used with great intensity, making it possible to access the desired "foreign" part data bases.

The most important experiences connected with the data base management/data transmission system nucleus in the course of the operational test are:

--The bottleneck of the permeability of the system is the DMS-60 data base manager (a data base manager can service simultaneously 4-8 terminals, depending on the size of the data base description);

--By the end of the operational test it was possible to improve the local terminal service speed of the system so that it almost coincided with the traditional terminal service speed of the DMA-60. In the case of remote terminals the response times increase by about 7-15 percent per intermediate node, as a function of line speeds;

--the bottleneck for the reliability of the system is the reliability of the data transmission channels.

In January 1982, on the basis of these positive experiences, regular operation of the VNS began with the user subsystems described. In the course of 1982 two additional nodes and user subsystems were added to the production guidance system--the commercial information system in Budapest in August 1982 and the inventory records of the Tab parts factory in December.

In the future Videoton will base its entire enterprise production guidance system on the VNS, adding to it and developing it further. The ESZ 1012 host computer and the DMS-60 data base manager, as the bottleneck, will be replaced by an ESZ 1011 megaminicomputer and a DMS-600 data base manager. It is intended to realize access to large computer data bases through network connection of the ESZR computers. These developments are under way through the cooperation of Videoton and the SZAMALK [Computer Technology Applications Enterprise], and we hope that we can report on their successful completion and utilization in the near future.

8984
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BROADER EDUCATION IN COMPUTER TECHNIQUES RECOMMENDED

Budapest FIGYELO in Hungarian 22 Sep 83 p 7

[Article by Dr Peter Szirmai: "The Third Culture"]

[Text] I wonder whether, as we examine the relationship between culture and the economy in the light of today's pressing economic problems, we are correct in making international comparisons on the basis of data that end at the turn of the 1960's and 1970's.

Since the 1970's a new and rapid technological development has been under way with social implications of increasingly far-reaching dimensions. The key word in this technological development has been computer technology (and information), its key industry has been microelectronics and its key figure has been the mathematician programmer. Today it is already a platitude to say that while the forces of production that have evolved in the wake of the industrial revolution have multiplied man's physical abilities, the productive forces of the scientific-technological revolution have augmented his mental powers. It is much less often that we think about the "other side" of this platitude, namely about how much mental power man must have in order to be able to use the microprocessor designed to augment his abilities.

The Other Side of the Platitudes

It has also become a platitude to say that it was the industrial revolution, the original capital accumulation and the bourgeois revolution that had created the need for universal schooling and had made education unversal. We have given even less thought, looking at the "other side" of this platitude, to the kind of school system that it would take (in terms of length, composition and curriculum structure) to promote scientific-technological development that would augment our mental powers.

Thinking these questions through is especially appropriate today when it appears that we may be able to join the main stream of world development by avoiding certain developmental dead-ends, assuming that we correctly recognize the main directions and that we take appropriate measures to encourage or even enhance efforts to find these directions.

In Hungary there is an increasingly tense contradiction between industry demand and training: while the former is aimed primarily at unskilled, and to a lesser extent at skilled workers, most of those entering employment are

skilled and only a small percentage of them are unskilled workers. Our society's solution to this contradiction has been to assume that only fifteen to 20 percent of those trained actually become skilled workers--despite our existing training structure--and that the others, even though they may have vocational diplomas, will actually work as unqualified laborers. In the final analysis our system of vocational training as a whole does help to ensure that once people enter into industry we do not have masses of unemployed skilled workers, and that at the same time we do not have masses of vacant unskilled and semi-skilled worker positions.

On the world market it is becoming increasingly clear that the only marketable products, at least from the point of view of profitability, are those which have a very high mental ratio, and which as a result of advanced automatization (essentially this also implies computerized controls) or cheap wages--as in the case of Taiwan and Singapore--involve low production costs. For a long time Hungarian industry has tried to remain competitive by using this second solution, however--basically as a result of increased wage costs and socio-political expenditures--continuing in that direction has since become impracticable.

The most important elements affecting industry's competitiveness include the production of higher mental-ratio products, the introduction of production systems and the creation of an advanced industrial structure which is based on computer technologies supported by high-performance computers and microprocessors, and which, therefore, can eliminate an increasing number of worker slots thus allowing them to be used for other important purposes (such as for improving services). This can only be attained with properly educated workers, hence there is indeed a close relationship between the need for culture and the need for industrial development.

The Missing Links

There are in fact many who would agree with this statement, however, objections can often be heard that there is not enough money for everything. Whether there is, or there is not enough money is not so much a question of principle as it is one of practical considerations, and in my opinion the problem is not that there is not enough money for it, but rather that we are lacking the necessary socio-economic forms of movement.

This form of movement, of course, is made up of various components, starting with our tariff system. Many have argued, recently including academician Tibor Vamos, that our existing system of tariffs is presently geared toward protecting a non-existing domestic computer industry, by levying incredibly high tariffs on imported machines. It would be essential for us to declare these machines to be completely exempt from tariffs (and perhaps indirectly even to "get a hold" on the earning of excessively high profits, although the marketplace would probably bring the price of personal computers in line with their actual value anyway).

The next missing link is education. Equipping our high schools with personal computers has been a great step forward, and we should continue to take

drastic steps in that direction without being afraid of even turning to less costly solutions:

--Hungarian television could organize computer technology extension courses, perhaps along the lines of the Swedish or Norwegian correspondence programs, in other words providing a format that would make it possible for a given university extension to grant degrees to people upon passing the required tests;

--Computer training should be greatly expanded in post-graduate education, if possible giving everyone who feels it is necessary a chance to complete such a course. (Even by making it mandatory to grant study leaves for workers wanting to take advantage of these forms, which, in the case of an unsuccessful test, they would have to repay to their respective companies.)

As far as our economic forms of movement are concerned, first I would return to the question of whether we have enough money for such purposes. If we were to approach the task of building up our software base as a centrally funded state program to be implemented within the organizational framework of our large enterprises, it is probable that even several billions of forints would not bring the desired results. As for our hardware base, I am not quite as confident of the validity of this assertion; here it would be worthwhile to examine our government program on computer technology in greater detail.

What Is Mathematics?

In order to promote small businesses involved in the development of computer technology, we should--I believe--establish incentive-providing organizational forms, occasionally making them exempt from legal (and tax) regulations, some of the basic elements of which are already visible in today's small business sector. We should take steps to ensure that those whoacquire additional qualifications in computer technology-related professions or activities through state education, extension courses, professional training colleges and other types of educational institutions or by way of other solutions, can find a proper market for their skills. (And, of course, this could also be worded the other way around: greater access to these kinds of possibilities would at the same time motivate wide segments of the population to complete such extension courses, to obtain second diplomas, etc.)

With adequate propaganda and good organization, within 5 to 10 years this sphere could provide jobs for some 4,000 to 5,000 workers in Hungary (naturally a part of these would be in auxiliary activities, in small businesses operated on the side, etc.), not to mention that it could promote the development of more intensive working relationships with the Western European manpower markets (and software houses), while at the same time it would help our industry to become more competitive on the international market even without state investments.

The computer lobby has once again gone to the offensive in order to strengthen its positions, this time under the pretext of wanting to improve the

relationship between economy and culture--someone could say in opposition to my statements. Well, the matter is not nearly as simple as that.

For no one would doubt that I would be standing up for culture if I were urging the training of 500,000 art historians (it is another question that such an idea would not reflect a strong sense of reality and that it would be simply silly to suggest).

The existence of the two cultures, however--whether we admit it or not--is a fact, just as it is a fact that in society's view often it is only classical culture which is recognized as "culture." But where does the mathematician belong? Have we noticed that every great mathematician has had some classical accomplishment for which he is also known (such as for being music experts, writers, social thinkers, etc.)?

For mathematics--in my opinion--does not belong in either of the above defined two categories. In a sense it is a third culture, but we would probably be closer to the truth if we referred to it as a "metaculture." Just as every science has a mathematical dimension (today the possibility or the actual fact of a mathematical dimension is considered by many to be one of the criteria in the definition of science), so do both cultures have their own mathematics. Mathematics is thinking about something, but this something is, at the most, only temporarily itself. If Hegel defined symbols as "movements wistful of their subject," then the mathematician who works with these symbols is a "thinker wistful of his subject."

There can, therefore, be no developed mathematics-oriented culture without culture in its "general" sense; introducing mathematics into the production system is no longer a purely engineering task (!), for it already has its own aesthetics, logic, in short, its own philosophy.

9379
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BRIEFS

MICROPRINTERS, PERSONAL COMPUTERS--The Telephone Factory has begun producing microprinters, scarce in Hungary, on the basis of a license acquired from the firm, Mannesman Tally. Plans call for production of about 1,000 printers this year. They will be marketed for 60,000 forints. The latest domestic personal microcomputer is the SIMON 68. Its display uses not only capital and lower case letters but includes all Hungarian diacritical marks. Developed by Dr Endre Simonyi, Marton Simonyi and Miklos Marosvasari, the computer is based on the 6801 microprocessor fabricated by MOTOROLA. It is considerably cheaper than microprocessors of similar capabilities and therefore less foreign exchange demanding. Manufacturing has begun at the Rozmaring agricultural producer cooperative. Even with its high-resolution graphics display and all peripherals, it will cost more than the computer made for schools by the Communications Engineering Cooperative. [Text] [Budapest OTLET in Hungarian 20 Oct 83 p 18]

CSO: 2502/10

AUTHOR EXAMINES STATE OF SCIENCE

Krakow ZYCIE LITERACKIE in Polish No 41, 9 Oct 83 pp 1,4

/Article by Waclaw Opacki: "Report on the State of Polish Science"/

/Text/ The Polish Academy of Sciences /PAN/ performs two basic functions: it makes statements regarding the state and needs of science through its corporate bodies (general assembly and PAN scientific committees) and it carries out research through its institutes. In the past 2 years a number of extremely important documents were drawn up in the sphere of science in which PAN defined its attitude toward the country's basic socioeconomic and scientific problems. Among them one must note above all the "Report on the State of Polish Science"* and the "Memorandum on the Situation and Prospects of Polish Science in the Years 1982-1985." Both were prepared by the PAN Committee on the Study of Science, headed by Prof Ignacy Malecki from the PAN Institute of Basic Problems of Technology.

The goal guiding the authors of these studies was laid out in the introduction to the "Memorandum." It stated that the "Polish Academy of Sciences--as a corporation of scientists from all the departments of science and as a center combining in its research institutions a considerable scientific potential--considers it a duty to speak up, provide help and counsel, and carry out its share of tasks in increasing the participation of science in resolving the country's urgent socioeconomic problems."

Cardinal Sins

The "Report on the State of Polish Science" is a document which synthetizes, so to speak, the committee's earlier reports. It defines the actual state of Polish science and the strategy and conditions for its development; it also suggests the priorities and directions for research in the nearest future.

* The full text of the "Report" was published in the bimonthly POLISH SCIENCE.

In People's Poland a relatively large, well educated and skilled scientific cadre has been trained and given employment. On the other hand, poor organization and chronic deficiencies in the material base have negatively affected the development and results of research. There have been efforts by the authorities to manage not only the form but also the content of research in some branches of the social sciences, whose development--as a result of negative selection--has been rather haphazard (especially with regard to sciences in which the authorities were particularly interested, namely economics and sociology). Numerous but poorly prepared people participated in the research, resulting only in its extensivness.

The growing gap between Polish science and the world level of science creates a series of implications for current science policy. In the opinion of the authors of the "Report," the rapid decline of Polish science in relation to world science is the result of crisis "survival strategy." There will undoubtedly be further losses on the science front. Nevertheless, these ought to be effectively minimized with the help of an effective strategy for disposing funds allocated for science.

Scientific research has been carried on too broadly in most disciplines. The so-called higher priority brackets were too numerous, as was the practice of "tying up" research with preferential problems.

Therefore, we are faced with the following question: "What road should we choose to counteract the negative process of the disintegration of Polish science? Should we concentrate on selected problems, or should we spread our modest funds in a 'thin layer' over the whole field of science?" The authors suggest the middle way: equipping the whole field of science with a thin layer of funds which would preserve the existing research potential. On the other hand, the number of problems or preferential themes should be reduced, thereby securing the material means that would allow us to retain a world position in science.

But how do we combine themes in preferential problems? Having talked to many researchers, I know that each professor and every research post will consider their research as particularly important for science and the economy. Undoubtedly, as usual in such cases, pressure groups will appear which, bypassing merits, will claim preferential treatment. The "degree of the problem's complexity, based on the systematic formulation and the principle of interdisciplinary character of the research carried out" ought to constitute one of the criteria for selection. Another criterion ought be the significance of the problem for the country's socioeconomic development when dealing with problems whose solution should be based on the results of scientific research. Thus we are excluding here problems, even key ones, whose solutions lie in the spheres of political, economic or organizational activities.

For the scientific community itself, the expected research results are the decisive criterion. The country's possibilities and the need to

protect the traditions of Polish science require that highly productive research be undertaken while at the same time proper conditions for the development of strong scientific centers must be assured.

The authors of the "Report," on the basis of studies by seven PAN departments and discussions with practicing scientists, also specify their suggestions for priority directions of research. I shall refrain from reviewing them because the final version of the National Socioeconomic Plan for the Years 1983-85 has already been adopted. I wrote about the plan in the 19 June 1983 issue of ZYCIE LITERACKIE, under the title: "Science in Crisis."

State of the Material Base of Science

The general character of the "Report" can be boiled down to two or three quite pessimistic elements. Let us repeat them again. First: In the last 5 years we have witnessed a steady distancing of Polish science from the world level. Second: In the near future we can expect further losses in the field of Polish science and thus greater regression in relation to world science. The situation of our science is best illustrated by numbers: In 1970, the value of machines, installation and other equipment per researcher amounted to an average of 123.3 percent of the value of equipment per industrial worker; in 1980 the value per researcher was only 58.2 percent. Nearly everywhere in the world scientific workers are better equipped than industrial workers; in our country the opposite is true. I think that the declining trend will continue and the end of the economic crisis will not signify the halting of the science crisis. In science, losses are made up for much more slowly than in other areas of life. Moreover, the above figures do not include the aging of fixed assets, which is best illustrated by the degree of wear and tear (in case of equipment in PAN posts, it reaches 70 percent) and the time necessary for its replacement.

The situation with regard to housing scientific-research posts is downright tragic. In 1975 (later data are unavailable) there were 13.1 square meters of building space per 1 employee in research and development /R&D/ posts. Compared with the year 1966, this constitutes a regression of 2 square meters (for example, in the Institute of Basic Automation and in the Institute of Mammal Studies, there are fewer than 5 square meters per 1 employee). The indices of library equipment and space have also further declined. In several colleges in Warsaw, Lodz and Olsztyn I had the chance to observe closely research conditions, especially laboratory research: typically, there were several people working shifts in one room of a dozen or so meters among densely packed equipment.

The thesis of the authors of the "Report" that this situation is the result of neglect in investments in the sphere of R&D is undoubtedly correct. The size of investments was the result of random negotiations and was not correllated with the growth of investments in the national

economy. We know very well from the recent period that some investments fulfilled only the dreams and ambitions of local decisionmakers. Some of those investments were indeed needed, but they would have been put to much better use in other places.

In the years 1970-76 investment outlays for research and development were growing slower than outlays in the rest of the economy. From 1976 a quicker decrease (1970--1.8 billion zlotys, 1975--4.4 billion zlotys, and 1980--2.1 billion zlotys) could be seen. These figures represent current prices; the decline in real prices was undoubtedly greater. Thus, if we are to assure a minimum of development conditions, additional investment outlays in the range of 5 percent of assets after amortization would be necessary.

The supply of science with scientific-research equipment is also unfavorable. In 1978, equipment of a total value of 4.6 billion zlotys was produced in the country. In the same year the value of equipment imports amounted to about 3 million zlotys (including 59 percent from socialist countries and 41 percent from capitalist countries). In 1980 this import declined drastically to the amount of 1.7 billion zlotys. I remember the situation in the Institute of Land-Surveying and Photogeometry of the Agricultural-Technical Academy /ART/ in Olsztyn, when the realizations of several doctoral and master's dissertations were delayed due to a lack of a measuring device.

Finally, engineer Z. Boenigk from the Institute of Prototypes and Scientific-Research Equipment of the ART took it upon himself to build the prototype of an apparatus for satellite land-surveying. However, through no fault of his own, it took him several years. The candidates for a degree kept changing the topics of their master's theses, the doctoral candidates were getting dangerously close to the rotation borderline.

I must also recall what the "Report" does not mention, that in June 1978 there was a plenum of the PZPR Central Committee dedicated to the problems of science and higher education. The plenum resolution emphasized, among other things, the need for developing the production of scientific-research equipment. In August 1978 the Government Presidium voted a program for the development of research equipment. It made plans for creating a modernized equipment industry, which was to generate production in the years 1979-80 for the sum of about 6 billion zlotys a year, in the years 1981-85 for about 8 billion zlotys a year, and in the years 1986-90, for 15 billion zlotys a year, including 4.5 billion of export production. This program was tied to investments within the framework of which the realization of 32 tasks for about 6 billion zlotys was planned. The Ministry of Metallurgy and Machine Industry, however, failed to meets its obligations in as much as 82 percent of the tasks. Because of this, the Ministry of Science, Higher Education and Technology set about preparing a new program for the years 1982-85, limiting it to its own production possibilities (600-800 billion zlotys a year).

In any case, the technical level of the equipment produced varies and often diverges considerably from the world standard.

A quick improvement in supplying research units seems to be imperative. This can be achieved through developing a domestic production basis. The best solution lies in bringing together the best specialists in a given field in smaller, specialized production plants attached to research units. Purchases of spare parts and auxiliary materials are necessary for operating foreign equipment. The "Report" also suggests creating possibilities for the purchase of small parts and materials by bypassing the central enterprises for foreign trade (for example, by institutions from their own foreign exchange accounts or by scientists themselves who are temporarily abroad), which are known for their bureaucratic habits.

Communications in Science

There is no need for elaborate arguments to prove that without the communication there can be no development of science. Creating a so-called "information vacuum" can have incalculable results. In order to get a complete picture of the achievements of world science, it is necessary to have access to about one-third of all scientific periodicals published in the world. Polish scientists, however, have access so far to one one-fifth. This index continues to decline. In the years 1976-79 a gradual decrease in scientific publishing took place. The production of scientific books, including college textbooks, decreased in that period by 1.9 percent in titles, 3.4 percent in number of sheets and 21.7 percent in number of copies. A similar regression took place in the publication of periodicals: 22.1 percent in titles and copies.

The insufficient processing power of printing houses and a shortage of paper due to many years of neglect in the building of infrastructure have caused publishing difficulties. It is therefore necessary to reactivate production powers devastated by the long-term exploitation of small printing works, a step which requires some financial outlays.

In recent years I have had over a dozen interviews with professors, some of them eminent world authorities. The talks concerned various problems, but nearly all of the professors used the occasion to voice their greatest complaint: the drastic limitations set on access to world literature. Some of them receive (received) some publications "with pains," after bypassing many bureaucratic obstacles; in Poland--thanks only to private contacts. In some professional communities, a system of circulating unique publications has been created. For many years now a so-called "informatorium" has been operating in the PAN Center for Scientific Information, which supplies its subscribers with photocopies of lists of selected publications and photocopies of articles chosen by them. This, however, requires that /research/ posts be equipped with copying machines on a larger scale than they are now.

Foreign contacts, developed in the middle of the 1970's, have undergone drastic reductions. The authors of the "Memorandum" emphasize that they play an extremely important and useful role for Polish science: they permit fast learning of scientific innovations, bringing them into the country and taking up the research thread, among other things. Short trips to conferences, symposia and congresses fulfill this function as well. Contacts also have positive influence on the intensification of our own research work thanks to access to modern, sometimes unique equipment, computer centers, libraries and archives.

Who Creates Science

In the years 1976-81, 18,800 doctoral degrees and 2,900 doctor habilitatus degrees were granted. A total of 1,678 titles of associate professor were also granted. This did not increase in a significant way the participation of people with qualifications higher than a doctoral degree in the overall number of scientific workers (11,700 professors and assistant professors were employed in R&D posts and schools of higher education in 1970, and 8,100 in 1980).

The "Report" states that the rate of employment in the R&D sphere considerably exceeded the increase in building space and modern equipment, resulting in insufficient utilization of the existing potential of highly qualified cadres. This potential, in the conditions of the economic reform, often turns out to be underutilized in the face of enterprises' lack of interest in innovative activities--although the reverse ought to be true. In 1980, the ratio of lecturers and teaching assistants approached the average of 1:1 for the whole of higher education. In many institutes and university departments a young scientific worker without a doctoral degree was therefore a "rare commodity," whose shortage was particularly felt in some types of research work.

We also witness a relative decrease (about 20 percent in schools of higher education and the PAN) of the number of auxiliary personnel in relation to scientific workers. Improving this ratio will be very difficult because of pay conditions worse than in industry.

The intellectural potential of science is the most difficult to reconstruct and therefore needs particular protection. We must not permit an age gap. In order to maintain the proper structure of employment, a 5 percent increase in employment of scientific cadres would be desirable, with simultaneous moderate selection from the existing team of workers. The "Report" authors, taking into consideration the current economic difficulties, propose, however, to adopt for the 1980's a 3 percent index.

In science there has been a trend toward "window-dressing" activity: raising the rank of various institutions and teams through premature scientific promotions of their workers and curbing of scientific criticism. This has not been without impact on attitudes and has

weakened the norms of scientific ethics and the evaluation of scientific achievements on the merit principles, all of which made it easier for people practicing "apparent science" and not turning out proper scientific achievements to stay on and prosper. In sporadic cases these people even halted the development of younger coworkers who could have become inconvenient competitors. The leadership bodies in schools of higher education and research institutes have for many years displayed a lack of determination, consistency and courage in this regard, and recently even more so. Because of a definite disinclination to introduce a system of periodic evaluation as a rational basis for shifting unproductive people to other work, the problem of scientific workers in higher education has been dealt with by extending the rigors of periodic employment to the lecturers' group.

Finally, the "Report" brings up the disqueting facts of community disintegration and moral decline (my own definition: W. O.). It is nothing new and /garbled sentence/. Prof Groszkowski has often voiced his opinion on this subject.

In 1981, I discussed the ethics of this issue with a prominent expert on criminal law, Prof Marian Cieslak from Gdansk University, the author of the "statute on science" proposal, which suggested a formation of honor courts. He told me (transcribed from a magnetic tape): "It is generally assumed that the codification of issues belonging to the sphere of ethics is impossible. Of course, there have been attempts to create a code of ethics, but the point is to specify issues connected with the execution of a trade. Every trade code of ethics, on the other hand, contains, besides specific features, a whole set of moral norms which every person belonging to a given group ought to comply with. Codification of these questions is a difficult and, I should even say, risky matter. More important is the existence of appropriate procedural tools. In particular, there ought to exist an appropriate organ composed of specialists, which would permit the objective evaluation of the degree of behaviour blameworthiness in a given case."

/Waclaw Opacki/ The issue of scholars with higher degrees appending their names to scientific works by others is generally known...

/Marian Cieslak/ This is one of the questions for which it would be useful to create honor commissions (courts). This question is within the scope of ethics. Treating it rigorously and schematically, however, we can eliminate the issue of coauthorship. Very often sponsorship by an experienced professor is extremely important and advantageous for a team. The point is only making sure that the practice is not abused. Not only are those cases in which one appends one's name reproachable, but also those in which one author who has done all or most of the work permits another scholar to append his name to the publication as well.

/Waclaw Opacki/ You know the so-called "queuing for a title." An institute worker with a completed scholarly work cannot qualify for an assistant professorship until a worker of longer standing in the institute has become assistant professor. This becomes a cause for delaying scientific promotion for even several years. It does not apply in cases in which the promoter is personally concerned that his candidate for a Ph. D. defends his dissertation at the earliest date.

/Marian Cieslak/ This is another reason why it would be desirable to create honor commissions. However, I believe that in the case of qualifying for an assistant professorship, this phenomenon is not harmful. On the other hand, in the case of doctoral dissertations there exists a situation in which the promotor requires a certain standard from the work and the candidate is inclined to assert that the promotor is excessively demanding or biased. It requires a penetrating examination of scholarly achievements on the basis of which one could draw objective conclusions regarding the Ph D candidate's and the promotor's scholarly standings. In qualifying for assistant professor, the candidate has the right to take an oral test before any scientific commission in the country entitled to give such test. This right is, however, limited by the actual possibility of its realization, because by submitting a petition for the test in a scientific unit other than his own, he could get into trouble with his employers. This problem could be generally resolved by introducing the principle that a candidate takes the qualifying exam outside his own institution.

The "Report," on the other hand, states that "Interest in one's own career instead of contributing to the development of knowledge, and criticism in science directed against persons rather than against errors in the methods of carrying out research or formulating results, are often quoted as indices of the scientific community's loss of ability to control the conduct of its own members. In order to assess the strength and possibilities of the scientific community, the community must be allowed to voice its opinion and be a real partner in situations concerning the vital interests of each researcher. These include the establishment of the principles of cooperation between scientists and other specialists, perfecting these forms of cooperation, choosing roles and determining their interdependence, and searching for the criteria of the social utility of the mission of researcher and citizen of a socialist state. Until now the establishment of the above has been too frequently left to scientific institutions and their official authorities. Among other things, it is necessary to fulfill in this regard the aspirations of young people entering science and currently embarking on the road of independence in research, in participating in decisions on the shape of scientific life."

Negative phenomena in cadre policy of course did not only stem from the lack of, or limitations in, the self-governance of scientific communities.

After all, nearly all promotions have been made on the basis of proposals and resolutions of community bodies (scientific, or university department councils). For this reason, the number of bodies entitled to confer degrees ought to be limited, and the Central Qualifying Commission more frequently ought to exercise its power to revoke or suspend the rights of those bodies whose activity in this respect raises substantial reservations.

The system of degrees, titles and scientific positions has not exerted the expected positive influence on the development of science. It has also turned out to be insufficiently effective in the selection of people with appropriate ethical stands. It has brought high social costs because of time-consuming procedures absorbing large numbers of scientists. At the same time it has been viewed as a system in which evaluations bypassing merits and the manipulation of cadres can be used.

Prominent scientists have frequently voiced their opinions on this subject in ZYCIE LITERACKIE.

"When I was getting my doctoral degree," Prof Szczepan Pieniazek said, recalling his American period, "in May of 1942, I did not defend my dissertation publicly. Americans would consider it an outrage to have a dozen or scores of people waste their time unproductively by listening to such a defense. My promoter together with three commission members read my dissertation, and judged it. I was even asked a large number of questions, and that was all. Three years later, in June 1945, I received my first professorial degree (Assistant Professor), which corresponds to our /Polish/ docent. In America there is not and has never existed a qualifying exam /habilitacja/. Again, a commission of three of four persons gathered, analyzed my scientific achievement and on the same day informed me of its final decision. No Central Qualifying Commission needed to confirm it, because in America there has never been such a commission. Yet despite that, somehow the standard of American science is no lower than ours."

In our country the road to obtain scientific degrees is certainly long and bureaucratized. I am not certain whether the law "on scientific degrees and scientific titles" will shorten this road and change the unfortunate situation.

The "Report" on the other hand, insufficiently or not critically enough discusses the policy of scientific promotion. It pays no attention to the drastically low general standard of doctoral and docent dissertations. The phenomenon, however, of wholesale granting of professional degrees (after the long formal procedure, of course) seems alarming to me. It is one of the factors--with simultaneous low efficiency of utilizing the achievements of science in economy--which have had an impact on lowering the authority of science in society.

The Steering of Science

Polish science is organized into three divisions: schools of higher education, the PAN, and the scientific-research bases of the economy. Two of them--schools of higher education and the bases--have in principle the capacity to carry out research in a full R&D cycle (the PAN limits its activity to basic research). In practice, scientific-research units (91 schools of higher education, 43 PAN scientific institutes, 123 scientific-research institutes, and 158 R&D centers) operate in all government departments. Until now there has been no cohesion and integration among the divisions, while at the same time efforts to bring about their artificial standardization have been made. This has led to the creation of organizational barriers which have hampered the flow of people and topics while provoking at the same time the phenomenon of a massive scramble for degrees and scientific titles. The immediacy and lack of consistency in planning has led to unjustified changes in topics and organization. The dispersion of decisionmaking centers made synchronization of coordination functions impossible. The tendency toward excessive interference in the institutions' topic selection, and the authorities' growing tendency to steer them, must be noted. Moreover, frequent changes in regulations and organizational forms of directing science have resulted in a lack of stability and a decline in the willingness to undertake long-term activity.

By the end of the 1960's, a subject-oriented system of financing research, and centrally organized metworks of large-scale research and R&D programs based on it, were introduced. The system was to help make research closer to practical application and to debureaucratize planning and administration. It was also to integrate and mutually coordinate works carried out in the full development cycle. The experiences of subject-oriented financing did turn out to be partly positive. Nevertheless, the obstacles posed by government departments could not be overcome, nor could a concentration of research efforts be secured. The method of subject-oriented financing and large programs of R&D was extended over too big a field. Devoting nearly two-thirds of the outlays on R&D for key programs and problems made their priorities a shame, hampering coordination and integration. The authors of the "Memorandum" believe that if we adopt the idea of subject and object financing as two complementary forms of securing funds for science, in crisis conditions we must treat subject financing as the main method of maintaining research potential and setting it in motion according to possibilities . Object financing must be made into an efficient tool for establishing a hierarchy of research tasks, which would be used to obtain particularly desirable results. This applies to basic research as well.

Until now, practically speaking, there has been no specific center directing the whole of the country's scientific policy. The activity of the Committee for Science and Technology (dissolved in 1972) was in its last period overly bureaucratic and, in the face of resistance

from government departments, had insignificant effect on a daily basis. On the other hand, the Ministry of Science, Higher Education and Technology was unable to assure cohesiveness in scientific policy because research included in government programs found itself totally within the management of government economic departments that also, independently of each other, laid out research directions for the research institutions subordinate to them. The role of the PAN was also small. In the management of science in recent years there has developed a peculiar mixture of acting and directing through mechanisms and financial incentives (with little effect, because they were not acting selectively with regard to priority topics, while at the same time were not fully meeting requirements) and administrative commands, which were thwarted because of the dispersion of decisionmaking centers (the Committee for Science and Technology, and later the Ministry of Science, Higher Education and Technology, did not have sufficient powers, authority and essential capacities to be able to direct effectively the whole of scientific research in the country).

"One of the essential conditions needed to minimize mistakes," wrote the authors of the "Report," is to create a system of studies of scientific policy which would be coordinated by an institution with strong cadres and major authority. The situation existing in this regard in Poland is far removed--negatively so--from the situation in other socialist countries."

We shall return to the "Report on the State of Polish Science" more often in the columns of ZYCIE LITERACKIE. The "Report" undoubtedly reflects the opinions of the scientific community. "It is, however, of a general character," said Prof Jan Michalski, director of the Lodz branch of PAN. On the other hand, PAN chairman Prof Aleksander Gieysztor, when answering my questions, pointed out a particularly important fact signalled in the "Report:" The necessity for a clear determination of the share of science in the distribution of national income. The Congress of Polish Science ought to discuss this issue (on 6 July 1983 when PAN Presidium decided on initiating the preliminary works).

In many questions the authors of the "Report" went too far, shifting in their evaluations from one extreme to the other, for example, as deputy Waldemar Michna pointed out at the Sejm session of the Commission for Science and Technological Progress, in their statement that "the actual sum of outlays for R&D per capita remains in Poland at the level of developing countries."

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