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Europe/Latin America Report

SCIENCE AND TECHNOLOGY

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EUROPE/LATIN AMERICA REPORT

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WEST EUROPE/AEROSPACE

POLITICS AFFECT HERMES, COLUMBUS DECISIONS IN FRG

Munich SUEDDEUTSCHE ZEITUNG in German 26 Nov 86 p 4

[Article by Michael Birnbaum: "Paying Guests on Space Flights--The Federal Government Is Buying into Several Expensive Projects--Riesenhuber Hopes for a European Strategy"]

[Text] For some time now, the course of space policy has no longer been set exclusively by the federal research minister in Bonn. Both foreign politicians and supporters of industry within the government are attaching increasing importance to space projects, albeit with different intentions. The Federal Chancellery will not let its policymaking authority be usurped, either, and is adding its voice to the discussion. However, toomany cooks spoil the broth. Recently, following the government's latest decision to take part in the European space shuttle project Hermes being pushed by France, it has become clear that definitive guidelines for German space policy are lacking.

Shortly before the French-German summit conference on culture, the ministers' group, under the leadership of Chancellor Kohl and with the cooperation of Bavarian Minister President Franz Josef Strauss, decided to put DM32 million into the planning phase of the Hermes project. Scarcely anyone doubted that this preliminary decision amounted to final consent to participate in the construction phase as well.

Hermes is the third mammoth project in the list of future German space activities, along with the construction of the European Ariane rocket and the European contribution to Columbus, the American space station. According to current estimates, Hermes will cost about DM5 billion, one-third of which will be financed by Bonn. Calculation of the total cost of German participation on all three projects, with allowance for price escalation due to inflation for the next decade, indicates that the research minister will have DM30 billion worth of bills to pay.

His current space budget is about DM1 billion per year. Out of this, however, Riesenhuber has also been financing projects such as the development and launching of satellites, parabolic flights with experimental rockets for scientific and industrial tests under weightless conditions, and even the participation of German astronauts in American shuttle flights. When the decision was made to participate in the American space station--a decision

based more on foreign policy and alliance regulations than on research policy--the research minister had already obtained a promise from the finance minister that 50 percent of the expenditures necessary for this participation (about DM4 billion) would not be financed with funds set aside for the general research budget. In January 1985 Stoltenberg kept his promise: Bonn would not take part in any more major projects after Columbus and Ariane.

This makes Stoltenberg the loser in the wrangle over the promise to contribute to the Hermes project; the winner is Foreign Minister Genscher. Bonn's agreement to participate in Hermes is the work of a triumvirate that seldom finds itself in mutual agreement. For foreign policy reasons, Genscher has been arguing for closer cooperation between Germany and France in space research since the beginning. He believes that what is at stake here is "Europe's ability to hold its own in the political, economic and cultural environment of the 21st century." He argues for "autonomous capabilities," so that Europe can "help to shape the space age" and "can work in space on an equal footing with other nations." Without really consulting his research minister, Chancellor Kohl had long before made a virtual promise to Francois Mitterand, who had been pressing him for over a year. And the third party to the accord was CSU Chief Strauss, who--in complete agreement with Genscher, surprisingly enough--wants to see Europe in the vanguard of future technology and to ensure contracts for the German space industry.

The situation confronting Riesenhuber is one of semi-chaos. Research policy can scarcely justify the space projects that are being envisioned. A year ago the research ministry was already saying that, according to various studies, Hermes is a technically outmoded concept, and that when the shuttle is finally ready for operation at the end of this century it will still be based on ideas from the Seventies, when the U.S. shuttle was being developed. Furthermore, the ministry stated, Hermes will be smaller than the present-day shuttle and therefore less economical to operate, since its payloads will have to be lighter.

The Americans are already designing a new space vehicle known as the Orient Express, which does not need carrier rockets, but can take off from an airfield independently and land again. The German space industry has come up with a similarly momentous proposal: the Saenger space transport. However, this national project would naturally have to be financed in part by the federal government--nobody knows how.

The decision to participate in Hermes was already enough to wake up the budget committee's coalition majority, which temporarily blocked funds for the project. Before it would give its consent, the coalition majority demanded that the federal government at least submit a set of overall space policy guidelines.

Riesenhuber is conspicuously absent from this discussion. His hopes are for Europe as a whole: instead of carrying out an endless series of isolated, individual space projects, Europe must ultimately develop a "consistent strategy." However, he himself is responsible for developing and implementing just such a policy for Bonn; it is the research minister who must answer the question of whether such immense investments in space projects are really

practical and what the specific national focuses of federal space policy are. Merely to participate in other countries' initiatives, whether for reasons of foreign or industrial policy, will have an increasingly unfavorable effect on our cost-to-earnings ratio in the long run.

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DANISH LAB RESEARCH ON PLANT CELL TECHNOLOGY

Copenhagen BERLINGSKE TIDENDE in Danish 24 Nov 86 p 10

[Article by Erik Bendt Rasmussen under the rubric "Business: the Information Society": "Here is the New Biotechnology"]

[Text] Natural red salmon color and cell propagation of plants. Research is being carried on in this at Danisco Bioteknologi, which is a subsidiary of the major Danish industrial concern Danisco. The expensive spice saffron can perhaps be mass produced in fermentation tanks instead of being harvested from crocuses.

Salmon should have red flesh. Salmon from pond farms does not always have this. Can it be believed that it is possible to produce by biotechnology a natural dye, such as the salmon takes in with its food? Just as in nature, where the red flesh color comes from the salmon's favorite dish, which is crustaceans.

They are working on the Red Salmon Flesh Project at Danisco Bioteknologi A/S in Glostrup. Pond farm salmon can easily get through feed with synthetic dyes that attractive red color which is a commercial desire and which consumers find delicious to look at. But it is a widespread desire that the salmon get the color from natural dyes.

Spices and flavorings are expensive, but can they be made less expensive with biotechnology? Imagine, if an expensive spice like saffron could be grown through the mass propagation of the cells which form saffron in the plant. The spice could perhaps be produced directly industrially by taking plant cells from the crocus species which produces saffron (from the flower style).

Danisco Bioteknologi is also working on the propagation of plant cells. The principle of plant cell technology is that instead of growing plants in the field cells are taken from the plants and they are grown in fermentation tanks. Here the goal is to get the cells to produce the desirable substances in such large amounts that the process is economically profitable.

Take a Carrot, Cut Off a Slice

"The technology is so new that it is still not in real commercial use anywhere in the world," says Danisco Bioteknologi Director, Academy Engineer Lillian Reesen. "Here at home there was still no progress in research in this field of technology within plant cells before Danisco got started. A contract was entered into for purchase of the new technology from an English firm and at the same time the staff was sent to a course in the technology."

The growing of plant cells has nothing to do with gene splicing. The method, outlined briefly, is as follows:

A rather small slice is taken from a place in the plant--a carrot, for example--and this slice is transferred under sterile conditions to a so-called solid medium which contains growth-promoting substances. After this the piece of carrot begins to develop tissues with cells. It resembles a sponge. It is later treated in a liquid medium in a shaker flask, from which it is placed in the laboratory's fermentation tank. After this the cells should divide, so that it is possible to achieve the production of cells with a carrot color or aroma, for example.

It is not possible yet to begin industrial production, but it is being worked on. Danisco can now do it itself, and the English contract expires at the end of 1986. Regarding future development, they have gotten into touch with Copenhagen University, the Pharmaceutical College and foreign universities. This is an assignment which the laboratory is working on for the Grindsted Products company.

Shrimp Shells for Fish Is Too Expensive

Director Lillian Reesen thinks that the Red Salmon Flesh Project is very exciting. It concerns producing a yeast for trout and salmon feed which contains the natural red pigment astaxanthin. This is also an assignment for Grindsted Products.

Interest in this pigment is due to the fact that salmon and trout in pond farms do not get the attractive red color unless the feed contains the pigment for the color. As mentioned, in nature the fish gets the red color from crustaceans. There is on the market a pigment extracted from shrimp shells, but not in sufficient quantity, and it is too expensive. For this reason the pond farmers have chosen as an alternative solution the synthetic dye cantaxanthin.

Grindsted Products' interest is to be able to offer a natural product as a substitute for the synthetic one. The laboratory's problem now consists in getting the particular yeast with a red color to propagate and form the desired red color. The yeast must have a very high pigment content in order to be competitive with the synthetic dye.

Danisco Bioteknologi A/S is a highly advanced laboratory which is housed at the domicile of the Danisco concern. It is furnished with the most modern computerized equipment in a several-story building.

The Beginning Was Yeast for Baking

The laboratory has no outside business. It is functioning for its third year exclusively as the central biotechnology research center for the Danisco group's companies. Therefore, the laboratory also has an environment department which is working on finding methods for removing or converting undesirable chemical substances such as phosphates and nitrates in drinking water and sewage. This is taking place with a view to the I. Krueger subsidiary, which supplies water purifying plants over most of the world.

Another Danisco company--Dansk Gaerings-Industri [Danish Fermentation Industry] (DGI)--whose activities have been transferred to Grindsted Products, was formerly in Danisco Bioteknologi's building. DGI was founded in 1918 as a producer of baker's yeast. It later became a producer of brewer's yeast and wine yeast and enzymes, as well as a consulting firm in the sewage treatment field.

After the reorganization of DGI the laboratory got the new name of Danisco Bioteknologi. In addition to the assignments mentioned, the laboratory is engaged in a long list of projects. They are divided into two main groups: the short-term, which must be able to be utilized commercially quickly; and the more long-term, with a greater basic research content.

The short-term include biotechnology processes for the purification of drinking water and sewage. And new fermentation processes for the production of aromatic substances and feed products.

In the longer term, work is being done on plant cell technology. This includes, for example, products for producing aromatic substances, dyes and pharmaceuticals from plant cells. This is one of the newest branches of biotechnology.

8831
CSO: 3698/151

EC ISSUES GUIDELINES FOR BIOTECHNOLOGY REGULATION

Brussels COMMUNITY FRAMEWORK FOR THE REGULATION OF BIOTECHNOLOGY in English 4 Nov 86 pp 2-6

[Official publication of the Commission of the European Communities]

[Text] 1. Traditional biotechnology, achieving genetic modification by such techniques as hybridization and selective breeding, has always played an essential role in the development and improvement of plants, animals and in manufacturing processes. Within the last decade new techniques of genetic modification have been developed to make possible major advances in animal and plant breeding, and in the modification and the use of micro-organisms and cell lines to manufacture medicines, fine chemicals, and many other products. These new techniques, such as recombinant DNA or RNA, and cell fusion, are now generally known as genetic engineering.

2. The question has been posed as to whether these newer genetic modification techniques bring with them extra or new risks for consumer/worker health and safety or the environment. In that they enable much more precise genetic modification, there is no a priori reason to believe that their use in enclosed manufacturing processes entails any extra or new risks. Nevertheless, the use of genertically engineered organisms in both laboratory and industrial conditions has been subject to regulatory oversight in the community and in the U.S. Moreover, in recent years, the planned release of genetically engineered organisms in agricultural and environmental applications has given rise to further debate about the possible risks involved.

3. Several countries have therefore been reviewing existing regulations, and generally assessing the risks to human and environmental safety from genetic engineering. A major study-report prepared by leading international experts for the OECD entitled "Recombinant DNA Safety Considerations" has been recently published.

The report distinguishes between

--the use of genetically engineered organisms in enclosed manufacturing systems, and the products produced by such methods, and

--the planned release of genetically engineered organisms in agricultural and environmental applications.

4. The report concludes that genetically engineered organisms used in manufacturing systems contained or enclosed to the appropriate standards and not at any stage unappropriately exposed to or released into the environment, give rise to no new or additional risks, either for the workers involved, the environment or in respect of the resultant products.

It states that, for the majority of cases, the levels of physical and biological containment laid down by the principles of Good Industrial Large-Scale Production (GILSP) would provide adequate safeguards for worker and environmental protection. In those few cases where higher risk organisms have to be used (e,g. vaccines) well-known containment measures would be applied in addition to GILSP.

5. On the question of planned release of genetically engineered organisms in agricultural and environmental applications, the report concludes that while risks exist, they can be assessed to some extent by analogy with information about existing organisms. However, there is insufficient experience at this stage to lay down a coherent set of regulations. Instead the report recommends a prior case-by-case evaluation of all planned release applications.

6. The Community took a first step in biotechnology regulation in 1982 with the adoption of a Council Recommendation on Laboratory safety measures in relation to RDNA experimentation. A new coordination procedure for Community evaluation of biotech medicines was proposed in October 1984 and is currently before Council. Existing Community legislation already covers the protection of workers from the risks related to exposure to biological agents at work, and work is in progress on specific norms for pathogenic biological agents. In July 1985, the Biotechnology Regulation Interservice Committee (BRIC) was set up, and has been assessing the need for Community regulation in this area. Existing Community legislation in respect of products, worker protection and environmental protection is being re-evaluated as to its adequacy. BRIC was involved in the preparation of the OECD report referred to above, and organized on 29-30 April 1986 a high-level meeting with Member States officials to discuss the regulation of biotechnology in the Community, taking account inter alia the OECD report. Following this meeting, Member State officials have been requested to keep the Commission services informed of national activities and intentions in regard to biotechnology regulation. The Commission services involved have also been in consultation with the industries most involved with modern biotechnology--indeed the chemical, agrochemical, pharmaceutical and food industries have submitted a joint report to the Commission, setting out their views on the need for Community-wide regulation of biotechnology. At the same time, Community research is being undertaken in the framework of the Biotechnology Research Action Programme to develop further the scientific basis for the assessment of risks resulting from the release (accidental or deliberate) of genetically engineered organisms. Member States representatives on the Advisory Committee ("CGS") for the Biotechnology Research Action Programme have been requested to prepare a summary of relevant research in national programmes.

7. In the light of the examination which has been undertaken by the services, the Commission believes the rapid elaboration of a Community framework of biotechnology regulation to be of crucial importance to the industrialization of this new technology in the Community. Equally, citizens, industrial workers, and the environment, need to be provided with adequate protection throughout the Community from any potential hazards arising from the applications of these technologies. The internal market arguments for Community-wide regulation of biotechnology are clear. Microorganisms are no respecters of national frontiers, and nothing short of Community-wide regulation can offer the necessary consumer and environmental protection.

8. The Commission therefore intends to introduce proposals for Community regulation of biotechnology by Summer 1987 with a view to providing a high and common level of human and environmental protection throughout the Community, and so as to prevent market fragmentation by separate unilateral actions by Member States. The Commission's proposals will address two distinct aspects of the use of genetic engineering, viz:

A. Levels of physical and biological containment, accident control, and waste management in industrial applications, and

B. Authorization of planned release of genetically engineered organisms into the environment.

9. The purpose of the first proposals (A) would be to ensure adequate Community-wide levels of containment, accident procedures and waste management in respect of the use of genetically engineered organisms in enclosed manufacturing systems. This measure would ensure adequate standards, while at the same time comparable conditions of industrial production as between Member States. It will be based on usual requirements of good manufacturing practice--and may in its scope cover other biological agents used in industry.

10. Because international experience of risk assessment in the field of "planned release" is still limited, it is not possible to propose any general guidelines or testing requirements for the time being. The Commission will be proposing a Community case-by-case evaluation and authorization procedure based on mandatory phased notification by industry. This is in line with industry's own proposals and with the recommendation of the OECD report. The stages at which Community notification would be mandatory, the procedures for dealing with agricultural and environmental applications, and the general question of a priori exemptions, have yet to be agreed and will be a matter for further discussion with experts and with Member States officials in the light of the reevaluation of existing Community legislation referred to in para 6.

11. These new technologies have a significant international impact and the market for the new biotechnology is worldwide. The Commission therefore considers it to be of importance that in the elaboration of Community regulations care is taken to achieve and maintain a broad measure of harmonization with other countries, in particular with the practices of our principal trade

partners. The Commission is prepared to sponsor or co-sponsor general and technical international meetings on aspects of the regulation of genetically engineered organisms.

12. The Commission is convinced that the development of a Community regulatory framework, which will both provide a clear, rational and evolving basis for the development of biotechnology and also ensure adequate protection of human health and the environment is an urgent necessity. To this end the Commission services, working together in the framework of BRIC, are launching the necessary work to draft proposals for legislation on genetically engineered organisms to be presented to the Council by Summer 1987. In the meantime, the Member States are requested to inform the Commission of their activities and intentions in the fields of biotechnology regulation and risk assessment research.

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GIST-BROCADES, SHELL FOUND JOINT BIOTECH VENTURE

Rotterdam NRC HANDELSBLAD in Dutch 11 Dec 86 p 11

[Text] Rotterdam, 4 Dec--Shell and Gist-Brocades are combining a number of existing businesses which make fine biochemicals, biopolymers and industrial enzymes in a new joint enterprise to be set up. The industry is starting with 800 workers, of which 500 come from Gist-Brocades and about 300 from Shell.

A number of--mainly foreign--enterprises are being merged which supply those raw materials for, among others, the production of starch, detergents, medicines and food-stuffs and agricultural chemicals, while biopolymers are used in water purification, waste processing and oil production.

Gist-Brocades and Shell, which have been cooperating since 1981 in research in these materials, will each participate to the amount of 50 percent in the joint venture. The plan is that Gist will bring to the new enterprise a considerable part of the production and marketing of its industrial enzymes division. According to a spokesman of the Delft firm, it involves especially enzyme plants in Belgium and the United States with a total of about 10 percent of Gist's turnover or 180 million guilders.

Shell's contribution will consist of part of the production and marketing of fine chemicals, especially those of the British Shell subsidiary Ward Blenkisop, which will be modernized. The size of the turnover of Shell's input is being kept secret.

The joint venture is obviously building on the existing joint research. That research concentrated, among others, on the development of plant alcohol (alternative fuel), a new type of yeast and on fine chemicals which are used in oil production. The far-reaching cooperation which was foreseen at the time, is partly a consequence of the results of the joint research, but not exclusively. In the field of industrial enzymes, fine biochemicals and biopolymers, biotechnology and chemistry are continually approaching each other more and consequently Shell and Gist expect a synergistic effect from the combination of these operations. The cooperation also serves to prevent duplications, a spokesman of Gist-Brocades says. Moreover, the joint venture can use the research facilities of both parent companies.

Merger

It is definitely not intended that the cooperation leads to a merger between Shell and Gist or a takeover by Shell of Gist. As a result of a telex sent by mistake to the FNV [Netherlands Trade Unions Federation], in which the word merger appeared, it buzzed yesterday with merger rumors. Even the quotation of Gist-Brocades was hurriedly suspended yesterday morning. A joint press report of Gist and Shell ended the confusion later in the day. Both concerns had really just wanted to announce the cooperation next week.

FNV executive committee member A. van Emmenes, originally completely surprised by Gist-Brocades telex, immediately requested an interview with both boards of directors about the possible results for the personnel. That talk will take place tomorrow morning. On being asked, Gist-Brocades spokesman declared that the establishment of the joint venture would have no harmful effects for the workers.

8490
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MORE AIRBUS WORK, INCREASED STATE FUNDS SOUGHT BY DUTCH FOKKER

Rotterdam NRC HANDELSBLAD in Dutch 4 Dec 86 p 11

[Article by editor Pieter Graf: "Fokker will have to Indicate what it Wants in the Future"]

[Text] The merger with United Aeronautical Works was dissolved after 10 years and Fokker was again revived. Especially the F 29, a machine for over 130 passengers, would again give Fokker a secure place in the world aviation industry. Market research had shown that airline companies wanted such a plane and not a lengthened F 28. This was the exit of the F 28 Super for 115 passengers. We wrote in 1980 and president-director F. Swarttouw says at the air show in Farnborough: "Fokker must remain an independent industry which makes civilian planes, exercises completely all functions such as production and sale and preserves its own identity."

Just before that, the Netherlands faced the choice of a successor for the Lockheed Neptunes of the Royal Navy. The choice was between the Lockheed Orion and the Atlantique "new generation" of Breguet. The French would have to purchase in exchange F 29's and the inclusion of the F 29 in the European Airbus Consortium was even mentioned. But the Netherlands chose the Orion, a choice which brought the then minister of economic affairs a motion of disapproval by the PvdA and D'66.

A supercritical wing may be designed for the F 29. The project was not geting off the ground, until Fokker announced on 4 May 1981 that a joint venture would be set up with the American builder McDonnell Douglas for the production of a 150 seater, christened the MDF-100. Fokker contributes the F 29 and Douglas its vague plans for a DC-11. Before then, rumors regularly surfaced that Fokker would produce the F 29 with Boeing or with Japanese, but McDonnell Douglas was also good. The Second Chamber reacted very contentedly in each case and the FNV and the CNV [National Federation of Christian Workers in the Netherlands] spoke of a "fine result."

There is great euphoria at Fokker. Swarttouw allowed himself to be photographed in June 1981 at the Paris Air Show with Sandy McDonnell under a model of the MDF-100. He is launching at the same time a new project: the FXX, a

machine for about 100 passengers. The first X stands for the technology to be applied, in which one of the most important aspects is the economical propane engine; the other X stands for the market segment. Fokker was producing at that time the F 27 and the F 28 and somewhat later the MDF-100 will be added there. Swarttouw declares "I never want four product lines."

Eight months later--the government has meanwhile promised Fokker 1.7 billion guilders in loans and credits for the MDF-100--Swarttouw decides that it makes no sense to continue the cooperation with McDonnell Douglas. FNV executive committee member, Aalko van der Veen, expressed the general dismay as follows: "This is over now, for at Boeing, Fokker was never accepted as a full partner and at Airbus they are altogether last in line." The PvdA and D'66 together with the trade unions urged seeking affiliation with Airbus.

After an unsuccessful marriage and a damaged relationship, Swarttouw said: "It is winter for Fokker." The plan for the MDF-100 could be discarded, for the market prospects for such a 150 seater, as a result of much lower fuel prices, were poor. In the fall of 1982, Fokker announces its future will be to seek to modernize the F 27 and F 28. With Airbus' flirtation to participate in the construction of the Airbus A 320--a 150 seater!--the Dutch plane producer does not want anything to do with it.

A Full Value Position

Fokker only wants to participate if it can obtain a "full value position" with Airbus and according to Swarttouw that means a participation on the order of several tens of percent. He does not care "to wind up in an awkward position" or "to pay the full price and not have anything to report." And for whoever all that is still not clear enough Swarttouw says: "We do not intend to be Airbus' 'show plant.'"

In principle Fokker is best prepared to participate in other projects "to be assured of satisfactory use of its plant and to maintain the enterprise's capacity." He again declared in HET FINANCIEELE DAGBLAD: "But the goal is to maintain Fokker as a producer of complete planes." At that time, according to the American magazine FORTUNE, Fokker was involved in a "bumpy solo flight." In November 1983, the royal airplane plant celebrated its silver jubilee. Plans were launched for the Fokker 50 and 100.

On this occasion, Swarttouw declared that those two new projects must insure "Fokker's continued existence for the coming decades." The state supplied 900 million in credits and guarantees. The winter--meanwhile 1,400 workers were discharged--appears to be over when Swissair as the first placed an order in July 1984 for 8 Fokker 100's. In March 1985, the government again loans Fokker 100 million for the Fokker 50 and Fokker 100. By and by Swarttouw indicated at the air show in Farnborough that these two projects certainly will be the last which Fokker will carry out under its own power.

Mitsubishi

The sale of the Fokker 100 stagnated for some time, but that changed when the Irish leasing company Guiness Peat Aviation together with Mitsubishi and Fokker itself placed an order at the beginning of November for 40 Fokker 100's and an option on another 60 machines. What financial consequences the 25 percent share in the GPA Fokker 100 Company, set up for this order, will have on the Dutch plane builder is not made clear. Questions can also be asked about the role of Mitsubishi, one of Fokker's partners in talks in the past about cooperation. Is there anything more behind this?

Meanwhile Fokker again appears to need money, because the enterprise has great problems "pushing the two projects through the plant," to speak with president and board member H. Langman. It appears to be the beginning of a loan cycle. The question arises among many whether the Second Chamber and the minister of economic affairs must immediately comply with Fokker's request for more money, without the enterprise submitting a clear strategic outline.

Moreover there exists the choice of a self-reliant enterprise which supervises projects and produces Fokker planes, a prospect which only has a chance of succeeding with partners. A second possibility is switching to a risk-bearing coproducer in one or more projects of third parties. The remaining options are: assembly plant or subcontractor. Fokker has always rejected the last two possibilities and it is also very much a question whether the Second Chamber intends to earmark tax money for an enterprise that then is not much more than a glorified "jobber."

Vital questions remain: what does Fokker want to become in the long term and what strategy does the industry think it must follow? The Second Chamber will want a definite answer to both questions from the minister, before he brings up the loans.

8490
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NETHERLANDS FOKKER ACQUIRES LARGE AIRCRAFT ORDER

Rotterdam NRC HANDELSBLAD in Dutch 5 Nov 86 p 1

[Article by one of the paper's staff writers: "Largest Order Ever Booked by Fokker"]

[Text] Amsterdam, 5 Nov--Fokker recorded its largest deal ever today. The order is from the Irish aircraft leasing company GPA [Guinness Peat Aviation] and it includes 40 F-100 jet airliners and an option on 60 more of these aircraft. The order, including the options, is worth $2 billion.

The order was placed by a new company in which the Irish GPA aircraft financing and leasing company holds a majority share. Along with the Japanese Mitsubishi Trust and Banking Corporation and the Mitsubishi Corporation of Japan, Fokker BV itself will also hold approximately 10 to 30 percent. This was announced today by Fokker's chairman of the board, F. Swarttouw, immediately after the contracts had been signed.

Swarttouw described himself as very pleased with this order, which enables Fokker to penetrate the new market in the aircraft industry, namely that of leasing. He added that this order also enables Fokker to widen its already large clientele by combining its own marketing and financial resources with those of GPA.

This order brings Fokker's total of firm orders for F-100's to 85 aircraft, with options on another 91. According to Swarttouw it will not be necessary to take on additional staff at Fokker. At present a little more than 10,000 are working at the aircraft factory. The aircraft ordered today will be delivered between 1988 and 1991.

The new joint venture GPA Fokker 100 Limited, formed by GPA, Fokker, and Mitsubishi, which placed an order with Fokker this morning for 40 F-100 aircraft and took an option on another 60 aircraft, will be headed by R. van de Heuvel, now responsible for finances on Fokker's board of directors. GPA will provide a second director, C. Brown, the current vice president of GPA's sales department.

Including the order from GPA Fokker 100 Limited, in which the Irish GPA holds the majority share, this Irish company has placed orders worth more than 10 billion guilders within 6 months. In June this year, GPA placed a single order for 96 aircraft worth almost 7 billion guilders.

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FOKKER OF NETHERLANDS HIT BY ORDER LOSSES, INDUSTRY MERGERS

Amsterdam ELSEVIERS WEEKBLAD in Dutch 8 Nov 86 pp 17-18

[Article by Frans Janse: "How Long Will Fokker Be Able To Remain Really Independent?"]

[Text] The "Irish dream order" is keeping the national minds busy. Will Fokker really deliver a few dozen airplanes of the "100" type? Even if this order is released, the national airplane manufacturer will experience heavy headwind in the coming years. Its independence is no longer a matter of course.

In all the excitement about a possible dream order from the "Irish" Guinness Peat Aviation GPA company of several dozen Fokker-100 airplanes from the Dutch airplane manufacturer, another report, which is probably of much more decisive importance to the company's future, has landed somewhat in the background. It involves the cooperation, made public in September of this year, between Fokker, Boeing, the Indonesian company IPTN and the German MBB, to study together whether the development of an "advanced" medium range airplane is feasible."

The largest airplane manufacturer in the world, Boeing, stated in this regard that "if the new jet commercial airplane is produced, it will be equipped with the most modern propulsion technology." The airplane could be ready for use between 1992 and 1995. That sounds very promising, but it very probably means that when Fokker becomes a member of a consortium which will produce such an airplane, the role of the Dutch company as independent airplane manufacturer will be finished.

Respect

"When Fokker lost its bid to take over the Canadian national De Havilland company last year, Boeing, which got control of De Havilland, took a decisive step in the struggle for the market segment in which Fokker is strong," said Henk Vos, PvdA member of the Second Chamber and former district leader for the FNV [Netherlands Trade Unions Federation] industrial union. In this latter capacity, Vos concerned himself for years with the operations of the sole Dutch airplane plant. Vos was more than just a caretaker in the strict sense of the word for the interests of his members. Among friend or foe, in the

Netherlands as well as among the major American airplane manufacturers, he commanded respect because of his thorough knowledge of the economics of this branch of industry. Vos still has good contacts in the airplane manufacturing sector. "An enormous company such as Boeing will never leave the final responsibility for the development and production of an airplane in the hands of another enterprise and be content with the role of partner in a project in which a competitor plays first violin. Like all airplane manufacturers, Boeing has a large number of cooperation agreements, but there is not a single one among them in which Boeing, as an equal and risk bearing partner, plays a secondary role."

"From the smallest airplane made by the Americans, the 737, to the largest plane, they offer a very complete 'range.' The takeover of De Havilland should be seen as a strategic decision, the result of which should be that in the longer term Boeing will also play an important role in the lowest market segment of line airplanes. Given the enormous strength of the American airplane manufacturer, I do not see who or what would keep the Americans from becoming dominant in all market segments."

Vos was referring to two mutually independent developments. First of all, last year the Canadian government announced that it wanted to withdraw from the insolvent national De Havilland company. The Canadian government's involvement with this company actually occurred of necessity. As a result of the wave of mergers in the British airplane industry in the seventies, which led to the formation of the national British Aerospace company, Canada was faced with the fact that the subsidiary of one of the British merger partners would end up under foreign control. That was considered undesirable in Canada. De Havilland was separated from the British corporation and made independent as a national company.

The De Havilland program includes the development and construction of lighter propeller airplanes. One of those, the Dash-8 is a competitor of the new light airplane made by Fokker, the Fokker-50. It is true that with the forerunner of this airplane, the F-27, Fokker was able to build up a greater than 50 percent market share in the relevant segment and develop a lead in terms of market knowledge and experience. Even more than the F-27 and the Fokker-50, the Dash-8 is a plane especially built for use in inhospitable regions where airfield facilities are minimal. For short distance operations, usually as "feeder" -- provision planes for the larger airlines -- Fokker has taken the lead from the very beginning with its propeller planes. When the Canadian government decided last year to withdraw from De Havilland, Fokker was secretly approached to participate in a consortium which was supposed to make a bid for De Havilland.

The Canadian government would have preferred to see this consortium continue the company rather than have it end up in the hands of Boeing. The main reason for this is that the American corporation has production facilities at its disposal in Canada and it has repeatedly happened in the past that, as a result of sharply reduced sales by the American parent company, large numbers of workers in Canada were dismissed (and a little while later rehired).

Last year, Fokker did indeed realize that it was very important to keep De Havilland out of the hands of Boeing, but it was not even remotely able to come near the attractive offer made by the Americans. Boeing guaranteed that capital injections would take place, that there would be no dismissals, that De Havilland would continue to exist as an independent developer and manufacturer of lighter weight airliners and, in addition, made a more than attractive monetary offer.

Thus the American company implicitly let it be known that it was very interested in owning a company with technological and market knowledge in the lowest segment of the airliner market.

Headwind

The combination of the enormous technical and financial opportunities of the largest airplane manufacturer in the world and De Havilland's specific knowledge in the area Fokker is active in means that in the future in its own market segment Fokker will have to take into account the tough competition of a company whose resources and opportunities are virtually limitless.

That Fokker would loose the intrinsically uneven battle with Boeing was a foregone conclusion, particularly also because the Dutch enterprise had put all its resources and energy into the development of two new airplanes at the same time, the Fokker-50 and the Fokker-100. It is true that this involves planes which are based on already existing types, but for a relatively small company like Fokker it really is a tour de force which does not leave any leaway for other far-reaching, costly and time consuming activities.

Fokker also admits, although somewhat reluctantly, that in the long term De Havilland's acquisition by Boeing may well imply a strong threat. A spokesman (as long as no definitive result of the negotiations about the Irish "dream order" is known, top level Fokker officials will not comment) said: "Of course, it would have been a good thing for Fokker if some form of cooperation could have been worked out with De Havilland. A smaller airliner plant in the hands of Boeing is obviously a threat to Fokker in the long term. But I should note that in the area of smaller propeller planes for regular transport Fokker has both a major lead and specific technical and market knowledge, which even a company such as Boeing cannot master at the drop of a hat. For the time being we are the strongest enterprise in this segment and the knowledge that Boeing now also has facilities at its disposal in our area means for us, first of all, that we will do our utmost to exploit our lead as much as possible."

Farnborough

The second aspect Vos was referring to, was the cooperation agreement which Fokker concluded earlier with the triumvirate of Boeing, the Indonesian IPTN and the German airplane manufacturer MBB. This cooperation agreement, the conclusion of which was made public in September of this year in Farnborough, provides that the four participants will carry out a feasibility study of the market potential and design criteria of a 100 seat airliner to be built

according to the latest technological principles. If the study, the cost of which will be divided equally among the four partners, indicates that the development and manufacturing of such an airplane offers possibilities, then the plane could become operational between 1992 and 1995.

Even though this has not been admitted in so many words, it is clear that Fokker's joining in the already existing cooperation came about at the initiative of the Dutch enterprise.

That is not all that surprising for more than one reason, but it could mean that Fokker is taking into account the fact that a far-reaching change in strategic policy may be necessary in the future.

The very fact that the Indonesian company IPTN is participating in the study project makes it necessary for Fokker to get a foot in the door. Traditionally Indonesia has for years been the main purchaser of Fokker airplanes. It is true that the American Piedmont company is currently the largest operator of Fokker airplanes, but among its fleet of 45 F-28 planes only 8 are of the Mark-4000 type, bought new by Piedmont. The other airplanes came into the airline company's possession through takeover of a competitor and through the purchase of F-28s completely overhauled by Fokker, which the airplane manufacturer had "exchanged" within the framework of the delivery of new F-28 planes to the Indonesian airline company Garoeda. Indonesia is an extremely important market for Fokker, and it was very unpleasant for the Dutch company to know that an Indonesian company was a partner in a study project which could result in the development and manufacturing of a new technology plane which would be first in line to replace the Indonesian F-28 fleet.

A second reason why Fokker had every reason to join the already existing cooperation effort is the fact that the orders received for the Fokker-100, the new jet transport plane which will be put into production next year, are still behind earlier expectations. Although there is no reason yet to be too upset about this, there is definitely no evidence so far of a development whereby sales of the new airplane would clearly indicate the creation of the broad market base and strong financial support needed to go on as an independent finished product manufacturer in the future.

The Fokker spokesman noted: "We have received 45 firm orders for the plane and 31 options. That is obviously far from enough to recover the costs, never mind making a profit on the production. But there clearly is an interest in the Fokker-100. Furthermore, right now the situation is such that the long delay in receiving order notices does not necessarily mean all that much.

"In the past the situation was such that we were able to announce every month that one, two or more planes had been sold. Obviously, we still do not sniff at such orders, but the market has changed and thus also our approach. The smallest order we have booked so far is the one for seven planes from IFLC in Beverly Hills. Following the deregulation of air traffic in the United States companies have been established, or grown, which have built up a strong local short and medium distance airliner network and which are good for large orders."

"The liberalization of aviation in Europe is progressing only slowly but developments similar to those in the United States are in the offing here. In addition, there is the fact that air traffic in Europe is increasing and more and more direct connections among smaller cities are being established. That also means that orders for one or two planes will be increasingly less frequent. Fokker has as a matter of course adapted itself to this development. It so happens that negotiations about large orders take longer, they are also tougher."

SAS

And yet, some companies in the United States, hoped for purchasers of Fokker-100 airplanes, ordered planes from the competition, as was the case with the Scandinavian airline company SAS. The latter in particular was a disappointment to Fokker. SAS participates, together with the French airline company UTA, KLM [Dutch Royal Airlines] and Swissair, in a maintenance pool, the KSSU group, which as a whole is the largest purchaser of airplanes in the world. After KLM and Swissair made a choice in favor of the Fokker-100, it was reasonable to expect that the Scandinavians would also choose Fokker to replace part of their obsolete DC-9 fleet. That did not happen. SAS ordered all replacement planes from McDonnel Douglas and thus made a choice in favor of airplanes with a somewhat larger capacity than Fokker could offer.

The Fokker spokesman said: "The fact that SAS chose McDonnel Douglas was indeed a disappointment for us. But of course we do take such disappointments into consideration. We estimate the total market for 100 seat capacity airplanes at approximately 900 planes. Our forecast, that we should be able to secure about a 30 percent share of this, did not change because the SAS order did not materialize. Our market estimate is based primarily on the number of DC-9 and Boeing 737 airplanes which are due for replacement. We believe that we are not aiming too high with our market expectations."

Against this background, cooperation with Boeing, MBB and IPTN is a harsh necessity for Fokker. It is expected that it will be possible to sell a maximum of 300 Fokker-100 type airplanes. Because of competition considerations, no information is being released on the break even point for this plane. But as this is not a completely new plane with the very high development costs inherent in that, it is assumed that a 300 plane production would represent a profitmaking operation.

But the Fokker-100 project is definitely not of such a nature to form the basis for the development of a successor by Fokker alone. But it would be impossible for the Dutch airplane manufacturer to repeat the success story of the Boeing 727, of which more than 2000 planes have been sold and on the basis of which Boeing was able to build up its current empire. The new generation plane, of which the partnership now involving Fokker will carry out a feasibility study, should be a highly advanced airplane. New aerodynamic insights, the increased use of composites and the development of a so-called propfan-motor with high energy yield will be the main characteristics. It is highly unlikely that Fokker will be able to develop such a plane on its own and be able to manufacture it in the capacity of top producer in cooperation with

others. Are the Fokker-50 and the Fokker-100 the last of the Dutch enterprise's "own" planes and will the future only allow for partnerships (with Boeing, with Airbus for the 330/340 project), where Fokker would undoubtedly play a significant role, but no longer the main one?

Reorientation

It has happened a number of times before in the course of its existence that the Dutch enterprise caused a sensation through surprising shifts in direction, which, although not always, at the crucial moment did mean that the company was able to maintain its own technical and economic independence. Developments on the North American market will be decisive. In the meantime, the North American Fokker office has sharply expanded its staff. In addition, Fokker is keeping an eye on further strengthening its position on the North American market.

Now that cooperation with De Havilland will not materialize, the Dutch company is consistently on the lookout in the United States for a small company to take over in order possibly to start North American production there. If such a transaction could be effected, then the future of the only Dutch airplane manufacturer could well look completely different from what seems likely at the present time. In the final analysis, the long term developments are more decisive for Fokker than whether the Irish dream order, which as a matter of fact is of the utmost importance for the success of the Fokker-100 project, goes through.

Henk Vos commented: "The nature of international developments is such that Fokker is faced with a thorough reorientation. In the short term the problems are not too great, but it is extremely important for the future of the enterprise that an adequate analysis of developments over the next 20 years be carried out and that a policy be established which anticipates those developments."

8463
CSO: 3698/130

NETHERLANDS STARTS FIFTH GENERATION COMPUTER PROJECT

Amsterdam DE TELEGRAAF in Dutch 20 Nov 86 p 27

[Unattributed article: "Philips Together with Universities in Fifth Generation Computer"]

[Excerpts] It is very possible that a few years from now, when fifth generation computers make their appearance, Philips will be ahead of international competition in this area.

Dr A.J. Nijman from the Physical Laboratory at Philips stated this yesterday at the launching of a cooperative project between Philips, the universities of Amsterdam, Twente, Leiden and Utrecht, and the Mathematics and Data Processing Center [CWI] in Amsterdam.

These six partners will build a fifth generation computer sponsored by the Data Processing Research Project Stimulation Team [SPIN], which will provide a 5.5 million guilder grant. The total cost of the project, referred to as PRISMA [Parallel Interference and Storage Machine], will amount to approximately 25 million guilders.

Dr. Nijman, who will act as project leader for PRISMA, is not very worried about progress made by Japan which has been mentioning a national fifth generation computer project for quite some time. Given the level of scientific publications by American experts, he expects that the real competition will come from the United States. For the time being, however, the European potential in basic data processing knowledge does not show any lag.

Engineer H.P. Struch, director of SPIN, believes that the lack of standardization of fifth generation computers within the EC will not become an agenda item for a long time, so that this future market is still completely open. The project team expects that a prototype of PRISMA will be ready in 4 years.

PRISMA is the second major SPIN project. A program in the area of speech processing started earlier this year. PRISMA is not the first fifth generation project for Philips. Within the framework of the EC stimulation program ESPRIT, they are working on a related project together with European electronics corporations. According to Dr Nijman, knowledge gained in this project will also benefit PRISMA.

8463
CSO: 3698/130

EXPORT CONTROL HAMPERS SWEDISH RESEARCH USE OF CRAY COMPUTER

Stockholm NY TEKNIK in Swedish 20 Nov 86 p 2

[Article by Hakan Borgstrom]

[Text] Swedish researchers are worked up. Users of the Cray supercomputer are dissatisfied. It is difficult to work with the clumsy secrecy regulations. As a result, many researchers refrain from using the computer. This will threaten the prominent position of Swedish research.

The Cray-1 supercomputer is located in Linkoping at Saab-Scania, which owns the computer. The Natural Science Research Council (NFR) has a certain amount of computer time at its disposal. The computer is an invaluable tool to many researchers, but it is surrounded by a number of secrecy rules because of the American export regulations.

"Many research projects have refused to use the computer because of all the clumsy regulations involved in utilizing the machine. In the long run, this will threaten the prominent position of Swedish research," said Kim Holmen, NFR contact person for Cray users in the research world.

"Even though a large program takes only minutes to run, it may take up to 6 hours before we get any results. In the worst case, it can take 2 days," Kim Holmen said.

According to the researchers, this is because the National Police Board, which established the regulations, has interpreted the American export laws in an estremely strict manner.

"This is remarkable, since I can sit in may office and reach similar supercomputers in the United States, West Germany, or Norway in half a minute," Kim Holmen said.

Locked Room

In Sweden researchers must go to a special locked room and put their name on a list before they can begin to contact the computer. Then they must call up the host computer in Linkoping via a telephone modem and give a password. The conversation is then cut off and an automatic redialer calls up the

terminal again. Then the researcher must repeat the password. Yet another password must be given before contact is established between the Cray and the host computer.

"This is a clumsy procedure. Sometimes it is impossible to make the connection," Kim Holmen said.

In larger, so-called syntax runs, communications occur by way of a computer in Stockholm that encodes the information.

"In syntax runs, the user must go through three different computers and give three passwords. If something goes wrong somewhere, we never find out about it. The mistake is hidden in a printer list that is filed away for 5 years. This is an extremely miserable arrangement," Kim Holmen said.

Takes 2 Days

Because of these difficulties, most researchers choose to send their magnetic tapes to Linkoping. After about 2 days the information is returned to them. Ever since the computer was installed 3 years ago, the NFR has been fighting for more rapid and reliable communications.

"In the beginning, the National Police Board wanted us to have a system that was totally separate from the Cray. Contact between the supercomputer and the host computer was to consist of a computer operator running back and forth between computers with magnetic tapes. Fortunately, we put a stop to that," Kim Holmen said.

The NFR also wants a faster new supercomputer. A funding request has been presented to the government. It is not yet known where this new computer will be located.

"We believe we will be troubled by the same secrecy regulations wherever it is located. This is because of the American export regulations," said John Gustavsson, department director at NFR.

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CSO: 3698/146

BRIEFS

PHILIPS' PARTICIPATION IN ESPRIT--Philips is participating in four new projects of the third phase of ESPRIT, the European Strategic Program for Research and Development in Information Technology. These projects have a total budget of 50 million guilders. Philips will contribute 40 man-years to these projects. Research is to be conducted in Philips' laboratories in the FRG, the UK, France, and the Netherlands. The average term of the projects is for approximately 3 years. In total, Philips is participating in 35 ESPRIT projects. Three of the four new projects deal with software. The fourth project involves research on computer-managed manufacturing. [Text] [Amsterdam COMPUTABLE in Dutch 31 Oct 86 p 17] 25044/12859

PHILIPS OPENING DUBLIN UNIT--Eindhoven--Philips has acquired the largest share in Ireland's first commercial company for software and chip design (ASIC's in Dublin with its investment of just over 7 million guilders. The company, Silicon and Software Systems, is led by Maurice Whelan, a former lecturer in microelectronics at Dublin's Trinity College and former employee of Philips Eindhoven (at the Physics Laboratory, among other places). Philips decided to establish the design center in Dublin because of its relationship with the university there (140 graduates from Whelan's faculty working for Philips), and because the research laboratory in the Netherlands has no more capacity. Silicon and Software Systems is to become a profit-making company, which will initially work only for Philips, but will later serve other technological companies in Ireland. Major activities will be the design of VLSI (Very Large Scale Integration) chips and ASIC's (Application Specific Integrated Circuits) for both digital and image processing (CAD/CAM), as well as aids for the design of ASIC's. The company hopes to employ 35 people in the first year and twice that number by the end of the second year. [Text] [Amsterdam COMPUTABLE in Dutch 31 Oct 86 p 13] 25044/12859

CSO: 3698/A047

SWISS MICROPOSITIONING SYSTEM FOR PRODUCING OPTICAL COMPONENTS

Frankfurt/Main FRANKFURTER ALLGEMEINE/BLICK DURCH DIE WIRTSCHAFT in German 11 Nov 86 p 5

[Text] Switzerland is still in the forefront in the field of ultraprecision mechanical systems. This was demonstrated with a multiaxis micropositioning system, whose operation is not adversely affected by mechanical faults, such as those caused by lash, friction and wear. As described in a report in the October issue of OPTICS AND LASER TECHNOLOGY, the system developed by the Centre Suisse d'Electronique et de Microtechnique (CSEM) is based on the systematic application of purely elastic links to control and transmit motion.

The company has also developed units to display and automatically control position coordinates using digital and analog circuits. One of them is a two-stage digital-analog converter for the rapid and precise positioning of components, even if a certain degree of friction is present. The displacement range is 4,000 µm, the resolution, depending on the frictional force, is 0.5 to 2.0 µm and frictional force is 20 N.

The monolithic microtranslator offers high resolution, reproducibility and linearity in the submicron range. The mobile xy junction has a 25-mm diameter bore to accept standard microoptical equipment. Two models are available: one manual, with an optional separate digital display, and one with motor drive and elctronic controls. The latter measures the transmitted intensity using the integral PIN diode and drives the translator stage until the maximum is reached. Three pieces of equipment are available as options. One is for scanning at a constant speed, which is adjustable, and with automatic sequential setting of the maximum transmission by means of manual xy commands. The sequence stops when the maximum is reached. In the second, a small rotational test movement of one of the components to be aligned is carried out through a piezoelectric transducer. The third consists of a 3-axis digital display with a resolution of 0.025 µm and analog output. The most important applications for this system are the positioning and alignment of monomode glass fibers and optical guided wave components.

9581
CSO: 3698/156

FRG FIRM USES 5-AXIS MILLING FOR ARIANE PROPELLANT PUMP PARTS

Frankfurt/Main FRANKFURTER ZEITUNG/BLICK DURCH DIE WIRTSCHAFT in German 2 Dec 86 p 5

[Excerpts] Greater consideration is being given to 5-axis milling, because manufacturing costs can be reduced and quality can be improved with this technology.

Five-axis technology offers great advantages primarily in the processing of convolute surfaces. Convulute blade surfaces can be found today in radial impellers for pumps and compressors, not just in propulsion systems for air and space travel. The New Technologies group at M.A.N. used this technology in the manufacture of the fuel pump impellers for the first and second stages of the Ariane booster rocket. The startup and development costs associated with the introduction of this milling technology were cofinanced by the Ministry for Research and Technology.

Development of 5-axis milling was carried out on two different impellers, which are, however, very similar in the design of the blades. In the case of the fuel pump impeller for the Ariane, the blade assembly consists of four large blades,with axial entry and radial exit, and four shorter intermediate blades. Encirclement of the hub is 273° for the large blades of the first turbine and 244° for the second turbine. The blade height starts at 42 mm at the entry, with a wall thickness of 1 mm, and ends at 13 or 17 mm at the exit, with a wall thickness of 3 mm. The turbine blades are enclosed, the cover being welded on. Machining the impellers must be considered to be extremely difficult. The material used has a stress rigidity of about 1,000 N/mm^2. The spaces between the blades are so tight that large areas have to be machined with end milling cutters in order to achieve stable cutting conditions with small tool lengths.

Because the free spatial positioning of the workpiece always has to be seen relative to the milling tool, some of the axes can be shifted to the positioning of the tool, that is, of the spindle. The spindle axis can be moved with a translatory motion and also rotated. However, a different machine construction is better suited to machining turbine blade wheels. The rotational axes in this instance are located in the components for the positioning of the workpiece. M.A.N. uses a machine of this design. Four axes can be used to position the workpiece, and one axis to position the tool. The two rotational axes are obtained in this case by means of superimposed rotary tables. This

makes heavy demands on the manufacturer of machine tools. Any inaccuracy in the individual axes has to be extremely small, because inaccuracies are cumulative when all the axes are in operation simultaneously.

As a result of the complicated geometric relationships, programming blade surfaces is made more difficult. In the case of the M.A.N. machine mentioned, which almost attains the accuracy of a template borer in its individual axes, the blades are defined by axial radii and attendant wall thicknesses. The blade surfaces of the impellers cannot be generated in one plane because they are convolute forms. The standard reference points at the foot and the crown of the blade surfaces are not the same. So it is difficult to find milling machine settings to prevent undercuts in the blade cross section. It has been possible to find satisfactory solutions to these problems in spite of the sharp twists in the blades. Not very long ago, suitable programming systems were not readily available.

Position and wall thickness deviation of the blades are the most important characteristic for judging the quality of impellers that have been machined on the 5-axis machine. A traverse and rotary table, which allows free positioning of the turbine wheel, is used for measuring on a 3-coordinate measuring machine. This allows the blades to be measured in the plane of the axial radii which provide the basis for the programming.

As a result of the high maching performance with peripheral milling and the saving in manual refinishing, processing times could be reduced to less than 25 percent, compared with copy milling. This applies only to the pump impellers for the Ariane. No general conclusion can be drawn. However, with easily machinable materials and with a simple blade arrangement, 5-axis milling technology could well offer an economical alternative, when compared with previous milling techniques.

9581
CSO: 3698/156

BRIEFS

ESPRIT II ROBOT PROJECT--Louvain University and the Louvain-based Measurement and Systems (LMS) company are going to participate in a new Esprit project aimed at improving robot performance in integrated factories. The French firm Bertin, a well-known engineering company, leads the project, which is called "Sacoday: a high-performance FMS-robot with on-line dynamic compensation." The project deals mainly with the research into vibration in robot movements. If a robot arm continues to vibrate after a movement, the next movement can only be made after this vibration has ended. Vibration can be reduced by slowing down robot movements, but a certain "delay" in the production process cannot be eliminated. The Sacoday project will look directly at what robots actually do. Twenty-four million guilders have been allocated to this project. Other participants are the West German robot manufacturer Kuka, the University of Dublin, and the Danish Danfoss company. The Louvain LMS company specializes in vibration research and is currently conducting research on noise in vehicles. [Text] [Amsterdam COMPUTERWORLD in Dutch 28 Oct 86 p 18] 25012/12859

CSO: 3698/A050

FRANCE'S CNET TRANSFERS ADVANCED SILICON TECHNOLOGY TO INDUSTRY

Paris ELECTRONIQUE ACTUALITIES in French 12 Sep 86 p 27

[Article by Guy Cuciuc: "CNET-Grenoble Prepares to Transfer a 1 Micron CMOS Product Line to Industry"]

[Text] CNET [Centre National d'Etudes en Telecommunications: National Center for Telecommunications Studies]-Grenoble, in the area of its research activities in silicon microelectronics, has now completed, in accordance with the predictions of a master plan which was initiated in 1983 and will end in 1987, the development of a 1 μm double metal CMOS product line (transferable to industry in the spring of 1987). Its applications are particularly designed for the execution of complex circuits having logic and analog functions on the same chip. A version with a specific telecommunication circuit (video decoder for the D2-MAC-PAQUETS television standard) is currently being executed.

After this stage, CNET plans to enter the 0.5 μm product area in 1995 and the 0-25 μm product area in the year 2000. In the short term, other products are also being planned. These products include the introduction in 1987 of a SOI (silicon-on-insulator) experimental line which will be made available to designers. The participation of engineers at MHS, Bull, ESS, Motorola, etc., has already been planned at CNET for the purpose of industrial transfer, since the materials phase has been completed. Agreements have already been signed with CIT-Alcatel and Thomson-Semiconductor. For other micron research programs, CNET is participating, as the general contractor, in the European SPECTRE product line with SGS in Italy, MITS and Bull in France, British Telecom in Great Britain, IMEC and UCL in Belgium, etc. In 1990 CNET, which has been receiving basic technology from its European partners for this project, should have an industrialisable laboratory demonstration of a 0.7 μm circuit having 4.10^6 transistors.

The 1 μm product line

The halfway point introduction (1983-1984) of the 1.5 μm product line has allowed CNET to carry out laboratory demonstrations of the opportunities for the feasibility potential of a complete technological product line transferable to industry, resulting in a 1 μm product line. The latter is completely determined, and CNET now needs only to carry out efficiency tests before its transfer to a manufacturer in the spring of 1987 (the agreement was entered into

one year ago with Matra-Harris). This product has the potential of reaching a high elementary gate speed by using a tungsten silicide grid and selecting a slightly doped substrate. During the feasibility demonstration carried out at the end of 1984 with ten lots, on a 16 x 16 - 108 bit switching matrix, speeds of 160 bits were obtained.

The measured switching rate was 250 picosecond/gate. The other characteristic of this product line is the relatively high production cost due to the use of only photorepetition processes where performance is necessary (expensive technology), since the projection process is used to the maximum in other cases. With this method, CNET obtains alignment precisions [precisions d'alignment] on the order of ± 0.2 μm, which should allow them to achieve an integration density of 30,000 transistors per mm^2, with a good yield. In addition, this product line provides the potential for achieving "standard," nonspecific "memory," and also combined logic/analog logic circuits.

The current industrial result of this technology is the achievement of a high-speed logic/analog converter designed for the future video decoder, operating at 27 MHz, for the D2-MAC-PAQUETS television standard. Since the combination of the digital filter-dematrixing circuit with analog to digital converter has already been tested separately, CNET now needs to combine them on the same chip (circuits on the order of 50,000 transistors, an extremely high number for combined technology). Masks should be available within 1 or 2 months.

Industrial transfers

In the area of industrial transfers, CNET-Grenoble has recently signed service contracts with SAGEM (ionic implantation), Thomson (micro-beam laser test) and Rhone-Siltec (cleaning of silicon wafers). The granting of licenses was also carried out with SAPI, COILLARD (machines for washing quartz tubes), APSIS (ELDO software designed for electrical simulation), SNLS (multipolar plasma machines [machines a plasma multipolaires]). Their knowledge transfer in the area of lithography and polycrystalline silicon deposition is pending signature with CIT-Alcatel.

Within the framework of industrial transfers, since March, CNET has put into place a structure to provide the execution of the contract signed last 30 December with China. Note that, in the meantime, the French government has changed, and, although the agreement has not been challenged, France has not yet agreed, whereas as far as China is concerned, all the conditions have been fulfilled.

100 Gigahertz transistors

In the high-level research area, CNET-Grenoble has achieved the first SMS (semiconductor-metal-semiconductor) metal-based transistor by using a metal compound (cobalt disilicide), the active region of the component (or base) is 1000-fold thinner than in a silicon transistor. This new compound should have other applications in ultrahigh frequency amplification and high speed data transmission, sectors which concern telecommunications, information technology and television reception.

However, the prospects for applications are at least ten years in the future. These studies require intensive investment: extensively-equipped clean rooms, nanolithography, ultrahigh frequency characterization. However, according to CNET, this research should result in the achievement of components operating in the 50 to 100 gigahertz range.

13146/12859
CSO: 3698/47

NOKIA SUBSIDIARY MICRONAS STARTS CUSTOM CHIP MANUFACTURE

Helsinki FORUM in Swedish No 15, 9 Oct 86 p 10

[Article: "Micronas Started Up in Esbo"]

[Text] In the future, microelectronics will be the foundation of all industrial activities, honorary industrial counsellor Kari Kairamo of Nokia said during the opening of the Nokia subsidiary Micronas' new microcircuit plant in Esbo 2 weeks ago. Micronas is the first domestic manufacturer of microcircuits on a commercial scale. Eighty percent of the workers are Finnish, but this figure will increase even more when the industrial production of pure silicon chips begins in Finnland.

Custom Circuits

The new factory produces custom microcircuits for demanding applications, primarily in telecommunications and instrumentation. This requires close cooperation between the designer and the manufacturer and represents custom production. According to Kairamo, Finland has a real chance to succeed in this "circuit market," but not on the market for so-called standard circuits.

For several years now, integrated circuits have been manufactured on a small scale in Finland for domestic and laboratory use. Micronas is now adding the sales aspect and is also looking for export markets. Kairamo classifies this new production as strategically important and, of course, of national significance.

Quick Takeoff

Micronas was created in a relatively short time. The factory was planned in 1984, the Esbo plant was completed in 1985, production facilities were installed in February of that year, and test production started in May.

Nokia owns 51 percent of Micronas, Outokumpu 25 percent, Kone 11 percent, Aspo 5 percent, and the Japanese company Seiko's California firm Micro Power Systems Inc (MPSI) 8 percent. The company now employs 100 persons. Total sales this year will amount to 25 million markkas and estimates for 1990 are about 100 million markkas.

The idea behind the new unit was to create a production facility with modern and reliable process equipment--a factory that, in every respect, would meet the requirements for cleanliness, freedom from vibrations, safety, and environmental protection. The Micronas plant is equipped with high-quality measuring equipment and a CAM system that guarantees effective follow-up for all measurements and assures quality control during the various process phases. The production of integrated circuits includes about 40 main work phases and several hundred detail work phases.

Micronas' custom circuits will be found in many well-known Finnish high-tech products, including Mobiras' Talkman.

9336
CSO: 3698/150

PHILIPS OF NETHERLANDS SEEKS MORE TIES WITH SIEMENS, THOMSON

Rotterdam NRC HANDELSBLAD in Dutch 3 Dec 86 p 11

[Article by editor Pieter Graf: "Philips Desires Broader Cooperation"]

[Text] Eindhoven,3 Dec--Such great risks are connected with the further development of advanced integrated circuits (chips) that no single producer will be able to bear this alone. For these reasons, Philips will continue its present cooperation with Siemens even further and conversations are also now in progress with, among others, the French electronic concern Thomson for setting up joint projects.

Dr S. van Houten, member of Philips' board of directors, said this, at the opening by Prince Claus of a new laboratory for fundamental and applied research in the field of integrated circuits in Eindhoven. This test plant is part of the megaproject in which Philips is cooperating with the FRG Siemens concern. The total investment in the project amounts to 1.5 billion guilders, for which Philips, Siemens and the Dutch and FRG governments together, each have taken responsibility for one-third.

The megaproject aims at the development of submicron technology with the aid of which in due time chips can be produced with details which are smaller than one-thousandth of a millimeter. "Just to imagine the idea," according to Van Houten,"head hairs have a diameter of approximately 70 microns." Thus integrated circuits can become more intricate in the future, but also smaller and as a result cheaper.

According to Van Houten, the efforts are very risky. "It can only be clear later whether all the plans are technically feasible and economically sound. Therefore we are of the opinion that we must not want to do everything ourselves." Besides the financial risks, it is moreover impossible for every producer to find all the expertise in its own enterprise.

At this time, 450 people are employed on the megaproject in the test plant. That number will increase to about 600 by 1988. About 20 experts in the field of chip technology come from the United States. Some of them worked formerly

at the subsidiary enterprise Signetics, but most of them were bought off from competitors. When asked,doctoral candidate R. Hamersma, director of the Philips' Elcomo parts division declared "that is not all too easy today."

Luring Talent Away

According to him, it is more or less a matter of enticing talent away from the United States because the chip industry in that country is in a critical condition. Hamersma thinks this is due to the lack of American industries which buy chips on a large scale. Hamersma explains "you must be able to make chips in large numbers. Only in this way, will you succeed in continuing to bear the enormous investments which are necessary for further development."

"We think the consumer electronics is indispensible for achieving such series. You can then invent special applications for specific clients from the large series. In America they do it the other way around. There the government subsidizes definite projects, but you will not be able to maintain that in the long run, because the scale is too small and too expensive. That explains the current depression in the chip industry in the United States and part of the people who work in it are now looking toward Europe."

Asked about a reaction to the government's plans to no longer subsidize in the future large-scale projects such as the megaproject, board member, Van Houten did not indicate he was very impressed by that. He said "the trend is to act more on the European level." But, if necessary, Philips will not hesitate to approach "everyone."

8490
CSO: 3698/167

ESPRIT'S SILICON COMPILER PROJECT ADVANCING

Zellik TECHNIVISIE in Dutch 19 Nov 86 pp 19-20

[Article by Eng Patrick Pype; first two paragraphs are TECHNIVISIE introduction]

[Text] Toward a "real" silicon compiler for VLSI digital signals processing.

During "ESPRIT [European Strategic Program for Research in Information Technologies] Technical Week" (29 September-3 October), the opening talk was given by Prof H. De Man, director of IMEC's VSDM Division (VLSI Systems Design Methodologies). His subject was the status of the ESPRIT 97 project, which involves work on a "real" silicon compiler for VLSI digital signals processing. TECHNIVISIE brings you a summary.

Digital Signals Processing

A silicon compiler is a software CAD system that systems designers need to design systems chips quickly using a high-level specifications language. The language is not converted into machine language; it is transferred directly to silicon appropriate for this application. This is very important for customer-directed VLSI circuits, or ASIC's (application specific integrated circuits), because in 1990 these will achieve sales of $20 billion, about 50 percent of the integrated circuit market (according to a recent study from Dataquest).

In developing such a customer-directed VLSI circuit, or ASIC, it is necessary to take into consideration the range of applications for which the chip is being developed. "The" silicon compiler does not exist and probably never will. Whatever success has been achieved in this field is due to the fact that researchers have chosen a specific architecture to synthesize.

The target application that researchers are concentrating on for the ESPRIT project is digital signals processing, with its great range of possibilities in telecommunications (robot vision, etc.) and the consumer sector (digital speech and image processing).

The first phase of the project concentrated on the design of bit-serial digital filters from specification to layout; the second phase looks to bit-

parallel multiprocessor structures for implementing advanced, so-called third generation DSP algorithms such as speech processing, data compression, modems, etc.

ESPRIT Partners

IMEC is the chief contractor in this ESPRIT 97 project. It is working with five partners: Philips (Eindhoven); Siemens (Munich); Ruhr University, Bochum; Bell Telephone Mfg. Co. (Antwerp); and Silvar Lisco (Louvain). Besides this project, Prof De Man's VSDM group is also working on another ESPRIT project involving the development of an interactive expert system to verify the electrical, functional, and timing correctness of flexible VLSI modules like those generated by silicon compilers. This project also involves Philips (Eindhoven) and Silvar Lisco. Independently of both projects, the group is also working with other industrial partners: Tektronix (Portland, United States), Atea (Herentals) and SGS (Italy). This cooperation is extremely important, because developing software without "practising" with concrete applications is like learning to swim on dry land.

Silicon Compiler

In developing this kind of compiler, a "meet-in-the-middle" design strategy is chosen. This involves splitting up the work between the systems engineer and the silicon specialist. This split is necessary, because in the entire world there may be 5,000 silicon specialists, whereas there are 250,000 systems designers. The gap between their approaches is too great, and it is therefore necessary to work with restructurable modules. Starting from a high-level algorithmic description of behavior, a target architecture is compiled at the so-called module level. Modules are functional blocks, such as ALU, multipliers, dividers, comparators, accumulators, RAM, ROM, and the control structures for all these.

In the "middle" comes the work of the silicon specialists, who design reusable and parameterizable module generators. A module generator is a software procedure which, when called up from the compiler, generates a "customized copy" (with current parameters) of the module. This copy provides the required information about layout, timing, and functionality.

After that, the modules used are placed on a "floorplan" and connected. Based on the connection and fan-out load capacities--which can be derived from the floorplan--the designers must then verify whether the desired performance can be achieved. This is precisely what the VSDM group's other ESPRIT research project is concentrating on.

"Real" Silicon Compiler

Today numerous software aids are available for the design of integrated circuits. Besides the work on module generators, research is also being done for ESPRIT 97 into software for architecture synthesis. And this leads us to compare current design techniques with the ESPRIT project's approach.

The first difference is the level at which the systems designer and silicon specialist meet. Where in the past a wish-list of gates was drawn up manually--starting from the natural language specifications--today a wish-list of modules is generated.

A second difference is that this structure is achieved with the necessary software aids, which start from a description in a high-level formal language. The goal is to considerably shorten the design time required for the synthesis by using a computer. It will immediately be clear therefore that what work station salesmen claim are "silicon compilers" should in fact be called structure compilers. They all start out from a wish-list or merely generate the layout for a single functional block. The package does not perform the synthesis, which is still performed manually.

Results Thus Far

At present, work on Cathedral I is complete. This involves the silicon compiler for bit-serial filters. This software was tested in early September in an IMEC workshop. The reactions were positive, so that this software will be offered to interested parties in the business world. For more information about this, contact P. Pype (telephone 016/28.12.11).

The photograph [not reproduced] shows an adjustable digital equalizer filter for digital audio (compact disk) with 32 bit internal word length and 100 dB signal/noise. It is entirely CAD designed. To perform the same function as this chip would require five modified TMS 320's, which makes the value of customized chips clear.

At present work is continuing on Cathedral II (into which Cathedral I will be integrated as a module). A "single chip pitch extractor" for speech was chosen for design practice for a digital multiprocessor. A description of the steps involved in synthesizing this application, from the high-level description to the "middle" (module level), follows.

Architecture Synthesis

Various tools are used for the architecture synthesis. Starting from the description in a high-level language (SILAGE), a partitioning is carried out into a number of processors with their respective control structures. Between these processors there is a buffer memory that varies from switched RAM to FIFO memory. A general controller manages the whole. The synthesis (JACK-THE-MAPPER) is then carried out for each processor, to split it into a data pad and accompanying control structure. The designer's work is important, for he can always use pragmas to make the necessary modifications manually (for example, use one multiplier instead of two, use three buses instead of four, etc.). For the control part, placing the microcode in the proper sequence (scheduling) is an ILP problem.

IMEC already has a first, experimental version of this synthesizing expert system. It makes extensive use of the PROLOG artificial intelligence language, because synthesis at this level depends strongly on heuristic engineering rules and on attempting to copy from one representation to

another. The goal of the whole is to considerably shorten the design cycle for chips and to guarantee their correctness interactively (introducing and modifying pragmas).

The Future

Two points are of importance in the further development of customer-directed systems on chips. First, it should be noted that the development of this kind of CAD system requires the interworking of advanced software techniques and outstanding expertise in electronics. Although specialists who combine a knowledge of electronics and computer sciences are extremely scarce, they are the sine qua non for further progress in the European microelectronics industry.

A second essential factor is the necessity for cooperation among the various countries of Europe (ESPRIT, RACE, and other programs are absolutely vital) but also among companies, research centers, and universities. In a field where talent is so scarce, duplication of effort should be avoided like the plague. Consequently, the exchange of ideas and software aids can do much to further strengthen the traditional strong points of the European electronics industry, namely telecommunications and consumer electronics.

Our inferiority complex toward Japan will only disappear when we cease trying to compete with that country's products and instead do original research in a field where Europe already has the necessary experience.

12593
CSO: 3698/A158

BRIEFS

FRANCE - UK IC MANUFACTURING--Thomson Semiconductor (TS) has signed a collaboration agreement with two British firms for the design of custom-made integrated circuits (IC) at its new Basingstoke (UK) ASIC design center. According to this agreement, Wolfon Microelectronics and Swindon Silicon Systems, Ltd. will have access to the integrated circuits technology and production facilities of Thomson Semiconductors (Thomson Components) at Basingstoke. In exchange, Thomson can offer its British clients two teams of designers experienced in this area, stated the French manufacturer. The center, inaugurated 2 October, is located on the premises of Thomson Components, Ltd., near London. It has two work stations linked to the Grenoble center of the Specific Semiconductor and Microsystems Services division (DS3M). It will allow TS's British clients to design their own ICs for their telecommunications, defense, automobile electronics, industrial or aerospace equipment, announced the press release. The Basingstoke center joins the TS design centers in Grenoble, Velizy, Dallas, Phoenix, Boston, Munich, Milan, Tokyo, and Singapore. Each center has a team responsible for user training, technical assistance, and the maintenance of machines and software. [Text] [Paris AFP SCIENCES in French 9 Oct 86 p 32] 13146/12859

CSO: 3698/47

EUROPEAN VENTURE CAPITAL FUND EXPLAINED

Rotterdam NRC HANDELSBLAD in Dutch 8 Oct 86 Supplement p 5

[Article by Dick Wittenberg: "Euroventures' Continuing Expansion"; first paragraph is source introduction]

[Text] The development phase of Euroventures, the European venture capital fund, is nearly over. The network of branch companies is filling up. Now they are ready to work with promising and risky companies--to the benefit of both Europe and their own pocketbook.

Euroventures, the European venture capital fund established almost 2 years ago at the initiative of the Roundtable of European Industrialists, is extending the reach of its activities. Last week it was announced that the Saudi Arabian Tag investment group and the American 3 M have acquired a 15-million guilder share in Euroventures between them. This brings the fund's total capital to 99.3 million guilders. But this is only the beginning. "If all goes as planned, this will increase to some 150 to 160 million guilders," says Henk Goris, chief executive officer of Euroventures BV in Eindhoven.

That is why Euroventures is anxiously trying to attract fresh capital. The present shareholders have been asked to buy more shares. Roundtable members who have not yet invested in Euroventures have been approached to do so. For the first time, the fund has also been looking for new shareholders who are not participants in the select Roundtable conference, as is the case with Tag and 3 M.

Euroventures needs the additional capital to further extend its branch network throughout Europe. In 1985, Euroventures Benelux and Italy's Eurovenca were the first branches to open. In 1986, they were followed by Euroventures France and the Scandinavian Nordica. Large parts of Europe, however, are not yet covered.

Goris hopes this will change this very year. There are projects for branch funds in the FRG, Switzerland, and the UK. In establishing these new branches, they will take a different approach from that used for the four existing funds. Euroventures Benelux, for example, had to start with little venture capital experience. Goris says that this approach is too slow. Thus, in the FRG, Switzerland, and the UK, Euroventures will join forces with existing management teams that have already proven themselves in venture capital or in providing guidance to young companies.

The FRG branch will receive DM100 million; the Swiss branch, 40 million Swiss francs; and the British, only 15 million pounds sterling. It is worth noting that creation of the British fund has long been in question. In Goris' opinion, the UK is already "slightly over-ventured." Hence the final decision to create a specialized fund targeting only the data processing industry.

Euroventures also plans a fund in the Iberian Peninsula. It is currently negotiating with the Compania Telefonica Nacional de Espana, among others, and, according to Goris, prospects are good.

Little by little, the chain reaction sparked off by Euroventures is spreading. Euroventures' basic strategy consists in channeling capital to its branch companies. This means that if Euroventures has 150 million guilders in capital, its branches can have a total of about 500 million guilders at their disposal. The branches' strategy, in turn, consists in investing in promising and risky companies, but without acquiring a majority share. This brings the total investments generated by Euroventures to more than 1 billion guilders.

Thus, Euroventures is realizing its goals, as set by Roundtable members: stimulating venture capital in Europe and promoting transnational investment to strengthen industry and the European market.

In the meantime, Euroventures Benelux, with offices in Brussels and Den Bosch, has invested in eight companies. These are Nava in Italy (special ski bindings), Amber Software International in Amsterdam (fourth-generation programming language), Shockwave Metalworking Technologies in The Hague (combining metals by means of explosives), European Silicon Structures in Luxembourg (design and production of custom chips in small quantities), Van Doorne's Transmissie in Tilburg (revolutionary automatic gearbox), Forelec/PM Electronics in Wilrijk, Belgium (medical electronics), Diversified Technics in Salt Lake City (medical products), and BCG Interim Management in Amsterdam (interim management).

Albert Kloezen, managing director of Euroventures Benelux, expects to invest in another four to seven companies by year-end. Then some 25 million of the fund's 100 million available guilders will have been spent. According to Kloezen, it will probably take another 2 years before Euroventures Benelux will run out of investment funds. By that time, about three-fourths of the money will be spent, and the rest reserved for additional funding of existing investments. Kloezen is also cautiously preparing the creation of Euroventures Benelux 2, scheduled to open in 1988.

Interest

For the time being, there is no lack of interest in Euroventures Benelux. According to Kloezen, more than 200 applications from entrepreneurs have been submitted over the past year, despite scant soliciting by the company. "The quality of the applicants and the paperwork was quite good," Kloezen says.

The fact that even so only a small number of companies passed muster is due to several practical considerations. Sometimes the entrepreneur himself did not want to invest in the operation, which is one of Euroventures' few unbendable conditions. Sometimes the projected profitability was judged unacceptable.

In other cases, the 500,000-guilder minimum investment required by the fund was far from being reached.

The development stage of Euroventures is now almost complete. "Now it is a question of strengthening competitiveness, efficiency, profitability, and market positions," Goris says. Although Euroventures was founded for idealistic reasons, both the parent company and its branch funds do pursue maximum return on investment.

[Box]

Shareholders

The Euroventures BV shareholders are: Asea and Volvo (Sweden); Fiat, Olivetti, and Pirelli (Italy); BSN, Lafargue Coppee, and Saint Gobain (France); Petrofina (Belgium); Philips (The Netherlands); Robert Bosch (FRG); and Anova (Switzerland). Since last week the Saudi Arabian Tag investment fund and the U.S. 3 M company have been added to this list.

The Euroventures Benelux shareholders are: the Amro Bank, the Banque Internationale a Luxembourg, Euroventures BV, Mafina (from the Petrofina group), the Maatschappij voor Industriele Projecten [Industrial Projects Company], Philips Belgium, Sibeka (of the Societe Generale group), and the [Netherlands] pension funds of AKZO, the construction industry, the Hoogovens [blast-furnaces], KLM, Philips, Shell, Unilever (called Progress), VMF-Stork, and the pension fund for health, mental, and social interests.

We should also add Euroventures Benelux Team, which is owned by the eight managers of Euroventures Benelux. Due to their personal involvement, it is in the managers' interest to see that the companies in which "their" branch fund invests are profitable. A similar strategy has been followed with the other branch funds.

25007/12859
CSO: 3698/A052

PHILIPS PRESIDENT URGES MORE GOVERNMENT R&D SPENDING

Amsterdam COMPUTABLE in Dutch 24 Oct 86 p 3

[Unattributed article: "Philips Calling for Conscious Technology Policy--Van der Klugt Demands Policy Comparable to Other Countries "]

[Text] Rotterdam--Philips senior executive C. J. van der Klugt wants the Netherlands Government to conduct a conscious technology policy. At present the government too often expresses its intentions without proceeding to actual funding. In a speech at Rotterdam's Erasmus University, Van der Klugt specified what Philips understands by an adequate technology policy. The cornerstones include the government's financial contribution and actual form that takes, its procurement policy, and the technological infrastructure.

Philips welcomes the idea of government restraint, but allows for one exception when it concerns technology policy. Philips boss C. J. van der Klugt recently gave a lecture at the Erasmus University in Rotterdam on Philips' economic and political influence in the Netherlands, an opportunity he seized to specify what Philips understands by a well-defined technology policy.

What Form?

An important first point is government expenditure. "After the recent reports from, among others, the OECD and the [Netherlands] Advisory Board for Scientific Policy, this should no longer be a point of discussion," feels Van der Klugt. "These reports unanimously conclude that Netherlands Government support to industrial R&D is very low, with percentages about half of what is customary in other important European countries." Van der Klugt endorses these reports by requesting and R&D budget increase of several hundred million guilders.

Van der Klugt thinks that the actual form government funding takes is important. The difficulty of defining R&D projects in small countries and the fact that a few international concerns make the lion's share of all research efforts should be reflected in the form of financial incentives. Van der Klugt is thinking for example about stimulating international cooperative projects between large companies and about a flexible policy for the remaining national areas of interest.

Procurement Policy

An innovative government procurement policy focusing on high technology requires political will. Van der Klugt, however, considers it essential that the government thus contribute to broadening the market for Netherlands enterprises, whose domestic market is too small.

The relationship between large and small companies must also be considered in technology policy. This involves not only buyer/supplier relationships, but also promoting "comaker" relationships, which can increase technological opportunities for small companies. To that end, tools such as optimizing the use of grants, stimulating the practice of contracting out development work, and, in general, promoting cooperation between large and small companies may be very useful.

Another point involves the technological infrastructure, which is described by Van der Klugt as "fragmented." He advocates a "rigorous coordination and allocation of tasks," which would improve quality. Besides, allocating funds for tangible investments in this infrastructure is also worth considering.

According to Van der Klugt an adequate technology policy must include two more things: export financing as a useful means to increase competitiveness, and the creation of a homogeneous and challenging European market. He thinks that implementing the intentions expressed in the EEC white paper to create a single EEC market, and radically increasing the budgets for projects such as BRITE, ESPRIT, and RACE are good tools to create such a market.

25056/12859
CSO: 3698/A046

FRENCH MILITARY, CIVIL RESEARCH BUDGET FOR 1987 FINALIZED

Paris AFP SCIENCES in French 9 Oct 86 pp 1-3

[Text] In 1987, 80.2 billion francs will be devoted to a research and development budgetary outlay in France, making up a significant portion of the domestic R&D expenditure, which will reach 125 billion francs next year, or the equivalent of 2.43 percent of the Gross Domestic Product (GDP). These figures were announced 9 October by Mr Alan Devaquet, minister for research and higher education, and his colleagues.

These 80.2 billion francs do not include the impact and the cost of financial incentives, particularly the tax credit favoring research granted to businesses, the eventual recourse to loans, provided for in certain aeronautic and space programs, and does not include equity capital of public regional institutions.

The civilian research and development budget for technology will increase to 39.1 billion, and the 1987 budget of the research section of the Ministry for Research and Higher Education will be 21.040 billion, for an increase of 6.1 percent.

In passing it should be noted that the importance of military research expenditures, 30.8 billion francs, allocated not only to R&D operations, but also to tests which will be carried out under programs planned in appropriations of the General Delegation for Armaments, the Army Health Department, the Hydrographic and Oceanographic Departments of the Navy, Technical Departments of the Army, etc.

The total appropriations corresponding to the civilian R&D budgets was established at 39,085 million francs, as compared to 38,851 in 1986 after the Spring deficiency bill [collectif budgetaire de printemps]. The increase in this total (+0.6 percent in ordinary expense and program authorizations) is based on the following factors:

--the development and the methods of financing for aeronautic programs attached to the Ministry of Transport (budgetary subsidy fixed at 2,192 million as compared to 2,662 in 1986)

--the decisions to be made on new space policy programs, including financing, were not taken into account in the ceiling for CNES authorizations which, at

this stage have been fixed at 4,137 million francs for 1987 for previously committed programs and at 239 million francs for the specific purpose of the development of Ariane-V.

--the limit of 739 million francs for the equipment subsidy given to AEC by the Ministry of Industry

--the limitation of 500 million francs for the contributions to government subscriptions of equity capital to companies in the electronics sector (capital appropriation capital of 1,000 million francs in the 1986 PTT budget) and, finally

--the completion of the public planning operations for the la Villette installation (46 million francs in 1987 of the budget of common expenses, as compared to 172 million francs in 1986).

Within the framework of the budget of the research section of the ministry (21,040 million francs in 1987, as compared to 19,837 in 1986), two major measures have been taken:

--the creation of 527 research posts for young scientists (researchers, engineers, EPIC managers),

--the loss of 766 jobs in accordance with the goal of reduction in structures and staff was fixed to be at least 1.5 percent of the jobs. Note that for researchers, job losses were limited to 115.

On the whole, it was emphasized at the ministry, the 1987 budget proposal includes a net increase of 238 research jobs within public scientific and technical institutions. In addition, three hundred job transfers involving competition within organizations are planned; one hundred for researchers, and two hundred for engineers, technicians, and administrators.

	2 Montant en milliards de francs	3 Progression en %
4 DEPENSE NATIONALE DE RECHERCHE ET DEVELOPPEMENT (DNRD) -	6 environ 125,0 7 MdF	+ 6,8 %
5 Part de la DNRD/PIB en 1987	2,43 % 8 (2,39 % prévus en 1986)	
9 EFFORT BUDGETAIRE DE RECHERCHE ET DEVELOPPEMENT (EBRD)	80,2 MdF	+ 8,1 %
10 dont:		
11 - recherche universitaire (y compris les dépenses de personnels relatives aux enseignants-chercheurs	(8,7 MdF)	
12 - défense	(30,8 MdF)	15 (avant décisions ultérieures sur programmes duCNES
13 - P et T (y compris le CNET)	(10,8 MdF)	
14 - autres ministères (hors MRES)	(9,0 MdF)	
16 BUDGET CIVIL DE RECHERCHE ET DE DEVELOPPEMENT TECHNOLOGIQUE (BCRD)	39,1 MdF	+ 0,6 %
17 BUDGET 1987 DU MRES (section "recherche")	21,040 MdF	+ 6,1 %
18 dont : dotations des EPST (CNRS; INRA; INSERM; ORSTOM; INRETS; INED CEMAGREF)	13,611 MdF	+ 9,1 %

Key: Table I

1. National Research and Development outlay for 1987: principle key figures
2. Amount in millions of francs
3. Increase (percent)
4. NATIONAL RESEARCH AND DEVELOPMENT EXPENDITURE (DNRD)
5. Amount of the DNRD/GDP in 1987
6. Approximately
7. Billion francs
8. Planned for 1986
9. BUDGETARY OUTLAY FOR RESEARCH AND DEVELOPMENT (EBRD)
10. Including
11. - university research (including personnel expenditures concerning teachers-researcher)
12. - defense
13. - Posts and Telecommunications (including CNET)
14. -other ministries (excluding the Ministry of Research and Higher Education (MRES))
15. (before subsequent decisions on CNES programs)
16. CIVILIAN TECHNOLOGY RESEARCH AND DEVELOPMENT BUDGET (BCRD)
17. 1987 MRES BUDGET ("research" section)
18. Including: EPST appropriations (CNRS; INRA; INSERM; ORSTOM; INRETS; INED; CEMAGREF)

2 (en MF)

	LFR 1986	PLF 1987
3 Ministère de la recherche et de l'enseignement supérieur		
4 - section recherche	19 837	21 040 (+6,1%)
5 - section enseignement universitaire		
6- personnels	est. 7 008	est. 7 040
7- actions recherche (titre III)	216	218
8- équipement recherche	1 406	1 440
9 ANVAR	746	726
10 CEA		
11- dotations du ministère de l'industrie	3 864	3 761
12- contribution EDF	-	150
13 Equipements du CNES (ch.69-59)	4 210	4 376 *
14 Programmes aéronautiques civils	2 662	2 192
15 Développement de la filière électronique (hors dotations en capital)	2 380	2 543
16 Recherche en télécommunications		
17- personnel et fonctionnement	986	1 015
18- dépenses en capital (ch. 69-53)	2 848	2 833
19 Ministère de la défense (recherche, développement, essais)	est.25 780	est.30 750
20 CERN et autres dotations du ministère des affaires étrangères	770	696
21 Ministère de l'équipement, du logement, de l'aménagement du territoire et des transports (hors P.D.T.)	674	629
22 Autres dotations "recherche" des ministères	811	802
23 Total de l'effort budgétaire de R & D	74 198	80 211 (+8,1%)
24 p.m. - dotations en capital (fil.élect.)	(1 000)	(500)
25- crédit d'impôt recherche	(1 000)	est.(1100)
26- recours à l'emprunt	(705)	-
27- régions	est. (800)	est. (900)

28 * dotation non définitive (cf. décisions ultérieures relatives aux programmes nouveaux de la politique spatiale)

Key: Table II

1. Components of R&D outlay in France
2. In millions of francs
3. Ministry of Research and Higher Education
4. - research section
5. - university teaching section
6. - personnel
7. - research activities (Title III)
8. - research equipment
9. ANVAR - National Agency for the Implementation of Research
10. AEC (Atomic Energy Commission)
11. - appropriations by the Ministry of Ind.
12. - EDG (Electricite de France) contribution
13. CNES equipment (ch. 69-59)
14. Civil aeronautics programs
15. Development of the electronics sector
16. Telecommunications research
17. - personnel and operations
18. - capital expenditures (ch. 69-53)
19. Defense Ministry
20. CERN (Consiglio Europeo per le Richerche Nuclear: European Council for Nuclear Research) and other appropriation by the Ministry of Foreign Affairs
21. Ministry of Equipment, Housing, Territorial Planning and Transport (excluding PDT)*
22. Other ministerial "research" appropriations
23. Total R&D budgetary outlay
24. **p.m. - capital outlay (electronics sector)
25. - research tax credit
26. - recourse to loans
27. - regions
28. - *undefined appropriation (cf. subsequent decisions concerning new space policy programs)

*PDT: could not identify
**p.m.: could not identify

FRG OUTLINES SCOPE, MAIN EFFORTS OF RESEARCH POLICY

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[Excerpts] Goals and Priorities of Research and Technology Policy

With the 1984 federal report on research, the federal government not only made an interim evaluation of the new orientation of its research and technology policy, but also formulated its guidelines and principles in a comprehensive way. In it the government stresses the extraordinary significance of research and technology for:

--intellectual and cultural development, i.e., our knowledge, thinking, and understanding of the world, and especially for the increasingly important cultural, social, and commercial "orientative knowledge" as a prerequisite for the intellectual understanding and resolution of social problems;

--scientific-technical innovation as a prerequisite for life in a modern, export oriented economy;

--development of human life potentials (health, living conditions, working conditions, employment possibilities);

--environmentally tolerable and resource-preserving growth, and finally;

--the role of the Federal Republic of Germany as a partner in the world.

In its research and technology policy, the federal government emphasizes the following principles and guidelines:

--acknowledgment of the freedom of research; stimulation of private initiative and improvement of the basic conditions for science and research;

--a basic affirmation of technical change as a basis for growth and employment and for the resolution of urgent problems which in part arise from careless use of technology;

--recognition of performance and stimulation of superior performance in research, development, and innovation;

--supplementary use of public means in industry and trade, that is, in principle only where there is government responsibility and where private research and development in industry and commerce need to be subsidized due to overriding social or national economic reasons;

--trusting cooperation of science, industry and trade, and government without blurring the separation of responsibility; efficient coordination between the federal government and the federal states, and between the various federal departments;

--reinforcement of scientific institutions and subsidies in science, like the German Research Association, the Max Planck Society, the Fraunhofer Society, and the large-scale research institutions which are in the process of reorienting their tasks, also by reducing unnecessary bureaucracy;

--contributions to providing the next generation of qualified scientists;

--more stringent quality selection for subsidy; concentration of R&D capacities, especially through joint research;

--reinforcement of international scientific-technical cooperation.

The evaluation of problems, methodology, and orderly political incorporation of research and technology policy are determined by important new guidelines. The general goals continue to be valid, enjoy broad consensus from the political parties, and are also accepted by the federal states. The R&D policy of the federal government aims at:

--broadening and deepening of scientific knowledge;

--contributing to the preservation of resources and the environment as well as to humane living and working conditions; and

--increasing commercial performance and competitivity.

However, the emphasis on freedom and private initiative in R&D and innovation requires that responsibilities be well defined and consequences of technology be clarified and mastered.

As far as the problems of science and ethics and the autonomy of science are concerned, the 1984 federal report made it clear that:

--research must be protected from exaggerated fears, limitations, and liabilities;

--it is a responsibility of the state to start the clarification processes necessary for the definition of limits or conditions.

An important example of this is the creation of a working group, together with the minister of justice, to evaluate the requirement for legal regulation of the application of genetic engineering and reproduction biology to human beings (the "Benda Commission"). The report of the working group was presented at the end of 1985. Also, regarding the question of the consequences of modern technology on the development of the labor market, an information base for further research and for constructive dialog between science and the union and employers' representatives was established with a study which summarizes the available knowledge (the "Meta Study").

In order to promote autonomy and de-bureaucratization of research subsidies, the federal government has considerably increased the proportion of indirect and directly-specific measures in its research policy. While the ratio of indirect to direct measures for the subsidy of industry and trade was still 1:14.8 in 1976, measured in terms of financial volume, it had already improved to 1:2.8 in 1984.

Globally, the funds allocated by the federal government for indirect and indirectly-specific measures totaled approximately DM1.2 billion in 1985. The BMFT will continue this reorganization with further concentration of direct project subsidies on especially long-term and risky projects. After postponements caused by the EC approval procedures, even the measures regarding individual grants have been successful beyond all expectations. Small- and medium-sized companies, in particular, will therefore be able to conduct their own R&D. Together with increased subsidies for joint research and knowledge transfer, the technological basis of middle class economy will be improved and job opportunities for junior scientists and engineers will be created.

With its report entitled "Status and Prospects of the Large-Scale Research Institutions," the federal government presented in April 1984 a plan for the future of the large-scale research institutions (financed by the federal government and the host states at a ratio of 90:10). In this report the federal government recognized large-scale research as a cornerstone of research and technology policy. The autonomous role of large-scale research lies in its long-term complex R&D tasks which require high expenditures for financing, planning, and management. Large-scale research is, in principle, complementary to the other private and governmental research institutions in the FRG. Here also the dismantling of unnecessary, rigid bureaucratic regulations helps to make research subsidies more efficient. At present, the 13 large-scale research institutions employ a total of 20,400 people, including 5,000 scientists. Six GFE's (large-scale research institutions) work primarily on technology-oriented questions in areas such as energy technology, biotechnology, ocean technology, and aviation; two institutions focus on preventive activities with contributions to cancer research and research on the effects of harmful substances; five institutions conduct basic research with large-scale scientific equipment.

Several large-scale institutions are in a reorientation phase due to the completion of large technological projects, especially in the area of nuclear energy technology. New tasks, such as:

--clarification of the causes and effect of environmental pollution;

--microelectronics and information and communications technology;

--materials research (including findings from nuclear and aerospace research);

are now being tackled. The large-scale research institutions are therefore challenged to complete those R&D tasks which can now be handed over to the users or which the users can further develop by themselves.

With the implementation of new R&D priorities and with the construction of new large equipment for basic research, the large-scale research institutions are increasingly oriented toward user needs in the economic, scientific, and governmental realm. They are increasing their contributions to governmental programs. Depending on their orientation, they deal increasingly with:

--joint research;

--technology transfer, also through personnel exchange with industry and trade;

--aid for technology-oriented establishment of companies;

--offering services as well as contracted R&D.

Scientific Bases

Max Planck Society for the Promotion of Sciences

The Max Planck Society, (MPG) an independent scientific organization, operates a total of 60 research institutions in numerous locations working in a largely autonomous way. The MPG conducts basic research in the natural sciences and humanities. Priorities are in medicine and biology, physics and chemistry, and comparative law. Junior scientists receive grants in programs which have been expanded steadily. More than 10,000 employees are working in the MPG, including 4,000 scientists. The 1985 budget totaled DM1.024 billion, including DM966 million from the federal government and states.

Here are examples of the work done in 1985: Scientists of the MPG Clinical Research Group for Multiple Sclerosis in Wuerzburg developed a completely new picture of the immunity status of the central nervous system. At the Max Planck Institute for Neurological Research in Cologne, new fundamentals for brain damage therapy were discovered. Researchers of the Max Planck Institute for Biochemistry in Munich opened new paths for biophysics when they explained the structure of a purple bacterium which obtains energy from light like plants. At the Max Planck Institute for Biophysical Chemistry in Goettingen,

an important measuring system was developed for the ion currents transmitting nerve signals and other information in cell membranes.

Klaus von Klitzing at the Max Planck Institute for Solid-State Physics in Stuttgart received the Nobel Prize for physics for the discovery of the quantized Hall effect.

At the proposal of the BMFT, the federal government and the states adopted a special program to subsidize selected researchers and research groups. Starting in 1986, the German Research Association (DFG) will select 10 researchers or research groups which will receive up to DM3 million, distributed over 5 years. Through the special "top research" program, exceptional performances are being recognized and funds for largely free use for scientific purposes are being distributed.

The BMFT has again intensified university research in key areas: in 1985 about 1,900 projects were subsidized with DM373 million, 8.7 percent higher than the previous year.

Special Areas of Basic Research

Federal funds were granted in 1985 for a 3-year period for almost 300 research projects in universities and large-scale research institutions at home and abroad. With roughly DM260 million over the period from 1986 through 1988, universities will be able to finance not only investments for their experimental programs with large particle accelerators and neutron sources, but also temporary contracts for about 900 junior scientists, technicians, and engineers. The technical priority--with 30 percent of the subsidy--is in the area of condensed matter research with synchrotron irradiation and neutrons, followed by elementary particle physics (25 percent).

An agreement has been reached on the European level to jointly plan the construction of a new synchrotron radiation source (ESRF) in Grenoble. In addition to the FRG, France, and Great Britain, other European countries will probably participate in financing construction and operation of the installation.

A decision was made for the construction of a new accelerator installation for the Society for Heavy Ion Research in Darmstadt in 1985. The cost has been estimated at DM275 million. Construction will begin in 1986 and completion is scheduled for 1989.

Long-Term Government Programs

Space Research and Space Technology

In the further development of the space program passed on 14 July 1982, which also included FRG cooperation in the European Space Agency (ESA), the federal

cabinet decided on 16 January 1985 to cooperate substantially in two new large-scale programs within the ESA:

--the COLUMBUS program, which will yield an autonomous European contribution for a manned space station, and

--the ARIANE 5 program for the development of a new generation of European launch vehicles with a new propulsion unit (HM 60).

The two programs are closely connected and in the long term open up the option of autonomous European manned space flight.

The conference of the research ministers of ESA member countries from 30-31 January 1985 in Rome was an important milestone for European space flight. This conference decided to start preparations for the ARIANE 5 and COLUMBUS programs and to expand other ESA activities, especially the scientific program with a yearly growth rate of 5 percent until 1989. The goal is to ensure European autonomy and competitiveness in space in all areas until the end of this century and, therefore, to considerably increase the common expenditures within the framework of the ESA.

Three interrelated guidelines have been and will remain the leading fundamentals of the German space policy:

--intensive participation in joint European programs within the ESA;

--international cooperation beyond Europe, mainly (trans-Atlantic cooperation) with the United States;

--basic national scientific and technological activities.

The goal of the governmental support of astronautics in the FRG can likewise be summarized in three aspects:

--promotion of science and basic research;

--improvement of public services and infrastructures at the national and international level through application-oriented exploitation of space flight;

--increasing the performance and competitiveness of the industry.

Spacelab

After the conclusion of the SPACELAB-project and the successful test flight at the end of 1984, the first German mission D-1 took place from 30 October 1985 to 6 November 1985. The European spacelab was used for the first time under complete German responsibility. For the first time the execution of experiments was supervised by a control center outside the United States, that is by the DFVLR [German Research and Experimental Institute for Aeronautics

and Astronautics] payload control center in Oberpfaffenhofen near Munich. The next German SPACELAB mission D-2 is scheduled for the end of 1988.

It will be a continuation of the SPACELAB program and of the first retrievable EURECA space platform which will be launched in 1988 and then recovered by the space shuttle after 6 months' operation and brought back to earth. In doing this, Europe is already taking the first step in the preparation of space platforms which will be part of the overall system of a future space station.

Launch Vehicles and Applications Satellites

With the further development of ARIANE 1 through ARIANE 3, it was already possible to carry out two satellite launches in August and November 1984. This yielded significant savings as compared to launching a single satellite. Among others, both the European telecommunications satellite ECS 2 and the maritime satellite MARECS B2 were put into orbit this way. The development program for ARIANE 4 continued as scheduled.

For the European telecommunications administrations which jointly operate EUTELSAT, two ECS satellites are now available for PTT use. ECS 3 was lost in the fall of 1985 because of a failure in the launch vehicle. MARECS B2 was accepted by the International Maritime Satellite Organization (INTERMARSAT) for secure radio connections between ships and land stations through a leasing arrangement. Joint development of broadcast satellites was continued with France, and the German satellite TV-SAT will be launched in 1986. With satellite developments of this kind, European users are now able to meet their requirements with modern European systems. Since the successful ARIANE qualification, this even includes the launching of rockets.

The design and development of ERS 1, the first European microwave satellite for earth exploration, was continued under the leadership of a German company. Programs for the use of data in oceanography, meteorology, climate research, geophysics, geodesy, geology, agriculture, and forestry were collected by a German user committee.

Space Sciences

After 11 years of functional performance in space, the sun probe HELIOS made it possible to measure an entire solar cycle. NASA's Jupiter probe GALILEO, developed with German cooperation, is now ready for launch. The development phase of the x-ray satellite ROSAT, which for the first time would allow comprehensive charting of x-ray stars, was concluded in 1985. Launch of the project, developed in cooperation with the United States and Great Britain, is planned for 1988. The ESA comet probe GIOTTO was launched on 2 July 1985 and flew by Halley's comet in March 1986; German scientists are deeply involved in this mission.

Economy Related Technology Subsidies, Key Technologies

Information Technology

In the spring of 1984, the federal government approved and published the announced plan for the promotion of the development of microelectronics and information and communications technologies (government report on information technology). It documented in this plan its evaluation of the technological level reached, development trends, and the economic and social chances and risks connected with them.

Its measures are interdepartmental and combine microelectronics, information processing, and technical communications in an overall plan.

Information Processing

The measures concerning computer-aided design (CAD) for computers and software, new computer structures, knowledge processing, and pattern recognition (image and voice processing) announced in the government report on information technology have entered the main phase for joint projects. In a series of short-term projects, the goals and tasks for the projects were previously specified (the definition phase). Several industrial partners and scientific institutions are cooperating in all projects.

Technical Communications

Technical communications have gained a surprising significance for economic and social development. The basis for the subsidy in this area are both the "Information Technology" program and government report.

The promotion priorities are basic optical telecommunications and integrated optics technologies as well as new system solutions based on these technologies. This is supposed to promote mastery of these key technologies and development of innovations in the area of modern communications systems both in the business and private sectors. A fundamental goal here is the reinforcement of export capabilities of the communications industry. The promotion priorities are in:

--optical telecommunications technology;

--integrated optics (optoelectronics, optical signal processing);

--system technologies (high resolution TV, video technology);

--data communications (German research network).

Applications in Microelectronics; Microperipherals

Joint projects concerning structures smaller than 1 micron have been continued. German-Netherlands project for the development of a 4-MByte memory

has been agreed upon. The priority on "development technologies for integrated circuits" has been further developed with the cooperation of universities, research centers, and industry.

A substantial bottleneck for the broad application of microelectronics in the area of investments is the lack of a broad supply of intelligent sensors and actuators compatible with microelectronics. Therefore, the federal government has strengthened--as announced in the government report "Information Technology"--aid for research projects in the sensor and actuator area under the promotion priority of "microperipherals." For the years 1985-1989, DM400 million have been allocated for this purpose. The goals are:

--broad support for the development of modern microelectronic-compatible sensors with integrated, intelligent signal processing;

--creation of an internationally competitive base of expertise in the most important areas of technology for future microperipheral components, and;

--improvement of technology transfer between research institutions and small- and medium-sized companies.

Biotechnology

In the promotion of key technologies, biotechnology is assuming a constant, fixed place. In view of the importance of this field, but directed at the still limited research staff capacity in the FRG, funds for biological research and technology in the 1985 BMFT budget rose by 15 percent to DM134 million compared to 1984.

The federal government approved the "Applied Biology and Biotechnology" subsidy program for the period up to 1989 on 10 July 1985. It contains the discipline-oriented subsidy priorities of the BMFT which were defined in close coordination with other departments, especially with the Federal Ministry for Food, Agriculture, and Forestry. The federal government is planned to allocate a total of about DM1 billion for biotechnology research in the FRG for the period up to 1989.

The range of measures for this program contains, among other things: Institution subsidies and the subsidy of central priority projects: as a national center for biotechnological research, the Society for Biotechnological Research (GBF) is being further expanded in the form of an institutionally subsidized large-scale research institution. The activity of GFB must be consistently strengthened by additional personnel and expansion of its infrastructure.

The long-term subsidy in the area of genetic engineering for the genetic research centers of Cologne, Heidelberg, and Munich supports research work in the three main themes (gene structure, gene function, and gene regulation) of the present genetic and genetic engineering research.

Similarly to the three genetic research centers, two main centers for basic research in bio-processing technology are planned. The planning phase for the two projects is not yet completed. However, one is already being implemented as a result of an agreement among the universities of Hanover, Braunschweig, and Goettingen, with GBF participation.

Support of theme-oriented joint research and, to a limited extent, other project subsidies, as well as, increasingly, indirect subsidies contribute further to improved utilization of the broad possibilities for the application of biotechnology. The planned program for the support of the biotechnological industry, especially of small- and medium-sized companies (KMU), which is going to be considerably simplified from the administrative point of view, will help in the introduction of modern methods of biotechnological production and reduce the risks of the initial application of these technologies. Product developments in different areas of biotechnology are being subsidized, such as in cell culture technology, genetic technology, processes with cells and biological plant protection, enzyme technological processes for medical and food applications, as well as development of the pertinent equipment and bioreactors.

The model experiment, subsidized by the federal government since 1983 for the establishment of technology-oriented companies (TOU) has already been expanded with the new priority for selected sectors of biotechnology (without regional limits).

Several measures are improving the possibilities for interdisciplinary education and continued education of the next generation of scientists through qualified research activities both at home and abroad. The subsidy includes research grants within the framework of scientific cooperation with foreign research institutes (funds are being made available temporarily by the German Academic Exchange Service) and the granting of research subsidies from the Funds for Biochemistry, financed jointly by the BMFT (40 percent) and the Federation of the Chemical Industries (60 percent). In order to meet the need for qualified biotechnologists trained in microbiological processing technology, the plan is to offer graduates in scientific disciplines such as biology, chemistry, or process technology the opportunity for further qualification within a special program.

The work team appointed by the BMFT together with the federal minister of justice, and chaired by Prof Dr Ernst Benda presented a comprehensive final report on questions of ethical and legal problems regarding the application of cell biology and genetic technological methods to human beings on 25 November 1985.

A proposal for revision of the present fourth version of the genetic guidelines was presented to the federal government by the Central Commission for Biological Safety (ZKBS). The federal government plans to conclude the revision of these guidelines in 1986.

Materials Research

The materials research program of the BMFT with its five priorities:

--structural ceramics,

--powder metallurgy,

--new polymers,

--composite materials,

--metallic high temperature materials,

was published in October 1985 and was fully under way by the end of 1985. Over a 10-year period, DM1.1 billion will be provided for subsidy measures. The program should especially contribute to linking effective basic research with its industrial utilization. In the coming decades, new materials will radically change the image of our industrialized world. Those materials selected for this program after extensive discussions with well known experts will, according to the present status of the discussion, play a decisive role. They will greatly facilitate development of new technical products and, therefore, will also contribute to safeguarding the economic future of our country.

The special program was started in 1978 and aimed both at improved efficiency and competitiveness in the area of iron and steel metallurgy and the development and processing of materials. Industry, universities, and other independent research institutions have been subsidized with DM521 million since 1978. The very successful program was concluded at the end of 1985.

The joint projects in the area of corrosion, friction, and wear concentrated on questions regarding the use of materials and stress on materials under excessive strain, especially for the manufacture of equipment and plants and for energy and off-shore technology. The compilation of technical rules and standards for corrosion- and tribology-susceptible constructions and for materials selection resulted in a fast distribution and utilization of the results obtained. A consulting office for innovation in tribology was created for the expansion and acceleration of technology transfer. An inventory of the previous subsidy measures was made with cooperation of experts from science and industry, and a guideline for future subsidy priorities was published.

The development of methods and installations for the processing of low-grade and complex ores is being conducted in cooperation with developing countries, but also serves for the utilization of secondary raw materials in our own country such as mine tailings, tailings ponds, slurries, and dusts. New metallurgical processes are based on the use of low-grade raw materials, taking environmental impact and reduced energy consumption into consideration. They all contribute to assuring the productivity and competitiveness of the

FRG in an internationally contested marketplace with strong competitive distortions.

Manufacturing Technology

The 1984-1987 manufacturing technology program was launched on 1 January 1984 and is endowed with a total of DM610 million. Industry and research accepted it very positively.

After a period of 2 years, the following must be stated regarding the three components of the program:

The possibilities of indirectly-specific subsidy for developmental work in the production technology industry have been used extensively for their own operation use of computer-aided systems both for design and manufacture, and for the development of manufacturing robots and handling systems. Due to the unexpectedly great interest of industry, the available funds were increased in April 1984 from DM350 million to DM450 million. The appropriation phase for this portion of the program ended in July 1985.

With the available subsidy funds, 1,425 projects have been subsidized in 1,327 production technology companies, that is, 1,285 projects with approximately DM369 million for CAD/CAM applications and 140 projects with about DM72 million for the development of industrial robots.

The subsidized companies are almost exclusively of small and medium size (more than 90 percent of the projects are conducted in companies with annual turnover of less than DM200 million).

The joint projects are supposed to jointly solve inter-company, future oriented questions (characterized by especially high developmental risk and high costs) in cooperation with tasks divided between companies and research institutions.

The priorities of the present joint projects are:

--modern handling technology (robot technology for the 1990's);

--assembly technology;

--flexible manufacturing;

--safeguarding of the manufacturing process;

--key technologies for manufacture;

by the end of 1985, 13 joint projects with subsidies of about DM85 million (1984-1988) had been approved for 25 research institutions and 74 industrial enterprises. The industrial enterprises bear at least 50 percent of their own expenses.

The activities for technology transfer and for assessment of technological results concentrate, above all, on the work of the CAD/CAM laboratory in Karlsruhe, on research on the effects of modern manufacturing techniques, and on the analysis of the efficiency of the indirect-specific subsidy measures of the program.

The activities triggered by this program underline the great willingness to innovate in the middle-class manufacturing industry.

Physical Technologies and Chemical Processing Technology

In the "Physical Technologies" subsidy area it is important at an early stage to recognize and evaluate new approaches of technology in natural science research, to bring them to the level of technical/commercial decisionmaking and maybe to start broad dissemination. The present priorities are laser technology, surface- and microstructure technology, low-temperature- and plasma technology, as well as electronic image technology.

Two particularly future-oriented areas are being subsidized in chemical processing technology:

Catalysts not only have a great economic significance for the chemical industry--approximately 75 percent of all chemicals are being produced catalytically; 90 percent of all new large-scale installations work with catalytic processes--but they also play an important role in petroleum processing and, increasingly, in pollution control. Therefore, catalysis research--that is, the entire area of new and continued development of catalysts, including optimal manufacture of catalysts, explanation of reaction mechanisms and of the best process engineering for design of reactor containers--is being conducted intensively worldwide. Subsidies are preferably granted to joint projects with an interdisciplinary structure.

Membrane processes must be included among the key technologies of the next decade because they are non-polluting and economical. Important innovations in the area of chemical technology, biotechnology, environmental technology, as well as in oil and natural gas production, depend on the use of new or improved membranes and membrane processes, not to mention the medical field with developments like artificial kidneys and other artificial organs. While a few conventional processes are already available in "ready-made" form, other processes with especially high development potential, such as gas separation, pervaporation, and liquid membrane technology, are still in the research phase. Here, the subsidizing of joint projects is supposed to especially improve the cooperation of basic research with more application-oriented industrial research.

Aviation Research and Development

The continuation of the federal government's third general program for 1986-1989 on aviation research and technology was largely finalized.

The subsidy concentrates on the following priorities:

--wing technology and CFK [synthetic fiber reinforced plastic] construction methods for large passenger aircraft;

--technologies for general aviation aircraft;

--helicopter technology;

--engine technology (low-pressure chamber, propfan);

--avionics.

Along with the FRG, France, Great Britain, and the Netherlands also participate in the European ETW supersonic wind tunnel. It is being constructed in Cologne-Porz near the German Research and Experimental Institute for Aeronautics and Astronautics. The preliminary design work for this project has been completed. The cost of construction is estimated at DM500 million (1985). The 2-year main design phase began in September 1985; construction is planned to start at the end of 1987.

Basic Conditions, Infrastructure

Fraunhofer Society for the Promotion of Applied Research

The Fraunhofer Society (FhG) conducts applied research and development in the fields of natural sciences and engineering. Priority tasks are in microelectronics, automation of manufacturing, materials technology, manufacturing technology, and process technology, as well as in environmental research. The Society's budget was DM400 million in 1985 and it employed 3,000 people, one-third of whom are scientists, in 34 research institutions located at numerous sites. Seven additional facilities are being built, and a scientific working group for integrated circuits has been created in Erlangen.

In the area of contracted research, which had a volume of DM280 million, the FhG intends both to improve the capabilities of German trade and industry and to carry out government projects. It transfers research results directly into practical applications. Sixty-two percent of its expenses were met by income, the rest by basic public financing, depending on the results obtained. Income from trade and industrial associations reached DM68 million. The FhG plans diversified further growth in accordance with market demands.

Examples of 1985 research results are: The Fraunhofer Institute for Information and Data Processing in Karlsruhe developed an information system for control and regulation of complex industrial installations which combines several techniques with future potential and can be used, for example, in chemical, automobile, or electrical power plants. The Fraunhofer Department for Microstructure Technology in Berlin is developing x-ray masks with the help of electron-beam writing machines in order to achieve increasingly higher

miniaturization. The Fraunhofer Institute for Operational Stability in Darmstadt has developed methods to predict the long-term behavior of fiber composites in aircraft, which are supposed to achieve considerable weight savings. The Fraunhofer Institute for Wood Research in Braunschweig has developed a wood-gypsum particle board which does not emit formaldehyde and at the same time is more fireproof and cheaper than the type used at present. The Fraunhofer Institute for Silicate Research in Wuerzburg has developed efficient protection layers for medieval churches using [Ormosilen].

Indirect Subsidy of R&D Personnel in Trade and Industry

To supplement and expand the indirect R&D subsidy helpful to the middle class, a common plan for R&D subsidy in trade and industry with particular reference to personnel was developed (1985-1988) together with the federal minister of economics. The subsidy is being continued through grants to cover personnel costs and expanded through a "growth subsidy for research personnel" for industries involved in production (including companies engaged in the breeding of useful agricultural plants), which is financed out of the BMFT budget. In this way young natural scientists, in particular, but also technicians are given a chance to work in their profession and at the same time to build up the scientific capacities that will be decisive for international competition in the 1990's.

The "growth subsidy" is meant to subsidize primarily small- and medium-sized personnel-intensive research companies that expand their research personnel with new positions between 1 September 1984 and 31 December 1987.

The subsidy applies to companies with less than DM200 million turnover and with fewer than 1,000 employees. It includes:

--55 percent of gross taxable wages and salaries for 15 months from the time of new employment for firms with fewer than 500 employees;

--45 percent of gross taxable wages and salaries for 12 months from the time of new employment for firms with 500 employees or more.

Improvement of Transfer of Technology and of Knowledge

The international competitiveness of German trade and industry depends not only on the quality and scope of R&D activities, but also increasingly on the fact that new technologies and technical improvements be marketed quickly and on a broad scale. Therefore, to reinforce the innovative power of small- and medium-sized companies, the following steps have been taken:

The BMFT has subsidized 14 pilot projects for advising small- and medium-sized enterprises since 1977. The goal of facilitating a long-term commitment of suitable counseling bodies to this sort of service has now been largely reached. It was therefore possible to reduce the subsidy to four third-generation projects in 1986 with a total subsidy of DM4 million.

In February 1984 the program existing since 1978 for the subsidy of companies which contracted R&D out to third parties was expanded considerably. In particular, the following improvements were introduced for small enterprises:

--the subsidy percentage of 30 percent was raised to 40 percent for companies with annual turnover of up to DM50 million;

--subsidizable contracts now also include--to a limited extent--those which involve the design or planning phase during development of a product or process.

An increase in subsidy funds of over 90 percent is planned for 1985 compared to 1984.

Technology-Oriented Foundation of Companies

In the summer of 1983, the federal government launched a model program to subsidize technology-oriented new and young companies through several tailored subsidy measures, to gain experience with these measures, and to stimulate private venture capital offerings for this group of companies.

As of 31 December 1985, 268 foundation projects have been subsidized in the various phases of the model program. In all, DM87.3 million were made available.

Professional Information

The 1985-1988 professional information program, developed under the leadership of the BMFT, was approved by the cabinet on 25 June 1985 following a vote of all concerned parties. The goals of the new professional information policy are:

--to increase and improve the supply of German professional information and its utilization, so that German suppliers of professional information may strengthen their international standing;

--to assure reciprocal access to professional information within the framework of international data traffic and to avoid unilateral dependency and vulnerability through the creation of interdependency;

--to promote international cooperation for the creation, availability, and utilization of databases and the development of a worldwide information network.

By improving the basic conditions in the professional information market, the program wants to encourage private initiative; government aid will be available only in the form of subsidies and will strictly avoid interference with competition.

The main activities in 1985 were:

--further expansion of STN-International network; inclusion of an additional cooperative partner in Japan (JAICI, JICST);

--establishment of a patent database and public availability through private carriers;

--expansion of the availability of technical-scientific databases (for example, the Beilstein database, the chemical reactions database);

--start of the second phase of the European translation system EUROTRA (software development) for the eight European official languages;

--development of reorganization plan for the Society for Information and Documentation (GID) with the goal of partial privatization.

International Cooperation

Europe and Western Industrialized Countries

EUREKA is a new project for intensified technological cooperation in Europe. It was created by a German-French initiative and was established in Paris on 17 July 1985 during a conference of ministers from 17 states and members of the European Community Commission. In a declaration of principles, the second EUREKA ministers conference in Hannover on 5 and 6 November set forth EUREKA's project goals, priorities, and criteria, as well as its origins and organization. The 12 member states and the EC Commission, as well as Finland, Norway, Austria, Sweden, Switzerland, and Turkey, are participating in EUREKA. It is EUREKA's goal to improve Europe's competitiveness on the world market in the high tech area through intensified cooperation of companies and research institutions. EUREKA projects are supposed to be directed toward development of products, processes, and services with worldwide market potential. They currently apply to the following high tech areas:

Information and communications technology, robotics, materials, processing technology, biotechnology, oceanology, laser technology, and technologies for environmental protection and transportation. Also included are high tech projects which create the technical basis for a modern infrastructure or are aimed at the solution of international problems.

The European Community gave itself a legal foundation for its research and technology policy with the unified European act in Luxembourg in 1985. Since 1974--in some areas, for a longer period--the community has carried out research and development programs with which it defines the tasks of the joint research center GFS and within whose framework the subsidy of R&D projects and demonstration projects in companies, research institutions, and universities is planned. The expansion of the European Community treaty was necessary because the Community previously could base its actions only on article 235 of the EEC treaty when it extended its activity gradually to economically

significant research areas (energy, environment, raw materials and materials, information technology) and when, in 1983, with its first research programs, it created a still imperfect instrument for comprehensive medium-term planning.

The new section of the agreement on "research and technological development" is supposed to facilitate the development of a "technology community" as an important element for a homogeneous internal economic area (domestic market) of the Community. It is supposed to improve the freedom of action of Community organs by specifying their authority, expanding and refining their instruments, and accelerating their procedures, and to assure the European Parliament extended cooperation rights.

Even before the signing of the unified European act, the council came to an agreement on 10 December 1985, with a provision subject to the decision of the European parliament, regarding the content and the financial endowment of R&D programs in the areas of the environment (environmental protection, climatology, and natural risks, as well as larger technological risks), and materials (primary raw materials, secondary raw materials, wood as a renewable raw material, and modern materials).

In Rome in January 1985 the ESA council decided at ministerial level on a long-term space program with the following significant elements:

--5 percent annual increase of the science budget until 1989;

--preparation through the European space program "COLUMBUS" for participation in the international space station at the invitation of the U.S. President;

--preparation for further development of the European launch vehicle system (ARIANE 5).

The two preparatory programs "COLUMBUS" and "ARIANE 5" have been advanced on schedule, and government discussions have started regarding a continuation of the cooperation with the United States for the space station beyond the preparatory phase.

In the European Organization for Astronomy Research in the Southern Hemisphere with headquarters in Garching the construction of a large-scale telescope with new technology has been advanced on schedule; parts of it have already been transported to the ESO observatory in Chile. The preparatory work for a 16-m-diameter telescope ("Very Large Telescope") have been intensified in order to reach a decision regarding its construction, possibly by the end of 1987.

The European Nuclear Research Center CERN in Geneva has been joined by Portugal as 14th member state.

Two multilateral European large-scale projects were further advanced in 1985. The FRG, France, Great Britain, and the Netherlands are participating in the

European supersonic wind tunnel (ETW), in Cologne-Porz. Also, the FRG, France, Great Britain, Italy, Spain, (and probably other countries) are participating in the European synchrotron radiation source (ESRF).

The significance of international cooperation in research and technology was again underlined during the 1985 world economic summit in Bonn. At the request of the 1985 economic summit, the technology, economic growth, and employment working group concluded by the end of the year its examination of the work performed in the 18 areas of international cooperation selected during the 1983 summit in Williamsburg. The pertinent report is presented in 1986 at the economic summit in Tokyo.

The 1985 economic summit also requested the environmental experts of the technology, economic growth, and employment working group to consult with the competent international boards on the most efficient possibilities for progress in the area of improved and internationally coordinated environmental measuring techniques. Proposals for this are also presented at the 1986 economic summit.

The federal government complements the extensive scientific-technical cooperation within the framework of international organizations and research institutions with intensive bilateral contacts and joint projects with most Western industrialized countries. This is especially true for neighboring European states, where cooperation with France plays a predominant role.

The excellent and close cooperation with the United States in areas such as energy research, space research and technology, medicine, and advanced transportation systems was continued successfully in 1985. It found its culmination in the successful D1 mission, when the SPACELAB, which was developed through European cooperation, flew with the American space shuttle, and control of the scientific tasks under German responsibility was for the first time conducted from a facility outside the United States, the German ground control center.

Worldwide Cooperation

The activities of the International Atomic Energy Agency (IAEA) in Vienna were especially honored in the final document of the third oversight conference (Geneva 1985) on the Treaty for Nonproliferation of Nuclear Weapons. It particularly emphasized the key function of IAEA security measures for prevention of the proliferation of nuclear weapons and the support of Third World countries in their efforts for peaceful utilization of nuclear energy.

The increase in membership in the Antarctic treaty to 18 consultative countries and to 14 additional states has further reinforced its significance as a basis for international research cooperation in the Antarctic.

Together with the United Nations Center for Science and Technology at the Service of Progress (CSTO), the German Endowment for International Development (DSE) conducted a seminar at the end of 1985 in Berlin on the

possibilities for cooperation in the assessment of the results of technology for developing countries. The focus was on the benefit for developing countries of experience with new technologies and of knowledge from industrialized countries, especially in the areas of biotechnology, microelectronics, information technology, and materials sciences. In cooperation with the United Nations Environmental Program (UNEP), the BMFT organized an October 1985 international symposium in Karlsruhe on low-emission (nonpolluting) manufacturing technologies which conserve raw materials.

Bilateral Cooperation With the Third World

Multifaceted cooperation with a relatively large number of developing countries which have the necessary scientific-technical infrastructure, especially Egypt, Argentina, Brazil, China, India, Indonesia, Kuwait, Mexico, Saudi Arabia, and Venezuela, has been advanced in several partner countries despite growing financial difficulties. The principles and technical priorities of cooperation were presented to the public in September 1985 in the plan "New Technology for the Third World." The R&D cooperation concentrates on environmental protection, energy, water supply, and oceanology, as well as on space research and technology.

A follow-up project to the successfully completed "Solar Village Indonesia" project for renewable energies was started with Indonesia. Cooperation for the creation of a utilization program for the MPR-30 research reactor, whose construction proceeded according to the plan with German-Indonesian cooperation, was intensified.

Discussions are under way with the Republic of Korea for the conclusion of a government agreement for scientific-technological cooperation, and for cooperation in the peaceful utilization of nuclear energy.

Cooperation with the People's Republic of China was considerably expanded on the basis of the agreements reached in 1984 in the area of civil space research and technology, and the peaceful utilization of nuclear energy was also extended to these areas. New areas of cooperation were agreed upon for tertiary petroleum recovery, protein production and biotechnology, ocean and environmental research, and information technology, as well as the use of nuclear energy for heating cities.

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BRIEFS

PHILIPS ESPRIT PARTICIPATION--Amsterdam--"ESPRIT [European Strategic Program for R&D in Information Technology] has given rise to substantial new research efforts. The projects are making progress within the selected partnerships. There are few setbacks and the return on investment appears to be quite satisfactory." Such are the conclusions of Dr P. Kramer, international research coordinator of Philips International, at the opening of the [Netherlands] Efficiency Fair. Philips is now participating in more than 30 projects of the ESPRIT program, which started 3 years ago. In all some 140 people are involved, equivalent to roughly 620 man-years of work, while the projects in which Philips participates account for 2,300 man-years of European research. This makes the Netherlands multinational company the biggest participant in the project. The major problem in participating in the project involves the loss of autonomy due to dependence on other participants. These are other European companies or research institutes that may or may not be linked to a university. Also, the participants' travel costs time and money. These disadvantages, however, are counterbalanced by faster and more efficient progress of the project. Hence, both Philips researchers and management are enthusiastic. ESPRIT II, the program's second phase, is currently being prepared. Philips welcomes this, though it warns that joint research which is too market-oriented may influence competition between companies. Moreover, Philips does not want political forces in major European countries to have a greater role in Europe's industrial system than that of technical and commercial competition. [Text] [Amsterdam COMPUTERWORLD in Dutch 7 Oct 86 p 1] 25055/12859

CSO: 3698/A040

AUSTRIA TO TIGHTEN TECHNOLOGY EXPORT

Stockholm NY TEKNIK in Swedish 20 Nov 86 p 6

[Article by Mikael Holmstrom]

[Text] Austria is now being forced once again to tighten its regulations on high-tech exports. The tougher regulations apply to high technology passing through the country as transit goods at Austrian airports. The tougher regulations are a result of demands by the United States and the other NATO countries.

Since Sweden and Switzerland recently clamped down, Austria had to follow suit.

In December 1984 Austria was the first neutral country that gave in to the diplomatic offensive carried out by the United States and its allies. The goal is to make the neutral and nonaligned countries join in the construction of the "technology wall" that will prevent the illicit flow of high technology from West to East.

But the Austrian export controls only cover the import and export of high technology, not the transit trade in which goods are simply redirected at the country's airports, without leaving the customs area.

This year Switzerland and Sweden introduced export control regulations for transit traffic. These regulations took effect on 1 June in Sweden. This and a number of "affairs" in which Austria served as a junction for smuggling have now made Austria promise a crackdown.

Since the Austrian parliament is not now in session, it is impossible to say when the tougher new Austrian regulations will take effect, since they must first be approved by parliament.

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CSO: 3698/146

SWEDEN OFF HIGH TECH RISK LIST, CONTROLS AFFECT FIRMS

Sweden Politically Cleared

Stockholm NY TEKNIK in Swedish 20 Nov 86 p 6

[Article by Mikael Holmstrom]

[Text] The United States government has finally removed Sweden from its risk list of possible smuggler nations.

A high-ranking source at the United States Defense Department, the Pentagon, told this to NY TEKNIK.

This means that Swedish companies will be able to import advanced high technology from the United States more easily and quickly.

Even earlier, high-ranking politicians in the Reagan administration indicated that Sweden would be removed from the list (see NY TEKNIK, 1986:31). The reason for the change in the American view is that Sweden has introduced its own export controls for high technology. The regulations took effect on 1 June this year.

As recently as 2 weeks ago, however, a Swedish delegation under the leadership of Undersecretary of State Carl-Johan Aberg, while on a visit to Washington, was given no indication as to when Sweden would be removed from the list.

Now officials at the Defense Department, the Pentagon, have told NY TEKNIK that the list had actually been changed.

"We at the Defense Department proposed this change long ago, but now it has finally been accepted by the State Department and the Commerce Department."

The change, which occurred "recently," means that it will be both quicker and easier for Swedish companies to import advanced high technology to Sweden than it has been in recent years.

The list of "risky countries," where technology smuggling occurs, includes 15 countries. The list is actually secret, but it is known that Sweden was placed on the list in March 1984, after the container affair.

For Swedish companies, this has meant that the American Commerce Department has been unable, on its own, to grant permits for the export of technology to Sweden. Certain export applications have been detoured through the Pentagon, where they have been subjected to additional examination.

This examination is made by the Pentagon's export control division, DTSA, which has become more and more powerful in Washington in recent years (see NY TEKNIK, 1986:13). For the companies, this has meant that the already long waiting periods for export permits have become even longer. In addition, in certain cases, they have been forced to answer additional questions.

As recently as the summer of 1985, neutral Finland and Austria were also on the Pentagon's list. It is not known whether or not these countries remain on the list.

Firms Still Experience Delays

Stockholm NY TEKNIK in Swedish 27 Nov 86 p 2

[Article by Mikael Holmstrom]

[Text] Last week's news that the United States government had removed Sweden from the Pentagon's list of smuggler countries is primarily of political significance.

For the companies, this means that an additional control has been removed. But Swedish firms are still at a disadvantage, compared to their most important competitors in other countries.

The news in last week's NY TEKNIK that Sweden had been removed from the list of "smuggler countries" was a result of the fact that we introduced our own export controls as of 1 June this year. An American politician had already made this clear in NY TEKNIK (NY TEKNIK, 1986:31).

As before, Swedish politicians do not wish to comment on the changes that have been made within the United States administration. But Undersecretary of State Carl Johan Aberg of the Foreign Ministry's Trade Section said, in general terms:

"By far the most important aspect is that Swedish companies, in general, will now receive the same treatment as their competitors in Western Europe and Japan."

The Stockholm Chamber of Commerce, on the other hand, believes that Swedish companies are still far from receiving the same treatment as their competitors in the Western countries. West Germany, England, Norway, and the other NATO countries as well as Japan belong to COCOM. The COCOM countries coordinate their export controls with those of the United States and, thus, they are favored.

"We are not yet on the same level as COCOM. There are still many differences in effect."

Normal State

It could be said that while, in the past, we received special treatment, we have now reached a normal state, according to Torbjorn Spector, export control expert at the Stockholm Chamber of Commerce.

"The COCOM countries, on the other hand, enjoy a favored status that we have not yet reached. The great advantage is that their export permits are handled more quickly," Torbjorn Spector said.

The removal of Sweden from the Pentagon's list means that an extra American control has been eliminated. As a result, some Swedish applications will be handled faster and companies will not be subjected to additional questions from the Pentagon.

For Sweden as a nation, removal from the list means that the Pentagon may lose some of its interest in Swedish trade. Most importantly, we will no longer be "marked" as a smuggler country.

Problems Remain

But problems remain for Swedish companies that use American technology--even small components. Sweden remains one of the Western countries that are most closely regulated by the United States.

This means closer examination and longer review times in Washington. The uncertainty and delays make it difficult for companies that are involved in tough competition on the international market. Several examples follow:

Export licenses are required for the export of both "intermediate technology" and genuine high technology from the United States to Sweden. The export of "intermediate technology" from the United States to the COCOM countries, on the other hand, is unrestricted (this is called G-Com).

There are also differences in cases requiring licenses for exports from the United States to the COCOM countries. Exports to the COCOM countries are automatically approved after 15 working days, unless the United States Commerce Department decides otherwise within that period of time. Swedish companies, on the other hand, must wait until a license is issued. Waiting times of 2 months are not uncommon.

There are also differences among favored companies that need not seek export permits in each individual case. There are stricter requirements for non-COCOM countries that wish to obtain such a permit--a distribution license. In addition, a Swedish company must specifically point out to all its customers that the goods are controlled by the United States. This does not apply to companies in COCOM countries and Swedish firms see it as objectionable discrimination.

Exports to Eastern countries and China are also more difficult for Swedish companies. Such business deals must be approved by COCOM in Paris. Since

Sweden is not a member of COCOM, such applications must be sent to the United States which, after its own examination, presents these cases to COCOM in Paris. Here, every country has the right to veto the export permit. There have been many cases in which discrimination against Swedish industry has been suspected.

"It is a disadvantage for Sweden not to be a member of COCOM. Obviously, each country will do what is best for itself," a COCOM insider told NY TEKNIK.

In addition, from a purely legal standpoint, Swedish companies have their hands tied more than other countries by the American export regulations.

These tougher conditions for trade with United States technology are, so to speak, the price industry must pay for Sweden's nonalliance. The big difference is that the COCOM countries have introduced export controls for their own domestic technology--a step that Sweden has not taken, due to foreign policy considerations.

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BELGIAN-RUSSIAN BIOTECH COOPERATION, JOINT VENTURES TAKING SHAPE

Groot-Bijgaarden DE STANDAARD in Dutch 22 Oct 86 p 13

[Article by DE STANDAARD correspondent in Moscow, signed P. C.: "Flemish-Soviet Biotech Cooperation Taking Shape"]

[Excerpt] Yesterday morning a Flemish delegation led by Mr Geens, President of the Flemish Regional Government, and Mr Vanden Avenne, chairman of the Flemish Economic Association [VEV], returned from a 5-day visit to the Soviet Union. They signed several cooperation agreements, of which the most concrete one is related to biotechnology. The Soviet Union also confirmed its participation in the Flanders Technology International fair, which takes place in Ghent next May.

Prof Dr M. Zabeau, business development manager of Plant Genetic Systems, concluded an agreement in Moscow on behalf of the Flemish Government. It comprises various forms of cooperation for the 1987-1988 period: two feasibility studies will be carried out, one for research on a potato disease and the other on the development of a cotton plant with a shorter ripening time. Researchers will also be exchanged and seminars organized.

On Friday, VEV Chairman Vanden Avenne signed a cooperation agreement with the Moscow Chamber of Commerce and Industry. On Monday, Minister Geens received a list with proposals for cooperation on advanced materials, automation, and robotics from the vice president of the Soviet State Committee for Science and Technology (GKNT). The VEV will examine these proposals.

The director-general of Soyuz-Patent (the institution that manages both Soviet and foreign patents) notified Minister Geens of the Soviet Union's participation in the next Flanders Technology International (FTI) fair. The Soviets will occupy a 100 square meter stand, twice as large as the one in 1985.

Joint Ventures

The Soviet Union will also organize a seminar about its projected joint ventures during the FTI fair. Joint ventures, a new proposal on the economic scene, constitute the major topic of discussion in Moscow nowadays, but nobody, not even the Soviets, knows exactly what they will look like in practice. The only certainty is that 51 percent of the joint venture's capital must be in Soviet hands, the rest will be held by a foreign partner. By next spring things should be clearer.

Geens was also promised participation by Soviet scientists in FTI seminars. The subjects will be known by year-end.

Furthermore, Flanders Technology International '87 will be visited by a delegation from Leningrad. According to Minister Geens this may result in an exhibition in Leningrad about technologies in which local authorities are particularly interested (ecology, automation, and robotics).

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USSR-NETHERLANDS COMPUTER INDUSTRY TIES DEVELOPING

Amsterdam COMPUTABLE in Dutch 31 Oct 86 p 6

[Unattributed article: "Tulip Talking with Soviets and French: Possible Joint Venture in USSR"]

[Text] Den Bosch--Tulip Computers is negotiating a cooperation agreement with a Soviet trade delegation in Amsterdam. The most ambitious scenario calls for establishment of a joint venture in the Soviet Union. Tulip Director R. Romein denies reports that a contract has already been signed.

Within a few weeks, however, Tulip expects to be able to release the name of a new French partner, with whom Tulip will establish a new sales organization in or near Paris by year-end. Tulip was approached by two members of the Soviet trade delegation at the recent Efficiency Fair. Following changes in Soviet law to allow joint ventures with foreign companies, the soviets have also contacted Philips and AKZO.

Schools

"In general, the USSR is interested in obtaining Western technology. As far as Tulip is concerned, the soviets are interested in our complete product line," says Romein, who adds that there is special interest in [Tulip's] educational computer aids interconnecting eight PC's in one network and giving the teacher direct access to the students' PC's.

At the Soviets' request Tulip has already drafted proposals for immediate delivery, licensed production, or establishment of a joint venture in the Soviet Union. Romein says that "all three possibilities are negotiable for Tulip, as long as they are economically and financially feasible. We are now waiting for the trade delegation's reaction. No further arrangements have been made."

According to Romein, U.S. export restrictions on strategic goods have led to a liberalization of the Soviet economy (joint ventures). The Tulip director does not expect too many problems from the Americans. "Sixteen-bit technology is no longer considered strategic information, but I do not yet know whether the Americans will grant export licenses for all the components. We may have to develop our own operating system. We are prepared to do this, provided that a firm contract has been concluded."

Romein rather likes the idea of an agreement with the USSR. "Although it will not change overnight, the Soviet market is theoretically as large as the entire European market."

Nine Months

At best, Tulip would be able to meet the Soviet Union's requests in 9 months' time. Romein thinks that if an agreement is reached, some Russians will first receive training at Tulip and work in the factory there. "The establishment of a plant in the USSR will certainly take longer."

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CSO: 3698/A048

GDR COMPUTER DEVELOPMENTS, APPLICATIONS

Software from Schwerin

Schwerin SCHWERINER VOLKSZEITUNG in German 7 Nov 86 p 3 of supplement

[Interview by Gisa Neumann: "Software from Schwerin in 80 GDR Companies Already--An Interview with Comrade Dr Siegfried Pahl, Director of the Center for Applied Research in Schwerin"]

[Text] The Schwerin Center for Applied Research (LFA) has been in existence since 1969. Of the 75 colleagues, 65 are either mechanical engineers qualified in electronic data processing, or trained data processing specialists or graduate mathematicians.

The centers in East Berlin, Karl-Marx-Stadt and Leipzig were founded at the same time, and they preoccupied themselves primarily with the development of "basis-software," that is, computer operating systems. The Schwerin Center, however, has been programmed from the beginning for special assignments, and for concrete commercial software for rationalization of the process of engineering and tooling for production. At first the concern was with mainframe computer equipment, the R 300 computer and later on the ESER installations. Now, with decentralized computer technology, the assignment field has grown significantly. Software from Schwerin is already running in 80 companies in the GDR.

G.N.: Comrade Dr Pahl, which companies are currently using programs from the Schwerin software shop?

Dr Pahl: First of all, it is the machinery companies in Bezirk Schwerin, but traditionally in addition to that the principle factories in the GDR, which for example use our software for digitally-guided machinery. for roughly the last 3 years we have been concentrating on graphics software, which has a considerable effect on rationalization at CAD workstations (that is, in engineering). Computer-aided transport systems in multi-faceted solutions are within the scope of work performed at the Schwerin center. In the Schwerin Bezirk Hospital, for example, one variation called the Ghost Train was created. It has computer-directed carts which run on little tracks through the corridors, which carry things such as laundry to the individual nurse's stations with a savings of time and

effort. We have also developed commercial software either under contract or in conjunction with other companies and facilities. For example, we worked with the hydraulics companies developing software for design proposals and fabrication of hydraulic steering blocks, for the welding construction crews in the Klement-Gottwald-Factory in Schwerin, and for engineering workstations in the plastics machine factory. We were also active in the Elbe docks, in the Farm Machinery Factory Guestrow, at BAMA Ludwigslust, in the Vehicle Factory Luebtheen and other places.

New central research contracts have now arrived; we are to develop software for larger decentralized computers which are currently planned to be in large scale production in our country.

G.N.: Quite a pile of assignments--and ever more computers in ever more companies are being added. What consequences does that have for the work in the Center for Applied Research?

Dr Pahl: Naturally, we can no longer develop complete software for each individual user, as was perhaps the case up to 10 years ago. Instead, we increasingly concentrate on multi-use solutions which can be applied later. We primarily take care of all the specific, or you could say, most complicated building blocks within complex programming solutions. Furthermore, when the first use of a program which was written under a central research contract benefits the user, which is as a rule a company in Bezirk Schwerin, the company can no longer neglect to utilize its own capacity in the development of software. This is because beginning with a comprehensive process analysis and then transfer of these results into a procedure (the effective form of the developmental process)--which every computer application guides and which takes a total of about 90 percent of the work--through to continuous software maintenance, each company must actively participate if a program is to be worked out in scientific cooperation with other institutions. Engineers who adopt special knowledge in programming and corresponding technicians in company-owned high-powered rationalization review are needed today in every case. This is so because the key technology CAD/CAM definitely demands completely rationalized, and even automated, fabrication sections.

G.N.: Could you give some examples of such CAD/CAM solutions?

Dr Pahl; There is already even in our country a large number of such applications. The Schwerin Plastic Machinery Factory, for example, is already working on that. These CAD/CAM systems are complex, automated computer-supported pieces which run from engineering through to production, and which, for example, enable the modification of completed basic production models in a very short period of time. That means the production line and the products can be modified quickly. That is an important criterion of market effectiveness in the domestic market as well as in foreign trade.

In my opinion, however, you could count all the complex CAD/CAM systems in the world today on the fingers on your hands. These CAD/CAM systems

are known as ghost factories (computer-instructed manufacturing, CIM for short) with few people in the manufacturing halls.

G.N.: Is the increase in the number of individual CAD and CAM work stations which our companies and facilities are currently working on therefore a first step in increasing the number of such applications and systems?

Dr Pahl: Yes, and therefore it is important that, beginning with the application of the first computers, complex solutions are actually sought, such as for example with the incremental expansion of computer networks, or also with databases. Otherwise you will soon have a great number of separate computers and work stations, but the number alone--and in the end that will be very high--does not automatically add up to a complex technology. This complex technology is, after all, what we are striving for on the way to production automation.

G.N.: Can't individual CAD or CAM work stations provide a considerable productivity increase?

Dr Pahl: If an individual computer assigned to a specific task can achieve a 10 to 15 percent increase in productivity in its area, then a complex CAD/CAM application is more powerful and effective by several times that. The complete CAD/CAM system can realize a productivity growth of 500 to 600 percent!

G.N.: A couple more remarks concerning qualification to use the equipment, without which CAD/CAM does not work. What are the possibilities?

Dr Pahl: Many engineers and technicians are working on that or have already earned their authorization. Above all, naturally, are the young engineers and technicians who today are already trained in their courses of study and now also in the classes on data processing. The computer and CAD/CAM are naturally of no less interest to the older people, as they quickly realize that this technology, the computer itself, relieves them of routine activities in engineering, just as it works in the administrative sector, in technology, in inventory management, in the main office or also in the director's office.

The Chamber of Technology offers, in cooperation with colleges such as the one in Wismar, for example, courses at various levels. Many of the colleagues in our little organization are engaged in qualification work in Bezirk Schwerin--primarily in their free time, just as they also help with advice and guidance in the companies.

Right in our group we are holding courses attended by members of the SED's Bezirk Schwerin Directorate and the Kreis Directorates, by Party secretaries from the companies and installations. They are not only learning general information about CAD/CAM but want to learn practical use of the computer. The party members believe that concrete factual knowledge is important for political leadership in the realization of the decrees of

the 11th SED Party Congress, especially concerning key technology CAD/CAM with applications almost everywhere.

G.N.: Thank you very much for the answers.

Computer-Aided Design

Magdeburg VOLKSSTIMME in German 7 Nov 86 p 4 of supplement

[Article by Manfred Zander: "Computer-Aided Design"]

[Text] CAD--this spell cast itself over many more listeners than Lecture Hall 3 at the Technical College "Otto von Guericke" could handle. Still, even those who had to stand certainly did not regret their attendence. True, Dr Rugenstein, Eng, was sick and could not direct the meeting as was scheduled, but colleagues from Mechanical Engineering [ME] Equipment Branch in the ME Section jumped in in his place. Under the direction of Dr Bernd Schuetze, director of the CAD laboratory in the ME Section, they propped up a new presentation "overnight." Long sustained applause thanked Dr Schuetze, Dr Ulrich Deh who prepared a film on the work at the CAD laboratory, Eng Karsten Chamier, who sat at the computer, and the other colleagues and students in the Branch.

What do we need Computer-Aided Design for? Drafting table, slide rule, compass, straight-edge and log table books are still the most important tools today for the engineer, designer, planner and technician. Nothing has changed there since Pythagoras's time, as Dr Schuetze pointedly remarked. Right in the engineering offices, where ever more powerful machines were being puzzled out, it appeared that scientific-technical advances were passing by without a trace. And so it has been estimated that in the past 100 years the productivity in industrial fabrication in machine production has increased 1,400 percent, but the design work in advance of that has increased only 80 percent. In addition, an analysis of engineering practice reveals an imbalance in favor of routine work and against thoughtful and creative work: calculation steals 5 to 8 percent of the time, information research takes another 15 percent, and drafting work takes 30 to 40 percent.

With computer-aided engineering, scientific-technical advance is now arriving to the design offices. It is the routine work in particular that the computer takes away from the engineer, whereby he sends out considerably more reliable work than even the best engineer could produce. Several races between man and computer in Lecture Hall 3 made that clear. The computer works considerably faster than a man in stereotypical repetition, for which it is best suited.

For computer-aided engineering, a powerful computer with corresponding memory, accessories, monitor and graphics equipment are all needed. This is the so-called hardware. At the same time, software, or computer programs, are also required.

The listeners were witness to how this CAD equipment draws, calculates and sketches. One visitor had an opportunity to get right into the activity. In dialogue with the computer, he sketched a hook capable of hoisting an elephant weighing 3.4 tons. As directed, the computer selected the appropriate material and diameter. In order for man and computer to step into dialogue, there are naturally certain prerequisites, on the technical side and the human side. User-friendly equipment which offers the engineer a wide selection is needed. It is understood that software development for that is four to five times greater than with programs developed for a single user. Further prerequisites are information which needs no further control, and assistance which the computer can provide the dialogue-partner through "HELP" keys. An all-encompassing service line goes along with that. Man must master the computer language and know the keyboard (in some countries, touch-typing has since become a prerequisite for engineering studies). Also: In order to develop CAD software, a well-established engineering background and good mathematical knowledge are required.

As opposed to conventional engineering work, the use of CAD can already save up to 90 percent of the work time required. Is the computer threatening to push aside the engineer? That was answered by the experiments in Lecture Hall 3, too. The computer takes as much routine activity--ballast, so to speak--as possible from the engineer. Of course, the machine can only do that because man fed it with the correct software. The computer cannot replace the engineers' creativity, but it sure does gain some time for their creativity.

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PERSONAL COMPUTERS IN POLAND

Warsaw INFORMATYKA in Polish No 5, May 86 pp 28-29

[Article by Waclaw Iszkowski: "Gridlock"]

[Text] It is difficult to determine the number of personal computers currently in use in Poland. One of the reasons is that it is difficult to for mulate an adequate definition of a microcomputer, and another is the lack of any partial data, even estimates. For example, it is said that there are approximately 60,000 privately owned microcomputers in Wroclaw Province. We also know that that the immediate production plans of Polish emigre firms, associations, enterprises, and other establishments stop, to be on the pessi mistic side, at several thousand personal computers of various types per year, with unlimited selection so long as the model selected is "black," that is, the IBM PC. In addition, copied or original designs based on microprocessors brought into the country by any route, already exist and will continue to be developed.

The magic of computer equipment keeps people awake at night trying to answer simple questions such as the following: Should I buy from a Polish emigre firm for millions of zlotys? Should I buy equipment imported from the West or Tai wan for foreign currency? Can I put together a system myself and save money? What type of microprocessor is preferable (is the 16-bit microprocessor pos- sibly the best)? How many disk drives should I add (obviously I have to have at least two)? What kind of printer should I buy?

The questions could be multiplied. The answers are generally oriented toward purchase of the maximum configuration. In the last analysis, speed of delivery is also a factor, and above all financial resources are decisive. Rarely is a purchase preceded by matter-of-fact calculation and matching of equipment con figuration to actual applications.

Before we plunge into the thicket of microcomputer problems, however, let us try to classify our interests on the basis of the class of equipment and user requirements.

From the outset we disregard games computers, such as the ZX Spectrum or even the Spectrum Plus. There is obviously no denying their role in education and introduction to the world of data processing, but on the other hand I am amazed by their use in scientific research work or for compilation of

data bases. This is entirely a mistake, and only a lack of other resources can justify such action. Someone may ask why I make this statement. Since these computers have a very decent microprocessor and a fair amount of memory (in comparison to the old but once powerful computers such as the ZAM, UMC-1, or GIER), what is wrong with them? The answer lies in the definition of the class of equipment, and above all its reliability and operating features. I agree with those who are not convinced that you can get to the Baltic from Warsaw in a go-cart.

I must point out immediately that I am not overlooking here the essential applications of 8-bit microprocessors, or 4-bit or segment processors in corporated in many highly useful control systems. Problems of this kind are very important, and the use of configurations that are larger than are necessary is often a source of amazement.

But let us return to the use of personal computers outfitted with at least one disk drive, and possibly a hard disk drive of the Winchester type. This is essentially an adequate configuration, and sometimes is even too extensive in many applications. It must be said, however, that the IBM PC, Apple, and Macintosh are basically equipment designed more for private use than for very small businesses and institutions. In the West, the world of microcomputer equipment users has been divided into a private and a professional group. The latter group includes altogether different businesses, and the equipment is also different, being more reliable and marked by higher performance. This area is becoming less and less accessible to us because of financial considerations and the embargo. We must realize, however, that we are separated from the rest of the world by an abyss that even thousands of IBM PC's would not be able to fill. I promise to make no further mention of medium-sized computers, mainframes, and supercomputers, in order not to upset my readers.

Enough about the magic of hardware. I personally regard current purchases as a typical example of overkill. They are a very small, and, I think, expensive step toward introducing data processing. After all, it is the software that determines the quality and potential for actual use of the hardware.

Not until we get to this point does the trouble begin, since no one (or very few who do, confirming the rule) who buys costly equipment takes the trouble to answer the question of how and in what work will he use the equipment he has bought, if the manager or computer hobbyists are already enjoying themselves with it. And even if people know why they have bought a computer, not many give thought to the software to use with it. Unfortunately, the software sold with a computer or obtained by copying, out of fascination with owning magnificent programming languages such as Turbo Pascal, Aztec C, or even Super Basic, serves no concrete purpose in the context of our needs. The same may be said of other programs. Word processing programs understand only English. It is difficult to adapt data base management systems, and, while graphic program packages are fascinating, what would we draw with them? To tell the truth, there is no decent Polish word processor, invoicing program, or accounting or inventory management software.

As a result, there is equipment of considerable value but in effect useless standing in hundreds of establishments. This equipment does not earn money to pay for itself and is increasingly anathema to accountants. There is no soft ware market in Poland meeting the following requirements:

Interaction between program and user must take place in Polish, with a vocabulary understandable by a secretary, inventory clerk, or accountant.

The documents introduced by the program must take the shape of well-known forms.

Storage and circulation of documents in the program system must take place in accordance with the regulations and administrative practices prevailing in Poland.

All these requirements, and others, are not currently satisfied and, except in isolated cases, will not be for some time to come. Moreover, various establishments, forced to use their equipment in one way or another--this is an appropriate way of putting it in this context--decide to develop such software independently. So there begins a costly game of creating different kinds of user programs which are designed ad hoc, without careful consideration and the necessary experience. Energy typically is wasted in duplicating the effort expended on the same subjects by other institutions. I expect a dozen or so word processor programs to make their appearance in Poland in the near future (not counting a translation of Wordstar into Polish), along with invoicing and accounting software. And only at first does it seem to be not particularly difficult to write such programs. After all, there is no need to buy the hardware; all that it takes is ideas, time, and a little spare change. Well, it soon develops that much more time and financial outlays are needed. It has not been discovered in Poland that the cost of software is more than 3 times, and often even 10 times, higher than the cost of equipment. The accounts of remuneration from hardware costs in Poland are possibly somewhat distorted, but we won't quibble over these "few millions."

We currently have a situation typical of the field of concurrent programming called gridlock, in which operation of a program is held up by the wait on both sides of synchronous processes for events to take place on the other side occurrence of which depends on both sides. Further hardware procurement, although possible, will be limited by the absence of motivation for purchasing it, because of the impossibility of using it determined by the absence of software. The creation of useful software, in turn, requires the formation of strong teams outfitted with good equipment and strong financial capabilities. The question is, who is to make such investments, the current owners of the hardware, who have already spent money, or the future owners, who will then be short of money for hardware. As always, the solution is a compromise, but special effort will be needed, inasmuch as individual computer owners will be unable to meet these financial demands. On the other hand, we know how difficult it is to do business in software. Because of the absence of real copy protection, it is difficult to distribute the costs of software development among future customers.

What is left, then? In my opinion we should promote honest, good, useful, and proven Polish solutions aimed at practical application of the computer hardware already on hand. Publication of a description of such solutions accompanied by presentation of the fundamental concepts of the structure of the algorithms would make it possible to protect authors' copyright and would provide a basis for claims against dishonest persons. Such publications could at the same time facilitate exchange of experience and restrict duplication of effort, and as a result could lead to saturation of the market with basic original programs. The number of such programs is now fairly limited.

I would like to hear the opinions of readers in this matter. The editors of INFORMATYKA are making the pages of their magazine available for presentation of practical applications of microcomputer hardware based on original software development efforts.

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AVIBRAS, ENGESA MISSILE PROJECTS DESCRIBED

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[Text] The Brazilian Aerospace Industry, Avibras, will present to the Armed Forces and the international market its first two missiles sometime between July 1988 and January 1989. These missiles will be the SS-300 [surface-to-surface], and the "Barracuda," which will come in two versions, surface-to-sea, and sea-to-sea.

Also, by mid-1988, the "MOL (formerly "Piranha") missile will be tested for the first time. It will be air-launched against guided or towed targets.

Meanwhile, ENGESA [Specialized Engineers, Inc] directors expect to present their MD/EE-150 missile in 1990. This missile is meant to be used by land troops. ENGESA experts believe that by 1990--possibly working in the facilities of the Orbita Company (to be formed by ENGESA, EMBRAER [Brazilian Aeronautics Company] and four smaller companies specifically to manufacture missiles)--the prototypes of the antitank missiles ordered by the Army will be in the advanced testing phase. These missiles will be based on Italian technology.

The following is a summary of each of the missile projects developed by the Brazilian weapon industry:

SS-300--This is currently the most important Avibras project. Its characteristics are similar to those of the Soviet "Seud B," long used by the Warsaw Pact (Eastern European Alliance headed by the USSR) troops. It will have a 300-km range, and will be guided to its target by the SIS, Inertial Solidarity System [Sistema Inercial Solidario]. The SIS was developed by Avibras, and based on American technology but it is described as relatively uncomplicated.

In order to test this missile in Brazil, Avibras will certainly have to be on better terms with the Aeronautics Ministry, which operates the only testing ground for this sort of weapon: The Barreira do Inferno Launching Center in Natal, Rio Grande do Norte State. Another testing site that could be used is the Restinga do Marambaia Army Testing Ground in Rio de Janeiro State. This areas, however, is surrounded by much passenger ship and airplane traffic.

MB/EE-150--Is ENGESA's counterpart of the Avibras SS-300. It will have a 150-km range, and be the first of a "family" that is expected to include the MB/EE-300 by 1995 (with a 300-km range). This weapon will be for tactical use, and the first ballistic missile to be developed by the new Orbita Company.

SM-70--This is the "Barracuda" version developed by Avibras for coastal defense. During the first half of 1985, two Army officers visited military installations on the coast of Sweden, northwestern Europe, and drafted a flattering report of the Swedish defense system, based on small battalion-sized units, which are extremely mobile. These units combined sophisticated radar with powerful coastal defense missiles and cannons with a rapid firing rate.

During the second half of 1986, Army Minister General Leonidas Pires Goncalves went to Sweden to inspect the system closely. Brazilian coastal artillery still uses heavy British and American cannons made before the Second World War.

MM-70--This is the naval "Barracuda" launched from a ship at surface targets. Avibras expects its performance to be comparable to that ofthe MM-40 Exocet, built by the French Aerospatiale. Each "Barracuda" will weigh nearly 800 kg (of which 150 or 300 kg will be the explosive charge), and have a maximum range of 70 km. The plans for this missile have already been sent to the Navy Staff, which has not yet officially expressed interest in it.

"MOL"--For the past 6 years the FAB has been working on the development of this missile. The former "Piranha" will not be the last of its type when it is ready for use in 1989. Its manufacture, which was entrusted to ENGESA in 1986, will help, especially, in the training of technicians and specialized workers in the sector.

The "MOL" was designed to perform similarly to the U.S. "Sidewinder," of which over 50,000 units in 9 different verions have already been manufactured. The "MOL" will be 15 cm shorter and 1 kg lighter than the U.S. missile. Nevertheless, its guidance system will be less sophisticated than that of the "Sidewinder" AIM-9M model.

The main drawback of the "MOL" (with which Aeronautics Minister Octavio Moreira Lima plans to equip the AMX jet fighter which is being built within the framework of an Italian-Brazilian joint venture) is its inability to carry out what in military terms is referred to as "frontal interception," that is, the destruction of an enemy plane in a frontal strike. This is because the "MOL" is guided by infrared rays released by the heat of the turbines in the rear of the target plane.

"Leo"--This is an antitank missile assigned to ENGESA. Its basic technology is Italian, produced by the Oto-Melara Company. It was originally conceived to penetrate armor approximately 80 cm thick at a distance ranging from

500 to 2,500 meters. Nevertheless, this missile, which is known in Italy as the MAF (antitank missile), can be used only against targets at a range of between 300 meters and 3 km.

The Army's decision to choose this missile was the subject of a discreet controversy. The Leo has not yet been fully developed (not even in Italy), and the Oto-Melara missile technology is not as traditional as U.S., British or German missile technology. The Army intends to acquire 400 Leo missiles, which is believed to be a small quantity.

In addition to the antitank missile, Minister Leonidas Pires Goncalves is determined to make more viable the manufacture of antiaircraft missiles for low-altitude targets.

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