JPRS-ELS-87-047
9 SEPTEMBER 1987

FOREIGN BROADCAST INFORMATION SERVICE

JPRS Report

Science & Technology

Europe & Latin America

JPRS-ELS-87-047

9 SEPTEMBER 1987

SCIENCE & TECHNOLOGY

EUROPE & LATIN AMERICA

CONTENTS

MICROELECTRONICS

SCIENCE & TECHNOLOGY POLICY

TECHNOLOGY TRANSFER

/7310

BRIEFS

FRG SUPERCONDUCTOR WORKING GROUPS--Federal Research Minister Heinz Riesenhuber was also visibly seized by "superconductor fever" as he yesterday presented to journalists in Bonn the effect which has had physicists and engineers breathless for several months now. Shrouded in clouds of nitrogen, he presented a small ring made of that new ceramics material in which an astonishing change takes place after cooling down to a temperature of -196° C. At this temperature, the material, which is otherwise completely impermeable to current, abruptly loses its resistance and becomes extremely current-conducting. This effect was possible, using earlier materials, only at temperatures close to the absolute zero point (-273°); these temperatures can be generated with liquid helium only as part of a very expensive procedure. The moment the "aha" effect had faded away, the minister described what he and his ministry are thinking of doing in order to keep up with the international race which started toward the development of these superconducting materials, above all in Japan and the United States. The Research Ministry reacted quickly and made additional funds available for basic research to keep around 30 study groups busy at college institutes. In the meantime, the Karlsruhe Nuclear Research Center developed the ceramics mixture which, already at the temperature of cheap liquid nitrogen, becomes superconducting and which the minister was able to present so effectively yesterday. [Excerpt] [Bonn DIE WELT in German Jul 87 p 10] 5058

CSO: 3698/575

ESA PURSUES POLICY OF INDEPENDENCE IN SPACE PROGRAMS

Brussels KNACK in Dutch 1 Jul 87 pp 107-110

[Article and interview with CNES director Frederic d'Allest and ESA director Reimar Luest, by Lode Willems: "Together if Possible, Alone if Necessary"; first paragraph is introduction]

[Text] The European Space Agency (ESA) wants to achieve space travel on its own by the turn of century. However, this will require a doubling of the budget.

At the Le Bourget aerospace show, ESA exhibited a number of its projects. The eye-catchers were the life-size models of the European space shuttle Hermes and one of the elements of the Columbus program, the MTFF, or Man-Tended Free Flyer, an autonomous space laboratory that can be visited by humans.

As you know, four elements are being considered for the Columbus program: the Attached Pressurized Module (APM), a permanently manned lab linked to the core of the International Space Station that the United States wants to build. The autonomous MTFF. The European Retrievable Carrier (Eureca), an automatic module that is to orbit in the same trajectory as the International Space Station, and the Polar Platform (PPF), a platform for the development of new instruments for earth observation, orbiting in a polar, heliosynchronous path.

The APM will be used for research and applications concerning microgravity or weightlessness, whereby the presence of humans is required almost continually. The Eureca is to be used for 6 months of microgravity experiments, and will then be picked up by the U.S. Space Shuttle and brought back to earth. The MTFF is independent of the space station in part because long-range and absolutely unperturbed microgravity applications are supposed to take place there in the fields of crystal growth and research into new materials. The MTFF will be visited regularly by European astronauts, and Europe itself will provide transportation through the Hermes space shuttle.

On 1 January of this year, Austria became the 13th member state of ESA, following Belgium, Denmark, the FRG, France, Great Britain, Ireland, Italy, the Netherlands, Norway, Spain, Sweden and Switzerland, while Finland is an associate member and Canada is participating in a number of projects.

The first promotor of Europe's independence in space was in fact France, in part through the Ariane project and now through Hermes. As a result, the press conference in one of the ESA pavilions at the beginning of the Le Bourget show was held by Director Frederic d'Allest of the French National Center for Space Studies (CNES), in addition to ESA director Professor Reimar Luest (63), proclaimed on 12 December 1986 the "Science Figure of the Year" by an international jury of prominent scientists for his contribution to the space program. Reimar Luest, who had previously spent 12 years as the chairman of the Max Planck Gesellschaft, is now entering into his third year as head of ESA, and in this capacity he is a dogged advocate of more financing of peaceful space research by ESA member states.

Double Budget

"ESA and all organizations in Europe that are involved in space travel are ready to make more wide-scale use of the possibilities offered by space," Luest said in Paris. "What are these possibilities? Observation of the earth for purpose of exploiting raw materials, for meteorology, as well as for protection of the environment, will make earth observation very important. Communication via satellite will increase in scope. And finally, last but not least, space science is an important component of space activities. For all this, Europe needs a new step forward. And the three pillars with which to expand Europe's space activities are the Ariane-5, Hermes and Columbus projects.

"Within the ESA and in the companies, preparations for these three big projects have reached the stage at which we are finding that the necessary political decisions must be made, as early as this year. These political decisions are now possible, since the cost estimates are available. Industry has completed the necessary technical preparations. Our proposals for Ariane-5, Hermes and Columbus contain very detailed technical specifications, very detailed cost estimates and very detailed timetables for all the projects. We have completed an exhaustive plan with cost estimates up to the year 2000. The decision must be made before the end of this year because the projects are at a stage such that European industry can no longer wait without serious difficulty arising in keeping the teams together.

"We are also convinced that a decision must be made on these projects simultaneously, because all three are technically interlinked. Ariane-5 is necessary so that Europe can remain competitive on the market for satellite launches, but it will also be the carrier rocket for the European elements of the International Space Station and the rocket for launching the Hermes space shuttle. To this end, our space budget must be doubled.

"At this moment, the ESA budget is about 1.5 billion computational units in size (The ESA budget is expressed in computational units, calculated on the basis of the average value of the ECU from June of the previous year, Ed.). For our projects, an increase in the magnitude of 2.5 billion computational units a year is necessary. I call attention to the fact that even with this increase, Europe would still be spending a fraction of what the United States spends on civilian space projects alone--to say nothing of their military space expenditures."

Luest is joined here by Director d'Allest of CNES: "This involves an important step for Europe, comparable to the decisions of 10 or 15 years ago. France's position is one of great willingness to support European cooperation. The importance of manned space travel goes well beyond the significance of the momentous programs on the level of science and its applications. We want to prepare Europe for manned space travel by the turn of the century, and we must be capable of putting ever-larger and more complex structures into space and of putting observatories and laboratories into orbit.

Europe's Independence

KNACK: MTFF is intended to be linked to Hermes. Does MTFF have priority over other Columbus projects?

D'Allest: France feels that Europe's independence in space must result primarily from autonomous programs. We see MTFF as a very important building block of the European space station in 20 or 30 years. Hermes and MTFF must be compatible. This does not mean that we would not support the other elements of Columbus.

KNACK: And what if the United States wants to use the space station in part for strategic defense purposes?

Luest: In the negotiations between the United States and the European countries, we have reached the point at which it has been stipulated clearly and unequivocally that the space station will only be used for peaceful purposes. Our convention states that ESA will promote research, technology and its applications in space for exclusively peaceful purposes, and we are unflinching in holding to our convention.

KNACK: Is it true that thought is being given to the possibility of docking Hermes with the Soviet Mir space station?

Luest: I think that it would be a good idea if all current and future space powers would design their equipment such that they can all help each other. This means that Hermes should be able to dock at the International Space Station and hopefully at Soviet space stations as well. But discussion on this has only just gotten under way. I hope that a technical solution will be found for this and that it will be accepted politically as well.

KNACK: So cooperation with the USSR as well?

Luest: Europe is already cooperating with the USSR, especially in the area of space technology. And the most spectacular project was the Halley mission, whereby Europe cooperated not only with the USSR, but also with the United States and Japan. The Soviet Vega probes were essential for determining the exact position of the comet in order to steer the European Giotto probe as precisely as possible. Now we are talking about further cooperation, not only in space technology, but also in conjunction with microgravity research, biology and possibly new materials as well. I hope that there are good opportunities for this type of cooperation and, as I said, for docking Hermes at Soviet space stations.

D'Allest: As you know, CNES has been working together with the USSR for more than 20 years, as well as with the United States. France is in favor of giving Hermes docking options for space craft of any country, American and Mir as well. It is clearly in the interest of all countries that they be able to make use of each other's resources. After all, in the case of a serious mishap, one space craft must be able to hurry to the assistance of another. It is inconceivable that such a thing might not be possible, and I feel that it is possible to reach an agreement on this.

KNACK: Is Europe's pursuit of independence not getting in the way of cooperation with NASA? Europe wants to have its own space station by the next century, allowing it to say, thanks United States, and so long.

Luest: At the ESA Council of Ministers in Rome 2 years ago it was clearly agreed that Europe must strive towards autonomy, but that autonomy is not an obstacle to cooperation with the other space nations, in particular with the United States. It was in this sense that President Reagan's invitation to Europe to participate in the space station was accepted. But at that conference in Rome, the ministers were also loud and clear in stipulating the conditions for this cooperation, and at this moment negotiations are still under way between the United States and Europe to see whether these conditions can be met, and there are also negotiations going on between NASA and ESA. The two most important points--among others--are first of all that we want to set up a partnership and secondly that Europe wants full jurisdiction and control over all the elements that Europe would contribute.

D'Allest: We are not opposed to cooperational autonomy. We are in favor of cooperation with the United States, the USSR and other countries. What matters is our own control over our important decisions. We want the best access to space.

Luest: I agree. In conclusion I would add this: Europe has about the same number of inhabitants as the United States, even in fact a little more. We have the same economic strength. Why then should Europe not be able to support its own space program? And in my opinion, autonomy also means that Europe must have the ability, if necessary, to do everything by itself.

On the other hand, I can foresee there being many projects around the year 2000 whereby cooperation is more advantageous for the United States and Europe, as a result of the enormous expansion of the scale of space projects. But the point is that the presence of man in space is very important and that for that reason everyone should have their own independent access to space.

[Box, p 108]

The European Shuttle

It is unfair to call Hermes the European mini-shuttle. It is true that its dimensions are more modest than that of the American Space Shuttle, but Hermes is of an entirely different design. Hermes is a space airplane that is mounted atop the Ariane-5 carrier rocket for launching. It is thus positioned above the booster and is not attached alongside it with bolts that must absorb an enormous amount of vibration, like the Shuttle.

In the first design of the space craft, no escape provisions were included for astronauts should some danger develop during launch. But it was not only the Americans who learned some lessons from the Challenger disaster. On 26 January of this year, the advisory committee for the safety of Hermes met for the first time. This committee is made up of 10 experts from ESA member states with recognized competence in safety issues in various fields of high technology, ranging from nuclear energy to aerospace technology to medicine. It is chaired by M.P. Govaerts of Belgium. Their recommendations were included in the new design in March. In actuality, they adopted the suggestions made years ago in a report by European astronaut Jean-Loup Chretien: In case of emergency, it must be possible for the cabin with the crew to separate and land with three parachutes.

The European Hermes space craft will be 15 meters long with a wingspan of 10 meters. It can transport a crew of three persons.

The two solid-fuel rockets of Ariane-5 have a total of 230 tons of fuel at launch instead of the previously designed 190 tons, and the middle stage contains 155 tons of liquid fuel instead of 140 tons. The total weight of Hermes itself is 21 tons, containing a three-ton payload plus 1.5 tons of fuel for independent maneuvers. Hermes will be put into a circular LEO (low earth orbit) at 500 km with an inclination of 28.5 degrees.

The craft, which like the Shuttle glides to its landing after reentering the atmosphere, is to provide transportation for the European MTFF (Man-Tended Free Flyer) module, where it can dock. ESA is also a proponent of docking compatibility with space craft and space stations of other nations. The Soviets are also in favor of this, but after the successful Apollo-Soyuz docking experiment in 1976, the mood in the United States has changed and NASA has rejected Soviet proposals in this regard for the Shuttle, for example. In view of the fact that the Europeans want to deal with both countries--in order to be able to give or get help from either one in the case of emergency--it will presumably be a matter of talking the Americans into adopting a more liberal position on docking, since Hermes can scarcely be burdened with the weight of having two different docking systems. One uniformly international docking system for everyone appears to us to be the only logical solution.

Hermes is to be operational by the turn of the century, around 1996. Its most important task will be to provide shuttle transportation to the MTFF, about every 6 months, with deliveries of scientific and technical materials, experiments, maintenance supplies and provisions. The three-person crew plays an important role in all this, and there is no longer any doubt that humans will be indispensible for the exploration of the sixth ocean, regardless of how useful automatic satellites and probes may be.

The Hermes missions will last 11 days, 7 of them docked to the MTFF, but this can be extended to 28 days, 23 of them docked to the MTFF.

In addition, Hermes can also conduct flights to visit other space stations, in particular the International Space Station, in addition to Soviet stations.

Hermes will also be used to service and maintain automatic satellites and platforms. Structures are, after all, being put into space that are intended to function for 15 to 20 years, and they will at some point require some sort of repair work or replacements.

12271
CSO: 3698/594

ESA MEMBERS VOICE DOUBTS ABOUT PLANNED LARGE PROJECTS

Frankfurt/Main FRANKFURTER ALLGEMEINE ZEITUNG in German 25 Jul 87 p 4

[Article: "Reservations Concerning Overly Expensive Space Flight. Criticism in European Capitals of Costs and Concepts"]

[Text] Bonn, 24 Jul (KB)--Most of the governments of the nations involved in European space flight still harbor considerable reservations about current plans for joint large-scale projects. Decisions are expected to be made at a meeting of the ministers council of the European Space Agency (ESA), set for November 9 and 10, but to date many questions remain unresolved. In difficult deliberations between the ESA and the individual nations, attempts are currently still under way to work out a concept on which the majority can agree. The basis is a long-term program by ESA Director General Luest. Since the date of the ministers meeting has been set, the FRG cabinet wants to adopt its resolutions regarding future German participation in the space program by the end of October.

In the meantime, resistance is increasing within many governments to expensive European space programs. Nearly everywhere, except Paris, there is concern that the costs of space projects are increasing so fast that the financial effects on national budgets are becoming unmanageable. This is confirmed primarily by information provided to this newspaper from London and The Hague concerning what happened at the last meeting of the ESA council at the end of June in Paris. The French government alone had referred to the ESA outlay of funds as not ambitious enough. Both the British and Dutch governments point out over and over again that each of the three planned projects--the more powerful Ariane V rocket, the Hermes space shuttle, and European participation in the American manned space station Columbus--costs more than European space flight has cost to date. Europe would be taking incalculable risks, it is said in London, and ought to proceed one step at a time on solid financial ground.

FRG Finance Minister Stoltenberg has long feared that expenditures for such projects cannot be kept under control. Research Minister Riesenhuber determined some time ago that the projects could not be justified in terms of research policy alone and that therefore the funds could not come exclusively from his budget at the expense of support for other research. The Federal Association of German Industry has now also advised against overly expensive

space flight. In the coming years, the German contribution to the ESA projects by this top industrial association is calculated to be at least DM 2 billion annually. There are also estimates that by the end of the 1990's, DM 3 to 4 billion, including price increases, will have to be paid from the federal budget alone if the projects are to be realized as recommended by the ESA.

The ESA has been informed by the Belgian, Danish and Swedish governments that it is extremely doubtful that the decisions regarding the co-financing of further development can be made by November. Several countries are also pointing out open technical questions, so a final ESA resolution is considered impossible at the moment. Governments are also expressing scepticism about whether there are even enough qualified personnel available in Europe to execute all three projects at once.

In order to facilitate the discussions at the ESA meeting in the fall, the directorate general has offered the suggestion that the program be extended. This measure is intended to keep the annual contributions of the individual nations within bounds. But there is also resistance forming against this idea. The reply to the ESA is that extension would only drive costs even higher. Crucial is the realization of a joint European program at an overall uniform cost level which would achieve the most important goals.

12552
CSO: 3698/606

MBB DETAILS LOSSES DUE TO AIRBUS FUNDING, INDICATES STRATEGY

Duesseldorf HANDELSBLATT in German 22 Jul 87 p 11

[Article by "gw": "Only at 2 DM to the Dollar Can the A 320 Be Sold Without a Loss"]

[Text] Munich, 21 Jul--For the first time since 1969, the largest German aviation and aerospace concern, Messerschmitt-Boelkow-Blohm GmbH (MBB) of Munich-Ottobrunn, is showing a loss for the fiscal year 1986: Below the line is a year's net loss of DM 103.7 million and a consolidated loss of DM 101.3 million, which is linked above all to the old indebtedness reorganization share for the Airbus of DM 150 million.

Financial head Dr. Johannes Broschwitz put the MBB Airbus losses in 1986 at about DM 200 million (1985: DM 130 million). For the expansion of the Airbus program by way of the A 330/A 340 planes another DM 150 million must be raised, so that in 1987 also an Airbus loss of DM 95 million must be allowed for. In all, the subsidiary Deutsche Airbus GmbH is being furnished DM 300 million in order to reduce its accumulated losses of about DM 2.3 billion. The Federal Government and the MBB are making available a total of DM 1.9 billion for the old indebtedness reorganization. In 1986 alone, about DM 400 million in losses were brought in by the Deutsche Airbus GmbH.

Broschwitz stated that the loss from business operations at MBB was DM 70 million. Of course, here prepayments and foreign exchange losses of DM 60 million (previous year: DM 90 million)--not including Airbus foreign exchange losses--also played a large role: Although the sales declined by 6 percent to DM 5.635 billion, the manpower force was increased, above all in the development divisions, so that the number of workers rose to 37,642 (36,915) employees. This led to an increase in employment costs to DM 2.61 (2.41) billion.

In addition to this, there were also adverse impacts in the civilian helicopter business. Moreover, sales in the normally profitable sector of defense technology declined to DM 1.36 (1.52) billion. Also the export revenues in this sector dropped in 1986 to DM 120 (150) million, and they are likely to decline further in the current year. In addition, about DM 30 million in foreign-exchange losses are expected for 1987. Even though the year's loss by MBB arose primarily because of drains from Airbus, nevertheless

the additive effect of numerous negative profit-diminishing factors was also present. The plan of the MBB board of directors anticipates that the overall business will be in the black only from 1988 on, announced the chairman of the managing board, Dr. Hanns Arnt Vogels. Thus, he said, just the current year will bring an increase to DM 6.3 billion in sales and DM 4.1 billion in company-manufactured assets. The volume of orders will climb to over DM 10 billion, yet the profit situation will remained strained because of the shifts in the sales structure.

However, the coming years at MBB will be increasingly marked by the launching of profitable international programs of defense technology and by an acceleration of civilian large-aircraft building, stressed Vogels. He expects about DM 9.5 billion in sales for 1990. Thus, even in 1987 Airbus manufacturing will come to at least three wide-body aircraft A 300/A 310's and two A 320's monthly. In sight for the end of 1988 is a monthly production of six A 320's and four A 300/A 310's, although because of the smaller fraction of production going to the A 320 this by no means signifies a doubling of production compared to 1987. As early as in 1989, eight A 320's are to be manufactured monthly. But this considerable acceleration of turnover by 1990 will not be accompanied by a corresponding expansion of personnel for the overall MBB concern, stressed Vogels.

Finally, MBB is to make an additional contribution to improving the profit situation at Airbus by way of cost economies. But the ideas of the Federal Government and the MBB still diverge quite a bit about the capacities for such economies, Vogels admitted. In any case, a total of 455 A 300/A 310's had been sold by the end of May, of which 370 airplanes have been delivered as of this time.

So far, a total of 200 airplanes of the "small" Airbus A 320 type have been sold to 17 customers. With the first assembly-line airplane having reached its destination just recently, now a sharp acceleration of mass production is being planned. Of the A 330/A 340's that will not go into production until in the 1990's, it has already proved possible to book orders for 70 sales and 60 options. The proportion of Airbus business and thus the fraction of civilian business, which was about 46 percent in 1986, will increase in the coming years. However, it is said that the Airbus A 320 can be sold without a loss only at a dollar exchange rate of 2 DM.

Of course, the currently difficult profit situation of MBB is fostering the desire for and the rumors about an industrial control for the firm. "I will not say what is in my cerebral convolutions about this issue," responded MBB head Vogels to questions from journalists. Even since Ludwig Boelkow's time, the MBB management has been of the opinion that one integrated German aviation and aerospace concern--thus including Dornier--would be a great advantage.

However, it is said, the realization of this goal under the already all-too-powerful and by now diversified Mercedes-Star, which would have to take over the industrial control, has become rather more difficult, especially since the only solvent German airplane-engine builder, MTU-Munich, now also belongs to the Daimler concern. In view of the fact that certain important key personalities of aviation and aerospace prefer such a solution, in the next few

months there could be movement again in the MBB stockholder structure.

Because of the expansion in sales of MBB, the question naturally also arises of an increase in capital stock. But Vogels does not want to tackle this issue until in 1988, when no more figures in the red will be generated. Of vital concern to the future of the helicopter division, whose sales rose in 1986 to DM 457 (334 previously) million, was the agreement between the German and French defense ministers on the joint anti-tank helicopter PAH 2 project, asserted the MBB head. But the PAH 2 (German budget: DM 6 billion) will be flying only in 1994 at the earliest. In order to close this gap until then, a program of combat effectiveness upgrading for 212 PAH-1's is to be effected, which will include a night-operations capability; the total amount for this project comes to about DM 700 million.

In military aircraft construction, all hopes are being concentrated on the fighter JF90 program. The budget estimate by the German pentagon for this is between DM 20 to 25 billion, and added to this would be another DM 7 billion of development costs. In 1986, the Tornado program's share in the total output of MBB was 25 percent. Of the 359 combat aircraft for the Bundeswehr, 256 have already been delivered. It is said that not least thanks to the Tornado exports to Saudi Arabia and Oman and because of repeat orders, no slump in the utilization of capacities can happen in connection with military aircraft. The diversification division, whose sales should increase from a present DM 260 million to about DM 450 million by 1990/91, is likely to achieve the break-even point only at the end of this decade.

12114
CSO: 3698/602

AIRBUS LOSSES DRIVE MBB INTO RED

Munich SUEDDEUTSCHE ZEITUNG in German 22 Jul 87 p 23

[Article: "High Airbus Losses Drive MBB Into Red. Deficit Years in 1986 and 1987. Profits and Further Expansion Again Expected Over Long Term"]

[Text] Munich--In 1986, for the first time since the merger with Messerschmitt and Hamburger Flugzeugbau in 1969, Messerschmitt-Boelkow-Blohm GmbH (MBB) of Ottobrunn near Munich showed a loss--to the tune of DM 103.7 million on the heels of a DM 108 million surplus the year before. The leading cause was Airbus debts which nade it necessary to transfer capital to its wholly-owned subsidiary Deutsche Airbus GmbH (DA). Financial plans indicate red ink in the amount of DM 95 million for this year as well. Export problems due to the unfavorable exchange rate of the dollar, delays in incoming orders and setbacks in the space programs caused sales to fall in 1986 to DM 5.63 (6.01) billion. However, an increase to DM 6.3 billion is again expected this year, and by 1990 DM 9.5 billion is being aimed for. (See also commentary, p 4.)

The subject of Airbus took up considerable time at the press conference on the financial statement. Financial manager, Johannes Broschwitz, pointed out that in the second half of this year DM 150 million will be transferred to DA for capital reconstruction of so-called "old debts" from the A 300/A 310 program, but that these figures were already included in the 1986 financial statement. Added to that is another DM 150 million for the startup financing of the new A 330/A 340 programs. With this sum, the Airbus subsidiary's capital will probably be raised to DM 450 million by the end of this year. The "old debts" mentioned refer to loan commitments (interest and repayment) which were originally to be paid off by 1994. Given the losses due to the falling dollar, this now appears impossible, and so the FRG government has agreed to assume the DM 1.9 billion debt in place of the banks. MBB's own contribution is the DM 150 million.

DA chief executive officer, Rolf Sievert, pointed out that his company has suffered a cumulative loss to date of over DM 2 billion from serial financing of the A 300/310--DM 400 million alone in the past year. For the A 320 and 330/340 programs, no federal guarantees but rather federal loans are planned, he said. Bonn wants to gradually withdraw from the serial program financing. Sales of the A 320 are covering its costs, although a dollar exchange rate of

DM 2 is being assigned. The FRG government, he said, expects MBB to reduce costs.

Military Version, Too?

Company CEO Vogels said, "Our planning assumes that as of 1988 no further Airbus losses will occur and no new transfer of capital to DA will be needed." Without the latter there would have also been no losses in 1986 and 1987. Management would endeavor, he said, to bring about future sales increases without substantial increases in personnel. On the other hand, there are also currently no plans for specific layoffs. In terms of fixed costs, the company will take advantage of natural attrition. Of the 455 model A 300/A 310 aircraft sold by the end of May, said Vogels, 370 have already been delivered. By June, 290 model A 320 aircraft had been sold. The monthly production rate is to be increased from currently just over five (3.2 wide-body aircraft and two A 320's) to 10 (six A 320's and four wide-bodies) by the end of 1988. According to Vogels, military versions of the Airbus are also being considered, although apparently no specific model is under consideration as yet.

"Not Overly Concerned"

Currently about one-quarter of MBB's activities involve Airbus and another one-quarter involve the Tornado combat aircraft. By the end of June, 933 Tornados had been ordered; 359 of them were for the Bundeswehr, 256 of which

Table 1. MBB Figures (in millions of DM)

Category	1986	Percent of sales	1985
Sales	5,635		6,011
from Aircraft construction	3,214	57	3,181
military	1,617	29	1,586
civilian	1,597	28	1,595
Military technology	1,359	24	1,520
Rotary wing aircraft	457	8	334
Aerospace	358	7	757
Other	247	4	219
Total output	5,788		5,890
Gross proceeds	3,796		3,849
Personnel costs	2,613		2,408
Investment in material assets	448		320
Cash flow, gross (1)	325.6		558.1
Cash flow, net (2)	260.1		423.8
Year's result	- 103.7		108.9
In percent of sales	- 1.8		1.8
Employees (as of 31 Dec.)	37,642		36,915

(1) Year's surplus + depreciation + transfer/imposition of separate items with reserves + taxes on income, profit and net worth + transfer of retirement fund reserves.
(2) Without taxes on income, profit and net worth

have been delivered to date. Regarding recent talk of a possible German withdrawal from the Jaeger 90 program, Vogels said he was "not overly concerned" by this and added, "I would, however, have doubts about many things if this program is undermined." From the current point of view it represents about DM 7 billion in development costs and a procurement volume of DM 20 to 25 billion for the FRG alone. Vogels also added, however, that some kind of alternative would be found if this program were to be abandoned.

Relief Over "PAH 2"

MBB learned with obvious great relief of the agreement in principle between Germany and France on the construction of the PAH 2 antitank helicopter. Development costs of DM 2.2 billion and procurement costs of approximately DM 6 billion are envisioned with this project. But since the first models are not expected to be delivered before 1996, the company is attempting to acquire a combat effectiveness upgrading program for the PAH 1 which could be worth approximately DM 700 million. According to Vogels, concern that there could be acute gaps in capacity utilization has lessened: "In our five-year plans we are not assuming clearcut declines."

Table 2. From the MBB Financial Statement (in millions of DM)

Assets	1986	1985	Liabilities	1986	1985
Fixed capital	1686	1533	Equity capital	868	871
Working capital	4641	4814	Reserves, retirem.	501	451
Inventory	1367	1559	Reserves, other	2570	2544
Accounts receivable	1576	1952	Long-term obligations	518	498
Cash assets	461	473	Maintenance payments	693	606
Other working capital	1706	1312	Other obligations	1292	1429
Balance sheet total	6445	6438	Balance sheet profit	--	36

In his words, the business situation is still tense in the aerospace sector, due primarily to delays with the shuttle and the European Ariane rocket. This area of the business, in which Vogels has taken over the management himself, will not make a positive contribution to MBB's earnings again until 1988. The areas of diversification in 1986 had sales of around DM 270 million; by 1990 it is hoped that the profit threshold can be reached with about DM 450 million. These areas concentrate on data technology and electronics, plastics technology, freight car and machine construction, as well as power and process engineering. Among other things mentioned by Vogels in this regard was the direct conversion of solar rays into electrical power using photovoltaics.

No Comment on Daimler

The head of MBB was very cautious in his statements regarding questions of equity capital holdings. He did not want to comment on possible participation by Daimler-Benz in MBB or renewed participation by the Daimler subsidiary, Dornier, in Deutsche Airbus GmbH, but there was something "rolling around in his head." Debit years like 1986/87, he said, are not appropriate for an increase in capital stock at MBB, although there has already been speculation to this effect.

12552
CSO: 3698/606

'F4' WINDTUNNEL EXPECTED IN 2 YEARS FOR HERMES TESTING

Paris AFP SCIENCES in French 26 Mar 87 p 21

[Text] French and European windtunnels lack air. To simulate all mechanisms for reentry into the atmosphere and landing by the future Hermes European space mini-shuttle, the engineers are asking that a new hypersonic windtunnel be built for them.

For this shuttle designed for four to six astronauts and which should be flying by 1995, safety takes precedence: uncertainties about performance in hypersonic flight at more than Mach 25 by a space shuttle must be reduced to the minimum. When this glider returns into the atmosphere, the usual calculations are no longer valid.

The speed of a space shuttle varies between 28,000 and a few hundred kilometers per hour, with temperatures on the fuselage possibly exceeding 1,500 degrees--an area of flight about which little is known. Gross errors are not impossible, and NASA had a few cold sweats at the time of the first flight by the shuttle "Columbia" in 1981.

"Now we know that this first flight just missed being dramatic due to an error in estimating the stability of the craft at hypersonic speed," explains Claude Capelier, chief of aerodynamics at the National Office for Aerospace Studies and Research (ONERA).

"Although the piloting controls had been checked out, they turned out to be incapable of ensuring flight control, and the pilot had to resort to makeshift measures, including utilization of a lucky bit of leftover fuel for the attitude jets," he explains. This error occurred despite 70,000 hours of windtunnel tests, however, in an area of speeds and temperatures far removed from actual conditions. The engineers had to extrapolate, which implies error risks, primarily because of insufficient knowledge about the phenomenon of real gases.

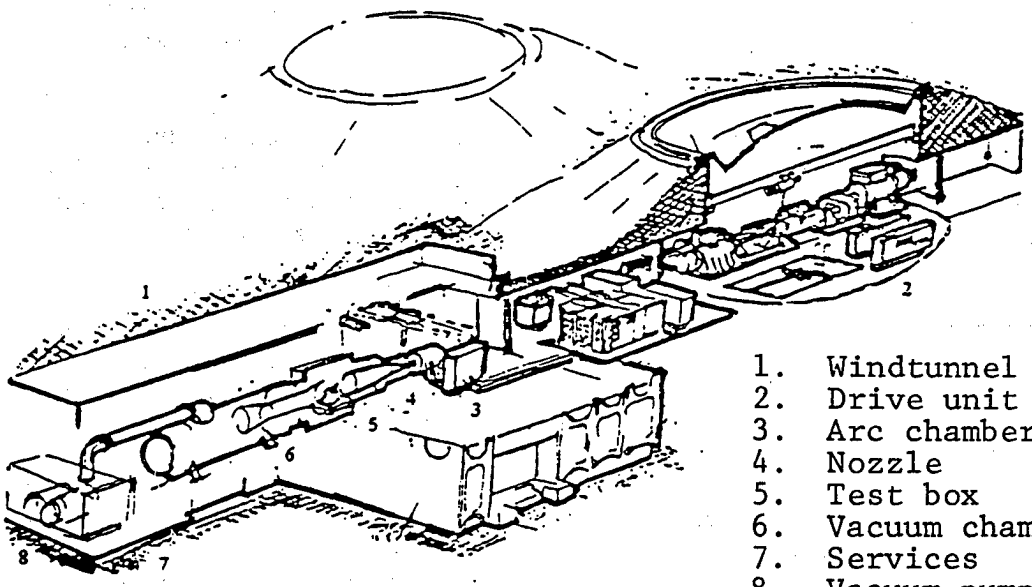
When air flows at Mach 25 over the shuttle's fuselage at temperatures of several thousand degrees C, the oxygen and nitrogen in the air surrounding it undergo a physical change, which consequenctly alters the laws of aerodynamics acceptable for fighter aircraft, for example. These complex

phenomena have been studied only for nuclear missile warheads, which are not required to fly.

So, to simulate this hypersonic flight by Hermes more closely, there was for the ONERA specialists only one solution available: construction of F4, an impressive windtunnel which would simulate flight conditions very closely. But to execute this is a technological achievement in itself.

To create gale wind forces at thousands of kilometers per hour and at thousands of degrees for a tenth of a second over a Hermes 40 cm long, the engineers will have to produce miracles.

Supplying energy to the electric arc which will release the blast will require a power station to supply 100 mW in a few fractions of a second. The inertia factor, having to accumulate all this energy only to release it suddenly, will have the energy of a 15-ton weight, falling from an altitude of 2,700 meters. A veritable bomb which the engineers prefer to bury, at Fauga near Toulouse, in an earth and concrete crater. This project is worth Fr 50 million, and will reportedly be carried out in 2 years.



1. Windtunnel building
2. Drive unit
3. Arc chamber
4. Nozzle
5. Test box
6. Vacuum chamber
7. Services
8. Vacuum pump

9436/9599
CSO: 3698/528

BRIEFS

FRG SPACE CUTS RUMORED--The participation of the Federal Republic in the three major space projects "Columbus," "Ariane 5," and "Hermes," about which a final decision is to be made at the end of September, obviously has not yet produced a new situation because of the growing expenditures which are running into the billions and because the overall concept has still not been spelled out clearly. Following a coalition conference on Thursday night with Federal Chancellor Helmut Kohl, which was attended by the pertinent ministers and by CSU [Christian Social Union] boss Franz Josef Strauss, rumors were making the rounds in Bonn on Friday to the effect that only a "slimmed-down" space program was now under consideration. According to usually well-informed circles, serious consideration is now being given to equip the "Columbus" laboratory element, which is earmarked for the permanently manned American space station, with less technical precision devices then had been planned. The "Hermes" space glider project, propagated by France, is to be scaled down to a "Mini"-Hermes and is to be sent out into space, unmanned, with the help of the already available "Ariane IV" rocket. This means that "Ariane 5" would also have been put on ice. [Text] [Bonn DIE WELT in German 4 Jul 87 p 8] 5058

FRG SPACE ACTIVITIES--Bundestag technical committees have been making important decisions affecting German space travel. Although Bonn does not intend to make a decision before fall on FRG participation in the European space projects Columbus (orbiting space station), Ariane (launch rocket), and Hermes (space shuttle), the Budget Committee has approved an additional DM 255 million for Federal Research Minister Heinz Riesenhuber (CDU) to cover preliminary work. At the same time, the Research Committee laid the groundwork for a new organizational form for coordinating German space travel interests, for which the industries involved have been lobbying for some time. After weighing the merits of various models, the Riesenhuber Ministry has come out supporting creation of a private management organization, thus opposing the plan for a public-funded space agency.This management company which Riesenhuber is favoring is supposed to coordinate the interests of the Federal Ministry closely, but will leave political responsibility to the individual ministries. The company could take the legal form of a Federal Corporation (with the federal government acting as sole partner) or an affiliate of an existing federal enterprise. It would have to feature 300 planning stations. In spite of this proposal, the details are not supposed to be finalized until fall.In conjunction with the newly organized German space travel activities, indications have also been made on financial needs through the year 2000. According to these figures, the three large-scale projects, Columbus, Ariane, and Hermes, could cost as much as DM 60 billion at today's prices, with the

FRG covering about one third the cost. This year Research Ministry expenditures of the for space travel activities will be about DM 1.1 billion and should increase to DM 1.6 billion per year by 1990. Committee members share the opinion that given the magnitude of these figures, it is clear that the large-scale projects cannot be partly financed from the funds available to the Research Ministry. These funds would have to be provided as additional money by Finance Minister Gerhard Stoltenberg. However, given the present status of things, no one is ready to discuss these questions with reference to the budget. [Article by NS: "Bonn Approves More Money for Space Travel"] [Text] [Munich SUEDDEUTSCHE ZEITUNG in German 25 Jun 87 p 30] 13127

SEPTEMBER 8 ARIANE LAUNCH--On-site CNES representatives have indicated to local officials that the next Ariane launch, which will mark the resumption of launches of the European rocket after an interruption of more than fifteen months, should occur next September 8 at the Kourou Space Center (French Guiana). The firm Arianespace, in charge of marketing the launches, indicated that no official calendar has yet been set, but does not deny the information that had been revealed on July 7 by RFO (Radio-France Outre-mer) in Guiana. This 19th Ariane launch should place in orbit the telecommunications satellites AUSSAT K-3 (Australian) and ECS-4 (Eutelsat). In addition to this launch, two other launches are still planned between now and the end of the year. The tests of the rocket's third-stage engine, responsible for the failure of the 18th launch and since modified, are almost finished at SEP [European Propulsion Company] in Vernon (Eure). [Text] [Paris AFP SCIENCES in French 16 Jul 1987 p 14]

AIR FRANCE BUYS A-340'S--The board of directors of Air France has approved the purchase by the national company of seven Airbus A-340's as well as an option for four others. The delivery schedule is as follows: two aircraft in May and June of 1993, two more in February and March 1994, and three in the first quarter of 1995. Air France plans to use these Airbus A-340's on some of its routes to the United States, South America and Asia. [Text] [Paris LE FIGARO in French 9 Jul 87 p 19]

CSO: 3698/579

PEUGEOT, RENAULT USING AEROSPATIALE'S CAR TESTING EQUIPMENT

Paris L'USINE NOUVELLE in French 14 May 87 p 65

[Article by Marc Chabreuil: "The Automobile 'Hardens' Its Chips"; first paragraph is L'USINE NOUVELLE introduction]

[Text] Aerospatiale puts "parasite simulators" at the disposal of private companies.

In Les Mureaux, only a few dozen meters from the immense hall where the Ariane rockets are assembled, Aerospatiale technicians bustle around two cars, seemingly standard models. However, their interiors are stuffed with electronic circuits. Here, PSA [Peugeot SA] and Renault have formed a GIE [economic interest group] for R&D to prepare tomorrow's vehicle.

This car of the 1990's will have an impressive number of circuits: icy road detection, anticollision system, surveillance of the driver's alertness by analyzing steering wheel movements, etc. To avoid excessive complexity of the cabling system, which would be heavy and unreliable, the manufacturers will have to apply multiplexing. However, the single cable (bus) that routes orders coming from one or more microprocessors in several places is allergic to all kinds of parasites. There are more and more electromagnetic pollution sources: television transmitters, radars, high tension lines, etc. The only solution is to make these systems insensitive to such phenomena, i.e., "harden" them, as they say in military jargon. This is a specialty of Aerospatiale's strategic and space systems division, which has access to testing and measuring facilities that are unique in Europe: Pegase and Super-Pegase.

Large enough to be used for cars (4 and 8 cubic meters), these two computer-controlled installations have been put at the disposal of the PSA-Renault GIE for some Fr 15,000 per day. The tested vehicle is subjected to an electromagnetic field with an amplitude varying between 5 and 500 kV/m and a scanning frequency of up to 100 MHz. An optical fiber network of sensors responding to field, intensity, tension, etc. throughout the car determines the exact level of aggressivity to which the electronic circuits are subjected. GIE will thus gradually validate its filtration calculation methods and define protection specifications.

The use of these interference simulators originally developed for missiles will not be limited to cars. According to Jean-Claude Baert, a member of Aerospatiale's new products team responsible for implementing advanced techniques and technologies, there are multiple applications: nuclear safety; civil security; switchboards; air, ground, and sea transport; telecommunications; and even data processing.

In short, the simulators can be applied in all those sectors where losses of information due to electromagnetic disturbances can have disastrous consequences.

25048
CSO: 3698/A237

BRIEFS

FRENCH-SWISS ACCELEROMETERS--The company Metravib, the French Institute of Electricity and Electronics Engineering (ESIEE) and the Swiss Electronics and Microtechnology Center (CSEM) in Neuchatel have agreed to collaborate on a project for the design and manufacture of miniature accelerometers using an integration technique with a suspended arm. The potential market is very great, notably in the field of automobiles. The ESIEE which is responsible for the study phase of the project is initially aiming at integrating the synchronous detection into the component by the end of 1987. With the assistance of silicium smelters, it will then attempt to complete the digital filtering through the component. For the time being, the ESIEE has produced a prototype with a 4-beam symmetrical structure (providing compensation for oblique component forces) and micro-machined overburdening in the polysilicium. The first units are scheduled to be marketed by the end of 1988 with the assistance of the CSEM which is responsible for the pre-industrialization stage (100,000 pre-series units available by the end of 1987). Metravib, a company specializing in measuring and processing vibrations and noise, has been selected to control the project for which the total investment will be 92 million francs by 1990. Half of this sum will be in the form of a subsidy under the EEC EUREKA program. [Text] [Paris FTS--FRENCH TECHNOLOGY SURVEY in English May 87 p 4]

CSO: 3698/A278

ITALIAN BIOTECHNOLOGY RESEARCH

Milan BIOTEC in Italian Jan 87 pp 20-25

[Article by Maurizio Iaccarino, director of the Naples CNR Institute of Genetics and Biophysics, and Pier Luigi Sparapani, an official of Microbiological Processes Development at Pierrel S.p.A. in Capua: "Spotlight on Antibiotics"]

[Text] The molecular biology of Streptomyces erythreus is finding immediate applications.

Genetic engineering applications in the field of antibiotic biosynthesis are being widely discussed. Prof D. A. Hopwood's group at the J. Innes Institute of Norwich, Great Britain, has done basic research in developing new methods and techniques for transferring Streptomyces genes (Hopwood, 1986). We are now also receiving information on genes for the biosynthesis of antibiotics and their organization into productive Streptomyces cultures. Thus, for example, genes have been cloned for the biosynthesis of undecylprodigiosin (Feitelson et al., 1983 and 1985), actinorhodine (Malpartida and Hopwood, 1984) and erythromycin (Stanzak et al., 1985). Various communications at the recent (September 1986) Symposium on the Genetics of Industrial Microorganisms (GIM) at Spalato also report preliminary data on the cloning of genes for the biosynthesis of other antibiotics such as tylosine, oxytetracycline, streptomycin and tetracenomycin.

Collaboration between the laboratories of the International Institute of Genetics and Biophysics of the CNR [National Research Council] in Naples (Maurizio Iaccarino) and the Development of Microbiological Processes of Pierrel in Capua (Pier Luigi Sparapani) was begun in 1984 to see whether molecular biological techniques could be applied to problems directly affecting the production of antibiotics. The progress made has encouraged further research; it shows that a small investment can increase the understanding of the biology of productive cultures and that the results can be applied immediately to production.

In this article we shall describe two projects, one on the mechanism of some bacterial cultures' resistance to bacteriophages, and the other on the cloning of Streptomyces erythreus genes for the biosynthesis of erythromycin.

Mechanisms of Resistance to Bacteriophages

The first project was conceived because it was necessary to demonstrate with direct methods whether cultures of S. erythreus resistant to a bacteriophage are lysogenic, i.e. whether they contain phage DNA and, in particular, what conditions produce phage. Indeed, a culture used in industrial production must absolutely not release phages during fermentation; only an analysis of the bacterial DNA can show directly that phage DNA is present and, therefore, how likely it is to be produced. The use of phage-resistant cultures in industrial fermentation is particularly important not only for preventing contamination of the fermenter by phages present in the environment but also because, as described earlier, the resistance to phages can be used to facilitate the selection of cultures hyperproductive of antibiotics.

We have characterized (Donadio et al., 1986) three bacteriophages that infect S. erythreus, called G3, G4 and G5. They contain linear, double-helix DNA with complementary, single-filament extremities. We have obtained with four restriction endonucleases a map of the DNA of G3, formed by 48,000 base pairs. The DNA of phages G4 and G5 is made up of 43,000 base pairs, and the restriction map with seven endonucleases shows that G4 and G5 are very similar to each other and different from G3, as is confirmed by hybridization experiments. The DNA of G4 differs from that of G5 by the absence of an EcoRI site that has been located on the restriction map. In the map on the following pages, which is one of those we have published (Donadio et al., 1986), it can be seen that homologies can be drawn between the DNA of G4 and G3; these homologies may be correlated to function. An antiserum against phage G3 does not show a cross-reaction to G4, while an antiserum against G4 is positive to G5 and negative to G3.

A phage-sensitive culture of S. erythreus has been used to isolate phage-resistant cultures. Among them the Pierrel laboratories have found a high frequency of cultures with an elevated production of erythromycin. The significance of the increment was such that some of these cultures were usable in production. For this reason, it was important to analyze the mechanism of phage resistance. All the DNA of the phage-resistant cultures was digested by various restriction enzymes and used in radioactive DNA hybridization experiments with high specific activity in G3 and G4. This enabled us to demonstrate the absence of a hybridization signal. A reconstruction experiment with a mixture containing bacterial DNA and a small quantity of phage DNA enabled us to demonstrate that the phage-resistant cultures contain less than 0.05 molecule of DNA of G3 and less than 0.005 molecule of DNA of G4 per genome equivalent. This shows that these cultures are not lysogenic and therefore cannot produce phage; this guarantee is indispensable if they are to be used in industry.

To seek to understand why there are so many hyperproducers among phage-resistant cultures, we measured the efficiency of transformation with the DNA of G3, G4 and G5 on protoplasts of sensitive and resistant bacteria. We found that the resistance to phages occurs at the level of the cell wall or bacterial membrane; the increases in antibiotics production therefore probably correlate with altered permeability. For this reason we think that the process limiting erythromycin biosynthesis in some cultures is its secretion in the area of the culture. Mutants with a specific alteration in the cell wall or membrane could show an effect on both erythromycin production and phage absorption. A better understanding of the mechanism of phage resistance is therefore very important for

developing an efficient selection of cultures hyperproductive of antibiotics. We therefore plan to continue these studies and, among other things, to clone the bacterial gene coded for the phage receptor.

Previous studies (Costanzi et al., 1986) analyzing the phage development cycle show that in transfection experiments G5 DNA is unable to complete the phage development cycle. Indeed, a protoplast treated with phage produces from 10 to 50 phage particles, while it produces a single phage particle if it is transferred with DNA. This leads us to think that the phage injects into the bacterium, in addition to the DNA, a factor necessary for replication. These results may lead to further research into new types of phage-resistant mutations.

The study of the mechanism of resistance to phages or viruses will become increasingly important as new microorganisms or even animal or plant cells are used in biotechnical research. Indeed, the use of a specific culture on a large scale may cause phages or viruses to be selected from the environment and propagated in industrial fermentation with consequent enrichment of the environment. This phenomenon may also be dangerous if the cultivated cells contain recombinant DNA, because it may be transported out of the fermenter by the phage or virus.

Genes for the Biosynthesis of Erythromycin

At the same time as we were studying phages we started a program on cloning S. erythreus genes coded for the biosynthesis of erythromycin. Our research on these genes hypothesized that just as in the cases of undecylprodigiosin (Feitelson et al., 1983), methylenomycin (Chater and Bruton, 1983) and actinorhodine (Malpartida and Hopwood, 1984), the genetic information for resistance to erythromycin might be contiguous to the genes to be biosynthesized. For this project bacterial DNA must be cloned in an appropriate vector in order to transform non-productive cultures and to have effective means available to determine which bacterial colonies produce the antibiotic.

The search for an appropriate vector for S. erythreus was particularly difficult. Such a vector had to: (a) be able to transform the bacterium; (b) replicate itself inside the bacterium; (c) show resistance to a substance to which the bacterium is sensitive. From the markers already cloned on the vectors of other species of Streptomyces we isolated those usable by S. erythreus after determining the conditions for growth inhibition. We thus started by transforming S. erythreus with various vectors of S. lividans furnished by Prof Hopwood, but we did not obtain an effective level of transformation. Continuing our search for an appropriate vector, we obtained positive results with the plasmid pWOR 109 (Bailey et al., 1986) given us by Beecham Pharmaceuticals (Great Britain). To optimize transformation efficiency we used DNA transfection from phage G3 as a model system, because the results of the phage transfection were obtained very rapidly compared to the results of the transformation and it was thus possible to analyze many parameters. The optimal transfection protocol (10^4 transfection centers per microgram of DNA) made it possible to improve the efficiency of transformation by a factor of 10.

Once we had a vector, we digested the DNA of S. erythreus with a restriction enzyme and cloned it in some derivatives of pWOR 109 obtained in our laboratories. Two non-productive cultures were transformed with the recombinant plasmids thus obtained. The first was a mutation of S. ery-

threus blocked from biosynthesizing erythromycin (Ery-). We selected the transformants containing the recombinant plasmids by selecting resistance markers with tristreptin (Tsr); among these transformants we found some Ery+ cultures from which it was possible to isolate plasmid DNA in quantities insufficient for a physical determination but sufficient to yield new Tsr and Ery+ transformants.

Some of these transformants can be seen in the microphoto on the title page [photograph not reproduced].

S. lividans was the second culture non-productive of erythromycin used for transformation with the recombinant plasmids. In this culture we selected both Tsr clones and cultures resistant to erythromycin (Ery(r)), and in both populations we found some clones resistant to both antibiotics. In this case, too, we did not succeed in recovering plasmid DNA from the transformations, and on the basis of these and other results we think that the apparent absence of this DNA is due to an instability caused by inserting the DNA of S. erythreus. Another cloning experiment in S. lividans was done with the conjugated vector pIJ 941, which, unlike pWOR 109, has a small number of pairs. Also in this case we selected Tsr transformants or Ery(r) transformants and in both populations we found some clones resistant to both antibiotics. The analysis of some of these clones shows the presence of an antibiotic activity that we have not characterized, because this phenotype has proven unstable. The extraction of plasmid DNA has given results consistent only with a clone from which we have extracted a stable plasmid that we call pF7. The analysis of pF7 shows (Di Guglielmo et al., 1986) that a large part of the vector's DNA is deleted and that an insert of DNA from S. erythreus is present containing Ery(r), as is shown by hybridization experiments with a probe of Ery(r) DNA obtained from the plasmid pIJ 460 (M. Bibb, unpublished).

In conclusion, all these experiments indicate that S. erythreus DNA inserts are highly unstable when cloned both in a vector with a large number of pairs (pWOR 109) transformed in S. erythreus or S. lividans and in a vector with a low number of pairs (pIJ 941) transformed in S. lividans.

This instability is at least partly due to the unavailability of a culture altered through recombination, as in the case of Escherichia coli. The characterization of the stable plasmid pF7, as well as other experiments in progress, is intended to resolve the problem of instability. Another laboratory has encountered instability in S. erythreus inserts cloned in S. lividans. Stanzak and others (1986) cloned in S. lividans a fragment of 35 kb of S. erythreus with the Ery(r) coded gene and demonstrated that this DNA also makes possible the biosynthesis of erythromycin in this host. However, in this case, too, both the inserts and the phenotypes are unstable.

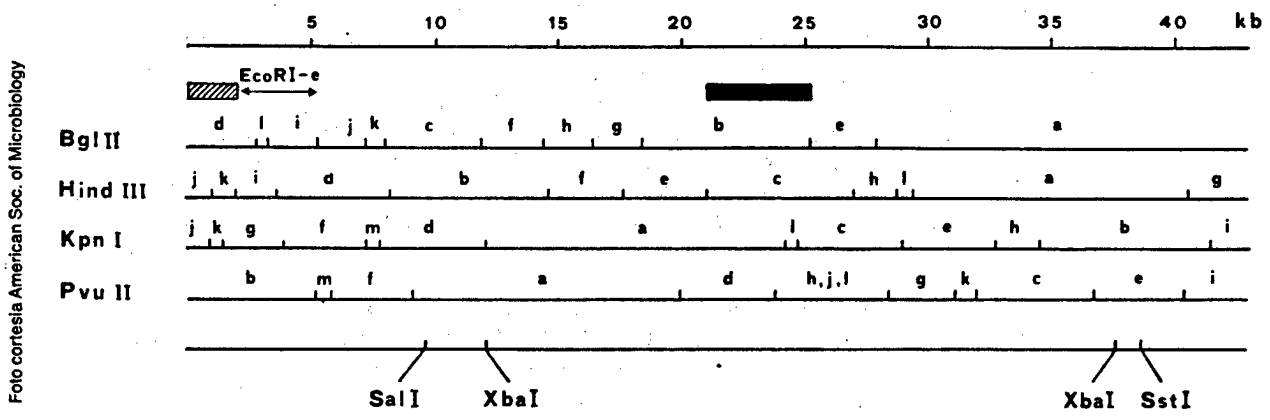
To begin to study the Ery genes we therefore decided to clone them in phage lambda by obtaining inserts of about 20 kb in the phage vector EMBL 3. In this case, the inserts cannot easily show their instability because they appear as phage plaques in E. coli. Using the DNA of the Ery(r) gene as a probe we took a plaque from among about 200 that had been analyzed (Di Guglielmo et al., 1986). The phage of this plaque was purified, and analysis of its DNA made it possible to obtain a detailed restriction map on which we located the Ery(r) DNA. The terminal positions of these inserts can now serve to isolate the phages that contain the DNA contiguous to both sides. The experiments in progress are in-

tended to perfect the use of vectors capable of replicating in E. coli, S. lividans and S. erythreus, and this will enable us to subclone fragments of DNA cloned in EMBL 3 to study the appearance of Ery- in S. erythreus and in the industrial production culture.

Conclusions

In conclusion, the results described here show how effectively an industrial laboratory and an academic research laboratory can collaborate. Indeed, the ways in which our laboratories have complemented one another have made it possible to obtain rapidly the results published (Donadio et al., 1986) or publishable (Costanzi et al., 1986); Di Guglielmo et al., 1986), which are of immediate industrial interest. This was possible also because of the knowledge accumulated on the physiology and genetics of S. erythreus and because of the availability of methods and equipment for the rapid identification of mutant Ery- or hyperproductive cultures. As S. erythreus is utilized for production, further methods of characterization are being continually developed, and these methods are applicable to the genetic improvement of industrial cultures. This project has opened the way for research on the molecular biology of Streptomyces in Italy. This research sector is expanding rapidly throughout the world, especially for industrial applications. This is all the more important because Italy is among the nations with the highest concentration of fermenting plants using Streptomyces.

Figure 1: DNA restriction map of the G4 phage. The restriction fragments are identified with a letter in decreasing order of length. The measure (in thousands of base pairs, kb) of fragments not ordered is 2.70, 0.88 and 0.86 for PvuII-h, -j e -l, respectively. The black bar shows a zone of high homology with the DNA of G3; the grey bar indicates a zone of low homology. The EcoRI-e segment shows the approximate position of an EcoRI site present in the DNA of G5 and absent from the DNA of G4. Figure courtesy of the American Society of Microbiology.



8782
CSO: 3698/475

GIST-BROCADES, SHELL FORM GENERAL BIO-SYNTHETICS JOINT VENTURE

Official Announcement

Rotterdam NRC HANDELSBLAD in Dutch 25 Jun 87 p 11

[Text] Rotterdam, 25 Jun--Shell and Gist-Brocades officially set up General Bio-Synthetics (GBS) yesterday. This new company, in which the two firms each have a 50 percent interest, will produce very specific chemicals using biotechnology.

The establishment of GBS was announced some time ago. Dr G. Bresser, the head of Gist-Brocades, said in presenting his company's most recent annual report in March that he expected the joint venture to come into being 6 weeks later. According to a spokesman, that prediction was "somewhat optimistic," since many financial and legal details had yet to be worked out, such as the issue of products already in the development stage.

No agreement has yet been reached on where GBS will be located. The headquarters will be in South Holland, but not at the Shell office in Rotterdam or the Gist-Brocades office in Delft. Subsidiaries of GBS will be in Bruges (Belgium), Widnes (Great Britain) and in Charlotte and Kingstree (United States).

After the Danish firm Novo, GBS will be the world's largest producer of industrial enzymes. Customers for these products include the detergent industry, the starch industry and the textiles industry. Enzymes for the food-processing industry will remain with Gist-Brocades. In addition to enzymes, the new company will focus on refined chemicals, especially semi-manufactured goods for agricultural chemicals and for medicines.

General Bio-Synthetics intends to bring together the know-how of Shell and Gist-Brocades in order to expand the range of products and the market for enzymes and refined chemicals. Research remains in the hands of the parent companies. Gist-Brocades has made 100 researchers available to GBS on a yearly basis, while Shell is providing 40.

Both parent companies expect that the new company will initially have a start-up sales figure of 250 million and will be fully operational by the end of this calendar year. It will provide jobs for approximately 850 people who

were employed by Gist-Brocades in industrial enzyme production and in the refined chemicals sector by Shell British subsidiary Ward Blenkinsop.

A.G. Oliver, currently general director of Ward Blenkinsop, will head GBS. H.J. Kooreman, director of research and development at Gist-Brocades, will be appointed director of science and technology. Other members of the general management will be named later.

GBS expects to eventually open up new markets for bio-refined chemicals, bio-polymers and bio-pesticides. These are chemical products, materials and pesticides made using biotechnological processes. Shell and Gist-Brocades have been engaged in joint research in this area since 1981.

Statements by Gist-Brocades Head

Rotterdam SHELL-VENSTER in Dutch Jun 87 pp 18-20

[Article by Jose van der Laan and Kees Beerthuizen: "A New Spring, a New Noise"]

[Excerpts] Dr G. Bresser, chairman of the Board of Directors of Gist-Brocades NV, made headlines in much of the national press at the end of April. While presenting the annual report, he let it slip that "Gist" expected to conclude negotiations with Shell on "the biotechnological step into refined chemistry" within 4 to 6 weeks. As far as that time period is concerned, he was a little optimistic, but the message was clearly there.

Within the foreseeable future, the project that was announced at the end of last year as "a study of the possibility of setting up a 50/50 joint venture" will take tangible form. The new company will have around 800 employees and will be active all over the world in the area of bio-refined chemicals, bio-polymers and industrial enzymes. Sales are estimated at 260 million to 300 million guilders.

Bresser: "Cooperation is an excellent example of showing how you can cover an area that otherwise would have been accessible to each of the partners only with great difficulty, if at all. The combination of specialists from the departments involved in the cooperative arrangement offers a perspective for production rejuvenation and an expansion of markets, whereby the whole is clearly more than the sum of the parts. And to initiate an operative political discussion: The call for a joint strategy for economic expansion remains. Cooperation in the area of biotechnology as frequently advocated by Gist-Brocades fits into this strategy. It seems to me that the Gist-Brocades/Shell joint venture is an example of this."

12271
CSO: 3698/571

ITALIAN AI RESEARCH CENTER DIRECTOR DISCUSSES OBJECTIVES

Turin MEDIA DUEMILA in Italian No 6, Jun 87 pp 72-75

[Article by Nicoletta Castagni: "Trento: On the Frontiers of Science With Artificial Intelligence"]

[Excerpts] Trento -- A few kilometers from Trento there is a research center whose structure and objectives make it unique in Italy and in Europe. At IRST, the Institute for Scientific Research and Technology, which comes under the Trento Cultural Institute and is financed primarily by the provincial authority of Trento (as well as by several banks, the industrial association, and the chamber of commerce), some 100 researchers are working in the most advanced and widely discussed areas of computer science and physics, namely artificial intellegence and materials sciences.

Luigi Stringa was asked not only to do the planning for the IRST but also to head it. To do this, he left a promising management career as managing director of the Selenia-Elsag group. His decision surprised a lot of people. "In 1985, when I decided to resign from the group," Stringa tells us, "I had been debating for some time whether to leave industry and go back to research. Bruno Kessler, president of the Trento Cultural Institute, gave me this opportunity. It was his idea to invest in the advanced research sector all the money the provincial government had left after the university became state-run."

The project put together by Kessler and Stringa has a 5-year investment plan totaling 66 billion lire. In approximately 13 months the comfortable, intelligently designed building which is the institute headquarters at Pante di Povo was built, and IRST's planning and production activities began with an initial group of researchers working on both pure and applied research.

Stringa has his own view of artificial intelligence and its potential for growth and consolidation, and has structured IRST operations around these beliefs. He explains it like this: "First, I want to make it clear that artificial intelligence should not be seen as a kind of artificial limb for the human brain. On the contrary, it is designed to provide a set of tools capable of making intellectual work less tiring and more effective. Artificial Intelligence is simply the branch of computer science dealing with the design of intelligent systems whose behavior would, if observed in a human being, be termed intelligent. This definition conforms to Turing's test.

"Thus, while data processing has pursued (and continues to pursue) the automation of data management, artificial intelligence aims at the automation of knowledge management in fields such as learning, reasoning, problem-solving, and natural language discourse. When you look at it carefully, you realize that this is not such a difficult thing to do. The real problem is in to have the right ideas when you want to put them into practice. Up until now, despite the fact that expert systems and vision applications in robotics are available on the market, to some extent artificial intelligence has failed to live up to the expectation of both scientists and potential users. My feeling is that many delays have been the result of an incorrect approach to research methodologies. The possibility that artificial intelligence will be successful, that is, that we soon will be able to verify it, is strictly dependent on the ability to integrate all the functions being studied and produced within the sector. The objective we should pursue is [to produce] capabilities which perhaps are not highly intelligent, but which are integrated. Artificial intelligence cannot consist only of expert systems or robots, since this would be restrictive. In fact, the area of specialized knowledge has proved to be not very intelligent. By continuing to produce expert systems which in fact are not very expert, we run the risk of looking as if we are boasting. On the other hand, I do not know of any research center with a single project which integrates the various functions. That is what we want to do here at IRST. Within 2 years, in fact, we hope to have a prototype of a robot which can hear, move, understand, and execute--perhaps in a fairly stilted fashion--commands given to it."

It is obvious that this will be a difficult goal to achieve, but the whole structure of IRST is oriented toward this objective. As mentioned earlier, in addition to artificial intelligence, research also is being done on the science of materials (part of the traditional work of Trento University). This research involves extremely sophisticated analysis, which is unique in Europe and which includes studies on vision components and on very advanced sensors. It goes without saying that this research area is of great importance for artificial intelligence and for the robot [production] project.

In addition, the IRST is structured like a business with extremely stringent management controls. Planning is done on a 5-year basis, as is the financing from the provincial authorities, but the budget is annual, and all types of research, including areas which might seem to be very abstract, are controlled. The efficiency of this whole apparatus, in which researchers do only research while management of all the other services is delegated to other sectors, can be seen from the speed with which IRST was constructed and started operation. Not only was the building built in 1 year (the fact which really won Stringa over), but the offices and laboratories have all the equipment necessary to conduct research and it is all of the best quality. The workstations alone, used for artificial intelligence programming, now total 15. Providing this material was a problem since the suppliers of these machines did not expect such a large order from Italy.

Research on artificial intelligence is subdivided into a number of closely interrelated areas of activity, in order to ensure the integrated approach that Luigi Stringa believes is a necessary premise for success in this area. The first field of activity deals with interfaces and studies of human factors, vision, voice recognition, and natural language. In the vision field, IRST has set itself short-term objectives and has signed industrial agreements worth several billion lire with firms in the Stet group, including the Selenia-Elsag group, as well as with American companies.

The research being done in expert systems covers methods, automatic generation, and applications such as CAD [Computer Aided Design] and factory automation. The models constitute the fulcrum of the whole project, since the problems dealt with in this area are central to intelligence, namely cognitive processes, logic, problem solving, and knowledge representation.

The hardware and software instruments which, according to Stringa, are "the measure of artificial intelligence," are being studied with the same interest as the other sectors. To conclude, the monitoring of world developments in this research field ensures that both basic technologies and architectures are constantly updated.

Therefore, it can easily be seen that the production of research is IRST's constant objective and that this drive is stimulated by the need to obtain orders from the outside. "The costs of a center like IRST," says Stringa, "are very high. We expect one-third of our entire budget to come from sales, and while we do not want it to be more than this, since this would make us an industry, we do not want it to be less because we must guarantee production. This is an important stimulus. All researchers have to meet the deadlines and produce the results required by those commissioning the research. Moreover, while IRST originated from a public body like the Trento Cultural Institute, it applies a private-sector approach which is more stringent than that of industry."

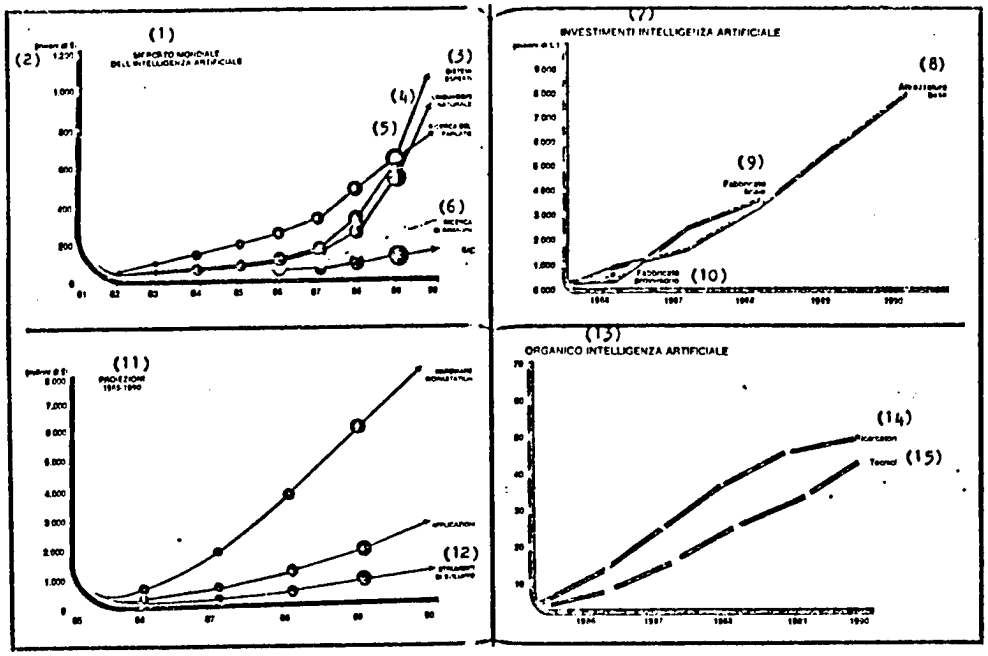
The biggest problem Stringa had to face was finding personnel qualified to work in a state of the art sector that had been monopolized by a handful of researchers for 20 years. The shortage of qualified personnel, particularly in Italy, is well known. In Italy, this is a new approach which has not yet been consolidated at university level. The human factor plays a decisive role in artificial intelligence research and is fundamental. However, researchers are not lacking at IRST; of a total of 70 employees in 1986, 30 were researchers; of these 30 researchers, between 15 and 20 were involved full-time in artificial intelligence research. At the end of this year, there should be approximately 80. The objective is to reach the critical threshold of 100 researchers in this sector from a total 250 employees, since this level is essential if valid research on artificial intelligence is to be conducted. Stringa does not hide his satisfaction as he emphasizes that he already is well along in his attempt to recruit qualified human resources by all possible means.

means.

He went after many researchers in the United States. Almost all of them are Italians who have acquired a wealth of experience which has proved to be very useful. But there also are Americans who did not scoff at the invitation to work in Italy on an integrated, well coordinated project which is without precedent even in their own country.

However, the majority of the researchers are Italian (30 percent are from the Trento region). They come from industry and universities and all have considerable experience in artificial intelligence. The weapons at Stringa's disposal are a competitive research center and high salaries. "A senior researcher can get as much as 100 million lire per year. I can afford this because our contracts are all for 5-year periods. I also offer researchers the possibility to participate in research which is highly stimulating in a place like Trento, close to beautiful mountains and lakes and far from the stressful pace of the city. This is a tremendous place to conduct state of the art research."

Table 1.



Key:

1. World AI market
2. $ million
3. Expert systems
4. Natural language
5. Voice recognition research
6. Image research
7. Investments in AI
8. Basic equipment
9. Final product
10. Experimental product
11. Projections
12. Development tools
13. AI personnel
14. Researchers
15. Technicians

8615
CSO: 3698/M333

RESULTS OF ESPRIT ARTIFICIAL INTELLIGENCE PROJECTS

Paris SCIENCES & TECHNIQUES in French Jun 87 pp 50-54

[Article by Edouard Launet: "Towards a Positioning of Europe in the Cognitive Sciences"]

[Excerpts] Artificial intelligence: An oiler of the wheels of production... and of minds. Will Europe soon be ready to roll?

Among the 219 Esprit projects and the 108 Eureka projects, the studies from which artificial intelligence is totally absent are rare. Knowledge engineering is becoming an essential binding agent in all ambitious undertakings. Whether it be the design of VLSI's, or an advanced automated office workstation, security of processed data, or software engineering, the techniques of knowledge processing are omnipresent.

This being the case--and Europe has fully understood it to be--it is imperative to address the following major subjects of research forthwith: Representation of knowledge; expert systems building tools; human-machine interfaces; and specialized architectures for artificial intelligence.

This problem is dealt with in no less than some 50 studies--a good fourth of the program--covered by the Esprit 1 section headed "Advanced Information Processing." Knowledge engineering techniques--that is, techniques aimed at realizing expert systems: knowledge acquisition tools, complex data representation languages(1), etc--are receiving the lion's share of the funding.

And already, results are evident...

Project 304 (see Table) has produced a software tool and a methodology designated KADS (Knowledge Acquisition and Data Structuring), which together yield protocols for the consulting of experts to extract the knowledge needed for the creation of an expert system. The expert systems generator that is to issue from Project 1098, and which is to be demonstrated for the first time in September, will include this tool.

Project 1063 centers on symbolic learning techniques: The aim here is to do away with the interviewing of experts as a means of creating and modifying

the knowledge base, in favor of automatic self-learning systems based on examination of examples. Three learning programs have been tested and are currently being integrated.

Two of the principal formalisms being studied under Esprit for the representation of knowledge are semantic networks and logic. The fashioners of Eurohelp (Project 280) have developed genetic charts by means of which it is possible to model the behavior of users of word processing, electronic mail, and all other information-processing systems.

Result: "Intelligent" help systems. An initial prototype capable of helping users of electronic message-handling has been operational since November 1985. The logic programming language Prolog--created in Marseille in 1972--is having a field day under Esprit. Being created for it are: Developmental environments (Alpes Project); graphics interfaces based on the GKS standard (Accord Project); ultrafast compilers (Loki Project, which has produced BIM-Prolog); and a new version of it--Prolog III--now in preparation (Project 1106, headed by Alain Comerauer, creator of the language) itself.

Five projects involve intelligent access to databases: Esteam and Epsilon, which have coupled Prolog to relational systems of database management; ADKMS, which has developed an interface between a rules-based natural-language analyzer and a system called BACK; KIWI, which has developed a knowledge-manipulation tool called OOPS for accessing external databases; and LOKI, which has interfaced Prolog with the Ingres and Unify relational databases.

Then, and above all, there are the tools for developing expert systems: The Europeans must develop generators capable of rivaling American products such as Art, Kee, and Knowledge Craft. Two projects are already at an advanced stage, having produced the command language Omega (Project 440), which is now operational, and the ESB [Expert System Builder] system (Project 96), part of which is based on CIMSA's Sypruc generator.

The realization of application-specific expert systems is the province of Eureka. Examples abound: The Fiabex Project, headed by the French firm CEP, for the development of expert systems specific to the analysis of industrial risk; the Formentor project, under Aerospatiale as its prime contractor, for the study and realization of a system specific to threat analysis and processing; the Comput-a-Crop Project, aimed at providing "intelligent" assistance to farmers... .

Other projects, more generally domain-specific, such as Galeno 2000 (tools for functional exploration and medical diagnostics), Prometheus (study of intelligent systems for directing and regulating highway traffic), and Europolis (control of urban and interurban street traffic), involve artificial intelligence and expert softwares.

Some ESPRIT Projects in the Domain of 'Advanced Information Processing'

Project No.	Title	Participants
304	Design of techniques and tools as aids in the analysis and design of cognitive systems	Standard Telecommunications & Cables (UK), SCS (D), Univ of Amsterdam (Nl), KBSC/Polytechnic of the South Bank (UK)
26	Architectures and advanced algorithms for word and image processing	CSELT (I), AEG Telefunken (D), GEC (UK), Thomson-CSF (F), Univ of Turin (I), Turin Polytechnic (I), Hitec (Gr)
96	Expert Systems Builder (ESB)	Plessey Electronic Systems (UK), CSELT (I), ST Lyngso A/S (DK), Trinity College Dublin (Irl), Plymouth Polytechnic (UK), Riso National Labs (Dk), LAI Marseilles (F), Tecsiel (I), CIMSE (I)
107	Logic-oriented approach to knowledge bases and to data supportive of natural user-interaction (LOKC)	BIM (B), Fraunhofer Institute IAO (D), Scicon (UK), Univ of Crete (Gr), Cranfield Institute of Technology (UK), SCS (D), INCA (D), Technical Univ, Munich (D)
256	Design of cognitive systems for industrial applications; influence of time and modeling	CISE (I), Framentec (F)
280	Intelligent aid to information system users	CRI A/S (Dk), Courseware Europe (Nl), Dansk Datamatic Center (Dk), ICL (UK), Univ of Leeds (UK), Univ of Amsterdam (Nl)
311	Advanced data- and knowledge--management systems (ADKMS)	Nixdorf Computer AG (D), Bull SA (F), Olivetti (I), Univ of Berlin (D), Univ of Turin (I), Univ of Bologna (I), Univ of Dortmund (D)

[Continued on next page]

Some ESPRIT Projects, etc. [cont'd]

Project No.	Title	Participants
316	An architecture for the interactive solution of problems through the use of databases and knowledge bases	CSELT (I), CAP Sogeti (F), CERT (F), Philips (B), Polytechnic of Milan (I)
393	ACCORD: Construction and interrogation of knowledge bases by means of expressions enunciated in natural language and of graphics	CGE-LDM (F), CII-HB (F), Triumph-Adler AG (D), Fraunhofer Inst. IAO (D), Univ of Edinburgh (UK), Univ of Stuttgart (D)
415	Parallel architectures and languages for TAI - An approach based on VLSI	AEH Telefunken (D), CII-HB (F), CSELT (I), CWI Amsterdam (Nl), GEC (UK), Univ of Munich (D), LIFIA (F), Nixdorf (D), Philips (Nl), Stollman & Co (D), Univ of Berlin (D)
419	Image and movement comprehension	Univ of Genoa (I), Captec (Irl), Trinity College Dublin (Irl), Univ of Nijmegen (Nl), Video Display System SRL (I)
440	Message-communication architectures and systems of description	Delphi SpA (I), Bell Telephone (B), Vrije Univ Brussels (B)
527	Communication fault during a dialogue: Detection and correction techniques	Education Research Centre (Irl), Linguistic Institute of Ireland (Irl), Memory Computers PLC (Irl), Univ of Leeds (UK), Univ of Pisa (I), ITT Europe (UK)
530	Advanced systems for the management of knowledge bases	S & M (I), Bense KG (UK), Criss (F), Univ of Pisa (I), C.-Bernard University, Lyon (F), Univ of Dortmund (D)
532	Real-time realization and display of a 2.5-D sketch for animated scenes	Univ of Strathclyde (UK), Barr and Stroud Ltd (UK), Zeltron (I), Olivetti (I)

[Continued on next page]

Some ESPRIT Projects, etc. [cont'd]

Project No.	Title	Participants
818	Delta 4: An architecture for an open and secure distributed system	CII-HB (F), IEI-CNR (I), Ferranti Electronics (UK), Fraunhofer Institute (D), GMD (D), LAAS (F)
857	Dialogue based on graphics and knowledge bases, for dynamic systems	CRI A/S (Dk), Univ of Kassel (D), Univ of Strathclyde (UK), Univ of Leuven (B), Brown Boveri (D)
874	Integrated environment for systems	Mari Advanced Microelectronics Jeumont Schneider (F), Univ of Bologna (I), Telettra (I)
940	Analysis of depth and movement	ELSAG (I), GEC (UK), MATRA (F), INRIA (F), ITMI (I), Noesis (F), Univ of Cambridge (UK), Univ of Genoa (I)
957	High-density mass memories for storage of knowledge and data	Bull (F), BASF (D), Bogen Elektronik GmbH (D), Glaverbel (B), LETI (F), Simulog (F), Thomson CSF (F)
973	Advanced environments for logic-based programming (ALPES)	CRIL (F), Bull (F), ENIDATA (I), LSI (F), LASI (I), Univ of Rome (I), LRI (F), TUM (D), Univ of Orleans (F)
1015	Integration of artificial intelligence, voice interface, and natural-language dialogue; application to telephone directory services (Palabre)	SESA (F), CNET (F), British Telecom (UK), ERLI (F), CNRS-LIMSI (F), Turin Polytechnic (I), SARIN (I)
1063	Integration of symbolic and numerical learning techniques	Cognitech (F), Univ of Paris-Sud (F)
1085	Development and application of a high-performance, low-cost multiprocessor machine	RSRE (UK), Apsis (F), INMOS (UK), Telmat SA (F), Thorn EMI (UK), Univ of Southampton (UK)

[Continued on next page]

Some ESPRIT Projects, etc. [cont'd]

Project No.	Title	Participants
1098	A methodology for developing KBS's	Standard Telecommunications & Cables (UK), Polytechnic of the South Bank (UK), Scicon (UK), SCS (D), Univ of Amsterdam (Nl)
1117	A knowledge-based, user-oriented system for use with databases	CRAI (I), DDC (Dk), Philips (Nl), Enidata (I), Univ of Antwerp (B), Univ of Rome (I)
1218	Next-generation integrated database and cognitive system of management	Syseca Logiciel (F), Univ of Kaiserslautern (D), Absy (B), CRIL (F)
1219 (967)	Development of an associative parallel machine in support of artificial intelligence	Cimsa Sintra (F), CSELT (I), GEC (UK), NOn Standard Logics (F), Thomson CSF (F)
1219 (1106)	Supplementary developments of Prolog and their validation by means of cognitive systems in technical domains	Prologia (F), GIA (F), GIT (D), Robert Bosch (D), Daimler Benz (D)
1220	Design and testing of a KBS architecture and tools for real-time process-control applications	CISE (I), Framentec (F), Ansaldo (I), Aerospatiale (F), CAP Sogeti Innov. (F), NEA-Lindberg A/S (Dk), Heriot-Watt University (UK)

And to conclude, there are the specialized architectures for artificial intelligence, a domain in which the Europeans still have much catching-up to do, particularly at the level of concrete realizations. Current effort is focused essentially on parallel machines for symbolic processing, via major project Esprit 415 (parallel architectures and languages for advanced processing of information), on which AEG, Bull, CSELT, GEC, Nixdorf and Philips have been working jointly since 1984. Each of the partners is studying a different type of architecture, and the initial prototypes are due to make their appearance beginning this year. Software tools for parallel machines --Prolog compiler and object-oriented language compiler--have been developed.

Project 415, also known as Non-Von(2), was supplemented in 1985 by two new studies on symbolic machines: Padmavati (Project 1219) for the development of an associative parallel machine, and Project 1085 for the development and application of a high-performance, low-cost multiprocessor machine.

A portion of the European research on artificial intelligence is being done at the ECRC [European Computer Research Center], an entity founded in 1984 by three of the Old Continent's principal data processing manufacturers: Bull, ICL, and Siemens. In particular, the ECRC is currently studying the modifying of the Prolog language for parallel processing.

[Excerpt of boxed information p 53]: BRAIN, an Anthromorphic Approach to Intelligence

Their names are Hecht-Nielsen Neurocomputer, Neural Tech, Revelations Research, Synaptics, etc... These American start-ups, formed barely a few months ago, have at least one astonishing point in common: Their products or services are based on neuromimetic networks.

The resurgence of interest in connectionism (another name for the neuronal approach) over the past few months stems from the problems being encountered by "classic" artificial intelligence from the standpoint of learning: Expert systems have a great deal of trouble adapting to changing worlds and dealing with the unforeseen.

In Europe, studies on connectionism have never entirely ceased. What's more: In February, the EEC decided to prepare a research program designated BRAIN [Basic Research in Adaptive Intelligence and Neurocomputing]. In 1987, this preliminary study will be funded to the extent of 1 million ECU's (approximately 7 million francs). By this summer, a project will be submitted to the research ministers of the 12, to be translated into action under Esprit or under the European research incentive program.

The six scientific notables who have been asked to work out a plan of action are Dr Gerard Toulouse, of the Ecole Normale Superieure's Physics Laboratory, and Professors Rolls of Oxford University, Wallace of the University of Edinburgh, Parisi of the University of Rome, and Von den Malsburg and Ginger, both of the Max Planck Institute (FRG).

And this now brings us into position shoulder-to-shoulder with our American and Japanese competitors at the first hurdle of a heated obstacle race, the outcome of which no one can as yet predict: Towards the human-featured computer?

FOOTNOTES

1. See "Artificial Intelligence in Search of a Language" by Edouard Launet "SCIENCES & TECHNIQUES No. 30, October 1986, pp 40-50.

2. Non-Von Neumann--that is, non-sequential--machines.

9399
CSO: 3698/565

NEW TECHNOLOGY FOR BULL DPS 7000 OFFICE AUTOMATION COMPUTERS

Paris ZERO UN INFORMATIQUE in French 6 Apr 87 pp 26, 28

[Article by Guy Herview; first paragraph is ZERO UN INFORMATIQUE introduction]

[Excerpts] At the lower end of its DPS 7 series, Bull is introducting five new models, christened DPS 7000. Brought about by G-COS 7 [General Comprehensive Operating Supervisor for local and remote batch processing], these five systems use a radically new technology developed entirely by Bull, and replaces the former X-07 models. These five DPS 7000's offer a power margin that ranges from 3 to 14 transactions per second.

The DPS 7000's Use a New C-MOS Chip Technology With a High Level of Integration

The new DPS 7000's benefit greatly from the architecture of the DPS's, but use a radically new technology. The heart of these five new DPS 7000's is made up of C-MOS chips with a high level of integration: some 20,000 logic functions and nearly 60,000 transistors per chip. These components were designed entirely by the DPS 7 development team, and are manufactured by Honeywell and VTI.

This expanded integration has made it possible to place the processor on a single circuit board. This new technology allows the DPS 7000's to function in an office environment under normal temperature conditions (15-20°) and humidity (30-70 percent). The size of the cabinets is reasonable--1.2 m high, occupying 0.6 m^2 of floor space--and they do not have to be installed on a raised floor.

On the architectural side, the DPS 7000's use an organization in specialized processors called mini-machines, which communicate by means of a bus offering a transfer speed of 27 Mo's [mega-octets; an octet is an eight-bit byte].

Consisting of the new C-MOS technology chips, the central processor is endowed with a 64 Ko [kilo-octet] ante-memory [ante-memoire?]. Made up of 256k dynamic RAM chips, the memory can reach a maximum capacity of 16 Mo's.

The DPS 7000's have up to eight entry-exit processors and include also a processor called a service and administration processor designed to monitor the system, and do remote diagnosis.

From 20 Simultaneous Terminals on Model 10 to 300 On Model 50

In a highly interactive environment, the idea of active terminals is obviously fundamental. On this point, Model 10 can, according to its designer, support 5-20 users operating simultaneously. Model 50 supports a maximum of 300 users.

The accessory hardware that can be attached to the DPS 7000's is exactly the same as that used with the classic DPS 7's. The maximum storage capability evolves from 2 G's [giga-octets] for Model 10 to 32 G's for Model 50. The printers that can be connected to it are relatively fast models (120 cps) as well as higher-powered units, such as the Mathilde magnetographic printing system.

If the idea of departmental computer depends on the system characteristics, it is just as strongly tied the ease of operation and use (Cf. article p 30). The DPS 7000's work under a simplified G-COS 7 version called G-COS 7-AS, which is completely compatible with the four G-COS 7 levels which have existed up to now: ES, MS, LS, and XLS. These correspond to the level of power and the extent of the DPS 7 configuration that they are supposed to draw on.

With DPS 7000's Bull Stresses User Friendliness

Thus, the DPS 7000's have the DOF 7 (Distributed Operations Facility) tools that are intended to make them operate more smoothly. An autonomous system can be started up by simply applying power to it, since all start-up messages are prerecorded on tape.

Used as a departmental computer, a DSP 7000 can be managed and checked by an operator at a distance; that is, of course, as long as there is no need for any handling of paper or tape. A DPS 7000 is able to function in relation to a central DSP 7, and this is due to the functions of G-COS 7, but also with an IBM site with the help of the XCP 1 cooperative exchange agreements, and the file transfer software developed by Bull.

The DPS 7000 obviously fits into the Blue-Green strategy, which one cannot fail to compare to certain aspects of IBM's SAA [systems application architecture] which was announced last week. Introduced on the occasion of the Sicob 1985, Blue-Green is defined by Bull as "a set of solutions, products, and the possibility of interconnection, training and assistance service." So the G-COS 7 Blue-Green solutions authorize the connection of all the work stations, ranging from the Micral 30, 40, and 60, to the Questar 210 and 420, including the SPS systems.

Main Characteristics of the DPS 7000

DPS 7000 [Model number]	10	20	30	40	5(
Central processor					
Size of memory (MO)	4	8 to 16	8 to 16	8 to 16	8 t(
Number of processors E/S	4	4	4 to 8	4 to 8	4 t(
Discs					
Number of axes	2 to 4	2 to 16	3 to 32	4 to 48	4 t(
Capability (GO)	0.7 to 2	1 to 8	1.5 to 16	2 to 24	2 t(
Number of Tape units	1	1 to 4	1 to 8	1 to 16	1 t(
Telecommunications					
Number of lines	3 to 7	3 to 79	3 to 143	3 to 158	3 to
Maximum number of Terminals	50	150	300	400	600
Number of simultaneously active terminals	5 to 20	10 to 50	20 to 120	35 to 170	50 t

Available only on DPS 6, the integrated office automation system DOAS (Distributed Office Automated System) is available today on G-COS 7. This latter notably brings together functions of word processing, classification and archiving with DFA 7, and with SM 7/SN 7 electronic messages at the standard rate of x400.

Departmental Data Processing With DPS 7000, Traditional Data Processing With DPS 7

The DPS 7000's benefit fully from the extensions contributed on the occasion of the last Sicob to the relational access system to IQS date, i.e. IQS-Link, for a presentation of data in Questar 400 and Info-Link formats toward the Micrals.

Two solutions are thus possible around G-COS 7: one based on IQS and its IQS-Link and Info-Link tools,d and the other built around the SGBD [Data Base Management System] Oracle and the SQL query language.

For management of textual data, Bull proposes a new version of its Mistral documentary research software, which is particularly characterized by a micro interface and a simultaneous research process. The EAV-7 videotex applications software is enriched by the support of synchronous terminals and type 1B minitel.

Finally, the supply of existing software on DPS 7, Mantis, IDA, and Pac-Base is, of course, available on these new DPS 7000's.

The clear improvement of the DPS 7000's performance-to-price ratio, which has been brought about by implementing a modern technology and new manufacturing processes, may introduce a certain imbalance in the G-COS 7 family. The DPS 7000's have a place in Bull's inventory, and especially in relation to the DPS 4000's and the DPS 6's.

The DPS 7000's replace the X-07 models and present a certain area of recovery in terms of power with the 617 and 717 models. "But," replies Gerard Roussel, who is in charge of sales for the DPS 7 series, "these two sub-families offer characteristics which are unique unto them. The former are office computers that are simple to work and, despite everything, are now limited to the power level of the Model 50.

"More classic data-processing systems, the latter can evolve on site up to the 827 and have redundancy functions, which are far from negligeable for certain applications. Moreover, the different levels of the performance-to-price ratio, which favor the DPS 7000's compared to the DPS 7's, are inherent in the introduction of a new generation." Compatibility with the DPS 4000's is clear for the builder.

CONFIGURATION

Les DPS 7000 modèles 20 et 40

Le prix de l'unité centrale des DPS 7000 incluant la maintenance pendant une durée d'un an oscille entre 0,3 et 1,4 MFF (ht).

Une configuration d'un modèle 20 comportant 8 Mo de mémoire, deux unités à disque de 500 Mo chacune, un dérouleur de bande magnétique streamer 1 600 bpi, un processeur de télécommunication de trois lignes synchrones est commercialisé à 900 000 FF (ht) environ.

Une configuration du modèle 40 avec 8 Mo de mémoire, quatre unités à disque de 500 Mo, un streamer 6 250 bpi, une imprimante 700 lpm, un processeur de télécommunication supportant une ligne HDLC et sept lignes asynchrones coûte quelque 2 MFF (ht).

Service-lecteurs. référence 12

Pure Bull Product

The importance of the DPS 7 is obvious in more ways than one. The G-COS 7 family represents about 20 percent of the company's turnover. Furthermore, it is the family of computers over which Bull has complete control, from conception to manufacturing. But, more than just a product, the DPS 7000 constitutes a real symbol which bears witness to the national manufacturer's accomplishments over 4 years.

On the conceptual level, Bull has put into place a new organization under the watchwords of efficiency and quality. Located in Clayes-sous-Bois, the Ares project development team has mostly called on data-processing to create circuits as well as to transmit their designs to the factory at Angers.

On the manufacturing level, Ares is the first product to benefit from the modernization efforts agreed to by the company for the Angers plant. These efforts represent Fr 1 billion over 4 years. Jacques Antier, the head of this unit, explained "This effort has made it possible to make a leap forward in quality, competitiveness, and flexibility." As for quality, the plan of action launched on a company-wide scale for Ares means installing control devices as early in the production process as possible, that is, at the level of components and circuit boards.

"In terms of competitiveness, we want to be equal to or better than the best, and that's Digital, Hewlett-Packard, or Siemens," continues Jacques Antier, who knows what he is talking about, because he used to be head of IBM's plant in Montpellier.

"We cut our manufacturing waiting period by a factor of five. So, assembling and shipping our DPS 7000's circuit boards requires 2 days instead of 2 weeks. That obviously makes it possible to reduce production time and insures better management of the production flow, further lowering manufacturing costs."

"The flexibility that we have greatly improved insures a better match between the supply and the demand. It most notably allows us to manufacture the specific systems ordered by the customers without overloading us with work. Thanks to this flexibility, the Angers factory is equally capable of manufacturing any system in the series."

Quality, zero defects--such are the buzzwords that Jacques Antier preaches to the 2,700 people employed at this plant, which are illustrated in every nook and cranny of this factory by diagrams, graphics, and other charts.

DPS 7000 Models 20, 40

The price of the DPS 7000 central unit, including maintenance for a 1-year period, is ea Fr 0.3-1.4 million.

A system of Model 40 with 8 Mo of memory, four 500-Mo disc drives, a 6,250 bpi streamer, a 700 lpm printer, a telecommunications processor supporting an HDLC line plus seven asynchronous lines costs ea. Fr 2 million.

9895/12828
CSO: 3698/419

ALVEY DIRECTOR ON INDUSTRY TRENDS

Paris ZERO UN INFORMATIQUE in French 4 May 87 p 23

[Article by Rex Malik: "Should the Tools Be Questioned?"; first paragraph is ZERO UN INFORMATIQUE introduction]

[Text] Is it wrong to favor the tools that assist software creation at the expense of the actual creation and writing of programs?

These questions were recently raised by Brian Oakley, director of the British ALVEY research program, at the National Technology Conference held in Brighton by the NCC (National Computer Center).

Questions from Brian Oakley naturally attract attention: Is not the bulk of ALVEY funding destined for R&D on software creation tools?

Brian Oakley himself stresses other trends. The revolution in communications has just barely started. Optical fibers will soon reduce communication costs in such a way that a database in New York will not be more expensive than in London.

Likewise, the Grosch law equation on data processing costs will soon be completely out of date. With the lower communication costs, a micro with communications will be just as good as a central computer.

The application-specific PC extension cards will even reinforce this trend. Before long universal (general) data processing will give way to dedicated application-specific data processing, according to Brian Oakley.

Other recent comments were made by Gene Amdahl, who stated at the Institute of Electrical Engineers (IEE) conference in London that the future of parallel processing and even of solutions such as the hypercube is limited and that these architectures are unlikely to revolutionize business applications of data processing.

In fact it seems that with more than 16 to 20 processors, performance gains are far from proportional to the increased investment (20 seems to be the practical maximum in terms of general data processing). Above those levels, performance gains drop considerably.

These conclusions seem to be valid even when we have the methodologies needed for the division of tasks and the software required to run a large number of jobs simultaneously.

Finally, for those who advocate replacing silicon by gallium arsenide (GaAs), it appears that GaAs' best performances can be matched with silicon, which has the advantage of having existed for 30 years.

25048
CSO: 3698/A239

FRG TESTS PROTOTYPE OF 'SUPRENUM' SUPERCOMPUTER

Bonn DIE WELT in German 24 Jun 87 p 1

[Article by Dieter Thierbach: "SUPRENUM Gets the Drop on the Weather"]

[Text] A recently presented study by New York's prestigious Columbia University has published the news: functioning as of a kind of scorekeeper, the study has determined who is hitting the mark in the international competition to develop the next computer generation. Conclusion: a German high-performance computer called SUPRENUM (Super Computer for Numerical Applications) holds the lead in world-wide development, along with three US designs.

The super computer has been developed together with the Technical University of Berlin's Research Center for Innovative Computer Systems and Technology, called FIRST for short [Forschungszentrum fuer Innovative RechnerSysteme und -Technologie]. According to concise comments made yesterday at the Scientific Press Conference in Bonn, by FIRST director, Professor Wolfgang Giloi, FIRST wants to live up to its name: "We want to contribute to raising the performance level of the FRG in the area of information engineering." Because the time is right, a combination of new technologies are making it possible to achieve higher performance in combination with a more compact, cost-effective design than has been the case in the past.

A prototype of the advanced machine, which according to rough estimates has swallowed up 130 million marks in development costs, was released from the Berlin computer workshop in May for test purposes. After applications software has been optimized, the giant computer is supposed to be turned over to industry next year in fully functioning condition, at which point mass production will begin.

The think tank, which is called the "Center of Excellence," currently employs 120 researchers. It has been involved for just two years in world-wide efforts to develop innovative solutions for powerful supercomputers and intends, according to Wolfgang Giloi, "to ensure that relevant know-how is also available in our country."

SUPRENUM is designed to aid in split-second processing of partial differential equations like those which related to aerodynamic problems in space engineering. "Mathematical simulations as an alternative to time-consuming, expensive testing in wind tunnels are the obvious initial application. But we also intend to evaluate weather data for the meteorologists."

SUPRENUM, with its total of 256 micro-computers and its gigantic capacity for five billion computer operations per second puts its predecessors in the shade. Yet, in spite of their respect for its power, the Berliners are not resting on their laurels, but are gearing up for continued challenges. According to Wolfgang Giloi: "We are in the process of thinking about a SUPRENUM II that is four to five times as powerful."

13127
CSO: 3698/561

FRG: SUPRENUM MASSIVELY PARALLEL SUPERCOMPUTER PROGRAM

Bonn RHEINISCHE MERKUR in German 3 Jul 87 p 14

[Article by Michael Globig: "Super-high-speed Computer at Half Price: Super Computer Designed in Berlin Eclipses Japanese and American Models"]

[Text] Three years ago when the Federal Research Ministry, several industrial companies, and various commercial enterprises reached a consensus on the basic operating principle for a planned German super computer, the proposed solution was by no means undisputed. At the time, many experts thought the idea presented by Professor Wolfgang Giloi of the Society for Mathematics and Data Processing (GMD) was too unusual. However, in spring 1987 the concept was afforded international recognition: a study by New York's Columbia University evaluated 30 serious super-computer development projects currently being conducted around the world; the study placed the German super computer at the head of the pack together, with three US projects.

What distinguishes the German SUPRENUM project (Super Computer for Numerical Applications) from the other super computers? Professor Giloi explained recently at the Bonn Scientific Press Conference that there are two ways to structure a super computer. The leading American computer giant, the "Cray II" system, is based on the idea that a super computer must be equipped with the fastest switches and the most powerful technology. However, such a machine cannot employ any highly integrated components--power conversion would be so great that even fluid cooling systems would be unable to dissipate the heat generated.

The first Cray model, the Cray I, sold a total of 120 machines world wide and still works with a single main processor; in contrast, the Cray II, which came on the market two years ago, uses four parallel main processors, so that information no longer has to be processed in sequence, but can instead be "computed" in parallel. The computer speed is accordingly phenomenal: a maximum of 1.2 billion arithmetic operations are processed per second.

The German team chose another route: they wanted to use components with four to five magnitudes slower response time, but a hundred times the degree of integration (a million switching elements per chip). The power needs of this kind of machine are two magnitudes lower than for a Cray II, so it is possible to get along without a complex cooling system, making the system cheaper.

In order to achieve high computer speeds anyway, the designers planned from the very beginning for massive parallel processing: the first version of SUPRENUM consists of 256 parallel microcomputers, each as powerful as a personal computer. They can process information simultaneously and thus are capable of more than making up for the disadvantage of slower response time. The SUPRENUM super computer is supposed to be able to conduct five billion computer operations per second, four times as many as the Cray II.

The SUPRENUM has been developed in conjunction with the Technical University of Berlin by the GMD Research Center for Innovative Computer Systems and Technologies (FIRST) under the leadership of Professor Giloi. At the end of May he was able to turn the first prototype over to the SUPRENUM company in Bonn, and next spring a fully developed functional system is supposed to follow, which will serve SUPRENUM-partner Krupp-Atlas as a manufacturing model.

The most important applications [for the new system] involve solutions of partial differential equations like those which occur in aerodynamics problems. Calculating such problems is simpler than conducting wind tunnel tests; furthermore, many problems--such as aerodynamic flow between the underside of an automobile and the road surface--cannot be duplicated in the wind tunnel.

The SUPRENUM project has cost a total of DM 130 million, one third for hardware, and two thirds for software. In spite of the success scored by the project, FIRST experts are already thinking about the successor model, which is supposed to achieve an even higher computer speed. According to Professor Giloi, SUPRENUM will only have a chance on the market if the customer knows that it is not just a one-time design, but that further development is being carried out. Furthermore, he has to fulfill the prognosis stated by one Krupp-Atlas manager: "Whatever the newest Cray machine can do, we can offer the same power at half the price."

13127
CSO: 3698/573

BRIEFS

VOLVO, ERICSSON, SAS, DP MERGER--The Swedish automobile manufacturer, the industrial group, and the international airline company will create a joint data processing company. The decision was inspired by "the unique situation in the Scandinavian countries, which have the largest number of electronics users in the world," the partners say. The new company's name is Scandinavian Info Link (SIL) and its goal will be to "facilitate data processing information exchanges between Scandinavian companies." SIL will offer its first products next summer and aims at "interconnecting over 60 large Scandinavian companies, representing a total of some 150,000 users." Volvo Data and Ericsson Data, the data processing divisions of Volvo and Ericsson, will become partners and will be using the services of the Swedish company Verimation AB, a software distributor. SAS will have a direct participation in SIL. Bjoern Stattin will also become SIL's president and the company's headquarters will be in Stockholm. [Text] [Paris ZERO UN INFORMATIQUE in French 4 May 87 p 7] 25048

CRAY FOR DAIMLER-BENZ--Daimler-Benz AG, Stuttgart, has installed an $8.5 million (DM 16 million) Cray X-MP/24 supercomputer in its research headquarters. Cray Research, Inc. of Minneapolis says that there are now ten of these high-speed computers in the FRG, seven of them in the automobile industry. In July Volkswagen AG bought a Cray X-MP/24 for $8 million. [Text] [Duesseldorf HANDELSBLATT in German 7/8 Aug 87 p 13]

FRENCH-JAPANESE AI COORDINATION--A small (65 employees, 1986 turnover of 20 million francs) Grenoble firm, ITMI [Industry and Technologies of Intelligent Machines], has just signed a marketing contract with Mitsubishi for two of its AI products: Pilotex and Planex. These inference motors serve to develop expert systems for industrial process control and resource allocation planning activities. Their main advantage is that they process the temporal aspects of these types of tasks. There is already one Pilotex installation in service in a Pechiney plant while five others are being developed. Five Planex systems are also in the planning stages. The ITMI engineers along with Japanese specialists in industrial processes will work out applications in the electronic, automobile and nuclear sectors. This marketing agreement may soon be extended to cover Propel, an expert system for designing machining schedules. ITMI has the backing of four "big" shareholders: Pechiney, Hewlett-Packard France, Banexi and Westinghouse each of which have a 12.4% share in the 7,658 million franc capital, while the staff and founders retain control with the remaining 50.4%. [Text] [Paris FTS--FRENCH TECHNOLOGY SURVEY in English May 87 p 4]

CSO: 3698/A279

BRIEFS

FRENCH MOBILE ROBOT--The companies Redoute Catalogue, Renault Automation and SERI have managed to combine a wire-guided trolley, controller and storage cabinet to produce an order preparation mobile robot. It is designed to move between two storage structures and is comprised of a digital control which manages the controller and a mini-computer which synchronizes all the movements. The computer architecture includes four levels: mobile robots, working area, operations carried out and management; it is comparable to that used in controlling modular workshops. In addition to this robot which is already operating in a pilot plant at Flins, SERI has designed a small and large order preparation and packing module as well as the associated computer piloting system. The equipment required for preparing large orders already exists on the drawing board and will be produced at a larger stage. The finishing touches are now being put to the development of the prototype crowning three year's work for a total budget of 20 million francs. As the project's feasibility has been proven, the management at SERI believe they will be able to market some 60 units per year starting in 1988. The target markets are the automobile and distribution industries. [Text] [Paris FTS--FRENCH TECHNOLOGY SURVEY in English May 87 p 3]

CSO: 3698/A280

PHILIPS PRODUCES FIRST FUNCTIONAL SUBMICRON CHIP

Project on Schedule

The Hague ANP NEWS BULLETIN in English 1 Jul 87 p 2

[Text] Electronics group Philips said on Tuesday it had produced its first functional submicron computer chip, with details 100 times smaller than the width of a human hair.

It described this as a major milestone in its joint research project with Siemens of West Germany to develop the technology to produce extremely small integrated circuits at low prices.

The chip packs six million transistors onto a surface slightly smaller than one square centimetre. The smallest details are just 0.7 microns (0.0007 millimetres) wide.

Philips said it was on schedule to begin mass production of such chips by mid-1989.

Philips Siemens and the Dutch and West German governments are together in vesting 1.5 billion guilders in the project which was launched in 1984.

The project is intended to help the two European companies keep up with their U.S. and Japanese competitors in the race to build smaller, faster, and more efficient chips.

Philips is Europe's biggest chip-maker and ranked seventh worldwide in terms of sales last year.

Race to Market

The Hague ANP NEWS BULLETIN in English 2 Jul 87 p 4

[Excerpts] Profits

But Dutch industry analysts said major U.S. and Japanese competitors were likely to beat Philips to the market for the new chips and would take most of the profits.

"Only the first three or five producers will make money with these new chips," one analyst with a major Dutch bank said, noting that surging development costs and fast technology changes called for rapid, big turnover to ensure profits.

"I think Philips will have a hard time being among the top five. For them, it's more a matter of being prepared for the future...they need to have access to this type of technology," said the analyst, who delined to be named.

Philips disagrees. "We anticipate that the industry will only see the first product models using these new chips by the end of the decade...we expect to start volume production in mid-1989," company spokesman Johan Waalwijk said.

Philips is planning to produce the new chips at what it says is Europe's largest "clean room" facility near completion in Nijmegen, near the German border.

The firm currently uses about 40 percent of the chips it makes in its own products. It declined to speculate on what part of its production it would hope to market separately in future.

/9274
CSO: 3698/566

FRG ALLOCATES DM 6.5 MILLION FOR 1987 SUPERCONDUCTIVITY R&D

Duesseldorf HANDELSBLATT in German 1 Jul 87 p 4

[Article by nl: "Riesenhuber: A Kind of World-wide Gold Rush Has Broken Out in the Lab; Superconductivity: Higher Temperatures and Utilization of Cheap Liquid Nitrogen"]

[Excerpt] Because of progress made especially in the last few months in the FRG and worldwide in the area of superconductor technology, Federal Research Minister Riesenhuber has increased this year's government support for basic research in this area to DM 6.5 million.

When current is carried through conductors, heat is produced, resulting in energy loss. For various materials, electrical resistance disappears below a certain temperature in the vicinity of absolute zero (about minus 273 degrees C) and current flows with almost no energy loss. However, this requires considerable expense for cooling with liquid helium. Helium is costly (more than DM 10 per liter) and can conduct very little heat. Consequently all equipment must be heavily insulated.

Taking matters in his own hands at the press conference, Minister Riesenhuber conducted an experiment to clarify the progress achieved with a new class of ceramic superconductors, primarily from the scientific initiative of physicists Mueller and Bednorz.

A small ring made from the new ceramic material, a compound of lanthanum, barium, copper, and oxygen, was dipped in liquid nitrogen, which is twenty times cheaper than expensive helium and has to be cooled down to only minus 196 degrees C. The ring is moved through the magnetic field produced by a strong permanent magnet to induce a current in the ring; in response, the ring then hovers about 2 mm over the magnet. Why? The induced current flows in the superconductive ring without energy loss. Only when the cold from the nitrogen has dissipated somewhat to the environment did the ring lose its acquired opposing magnetization and settle on the permanent magnet (quod errat demonstrandum).

In principle, this development of higher and more cheaply achieved superconductive transition temperatures at which loss-free or near loss-free conductivity begins holds enormous potential for science, technology, and industry in almost all fields.

No Assistance for Industry

According to Riesenhuber, "A kind of gold rush has broken out in labs all over the world. There is even recent evidence that somewhere or other they have achieved minus 40 degrees C with a ceramic material."

The German Institute for Large Scale Research (Karlsruhe, Juelich), the Fraunhofer Societies, the Max Planck Institutes, universities and industry would become actively involved with a total of about 80 working groups. The Federal Research Minister maintains that the important thing at this point is to coordinate German efforts and to combine them as rapidly as possible to conduct specific high-temperature superconductor projects. In the past, he has increased the funds for basic research from a yearly average of DM 1 million from 1976 to 1984 to DM 2 million by 1985 and DM 4.5 million by 1986. The DM 6.5 million figure for 1987 does not represent a top limit. Industry does not require any funds. Given their projected prospects, they would rather work without begging Bonn for money.

13127
CSO: 3698/561

ES2 DEVELOPS NEW CAD TOOL TO SPEED CUSTOMIZED IC DESIGN

Paris ELECTRONIQUE ACTUALITES in French 5 Jun 87 p 14

[Article by D. G.: "ES2 Wants to Democratize ASIC Design]

[Text] ES2 has started a strong promotion program aimed especially at French and German PME/PMI (small and medium-size enterprises and industries), which are still only a small part of the European market of the young company specializing in the design of silicon-compiled ASIC (application-specific integrated circuit). The company believes that the "bulk of the market" for PME/PMI is the area of peripherals which it can help design and manufacture rapidly, since it has both the silicon compilation facilities for design, and direct electron-beam writing capabilities for fabrication.

Broad Range of Customers

Having established the objective of solving users' problems, ES2 covers a broad spectrum of customers, ranging from beginners, for which it has and is developing training and design assistance activities through about 30 centers franchised throughout Europe (two of which are equipped with silicon function generators), to those "experienced in custom circuits," for whom it fabricates prototypes and preproduction (as well up to 10,000 units).

It can thus claim the production of a plotter logic component for a measurements company which needs 10,000 units per year. In this case, a simple 2500-gate device.

For a rolling door company, "new" to electronics, ES2 has developed a strategic circuit through a franchised center working with SOLO 2000 tooling.

For a university interested in nuclear research, it has supplied an input/-output device with specific current/voltage characteristics. And for a larger company, it has integrated a 4K x 80 bit ROM memory into a circuit which proved to be much less expensive than the design considered initially, which included two independent chips, the ROM and the ancillary circuit.

Some Standard Cells and A "Generation of Need" Approach

ES2 has not placed its bets on an excessively large library, but observing that 90 percent of the need is covered with about 50 standard cells (for 95 percent of these needs covered by about 500 cells), it has opted for a "custom" approach.

It can thus provide a requested circuit in one week, relying on conventional ROM (read-only memory), RAM (random access memory), FIFO (first-in first-out), data path, and PLA (programmable logic array) function generators, in addition to about 50 standard cells. The two franchised European centers (in Belgium and FRG) equipped with SOLO 2000, and the Sevres ES2 site for France, supply requested and "non-standard" functions. The library does not include microprocessors or microcontrollers in its catalog, but rather the elements with which to build them, so as to most efficiently incorporate software in the equipment at the most appropriate hierarchical level. With this concept, this way of "rethinking systems," ES2 understandably clashes with existing product manufacturers, which in the opinion of ES2's management "are overly self-critical and forget to think about solutions to the problems with which they are faced, tangled as they are in the constraints of the sugar-coated products they use." In the name of performance, ES2 urges designers to rethink in terms of decentralized functions (rather than in terms of functions allowed by the software), which leads to advantages, particularly in terms of silicon area (of which 70 percent is usually devoted to task management in the case of a 4-bit microcontroller).

According to its thinking, the long term goal of ES2, which has the SOLO 2000 CAD tools (with which it will equip French universities) capable of working with any devices, as well as the SOLO 1000 capable of working with CMOS random logic, and soon (by the end of the year) capable of integrating functional blocks (RAM) and analog elements, is a procedural compiler. Thus, by the end of the decade for instance, system designers "will only have to learn a high-level language (LISP)" with whose support they will be able to move from idea to silicon, the "architecture" becoming a fully transparent phase. IC design tasks are already assigned to the SOLO 2000, while system engineers "can make do" with the SOLO 1000.

In terms of performance, next year ES2 will adopt analog "top of the line" and EEPROM processes, and will continue to do so until the end of 1989, with phases being a function of product lines.

Training University Personnel

To capture a market you might as well start at its "base," and that is undoubtedly what the ES2 management believed in conducting a number of actions aimed at promoting their design equipment; consequently, 100 SOLO 2000 units will be provided to universities. A similar contract has been written with Spain. Moreover, students and researchers will have access to silicon, taking advantage of CMP (multi-project circuits) or PMW (product multi wafer) fabrication techniques. They will thus be able to both design and test their devices in less than one year from their studies.

11,023
CSO: 3698/549

CEO OF NEW THOMSON ASIC SUBSIDIARY INTERVIEWED

Paris L'USINE NOUVELLE in French 23 Apr 87 p 32

[Interview with Claude Bozzo, managing director of CETIA, by editor Jean-Pierre Jolivet: "ASIC's, CAE,...CETIA Expands Its Horizon"; data and place not given]

[Text] CETIA [European Company for Assisted Engineering Techniques], a product of the Visualization Plan and a former division of the CSEE [Electronic Activities and Signals Company], is now controlled by Thomson, which has just acquired 51 percent of its capital. Claude Bozzo, 41, its founder and managing director, explains in this interview with L'USINE NOUVELLE why he chose to have CETIA specialize in the design of custom VLSI circuits and the sale of turnkey CAE systems.

L'USINE NOUVELLE [L'UN]: Thomson has become the majority shareholder of CETIA. What are the consequences of this takeover?

Claude Bozzo [CB]: By acquiring 51 percent of CETIA's capital, Thomson has provided us Fr 13 million, guaranteeing continued strong growth. We have grown from 10 people in 1983 to 70, distributed between our technical center in Toulon and our commercial center in Ulis. Revenues have increased from Fr 2 million to Fr 36 million in 3 years, and we predict Fr 100 to 110 million in 1987.

Our activities in custom circuit design (ASIC) [Application Specific Integrated Circuit] and in sales of turnkey computer-aided engineering (CAE) systems complement those of Thomson, the components manufacturer. They allow Thomson to enter a promising field with a brilliant future. The ASIC market in the United States will exceed $2.2 billion in 1990.

[L'UN:] So your prospects abroad are significant?

[CB:] As its name--European Company for Assisted Engineering Techniques--indicates, CETIA concentrates on Europe. We are opening a German subsidiary this year. We expect to get a foothold on the British market next year.

[L'UN:] What areas of priority has CETIA set for the future?

[CB:] We are pursuing two fields of development. First, microelectronic design services, where we offer custom design of VLSI circuits and circuit boards. A true service company, CETIA is the link between the client and the silicon "smelters."

Our second activity is as a provider of turnkey systems. CETIA offers its clients Unigraph workstations and applications, which allow the user to develop his own circuits. Our target market in this field is the small- and medium-sized companies. We also offer Alliance CAE software, which can be used on different types of workstations. Here our approach is identical to that of Mentor Graphics, Valid, or Daisy in the United States.

[L'UN:] What product strategy have you chosen?

[CB:] Our offerings are based on 32-bit Unigraph graphics workstations developed by CETIA. This line runs the major industry standards: VME, Ethernet, UNIX, GKS, NFS, PHIGS. Thus, our hardware can operate on various networks. To complete its catalog, CETIA has signed joint technical and commercial agreements. We integrate Metheus graphics control units in our stations. In return, this American company will market the Unigraph line in the United States. CETIA also sells Phase Three Logic software for electronic CAE.

25037
CSO: 3698/A225

BRIEFS

SGS/THOMSON TO PRODUCE EPROMS—A technical agreement between the Italian SGS (a part of the IRI [Industrial Reconstruction Institute]-STET [Telephone Finance Corporation] group) and the French company Thomson Semiconductors was recently made official. Joint development by SGS and Thomson will concentrate on the production of 4-megabyte EPROM memories (erasable programmable read-only memories). These nonvolatile memories produced by CMOS technology with line widths of less than one micron (0.8 micron) as well as feasibility studies of a 16-megabyte EPROM with line widths of half a micron. According to SGS, the project is the only one in Europe in this sector of activity. It will last 5 years and cost each partner 200 million ECU's. SGS and Thomson say they are the only two European suppliers of EPROM memories on the world market, which was estimated at about $850 million in 1985. The market is divided almost entirely between Japan and the United States. However, the present balance between the United States and Japan, where Japan is the leader in high-density memories (256 and 512 kilobytes), is shifting rapidly toward Japanese industries. In 1985, the main sectors of application for EPROM memories was 45 percent for computers, 38 percent for telecommunications, 9 percent for industry, and 8 percent miscellaneous. It is predicted that the market for nonvolatile memories will reach $3 billion by 1990. [Text] [Milan SISTEMI E AUTOMAZIONE in Italian Feb 87 p 117] 8782

CSO: 3698/475

EC AGREES ON 1987-1991 FUNDING FOR R&D PROGRAMS

Duesseldorf HANDELSBLATT in German 24-25 Jul 87 p 11

[Text] The EC Council of Ministers has passed the new multi-year R&D program for 1987-1991.

The plan provides funding totaling 6.1 billion ECUs or over DM12 billion (1 ECU currently equals approximately DM2.07). The program was long an object of controversy and was passed only after Great Britain retracted a reservation. London had for some time waged opposition to the funding levels, wishing to force more frugality on the organization. The Federal Republic and France were at first also against the EC Commission's plans originally calling for a budget of 7.7 billion ECUs.

Just before passage of the program, EC Commissionar Narjes detailed the most important individual plans of the multi-year program. They can be passed singly by majority vote since the EC Reform went into effect, whereas the basic program requires unanimity.

The program is weighted most heavily toward information technology and telecommunications, fields in which the Europeans especially need to close the gap in international competition. Narjes' presentation reported that the ESPRIT program in information technologies will receive 1.6 billion ECUs. ESPRIT has been running for years with success, and 50 percent of its operating budget is furnished by the EC. The BRITE program for the application of modern technologies in traditional industries is to be increased by 60 million, this because, in Narjes' words, a "hardly explainable" rate of disapproval exists along with great interest. The JET nuclear fusion project will get 911 million ECUs. JET works on future solutions to energy problems and has been operated successfully in British Culham by the EC together with Sweden and Switzerland.

Narjes mentioned other programs as well. Among them, DELTA receives 20 million ECUs for developing training facilities in high-tech fields; DRIVE is allocated 60 million ECUs to develop a modern traffic control system and to reduce environmental pollution; and AIM gets 20 million ECUs to reduce the costs of health care. Also to receive funding are the radiation protection program and the program for the exchange of research scholars within the EC countries. DELTA is also designed to close a gap between the large programs ESPRIT, RACE (wide-band communications network) and the recently started COMETT program (cooperation between universities and industry). The commission reports that COMETT was inaugerated on the basis of an exceptionally great demand.

9992
CSO: 3698/601

DAIMLER-BENZ 'PARTICIPATION' IN MBB RUMORED

Duesseldorf HANDELSBLATT in German 24-25 Jul 87 p 13

[Text] HANDELSBLATT, Duesseldorf, Thursday 7-23-87--Daimler-Benz has not yet negotiated a single time regarding participation in the Messerschmidt-Boelkow-Blohm aero-space concern. So declared Daimler's board chairman designate, Edzard Reuter, adding that there is "just reason to consider it" in view of the situation of German aero-space industry and international competition. He stated that it is "totally premature" to say anything this soon about the outcome.

The Bavarian minister-president, Franz-Josef Strauss, confirmed talks between Daimler-Benz and MBB. In Munich, Strauss stressed that the talks have not started in earnest yet and would not "enter a decisive phase" until this fall. The CSU chairman thus responded to the statements of MBB-AR vice chairman Alois Schwarz concerning an alleged participation of Daimler-Benz in MBB. Such statements, said Strauss, not only anticipate the outcome of future negotiations, but could even jeopardize them. Above all, certain problems must yet be clarified by the federal government.

Dr Otto Graf Lambsdorff, FDP economics spokesperson in parliament and erstwhile minister of commerce, criticized a statement about the Daimler-MBB merger by Dr Erich Riedl, parliamentary undersecretary in the Department of Commerce. Riedl is reported in the press to believe that a participation by Daimler-Benz is possible in cartel law. Lambsdorff told the HANDELSBLATT that this statement was "somewhat surprising." Since Daimler holds a majority of the shares in the sole still existing German aircraft builder Dornier, an injunction against Daimler-MBB may be--as Lambsdorff "carefully formulated" it--within the realm of the possible.

Statements from the Department of Commerce in advance of a possible anti-merger action, Lambsdorff said, are a complete novelty. Are signals to be sent to the federal cartel office that a possible ban will be lifted through ministry permission? Lambsdorff further stated that with good reason no minister of commerce has ever taken a position regarding outcomes of anti-cartel actions before the conclusion of procedures in the federal cartel office. "Such behavior would make a farce of the office's work," asserted Lambsdorff.

Lambsdorff explained that in the case of a petition for a minister's permission, the law strictly prescribes the hearing of the monopoly commission. Only then can the minister decide, and then it is still possible for him to refer the petitioner's case to the appeals process to review the decision of the cartel office. A continuation of merger activities by Daimler-Benz, he contended, would run up against a public grown sensitive to the topic of "big mergers." Lambsdorff emphasizes that the CDU/CSU members of parliament have also taken note of this sensitivity.

9992
CSO: 3698/601

FRG-NETHERLANDS RESEARCH COOPERATION

Amsterdam COMPUTABLE in Dutch 1 May 87 p 2

[Article: "TNO and West German Fraunhofer Are Going To Cooperate"; first paragraph is COMPUTABLE introduction]

[Text] The Hague--The West German Fraunhofer research institute and the Netherlands Organization for Applied Natural Science Research (TNO) are going to cooperate. Fraunhofer's management signed a declaration of principles last week in the Netherlands, which leaves both organizations' structures unchanged.

Both institutions are convinced of the growing importance of cooperation within the European Community that surpasses the national borders. Although the TNO has occasionally worked with other organizations, cooperation like that now being studied with the Fraunhofer Institute has never before been concluded. TNO and Fraunhofer are more or less comparable. TNO disburses a 650-million-guilder annual budget, employs 5,000 people, and contains 35 institutes. At Fraunhofer's the budget is a tight 500 million guilders and it employs 4,000 people in 34 institutes.

TNO covers with health and defense research a somewhat broader field than Fraunhofer. Hence, cooperation will be in areas common to both institutes: information technology, production automation, applied biochemistry, food technology, and environmental research.

Two forms of cooperation have been agreed upon. The institutions will exchange information as long as a particular research task does not require complete secrecy. An exchange of scientific personnel will also take place as both parties want to extend their knowledge. Finally, both institutions want to set up joint projects. They want to support each other in obtaining approval for research proposals by both national and European research authorities.

25012
CSO: 3698/A236

R&D POLICY IN SWEDEN, NORWAY

Paris CPE BULLETIN in French April 87 pp 49-52

[Article by Philippe Montigny and Mark Booth: "R&D Policy in Sweden and Norway"]

[Text] Sweden

Sweden: 0.01 percent of the international scientific community with 0.001 percent of the world's population.

The Nobel Foundation is no doubt the best known indication of this scientific vitality, but Sweden's status depends primarily on the structure of the R&D system and its scientific strategy. As it cannot be active in every field, Sweden focuses on priority sectors where it acquires an international competence which then serves as a bargaining chip for technology transfers.

Lastly, Sweden was one of the first countries to become involved in technology assessment, systematically calling on international experts.

R&D Organization (see organization chart)

Attached directly to each of the ministries is either a directorate or a national agency responsible for the operational aspects of the ministerial programs.

These directorates or agencies are directly connected to public and private research and educational establishments to which they allocate funds.

The STU (National Directorate for Technological Development) thus has the task of financing research institutes involved in industrial development (polytechnic schools, cooperative research institutes, etc.).

As for basic research, this is under the control of the Research Councils.

An important feature of this R&D structure is the autonomy each entity enjoys.

R&D Evaluation

This autonomy is accompanied by the important task of assessment. Most of

these institutions have their own assessing body whose task is evaluating the quality of the projects for which they are responsible. The two best known evaluation units are the one in the STU, currently directed by Mats Ekeblom, and the one in the Nature Sciences Council (basic research), under Mr Samuelson.

Given Sweden's small size, these units have always called on international experts. This practice permits Sweden to see both its position in relation to international competition and to maintain a permanent technology watch.

In addition, none of these institutions hesitates to call on outside consulting organizations for an evaluation.

Thus, in addition to its expertise in the area of financial auditing, the Swedish National Audit Bureau (RVV) has a reputation for its optimization and efficiency studies.

Finally, we should recall that as early as 1978 (on the initiative of the Ministry of Industry and the major manufacturing companies, including Volvo) Sweden called on the Boston Consulting Group to evaluate its industrial structure. This evaluation was an important step in the restructuring of industrial policy and initiated a systematic process for evaluation by international authorities (CPA-MIT--the Massachussets Institute of Techology's Center for Policy Alternatives; STAR--Scandinavian Institute for Administrative Research, etc.).

Norway

R&D Organization (see organization chart)

The organization chart (see below) describes the three-level Norwegian R&D structure: The first level is the decisionmaking level, involving:
- parliament and its commissions,
- ministerial offices and their staffs,
- Scientific Policy Council,
- Ministerial Research Commission,
- research councils (NFFR, NTNF, NAVF, NLVF, etc.).

A second level, consisting of actual R&D activities, includes:
- universities and other learning institutions,
- public R&D organizations, under the direction of the research councils,
- private research organizations.

Finally, the last level includes R&D users, manufacturing companies, and government services.

Industrial Research and the Thulin Commission

A decade ago, Norway set up a series of ministerial or governmental evaluations and initiatives to develop its R&D policies. For example in 1980-1981 the Thulin Commission evaluated the national policy on technical and

industrial research, especially the role in this policy played by the NTNF, the largest research council.

It is especially interesting to note that the Thulin Commission entrusted the bulk of the evaluation to Ben Martin and John Irvine of the University of Sussex's Science Policy Research Unit.

This commission recommended administrative and financial independence for the research institutes linked to the NTNF. It also recommended better integration of public R&D structures into industry by encouraging technology transfers and mobility of scientific personnel.

These recommendations are currently being implemented.

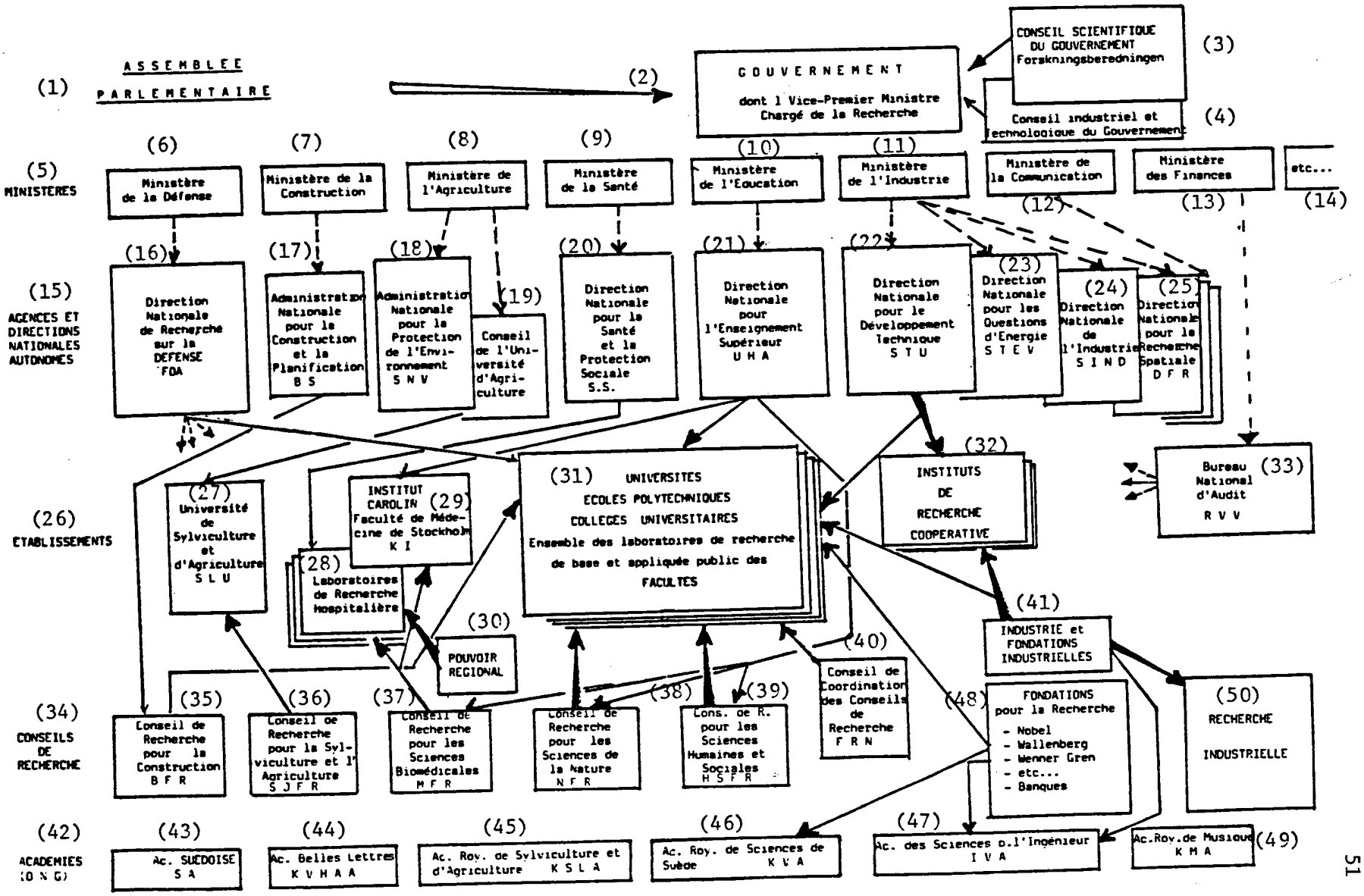

(1) ASSEMBLEE PARLEMENTAIRE
(2)
GOUVERNEMENT
dont 1 Vice-Premier Ministre Chargé de la Recherche
CONSEIL SCIENTIFIQUE DU GOUVERNEMENT Forskningsberedningen
(3)
Conseil industriel et technologique du Gouvernement
(4)
(5) MINISTERES
(6) Ministère de la Défense
(7) Ministère de la Construction
(8) Ministère de l'Agriculture
(9) Ministère de la Santé
(10) Ministère de l'Education
(11) Ministère de l'Industrie
Ministère de la Communication
(12)
Ministère des Finances
(13)
etc...
(14)
(15) AGENCES ET DIRECTIONS NATIONALES AUTONOMES
(16) Direction Nationale de Recherche sur la DEFENSE FOA
(17) Administration Nationale pour la Construction et la Planification B S
(18) Administration Nationale pour la Protection de l'Environnement S N V
(19) Conseil de l'Université d'Agriculture
(20) Direction Nationale pour la Santé et la Protection Sociale S.S.
(21) Direction Nationale pour l'Enseignement Supérieur U H A
(22) Direction Nationale pour le Développement Technique S T U
(23) Direction Nationale pour les Questions d'Energie S T E V
(24) Direction Nationale de l'Industrie S I N D
(25) Direction Nationale pour la Recherche Spatiale D F R
(26) ETABLISSEMENTS
(27) Université de Sylviculture et d'Agriculture S L U
INSTITUT CAROLIN (29) Faculté de Médecine de Stockholm K I
(28) Laboratoires de Recherche Hospitalière
(31) UNIVERSITES ECOLES POLYTECHNIQUES COLLEGES UNIVERSITAIRES Ensemble des laboratoires de recherche de base et appliquée public des FACULTES
(32) INSTITUTS DE RECHERCHE COOPERATIVE
Bureau National d'Audit R V V (33)
(30) POUVOIR REGIONAL
(34) CONSEILS DE RECHERCHE
(35) Conseil de Recherche pour la Construction B F R
(36) Conseil de Recherche pour la Sylviculture et l'Agriculture S J F R
(37) Conseil de Recherche pour les Sciences Biomédicales M F R
Conseil de Recherche pour les Sciences de la Nature N F R
(38)
Cons. de R. pour les Sciences Humaines et Sociales H S F R
(39)
(40) Conseil de Coordination des Conseils de Recherche F R N
(41) INDUSTRIE et FONDATIONS INDUSTRIELLES
(48) FONDATIONS pour la Recherche
- Nobel
- Wallenberg
- Wenner Gren
- etc...
- Banques
(50) RECHERCHE INDUSTRIELLE
(42) ACADEMIES (O N G)
(43) Ac. SUEDOISE S A
(44) Ac. Belles Lettres K V H A A
(45) Ac. Roy. de Sylviculture et d'Agriculture K S L A
(46) Ac. Roy. de Sciences de Suède K V A
(47) Ac. des Sciences d.l'Ingénieur I V A
Ac.Roy.de Musique K M A (49)

Chart p 51. R&D Organization in Sweden
With the permission of Mr Durand - Scientific Advisor

Key:

1. Parliamentary Assembly
2. Government - including a vice-prime minister of Research
3. Government Scientific Council - Forskningsberedningen
4. Government Industrial and Technological Council
5. Ministries
6. Defense Ministry
7. Construction Ministry
8. Agriculture Ministry
9. Health Ministry
10. Education Ministry
11. Industry Ministry
12. Communications Ministry
13. Finance Ministry
14. Etc.
15. Independent Agencies and Directorates
16. National Directorate for Defense Research - FOA
17. National Construction and Planning Administration - BS
18. National Environmental Protection Administration - SNV
19. Agricultural University Council
20. National Health and Social Welfare Directorate - SS
21. National Higher Learning Directorate - UHA
22. National Directorate for Technological Development - STU
23. National Directorate for Energy Matters - STEV
24. National Directorate for Industry SIND
25. National Directorate for Space Research - DFR
26. Institutions
27. Forestry and Agriculture University - SLU
28. Hospital Research Laboratories
29. Carolin Institute - Stockholm Medical Department - KI
30. Regional authorities
31. Universities
    Polytechnic Schools
    University Colleges
    All public laboratories for basic and applied research associated with an academic department
32. Cooperative research institutes
33. National Audit Bureau - RVV
34. Research councils
35. Construction Research Council BFR
36. Forestry and Agriculture Research Council - SJFR
37. Biomedical Science Research Council - MFR
38. Natural Sciences Research Council NFR
39. Human and Social Sciences Research Council - HSFR
40. Council for the Coordination of Research Councils - FRN
41. Industry and industrial foundations
42. Academies (ONG)
43. Swedish Academy - SA
44. Academy of Literature - KVHAA
45. Royal Academy of Forestry and Agriculture - KSLA
46. Royal Swedish Scientific Academy KVA
47. Academy of Engineering Sciences IVA
48. Research foundations
    Nobel
    Wallenberg
    Wenner Gren
    etc.
    Banks
49. Royal Academy of Music - KMA
50. Industrial Research

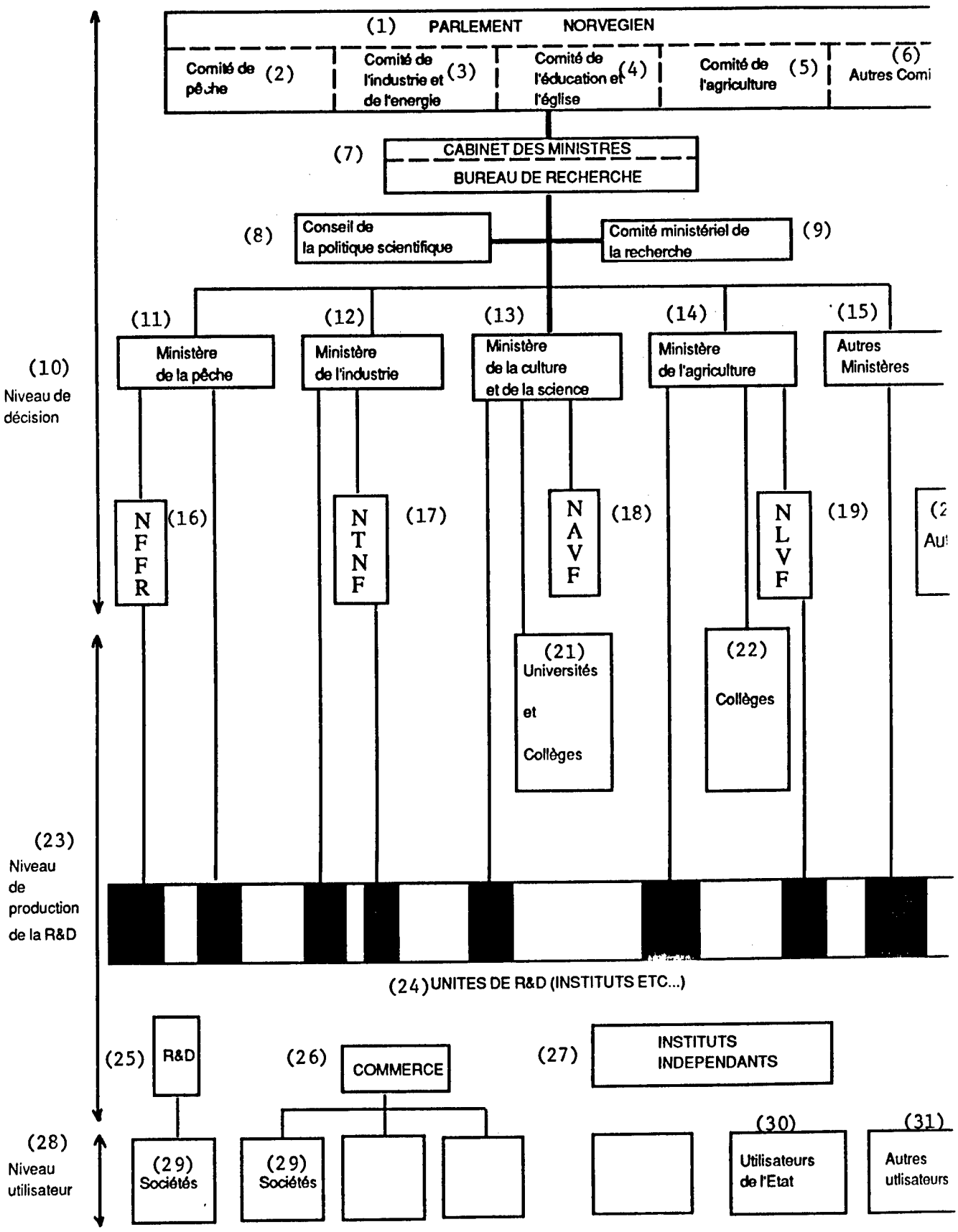

(1) PARLEMENT NORVEGIEN
Comité de pêche (2)
Comité de l'industrie et de l'energie (3)
Comité de l'éducation et l'église (4)
Comité de l'agriculture (5)
(6) Autres Comi
(7) CABINET DES MINISTRES
BUREAU DE RECHERCHE
(8) Conseil de la politique scientifique
Comité ministériel de la recherche (9)
(10) Niveau de décision
(11) Ministère de la pêche
(12) Ministère de l'industrie
(13) Ministère de la culture et de la science
(14) Ministère de l'agriculture
(15) Autres Ministères
NFFR (16)
NTNF (17)
NAVF (18)
NLVF (19)
(21) Universités et Collèges
(22) Collèges
(23) Niveau de production de la R&D
(24) UNITES DE R&D (INSTITUTS ETC...)
(25) R&D
(26) COMMERCE
(27) INSTITUTS INDEPENDANTS
(28) Niveau utilisateur
(29) Sociétés
(29) Sociétés
(30) Utilisateurs de l'Etat
(31) Autres utlisateurs

Chart p 52. R&D Organization in Norway

Key:

1. Norwegian Parliament
2. Fishery Commission
3. Industry and Energy Commission
4. Commission for Education and the Church
5. Agriculture Commission
6. Other Commissions
7. Ministerial Cabinet Research Bureau
8. Scientific Policy Council
9. Ministerial Commission on Research
10. Decisionmaking level
11. Ministry of Fishery
12. Ministry of Industry
13. Ministry of Culture and Science
14. Ministry of Agriculture
15. Other ministries
16. NFFR
17. NTNF
18. NAVF
19. NLVF
20. Others
21. Universities and colleges
22. Colleges
23. R&D production level
24. R&D units (institutes, etc...)
25. R&D
26. Business
27. Independent institutes
28. User level
29. Companies
30. Government users
31. Other users

25051
CSO:3698/A227

FRANCE'S MILITARY R&D DISCUSSED BY DIRECTOR

Paris L'USINE NOUVELLE in French 7 May 87 pp 52-53

[Interview by Marc Chabreuil and Pierre Virolleaud with Victor Marcais, director of defense research, studies, and technology; date and place not given: "Towards a EUREKA Program for Defense"; first two paragraphs are L'USINE NOUVELLE introduction]

[Text] Father of the "Redoutable" class ballistic missile submarine and a senior official in the nuclear field, Victor Marcais has been director of the Directorate for Research, Studies, and Technology (DRET) in the Ministry of Defense since 1984. A graduate of the Ecole Polytechnique, a military engineer with general officer rank, he directs all military research. DRET plays a key role in the Ministry of Defense. It provides overall coordination and leadership for some 30 project groups organized by technology or by end purpose.

The other mission assigned to DRET involves conducting or commissioning a certain number of research projects at an advanced or horizontal level (electronics, data processing, etc.). Most of these projects are contracted out to industrial firms. The others are carried out either in DRET research facilities or in facilities which come under its responsibility (the Arcueil Central Technical Weapons Facility, ONERA [National Office for Aerospace Studies and Research], and the French-German Saint Louis Institute in Alsace), or in university laboratories, state-run civilian research centers (CNRS [National Center for Scientific Research], CEA [Atomic Energy Commission], etc.), universities, engineering schools, etc.

L'USINE NOUVELLE [L'UN]: In 1987 a special effort was made for military research. What was the increase in the DRET budget?

Victor Marcais [VM]: This year we had an increase on the order of 9 percent, bringing our budget to close to Fr 2 billion. All defense research is, however, not carried out by DRET. If we add the exploratory R&D projects carried out by the General Armaments Directorate (DGA), we arrive at a total of Fr 6 billion.

Moreover, what is normally designated R&D constitutes 25 to 30 percent of the Defense Ministry's materiel and equipment budget. That is a record! As

substantial as those amounts are, however, they cannot be reduced if France is to remain in the defense technology race.
[L'UN] Are you optimistic for 1988?

[VM] Next year's budget is not yet known. Still, if we look at the program funding legislation that has just been passed, we can expect a 5-percent increase in the DRET budget.

[L'UN] Among the current DRET research projects, what are the high priority areas?

[VM] Our projects cover a very broad spectrum. The Research Service includes not less than nine groups extending from data processing to biology and including telecommunications and remote sensing, general physics and earth sciences, lasers, semiconductors and components, fluid mechanics, chemistry and propulsion technology, materials and structures, etc.

Research in all these areas will be pursued even if today some of them do not present an obvious application. Who would have bet on lasers 20 years ago, or more recently, on superconductors? We must remain alert, follow a balanced line of action, and monitor the landscape as broadly as possible to ensure that future weapon systems have the best technology available when the corresponding programs are initiated.

In future years we can expect substantial developments in oceanography, materials, especially composites, infrared and millimetric remote sensing techniques, and image processing techniques--without excluding, of course, an area which now involves almost all weapons: computer applications.

[L'UN] What portion of the contracts is awarded to firms?

[VM] The majority--more than 60 percent--of our contracts are with industry; one-fifth of these are with small- and medium-sized firms. If all the Defense Ministry's exploratory R&D contracts are taken into account, the portion going to industry reaches 75 percent (not counting nuclear research which comes wholly under CEA responsibility).

We have many contracts with industry. During the past 2 years DRET has awarded studies to approximately 100 small- and medium-sized firms, including subsidiaries of large corporations, and to 30 or 35 major companies.

In all cases the funding is shared, with the government's portion, which is variable, going as high as 70 percent.

[L'UN] Do you award contracts to foreign firms?

[VM] Currently, no. More out of habit than design. We do, however, have some contracts with foreign laboratories.

Today the research potential of French firms is adequate. We are at a turning point, however. In certain areas we must be directed toward European research. This approach is shared by many of our neighbors.

Currently, an attempt is being made to promote joint research with European industrial groups. Coordination structures are coming into place and are beginning to operate, especially in the field of electronic components. Last March, all the European defense research directors met here in Paris. Later, other sectors will get involved: materials, remote sensing, radars, etc. A sort of Defense EUREKA could develop.

[L'UN] Who owns the patents filed under a DRET contract?

[VM] The contractor remains the owner of his invention. There are, however, three provisions to protect the interests of the government. The government is entitled to a royalty-free license to use the patent for its own requirements. It receives a royalty if the firm exploits the patent. It also reserves the right to act in lieu of the inventor should the firm decline for any reason to file for a patent.

Every invention is examined from the defense secret viewpoint. The general rule is that an invention considered "sensitive" may not be patented. In that case, a "Solo" envelope is filed in a safe in order to be able to establish priority in case a similar foreign patent appears on the market.

[L'UN] What is the role of the Industrial Mission that has been established in the Ministry of Defense?

[VM] The Industrial Mission was established by DRET in 1985. It allows firms that want to contract with Defense to have a valid source of information. Thus, it has an introductory role, but advises and assists as well. For example, after investigation we are prepared to enter into a contract with a firm that approaches us with an interesting idea. The Industrial Mission must also allow small- and medium-sized firms to benefit from our research findings which have potential civilian applications. It will assume an ever greater role in innovation. In this way we hope to supplement the activity of ANVAR [National Agency for the Implementation of Research] with which we collaborate.

[L'UN] Are there many civilian spin-offs from defense research?

[VM] I would like to distinguish between transfer and spin-offs. Our primary concern is that research conducted in universities, state laboratories, and elsewhere be transferred to industry. We try to put researchers and industry in contact with one another. That is what we did in the case of an infrared detector developed in a LETI [Laboratory for Electronics and Data Processing Technology] laboratory. We promoted the establishment of an industrial structure around the CEA. Another example is the voice command, where research conducted by the CNRS is today appearing in industrial developments.

As far as civilian spin-offs go, it must not be forgotten that defense represents only 30 percent of national state-funded research--in fact, a bit more in high technology areas. A large portion of this percentage covers areas where civilian technology is not fundamentally different from military technology. That is the case for electronic components, mainframes, etc., which were the subject of coordinated research, with pooling of the results.

There remain areas which are more specifically military (remote sensing, explosives, armor plating, etc.) and which can nevertheless entail civilian applications. Let it not be forgotten that the carbon-carbon composites developed for missile exhausts and nuclear warhead reentry components are today used in brakes, in medical prostheses, etc., and that civil aviation benefits from military aircraft experience. Conversely, we benefit from civilian developments in telecommunications and in space. It is a matter of reciprocity--we help them, they help us.

[L'UN] Are military and civilian research coordinated?

[VM] That is indispensable not only to avoid duplication, but also to avoid gaps. The civilian and military together must use to best advantage the Fr 100 billion in annual funding. Fortunately, we work closely with the Ministry of Research and we have very good knowledge of what is going on in the top civilian laboratories. As a result, France's technological position is sound. We must take advantage of this and assume a position of leadership in certain major areas. Then, the industrial firms of the Old Continent will have to agree to work together. Perhaps that will be the hardest of all to achieve.

25050
CSO: 3698/A235

BRIEFS

FRG UNIVERSITY R&D PROJECTS--The German Research Association [DFG] recently launched six new specific research programs at different universities. These programs deal with the following fields: metallic materials with high electrical correlation (universities of Darmstadt, Frankfurt, and Mainz), selective behavior of reactions in solid catalyzers (Karlsruhe university), behavior of materials in very high velocity wheel/surface contact (Berlin university), the economy of the Lake Constance environment (university of Constance), malignant cell transformation: properties and control possibilities (university of Munich). In 1986 the DFG allocated DM317 million to 163 specific research programs. [Article signed R.B.] [Text] [Paris CPE BULLETIN in French Apr 87 p 20] 25051

CSO: 3698/A227

FRENCH RECHARGEABLE NICKEL-CADMIUM BATTERY FOR USSR, EAST EUROPE

SAFT Innovation

Paris ZERO UN INFORMATIQUE in French 11 May 87 p 25

[Article by Philippe de Moussac: "World Firsts"; first paragraph is source introduction]

[Excerpts] The Exhibition of Industrial Electronics, CIM, Robotics, and Automation was held in Angers this year.

The Williamson Electronics center certainly introduced the most anticipated innovation when the new leakproof and rechargeable nickel-cadmium battery from SAFT [Traction and Fixed Accumulators Company] was presented for the very first time to the public. Sony's announcement that this new prismatic storage battery will be used in a new Walkman permitted the exhibitor to announce--but he carries the full responsibility for his claim--that this new product could be the market standard of the future.

A New Revolutionary Battery That Could Become the Standard

It is true that the laser-welded container provides excellent leak protection and makes it possible for the positive and negative poles to be on one side allowing a far easier stacking than with cylindrical cells. The new "standard" provides a capacity of 300 to 1,200 mAh with 1.2 volts in natural tension, weighing 17 grams for a nominal capacity of 300 mAh.

Technology for East Bloc

Paris L'USINE NOUVELLE in French 14 May 87 p 24

[Article: "Storage Batteries: SAFT Goes East"]

[Text] As a subsidiary of the CGE [General Electric Company] specializing in storage batteries, SAFT already signed an agreement with the Soviet Union in late 1986 for the construction of a rechargeable battery factory in the Leningrad area. Today, SAFT is heading for Bulgaria and Yugoslavia, to which it will transfer its cadmium-nickel technology. A first contract, worth Fr 170 million, will thus be followed by two other orders, amounting to Fr 55 and Fr 60 million.

25012
CSO: 3698/A238

BRIEFS

MATRA-PRC SPACE COOPERATION--China has signed a new agreement with Matra concerning space cooperation. Matra equipment for experiments in microgravity is to be launched into orbit by China's Long March 2 rocket. The 15-kg payload will be launched in August and recovered after 5 days in orbit. This agreement follows another with Matra involving calculators and testing systems for the Chinese space centers. [Text] [Paris L'USINE NOUVELLE in French 21 May 87 p 34] 25062

CSO: 3698/A248

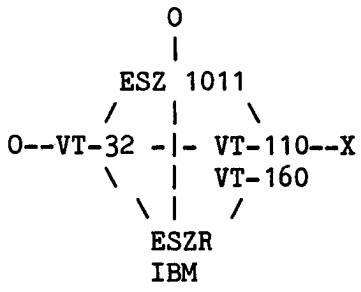
HUNGARY: LINKS BETWEEN VIDEOTON COMPUTERS

Budapest COMPUTERWORLD/SZAMITASTECHNIKA in Hungarian No 12, 3 Jun 87 p 3

[Article by Janos Andor Vertes: "Videoton Computers Among Themselves"]

[Text] Probably the characteristics of the computers involved do not interest the users so much as what connections can be built up among the several machines. Taking an example from the recent past, even among the new announcements from IBM the greatest interest was aroused by the SAA (Systems Application Architecture). The IBM announcements were at the beginning of April. At the end of April there was an NJSZT [Janos Neumann Computer Science Society] lecture on possibilities for connecting an ESZ 1011, VT-32, VT-110 and VT-160. This is what we should pay attention to!

So far Videoton has not announced a new, common user interface, but it has a natural aspiration that the ESZ 1011 and the 32 bit and 16 bit professional personal computers should be able to communicate with one another, with the large ESZR/IBM computers and, indeed, with any other sort of computer. The Janos Neumann Computer Science Society called together the members of the ESZ 1011 section for a program at which Peter Sugar, a department chief in the Videoton Developmental Institute, could talk about this theme before a large and quite interested audience.



If we glance at the figure we can see that although only three basic types are involved the problem is quite complicated. First it must be made possible to connect the same types of machines into a network. This might be symbolized by arrows which curve back on themselves. The large ESZR/IBM machine makes the triangle into a square, and in this square there is an arrow from every corner to every other corner, indicating communication among the various types. The

X, as usual, indicates the unknown here also, that is connection to optional computers.

We could write the mode of communication onto the arrows. Let us begin, as we might say, backwards: the word KERMIT might be put on the arrows belonging to the X. Programs compatible with the system developed at Columbia University can be found on all Videoton machines. The KERMIT makes it possible for us to establish a link on an ansynchronous line with any foreign machine (with one condition, that there be a KERMIT on it also), and we can pass files between the two machines or create a conversational terminal link. Naturally this is also the simplest way for Videoton machines to create a system with one another or with large ESZR/IBM machines, although this connection is not as high level as the Ethernet based local network realized between the ESZ 1011 and the VT-32 machines with the EXLOC 4.2 program. In this latter the transfer of files can also be initiated from a program, not only by operator command. One can connect 16 bit machines into this in such a way that the local network formed from the PC's (in the case of VT-110's and VT-160's this system is compatible with the Novell NetWare) contains an element which is also a member of a local network formed from VT-32 machines. They call this common computer the "gateway", or switching center in Hungarian, and this interpreter can map the multi-layer transmission architecture of one network into that of another.

The network services of the Videoton machines include an ability to access ESZR/IBM machines and the planned MSZR/DEC machines.

As for the PC's, a simpler connection with them can be established, of course, thanks to terminal emulation. The DEC VT-100 terminal emulation means a direct link to a VT-32; the IBM 2780 emulation provides block access to other machines through a synchronous line coupler; with the aid of a remote job entry point based on the IBM 2780 one can create a link providing batched processing with IBM/ESZR and ESZ 1011 machines; and in the IBM 3270 emulation mode the VT-110's and VT-160's can access the larger machines as terminals.

The listeners at the NJSZT lecture stormed Peter Sugar with most concrete questions--When, where, how much? The answers had, perhaps, more layers than the network structures. The developers are working on the "gateway" connection now but there are linking elements which are included in the basic machine at no extra cost. Of course then the questions pertained to the promised cheap basic machines--When can one get a VT-110 and a VT-160? The answer--Immediately.

(We checked this last answer with Janos Kazsmer, director general of Videoton, who said that although Videoton--like its fellow competitors--had not yet received the state support won in the course of the OMFB [National Technical Development Committee] competition, it had begun to sell the VT-110 and VT-160 computers on its own.

8984
CSO: 2502/74

HUNGARY: FLEXYS PLANS TURNKEY CAD/CAM SYSTEMS

Budapest COMPUTERWORLD/SZAMITASTECHNIKA in Hungarian No 12, 3 Jun 87 p 4

[Article by Attila Kovacs: "What Is Flexys Undertaking?}

[Text] If we ask how domestic industry might better utilize the research and development results achieved in the area of automating manufacturing technology processes and aid the production of more marketable products then the answer is obvious--we must create an industrial organization, or more properly a CAD/CAM engineering undertaking, which

--designs and realizes in a turnkey way the so-called flexible manufacturing systems which are at the highest automation level of computer aided manufacture;

--relieves the burden on domestic research bases;

--increases, through a readiness for a high degree of cooperation, the exploitation on various markets of the possibilities hiding in joint domestic and international undertakings and cooperation; and

--contributes creatively to the spread of computer integrated manufacture (CIM) which is bringing revolutionary change in industry.

These recognitions led to the formation of the Flexys joint stock company which deals with computerized automation of manufacturing. According to director general Laszlo Edelenyi the enterprise, which is open and ready for cooperation, will deal with systems technology and informatics as its own activity and will deal with turnkey realization of CAD/CAM systems as prime contractor, in such a way as to exploit every suitable and attainable result.

In addition to the three founders (MTA SZTAKI [Computer Technology and Automation Research Institute of the Hungarian Academy of Sciences], the State Development Bank--or its legal successor, the Budapest Bank joint stock company--and the Transmerx GmbH subsidiary of the Osterreichische Landerbank) and the additional share holders (the Technova Innovation Bank, Investbank, the Intercooperation joint stock company, the Orient Small Cooperative, Szamalk [Computer Technology Applications Enterprise] and the American Compumax software house) the enterprises cooperating with Flexys (the Budapest

Technical University, the Heavy Industry Technical University, Videoton, Vilati, the EMG [Electronic Measuring Instruments Factory], the Industrial Technology Institute, Intranszmas, Ikarus, the SZIM [Machine Tool Industry Works], the Csepel Works and DIGEP [Diosgyor Machine Factory]) form a very broad circle. So we cannot wonder that at the very moment of its formation the company, with a base capital of 150 million forints, is already dealing with 16 projects. This year Flexys, operating with 30-35 people, can count on the cooperation of an additional 1,000-1,500 highly qualified experts in the domestic R and D background or through its international contacts. Just by listing the titles of its business activities one can see how comprehensively it is striving to realize the automation of production processes. Among other things it intends to deal with development and implementation of the following types of systems: flexible manufacturing cells (1-2 numerically controlled machine tools served by robots or manipulators); small and medium manufacturing systems (2-4 NC machine tools automatically served with tools and workpieces; storage of and record keeping on tools, devices and workpieces partly or completely computerized); product design and technology designing systems; systems containing those already mentioned in combination (that is, small and medium integration material and data processing); computer controlled complex manufacturing systems (4-10 automatically controlled and served NC machine tools or processing centers); and computerized operations control systems for systems using traditional technologies.

"Going beyond the market expansion possibilities the Austrian Transmerx was motivated by the possibility of access to Hungarian R and D achievements, considered to be more concentrated and at a higher level, and by the fact that it is advantageous for them also if our industry produces more marketable products," said Istvan Eszes, business director. "The American participant sees advantages in mutual dissemination of CAD/CAM software products."

"We consider our own reference projects very important; on the basis of these we will be able to carry out our developments in an industrial environment, and not least of all our credibility on the market is strengthened by the reference systems," added Laszlo Edelenyi.

Let us add that it now appears that in connection with this undertaking one cannot bring against Hungarian industry the often mentioned charge that we are not getting on the world market in time, despite our significant intellectual achievements. In this case a Hungarian firm has joined into a "high tech" field which counts as new even on a world scale.

In any case, the expectations are great now. If it works effectively in the years ahead Flexys can contribute in large measure so that, perhaps by the mid-1990's, CIM will appear in our country also in the true sense of the word.

8984
CSO: 2502/74

HUNGARY: COMPUTER SYSTEMS FROM SZEGED

Budapest COMPUTERWORLD/SZAMITASTECHNIKA in Hungarian No 12, 3 Jun 87 p 4

[Article by Tamas Kolossa: "In the Wake of the PLATON"]

[Text] A new small cooperative was formed recently in Szeged. The saying is, "There is no Hungary, only Budapest." Well, let us add....

Procontrol began its career in December 1981 as a GMK [economic work association]. Its members came from among the best of the programming mathematicians and computer technology and process control engineers working at the Laszlo Kalmar Cybernetics Laboratory of the Attila Jozsef Science University and in the large industrial plants in Szeged.

The group doubled its sales receipts every year. Last year it already had 24 members and employed a number of outside workers, so in March the time had come to form a small cooperative.

Their activities extend to research and development and the design and implementation of new technical solutions, innovations and inventions, primarily in the area of microprocessor technology. One of their successful creations is the T80 microprocessor fire, property and life protection system.

Using an 8 bit, highly reliable microcomputer which they developed themselves the device monitors, displays with a map on the screen and logs the installations entrusted to it with the aid of fire, smoke, forcible entry and gas concentration sensors.

Another successful development is the PORTA CONTROL work time recording system which creates an objective technical base for broad introduction of flexible work time. Workers "show" their coded entry cards to the reader of a time clock when arriving and leaving. The central machine connected to the clocks lists and sums the actual work time by place of work and by worker. A C-64, PROFI 8 or IBM compatible PPC [professional personal computer] compiles reports and statistics according to various viewpoints on request. The WORKTIME PC work time and personnel records program package runs on IBM compatible machines under the MS-DOS operating system. The PROFI 16 computer, which they developed themselves, is IBM PC/XT compatible. The UNIPROM II

universal EPROM programmer and program developer provides intelligent programming of 2716, 2732, 2732 A, 2764, 27128 and 27256 type stores.

The chief profile of the small cooperative is process control. The most significant development, started in 1975 and continuing today with great intensity, is the PLATON R computer and process control system, which can be used in industrial plants and research institutes for realtime control of production processes. It can also provide objective control of processes and technologies with changing parameters using modern, so-called "learning" algorithms.

Its first application was in 1979 in the textile industry. The computerized process control system was further developed in 1982 to be used as a 160 channel data collection control system for a foundry hall, and it is still operating reliably today. The PLATON 83/84 process control system is already a quasi-graphic system. It draws and prints histograms and control configurations. It keeps an automatic operations and alarm journal and maintains a conversational operator link. In one application it controls and monitors a kiln at a pot factory. The Hungarian Academy of Sciences and a contract with the Soros Foundation in New York have given significant support to the scientific work of the firm.

With its multiprocessor technology, high resolution color graphics, light pen, large capacity hard disk and floppy disk stores, graphic output and convenient user services the PLATON B system belongs in the forefront of process control systems.

8984
CSO: 2502/74

HUNGARIAN SPECIALIST ON ROLE OF MATERIAL SCIENCES

Budapest COMPUTERWORLD/SZAMITASTECHNIKA in Hungarian No 12, 3 Jun 87 p 7

[Interview with Jozsef Gyulai by Anna Gyorgy: "Thoughts on the Material Sciences"]

[Excerpt] Jozsef Gyulai recently made a statement to our paper (No 10-11, 1987) about the causes of the miniaturization of microelectronic devices and about the present and expected limits thereto. He said then that the development of the semiconductor industry is closely linked with the solution of a number of questions in the material sciences. Our questions now are directed primarily at modern materials science which has developed in just a few decades and the meaning of which has not yet penetrated public awareness.

[Question] You claim to be a materials scientist. You indicate a study of semiconductor technologies as your narrower research area. I am informed that you are a regular lecturer at one of the most modern--in this respect--IBM study courses in the world. (The series of lectures is held every two years in the United States or Japan with the title "Ion Implantation and Equipment.") How is it that you can deal with such problems in Hungary, far from the Silicon Valley and Japan? How did a Hungarian materials scientist come to be known by the scientific world?

[Answer] Let me begin my answer with a favorite aphorism. In order to become a successful scientist one must be, as is well known, lucky, talented and diligent. But it is also perfectly sufficient if he has two (any two!) of these properties. But seriously, I consider your questions quite just. In my special area a condition for successful research really is that there be in the research environment a semiconductor industry that dictates hard requirements. The useful questions can then be formulated on the spot, as a result of a continual dialog by the materials scientist, the technologist and the manufacturer. In Hungary, as you know, there is no such thing. Still--in a manner which is delusive in a certain sense--we have publications on the basis of which one might think Hungary to be a VLSI large power. With our good international contacts we have been and are able to overcome the distance of several thousand kilometers. On the basis of close cooperation with foreign research sites we could put forward programs which fall in the sphere of interest of the countries leading in the theme. Naturally there can be no thought here of developing a complete technology, but here and there we can "have a say in" and to a certain extend "correct" the course of events.

[Question] Am I to understand that a few talented people--for their own professional pleasure and not least of all to guarantee their own progress--found a way to the appropriate foreign research groups and got included in their work?

[Answer] This is one possibility, but I am not talking only about this. It is a fact, for example, that my own professional fate is based on the periods when I had scholarships in Leningrad and then at Caltech (the California Institute of Technology). But an unparalleled opportunity which I received here at home certainly contributed to my professional successes; more precisely, it was an opportunity which I and a few KFKI [Central Physics Research Institute] colleagues received. In 1970 the then director of the institute, Lenard Pal, entrusted us with creation of an ion implantation laboratory. In the mid-1970's this laboratory was unique in its field. Its uniqueness consisted of the fact that it operated two ion implantation devices--differing in their philosophies. One, which we received from the Soviet Kurchatov Institute as the result of an international exchange agreement, made possible a study of technologies requiring large dose material implantation (in accordance with the Soviet and British school). The other, which we built ourselves on the model of the American school, was capable of small dose implantation. Thus our laboratory became suitable for conducting research connected with MOS devices also. Not least of all we had a suitable financial base which could be planned on with which we could manage relatively freely and deliberately. So this could give birth to such achievements, partly the result of international cooperation, as, for example, "perfect dosing" and double heat treatment, which has now become a routine procedure, or the improvement by an order of magnitude of the quality of SOS (silicon on sapphire) structures.

[Question] I think that this work did not unconditionally aid Hungarian manufacturing technology. Or am I wrong? Or rather, I would ask, what was the profit to Hungarian industry from the above research?

[Answer] I am proud that a few basic research achievements were built into some of the procedures used here at home. These were research achievements the use of which will become obligatory a generation later. If someone, let us say at the KFKI, were to look at this, breaking down the costs, then probably he would find it too expensive. Still I would say it has sense. If I only think that this produced a staff of experts which becomes suitable, in regard to knowledge, to perform the next generation of work then the investment has paid off.

[Question] My last question is addressed primarily to the university instructor. Are there suitable replacements, are there talented university students who are interested in questions of materials science?

[Answer] I must confess that I fear for the future. Today computer technology is siphoning off a large part of the young people with technical interests. Incentives must be created urgently to encourage university graduates to approach materials science and technology. We need not only clever programs but also finished models through which the clever programs will become useful ones as well.

8984
CSO: 2502/74

COMPUTER PARTS VENDOR AGAINST FORCED DOMESTIC PRODUCTION

Budapest COMPUTERWORLD/SZAMITASTECHNIKA in Hungarian No 12, 3 Jun 87 p 9

[Interview with Gyorgy Jani, deputy director general of Elektromodul, by Janos Andor Vertes: "The Separate Opinion of a Vendor--'I Consider the Forcing of Domestic Manufacture a Mistake'"]

[Text] The government level decision regulating acquisition and manufacture of professional personal computers, the OMFB [National Technical Development Committee] competition and its result and the situation which has developed in its wake are prompting many to express their opinion. In addition to the reports and roundtable discussions Mihaly Sandory, former government commissioner for the microelectronics program, recently expressed his views in our journal and in essence we are continuing this interview now as we turn to Gyorgy Jani, deputy director general of Elektromodul.

[Answer] Let me tell Mihaly Sandory that he is not alone in his view, I also consider the forcing of domestic manufacture to be mistaken. If we want to make a profit in production then we should not force the manufacture of computers but rather their use, so that PPC's [professional personal computer] should be in every area of the economy, in industry, agriculture, services, business and on the designing table of the engineer. The country would gain most if it did not try to make them itself, and thus experiment with the laughable competition idea (to divide up the production of 4,000 per year is a joke--a serious manufacturer makes 30,000 per month); rather it should urge the spread of this tool very cheaply, very widely and very quickly, people should get friendly with it and handle it like a TV or an iron. I understand that the OMFB would like it if we achieved technical development in production, but PPC manufacture is not an area where innovation has any sense.

[Question] Are you certain that this decision supports domestic manufacture? Do not get angry at the interruption, but when I talked with Gabor Szeles, president of the PerComp Association, about the OMFB competition his objection was precisely that if only the state would give this amount of support it would aid not only the domestic spread and development of computer technology but also the creation of a background industry. Nor did Janos Kazsmer, director general of Videoton, find this competition to be production centric; according to him the goal of the economic policy people participating in the decision was that the expenditure should be paid back in the sphere of

applications and this is why everything else became secondary, why everyone received a morsel of an allotment sufficient for the import of 4,000 PC's. So it seems that according to the producers the result of the competition is not production centric, and they consider this bad.

[Answer] It may be that the decision was less production centric for the manufacturers than they would have liked. But this is natural, because they are producers. In my opinion the decision was much less market centric than it should have been. The production which the manufacturers would like cannot be realized economically in Hungary, and with us the user always pays for what is not economical, the product will simply be more expensive. And in Hungary today the key question on the PPC front is cheapness! And outstanding quality linked with it. This can be achieved today in the Far East--one can get outstanding machines cheaply. Of course the producers know this too; they should not aspire to innovation excessively. What they produce is a good bit less than what they "haggle" over. And why should manufacture be forced when it is not even true that we will be learning some culture which we were previously unacquainted with. If we have deficiencies in the area of some culture it is precisely in the area of profitable use. In my opinion the intellectual and physical energy should be invested in that, and we could even call it an innovation if we taught the sensible use of computers to all organizations and individuals. We should use imported cards to assemble here machines which satisfy user needs; this could be another area for innovation. But to keep soldering away? When this makes the machines not only more expensive but also more unreliable?! Let me emphasize it one more time: Import is safer and cheaper!

[Question] Many were angry at the EMO [Elektromodul Electronic Parts Trading Enterprise] when it appeared last year with a 182,000 forint AT. Then at the end of the year when the traditional refund to large purchasers for parts import was less than the preceding year it was said that this action was certainly a deficit one and that ultimately the EMO AT was being subsidized by those manufacturers whose business it hurt.

[Answer] Part of the subsequent price concessions arising from combining orders operates a system of internal enterprise price supports whichaids a structural change in domestic electronic parts use; the other part we actually return to the largest customers in proportion to trade. If our partners last year found the repayment too small it could be simply because they got more during the year in the form of price supports. It is true that we sold one computer at a loss, but this was the Primo, domestically produced in the "home" computer category. The imported AT was not a deficit item; the 182,000 forint price even contained a little more profit than we realized on our other imported items.

[Question] Then--a user, and not a manufacturer, can ask--why did the AT become more expensive this year?

[Answer] The simplest answer is, due to changes in the rate of exchange. The same dollar costs us many more forints today. Naturally our present prices also contain the costs of domestic assembly, storage, gurantee, Hungarian documentation and other services and it is also true that with the possibility

won in the competition we want to import a better machine than the 182,000 forint one was. We discovered that in the area of floppy disk units we should choose not the cheapest but the most reliable, and ones which offer greater background storage. We offer a Japanese-American-Taiwanese combination in which we strive for the optimum in every area. For the basic machine we choose a model which does not rule out later expansion, so one can build in a module system as a function of the possibilities. We have reached another of my heart-aches--the relatively large number of winners does not favor uniformity. Just because of the lack of completeness our module system cannot be compatible with the system of every domestic manufacturer. At the COMPUTERWORLD/SZAMITASTECHNIKA roundtable my boss, Gabor Iklody, offered every winner that we would import the necessary cards without a trade markup, completely free (that is, at the outside acquisition price), if in this way we could do something for the uniformity of the basic cards. But they didn't kick it around. Surely because of the "competition spirit." Competition? That's not the right word. It's a sack-race!

[Question] Here at least there is no difference of view between manufacturer and vendor. The representatives of the cooperative industry also feel that there was competition in the commercial sense until there was the competition announced by the OMFB. Now there are quotas, promissory notes....

[Answer] In brief, the competition has become a dividing up. But this does not mean there is agreement. The manufacturer would like to earn a lot on a unit of production; if he could he would keep the price high. I do not want to make an issue of the other competitors. I stick with our own partner, the SZKI [Computer Technology Research Institute and Innovation Center]. The interests of manufacturer and vendor are different within the association too. It is natural that the Proper would benefit if machines coming from import were to appear at the same price level; the SZKI has no real interest in a radical price reduction. And neither do the others. Willy-nilly a cartel forms among the domestic manufacturers--this is not a theory, practice proves it. If you sell for 400,000 I will sell for, let us say, 390,000. Or if I am a new boy on the market and really want to get ahead then I will sell for 350,000. But there are no deep cutting price differences, because the producer is happy to take home the extra profit guaranteed him by the high price level maintained by others. He cannot believe in mass marketing because his possibilities determine a certain volume beyond which he cannot grow. But a vendor is interested in trade, in increasing the number of units. In our opinion prices should be determined in such a say as to move machines in volume. We must have a sure place on this market, we do not want to get rich on one machine. If users have many identical category machines which are truly compatible with one another then one can provide service and replacements with a smaller inventory. Let us not speak of national economic viewpoints but simply of enterprise ones; we feel that in this business the really great profit is with low prices.

[Question] But can these computers be sold cheaply in sufficient volume? And if the action falters? If the import allotment is used up? If the producers lose interest in the meantime? Consumers were happy about the tomato action by Skala too, but still many criticized the whole thing arguing that it did not hurt the middlemen or the dealers but rather the spirit of the producers.

[Answer] Do you think that there are so many tomato growers in the area of personal computer manufacture in Hungary? In my opinion they can produce pumpkins here; so our tomato action cannot hurt anything good. Import, import in its pure form, would have the side effect of forcing the producers to critically review the economicalness of manufacture and decide what should be given up and what should not. If we are right this will not hurt the interests of manufacturers with a real innovative spirit but rather the interests of those who want to get rich by dishonest means. Well, for me, as an official of a trading firm, working the market gets my back up.

8984
CSO: 2502/74

DEVELOPMENTS IN POLISH MARINE TECHNOLOGY

Computers in Shipbuilding

Warsaw BUDOWNICTWO OKRETOWE in Polish No 4, Apr 87 pp 137-140

[Interview with computer experts by Zbigniew Grywaczewski: "Who's Afraid of the Computer? Computers and the Shipbuilding Industry"]

[Text] Benefitting from the unusually rapid advances in electronics in recent years, computers have pervaded nearly every domain of science, technology, manufacturing, and all economic activities. A properly programmed computer with broad access to the needed information sources is becoming not just a convenient working tool for scientists, engineers, managers, and businessmen. Icreasingly often, the use of computers in design and production is becoming a prerequisite for catching up with the world market, in which modernity and an astute and rapid satisfaction of the expectations and desires of buyers are the factors that count. What is the place of computers, of the computerization of design and production, in our shipbuilding industry, which after all is ambitious to retain its standing on the world market, a standing which it has won years ago through considerable effort? What should be done to spur the growth of computer technology in that industry so as to promote its competitiveness and profitability? In what form and to what extent should the related problems be considered in future issues of BUDOWNICTWO OKRETOWE?

These questions were asked by Zbigniew Grzywaczewski, on behalf of this periodical, of persons dealing with the practical uses of computers in the shipbuilding industry and working with computers. Comments by Dr Eng Jan Cwynar of the Parisian Commune Shipyard in Gdynia, Dr Eng Wlodzimierz Majewski -- chairman of the Board of Marine Engineers at the SIMP [Association of Polish Mechanical Engineers] and director of the Computer Laboratory of the Shipbuilding industry in Gdansk, and Engineer Zygmunt Tyska of the Gdansk Shipyard, were recorded by Andrzej Golebiowski.

W. MAJEWSKI: In our shipbuilding industry we have already been dealing with computers for 25 years. The first steps in this direction took place in 1961, and the first computer, an Elliott 803, was installed in 1963. Since then, of course, much has happened and we have acquired much new hardware. It can be said, however, that from the very outset computerization in the shipbuilding

industry affected two domains -- design (where it was begun) and the technological process, production, starting with hull work.

At the moment it can be said that design work, with the related calculations being a prerequisite in every shipyard, has been computerized to a very large extent. though perhaps not as much as ensues from our expectations and the present development level of computer technology, this being the definite perception of the designers themselves. Still, I repeat, it has been computerized to a very large extent. Here I refer to the calculations involved in designing both a ship as a whole and its discrete systems, facilities, etc. I believe that nowadays it is difficult to find an engineer younger than 35-40 years of age capable of computing "manually" curves of stability.

As regard the design and technology of hull construction, we began in the 1960's by introducing digital-control machinery for cutting sheet metal. At present all sheet-metal work--at all large shipyards at least--is done with the aid of digital control. Recently the Ustka Shipyard, too, has been installing such machinery. However, at foreign shipyards computerization and roboticization are much more advanced; they are used in prefabrication and section welding. The robots that are being used abroad are inconceivable without computerization. After all, a robot is nothing other than a specially equipped computer.

Our internal ship systems are unfortunately in a less favorable position. I estimate, however, that the situation is considerably better as regards using computers to prepare the design and technology for the production and installation of electrical marine systems. This concerns the prefabrication of cable and electrical circuits, the design and construction of cable conduits inside the hull, and the offsite preparation of cable bundles for installation in ships. As little as a few years ago it used to be quite different: cable was planned, measured, and cut directly on ships, which involved a great deal of waste. At present the resolution of this matter is best at the Gdansk Shipyard, good at the Szczecin Shipyard, and not so good at the Parisian Commune Shipyard.

I believe that the field where most remains to be done is precisely the computerization of the design and technology of the production and installation of on-board systems. This largely accounts for the shorter shipbuilding time at foreign shipyards. This does not merely concern using computers to prepare drawings or specifications; rather, and above all, this concerns spatial coordination. As a result it is possible to prepare almost completely equipped subassemblies, so that corresponding pipe collars match when assembling parts of the hull. This is made possible precisely by computer engineering. At some shipyards already in the 1970's the in-slip assembling of the hull of a 300,000 supertanker took about a month and furnishing it with internal systems 5 weeks! Thus a new ship takes up the two most expensive production facilities -- the dock and the slip -- for not much longer than 2 months!

Here a great deal remains to be done, especially in piping-system production, where we are behind. A relatively simple system for computerized piping-system production that does not extensively impinge on the production process

has been developed. That in itself is a beginning, though it is not perfect. To transfer this system from the design stage to actual production of pipe with the aid of digital-control bending machines requires some more work. At present only one such bending machine is available in our industry, at Northern Shipyard, where it is indeed being used, and it should be said that precisely that shipyard is the leader in computerizing piping-system production.

So much on the current state of computerization. I have not discussed its uses in management and production organization, where its development has also been proceeding apace but is essentially similar to that in other branches of industry. I refer here to personnel and wage operations, materials management, etc. This is present to a varying degree in all the shipyards, where computerization of this kind streamlines operations but does not affect the technical level or duration of shipbuilding cycles. What is the advantage of ordering a piece of equipment via the computer rather than "by hand," when it anyway takes the supplier 2 years to send it?

Z. TYSKA: My opinion on the current status of computerization in the shipbuilding industry is somewhat different. I view computers as being definitely more advantageous to management than to engineering work. A comprehensive system had already been worked out here some 15 years ago and attempts have been made to apply it with a varying degree of success and luck. If the effects are much smaller than anticipated, this is because the hardware used is dated and not adapted to ergonomic and organizational needs. Computer hardware and its servicing have become an alien body in the shipyard's organism, even though, properly speaking, the effect of the operation of computers is visible everywhere! Computers are "living" a life of their own. They generate a multitude of so-called printouts which most often afterward fill shelves to overloading point. Owing to the very technology of its generation, information is too late in reaching those who need it. In effect, the computerization of management improves chiefly accounting and bookkeeping rather than management itself! It does not improve current decisionmaking, whether in production or in organization, etc. I cannot thus agree with the previous speaker that the computerization of management would help shorten production cycles in shipbuilding. Our cycles are too long for many reasons, including the specific nature of organization of labor and various operations at shipyards. Modern computer technology could be of benefit only if the approach were different and the hardware up--to-date. Then, for sure, other programs and other ways of using them would appear....

W. MAJEWSKI: We are talking of the present, not of the future.

Z. TYSKA: At present the computerization of management improves accounting and bookkeeping but not management itself! It is not accomplishing its most important task.

But as for the computerization of engineering work, that is different. The accomplishments in this field are indeed in line with the goals. Yet, unlike in the computerization of management, here there is no single coherent computerization program. A large number of often interesting and sometimes splendid partial solutions has appeared instead. I agree with the view that by

now ship design without the use of computers is inconceivable. At the same time, though, I want to reject it! For with us the computer is chiefly used to design a ship as a seaworthy object. It is partially useful in facilitating some engineering calculations, but there is no comprehensive system for designing a ship as a facility for the transport of people or cargo, as essentially also a salable item of merchandise. I refer to, for example, calculations of construction cost, the optimization of design and maintenance solutions, the spatial layout of ships, etc. In these respects, computers are not used or only used to a small extent. The ASTER-E and ASTER-K are wonderful systems and undoubted accomplishments, but they can be used only after the designer determines and prejudges the design, and in this sense they simply serve to record preconceived designs. Computers do not aid in design, instead, they aid in processing design information into the information needed by tracers, technicians, or other shipyard employees. Thus, computers as an aid in our engineering work are only of very minor use.

J. CWYNAR: I agree with the opinion of Engineer Tyska, but it should be added that the work invested in computerization during the first half of the 1970's has not been updated to this day. As a result, in many instances, computers prolong instead of shortening our preliminary production cycles. The goal was a comprehensive computerization of engineering work, but this precisely has not been accomplished since the mid-1970's! To be sure, solutions were being explored, and R&D work was even conducted but in effect, as I know, the opinion of users on the development of the existing systems for computerizing design and technology work is not positive. Of course, I am not referring to typical engineering calculations pertaining to design mechanics, heat balance, and hydrostatics, in which the computer at present is a permanent tool and indispensable of the engineer, yet this is precisely where, properly speaking, the limit at which we stopped and beyond which we made hardly any progress in the last 10 years.

Another field of the application of computers is, as previously mentioned, management. This problem often commences at the design office and culminates in decisions taken at the highest management levels in the stockyards. For the basis for the information systems used in this domain is the technical preparations for production, which determine the shape of the product, the precise layout of its components, the manufacturing schedule, and the technological processes. Yet in these respects our systems are still in their embryo stage. Certain discrete problems such as developing organizational flowcharts for the hull-construction process are being solved, but there still is not any overall system for the entire ship, such as would accommodate elements of technology, manufacturing, organization, and economics.

Instead of assessing the situation I will cite some comparisons. According to J. Jagoda and S. Zielinski, in the late 1950's eight American shipyards concluded that isolated solutions would have to be integrated. (Footnote) (Jerzy Jagoda and Stefan Zielinski, "Zastosowanie komputerow w przemysle okretowym" [Using Computers in the Shipbuilding Industry], WM, Gdansk, 1978.) This was accomplished during 1961-1965. We, on the other hand, still exist in the conceptual stage after so many years, in this respect. This provides an idea of the distance separating us from the world level. In the 1960's such systems, integrating technology with organization and management, were

developed in other countries, such as Sweden ("Viking"), Italy -- for the Italcantieri shipyard group, Japan (NASD), and elsewhere, and used in the late 1960's. I believe that this suffices to illustrate the situation in which Polish shipbuilding finds itself.

It is a fact that at present we are working with hardware other than at the time when second-generation computers or, in the best case, the first computers of the third generation, were used. Unfortunately, all this means at present is simply that we can perform calculations somewhat more rapidly, because of the absence of the aforementioned needed integration. We still exist in the stage of conceptualization and experiments with certain specific "pilot" solutions. As for the integral concept, it is still absent. Without denying the importance of the computerization of engineering work, I must stress that the delays in the computerization of management are markedly restricting the efficient performance of enterprises and their flexibility and quality of decisionmaking. This interdependence may become increasingly explicit.

Z. TYSKA: Let me provide an additional illustration of my colleague's comments. Recent studies of the causes of the prolongation of shipbuilding cycles at our shipyards revealed that general designers are not using any computers in their design work! This of course does not mean that that they are not counting on this in their recommendations, but they themselves, all without exceptions, are not using computers. And here is another fact: Following discussion at a recent meeting of hull technologists in Targa I can state that nearly all shipyard technologists are afraid of the computer and, of course, not using it.

J. CWYNAR: In general, two separate computer centers operate in shipyards: the design bureau and the information office or computer center. They coordinate their activities little or fortuitously. Yet without that coordination we cannot make progress.

Z. GRYWACZEWSKI: Let us then discuss that progress and what should be done and is desirable in the future.

W. MAJEWSKI: Our desires ensue directly from what was said here. It should be added, however, that my colleagues mentioned not only the status of computer services but also the status of awareness in general, of organization of labor, of the functioning of industrial enterprises, especially shipyards. In this connection, computers are only a tool. The widest gap separating us from the cutting edge of worldwide progress exists in the domain of the organization and functioning of industrial organisms. My colleague Cwynar's comment that only now do we perceive the need to solve problems that had been solved abroad 20 years ago, points to the state of awareness, not to the state of progress in computers. This is not a computer problem but a question of perceiving organizational flaws. This is related to computer technology only insofar as computers are a working tool. Computerization is not primary but secondary.

The aforementioned distance dividing the computer from the employee ensues, in my opinion, from the hardware we have been using so far. Until recent years we

have been computerizing our industry on the basis of mainframe and currently already somewhat obsolete hardware, thus erecting an organizational barrier between the user and the computer. Expert computer operators have always had to serve as the mediators. Recently, however, we have been dealing with completely different hardware -- microcomputers, which are "micro" only in their dimensions, not in their computational power. A computer small enough to be placed on a desk now has a computational power no smaller or even greater than what used to be the power of an entire computer room. There is no longer a need for mainframe operators, those wizards and shamans, whose work most often left users feeling dissatisfied because it usually was too slow and, moreover, at times strayed from the specifications of users. The greatest obstacle to the spread of computers, namely, the hardware obstacle, is now disappearing. And indeed, it now takes relatively little money to provide every chief designer and every team of two or three designers with a separate high-power microcomputer! All that is needed is knowledge of how to use it.

That is why computer experts still are highly important. An user actually does not have to be knowledgeable about computerese, but computer experts who develop programs for him must have greater expertise than in the times when they had worked for themselves alone. Nowadays programs must have more and clearer instructions so as to lead the user "by hand" throughout the entire computational process. Hence, computer experts now shoulder greater responsibility than in the past, without however standing physically between the computer and the user.

The use of microcomputer hardware in this country is spreading. I expect that in the future the growth of computer technology will result in the direct provision of high computational power to the workstation. This will mean computerization of the workstation, especially among designers, inclusive of its provision with all sorts of graphics software and hardware -- CAD (computer-aided design). But let us bear in mind that we are some 15 years behind in the influx of computer hardware to our industry. In this domain we stagnate at the level of the mid-1970's. The hardware then acquired -- which we are using to this day -- had been of the average world level. Currently, following this hiatus, we are installing microcomputers as designers' tools, at least 10 sets in every design office. In the next few years we should reach a level at which every design laboratory would receive two or three complete sets of computers. In practice, every design-office employee will have access to a computer. Hence the distance, the fear of the computer, should disappear.

This is the direction of the development in the field of computers, where microcomputers with their large memories and high speeds are eminently suited. But systems based on large data banks, such as bibliographic data banks, which also are important to designers, are still needed as well. Such systems require a capacious memory more than a high speed. Given the current state of their technology, microcomputers still do not meet these conditions. Thus they can be linked to mainframe computers, including those still used at the ZIPO [Association for Marine Industrial Installations], and utilize the data from their memories. Hence, a microcomputer can exercise the dual role of an autonomous computational device and a tool for access to data banks. Thus, the development direction of computer science is quite clear, the more so considering that in the next few years we can expect marked advances in

microcomputers, in their efficiency and communicability with users. It is precisely in this last field that basic changes are taking place.

All this necessitates developing a vast variety of software. As the number of computer users grows, the demand for diversified software grows also. Mutual exchange of information on and coordination of the related activities is becoming necessary, as otherwise we would scatter our efforts, engage in needless duplication, etc.

Z. TYSKA: To me computers mean hardware, software, and persons capable of using them. The hardware we have is generally obsolete and worn out. It should be rapidly replaced with the hardware referred to by my colleague Majewski. Engineering software is fragmentary and not integrated into a uniform system, and in some cases it is incomplete as well. For example, the final modules of the previously mentioned ASTER-R "piping" system still have not been completed after 2 years, so that the system as a whole still is not usable!

Modern microcomputer hardware offers completely new possibilities. But one of the most important tasks is to overcome the psychological resistance felt by the average engineer. All shipbuilders must realize that it is they themselves who should develop proposals for streamlining their work with the aid of computers and only thereupon ask programmers to develop the appropriate software. Programmers should serve them instead of doing everything for them. Some as yet rudimentary symptoms of overcoming this resistance have appeared, probably also owing to the increasingly popular if sometimes ridiculed home computers. However, most engineers and technicians still have fear of computers.

It would be good if an institution such as the ZIPO, the CTO [Marine Design Center], or the Marine Institute of the Polytechnic, or an ambitious group of shipyards, were to draft a proposal for a coherent and comprehensive system for computer-aided ship design in such a way that, beginning with the earliest design stages, the designer could work with a keyboard and a monitor instead of with paper and pencil. My dream is a CAD system that would at least encompass the stages from the initial proposal to the technical project inclusively.

Shipyards are understaffed with computer personnel. We know that output has decreased, and therefore some experts got the notion that the staff of project-design offices also would have to be reduced. And yet, the growth of the engineering applications of computers requires on the contrary augmenting the numbers of computer personnel in these offices.

Another thing: Closer cooperation among discrete shipyards and enterprises in resolving many issues is needed. This also is linked to hardware. How can willingness to cooperate be considered when each shipyard uses different computers! Some unification in this field would make possible joint development or exchange of software, which would yield substantial savings of funds and, above all, time.

As for the engineering uses of computers, I believe that priority should be given to a maximal computerization of the earliest stages of ship designing,

because each day less in the duration of these stages means shortening the entire ship construction cycle. Abroad, there exist shipyards whose designers can within a few days complete and submit to the potential purchaser a new ship design; why cannot Polish shipyards do this also? It seems to me that no one in this country has so far thought of it. The next priority should be the development and processing of material documentation, commencing with the "call-up" of material on the drawing board and ending with placing the order with the supplier. This application of CAD will link most effectively the sphere of production preparation to management and will produce considerable advantages.

The third priority should, I feel, be given to developing the computerization of closely engineering, computational work. True, it is in this field that computers are used most often, but much still remains to be done here.

J. CWYNAR: If we construe computer science and technology ["informatics"] as hardware, software, and personnel, all together, then of course we are speaking here of both computers and the state of awareness.

W. MAJEWSKI: But while we are investing a great deal in hardware, we invest very little in [promoting] awareness.

J. CWYNAR: That's what I am driving at. The state of computer science and technology ensues from the possibilities of access to hardware and software as well as from needs. How can the need to use computers in management be felt at an enterprise whose principal task is to implement [plan] indicators? Such a need simply had not existed! It arose only now in the 1980's with the rise and growth of demand for equipment serving to collect information rapidly and efficiently, process it, store it, utilize it, and transmit it, thus helping in decisionmaking. Let us therefore not be surprised by the position we are in now.

In my opinion, the future is primarily a question of computer education, both with respect to the propagation of technical possibilities (hardware, software) and the familiarization of potential users with the actual operating possibilities. Here it should be emphasized that at present availability of software is a much greater problem than availability of hardware, which even so is exceptionally expensive in this country. This concerns primarily the hardware offered by domestic firms, which is 5 to 10 times as expensive as corresponding foreign-made hardware as priced in terms of the official rate of exchange. For example, a printer which, according to the official rate of exchange of 240 zlotys per United States dollar, costs not much more than 100,000 zlotys, is actually sold on the Polish market at... 900,000 zlotys according to press advertisements!

Software costs at present are soaring. It used to be that hardware accounted for 80 and software for 20 percent of the total cost. Now the proportions are reverse! In West Europe there now operate about 15,000 software development companies. All-purpose software is no longer sufficient. Specialized software is in demand. The aggregate sales volume of these companies was 54 billion West German marks in 1984. For 1988 it is expected to reach 92 billion! This demonstrates the scale of the work and demand. In this country this demand

exists too. The question arises whether discrete Polish shipyards and enterprises are capable of solving this problem on their own. Rather not! Could not then a joint fund for financing the development of computer science be set up for the entire branch? Worldwide examples indicate that even financially strong enteprises cannot cope with it on their own.

This entails other problems. If we are to unite efforts and resources, then this is obviously to be done for mutual use. Here we face the problem of differences in systems, nomenclature, codes, etc., among discrete shipyards or enterprises. Besides, this is not a new problem and we discussed it in the 1960's and 1970's. It has to be resolved first if we are to speak of branch-wide computerization. Another problem, and one underestimated besides, is the creation of a databank. At present we are working with information banks, which is something completely different. We need a concept of a data bank, and a concept for administering it. World experience indicates that the use of data banks by given design, technology, and materials services saves about 30 percent of the work of these services.

[Z. GRYWACZEWSKI:] What aspects of these problems and in what form should be considered in BUDOWNICTWO OKRETOWE?

W. MAJEWSKI: I don't think that there is a need for introducing a separate section on computers in this periodical, because computers are not some autonomous part of marine engineering; rather, they are a mode of action that is utilized in design, manufacturing technology, electrical engineering, etc. Hence, computer-related subjects should be considered in different sections of this periodical. This concerns computer applications rather than information on programming languages or computers themselves. This should promote exchange of ideas and integration and coordination of activities within the branch as a whole.

Z. TYSKA: Shipbuilders should write for shipbuilders about the benefits of computers to their work.

Marine Electrical Engineering

Warsaw BUDOWNICTWO OKRETOWE in Polish No 5, May 87 pp 198-201

[Article by Professor Dr Eng Mieczyslaw Wierzejski, Higher Marine School in Gdynia: "Current Problems and Development Trends in Marine Electrical Engineering"; Paper presented at the Fifth Marine Electrical Engineering Conference, complemented and expanded by the author for BUDOWNICTWO OKRETOWE]

[Text] Ship electrical engineering and the broader concept of marine electrical engineering are not scientific disciplines. They are branches of electrical engineering, construed very broadly in this case.

Electrical technology should be dually interpreted as both the science of the generation and use of electrical energy and a domain of production and operation linked to the manufacturing and use of various electrical equipment. To avoid misundestandings, The Committee for Electrical Technology, Polish Academy of Sciences, has proposed that electrical technology as a science be

termed energoelectrics, with the term electrics comprising all electrical sciences. Electrical technology remains a popular term with broad and relatively imprecise connotations.

Prior to the Third Congress of Polish Science there had veen very lively discussion about the purposes of energoelectrics, its role in the engineering sciences, its links to other engineering sciences, and its place in science and technology progress. The source of the discussion was the objective changes in the situation of energoelectrics within the sciences of "electrical origin," and the opinions of representatives of such disciplines as automation, electronics, telecommunications, and computer science.

The objective changes are construed chiefly as the obliteration of differences and interpenetration among electrical technology, electronics, and electrical power industry. For it is hard to decide whether the "zwarcie udarowe" [as published] of a turbogenerator is a problem of electrical machinery or of power industry. Contemporary electrical metrology represents as it were apparatus electronics. Modern electrical drives are guided by microcomputers via electronic power systems.

This interpenetration of scientific disciplines is accompanied by a rapid growth of modern and derivative disciplines of the electrical sciences, i.e., power industry, automation, and computer science, which have prompted advances in certain traditional disciplines of electrical power engineering. Mention could be made here of circuit theory, metrology, process dynamics, control theory, and converter theory. It is being theorized that electrical power engineering plays a secondary role as a modern science. It is being claimed that its development now proceeds through the mediation of other and more rapidly developing disciplines such as electronics, power engineering, nuclear power engineering, automation, and engineering physics. A nontrivial reason for such fallacious judgments is the underdevelopment of the Polish electrotechnical industry. The state of that industry and the low quality of its products provide the seeming premises for such generalizations about energoelectrics as a science.

The Committee for Electrical Technology, Polish Academy of Science, and the Association of Polish Electrical Engineers have been in recent years, and especially during the period preceding the Third Congress of Polish Science, attempting to define the standing of electrical power disciplines and electrical engineering in the new situation termed "the science and technology revolution" and in connection with the situation of science and economy in Poland. The Committee for Electrical Technology made its position clear in a separate paper presented for the Third Congress of Polish Science, while the Association of Polish Electrical Engineers did likewise through a special resolution.

The position taken by the Committee for Electrical Engineering is largely of a normative nature by virtue of its standing as a highly authoritative and correspondingly representative body. According to it, the nature and purposes of energoelectrics are as follows: energoelectrics deals with the applictions of energy-conversion processes in which electrical energy figures prominently; they are electromechanical, electrothermal, electroradiative, and

electrochemical conversions. Hence ensue extremely numerous problems of research into these processes as well as of the construction of equipment for the generation, processing, transmission, storage, and control of electrical energy as well as of other forms of energy in conversion processes. The advances in energoelectrics have led to the rise of scientific disciplines which are currently making further rapid advances. The following principal disciplines are mentioned:

-- theory of the electromagnetic field and electromagnetic systems;

-- physicochemical effects in electrotechnical materials;

-- electromechanical energy converters and electrical machinery systems;

-- transmission and distribution of electrical energy;

-- electrothermy;

-- cryoelectricity;

-- electrochemistry;

-- electrometrology;

-- electrical illumination;

-- energoelectronics.

The linkages among or sometimes even integration of electrical disciplines complicate the distinctions both in terminology and in the organization of R&D work. The academic community, including the Ministry of Science and Higher Education and the Central Certifying Commission, intends, owever, to formulate a nomenclature of the related fields, disciplines, and specialties. This concerns providing the conditions for a correct evaluation of the activities of individuals and groups.

In view of the above, marine electrical engineering cannot be regarded as a scientific discipline. Despite its position, however, the Committee for Electrical Engineering, Polish Academy of Sciences, has proposed establishing its own Section on Marine Electrical Engineering, modeled on other Sections such as the Section on Electrical Drives and Energoelectronics, the Section on Electrical Traction, the Section on Electrothermy, etc. The Section was established in 1985, thus gratifying the marine electrical engineering community. The purpose of the Section is to support, initiate, and engage in scientific activities in the disciplines relating to electrical engineering and having specific applications in marine, shipyard, and harbor engineering. The reason for establishing the Section on Marine Electrical Engineering was precisely the interpenetration of various electrical disciplines in their specific marine applications. Ignoring scientific research into this field would have left a gap which could not be filled by other academic communities.

We interpret marine electrical engineering as something broader than the ensemble of disciplines relating to electrical energy insofar as they concern marine engineering. For this also involves extraneous problems such as accurate guidance of the movement of a vessel, anticollision systems, physical fields of the ship, research into environmental effects on electrical equipment and the effect of elements of that equipment on each other and on humans, and computer control and computerization. The vital need to investigate problems of marine electrical engineering is demonstrated by the recurrent scientific conferences and the great interest they elicit among the community of experts, a community that is quite numerous, being based on an expanded shipyard industry, shipping, ports, and technical schools.

A major role in integrating the community of marine electrical engineers was played by the Association of Polish Electrical Engineers (SEP). In 1957 it had established the Section on Marine Electrical Engineering, with its seat in Gdansk. This Section to this day sponsors projects relating to ship and marine electrical engineering. The first chairmen of this section, Professors Henryk Markiewicz and Zbigniew Woynarski, deserve gratitude for their professional and organizational activities.

Specialty-Field Problems

The thematic scope of scientific and technical activities in marine electrical engineering may be broken down into the following groups:

-- electrical power engineering for vessels;

-- shipboard and marine power drives;

-- automation of marine systems;

-- miscellaneous.

The first group accomodates problems relating to:

-- generation of electrical energy;

-- selection of energy parameters and quality;

-- energy conservation and cost reduction;

-- distribution and securing of electrical energy;

-- automation of electrical power systems;

-- energy sources and conversion.

Undoubtedly the principal problem at present is conserving energy and reducing the power generation cost on ships. Fuel cost is a major element in ship operating costs. Ways of conserving energy vary. Some belong among the present-day specialties of the science of electrical energy, such as semiconductor conversion of energy to the desired form at mimimum loss, the

automation of energy generating and conversion processes, and optimized computer-aided steering.

Specific problems include systems of drive-shaft power plants, conversion systems based on the utilization of waste heat, optimized computer-aided control of marine power plants, and optimal design and utilization of these plants.

One marine and shipyard power engineering problem that has yet to be solved in practice is the recovery of the electrical energy dissipated during operating trials of marine power plants in shipyards.

An essential problem from the standpoint of energy conservation is the optimal design of power instalations in special-purpose floating units. This concerns fishing vessels, floating cranes, various kinds of mother ships, and research and hydrographic vessels.

Design practice so far is based chiefly on the approximate analysis of two or three versions and investment costs. A more expanded design methodology allowing for all the important cost elements is needed.

In view of the changing price ratios between materials and fuels and the changing nature of recipients of electric power, the traditional parameters of marine generators should be revised. The need to conserve energy prompts reducing losses in machinery, which affects adversely the utilization of active materials and the application of improved materials. The growth of "zwarciowa moc" [as published] combined with the decline in reactances is causing difficulties in disconnecting short-circuit current. In this connection, the problem of limiting disconnected current and the use of higher or medium voltages, e.g., 6 kv, have appeared.

A still topical problem is the quality of shipboard electrical energy. The three main sources of disturbances are: converter-caused load on the circuitry, dynamic voltage drops due to changes in load, and radioelectronic disturbances of various origin. In Poland research into these subjects is under way, to be sure, but it is far from exhaustive. Her it is worth noting that decisions to use drives with converters, cycloconverters, or high-power autonomous "falowniki" [as published], are largely impeded by the negative effect of these devices on the shipboard electrical system.

A broad variety of problems is linked to electrical shipboard drives. In Poland a large number of centers is doing research into controlled electromechanical drives and machinery. Research laboratories and departments traditionally specializing in electrical machinery must of necessity do research into regulation of machinery, because regulation systems often constitute an inseparable whole with the machine in question. This may be exemplified by converter motors, or even by DC commutator machinery. A survey of the research topics pursued by Polish research centers shows that they do not include electromechanical systems specific to marine engineering. The following drives may be mentioned:

-- electrical main and auxiliary propeller-screw drives;

-- drives for auxiliary propellers, e.g., "stery strumieniowe, stery aktywne" [as published];

-- drives for cargo transloading gear;

-- drives for shipboard operating machinery, underwater vehicles, and floating platforms and cranes;

-- drives for underwater vehicles [as published].

Drive problems entail not only specific technical requirements but also the following research problems: economy of energy consumption, curtailment of effect on feeder circuits -- converter-system control, microcomputer control.

The problem of microcomputer control is at present among the most "fashionable" in scientific literature. Thus, e.g., at the First European Conference on Power Electronics in 1985 in Brussels, most papers dealt with microcomputer control systems. There is no need her to justify in detail the role of computer technolocy in electrical drives. Modern, economic, and higly specific drive systems have such expanded control algorithms that basing them on analog technologies is irrational. Here the following qualities of microcomputer technology are decisive: possibility of implementing extremely complex algorithms, including those of adaptation systems, amenability to changes in algorithms, ease of central control, ease of monitoring and diagnostics, use of standard mass-produced hardware. However, these advantages are obtained at the expense of a high labor-consuming cost of activation, on using highly skilled designers and CAD systems.

Closely drive-related requirements, i.e., dynamic requirements and those of accuracy in marine engineering, are not precise. The specificity of actual drive problems concerns replacing DC-motor drives with drives of other kinds, reducing losses, and minimizing effects on the network. As regards propeller drives, adaptability of the control system is essential.

A particularly interesting drive is the electrical drive of the propeller screw. In the Polish shipbuilding industry the need to construct this drive is definite. This concerns special floating units such as hydrographic and research ships, fishing vessels, various floating bases, floating cranes, and Arctic ships. DC-motor drives are very well known and hence do not raise any major research problems, although aspects of selection of parameters, curtailment of effect on the network, and computer control, are the subject of research and publications. A highly important research problem is the AC-motor drive for propeller screws. The drives under consideration here may include a cage-motor drive powered from a cycloconverter or an autonomous falownik, a synchronous-motor drive, an a converter-motor drive, and various other drive concepts as well. All the possible drive concepts should be investigated in detail from various points of view, i.e., from the points of view of power consumption, effects on the network, operating cost, drive characteristics, technological possibilities, converter power supply and control systems, and reliability.

The problem of propeller-screw drive is linked to the selection of the marine power plant system and the parameters of the energy process. The designer must decide whether to select one or two power plants, the number of voltages in the system, the amount of reserve power, and the commutating equipment. The basis for the decision is, in addition to technical characteristics, economic considerations, which require appropriate decision procedures.

Drives of shipboard deck systems increasingly often are of the hydraulic kind. This is an answer to the related known inconveniences of electrical drives. But this does not mean that quality electrical drives that are at the same time inexpensive, small, and reliable cannot be developed. New semiconductor elements such as the GTO [as published] and power transistors as well as microprocessor control, along with the transition to higher frequencies, are unlocking new vistas for constructing highly efficient and low-cost electrical drive systems for all marine machinery.

Development work on the automation of marine systems pertains to local elements such as voltage regulation, regulation of passive and active power, regulation of motor r.p.m., control of heat engines, etc., as well as integral control systems such as control of movement along a given route, selection of optimal route, safe maneuvering, so-called dynamic stabilization, control of movement of a convoy, etc. Problems of automating local elements pertain to these integral controls, and the attendant technical problems concern technology rather than control theory.

Integral control systems entail many important and difficult problems of theory and design. So far as theory is concerned, examples of the related problems are: precision guidance of movement along a given route, remote control of underwater vehicles, selection of optimal route, economical power-plant and movement control, and equipment and programs for the control-system operator.

Any automation task consists of two parts, as it were: study of the object, which yields the control algorithm, and selection of the principles and means of automation. Concerning the second part a fundamental question is whether the designs of all systems should be based on computer technology. Analysis of the systems and observations of trends in technology indicate that the answer to this question is, generally speaking, affirmative.

The spread of microcomputer technology is due to a number of its valuable and new qualities. Above all, it represents a common and universal technical basis for not only control but also modern metrological techniques and man-machine communication, and also as a tool assisting in decisionmaking control processes.

Control by means of microprocessor systems applies not only to large systems but also is useful in smaller tasks such as synchronization of generators, control of thyristor inverters, control of the motion of diesel engines, etc. Computer technology imposes no constraints on complex algorithms and facilitates adaptive control, model control, and diagnostic programs, the last-named being particularly important to marine practice.

Designing a shipboard computerized control system requires, inter alia, solving two basic problems on which the success of the undertaking depends: the development of "user-friendly" software for man-machine communication and a back-up system for when the computer is "down." Both these problems still require research and experiments. The computerized control system alters basically man-machine communication. Hundreds of gauges are replaced with monitors and printers. This does not preclude, besides, other optical and sound signals. The operator sits in front of a keyboard. Experience so far shows that the psychological barrier to the transition from the traditional to the computer communication system is not as formidable as had been originally assumed. Nevertheless, hardware and software for the operator should be based on medical, ergonomic, technical, and psychological studies.

Protection against breakdowns of the computer system is a prerequsite for winning the confidence of shipowners and seamen in the new technology. This is a domain of detailed studies, analyses, and experiments, which are yet to be undertaken. The consensus at present is that the ship of the future is a "computerized" unit. Computers are used both as control systems and as an aid in decisionmaking by crew members.

Many installations and machines provided by producers contain analog control systems. This situation will certainly still last for some time. It cannot be ruled out that, for example, r.p.m controllers for Diesel engines, voltage regulators, safety systems, etc., will, as organic elements of equipment, continue in the analog mode.

As for the problems of marine electrical engineering grouped under the rubric "Miscellaneous problems," these refer to topics which cannot be reduced to a common basis as was the case with, say, power drives. They are topics generally represented in the science of electricity but as yet not specifically considered from the standpoint of marine applications.

Here the following topics should be mentioned:

-- effect of marine environment on electrical and electronic equipment;

-- internal and external (magnetic, hydroacoustic, acoustic, electrical) physical fields of the ship;

-- protection against electrical injury, protection of ships against lightning;

-- protection against fire, explosions, and external impacts;

-- on-board static electricity;

-- transport and transloading.

Some of these topics are of major importance to the design of floating units and bases, including military ones.

Cooperation With Industry

To conclude these observations on marine electrical engineering, several aspects concerning R&D work and industry have to be considered. The state of domestic production of marine electrotechnical equipment is highly unsatisfactory as regars quantity, variety, and quality. The principal cause of this situation is the general backwardness of the Polish electrotechnical and electronics industry. Despite its very rich traditions and highly trained personnel, the Polish electrotechnical industry has never since World War II been accorded developmental priorities, probably because elementary needs of other subsectors of the economy had to be met. Besides, the big industries such as mining, metallurgy, and power, have been concerned with meeting their own needs. As for electronics industry, it is only in the last few years that the importance attached to it has become as great as that it had long ago gained in the developed countries.

This underdevelopment has resulted in that at present entire subsectors cannot be adequately supplied with electrical and electronic components. These subsectors include general and industrial construction, chemical industry, machine-tool and machinery ndustry, rolling stock industry, and the industry making other means of transportation, including also the shipbuilding industry. The shortages are particularly acute as regards communications equipment, wire and cable, electrical engineering materials, semiconductor elements, illumination equipment, minor installation gear, professional electronic gear, and mensuration devices. All these shortages are unusually keenly felt in shipyard production.

The shipbuilding industry does not pose particularly high quality requirements to electrotechnical products. Good products for the mining or metallurgical industry are relatively easily adaptable to conditions at sea. Without going into detail, it should be noted that the electrotechnical and electronics industries operate chiefly as suppliers to other industries, and the quality of their products is largely decisive to the quality of the products of the entire machinery industry, construction, and power industry.

The Polish electrotechnical industry must be capable of coping with the challenge posed by the development of modern industry in terms of quality and rapidly growing variety of products. The development of electronics, automation, and robotics without a concomitant broad development of electrical engineering is bound to lead to a situation in which there will be no facilities to be automated.

Another potentially negative major factor as regards domestically produced marine equipment, is the poor cooperation between industry and the R&D base. Since industry is operating in a very tense situation, in the presence of supply and manpower shortages, it avoids the hassle of new products and research. This tendency has grown in recent years.

In addition to its negative effects on industry, this situation affects adversely the domain of research, since practice is the sole criterion of research work in technology. The absence of this criterion is ultimately bound to deprive research centers of their ability to tackle and resolve actual

scientific and technical problems and prompt their escapism into "imaginary" and "ivory-tower" problems.

Furthermore, cooperation between research centers and industry is hobbled by the formal barriers impeding the mobility of personnel. Free flow of personnel between higher educational institutions and industry in Poland is practically nonexistent, whereas, e.g., in the FRG it is a rule that when a department chairman at a university vacates his post, he is replaced with his counterpart from industry. This matter requires a more flexible approach at higher educational institutions and the demolition of bad traditions in industry. Examples of extremely fruitful cooperation between research centers and industry could be given. The EFA Plant, which supplies excitation circuits for marine generators, has since its establishment been very closely cooperating with research centers, so that as a result its financial performance has been very good and the technical level of its production high, and it is enabled to offer ever new products so far as power-electronic equipment is concerned.

Attention should also be drawn to the organizational problems besetting the supply of electrical equipment for vessels built in Polish shipyards. It is difficult to find appropriate industrial suppliers of fuel-electrical drive systems, automation equipment, or computerized control systems. The Polish electrotechnical and electronics industry at present is capable of supplying equipment parts for, e.g., the electrical drive of a propeller screw or a computerized power plant control system. But there does not exist a Polish company that would provide shipyards with integral systems of this kind, install them, and service them. The attendant difficulties are sometimes surmounted, as when the Institute of Electrical Engineering in Gdansk provides a shipyard with a series of high-power electronic drive control systems. It may be assumed that an improvement in this situation will be brought by the nascent consulting firms and such research centers as the Marine Engineering Center.

Original Rescue Capsule

Warsaw HORYZONTY TECHNIKI in Polish No 11, Nov 86 pp 15-17

[Article by (ika): "Floating Capsules: Made in Poland...."]

[Excerpt] A distinctive and original approach to sea rescue in cases of fire was developed by Polish experts of the Ship Institute at the Gdansk Polytechnic. They propose keeping people underwater in a watertight capsule ejected from the threatened platform or ship during rescue operations. The author of this idea, which arose as a result of an analysis of accounts of several drilling-platform disasters, is Professor Jerzy Doerffer. Covered engine-driven lifeboats can rapidly leave the threatened area by proceeding through the flames of burning crude. This is possible when the sea is calm, and then locating the survivors and aiding them presents no difficulty. But when there is a storm, capsules floating on the sea surface are scattered by waves over vast areas. Then the rescue operation is difficult, time-consuming, and requires a great deal of equipment and many rescuers.

The rescue system developed by the Gdansk engineers consists of the capsule itself plus an ejection mechanism. The spherical pressurized hull of the capsule, which has a diameter of 3 m, is made of a polyester-glass laminate. The five transparent entry ports do yeoman service as windows. The outer hull must withstand thermal and mechanical impacts against water. The crew cabin contains chairs for from 14 to 16 persons, communications equipment, and an air regenerating system based on chemicals. The amount of air-regenerating chemicals is figured at a level sufficient for 16 persons over 48 hours with a 30-percent reserve. After it emerges to the surface, the capsule has its interior ventilated via valves. Located under the seats are containers with enough food for 14 days, and under the cabin's floor is a central water tank. The air conditioning and signal systems, ventilators, and illumination are powered by nickel-cadmium batteries. The equipment of this original Polish capsule is similar to that required for a manned submersible vessel.

A novel idea is making the bottom part of the capsule cone-shaped and equipping it with an anchor which is automatically released by a hoist during descent so as to halt the capsule at depths of from 30 to 60 meters below the sea surface. The pay-out of the anchor line is controlled by hydraulic brakes, and the anchored capsule may be steered up and down; reducing the pressure on the friction brake disks suffices to move it upward. Moving the capsule downward requires overcoming the buoyancy (about 30 kn). To this end, a manual transmission is used.

The gross weight of the completely equipped capsule together with its passenger payload should not exceed 5 tons. This is limited by the payload capacity of helicopters and the hoisting capacity of cranes on rescue ships. Submersion of the capsule can be accomplished with the aid of 13 tons of ballast consisting of the anchor (3 tons), the anchor hoist with line (2 tons) and ballast (8 tons). In the event of a breakdown when the capsule descends below the 30-60 m depth instead of remaining within it, pyrotechnical generators will with gas elastic float tanks located between the pressurized outer hull and the inner hull. The capacity of these tanks is sufficient to cause the entire capsule to surface. Since the capsule is to be ejected to a distance from the site of its attachment and thereupon to submerge, it is placed on an ejection platform with a ballistic cylinder.

This Polish-designed capsule is undergoing thorough tests. Following operating trials of models scaled 1:10 and 1:5, a 1:1 scale model was built in Gdansk. Toward the end of last may the inventor and designers observed with bated breath the dropping of the capsule from heights of 10, 15, 20, and 30 m. The principal purpose was to observe the capsule's material and measure the acceleration at the moment the capsule hits water.

1386
CSO: 2602/29

PLANS OF HUNGARIAN-SOVIET MICROELECTRONICS ENTERPRISE

Budapest FIGYELO in Hungarian No 12, 18 Jun 87 p 17

[Article by Andras Varga: "Intermos Microelectronics Ltd.; At First To Contract Production, Later Its Own Plant"]

[Text] A new Hungarian-Soviet joint enterprise called the Intermos Microelectronics Limited Liability Company will begin operations in the third quarter. At first the new enterprise intends to have production done but the not too distant goal is to establish its own production capacity.

The new firm was established with 56 million forints initial capital to get started by the Microelectronics Enterprise (its share of the deposited capital is 30 percent), the Communications Engineering Cooperative (20 percent) and two institutions in Moscow, the Development-Production Association named the Scientific Center (45 percent) and the Elektronzagranpostavka all-federation association, belonging to the Ministry of Industry, which has foreign contacts (5 percent).

The headquarters is in Budapest. The charter was signed by the interested parties in the second half of April after getting the official permits. After recording by the Court of Registration the enterprise is expected to begin operations in the third quarter. But this will be preceded by a preliminary membership meeting at which they will elect officials and members of the supervisory committee.

When it gets started the joint enterprise will maintain a contracting office of 6-8 people which will use the capacity of the Hungarian founding enterprises to manufacture equipment oriented integrated circuits for computer technology devices, measuring instruments and television and radio equipment. The semi-finished chips for these will come from the Soviet Union. In this first partial year, hopefully in the second half of the year, several tens of thousands of microelectronic parts will be manufactured for users by the two domestic founders of the new firm, partly on their existing equipment and partly on equipment which will be obtained for this purpose.

Intermos plans to establish an agency or subsidiary in Moscow in the first half of next year for the purpose of making closer contacts in the Soviet Union. It is not planned that the new firm will bring Soviet enterprises into

manufacture. But having production done is only the first step. According to an agreement by the founders the joint enterprise will build a large capacity factory in later years. The first period--contract production--will embrace 1987-1988. The possibility of contract production cannot be ruled out later either if the Hungarian founders have free capacity which can be contracted for. But the emphasis then will shift to their own production.

In the second period Intermos will do the earlier work in its own plant, finishing the semi-finished chips coming from the Soviet Union. In the third period it hopes to perform the entire production process with its own capacity. But the second and third periods presume a great investment which the joint enterprise--having modest initial base capital--can hardly finance tself. Here the founders will come in with new shares.

The starting deposit capital consists entirely of money, from which they intend to finance the initial activity, including contracting and maintaining the office. According to an agreement of the founders, marketing will be done at prices established jointly by them. From this will be taken the price of the primary material provided by the founders (the semi-finished chips coming from the Soviet Union will make up about 25-30 percent of the value of the final product), fees for jobwork and the costs of maintaining the joint firm (such as renting premises). The mixed enterprise will turn 15 percent of the remaining sum to generation of a risk fund. The remainder is the gross profit from which the firm will pay a 20 percent association tax when production gets started--according to a resolution of the Ministry of Finance. Later, when the enterprise is doing its own production, the enterprise will enjoy complete tax exemption and other concessions--in accordance with domestic regulations for mixed enterprises.

The founders have agreed that they will not take out of the enterprise the profit generated in the first 3 years. But they have planned to make a profit even in this first abbreviated year. If it proves during the first months that the deposited capital is too little to finance the activity, and it falls to 40 percent of the sum originally paid in, the founders will increase the base capital with additional payments at the beginning of next year.

Preparation for the investment will begin next year. This will be realized in parallel with and in harmony with the domestic microelectronics development program. According to international experience the construction will take three, four or even four and a half years, and an additional two years will be needed to reach full production. In the meantime the ultimate production profile may change, but it is already certain that in addition to equipment oriented integrated circuits it will also manufacture standardized, so-called catalog circuits.

The investment will be financed by the founders, and not by the joint enterprise, in such a way that the Hungarian parties will increase the base capital with buildings and both parties will do so with machines, equipment and money.

The joint enterprise plans production worth 39 million forints for the second half of this year and about 100-150 million forints next year. After the

investment is up and running Intermos will have production worth about 600-700 million forints using its own capacity, with 300-350 workers. If profit moves around the planned 12 percent the investment will pay for itself in less than 8 years.

In the course of the discussions the founders agreed that they would transfer their own developmental achievements to the joint enterprise, which will not set up an independent developmental division. And Intermos will transfer to the owners the experience and developmental results obtained during production.

In the charter the interested parties also established that the products made in Hungary would go to Hungarian and Soviet users on a fifty-fifty basis insofar as possible. The ultimate direction of sales will be established each year, and after a few years they also plan convertible accounting export.

But the new product is still unknown in Hungary so probably in the very first period the greater part of the sales will go to the Soviet Union. According to calculations about one and a half or two years' work will be needed for the domestic spread of the products. Within several years, however, the balance of the bilateral shipments is expected to even out, for the Hungarian active balance which may arise will be balanced by Soviet shipments of primary material and by machines arriving as shares and if a surplus in some direction should develop later the other party will try to balance this with electronic products (machines, picture tubes, integrated circuits).

In any case, on the Hungarian side, foreign trade will be handled primarily by the Microelectronics Enterprise, which received independent foreign trade rights as of the beginning of 1986. But it can be imagined that a joint interest foreign trade enterprise of Mikromodul, the MEV [Microelectronics Enterprise] and Elektromodul will also take part in this activity.

So developing the domestic market will be the first task in the marketing policy of the new firm. As part of this they plan to put out quality publications; these will be immediately translated into the English language also so that they can be distributed abroad. In the judgment of the new firm and of the founders there will be a real chance, after a few years, of selling a part of the production on capitalist markets.

Intermos is being created in one of the leading, rapidly developing branches of industry in the world economy, so its success and development cannot be imagined without a number of links to the outside world, including convertible accounting countries. So the founders have agreed that in the first 2 years of the activity of the joint enterprise they will cover its foreign exchange expenditures out of their own funds. Later the new firm must take care of this but all such expenditures and receipts will be accounted for in proportion to the base capital. Thus, for example, the profits appearing in foreign exchange will be distributed in such proportions and, naturally, will be distributed in foreign exchange.

8984
CSO: 2502/72

HAVANA UNIVERSITY PRODUCES CERAMIC SUPERCONDUCTOR

Havana GRANMA in Spanish 18 Jun 87 p 1

[Excerpts] The Institute of Materials and Reactive Agents for Electronics (IMRE) of the University of Havana has produced the first high-temperature superconducting ceramic.

The critical temperature at which the superconductivity effect (no electrical resistance) was observed is above that of liquid nitrogen (77 degrees Kelvin, that is, 196 degrees Celsius below zero).

The demonstration consisted in the immersion of the material obtained in a receptacle full of liquefied gas. When the latter reached the aforementioned temperature (minus 196 degrees Celsius), we observed how the superconductor began to be violently repelled by the magnetic field created by a nearby magnet.

At the world level, the first reports about obtaining these ceramics came almost simultaneously in February of last year from the United States, the Soviet Union, Japan, China, Poland, and other laboratories in European countries.

Formerly, in order to achieve superconductivity in ceramic materials very low temperatures were required, such as that of liquid helium (4.2 degrees Kelvin, that is, minus 269 degrees Celsius), with the disadvantage that obtaining liquid helium is extremely costly and our country does not have the technologies to produce it.

The use of liquid gas in Cuba to achieve such a notable result makes it possible to continue the investigations without high cost because we have plants in our country that produce this gas, which is used, for example, for the conservation of semen in the artificial insemination centers.

Components of the Superconductor Achieved

The ceramics developed were prepared from a mixture of oxides of yttrium (Y), barium (Ba), and copper (Cu) in appropriate proportions which, once heated to high temperatures in a controlled atmosphere, produced a new substance that acquired the superconducting properties mentioned.

Superconductors make it possible to generate powerful magnetic fields for research in industry and medicine, and are decisive in nuclear magnetic resonance (NMR) equipment as well as in plants for the generation and production of electricity because there is practically no loss of electric energy in superconductors.

8711
CSO: 3248/375

END

10

Foreign Broadcast Information Service (FBIS) and Joint Publications Research Service (JPRS) publications contain political, economic, military, and sociological news, commentary, and other information, as well as scientific and technical data and reports. All information has been obtained from foreign radio and television broadcasts, news agency transmissions, newspapers, books, and periodicals. Items generally are processed from the first or best available source; it should not be inferred that they have been disseminated only in the medium, in the language, or to the area indicated. Items from foreign language sources are translated. Those from English-language sources are transcribed, with the original phrasing and other characteristics retained.

Headlines, editorial reports, and material enclosed in brackets [ ] are supplied by FBIS/JPRS. Processing indicators such as [Text] or [Excerpts] in the first line of each item indicate how the information was processed from the original. Unfamiliar names which are rendered phonetically or transliterated by FBIS/JPRS are enclosed in parentheses. Words or names preceded by a question mark and enclosed in parentheses were not clear from the original source but have been supplied as appropriate to the context. Other unattributed parenthetical notes within the body of an item originate with the source. Times within items are as given by the source.

SUBSCRIPTION/PROCUREMENT INFORMATION

The FBIS DAILY REPORT contains current news and information and is published Monday through Friday in 8 volumes: China, East Europe, Soviet Union, East Asia, Near East & South Asia, Africa (Sub-Sahara), Latin America, and West Europe. Supplements to the DAILY REPORTs may also be available periodically and will be distributed to regular DAILY REPORT subscribers. JPRS publications generally contain less time-sensitive information and are published periodically. Current JPRS publications are listed in *Government Reports Announcements* issued semi-monthly by the National Technical Information Service (NTIS), 5285 Port Royal Road, Springfield, Virginia 22161 and the *Monthly Catalog of U.S. Government Publications* issued by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.

U.S. Government offices may obtain subscriptions to the DAILY REPORTs or JPRS publications (hardcovers or microfiche) at no charge through their sponsoring organizations. DOD consumers are required to submit requests through appropriate command validation channels to DIA, RTS-2C, Washington, D.C. 20301. (Telephone: (202) 373-3771, Autovon: 243-3771.) For additional information or assistance, call FBIS, (703) 527-2368, or write to P.O. Box 2604, Washington, D.C. 20013.

The public may subscribe to either hardcover or microfiche versions of the DAILY REPORTs and JPRS publications through NTIS at the above address or by calling (703) 487-4630. Subscription rates will be provided by NTIS upon request. Subscriptions are available outside the United States from NTIS or appointed foreign dealers. Back issues or single copies of the DAILY REPORTs and JPRS publications are not available. New subscribers should expect a 30-day delay in receipt of the first issue.

Both the DAILY REPORTs and the JPRS publications are on file for public reference at the Library of Congress and at many Federal Depository Libraries. Reference copies may also be seen at many public and university libraries throughout the United States.