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SCIENCE AND TECHNOLOGY

SPECIAL NOTICE INSIDE

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JPRS-ELS-87-029

22 MAY 1987

EUROPE/LATIN AMERICA REPORT

SCIENCE AND TECHNOLOGY

CONTENTS

EAST EUROPE

CHEMICALS/PHARMACEUTICALS

COMPUTERS

/12223

NETHERLANDS SPACE POLICY REQUIRES BROADER INDUSTRIAL BASE

Rijswijk PT/AKTUEEL in Dutch 25 Feb 87 p 17

[Text] Minister of Economic Affairs De Korte has sent the Second Chamber a letter concerning space policy for the period from 1986 to 1995. The minister intends to increase government aerospace spending, but feels that the industrial base must be broadened. He bases his opinion largely on a conference held on 9 April 1986 in which representatives of trade and industry, science and the government participated. The conference underscored the importance of continuing and expanding the space program on the basis of the ESA program. One precondition for the success of the program is greater participation by trade and industry and greater involvement by the users.

The current space policy was enunciated in the Space Memorandum. This document indicated that policy must be oriented towards the practical applications of space for the user, both at home and abroad. This latter point is seen within the context of promoting exports. The term "user" can be interpreted rather broadly. The government, science and the business community all fall under this category. In addition, a great deal of attention in the policy is devoted to participation in the programs of the European Space Agency (ESA). Attempts have been made to stimulate industrial participation in commercial programs outside of ESA.

The memorandum acknowledges that commercial space development is difficult to realize without government support. This means that space investments will continue for some time to be dependent on the government. Total expenditures by the government at the end of the 1970s amounted to around 85 million guilders a year. In 1986, this figure had increased to more than 120 million guilders. The share of Dutch industry in the total volume of ESA orders rose by a similar amount over the same period, which is one signal that Dutch trade and industry accounts for a fair amount of ESA orders.

In the recently completed administrative period, the Office of the Auditor General and the Advisory Council for Science Policy (RAWB) came up with a number of critical comments. In 1983-84, the Office of the Auditor General examined the practicality of Dutch contributions to ESA. In its report, the council notes, among other things, the importance of involvement of (potential) users in the space program. Mention is also made of the importance of strengthening the industrial base. According to the Office of

the Auditor General, space program activities are only to a limited extent working their way through the affected companies and institutions.

At the beginning of April 1985, the RAWB came to an even more drastic conclusion. The Council found that there was an inadequate foundation for a sharp increase in the space budget, basing its findings on the expectation that the industrial base would not grow very much and that greater involvement by the users would not take place to a sufficient degree.

ESA

The focal point of the Netherlands' space policy is participation in ESA programs. In 1985, a ministers' conference was held in Rome at which a long-term plan was adopted. The plan assumes an increase in spending from the present 2.5 billion guilders to 4 billion guilders in 1990. The resolutions that were passed are summarized as follows. The scientific space research program is to be continued and expanded. A strengthening of fundamental activities, such as the Basic Technology Research program. Expansion of the activities within the framework of earth observation (land observation, meteorology, etc.), telecommunications and the microgravity research program, which includes studies under zero gravity. Furthermore, a resolution of principle was adopted in favor of contributing to the building of a U.S. space station. ESA was invited to do so by the Americans. The ESA proposals for the Columbus program (the European part of the space station) and the Ariane-5 program (a new, powerful carrier rocket) were approved. The cost of developing these two programs comes to a total of around 14 billion guilders. Interest was shown in Rome for the French plans to build a manned spaceship, the Hermes project.

At the moment, these resolutions are still being formulated, and a second meeting of the ESA ministers sometime in 1987 will draw up a definitive program package.

Base

At the beginning of last year, representatives of the government, trade and industry and science held discussions on the question of what the next step in space policy should be. There emerged from the discussion the notion that the space program is in general viewed as a fundamental innovation, an engine for new ideas. Interest in Dutch participation in an expanded European space program was regarded by all the parties as a given. However, the industrial base must be broadened and the users must be involved in the space program to a greater extent. In this, they underscored once again the above-mentioned reports by the RAWB and the Office of the Auditor General. The government appears to be willing to increase investments, but it would like a guarantee that these investments will have a reasonable effect. In this context, a certain amount of capital contributions by trade and industry is expected.

Fokker

Trade and industry will be making increasing use of new telecommunications services and of earth observation, but they feel that participation in

materials development (biotechnology, crystal growth) is commercially unattractive. This is possibly the case with other research in materials as well.

Ultimately, the importance of the space program for the Netherlands was emphasized by the conference. The ZWO (Pure Scientific Research) and the NIVR (Dutch Institute for Aircraft Development and Space Flight) had previously presented positive suggestions. Based on all of this, the government wants to continue current space policy. The Netherlands will continue to participate in all the principal areas of the ESA program. It is, however, of vital importance that the industrial base be expanded. It is in fact currently the case that Fokker constitutes the entire industrial base. Fokker is doing a fine job in this respect, but both the participants in the conference and the Dutch government feel that this is nonetheless a bit too meager. This is why the government wants to attempt to broaden this base through financial support. The companies are in turn expected to provide the necessary investments, in personnel and separate research, for example. It is not entirely clear how trade and industry are to be tempted in this direction. Minister De Korte has thus asked the NIVR to draw up a plan for achieving greater involvement by companies.

The space program offers a large number of possible applications, such as in the areas of telecommunications and weather forecasting. Moreover, a number of new applications are emerging (predictions of harvest yields, environmental observations, etc.). The utilization of space as a research environment is also a factor in this (experiments under zero gravity). In order to make adequate use of these possible applications, the new policy is oriented towards enlarging the involvement of present users. In addition, ZWO will be devoting more attention to space research. Furthermore, the policy wants to encourage new users to participate. New participants from the government are the Ministries of Defense and of Welfare, Health and Culture. Sometime in 1987, a decision will be made on Dutch participation in the Italian SAX project. This project involves the development of an X-ray astronomy satellite. Moreover, it is important that Dutch efforts remain in step with international efforts.

Adequate

The government has decided that expenditures will rise gradually from 115 million guilders in 1987 to 187 million guilders in 1990. Spending is divided among the Ministries of Economic Affairs, of Education, of Science, of Transport and Public Works, and of Welfare, Health and Culture. The first two are taking the lion's share (around 168 million guilders). Given the civilian character of the ESA cooperative association, the contributions by Defense will relate to national technology development. The funding from Welfare, Health and Culture is primarily intended for developments in the area of broadcast satellites.

Minister De Korte believes that the proposed figure is adequate in order to continue to fully participate in the ESA program. In addition, the budgeting of government expenditures means that a broadening of the industrial base is possible, De Korte says. The minister assumes that trade and industry is

prepared to make extra investments. Here he is naturally not referring to Fokker, because that company cannot provide for a broadening of the industrial base, which is in fact the primary goal.

[Boxed material: "'The Netherlands Must Do More on the Space Program'"]

According to Eng K.F. Wakker, Dutch spending on space travel is much too low and should be increased to 250-350 million guilders a year in order to avoid opting out of international space developments. He expressed this view during his acceptance speech for his appointment to the professorship in space technology at the Technical University in Delft. He noted the difference between the Netherlands and countries such as Japan, Italy, the FRG, France and Sweden, who spend 0.1 to 0.2 percent of their gross national product on space programs (compared to the Netherlands at 0.06 percent). According to Wakker, the space program in the Netherlands has grown into a branch of industry and a field of research of great stature. Besides Fokker and Philips, around 25 companies in our country are active in the space market. He stressed the success of the ANS (1974) and IRAS (1983) satellites, which were developed in the Netherlands. Now that efforts in space are becoming attractive in most highly-developed countries, Prof Wakker senses a certain amount of hesitation from the [Dutch] government. In addition, practice shows that the Netherlands contributed only a few percentage points to the realization of the ESA programs. These contributions in turn primarily involved the realization of partial projects, whereby there is a danger that Dutch industry has specialized too much and is not optimally profiting from developments in space flight. Mr Wakker argues in favor of a national space program in which the objectives for 10 years down the line are determined. This should include a large project to be carried out in conjunction with one or two other countries. Furthermore, participation should be limited to only a few ESA programs, instead of dispersing efforts. Prof Wakker feels that the government spending figures given in the Space Memorandum are entirely inadequate and fears that the consequences for technological developments in our country will make themselves felt.

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CSO: 3698/411

BRIEFS

FRANCE-JAPAN PHARMACEUTICAL JOINT VENTURE--The Japanese firm Tanabe Seiyaku sought a partner in the European Market for the joint development, manufacture, and marketing of its new pharmaceutical products. It has reached basic agreement with the French concern Rhone Poulenc, to found a common joint-venture. Each partner will have a 50 percent interest. In Japan, Tanabe Seiyaku belongs among the five most important pharmaceutical enterprises. In 1985/86 (30 April) sales amounting to 185 billion yen (corresponding to 2.24 billion DM) were achieved. [Text] [Duesseldorf HANDELSBLATT in German 2.27-28 Mar 87 p 21] 3698/389

FRG BIO CENTER PROGRESS--Braunschweig Technical University celebrated "half-time" in its bio-center building project. Completion and start-up of the 54 million mark project is anticipated by the summer of 1988. Then the Institutes for Biochemistry and Biotechnology, for genetics, microbiology, the working area of the physiology of eukariotic cells, the laboratories of technical chemistry/production engineering, as well as other research facilities in the association will be able to commence work there. [Text] [Frankfurt/Main FRANKFURTER ALLGEMEINE ZEITUNG in German 27 Mar 87 p K3] 3698/389

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CSO:3698/389

NETHERLANDS: FOKKER REPAYMENT OF F-100 STATE SUBSIDY EXTENDED

Rijswijk PT/AKTUEEL in Dutch 25 Feb 87 p 5

[Article by Bart Stam: "De Korte: Fokker's Leeway Greater in F-100 Repayment"]

[Text] If it is up to Minister of Economic Affairs Dr R.W. de Korte, Fokker will gain greater leeway in repaying the state loans and credits that the company received for the development of the new F-100. This is indicated in a letter from the minister to the Standing Chamber Commission for Economic Affairs. After consulting with Minister of Finance Ruding, De Korte submitted a proposal to ask Fokker for full repayment only after 200 F-100s have been sold instead of the previously agreed term of 100 aircraft. However, the first 50 airplanes of this model are not covered by this proposal; they are "redemption-free." The state has made a total of approximately one billion guilders available for the development of both the F-50 and the F-100.

According to the vice prime minister, the "relaxation" regarding the repayment of the F-100 is possible because Fokker is currently on a sound financial foundation. He mentions in particular the order from the Irish company Guiness Peat Aviation (GPA) for 100 F-100s, of which 40 are firm orders and 60 are options. Fokker is to deliver these airplanes to a specially established joint venture consisting of GPA (50 percent), the Japanese Mitsubishi Group (25 percent) and Fokker (25 percent). Fokker has a total of 180 orders and options for the F-100 airplane.

The vice prime minister also stated that Fokker has in recent months been confronted with a sharp increase in costs. This has to do not only with the termination of the F-27 and F-28 programs, but also with high R&D costs in developing the F-50 and F-100. Moreover, the company is at a disadvantage because the transactions are being conducted in dollars. "Revenues per airplane are coming under pressure," the vice prime minister says.

Maximum

According to De Korte, however, it is not the case that Fokker can now count on more money from the government for new projects. Despite the increase in developmental costs for the F-50 and F-100 in 1986, government credits are subject to a maximum. These credits go to Fokker by way of the Dutch

Institute for Aircraft Development and Space Flight (NIVR). "The extra costs must be borne in their entirety by Fokker," De Korte says.

After the mass order from the Irish GPA in late 1986, the board of directors of Fokker requested from the NIVR a relaxation in the repayment schedule of the credits and loans. After consulting the Ministry of Economic Affairs, which enlisted the National Investment Bank (NIB) for this purpose, Dr De Korte decided to shift the term from 100 to 200 airplanes.

De Korte notes here that the contract between Fokker and GPA can only be successfully implemented if important steps are taken by Fokker itself, its partners, suppliers and banks.

Although repayment is distributed over a larger number of airplanes, the VVD politician says that the payment will be made only 1 or 2 years later than originally planned. This has to do with the increase in production announced by Fokker. Beginning in 1991, the company will produce 46 airplanes a year. The first F-100s will be delivered at the end of November to Swiss Air.

New agreements will be made between the NIVR and Fokker on all of these points, after consultation with the Ministries of Finance and of Economic Affairs.

The minister adds that the agreements between the NIVR and Fokker for the F-50 remain in effect.

Long-Term

In talks with the board of directors of Fokker, the two politicians also had a focused discussion of the company's long-term position. This involved the pace of technological developments, cooperation with other aircraft manufacturers and the financial situation.

A Fokker spokesman notes that Minister De Korte's proposal gives the company more leeway in paying off the F-100s. However, he was unwilling to commit himself yet, in part because parliament has yet to react to De Korte's proposal. According to Chairman A. van der Dek, the Standing Chamber Commission for Economic Affairs must first talk with the NIVR before the parliamentary caucuses consult orally with the responsible members of the government on government support for Fokker. According to PVDA members, this consultation will probably take place in March.

12271
CSO: 3698/411

FRG-PRC COLLABORATION:TECHNOLOGY CENTER WORK ON MICROSENSORS

Duesseldorf HANDELSBLATT in German 3-4 Apr 87 p 25

[Text] **HANNOVER. The "digital thinking" of the semiconductor industry has indeed led to an international race for ever-greater power densities of the components, even gigabit memories are already being discussed - i.e. a thousand-fold multiplication of current peak powers.**

But exploiting the application possibilities of the chips still presents a problem. This was explained by Klaus P. Friebe, Business Manager of the Berlin Technology Center for Information Technology, Inc., at an information meeting of the VDI/VDE, each of which has a 50 percent interest in the corporation, in Hannover.

In times past, the direction of the production assortment of steel transferred from the manufacturers to the processors; similarly, in the future, the users of microelectronics will directly influence chip development. Indeed, in the future the semiconduction industry will be successful only if it takes sufficient account of the needs of systems users.

The real technical challenge today concerns the so-called "microperipherals," in an adequate application of the chips. Meeting this challenge requires various scientific disciplines and several industrial branches to initiate new dialogues with one another. For example, one can observe a closer and closer meshing of the structure of the chemical and electrotechnical industry as well as of system manufacturers.

Information Technology Inc. at this time is employing about 100 staff members and concentrates on the following areas: technology trends and effects, business consultation, funding consultation and implementation, technological consultation, consultation and support in the use of application-specific switching circuits.

As project manager of funding programs of the Federal Ministry for Research and Technology (BMFT), the corporation especially supports small and medium businesses in applying the results of basic research to industrial utilization. Currently the most important funding programs serviced by the company are the funding focal point "microperipherals" and the model experiment "technology-oriented founding of businesses" of the BMFT. Since 1978, about 4,000 projects

were processed. In this connection more than 3,000 firms were serviced and about 80 firms were aided in their founding stages.

According to initial evaluations, the target group of "indirect-specific measures in the funding focal point of microperipherals", namely small and medium businesses with up to 500 employees, was reached with over 70 percent of the applicants.

The projects approved by the summer of 1986 already promised production of about 5 million microsensors with a sales volume of 200 million DM, already during the first year after completion of development. After another 2 to 4 years, this is supposed to increase to about 11.5 million units with 800 millions in sales. In terms of units, microsensors of the price class below 100 DM dominated. In nearly 30 percent of the projects, sensors of the class above 1,000 DM were also developed, aiming at nearly 30 percent of the total sales of 800 million DM. Application areas for this are supposed to be laboratory and quality control areas as well as machine tool construction.

The indirect-specific program, currently doped with 200 million DM, is limited to sensor manufacturers. But a so-called associated-project program with 180 million DM BMFT funding also involves funding of manufacturers of power electronics, ceramics, and adhesives. Finally, the BMFT also funds technology transfer with 20 million DM. Applications for indirect-specific funding can be submitted until the end of June 1987.

This time limit does not apply to the funding of associated projects in the funding focal point of microperipherals. The program, together with other focal points, is to be continued after this time. Here one thinks of micromechanical sensors, optical glass fiber systems, and chemical sensors.

Since February 1987, West Berlin and Peking each have a communications office for electronics and information technology, where each office is staffed by four Chinese and two German staff workers. The task of these offices is to promote cooperation between the People's Republic of China and the Federal Republic in the area of electronics and information technology. The offices are managed by the Institute for the Electronics Industry of the People's Republic of China in Peking and by the VDI/VDE Technology Center for Information Technology Inc. in Berlin.

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CSO:3698/389

EUREKA STOCKHOLM CONFERENCE: 37 NEW PROJECTS, CALL FOR STANDARDIZATION

Amsterdam COMPUTABLE in Dutch 2 Jan 87 p 7

[Unattributed article: "Fifty Million Guilders for EUREKA in 1987: 14 New Netherlands Projects Proposed"]

[Text] Amsterdam--In 1987 the Netherlands will allocate 50 million guilders in support to EUREKA projects, i.e., double the 1986 figure. The Ministry of Economic Affairs will issue a special EUREKA BULLETIN as of 1 January 1987.

EUREKA is an originally French initiative for European technological cooperation. A major motivation for EUREKA was to prevent Europe from lagging behind the United States and Japan in high tech developments. In addition to the Netherlands, the UK and France have also substantially increased EUREKA funding for 1987. In Minister of Economic Affairs de Korte's view, the 50 million guilders is still modest. He thinks that once industry has launched these projects, the government's role should decrease and private investors should take over financing. This will be the theme of the next EUREKA conference.

Stockholm

Thirty-seven new industrial projects were approved at the fourth EUREKA conference in Stockholm. This is a substantial increase considering the fact that the first EUREKA conference (with 10 projects) was held only 1 and 1/2 years ago. The total number of EUREKA projects is now 109. The Netherlands is participating in 30 projects, including the 14 new proposals. Total costs of the 30 Netherlands projects reaches some 1 billion guilders.

The Netherlands proposals are very diverse. There is the "Ink Jet Printing" project involving a study of non-impact printing (according to the proposal). The ERTIS (European Road Transport Information System) project wants to design an information transfer system to increase the efficiency of international road traffic. Other examples are: Tele Atlas for digitizing maps and storing the data in a database; SSI (High-Speed Computer Support for Translations) for "the development of a semi-automatic multilingual and interactive translation system for a PC environment; and finally DAB (Digital Audio Broadcasting), a name that speaks for itself."

Industry

At the Stockholm conference, industry seemed more interested. This time, representatives of large international companies such as Philips and Volvo participated in the negotiations. They indicated that their firms are especially interested in the development of generally accepted European standards. Of the 14 new Netherlands proposals, eight require international standards to be successful.

Three European companies--Philips (Netherlands), Siemens (FRG), and Thomson (France)--intend to cooperate in what is called the JESSI (Joint European Submicron Silicon Initiative) chip development project. The aim is to obtain the EUREKA stamp for this project proposal in Stockholm. The joint Philips-Siemens project (the Megaproject) in the same area will continue as before.

The next EUREKA conference will be held in Madrid in September of 1987. The intention is to discuss private financing for projects that have reached the final stage: the execution phase. A proposal made by industry to issue "Euro-shares" will also be discussed. These (probably tax-free) shares should increase interest in EUREKA projects.

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NETHERLANDS MINISTER ON EUREKA

Amsterdam EUREKA BULLETIN in Dutch Dec 86-Jan 87 pp 3-4

[Interview with Rudolf De Korte, Netherlands minister of economic affairs: "'Unification of Internal Market Essential to Technological Development'"; interviewer, date, and place not given]

[Text] "EUREKA was conceived out of impatience and is growing thanks to impatience." Dr Rudolf De Korte, minister of economic affairs, outlines what he sees as the driving force behind EUREKA, the European project for technological cooperation. Alongside the 12 EEC member states, Finland, Sweden, Norway, Austria, Switzerland, Turkey, and Iceland are also taking part.

[Question] Do you share EUREKA's impatience?

[Answer] "Yes, I do. In addition to a number of other impediments such as the rigidity of social and economic systems, the national borders remain major obstacles to technological development in Europe. The European market is fragmented by linguistic diversity, different standards, and the numerous customs formalities at the borders. Such handicaps are either not or hardly present on the domestic markets of countries like Japan and the United States."

"We can do little about linguistic differences in Europe, but we can do something about standards and customs formalities. We can come to an agreement on that. Unfortunately, harmonization of the European market is very slow.

"Many have grown impatient. Technology develops so fast that Europe risks falling behind--all the more so because of the restricted domestic market of each individual country. This impatience has given rise to EUREKA, which was primarily inspired by the idea that as long as the European market is not unified, companies will just have to cooperate as if no borders exist. By joining forces, they can make a better stand in the technological race. At the same time governments are put under pressure to get rid of Europe's trade barriers as soon as possible."

Catalyst

[Question] Does it actually work, this EUREKA idea?

[Answer] "I have been pleasantly surprised with EUREKA. When 1 and 1/2 years ago the plan was launched, it drew a lot of criticism: an unready idea, a premature baby, a balloon filled with hot air, the emperor's new clothes, a circus of ministers. In spite of all these critical ramarks, EUREKA did raise great interest. It is quite incredible how much has been published on this unready idea."

"By now, EUREKA has taken shape. The child has learned to walk. Maybe not quite in the direction the French initiators had wanted it to go, but it is on its feet.

"We can assume that the initial projects that received the EUREKA label in Hannover in 1985 had already been largely prepared. Now, EUREKA is bringing about new European high-technology cooperative projects that would otherwise not have come into existence. At least, not yet. I think this is the merit of the EUREKA concept: it acts as a catalyst, a process accelerator. The process was already underway, the climate was favorable, the desire for inter-European high-tech cooperation must have been latent. EUREKA has aroused this desire. The clever part is of course that no respectable country could say 'no'.

"EUREKA brings industries together across borders. Governments meet in concrete projects. If cooperation keeps growing, I expect EUREKA will contribute to the smooth harmonization of the European market. I hope that EUREKA will be the impatient child accelerating Europe's unification."

Joining In

[Question] In general large companies seem to do quite well, even across borders. They do not really need EUREKA. Still, EUREKA is being reproached for primarily benefiting large companies, although governments are always emphasizing EUREKA's value for small and medium-sized companies. What is your reaction to that?

[Answer] "Honesty forces me to say that some crossborder cooperative projects would have done perfectly well without EUREKA, especially those involving multinationals. That is why they are called multinationals. They know how to find each other, as well as how to get hold of the various forms of government support in the various countries.

"I am pleased to see more and more small companies taking part, as I gather from the 30 projects that were adopted in London in spring 1986. Half of the Netherlands participants are small companies. The same goes for projects that have been announced for Stockholm.

"Another asset of EUREKA for small companies is the real opportunity it offers them to join in on big projects. Take for instance the High Definition Television project, aimed at substantially improving the television image. Philips plays a major role here. It could be very worthwhile for smaller microelectronics and telecommunications companies to join in. This kind of thing calls for a European approach. The individual markets in Europe are really too small for such a development."

[Question] To what extent are European governments actually involved? They can hardly spare the money.

[Answer] "The European governments have not yet succeeded in establishing a single set of standards, uniform environmental and safety legislation, or the minimum of customs formalities. The question is, of course, whether they will succeed within the EUREKA framework. Still... [elipsis as in original] the concrete EUREKA projects actually compel governments to work on precisely this. They have to face up to their own task, which is to create the appropriate environment.

"What is important too is each government's role as a middleman. They have all established a national EUREKA secretariat. These secretariats are a point of contact for entrepreneurs who seek to cooperate with entrepreneurs within their own country or in another European country. At present, the national EUREKA secretariats are being linked by a communications network allowing for a quick transfer of data. Like a spider in its web, the international EUREKA secretariat in Brussels, too, will be connected to this network.

"Furthermore I am happy that the international EUREKA secretariat has been situated in Brussels, near to the European Commission's offices, ensuring good coordination of EUREKA projects and EEC research programs. The necessity for this has always been emphasized by the Netherlands.

"EUREKA and the EEC's technology research programs are aimed at joint European so-called precompetitive research. These programs, some 50 percent financed by the EEC, are mainly focusing on the development of technology as such.

"A typical example is ESPRIT, the strategic program for research in information technology. EEC programs are always cooperative programs involving all member states."

"EUREKA is a different story. It primarily involves the development of competitive, market-oriented, high-technology products in Europe.

"And this Europe transcends the EEC because it includes seven other countries. The European Commission also participates in EUREKA and is represented within the international EUREKA secretariat, which leads to good coordination.

"Another distinction between EUREKA and EEC programs is that EUREKA projects do not have to involve all participants. They must be crossborder projects, but not all EUREKA members have to take part. In many cases, cooperation is limited to companies from only two countries.

"And what about resources? There is no joint EUREKA kitty. The participating countries can individually support EUREKA projects. This is quite different than EEC programs."

Seal

[Question] The EUREKA ministers, some nineteen altogether, have thus far met every 6 months, first in Paris, then in London, in Hanover, back in London and

now in Stockholm. What does this amount to? I have heard people call it a circus.

[Answer] "Let me say that the ministers themselves do not do much work with EUREKA. The key figures are the civil servants who man the secretariats and act as matchmakers. They try to bring candidates together in projects. As soon as the candidates have found each other and fallen in love, the matchmakers withdraw. They just keep close watch in order to learn something for next time.

"What EUREKA ministers do at their half-yearly conferences is to seal the promises between European project partners. It is a sort of mass engagement. However, such a conference of ministers also has to cut knots, mainly in just the areas of government policy you would expect, such as abolishing barriers which, ironically enough, were often caused by the governments themselves."

Government Funding

[Question] This brings me back to government subsidies for EUREKA. In another context you said that you fear subsidy spirals. And in the case of EUREKA?

[Answer] "Of course this danger always exists. At first the French and later the Germans earmarked considerable amounts of money for EUREKA projects. However, the other countries did not follow their example to the same extent. To date, EUREKA's funding still has a sound basis. It is not primarily a sack of government funds. EUREKA is looking for private funding. In Stockholm a proposal to call a roundtable conference with private financiers will probably be discussed. This might give the impetus to the introduction of venture capital on the European market.

"Since last November the Netherlands can grant limited financial support to feasibility studies for potential EUREKA projects, to help managers cross the threshold. I intend to continue this form of support, because it especially benefits smaller companies. Furthermore, Netherlands participants in EUREKA projects can of course use the normal industrial support provided by the Ministry of Economic Affairs.

"By the way, I hope that the EUREKA ministers will be able to resist the temptation to pump large amounts of money into single projects. Otherwise this might lead to governments outbidding each other. National interests will then again prevail and that is exactly what we want to avoid. EUREKA primarily focuses on high-tech cooperation involving European industries. In order to make this cooperation run smoothly, governments had better not interfere too much with the projects themselves, but rather concentrate on their own field: providing an appropriate infrastructure, uniform standards, and unifying the European market."

25024/12859
CSO: 3698/A145

NETHERLANDS INDUSTRY CALLING FOR MORE R&D SPENDING

Amsterdam COMPUTABLE in Dutch 30 Jan 87 pp 1, 2

[Unattributed article: "Criticism at European Technology Hearing--The Netherlands Should Play More of a Leadership Role"]

[Text] The Hague--During a hearing last Monday organized by the parliamentary committees involved in technology policy, Netherlands participants in European projects such as ESPRIT, BRITE, and RACE were critical, inter alia, of the Netherlands position in the budget discussions for the so-called "Framework"--the financial framework for European projects proposed by the European Commission. Philips believes that the Netherlands should play more of a leadership role.

Eng W. Ledeboer, European projects coordinator, argued on behalf of Philips that the financial effort proposed by the Commission is more on the low than on the high side, and that the Netherlands, one of the nations supporting cutbacks in the international discussion, should adopt a somewhat less narrow-minded attitude. He mentioned that Philips concentrates its R&D activities in West Europe. Seventy-five percent of Philips' development activities and up to 80 percent of its research take place in Western Europe.

In the Netherlands this concentration is even greater. Despite the mere 5 to 6 percent of Philips turnover originating here, 40 percent of the development and 50 percent of the research undertaken by the Philips multinational is concentrated in the Netherlands. Consequently, the stimulation of technological research is, according to Philips, "to the good of the Netherlands."

The Netherlands should in particular work to develop a follow-up to the definition phase of the "Integrated Broadband Communications Network." Consequently, the funding for RACE should not be curtailed. Philips employs approximately 200 reaearchers full time for the implementation of European projects, of which more than 50 percent are in the Netherlands.

Interprogram, which participates in ESPRIT's Amadeus project, pointed out the problem of participants having to do a great deal of work on their own in the preparatory phase before a proposal can be submitted, and then facing an only one-in-five chance of being accepted. Partners have to be found and a report has to be drafted in English (comprising easily 80 to 150 pages). If the project is selected in principle, a "Technical Annex" has to be drawn up, again normally using one's own resources.

It is especially difficult to find partners in the Netherlands. Although it would appear to be more difficult to work with foreign partners, R. Scholten of Interprogram calls it a laborious process to get Netherlands software companies or the academic world interested in projects.

In industry Interprogram is frequently confronted with the problem of software companies being afraid of providing sensitive information to competitors. When asked about this, Scholten replied, "It makes you wonder what sort of information that might be, considering the fact that one rarely sees Netherlands software products on the market. They appear to be making money too easily in other ways." According to Scholten, the market will certainly make a basic change in that situation.

More Dynamism

In Scholten's opinion it takes a great deal of time to arouse the interest of universities in a project. "Whereas a quick response to call for proposals is usually needed. All was, however, quickly decided with the University of Manchester, our partner in Amadeus. A phone call and one day in England settled the whole matter." Scholten believes that the Belgians and Danes can serve as an example to the Netherlands. "They react with much more dynamism."

25044/12859
CSO: 3698/A134

VW-OLIVETTI SIGN COOPERATION AGREEMENT

Milan AUTOMAZIONE E STRUMENTAZIONE in Italian Jul-Aug 86 pp 84-85

[Text] The Ing. C. Olivetti & C. SpA firm and Volkswagen AG have reached an agreement providing for close cooperation in the typewriter, personal computer, minicomputer and office automation sector.

The agreement stipulates that Volkswagen will acquire, through a capital increase reserved to the latter firm, around 20 million shares, equivalent to 5 percent, of the C. Olivetti firm's common stock. The price of the shares is to be based on the price movement of the shares on the stock exchange during the period prior to the Olivetti stockholders meeting, but will in any case be between 18,000 and 21,000 lire per share. Volkswagen's total investment in Olivetti will thus be around 400 billion lire.

Olivetti, for its part, will acquire from Volkswagen the latter's Triumph-Adler AG shares. As regards the United States, Olivetti will acquire the Triumph-Adler activities presently owned by Volkswagen of America Inc. (Troy, USA). The Triumph-Adler North America Inc. (Hartford) holding company and the Pertec Computer Corporation (Los Angeles) are excluded from the acquisition. As for Pertec Peripherals Corporation, the two parties have decided on the form of their collaboration, the details of which, however, have not yet been defined.

The agreement, which has already received the approval of Volkswagen's Aufsichstrat (oversight board), was approved today by Olivetti's board of directors.

With respect to antitrust regulations, the agreement has been submitted to the appropriate government authorities (Kartellamt in Germany, and Department of Justice in the United States), and will become operative following receipt of their approvals.

Olivetti and Triumph-Adler will continue to operate independently, both retaining their own trademarks and their own typewriter, personal computer and minicomputer product lines, and through their own channels of distribution, with mutual support being provided by cooperation in their research and development activities and by an exchange of components. This cooperation is

intended to shore up their respective product lines and the distribution of their products on an international basis in the growing office automation market.

Olivetti's board of directors has also examined the results of the Group's and parent company's operations in 1985.

Last year, the Group's consolidated billings amounted to 6,140 billion lire, up 34.1 percent over the previous year. Consolidated net earnings showed a gain in terms of absolute value, going from 356 billion lire in 1984 to 503.7 billion lire in 1985 (+41.5 percent), as well as in terms of net earnings to billings ratio (from 7.8 percent to 8.2 percent) and of net earnings to net worth ratio (from 22.5 percent to 23.8 percent).

During the year, its financial situation improved further: Net financial indebtedness, in fact, declined from 319.3 billion lire as of 31 December 1984 to 190 billion lire as of 31 December 1985, or 8.3 percent of the Group's net worth, which rose from 1,958 billion lire as of 31 December 1984 to 2,280 billion lire as of 31 December 1985.

These results are particularly meaningful if one considers the high volume of investments made in fixed and commercial assets in the amount of 466 billion lire, and in research and development activities in the amount of 284 billion lire.

During 1985, the Group added 1,800 persons to its payroll in Italy, increasing its overall payroll from 47,613 to 48,944 employees.

The Ing. C. Olivetti & C. parent company had billings of 3,487.4 billion lire, up 36.6 percent over 1984, and net earnings totaling 329.5 billion lire, up 39 percent. A dividend distribution will be proposed as follows: 320 lire per share of common stock and per share of preferred stock (275 lire in 1984), and 340 lire per savings share (295 in 1984).

The board of directors also decided to submit to the convened shareholders meeting a proposed capital increase of 10 million nonconvertible savings shares reserved to employees.

Ing. C. Olivetti & C. SpA, Via Jervis, 77 - 10015 Ivrea (TO). RIF. 13.

9399
CSO: 3698/95

MORE FINANCING FOR ITALIAN R & D PROGRAMS

Milan RIVISTA DI MECCANICA in Italian Jun 86 pp 42-43

[Text] Funds available to Italian firms for applied research and technological innovation now total 1,700 billion lire.

Law 41 of 28 February 1986 (budgetary law) has allocated, for 1986, the sum of 250 billion lire to each of the two funds known respectively as the Applied Research Fund and the Technological Innovation Fund (Law 46/1982). These amounts are added to the 600 billion lire allocated to each by last year's budgetary law. Broadly speaking, the two Funds cover the following spheres of applicability and operative provisions:

--Research orders placed by small- and medium-sized firms and by outside laboratories (Applied Research Fund);

--Eligibility of small- and medium-sized firms for subsidization by the Technological Innovation Fund, regardless of priority sectors, pursuant to CIPI decision of 2 May 1985.

The principal provisions of Law 46/1982 are as follows:

Applied Research Fund (Arts. 1-13)

Objectives: Financing of applied research and development of industrial interest in acquiring the most advanced know-hows and operative technologies necessary for the realization of new products and/or processes, or for the substantive improvement of those now in existence.

Instrumentalities: Low-interest loans, contributions to sunk cost, majority shareholder participation.

Recipients of the Fund: Industrial firms that are producers of goods and services, consortiums among firms, consortiums between private firms and public entities, public entities engaged in productive activities, research firms, research centers.

Fundable Research Activities: Industrially initiated research projects; Government research programs; research orders placed by PMI's [small- and

medium-sized industries] and outside laboratories; initiatives for transfers to PMI's.

Provisos Governing Subsidization by the Fund: The following categories of expenditures are eligible: Personnel assigned to research; general expenses related to research, on a lump-sum basis (25 percent of personnel costs); in-house services; outside services; equipment and instrumentation; materials; and unforeseen contingencies (10 percent of the total). The following are excluded: Costs incurred prior to the date of record of the request submitted by the IMI [Italian Institute for Financing Personal and Real Property]; costs relative to investments, furniture, and interior decoration.

Industrially Initiated Research Projects (Arts. 5, 6, 7)

Governing Provisos: Capital participation as major shareholder; easy-term credit at interest rate established periodically by Ministry of the Treasury. Funding must not exceed 90 percent of the cost of the project for priority sectors and 80 percent for non-priority sectors; contributions to sunk fund for high-risk industrial projects.

National Research Programs (Arts. 8-13)

Purpose: Financing of Government research programs targeted on the development of highly innovative and strategic technologies capable of industrialization within the medium term.

Procedures: Definition of the Government programs and CIPI approval; publication of the topical areas of research in the Official Bulletin; examination of bids, to be carried out by the Scientific Technical Committee; drawing up of the contract with the preselected party, based on a standardized agreement.

Procedures for Transfers to PMI's (Art. 3)

Instrumentalities: Easy-term credit; contributions to sunk fund; majority shareholder participation.

Procedures: According to the Fund's general procedures.

PMI and Outside Laboratory Research Orders (Art. 4)

Purpose: Funding of subsidies for research that PMI's, alone or as members of a consortium, may order on outside laboratories in the public or private sectors. The laboratories must be on record in an up-to-date register maintained by the Ministry of Research. The regulation that has been issued stipulates that the subsidy is granted against expenses incurred for external orders based on the furthering of: applied research, transfer of scientific innovations and know-how, or study of methodologies relating to productive processes.

Provisos: Contribution to sunk cost not to exceed 50 percent of outside order, with a limit of 200 million lire per recipient firm.

Procedures: Submittal of results and paid-bill vouchers within 2 months of issue, together with the detailed-information form. Upon verification of the legitimacy of the request, the IMI makes direct payment.

Technological Innovation Fund (Arts 14-19)

Objectives: This Fund is intended to promote the introduction of significant technological advances targeted on new products or productive processes, or on the improvement of existing products or productive processes.

Instrumentalities: Easy-term credit, contributions to sunk cost.

Operative scope: Design, experimentation, developmental and pre-industrialization activities, considered as a whole or separately. The programs submitted must in each case introduce significant technological advances with significant benefits for the national economy.

Recipients of the Fund: Industrial firms that are producers of goods and services, or consortiums with a stable organization in Italy.

Priority Productive Sectors and Topical Areas of Research: The CIPI, through deliberative procedures, prioritizes the sectors to be subsidized by the Fund. Within each topical area, in each sector, higher priority will be accorded to those programs which:

a) Entail significant fallouts, from the technological innovation involved, for the national economy and for competitiveness of the entire sector considered;

b) Promote the development of emerging technologies with innovative content applicable to more than one industrial sector;

c) Reduce energy consumption per unit of product;

d) Reduce consumption of materials per unit of product;

e) Contribute to improvement of the environmental factors.

The PMI's are eligible for subsidization by the Fund without regard for priority sectors. The dimensional limits defining small- and medium-sized firms are updated periodically by the CIPI.

Provisos: Subsidization by the Fund is granted in the form of easy-term financing of a duration not to exceed 15 years, including 5 years of use and pre-amortization at the rate of 15 percent (for the pre-amortization period

and 60 percent (for the amortization period) of the reference rate in effect at the time of signing of the contract.

The following categories of expenses are eligible: Personnel; general expenses; in-house orders; services provided by third parties; investments; materials; contingencies (10 percent of the total).

Excluded are costs incurred prior to 2 years preceding submittal of the request for access to the benefits of the Fund.

Procedures: Responsibility for case examinations is vested in the Ministry of Industry. The procedural phases have been defined in Ministerial Decree of 28 April 1982. Examinations conducted by the Ministry of Industry must indicate the assessed level of the program (55 percent/45 percent/35 percent). At each of the three levels, the Ministry's decision will stipulate the percentage of subsidization of the eligible costs by the Fund. For those programs evaluated as being of exceptional importance, the CIPI may augment the Fund's contribution by an additional 15 percent. Subsidies by the Fund must not exceed 55 percent of the cost of the program unless the operations involved are chargeable to the quota for Southern Italy.

9399
CSO: 3698/95

FRENCH RESEARCH SPENDING TO INCREASE IN 1988

Paris L'USINE NOUVELLE in French 2 Apr 87 pp 16-17

[Interview with Jacques Valade, minister of research, by Marc Chabreuil and Pierre Virolleaud; date and place not given]

[Text] The arrival of Alain Devaquet's replacement in the Ministry of Research and Higher Education coincided with the first positions taken by the prime minister in favor of research. This will be a valuable asset for Jacques Valade if he wishes, between now and March 1988, to take the measures needed in a sector that has lain fallow since March 1986. However, a university professor and researcher himself, the senator from Gironde--Chaban's "heir apparent," it is said in Bordeaux--has more than one trick up his sleeve. With his colleague in Industry, he is now drafting a policy on research and innovation that will be presented to the Cabinet in a few weeks.

[Question] The prime minister has announced that research would constitute a prime objective in the 1988 Budget. Can you be more specific?

[Answer] Our fellow countrymen did indeed hear Jacques Chirac say repeatedly, in Strasbourg, Toulouse and Lyon, that research is a priority for the development of business and he is now asking us to express that in concrete action. Work on the budget has not yet begun and I cannot therefore go into detail. For the time being, we see two possible ways to express the remarks and instructions of the prime minister: On the one hand, capital endowments to national enterprises or organizations should benefit their investments in research. Second, subsidies and aid to research, whether public or private, must be improved.

[Question] Will there be new direct or indirect aid to industry?

[Answer] We are now looking at that question with Minister of Industry Alain Madelin. In the field of indirect aid, it has now become commonplace to say that tax credit should be expanded. At the present time, in consultation with business executives, we are reflecting upon the timeliness of modifying the rules. The tax credit could benefit from improved regulation that would wipe out effects due to sudden variations in research investments from one year to the next.

Concerning direct aid, the discussion is more political. The scales tipped heavily in the direction of eliminating such aid. We can in fact see that businesses still have trouble investing and in allocating more financing to research, while the fresh money they take in goes first of all into their treasury. Things change. At the outset, we came to question the very existence of ANVAR [National Research Development Agency], although, as the prime minister himself has said, its role is now being redefined. This is an important revision.

All of this goes hand in hand with profound modifications in our manner of managing credits.

[Question] Is it a question of a reform of the Research and Technology Fund?

[Answer] Yes. We are going to update and improve our way of using that fund, based on certain principles which I personally think are obvious, but which I shall gladly repeat.

The first principle: There is no "situation" income. Every proposal must be matched by a demonstration of its competitiveness.

Second principle: Evaluation will be the task of professionals. Committees will rule on proposals based on evaluations of research work.

In other words, everyone will report on the use of funds and we shall see whether we must continue to support the request being made.

My first objective is to facilitate the transfer of results from research to industry. However, please do not believe that I am not concerned with basic research; on the contrary. We observe a real consensus on this subject and business executives are not the last to say that in their opinion, we must promote basic research more. To sum up my philosophy, I would say that it seems essential to me that the researcher be concerned with the potential application of his work.

[Question] Do you have the means of evaluation required by this policy?

[Answer] At the present time, no. There are means of self-evaluation within the organizations, a sound discipline that each one of us in the scientific community must abide by, but that is not enough. There are also many centers here and there that handle evaluation, but all that is too scattered. This is why the conclusions of the mission with which the government entrusted Roger Martin will soon help us to see more clearly. Finally, in my own ministry, I have begun to analyze all the means and tools of independent evaluation that we have.

[Question] Is the High Council on Scientific and Technical Research (CSRT) among those means?

[Answer] Yes, precisely. I attended the last general assembly of the CSRT, which gathers together some 50 members of the different scientific, economic

and social milieux and I told its vice president, Kourilsky, of my interest in its work. It so happens that his term, like that of part of the council, is coming to an end. I therefore asked Jean-Pierre Causse, one of my advisers who is also deputy general director in charge of research at Saint-Gobain, to prepare for the change.

When we have reached that stage, we shall redefine the High Council, which I believe should be in a position to do more. I hope to turn it into more of a council of the minister and the government, a real high council, like that of the Bench. Rather than taking up a given problem of status, an organization or team, it would make much more global evaluations. I can easily imagine that it could evaluate the state of advancement, as well as the policy to be followed in France, of a given discipline. The guidelines in biotechnology provide us with an up-to-date example.

[Question] Is the concern for evaluation and economic profitability shared by all researchers?

[Answer] First and foremost, I believe it is useful to say clearly that researchers, because of their participation in the national community and the future, deserve the highest consideration from French society. In exchange, they must show that they are concerned about redistributing their talents and the product of their imagination. Just because a specific type of research is not profitable does not mean it should be eliminated. France also has a cultural mission that I am not forgetting. If one of my distinguished colleagues feels like studying Sanscrit or Gregorian chant, that is his right. I simply say that that must be intelligently quantified. If I were to sum up my viewpoint in a few words, I would say that economic valorization is necessarily based on the initial choice.

[Question] Researchers are accused of not being mobile. Is their status not an obstacle?

[Answer] For years, only the security of researchers was at stake or, at least, trying to achieve a common status based on a multitude of the same that were brought together. As soon as researchers were placed in the most secure environment possible, one cannot then immediately ask that such stabilization generate mobility! You will never hear me say that researchers should not enjoy the social benefits of other wage earners, but I believe there may be ways to allow passage from one system to another. This is not the case, either with respect to salaries, retirement or paid vacations. I have asked for study of a system that would truly permit mobility. I can easily imagine that it would have the form of an intermediate status to which the researcher from a university or an organization going into the private sector or the reverse would aspire.

In a word, the temporary nature of this situation must be taken into account and everyone must then be able to return to the previous status. I am totally aware of this urgency in a European perspective and that is why I have already made a number of suggestions. Today there are enormous disparities and yet, a researcher living in London or Cologne must be able to go work in Montpellier

or vice versa. I know a number of British researchers working in Paris in the new materials sector and who are thrilled to be under the French social security system. But when a European researcher goes to the United States, such coverage is nonexistent, unless the effort is made to pay in. But since researchers have scholarships that barely give them enough to live on, it is difficult to see how they would pay for that social security coverage in addition, especially since they are usually persons between the ages of 25 and 30, married and sometimes with children.

[Question] How are negotiations going on the European programs?

[Answer] The choices have been made: Esprit, Brite, Race and Euram. The last time I met with my European colleagues in Brussels, we spent about 20 hours negotiating on the content and financing of the framework program. A decision was made by ten nations, with Great Britain and Germany soon to announce their positions. Between now and 1991, some 6.4 million ECU [European currency units] will be invested. This package includes the conclusion of previous programs not yet carried out in 1987. Since we have the impression that this program will not be finished in 1991, after a heated discussion, I was able to make them add at least 16 percent (900 million ECU) by 1992. However, confidentially, I hope that it will be more than 16 percent.

11,464
CSO: 3519/104

HUNGARY: NEW TYPE OF HERBICIDE ANTIDOTE DEVELOPED

Budapest MAGYAR KEMIKUSOK LAPJA in Hungarian No 3, Mar 87 pp 81-85

[Article by Ferenc Dutka, of the Central Chemistry Research Institute of the Hungarian Academy of Sciences, Budapest: "Development of Original Antidote Types," prepared on the basis of a report titled "Development of Herbicide Antidotes" given at the A/8 OKKFT (National Medium-Range Research and Development Plan) colloquium held in Budapest, 1 December 1983, and on the basis of more recent work.]

[Excerpt] Summary
The use of antidotes to reduce or eliminate herbicide injury to crop plants is a new concept in chemical weed control. The article describes a novel strategy for the design of original antidotes based on the relationship of chemical reactivity and biological activity. Antidote activity seems to be closely related to the acylating ability of compounds, indicating some kind of acylation reaction associated with the protecting effect. On the basis of this theory a new class of herbicide antidotes was discovered and developed.

The Advantages and Achievements of the New Research Strategy

The study of the chemical reactivity-biological activity interdependence is a new research strategy which:

--refers the biological efficiency not to the given molecular structure or to a structural element but rather to the reactivity appearing in the chemical process responsible for the biological response and with which a modification of the reactivity can be achieved with quite varied molecular structure changes, significantly expanding the area for research and the tools available;

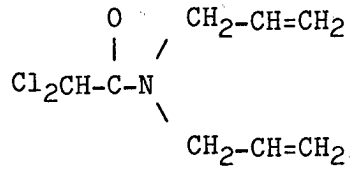
--makes it possible to prove that a good antidotal activity which can be exploited in agricultural practice is not limited to the compounds containing the N-dichlor-acetyl group but rather that other molecules bearing a chemically activated acetyl group but not containing any nitrogen atoms can also be outstanding antidotes. This has overthrown a dangerous view which oriented research incorrectly and has raised to the level of a rational conception for original antidote research the replacement of the dichlor-acetamide group earlier judged primarily responsible for the protective effect with other structural elements of similar or even greater activity; and

--has led to the discovery of acylation as a (bio)chemical process eliciting the biological (protective) effect; the acylation concept already frequently cited and positively evaluated in the professional literature is not only the first theory, a uniform theory, of the effective mechanism of an antidote type which has proven successful but also is a source for the recognition of new, effective antidotes.

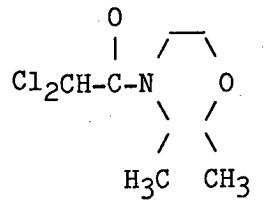
The correctness of the last assertion and the power of the method are proven unambiguously by the fact that by a consistent application of it we recognized a new antidote type which:

--fundamentally differs structurally from the dichlor-acetamides; and

--according to the results of several years of laboratory, greenhouse (Agricultural Science University Crop Protection Institute, Keszthely) and field (Grain Production Research Institute, Szeged) tests is more efficient than the antidotes commonly used and is botanically specific, and can be applied as a tank mixture with thiocarbamate and chlor-acetanilide herbicides.



R-25788



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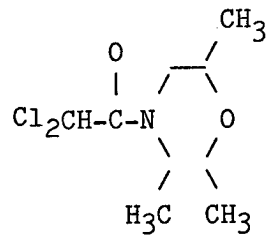

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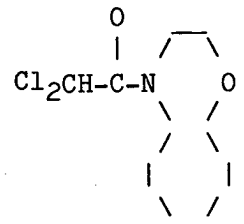

AD-67

The development of antidote R-25788 proved the effectiveness of analog-synthesis as a research method. In the wake of this there developed a view that other rational research concepts based on scientific deduction were not

viable and so for a long time there was very little probability of recognizing an antidote with activity comparable to the R-25788 effective material.

In contrast to this our results have proven unambiguously that another research strategy based on scientific deduction, in addition to analog synthesis, is viable, even more so than analog synthesis, because despite the previous pessimistic predictions it led within a short time to the development of new antidote types, more effective than R-25788, which are exportable and which can be made of intermediaries accessible to the domestic chemical industry. (Manuscript received 30 Dec 1985.)

8984
CSO: 2502/52

CEMA AUTOMATED DATA EXCHANGE SYSTEM

East Berlin INFORMATIK in German No 1, 1987 pp 6-7

[Article by Hans-Joachim Senst and Uwe Wolf of the Central Institute for Information and Documentation of the GDR: "The State of and Developmental Trends in International Automated Information Exchange"]

[Text] 1. Introduction

In the report by the Central Committee of the SED to the 11th party congress, Comrade Erich Honecker stated that it is necessary to accelerate the creation of data networks in order to make more effective use of the many computer-aided work stations, as well as of computer technology in general.

This means that the further development of scientific information and communication in the GDR must be targeted towards the requirements of all-encompassing intensification and towards the primary directions of the developments of science and technology up to the year 2000, as well as towards the realization of the comprehensive program of scientific and technical progress for the CEMA member states, and must thus make full use of the possibilities and benefits of socialist economic integration.

Under the comprehensive program, the member states of CEMA concluded an agreement on multilateral cooperation in developing a system for automated information exchange, in the realization of which the GDR is actively involved.

2. Goals of Criteria of Automated Information Exchange

In the international system for automated information exchange, a highly-productive data communication system between the socialist countries is being developed that, already in the developmental phase, makes it possible to automate the exchange of all types of information, beginning with the areas of science, technology and social sciences, and thus to significantly accelerate this exchange, compared to conventional methods. Important information from the vast store of knowledge in the USSR and other CEMA countries is in this way made available to users in the GDR in a matter of seconds. On the other hand, our own resources are available for use by other countries. Moreover, new services by this data communication system are being developed, such as

electronic mail, full text transmission, data base transfer, the use of specialized data processing centers in other countries or the linking of computers across international borders.

Important standards for the development of the international system and for its practical use must be created by the participating countries, in areas such as computer technology, microelectronics, program technology (software), the training of specialists and the availability of highly valuable stores of information in powerful data bases.

The efforts by the participating CEMA countries in this are primarily oriented towards offering data bases that in terms of content, quality and size are in keeping with the information requirements of the institutions participating in realizing the tasks of the comprehensive program of scientific and technical progress. This is also attested to by the results of the advisory meeting of the "MTsNTI Network" study group, held in Dresden in December 1985. It is primarily a question of developing, in addition to the documentation resources that have predominated thus far, a greater number of fact systems, and of offering them in the network with modern communication technologies.

The importance of these tasks is underscored by the fact that efficient data bases are part of the foundation for CAD/CAM systems, which in turn will be involved in networks to an increasing extent in the future.

In terms of practical use of the automated information exchange, a number of combines, scientific institutions and libraries will gradually be given remote access to the information resources of the USSR and of other CEMA countries. At the same time, it is possible that other CEMA countries will use corresponding information from the GDR.

3. First Practical Results of Data Remote Processing

On the occasion of the 35th anniversary of the founding of the GDR, the Central Institute for Information and Documentation [ZIID] of the GDR began to use data bases of the International Center for Scientific and Technical Information (MTsNTI) in Moscow through remote access.

Although initially only experimental interactive enquiries were conducted, it was possible by the end of October 1986 to provide more than 50 combines and scientific institutions in the GDR with the results of interactive enquiries via the ZIID. The number of users and searchers will increase significantly in 1987.

The increasing need for information and the greater number of data bases being offered in the MTsNTI network made it necessary to improve the technical preconditions for data communications. We conducted the first remote interactive enquiries in MTsNTI using standard telephone lines, the quality of which failed to ensure effective data transmission.

We introduced a new stage by setting up in August a leased line from the ZIID to the All-Union Institute for Applied Automated Systems (VNIIPAS) in Moscow, the international network switchboard, and by installing in October a packet

switching computer. Through this, the first important technical requirements were established for qualitatively raising remote access to data bases of the CEMA countries to a new level.

4. Technical and Functional Possibilities of the International System for Automated Information Exchange (ISAI)

ISAI represents a new quality of data exchange between the member states of CEMA. It forms the basis for the possibility of structuring the exchange of information within MTsNTI more effectively and of ensuring the full functionality of the MTsNTI network of information services and data bases (MTsNTI network).

ISAI is for all intents and purposes the data communication system for CEMA countries with which the national information and computer resources are linked and are mutually available for use. All types of information and data can be transmitted, non only scientific and technical data. Nevertheless, scientific and technical information through the MTsNTI network is currently the main use of the accomplishments of ISAI.

Up to now, work within the MTsNTI network has been limited to remote access to data bases in the form of interactive enquiries. The results of the search are still often printed from the data bases and sent by mail. Access takes place according to a time schedule, and the manipulation of the various network services at present is still laborious. The development of ISAI offers new functional possibilities for the user's work and for administrative duties, only a few of which can be mentioned here.

The automated mediator system ensures an intelligent interface between the user and the various search systems, or rather the search languages. This includes, for example, the synthesis of optimal search strategies and the generation of requests in a standard control language, followed by translation of the requests into the concrete search language of the system being queried.

The automated learning system makes it possible to train the user for work with domestic and foreign information and computer resources in areas such as interaction with the ISAI hardware and software and with information search systems, or the development of effective search strategies in data bases.

The automated information system gives the user access to information on the resources of ISAI, such as descriptions of available data bases, data files, catalogues, program packages, instructions for using available resources, statistical information, etc.

The automated data file transfer system ensures, for example, user access to remote data files, as well as their transfer to his own (work station) computer.

Other functional possibilities, some of which are already in use, offer the electronic mail system, which makes possible paperless "letter transmission" between subscribers to ISAI via electronic "mailboxes," or the remote conference system, which supports dialogue between scientists and specialists,

the exchange of information between them and the temporary storing of information, texts, documents, etc.

In addition to these ISAI services, there are others that go beyond the level of data remote transmission achieved thus far.

As already mentioned, ISAI is based on the national data networks of the CEMA countries, which are presently still in a developmental stage. In ISAI, each CEMA country has a national center (switchboard). This function is assumed in the GDR by the regional headquarters for international automated information exchange within the ZIID.

At the end of October 1986, a packet switching computer was installed at the ZIID, which makes it possible to join various GDR subscribers and data bases to ISAI. In this way, several users in different places in the GDR can carry out parallel searches of the data bases of the CEMA countries. At the same time, it is possible for users in other countries to search data bases in the GDR (Figure 1 [not included]).

The number of data bases in the MTsNTI network is constantly being increased. In 1986, 25 data sets at 11 data banks in four CEMA countries and in the MTsNTI were already accessible. In 1987, more data bases will be added, including some in the GDR, Poland and the USSR, as well as cooperatively generated resources from the component systems of the MTsNTI. By the end of 1986, the data bases of the MTsNTI, the VINITI (All-Union Institute for Scientific and Technical Information, Moscow) and the INION (Institute for Scientific Information for Social Science) in particular were used with the help of data remote transmission, via the ZIID. Since then, practical access to data bases in Bulgaria and at other institutions in the USSR has begun.

Through the direct connection of subscriber stations in the GDR--combines and scientific institutions--to the system, the number of remote searches carried out in 1987 will increase significantly compared to the previous year. Nevertheless, this represents only the first step. In the years ahead, both our own data bases and more subscriber stations are to be joined to ISAI, with priority given to the primary directions of science and technology, such as microelectronics, automation, biotechnology and economic energy and materials use. The first automated resources of the GDR in the MTsNTI network are the central ZIID data base and the data bases of the Office for Inventions and Patents.

Our orientation in this is towards the preparation of data bases that are generated in the GDR itself or are the result of cooperation with other CEMA countries and contain the highest level of vital knowledge. In this way, we are making our concrete contribution to fulfilling the tasks of the comprehensive program of scientific and technical progress of the member states of CEMA.

12271
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HUNGARY: FIVE COMPANIES WIN SUPPORT FOR COMPUTER PRODUCTION

Budapest COMPUTERWORLD/SZAMITASTECHNIKA in Hungarian No 4, 25 Feb 87 p 1

[Unsigned article: "We Have Some Good News"]

[Text] The reader may have noticed something already, and wondered why it wasn't news. Somewhere on the back pages (in our previous issue and the one before that) one of our famous domestic computer manufacturers advertised something which actually should have been front page news. An IBM PC/XT compatible computer for 180,000 forints! And an IBM PC/AT compatible machine for 260,000! How could the editors not have noticed this? This is a real price breakthrough on the PPC [Professional Personal Computer] market!

The editors did notice it but they also knew from certain sources that this news did not mean a real price breakthrough, but rather that in addition to the advertising enterprise a number of other manufacturers also were getting state support by virtue of which one can expect the manufacture and sale in Hungary of 4,000 IBM compatible professional personal computers at a price similar to or lower than the one advertised!

Who these manufacturers are and finally what the prices will be was announced 2 weeks ago at a press conference (we will return to the other themes of the conference in our next issue), so we could not be so up-to-date as some of the vendors for the firms competing for support. The numbers and the firms manufacturing the cheap PPC's can only now be put on the front page. Let us begin with the latter, in alphabetical order: the Csepel Association (members: the CSM Transformer Factory Csepel Electronic, Transelectro, and Ramovill); MTA SZTAKI Cosy [the Cooperative Systems subsidiary of the Computer Technology and Automation Research Institute of the Hungarian Academy of Sciences]; the Percomp Association (the members are the small cooperatives Applications Technology, Controll, Data Manager, Hungarocoop, Microsystem, Instrument Technology and Szamszov); the Proper Association (members: Elektromodul, the Communications Engineering Cooperative, and the Computer Technology Research Institute and Innovation Center); and the Videoton Electronics Enterprise.

The users are winners of the OMFB [National Technical Development Committee] competition as well as the 15 winning firms because the prices of the 4,000 machines will develop as shown below. (The first figure pertains to the price, in thousands of forints, of PC's, the second to the price of XT configurations

and the third to the price of AT configurations. In the case of Cosy there is no PC price; given the quite low price for the other two one must reckon that the Academy enterprise will supply computers almost exclusively to research and education bases with the possible remainder going to state administration.)

Firm	PC	XT	AT
----	--	--	--
Csepel	121	159	213
MTA SZTAKI Cosy	--	130	195
Percomp	95	170	220
Proper	89	129	215
Videoton	98	180	260

(Who will receive support for how many machines and why the figures must be treated with reservations can be read on page 8 in an editorial comment.)

"We have some good news," we said in the title, and did not add, because in the Hungarian language it goes without saying, "and we have some bad news." We did not continue the title in the spirit of the joke because there is no need to question that the bad news is the same as that with which we began. It is not probable that our news will delight the few dozen computer manufacturers and vendors who will now be forced from this sector, nor is it certain from the viewpoint of the winners that the competition and its result are the optimal answer to the problems of PPC supply in Hungary. It makes one think that even the joy of the winners is not unclouded, and their words should be considered evenif we know that every saint, and certainly every director, president and director general, has his eye on the main chance. Simce we learn from Eva Szekely that "only the victors are free to cry" we have not questioned the losers in the first round about their feelings. Our article dealing with the plans and doubts of the winners arrived after the paper closed and can be found on page 8, with the readers' letters.

8984
CSO: 2502/43

HUNGARY: COMPANY OFFICIALS' VIEWS ON PRODUCTION AWARDS

Budapest COMPUTERWORLD/SZAMITASTECHNIKA in Hungarian No 4, 25 Feb 87 p 8

[Article by Janos Andor Vertes: "Only The Winners Are Free To Cry"]

[Text] We announced our front page article about the winners in the OMFB [National Technical Development Committee] competition using the title of the book by Eva Szekely, already raised to a stock phrase, and we must ask our famous swimmer to forgive us, for she uses the phrase in a more exalted and more painful environment. Still, it might be borrowed in our case too, when the victor is not thinking about being first but rather about how he almost stayed out of the competition, is worrying about how to proceed, studying whether the result was fair, and whether the entire competition is good for the country.

It was perhaps only in the voice of Gabor Iklody that I felt satisfaction when we talked about the competition and the new division of roles in manufacture and supply of personal computers. The director general of Elektromodul did not grumble that his "team" finally won only a 30 percent share of the allotment and he was happy that his efforts last year--quite isolated ones--to bring down prices can now continue with state support, hitting his associates.

Gabor Szeles is more moderately happy--perhaps because he belongs to that half of the victors who learned of the appointment possibility only indirectly, we might say by chance.

"As for me, it is a little disturbing that in the end the distribution of the money was not done according to the actual market situation. If the small cooperatives gathered into Percomp actually had 60 percent of the PPC market then the 20 percent share actually sets cooperative computer technology back," said the president of Percomp (and also of Instrument Technology) before he began to praise the competition. He still did praise it:

"I consider the competition and its result a great step forward, because there was a need for a certain selection; it is not possible for a thousand firms to come out with a thousand different machines. In addition to standardization the other good thing is the price reduction, which is made possible by state import support. If the state provides this kind of support it could help not only the domestic development and spread of computer technology but through

this an improvement in the background industry as well. If card level manufacturing remains possible then this support will leave the background industry untouched."

Is IC level manufacture possible?

Emil Kindzierszky, developmental chief engineer of the Csepel Transformer Factory and manager of the relatively young Csepel Electronic, put on his desk an assembled mother board which he designed himself and which is completely IBM compatible in hardware and software, and he put his calculations beside it:

"Let us look at a coordinate system in which we depict the import fraction on the horizontal axis and the production price on the vertical axis. At the origin is the case where we import a finished machine, and it has a certain price. If we start toward the replacement of import, suitably selecting what we replace, this price can be maintained for a while. Then, after replacing 17 percent of the parts, the price (not just the forint price, but the dollars turned to import) starts upward, and at an imaginary limit where everything is done here at home, from manufacture of four layer printed circuits, instead of assembly, we reach double the original price. For example, it is more expensive to get all the IC's for this mother board than it is to import finished boards from the Far East. But we would be glad to get the manufacturing rights for the keyboard patented by the SZKI [Computer Technology Research Institute and Innovation Center] because, according to us, this would be competitive even with this procedure. We have something to offer for a possible cooperation as well; we can produce a power unit which satisfies the standards better, is more reliable and--counting in the shipping costs--is cheaper than the Taiwanese ones."

"If that is true I'll eat my hat," said Sandor Moricz, director of the MTA SZTAKI Cosy [Cooperative Systems subsidiary of the Computer Technology and Automation Research Institute of the Hungarian Academy of Sciences] when I mentioned that Csepel might ship power units to all the winners. "After the January increase in primary materials prices it is cheaper to ship iron from the Far East than to buy it here. But naturally I will be the first in line, I am willing to buy everything from a domestic manufacturer, if he offers it more cheaply than our other acquisition sources."

Janos Kazsmer did not receive so diplomatically the question raising the possibility of possible cooperation:

"Out of the question! Everyone is seeking solutions with maximum profit; because of the piling up of laid on costs an internal cooperation is disadvantageous for everyone."

After that even the director general of Videoton seemed mild, for he had calculated that the total quantity came to only one third of one day's production in Taiwan, and if the field is divided even in this it cannot be good for the national economy. He explained as follows the decision which seems irrational to many:

"It was not the goal of the economic policy types participating in the decision to make a possible national income increment on the manufacturing side. In Hungary, on the applications side, there was (or is) a need for a few thousand PPC's, and they thought that the cost of selective support, the amount turned to it, would be returned through applications. So how we satisfied the needs of the users became a secondary question, and since it is secondary, well, let all the flowers bloom, let everyone make or import PPC's who meets the conditions of the contest. There is certainly no economic background for this solution, because if we manufacture together, that is cheaper, and if we import together then that is cheaper, and what is more the Hungarian users can be happy because it is easier to set up a customer service network for a mass, uniform machine park."

Well, this explains everything. If the victors are crying it is because the users won this "cup" and the race will continue among those with the awards, until they are out of breath. From here, looking from the shore, it is still not clear why it is necessary to import in isolation from one another a ration of 200 XT's or 100 or maybe 300 AT's; we still do not believe that cooperation limits competition. So we asked everyone we talked to to look at the OMFB decision from at least a little distance, to catch their breath for a moment in the big race and sit down with the others at a common table. At the conversation imagined by us everyone could lay his cards on the table (the cards could be assembled or not) and make his bid and we might get some agreements--not like a cartel--which might exercise an attractive force even on the Hungarian background industry and even rationalize import, and it would be good for the user too. In the end everyone accepted our invitation (naturally the time for it remains to be agreed upon). Even Janos Kazsmer, who still views the chances of cooperation a little skeptically, said, "The national economy deserves that much, that we at least sit down."

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STATUS OF HUNGARIAN MATRIX PRINTERS

Budapest COMPUTERWORLD/SZAMITASTECHNIKA in Hungarian No 4, 25 Feb 87 p 21

[Unsigned article: "Status Report on Domestic Matrix Printers"]

[Text] Since the introduction of the first domestic matrix printers 4 years ago the take-off of manufacture has been very swift. An over-supply of some models has developed on the market. In the assortment of matrix printers we manufacture which can be used with microcomputers and in the number of manufacturing firms we surely lead the other socialist countries. It is also gratifying that more Hungarian devices are successfully traded on the socialist market. During 1986 here at home the prices fell by an average of 15-40 percent compared to the previous year.

But we cannot forget that with the successes there are also problems. It must be noted that the domestic matrix printers require quite a lot of imported parts, and some manufacturers are not able to produce the devices in sufficiently large series. It would appear to be a good solution if the vendors carried out more advertising and propaganda activity than at present so that potential users were better acquainted with the products. It might also increase the confidence of customers if the manufacturers were to emphasize through reference applications the similarity of their printers to internationally famous devices in regard to the design, performance and especially reliability of them. Our domestic manufacturing enterprises have to follow the needs of the market. We feel that there is increasing need for devices capable of printing more normal characters per line than eighty and for those which can print on larger format (A/3) paper sizes. Nor should we ignore the fact that there is also a need here--an increasing need--for multiple pin (18-24) models. Recently the professional personal computers have been taking over certain bookkeeping and accounting tasks. These require printing devices which can handle cards and individual sheets.

In our attached table we compare the more important characteristics of eight domestically made, desktop matrix printers, in alphabetical order by manufacturer. The data shown come from the manufacturers and reflect the status as of 1 January this year; the prices are for orientation only.

It appears from the table that the price of the devices varies between 24,000 and 89,000 forints. In the normal operating mode the maximum speed varies

between 80 and 150 characters per second. Maximum paper width does not reach the A/3 dimensions for any of the devices. Two printers are capable of producing near letter quality print. Not one is capable of producing line code, OCR A/B characters or various indexes. For the time being color printing is not a condition here. The devices print in one color.

The DCD-PRT models are products of a development by the Datacoop Small Cooperative. Last year the BHG [Beloiannisz Communications Engineering Factory] took over manufacture of the 80GS. A significant number of devices have been exported. Since their market appearance (1984) Datacoop and the BHG together have sold more than 5,000 printers.

The spindle movement head of the Karman printer works with special matrix plates; it contains no parts from capitalist import. The paper guide method is an original solution, as is the arrangement of the head and paper relative to one another. The enclosing dimensions of the device are quite large.

The TMT 1201 and 120L are products of the Telephone Factory, made on the basis of a license. The devices are exported to socialist countries and these types are organic parts of domestic equipment serving various purposes which go to capitalist export (e.g., scoreboards, medical instruments, telephone exchanges, etc.). We estimate that as of the end of last year a total of about 5,000 of the two types had been sold.

The two well known printers of Videoton, the VT 21200 and VT 21400, are made primarily for the VT-16 but are also sold separately. A new device is the VT 21500 which is primarily a peripheral for the VT-32 computer but it is expected to be sold separately as well. It is suitable for near letter quality and letter quality printing; it can put a maximum of 220 characters in a line and larger size paper can be used. Series manufacture is expected to begin in the first quarter of 1987.

Last year the SZKI [Computer Technology Research Institute and Innovation Center] and the SCI-L [Computer Technology and Informatics Subsidiary of the SZKI] decided to phase out manufacture of the MP-80 matrix printer. So they will supply printers for Proper configurations on the basis of the assortment which can be found in the country.

In the meantime we said farewell to another device as well. Present domestic market needs do not make necessary manufacture of the ROMOM small printer assembled by the MOM [Hungarian Optical Works].

As we have already reported the development of a matrix printer family is also under way at Medicor. Series manufacture of the MX-40 devices will begin in the second half of the year. They plan production of desktop versions and versions which can be built in. It is a common characteristic of the Medicor peripherals that they print at most 40 characters per line on roll paper with a maximum width of 88 mm.

1	2	3	4	5	6	7	8	9
Sebesség (kar/s)								
10 k/i	80	—	—	160	160	125	140	120
12 k/i	106	—	80	/	/	/	/	/
16 k/i (10)	132	84	40 (6)	133	/	/	/	/
NLQ	—	—	—	—	40	—	—	60
LQ	—	—	—	—	—	—	—	30
Soronkénti pozíciók száma (11)	80 106 132	42 84	80 40	80 100 132 160	80 100 132 160	132 106 80 66 53 40	132 176 220	132 176 220
Kétirányú nyomtatás (12)	●	—	—	●	●	●	●	●
Grafika								
IBM blokkgr.	●	●	—	/	/	●	●	●
Teljes gr.	●	●	—	/	/	—	—	●
Nagy felb. gr.	●	—	—	—	—	—	—	●
Egyéb (13)	/	/	Epson FX-k.	DNA	DNA	/	/	/
Felbontás (pont/i) (14)								
Vízszintes	60—80—120	72—108	72	50—100	/	/	/	120
Függőleges	72	72	72	64	/	/	/	72
Papír (15)								
Tekercs	—	●	●	●	●	/	/	●
Egyedi lap	●	●	●	●	●	—	—	●
Leporelló	●	●	●	●	●	●	●	●
Másolatszám	3	4	0	3	3	3	3	3
Papírtovábbítás								
Súrlódásos	—	●	●	●	●	—	—	●
Traktoros	—	—	—	●	●	●	●	●
Kombinált (16)	●	—	—	—	—	—	—	●
Lapadagoló	—	—	—	—	—	—	—	●
Kétirányú	●	—	—	—	—	—	—	—
Papírszélesség (mm)								
Min.	144	/	206	/	/	63,8	25,4	63,8
Max. (17)	254	210	222	254	254	254	397	397
Pontmátrix (Vízsz. x függ.) (18)	9 × 9	9 × 9	9 × 8	9 × 7	18 × 40	9 × 9	9 × 9	18 × 24
Írásmód								
Normál	●	—	●	●	●	●	●	●
Keskeny (19)	●	●	—	—	—	●	●	●
Széles	●	●	●	●	●	●	●	●
Kurzív	●	●	—	—	—	—	—	—
Kettős	●	●	●	—	—	—	—	—
Proporcionális	●	●	—	/	/	—	—	/
Karakterkészlet								
96 ASCII	●	●	●	●	●	●	●	●
Teljes magyar	●	●	6+6	/	/	●	●	/
62 cirill	●	●	—	●	●	●	●	/
Nemzetközi opció	●	—	—	● (7)	● (7)	●	●	/
8 bites (20)	●	●	●	KOI—8	KOI—8	●	●	●
7 bites	●	●	●	KOI—7	KOI—7	●	●	●
Letölthető	—	● (A)	—	—	—	●	● (A+B)	● (A+B)
Interfész								
Párhuzamos Centronics	●	●	●	●	●	●	●	●
DZM (21)	●	●	—	●	●	—	—	—
IRPR	●	●	—	—	—	—	—	—
Soros RS 232	●	●	●	●	●	●	●	●
áramhurok	●	●	—	●	●	—	—	●
IEEE—488	●	●	—	—	●	●	●	●
Commodore	●	●	●	●	●	●	●	/
Kézfogásmód								
X-on, X-off	●	●	—	—	—	●	●	●
ETX/ACK	—	—	●	—	—	—	—	—
Ready/Busy	●	●	●	●	●	—	—	—
Csatlakozó (22)	25 p. (D—SUB)	25 p. (D—SUB)	36 p. (DS2167)	36 p. 25 p.	36 p. 25 p.	36 p.	36 p.	36 p.
Puffertár (kbájt)	1 sor	1 sor	/	2	2	1,5	1,5	1,5
Kódtáblázat száma a ROM-ban (23)	4	8 × 7 bit	—	1	1	1	1	/
Programozhatóság								
Epson-k. ESC sor.	●	●	●	/	/	—	—	●
IBM-k. ESC sor. (24)	●	●	—	/	/	—	—	●
Saját ESC sor.	● (HP-k.)	—	—	●	●	●	●	—
Szövegfeldolgozás (25)	/	—	—	—	●	—	—	●
Aut. alánózás	●	●	/	/	/	/	/	●
Írógépszalag	—	●	●	—	—	—	—	—
Ár (ezer forint)								
Alaprendszer + egy if.	49,8	24,3	35,0	46,7	48,2	49,0	69,0	89,0
Opció (26)								
RS 232 if.	5,0	2,8	/	3,5	3,5	5,0	5,0	5,0
Centronics if.	5,0	2,8	/	2,1	2,1	5,0	5,0	5,0

Megjegyzés: k/i = karakter/inch; NLQ = közel levélminőség; LQ = levélminőség; k. = kompatibilis; p. = pólusú; gr. = grafika; sor. = sorozat; Aut. = automatikus; A = kódtáblázat; B = karakterkép; ● = van; — = nincs; / = nincs adat; DNA = Direct Nail Access (közvetlen tűelérés); if. = interfész.

Key to Table:

1. Model, Manufacturer
2. PRT-80GS, BHG
3. DCD-PRT-42, Datacoop
4. 210-01 (Karman), Rozmaring (Rosemary) Agricultural Producer Cooperative
5. TMT 1201, Telephone Factory
6. TMT 120L, Telephone Factory
7. VT 21200, Videoton
8. VT 21400, Videoton
9. VT 21500, Videoton
10. Speed (characters per second)
    - 10 characters per inch
    - 12 " " "
    - 16 " " "
    - Near letter quality
    - Letter quality
11. Number of positions per line
12. Bidirectional printing
13. Graphics
    - IBM block graphics
    - Full graphics
    - High resolution graphics
    - Other
14. Resolution (points per inch)
    - Horizontal
    - Vertical
15. Paper
    - Roll
    - Individual sheet
    - Fanfold
    - Number of copies
16. Paper advance
    - Friction
    - Tractor
    - Combined
    - Sheet feed
    - Bidirectional
17. Paper width (mm)
    - Minimum
    - Maximum
18. Point matrix (horizontal x vertical)
19. Writing modes
    - Normal
    - Narrow
    - Wide
    - Italics
    - Double
    - Proportional
20. Character set
    - 96 ASCII
    - Full Hungarian
    - 62 Cyrillic
    - International option
    - 8 bit
    - 7 bit
    - Downloadable
21. Interface
    - Parallel
      - Centronics
      - DZM
      - IRPR
    - Serial RS 232
      - Loop
    - IEEE-488
    - Commodore
    - Handshaking mode
      - X-on, X-off
      - ETX/ACK
    - Ready/Busy
    - Coupler
22. Buffer store (K bytes or lines ["sor"])
23. Number of code tables in ROM
24. Programmability
    - Epson compatible ESC seq.
    - IBM compatible ESC sequence
    - Own ESC sequence
25. Text processing
    - Automatic underlining
    - Typewriter ribbon
26. Price (thousand forints)
    - Basic system + 1 interface
    - Options
      - RS 232 interface
      - Centronics interface

Notes:

A=code table
B=character image
O=has it
---=does not have it
/=no data
DNA=direct nail access

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HUNGARY: ADVENTURES, MISADVENTURES OF MPROLOG

Budapest OTLET in Hungarian No 14, 2 Apr 87 pp 8-9

[Article by Peter Szakonyi: "The Legend of a World Champion"}

[Text] About a decade ago an engineer returned home from England with a computer program in his luggage, a program which represented utopian peak technology for us. His colleagues studied and tested it with wonder, until finally one of them offered a bet that in one week he could outdo the "import stuff." And he did. The ancestor of the Hungarian version of PROLOG was born for a glass of wine--the stakes of the wager.

The story began in a little room of an enterprise with an unpronounceable name, the NIM IGUSZI, that is the Industrial Management and Operations Organization Institute of the Ministry of Heavy Industry, where a few eager young people fresh from the university decided to "beat the champ" and basically change the programming of computers. The time was 1972, a time when each computer here was looked on as a miracle.

From this enthusiasm--and on the basis of the world famous Hungarian school of mathematics--was born Hungarian [Magyar] PROLOG, but the original team quickly broke up as the members sought a living here and there. We chased them down in order to recover with their aid the events of those days and to understand the present status of and domestic prospects for PROLOG and artificial intelligence.

The headquarters of the "PROLOG team" then was the computer room of an office building on Lehel Street in Angyalfold which had an ICL computer, the "peak machine" of the day. Today one can find here the computer room of the legal successor of the institute, the System Enterprise (under its new name Szenzor Enterprise). There is plenty of work, the wage accounting and labor records programs run day and night. Of the original team only Kata Labadi still works here. She was surprised when I asked about PROLOG:

"I have had nothing to do with artificial intelligence research for 5 years, although this area is still very interesting to me. In 1972 the newly graduated mathematicians, researchers and computer people at the IGUSZI grouped around Istvan Nemeti and Hajnal Andreka. The software development department itself--led by Miklos Naray--consisted of some 20 members. (Naray

now works in the FRG.) A magnificent creative atmosphere developed. Everyone from mathematician to user worked in one room here and as soon as a problem was formulated we could approach a solution from a number of sides. When Tamas Gergely brought home that PROLOG interpreter and Peter Szeredi almost immediately wrote a better and faster version the triumphant career of PROLOG began. Applications possibilities were born one after another--the program of Ferenc Darvas and Ivan Futo to test the interactions of medicines, Zsuzsa Markus' program to design apartments."

Her words seemed filled with nostalgia. The foreign "fathers" of artificial intelligence also noted the achievements of that original team. Even Robert Kowalski, the "pioneer" of logical programming, made a pilgramage here and listened with incredulity to the "ardent madmen" who used in practice things others only dreamed of then. But the team got less time on the institute's computer and for years they got no raise in pay. The increasingly receipts oriented leadership bound the "madmen", who deserved a better fate, to "chopping wood" and regarded this line of research as misdirected. So one by one they drifted off to the Computer Technology Research Institute (SZKI).

A good part of the former PROLOG team works there today, including the hero of that earstwhile bet, Peter Szeredi, who explained the essence of PROLOG and of artificial intelligence research with surprising simplicity:

"The programming of today does data processing; PROLOG and artificial intelligence are aimed at knowledge processing. The programming languages of today are adjusted to the 'electronic slaves,' to the computers. Tasks must be given in a form the computer can understand, step by step, necessarily embedded in algorithmic processes. Between the user and the machine stands the programmer, who formulates the tasks in a mystical language which the user cannot understand. Computers are going to be cheaper and cheaper, and programming expertise will be more and more expensive. And there will be no one to solve the ever multiplying tasks.

"Artificial intelligence tries to resolve this contradiction, the basis for this is the theory of logical programming, and the first volume of this is the PROLOG language. Its foundation is mathematical logic, which is sort of a reflection of human thinking. Instead of the algorithmized formulation of tasks one must describe with logical statements the problem to be studied and the goals to be achieved. A method based on theorem proof solves the task. Use of this can transform the link between man and machine, bring the machine closer to man, and thus speed up and make use of the computer more efficient."

In the beginning Peter Szeredi dealt with traditional programming, but that fabulous PROLOG interpreter--and the three volumes of lectures which reached the "lab" with it--swept him away. He worked for a month--not a few days!--on the "rebirth" of the problem and at the traditional Kerekto seminars in 1975 he demonstrated an interpreter which was better and faster than the original. The exchanges of professional experience held at the Kerekto resort of the Ministry of Heavy Industry were very significant because here everyone could listen to the talks, debate and support a research trend without regard to assignment or training. This is how and where architect Miklos Szocs and chemist Ferenc Darvas "latched on" to PROLOG.

The original prologists continued their work at the Computer Technology Research Institute, with no small success. The institute went on the world market with a product called MPROLOG, and won success. For several years selling MPROLOG and keeping it on the market has tied down Peter Szeredi's energies. Asked how this pragmatic attitude was holding back further development, he smiled quietly and answered:

"We are reaping the fruits of our 1975 period of tranquility, but what we will reap 10 years from now I do not know...."

Two floors up in the imposing building of the SZKI I met Ivan Futo who, with Ferenc Darvas, prepared the first practical applications of PROLOG. Fleeing to a quiet conference room from the large laboratory crowded with computers he recalled:

"We were in an aristocratic position then for perhaps 50 people in the world knew what PROLOG was, and ten of these lived in Hungary. They called on us because elsewhere this programming method existed only in university laboratories, but we were using it in practice. On a commission from the NEVIKI [Heavy Chemical Industry Research Institute] we prepared an expert system for clean air protection, and we worked for the KSH [Central Statistics Office] too. When the Japanese announced in 1981 that they were setting up a project to develop a fifth generation computer, and they selected PROLOG as the program language for it, research was given a push around the world. To mention just one item, in the Western European countries, within the framework of the Esprit plan, several hundred million dollars is available to researchers working on artificial intelligence."

Yes, again the vicious circle--money, highly qualified intellectual work, expensive equipment and a suitable industrial background. According to Ivan Futo these are things needed if domestic development of tools for artificial intelligence is not to get stuck at the level of the former achievements and if we are to go further in research and applications. Of all this what we have now is primarily the intellectual capital. The money and necessary equipment might be produced somehow, but the industrial background is very much missing. One cannot expect the large enterprises, struggling with serious problems, to put the results of artificial intelligence research into production. But there are examples of this--General Electric put a system resting on such foundations to work in quality control for electric locomotives. This is why the SZKI is turning to Western markets, but the competition there is increasing.

"Unfortunately, since the really big ones got into the PROLOG business the competition has gotten harder. They can afford to spread their software products at dumping prices with several million dollars for advertising. The American Borland firm put its Turbo PROLOG, written for the IBM personal computer, on the market at an "advertised price" of 99 dollars, and sold about 40,000 of them. It bothered a few that this program did not deliver the promised performance, but everyone wanted to try it out....

"Our place is, or could be, in the 'gaps.' We could be competitive in areas of PROLOG applications where the other PROLOG versions are clumsier or slower. And it appears that there are areas where promising possibilities await us!"

Ivan Futo accompanied me out of the quiet conference room and in the hall we remembered that little had been said about what I came to hear. We had hardly talked about the old PROLOG team and their achievements; it appears that the problems of today and the prospects for artificial intelligence research had obscured the memories.

The department chief Miklos Naray was the first and Ferenc Darvas was the second to leave the "PROLOG nest" to get out of an increasingly hopeless situation. Ferenc Darvas is president of a dynamically developing small cooperative, Compudrug. Within a few years they have really conquered the world, and largely because they recognized one of the gaps mentioned by Ivan Futo. Their program packages deal with designing pharmaceutically effective ingredients, a branch of one of the peak technologies of our day. The pictures and honorary diplomas on the walls would mean nothing in themselves, but the little firm is working with such great scientific centers as Yale, Florida university and Lausanne university.

Ferenc Darvas is now researcher, manager and user all in one. Although he has no illusions about the domestic development of artificial intelligence he is still optimistic:

"We are seeing the birth of a branch of industry. Many today still link artificial intelligence to the PROLOG program language but this concept is a good bit broader. The expert systems which already exist today, although they embody the ideal of artificial intelligence imperfectly, are already powerful computer systems and can be used to sum up and exploit human knowledge like no other tool before. One cannot doubt for a minute that there are unheard of possibilities in this market. Where I feel the Hungarian positions are endangered is in so many domestic researchers sticking to PROLOG.

"There are still a good many blank spots in the area of expert systems and success depends on whether we can seize them and produce systems which can be used around the world."

The other area is market work and the president of the small cooperative knows a lot about this from experience. Without a Western partner with capitalnd good conditions it is virtually impossible to break into the world market for computer technology. Software and the products of artificial intelligence research--including PROLOG and expert systems--are commodities in the price of which a small part is played by production costs, the crucial portion is the intellectual creative work expended--and it appears that we have plenty of that here even now.

More than a decade ago a few enthusiastic researchers put on the table an intellectual product famous and recognized around the world, but it appears that the success story of the computer builders working out of a garage who became factory owners, the story of the developers of the Apple computer, was not to be repeated. What was missing? Money, support, the industrial

background or the respect? There is no use brooding about that now. The essential thing is the future, what position we will occupy in this promising branch of peak technology and whether, moving ahead, we can apply in a worthy way our famous theoretical research and achievements.

8984
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HUNGARY: OMFB SUPPORT FOR SELECT EXPERT SYSTEMS

Budapest OTLET in Hungarian No 14, 2 Apr 87 pp 10-11

[Article by T. F.: "Supported Research"]

[Text] The National Technical Development Committee (OMFB) is supporting the development of expert systems partly on the basis of ad hoc applications and judgment and partly following occasionally announced competitions. At present the committee is materially aiding six research projects of which three sets of programs will aid medical work.

Researchis being done at the Medical Postgraduate Institute, in cooperation with the SZAMALK [Computer Technology Applications Enterprise], on an expert system to support cardiological diagnostics, under the leadership of Professor Dr Ede Kekes. The Tolna County Hospital and Clinic is developing a gastroenterology system (used for stomach, intestinal and liver diseases), under the guidance of Dr Laszlo Simon, department chief and chief physician. The OMFB has been supporting both projects since the beginning of 1985 and some elements of both systems are operating already--accompanied by lively domestic and foreign interest. The National Koranyi TB and Pulmonology Institute, jointly with the SZAMALK, has been working on a system supporting medication of hospital patients, again since 1985. The Compudrug small cooperative has been receiving support since last year; it is creating a system to design biologically active compounds (medicines, crop protection materials, etc.) and to predict their interactions.

A water affairs expert system is being prepared at the VITUKI [Water Management Scientific Research Institute] which, if realized, may facilitate the work of water affairs directorates; connected to a flood prediction program it may help in decision making. Since 1985 the SZAMALK has been receiving support for a framework system aiding the development of expert systems.

The OMFB does not want to publicize how much support the projects are receiving. Not only because the different size funds might give cause for envy but also because these sums are not comparable with one another. The value of the forints awarded in years past varies also because the various hardware items can be obtained for different sums, more cheaply with the passage of time, while the value of technical development and intellectual work goes up

more and more. The OMFB provides nonrepayable support for research on medical systems. In exchange the research institutions will be obliged to give their systems to the domestic health affairs network free of charge, and these are or will be suitable for training and testing medical personnel too. The committee has given repayable credit to the other three projects, and repayment of the debt must begin with completion of the research.

Most recently, within the framework of program 6-1 of the National Medium-Range Research and Development Plan, the OMFB announced last year a competition for the development of expert systems which can be used in industry, which can be realized with the equipment available under domestic circumstances and which are worthy of support. There were 24 entries eight of which were accepted immediately while a few were recommended for further consideration. Since then the OMFB has signed contracts for a good number of the successful entries--for development of two construction affairs systems and for optimal planning of manufacturing systems for Ikarus. The Budapest Technical University received support for a framework system aiding creation of technological expert systems; the Geophysics Institute wants to develop an expert system for raw materials prospecting. The evaluators of the competition considered it especially gratifying that the entrants not only intend to solve special technical problems but also show a technical-economic attitude.

The OMFB set aside 50 million forints to support these goals but there were not enough entries to make possible distribution of the entire sum. (The several million forints remaining are being regrouped to other goals.) The committee will assume half of the developmental costs of those interested. Results are expected by 1990, the support must be repaid in the 3 years following that, and to facilitate this the institutions can make repayment from their costs.

8984
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HUNGARY: SOFTCOOP, A MERCHANT OF INTELLECTUAL PRODUCTS

Budapest OTLET in Hungarian No 14, 2 Apr 87 p 10

[Article by F. J. B.: "Budapest-London-Softcoop"]

[Text] It has no administrators, not even premises. Their only telephone line is connected to a storeroom for baby-carriages in an apartment house. The most important "tools" of the members of Softcoop are their brains.

"We do the work at the customer enterprises, mostly abroad, in Western Europe. Twenty-nine engineers, astronomers, computer experts and physicists formed the cooperative in 1982. Total personnel has not changed since, but we have a few new members in place of old ones. We work in an interest system in which income depends on what one earns with the given work. If someone does not bring in enough money to cover expenses he has to pay the shortage into the account of the small cooperative. We may even part from him," said Dr Laszlo Pinter, president of the small cooperative.

"According to this you are exporting domestic brain-power!"

"Yes, we are selling our intellectual capacity; the user provides everything else. Although we continue to operate in the small cooperative form we would like to go further on the path already taken by founding joint enterprises. We founded one joint Austrian-Hungarian enterprise, the KOEHERT Hungarian Organizational Limited Liability Company, and jointly with Metrimpex we founded a completely Hungarian enterprise, under the name Coss GMVH, which is a firm registered in the FRG as well.

"We assume a financial risk with the foreign sojourn of our colleagues, but this is the only way to contact such partners as the Telecomputing enterprise. We are cooperating with the English firm in the development of Oxford-PROLOG. The English OBSERVER prepared an interview with our colleague Tamas Koltai and the director of the firm noticed it. The lack of domestic credits and the parsimony of the state organs drive us toward such cooperation, in which we are forced to give up virtually all our rights, so we are employees in undertakings which realize our own intellectual products."

From the baby-carriage storeroom we called Tamas Koltai, Softcoop researcher, who is working at the English Telecomputing firm on the development of Oxford-PROLOG.

"Our dialect within the PROLOG language can be used primarily in places where a number of machines and men work together. The central computer processes, sums up and passes on all the information which comes from the terminals. A device working in a logic language not only sums up different types of information but also takes upon itself to make decisions. They dealt with the PROLOG language in England at the end of the 1970's, but only at the level of basic research. Hungarian students on scholarships also participated in this research; our expertise derives from this. We got into concrete working contact with the Telecomputing firm because positive articles about us appeared in a number of English papers. So far the cooperation has brought us several hundred thousand pounds, and this sum can be regarded as just the start. We could have developed a stronger market position with greater publicity and a more aggressive business policy. It would be an exaggeration to say that we Hungarians are striving for some sort of world superiority, but with conditions substantially better than at present--with state support, with credit--the Hungarian experts might achieve much greater success. Under present conditions seeking foreign capital partners and joining with them is the only possible path for further development. This, however, means a sort of exploitation, for we are giving up all our rights."

8984
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HUNGARY: FIFTH GENERATION COMPUTER RESEARCH

Budapest OTLET in Hungarian No 14, 2 Apr 87 p 11

[Unsigned article: "Hungarian Idea, With Western Capital"]

[Text] The Japanese began experiments on fifth generation computers in 1981. These new type computers will be substantially more independent, will be capable of more than their predecessors, and a trained programmer will not be needed to operate them. The usual computers thus far have been so-called recursive machines, they were based on mathematical calculations, and the information came back to the user through multiple transposals. The task had to be modeled, made into an algorithm and sent to the computer this way. This process was repeated in reverse. The level of the new machine is substantially higher than this--the machine itself helps the modeling.

There were various answers to the Japanese challenge. Experts got the most money--a billion dollars--in the United States. Fairly large sums were devoted to this purpose in England, France and the FRG as well. And two programs, named Esprit and Eureka, were born affecting the countries of the European Economic Community. CEMA developed a complex program, building especially on the cooperation of the scientific academies.

"There was theoretical research of this type at the SZAMALK [Computer Technology Applications Enterprise] at the end of the 1970's," said Tamas Gergely, a worker at the SZAMALK, who leads domestic work with fifth generation computers. "We participated in the complex program too. PROLOG become the basic language of the new computers. Actually there are two basic logic languages, LISP and PROLOG. Last summer there was a series of lectures by the fathers of both languages (Kowalski and Robinson) and myself--not because of me personally but because of the character and importance of our work. I talked about the thoretical background of research and development. This is an area where we can make a virtue of our deficiencies--our relative lack of capital, the computer shortage connected with this and the fact that it is difficult for us to get peak technology. The large Western institutions and firms treat scientific achievements in a practical way and seek immediate practical applications. They begin putting together concrete systems and programs.

"So what are we doing? We are trying to recognize laws and principles and develop mathematical methods which will make possible the development of new systems."

Of course, this does not mean that the two areas are sharply divided, there is overlap, nor does it mean that the SZAMALK is not involved with "market production." Their Western partners seek them out with their offers primarily for their scientific and not their practical achievements. The Hungarian researchers are invited to join in joint development, of Hungarian ideas with Western capital. Certainly the most ambitious scientific task of the SZAMALK continues to be the building of a fifth generation computer, and indications are that this will be done within 5-6 years. At present they are at the experimental stage, building models. Naturally the experience and information acquired in the course of continuous experimentation will be used in all areas. Of these the most promising goal is the development of so-called expert systems in which the problem solving models of experts (physicians, teachers) are formed into a system and made generally available.

The largest domestic base for artificial intelligence research is the Computer Technology Research Institute (SZKI). They are vendors for the MPROLOG language and they cooperate with a number of world famous firms, including Siemens. We learned from Balint Domolki, scientific director of the institute, that it is appearing more and more on the international stage. In the fall of 1986 they held an MPROLOG conference and this year they organized a meeting at which they tried to develop a common marketing strategy with the vendors of MPROLOG. Overseas a Canadian firm, a small enterprise named Logicware, sells their products, adapting the programs to better quality machines. Certainly the American market continues to represent the greatest business opportunity but at present this powerful market still awaits exploitation.

8984
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TUNGSRAM MAPS PRODUCTION STRATEGY FOR SEVENTH 5-YEAR PLAN

Budapest HIRADASTECHNIKA in Hungarian No 10, 86 pp 447-448

[Article by Tamas Kenderesy]

[Text] Summary
Beginning in 1983, Tungsram Co. established an independent Development Main Department for the development of electronic devices. This communication describes the results achieved since then and the tasks of the seventh 5-year plan.

At Tungsram Co. the development of electronics was an important consideration even in earlier years, since the planning of light sources, electron tubes, and vacuum-technique machinery was related at a number of points in the area of consumption or control to the specialized area of "industrial electronics." However, there was no unified developmental activity along this line at the enterprise level; the factories subordinate to the overall enterprise did some developmental work beyond their area of competence, but they developed chiefly industrial electronic equipment to meet their own needs. Independent sales of electronic equipment were also minimal, for the reasons described above.

In 1983, in the interest of updating the traditional product structure, Tungsram Co. established the electronics branch as an important new element of its development strategy.

The main lines of activity for carrying out the strategy, that is, the main lines of the tactics to be used, were determined as early as the year in which the branch was established.

These tactics inspired the formulation of that narrower group of electronic products whose manufacture and development, with due regard given among other things to the special circumstances of Tungsram Co., is more advantageous for the branch.

In a broader interpretation, this means that they had to choose a type of product whose manufacture and development would offer as much opportunity as possible for utilizing the enterprise's several decades of experience in machine production and vacuum electronics and its technical background. The marketing of the new products is assured in the long run as well as in the

short run, the volume of the growing production value is suitable for shifting the center of gravity of the enterprise's price income toward electronics. At the same time, the profit content of the new products is higher than the average for the electronics industry. In the case of Tungsram Co., these requirements are satisfied--on the basis of further reasoning--primarily by highly complex industrial electronic products associated with technological machinery.

With the wide-ranging expansion of microprocessor and microcomputer technology, automation was accelerated at an extraordinary pace almost everywhere in the world. As the most important requirement for this rapid rise, during the past few years electronics has become integrated with mechanics, which has produced what is essentially a new branch of industry, known as mechatronics, the demand for which on the world market seems assured for a long period and whose profit content is higher than that of solo machines or electronic products.

An enterprise engaged in mechatronics must have a staff of specialists experienced not only in precision mechanics and machine production but also in high-level electronics and must also have a good production base. Since these requirements were met at Tungsram Co. from the standpoint of mechanics, machine production, and the automation of the manufacturing machinery, it was an obvious decision that an electronics branch should be established in addition to the existing machinery branch, so as to put the enterprise into a potential position that would ensure the manufacture and development both of mechatronics and of purely electronic products.

After the decision to establish the electronics branch, a task of fundamental importance was the rapid buildup of manufacturing and developmental bases.

In the selection of the factories, an obvious decision was to make the enterprise's Konvertagyar a part of the branch, since that factory had specialized primarily in the manufacture of electronic products even before 1983. The other manufacturing base, the former Elektroncso Gyar at Kaposvar, was made a part of the branch because the manufacture of electron tubes was already declining in 1983 and because, as a result of the nature of the sector, the enterprise's technical, physical, and tool base was close to what was needed for the manufacture of electronic products.

At the time of establishing the development organization, the enterprise essentially had no starting base--when considered in proportion to the factories--and thus the buildup of such a base, both with regard to specialists and with regard to tools, had to be started by laying the foundations for the organization.

Following the strategic decision, a sizable fraction of the development organization had been built up by the end of 1984, and it became possible to make substantial developmental energy sources available for the main lines of development within the area of industrial electronics, namely, those of:

ROBOTS, LASERS, MACHINERY CONTROL, AUTOMATION, and INFORMATION DISPLAY.

Parallel with the establishment of the Electronics Development Main Department, the enterprise also built up the Electronics Marketing Main Department, which began the distribution and marketing work associated with the specialized areas listed above.

By 1985 the intensive developmental work had achieved appreciable results, which were characterized by:

- The robot control system for the Betapont welding robot, developed as a part of CEMA cooperation;
- The TLS 61 60-watt CO_2 surgical laser system (Fig. 1);
- The 17 cm, 23 cm, and 31 cm display modules (Fig. 2);
- The control system for the microcomputer fluorescent-tube manufacturing assembly line;
- The multiprocessor theatrical light-control console.

By 1986 the production of the developed equipment had been started, as a result of which the electronics factories can record a price-income increase of 200-250 million forints in 1986.

Parallel with the developmental and manufacturing activity, the energy sources of the factories and of the developmental organization are also being steadily expanded.

During the period of the seventh 5-year plan, we want to develop the electronics branch at a rate considerably higher than the average for the enterprise, in order that by the end of 1990 its share of the enterprise's price income should be 4-5 times the value for 1985, without any change in the number of people working in the branch.
We do not plan to make any substantial changes elsewhere in the main lines of the strategy, which means that we want, as before, to work on the development and manufacture of industrial electronic products--that is, we want to expand our range of products for this area of specialization, in equipment belonging to the categories of robots, lasers, control technology, automation, and information display.

The above list naturally does not include those areas of specialization or those types of equipment which will be required later by a constantly changing and developing market.

Therefore our fundamental tactic is to continue strengthening the energy sources of the branch which are specially designed for industrial electronics and to steer them at all times in the direction of more up-to-date and economical activity.

FIGURE CAPTIONS
Fig. 1. Picture of the TLS 61 Tungsram CO_2 laser.
Fig. 2. Pictures of display modules with 17 cm, 23 cm, and 31 cm screens.

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