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ADVANCED MATERIALS

France's 1988 Materials Program Stresses Superconductivity

36980027a Paris L'USINE NOUVELLE in French 1 Oct 87 p 10

[Article by Pierre Laperrousaz: "Materials Program: Spurring Industrialists to Work Together"]

[Text] The 1988 research budget projects a package of around Fr 90 million for the national materials program, funded by the Research and Technology Fund (FRT). This is a mere drop in the bucket compared to the 1,500 to 2,000 million public research allocates each year to materials through research centers, university laboratories and the national defense department, or to the efforts made by a few large groups such as Rhone-Poulenc, Pechiney or Thomson. But this drop could function as a catalyst.

Indeed, its purpose is to spur industrialists to work together, and in conjunction with publicly funded laboratories, in areas which demand expertise of different kinds. "The development of a material for a given use always requires finding a compromise between its properties, method of manufacture, cost, etc. It is therefore important that the material's manufacturer and its user work in concert to arrive at a satisfactory compromise for both parties," explains Bertrand J. Escaig, "materials" department head of the Delegation for Innovation and Technology (Research Ministry). Examples come to mind: a glass manufacturer could team up with an automaker to develop a material for windshields; a chemist with an electronics industrialist to develop a superconducting ceramic.

In fact, this national program is a direct descendent of the Idemat program, launched by the previous government. Like Idemat, it will operate by calling for bids from industrialists and laboratories, in several sectors (traditional materials, ceramics, composites) and in a new field, that of superconductors. The latter will be allocated Fr 20 million (a portion funded by the "electronics" FRT).

The publications and advertising battle surrounding superconductors undoubtedly explains the speed with which government funds were made available and the fact that a call for bids was announced as early as last August. "It's now or never for laying the foundations of an industrial community for the next 4 or 5 years," remarks Bertrand J. Escaig.

Traditional materials (steel, glass, light alloys, widely used polymers) are not treated like poor cousins in the new program: more than 40 percent of the funds are earmarked for this group. This is justified by their impact on the national economy, which rules out their abandonment, lest important technological developments be missed.

Among the so-called "new" materials, ceramics is expected to receive 20 to 30 percent of the pie. Ceramics have inspired a lot of dreams and even though the scientific and industrial community has come back down to earth, efforts must not slacken. One point, among others, toward which public authorities would like to see efforts directed: non-destructive defect inspection, which remains a stumbling block, both in France and abroad.

In the field of composites, there is a problem with developing more productive manufacturing techniques. This is a typical example where the collaboration of several industrialists (manufacturers of resins, reinforcing pieces, machines) seems vital, as it does in applications research for more recent materials, such as thermoplastic matrices composites.

It is in the field of superconductors, however, that the necessity of "playing well" seems most pressing. Indeed, the future of this line of research will depend on the capacity of the industrialists concerned to coordonate their efforts. With Rhone-Poulenc (world leader in rare earths) and electronics companies the likes of Thomson-CSF and CGE, it would be a bitter disappointment if France missed the boat.

09825 AEROSPACE, CIVIL AVIATION

France Postpones MATRA Privatization Indefinitely

36980054 Paris ELECTRONIQUE ACTUALITES in French 30 Oct 87 p 3

[Text] On 21 October, Minister of Economy, Finance and Privatization Edouard Balladur announced that the privatization of MATRA [Mechanics, Aviation and Traction Company], originally scheduled for 26 October, had been postponed, and that he would soon make a decision on the new date selected for this operation.

After meeting with Mr Balladur, MATRA's CEO Jean-Luc Lagardere indicated that he was "convinced that the countdown on privatization will start again within a few days."

"I understand why Mr Balladur decided to put off MATRA's privatization for a few days," added Mr Lagardere. "The liftoff of the 'MATRA Privatization' rocket has to take place under clear skies so it can be placed in orbit successfully."

Mr Balladur explained this postponement by his desire to "allow the market to recover its bearings," stating that this did not mean that the privatization program had been halted.

MATRA's privatization was "technically possible on the date scheduled, for the market had recovered and the amount of money involved in the operation is not large (between 700 and 800 million French francs)," indicated the minister.

Mr Lagardere indicated that at least three foreign industrial groups, Daimler Benz (the leading industrial group in the Federal Republic of Germany), GEC (Great Britain) and Wallenberg (Sweden, the parent company of Ericsson), were candidates to form MATRA's nucleus, in addition to the MMB holding, which owns MATRA's former shares in press and publishing (Hachette, Europe 1, and Dernieres Nouvelles d'Alsace).

In this privatization operation, the government was to sell its stock in MATRA (50.97 percent) by mutual agreement in order to form the nucleus (approximately 22 percent of the capital) and through an OPV [Public Offer of Sale] (20 percent of the capital), with the rest being held for the employees (5 percent). The government will keep 3.9 percent to use as free shares given as a bonus.

In speaking of MATRA's upcoming privatization operation, Mr Lagardere estimated that the number of stockholders should be multiplied by 10 at the conclusion of this operation, reaching a figure of 250,000 shareholders.

MATRA's PDG also indicated that the firm MMB, of which he is the administrator, wanted to obtain the maximum possible of the MATRA capital right away: 6 percent. Later this company hopes to increase its share of the MATRA stock. Mr Lagardere emphasized that Mr Balladur had selected the companies which will form the nucleus of the firm. But he added that the foreign groups mentioned—"which I know and value"—might combine to form with MATRA a real major European group. MATRA already works with each of these groups or with their subsidiaries.

Ericsson: "The Logical Sequence"

Ericsson, acting through the investment firm, Investor Providencia (of the Wallenberg Group), has made an offer to form 5 percent of the nucleus of MATRA. It believes that its financial share can only strengthen collaboration between the two enterprises.

"We hope the French government will take the Providencia offer into consideration," said representatives of the Swedish group at their stand in the Telecom exhibition in Geneva.

For Ericsson, "this would be the logical sequence of its financial ties with MATRA," following the April 1987 buying into the CGCT [General Telephone Construction Company].

While cooperation with MET [MATRA Ericsson Telecommunications], a firm which arose from the CGCT, is considered quite satisfactory, the Swedish group indicated that it would also like increased cooperation with MATRA communications at the working group level, particularly in the radiotelephone field.

The Wallenberg group holds 35 percent of the Ericsson capital.

7679

FRG Aircraft Industry in Flux With Likely Daimler-MBB Deal

Possible Effect of Daimler Takeover of MBB

36980026a Hamburg DIE ZEIT in German 16 Oct 87 pp 37-38

[Article by Karl-Heinz Bueschemann: "Daimler's Next Coup: Germany's Biggest Industrial Concern Could Also Swallow Up the MBB Arms Firm"]

[Text] The subject appears to be an unpleasant one to the participants. For weeks, the boards of directors of Daimler-Benz AG and Messerschmitt-Boelkow-Blohm GmbH (MBB) have been discussing how they can join the two major German aerospace companies, MBB and Daimler subsidiary Dornier—but no one wants to talk about it publicly. Daimler is even saying, "There are no negotiations concerning Daimler-Benz interest in MBB."

The management of MBB in Munich is completely under wraps as well. The only thing that company head Hanns Arnt Vogels has revealed on this subject thus far is that he has "something floating around in his head." Even the otherwise anything-but-taciturn Lothar Spaeth, who as minister president of Baden-Wuerttemberg was actively involved in seeing to it that Daimler Benz was able to take over the Dornier private aircraft manufacturing company in May 1985, is suddenly unwilling to say anything more about this hot topic. Only this past September, the sharp CDU politician declared in DIE ZEIT what he thought about the possibility of both of the republic's aerospace companies belonging to Daimler, something that Bonn Minister for Economics Bangemann would heartily welcome: "I would strongly warn against that."

Opinions on this subject can only be heard if it is called something different—reorganization of the German aerospace industry, for example. In that case, even Edzart Reuter speaks his mind. Reuter is the brand- new chairman of the board of directors of Daimler, which has in the meantime become Germany's largest industrial enterprise. If the federal government is pursuing a reorganization of the aircraft industry, he says, his company will "not shirk" talks concerning such a move. Alfred Herrhausen is also speaking up. He is the spokesman for the board of directors of the powerful Deutsche Bank,

and practically the master of the Daimler-Benz household, since the bank is the largest Daimler stockholder. "Daimler-Benz cannot be indifferent to what happens to MBB," the bank executive and chairman of the Daimler board says. And Hanns Arnt Vogels, managing director of MBB, naturally wants to maintain an important growth industry. "We need a strong aerospace industry in order to be competitive with our partners in France and Great Britain," he offers. He even feels that promoting this industry is "the top need at the moment."

However, the intention that is currently being described so carefully by representatives of the aerospace industry as reorganization or promotion in fact boils down to nothing other than eliminating competition between two old rivals, MBB and Dornier. Erich Riedl, CSU state secretary in the Bonn Ministry for Economics, says so frankly and graphically: "I think that this competition is idiotic."

The names MBB and Dornier are synonymous in the FRG for the aerospace industry. MBB and Dornier mean aircraft manufacture, satellite technology, arms production, as well as high technology. The Bavarians at MBB, with around 35,000 employees, have a sales figure of DM 5.7 billion, while the Swabians [at Dornier] employ 9,500 and pull in around DM 2.1 billion. The two companies have thus far operated side by side. With a 52 percent share, the Laender of Bavaria, Hamburg and Bremen hold the majority interest in MBB, but it is primarily under the strong hand of Bavarian Minister President Franz Josef Strauss. The Swabians were at one time a classical family company, until an inheritance dispute broke out in the Dornier clan and 65.5 percent of the shares in the company were sold to Daimler in 1985.

Even though the MBB group, formed in 1968 out of the four companies Boelkow, Messerschmitt, Hamburger Flugzeugbau and Vereinigte Flugtechnische Werke (VFW), is not considered especially profitable, it is regarded as the German technological nexus and think-tank par excellence. Dornier has held its own ground next to MBB, and succeeded, for example, in achieving a technological lead in the area of research satellites. Many MBB executives have noticed with envy that Dornier is the only German company building a complete 20-seater as its own aircraft.

This coexistence should now be halted, since not only State Secretary Riedl believes that there "is a lot of duplication between Dornier and MBB." There are even existing models for cooperation between the two rivals, who have in the past always noted with irritation that neither of them were preferred by the state for orders to build combat aircraft or satellites. According to one of the plans, the first step is for Daimler to take over a total of one-fourth of the MBB capital stock from Bremen and Hamburg. After this, Dornier would be subordinated to MBB as a fixed asset, in order to help the Daimler concern gain a controlling interest in the Munich company. Talks concerning the appraisal of MBB and Dornier are in full swing.

Through these steps, Minister for Economics Martin Bangemann would achieve his goal, because he is disturbed by the billions of marks that Bonn has to shell out for the construction of the Airbus, built primarily in cooperation with France and Great Britain. MBB's interest in production is a little more than one-third. The European airplane can only be sold on the world markets at a loss. "In order to give Airbus a better chance in competition with the Americans, I feel that industrial management is needed at MBB," Bangemann says. Through this, the minister for economics hopes to achieve tighter management and more economical production at the company that, spoiled in the past by sumptuous arms contracts, has turned out products that are technologically superior but comparatively expensive. In addition, he envisages that a potent new partner could even cover the Airbus losses, which have up to now been financed by the taxpayers.

Woeful Message from Bonn

Deutsche Bank and Daimler also see reasons for giving some thought to the future of Dornier and MBB. Business at Dornier has for some time not been as good as it once was. Last year, in the first complete fiscal year under Daimler management, Dornier did not experience a growth in sales, and profits even fell by 20 percent.

On top of all this, the Daimler subsidiary was only recently surprised by a woeful message from Bonn: The Ministry of Defense will not grant a contract for modernizing the Alpha Jet combat airplane, which Dornier was building together with the French Dassault group. This means a loss of orders for the Swabians amounting to around one billion marks, orders that they had been solidly counting on.

A similar picture at MBB: In 1986, for the first time in its history, the proud technology concern was forced to show a loss in its balance sheet. Hefty armaments contracts and the construction of the Tornado combat airplane are running out, but new programs—such as the "Jaeger 90" military jet, which has been in the preparation stage for years and which four nations want to build, or a new German-French anti-tank helicopter—have not gotten under way for lack of money. There is even no more money in the noble MBB space technology branch, because the FRG government continues to put off giving the green light to participation in the European "Ariane 5" rocket, in the manned Hermes European space shuttle and in the Columbus space station. Industry—including Dornier- -is waiting for orders in the magnitude of DM 30 billion. "Financially speaking, the space sector is not at all a safe one," even State Secretary Riedl complains.

And so it can hardly come as a surprise that the Bavarian Land government would like to see the rich Daimler concern involved in MBB, and quickly. "The doors are wide open to Daimler here," is the word coming from Strauss associates. For many MBB executives as well, steps in this direction cannot be taken quickly enough. "We must bring about involvement as soon as possible," says an MBB man who would like to see the German aerospace industry rise to the number one position in Europe. The federal government needs a sign so that it can approve major projects."

The question that remains is how quickly Daimler can decide to get involved in MBB. MBB knows from its own experience with mergers that these things sometimes take a long time. Unification with Messerschmitt in 1968 took place at a brisk pace. The 1969 merger with Hamburger Flugzeugbau, which belonged to the Blohm family, was a process that took months to complete. But the takeover of VFW, strictly speaking, went on for 13 years. Talks broke down twice because VFW laid claim to the concern's senior positions, which the proud MBB executives were absolutely unwilling to give up. But even after VFW in Bremen grew considerably weaker in 1977, it still took another 3 years.

The only really surprising thing is that the urgent need to merge the two firms is being alternatively justified using contradictory arguments. There is not any competition between Dornier and MBB anyway, is the opinion held by Erich Riedl. According to this argument, all major projects are decided upon with the public contractor at a preliminary stage; the two companies could thus be combined straight away. Others, including Riedl again, say that competition between the companies for the ever-scarcer government contracts—both groups are more than 50 percent dependent on arms contracts—is leading to disastrous price wars. The result of this, it is said, is losses that ultimately must be covered by the state. This is why a merger is the only step that will safeguard the future of the companies, especially since competition in the aerospace industry is international in nature and should not be further intensified by national rivalries. In order for the Germans to improve their international competitive position, Alfred Herrhausen of Deutsche Bank would thus like to create "a critical mass" in industry. Herrhausen: "This attempt should not be abandoned."

And yet, before promises are made, the federal government will first have to dig deep into its purse, because Daimler-Benz is being extremely restrained in its takeover offers. "Significant fundamental decisions by the federal government" remain "open," the Stuttgart company maintains. For example, Deutsche Airbus GmbH, a full subsidiary of MBB, is still DM 1.9 billion in the red with Bonn, and a billion marks in the red with the banks. Furthermore, it is still unclear how the federal development cost subsidies amounting to more than three billion marks for the first three Airbus models will make it back to the federal treasury. However, the federal government thinks that it has a trump card, because Dornier wants from Bonn a DM 220 million development cost subsidy for a new 30-seat airplane. Bangemann has blocked this money until the airplane industry has been reorganized. Dornier is unable to pay for the airplane alone.

Guaranteed Existence

It is unknown whether the sought-after unified German aircraft manufacturer will be a tightly managed company, or whether it will think about that which preoccupied its predecessors: getting contracts from Bonn. After all, MBB had a guarantee from the federal government to the effect that the company would not be ruined by the airplane construction program desired by the government. Even Baden-Wuerttemberg Minister President Lothar Spaeth is afraid when he thinks about the new large- scale company, which despite its internationally competitive position will guarantee its own existence with government funding if need be. "I think it is dangerous for us to have another aerospace company that, because of its mix of military and civilian, will become a permanent recipient of federal government subsidies."

The security felt by the domestic arms industry in Germany was demonstrated only 2 years ago, by tank manufacturer Krauss-Maffei. When that company's owner, Friedrich Karl Flick, announced in 1984 that he wanted to sell the rather mismanaged manufacturer of the Leopard tank— possibly abroad—Bavaria immediately intervened at the request of Minister of Defense Manfred Woerner and took over a substantial interest in the firm. This was because at that time the Federal Anti-Trust Commission indicated early on that such an association would have to be prohibited because "a market-dominating position" in the armament business could have resulted. Even though MBB and Krauss-Maffei are active in entirely different markets, the state secretary in the Bonn Ministry of Defense responsible for procurement, Manfred Timmermann, had an uneasy feeling, fearing the "MBB Moloch."

Thus, there are many people who smell danger in the quest for one German aerospace concern, since this would create a new power in the FRG. Daimler, which carried out the biggest merger in FRG history through the AEG takeover in 1985, would together with MBB have a total of 370,000 employees—300,000 in the FRG—, thus making it the largest private employer in the country. Sales would exceed DM 70 billion. Most of all, Daimler, including AEG, engine manufacturer MTU and Daimler, is already the largest German supplier of arms.

Because even politicians are working on effecting a merger, officials at the anti-trust commission in Berlin can only tear at their hair. Even if the anti-trust commission were to prohibit Daimler interest in MBB, it would nevertheless take place, because Minister for Economics Bangemann can overrule an anti-trust commission veto.

"It is horrifying how little thought is being given to propriety, and you can see from this that such companies are politically dangerous," the champion of competition in Berlin says. Munich political scientist Professor Kurt Sontheimer also warns against this merger plan: "It is quite obvious that this will create an economic power that the government will not be able to ignore."

Erich Riedl, Bonn's advocate for a strong aerospace industry under the Daimler star, does not seem to be particularly disturbed by this. Strauss' friend in the Ministry for Economics says simply, "That's just the way it is."

Dornier Executives Concerned

36980026a Duesseldorf HANDELSBLATT in German 28 Oct 87 p 21

[Article: "Dornier GmbH: Skepticism Towards Bonn—Discriminated Against in the Awarding of Contracts?: Exhilaration Followed Now by a Contemplative Phase"]

[Text] Friedrichshafen, 27 Oct (DPA)—The euphoria felt in May 1985 by erstwhile employees of the aerospace concern Dornier GmbH in Friedrichshafen and Munich when, after long, difficult negotiations, Daimler-Benz AG took over the company with a 66 percent interest from the deeply-split Dornier family, has now made way for concern over the future. And it is not because the people on Lake Constance who were very active and emphatic about wanting the Daimler takeover are now disappointed by the new parent company.

Instead, the skepticism is being directed towards Bonn. There is a feeling that Dornier is being discriminated against in the awarding of contracts, and one senses political pressure from Bonn in favor of a Daimler interest in the Munich aerospace concern MBB. Factory committee chairman and Dornier board member Oscar Pauli thinks that should this come about, then a structural reorganization would be on the agenda.

When Bonn rejected the planned combat effectiveness upgrading of the Alpha Jet (value: around DM 1.2 billion) and mass production of the SGM-80 ocean floor mine (developed by Dornier) was awarded by the Ministry of Defense to Krupp Atlas in Bremen (value: DM 200 million), the factory committee sounded the alarm. Its publication, SEESPIEGEL, recently wrote in connection with a swipe against the supposedly inadequate Dornier presence in Bonn: "Even the father of our people in far-away Stuttgart has noticed that the roof is on fire, and has undertaken rescue measures. When will our mother, Daimler-Benz, give us assistance, or do we first have to burn down to our foundation?"

Strong words, to which the mother has thus far responded only by saying that there are no negotiations under way concerning a takeover of MBB, and that for the time being they are simply waiting to see what sort of future plan for the German aerospace industry would be presented by the federal government. It was emphasized, however, that talks concerning the future structure of this branch of the economy would also not be shirked.

In an interview, Pauli explained what the factory committee meant by a burning roof. In his words, some 300 jobs have already been eliminated in Munich, where Dornier's aircraft production facility is located, using early retirement plans and countermanding agreements. As is well known, things are not going well with Airbus production, in which Dornier is also involved. Even with the Do 228 airplane, the monthly figure of four and two units has been scaled back.

A spokesman for Dornier in Munich said that the problems with the jobs had not yet had any repercussions in this form and that new orders were expected for the Do 228. Still, no one has any doubts about the gravity of this company's problems, which in 1986 employed 9,500 people and had sales of DM 2.1 billion. In fact, these difficulties even motivated the leader of the Land, Lothar Spaeth (CDU), to send a letter to Chancellor Helmut Kohl, Minister of Defense Manfred Woerner and Minister for Research and Technology Heinz Riesenhuber.

All Bonn Subsidies Have Been Repaid

In this letter, Spaeth referred to the key position for the further development of the Do 228, which is intended primarily for regional air transportation. The 19-seat model is to be followed by a comfortable model with 30 seats, the Do 328, by 1992. As his State Secretary Matthias Kleinert confirmed, Spaeth made an urgent appeal to Bonn for support of this project. (It is not without pride, incidentally, that Dornier points out that all Bonn subsidies thus far have been repaid.)

Justification was provided by an enclosed memorandum that painted a gloomy scenario. If no subsidies were provided for the Do 328, the entire airplane sphere at Dornier would be jeopardized, together with more than 4,000 jobs. Furthermore, another 1,300 jobs in the area of research and development would be lost in Friedrichshafen.

Thus far, there has been no official response from Bonn. However, it was discovered in Stuttgart that talks concerning the Daimler/MBB/Dornier matter took place between Lothar Spaeth and Franz Josef Strauss at the most recent conference of minister presidents. And they were said to be "good talks." Nothing more was disclosed.

Thus, even the Friedrichshafen plant, which as a technological nexus with thousands of projects ranging from space undertakings and materials research to business expertise is of particular interest to Daimler, would not be spared from potential turbulence. "We are a sound technology center, with liberal creativity and flexibility,"

a responsible employee says, and then asks, "But for how much longer?" Not only is the possibility of subordinating Dornier to MBB an unsettling thought in Friedrichshafen ("Will we be sacrificed?"); the plans for the major Daimler-Benz research center in Ulm are also cause for concern on Lake Constance. It is feared that significant elements will be taken away from the plant in Friedrichshafen and thrown into one pot with AEG and MTU experts.

And yet, Daimler has its problems with its Dornier subsidiary as well— even if they are of a different nature. "Ruling" the company is not that easy, because the heirs to Claudius Dornier actively use their 20- percent blocking minority. Be it stock appreciation, be it program policy—nothing happens without the minority stockholders, and they make "every subject into a commercial affair," an insider reports.

This is because the heirs to Claudius Dornier must finance their "Seastar" seaplane, which experts say has scarcely any chance on the market, in contrast to the opinion held by the Dornier family. The financial straights are obvious. In Friedrichshafen it is reported that the heirs are trying everything possible to get money from Daimler in order to cover the needed financing for the "Seastar." "So the turmoil is not over," factory committee member Oscar Pauli says in summary, thus reflecting the contemplative mood in the company that has replaced the initial exhilaration after the Daimler takeover.

12271

COMPUTERS

CNET Experiments with Organic and Optical Processing Surveyed

3698A313 Issy-Les-Moulineaux L'ECHO DES RECHERCHES in English 1st quarter 1987 pp 19-30

[English abstract of a French-language article by Isabelle Ledoux of the CNET study group on optical properties in organic materials; coauthored by Joseph Zyss of CNET, who is currently directing an ESPRIT program on molecular engineering for optoelectronic applications: "Organic Molecules and Optical Signal Processing"; abstract published on p 2 of source]

[Text] The recent development of optical telecommunications has created a demand for associated components of growing efficiency and speed. The ultimate aim is the production of all-optical systems effecting non-linear operations of the second or third order. Organic materials have definite advantages for second-order non-linear operations such as frequency conversion and amplification. New organic compounds recently developed by the National Telecommunications Research Center (CNET) in France, using molecular engineering and crystal-formation rules that have been refined over several years, exhibit substantial non-linearity effects. They have already been applied in production of laboratory devices that rely on ultrafast optical phenomena. Now that non-linear organic light-guiding structures have been prepared and characterized, researchers optimistically envisage use of such materials in integrated optical devices for telecommunications.

FACTORY AUTOMATION, ROBOTICS

Siemens Opens 'Just-In-Time' Automated Computer Production Line

36980038a Duesseldorf VDI NACHRICHTEN in German 9 Oct 87 p 23

[Article by S. Kampfer: "Data-Processing Companies Are Now the Standard: When Computers Build Computers: At Siemens in Augsburg, Importance Is Attached to Modern Logistics and Just-In-Time Concepts"; first paragraph is introduction]

[Excerpts] Augsburg, 9 Oct 87 (VDI-N)—When a computer company starts up a new production, and thus provides its own equipment instead of automating only outside production facilities, then this is an exemplary demonstration of how things are done best. At Siemens in Augsburg, for example, material buffers situated close to production have been installed, and the supplier is obligated to provide his material just-in-time.

Progress is pushing itself along. Siemens spokesman Dr Hartmut Runge sees it like this: "For production, the rapid transformation in computer technology—swiftly increasing performance by the equipment at the same time as lower prices—represents an extraordinary challenge. Three-fourths of total sales is achieved with products that are less than 2 years old."

Thus, when Siemens dedicated a new site for computer production last summer, DM 150 million was tied up in construction, with completely modern production equipment installed over a surface area of 40,000 square meters. The goal: "Through nearly absolute computer control over the production process, a consistently high quality of the equipment produced and quick adjustment to customer demands is ensured," says Siemens spokesman H. Runge.

According to Runge, the primary goal in planning the new site was thus the realization of a modern system of logistics. Customer orders were to be filled without large stockpiles of material and finished products. The solution: Each product group received integrated production and testing lines, and each of these lines was assigned small material buffers. According to the Siemens plan, after the acceptance of goods the material is automatically stored in these buffers close to production, and subsequently sent by the computer to the assembly line when it is needed in the production process. In this production method, Siemens assumes that the supplier is also involved in the process, meaning that the material arrives exactly at the right moment.

One prerequisite for maintaining worldwide competitiveness is production automation. But Siemens has a special plan: CAI, computer-assisted industry, is based on computer support "from development to production and quality control, and from the placing of the order by the customer to the implementation of the order to shipment." Besides significantly reducing processing time, CAI can also ensure the consistently high quality of the products, Siemens' Runge says. This concept is being realized consistently in Augsburg.

What is Siemens building at the new plant? The range of products includes the assembly and system testing of communication computers, multiple work station systems with the SINIX operating system, data display units and personal computers using the MS DOS operating system.

The new building provides Siemens with a production space of 17,000 square meters and headroom of 6.50 meters. Through an installation cellar with a two-meter-high ceiling, the facilities can be converted in the case of a switch in product or changes in the production process without interrupting current production. Moreover, this makes it possible to provide optimal climate control of the production areas. Approximately 700 employees work in development.

The new Siemens site is part of the plant for systems that is developing and producing data processing and data transmission systems, data display units and personal computers. According to information from Dr Runge, a total of 5,400 people are employed in this area, of which 4,900 employees and 280 trainees are located in Augsburg. According to Siemens, sales during the last fiscal year amounted to around DM 1.7 billion, and is expected to rise during the current fiscal year to probably DM 1.8 billion. Total investments in Augsburg during the 1985-86 fiscal year came to DM 180 million, which is expected to remain around the same during the current year.

12271

Mandelli-IBM Italia: Joint R&D Venture

36980031a Milan INDUSTRIA OGGI in Italian Sep 87 p 30

[Article by Paolo Marasca: "Mandelli-IBM Joint Venture Named Spring"]

[Text] IBM Italia and Mandelli have formed a joint company with 51 percent ownership by Mandelli and 49 percent by IBM's national branch. The new company, named Spring (Studies and Plans for Engineering of the Automatic Factory), will function as a technology center, conducting applied research activities on behalf of producers of machines and equipment for production.

The new company, which combines other initiatives by IBM and Mandelli in the field of factory automation, will be able to provide prototypes, models, and plans to the various producers, and increase both the level of automation and the degree of finishing of the equipment they produce. It will thus be possible to request a plan to update a product through integration of advanced technological instruments such as special tactile and visual devices, and those for voice-controlled processing. Still in this context, it is planned for Spring to participate in research programs that have been promised by national public bodies and organizations of the European Community.

The chairman of the company, which will have its headquarters at Piacenza, is Franco Bernardi, assistant general manager for foreign affairs of IBM Italia. The vice chairman is Gian Carlo Mandelli, chairman of the Mandelli Group. Spring will go into operation during October, and will have total personnel of about 100 employees, coming in part from the two shareholder companies. The research structure will be organized into working groups, selected in relation to the work project acquired, for a period limited to completion of the project.

The initiative, planned on the basis of the experience acquired by Mandelli in the field of flexible automation and by IBM Italia in data processing, is aimed at the market for automation of production processes of manufacturers of machine tools, robots, measuring and testing instruments, robotized warehouses, and, finally, handling systems. The machine tool sector, which includes about 500 companies with almost 29,000 employees, had a turnover in 1986 of about 2.5 trillion lira. As for research and development in industrial automation, the supply of products for the sector challenged technical innovation and organizational capabilities, especially of highly specialized companies like Mandelli and IBM.

Indeed, automated manufacturing is based on products with high technology content, however, it is aimed at a public of companies, especially at small- and medium-size companies and also producers of equipment for production, which normally do not have resources to enable their own research activity. Spring thus offers itself as a qualified intermediary for product innovation and as a partner in research and development capable of adding technical and commercial value to supply of automation solutions.

Further, as regards Spring's sectors of support and research, these involve diverse technological disciplines, ranging from mechatronic to electronic and data processing, from sensing and tactile devices to laser technologies and applications, to alternative production techniques such as optoelectronics and special thermal treatments. There will also be the expert systems and techniques of artificial intelligence. All this means being

able to handle a large volume of data and information, produced by an assembly of microelectronic, mechanical and optical components that is increasingly sophisticated and complex.

And then, in the field of expert systems, there are already available applications for self-diagnosis of programing errors, automatic maintenance, and control of production processes. Finally, through the techniques of artificial intelligence, one can think about transferring typically human functions such as, for example, vision and voice recognition to mechanical means such as industrial robots. Further opportunities in these areas are offered by the programs of research promised on the national level by government bodies (the projects approved by the CNR [National Research Council]) and on the European level by the EEC (Esprit and Eureka), in which Spring intends to take part.

Thus, a structure intended to be, in addition to a research center (also for those that are unable to do it), an intermediary for those seeking quality products. Spring will thus sell research, in work orders, but it will also be open to possible partners, both in capital and research. As for the demand for such a product, both Mandelli and IBM are sure that it exists, and that all that is necessary is to reveal it.

9920

LASERS, SENSORS, OPTICS

CNET Improving Fiber-Optic Transmission

3698A321 Paris FTS—FRENCH TECHNOLOGY SURVEY in English Jul-Aug 87 pp 3, 4

[Article: "Solid-State Photosensitive Cells for Optical Links"]

[Text] A new type of solid-state photoreceptor with an indium gallium arsenide (InGaAs) base for fiber-optic transmission in the 1.3 to 1.6 micrometer wave lengths has just been produced by the CNET-French Telecommunications Research Laboratory in Bagneux. This photosensitive cell associates a p-i-n-structure diode and a junction field-effect transistor (FET) in solid state. In comparison to current p-i-n-FET hybrid photoreceptors for 1.3 to 1.6 micrometers detection using an InGaAs FET, the solid-state structure developed by the CNET will provide improved sensitivity through the reduction in interference capacity on the photoreceptor's inlet.

The production of such a device integrated on a semi-insulating substrate of indium phosphide (InP) presents a certain number of problems. There is no transistor technology for InP and the desired characteristics (doping, thickness, etc.) for the InGaAs material used for the photodiode are not compatible with the production of efficient transistors. The manufacture of a solid-state p-i-n-FET photoreceptor therefore presupposes the definition of specific photodiode and transistor structures that can be integrated on the same substrate.

The original feature of the structure developed by the CNET is that separate optimization of the photodiode and the field-effect transistor is possible. This is possible because an InGaAs multilayer structure is produced by molecular jet epitaxy on the InP substrate. The characteristics of the components are very promising since they give a detection treshold of -33 dBm for a flow rate of 140 Mbit/s. The remarkable transport properties of the InGaAs can be used to optimize the sensitivity and speed of the structure which should become a choice component for fiber-optic transmission especially for submarine links and links with a capacity greater than Gb/s.

MICROELECTRONICS

Philips Reorganization

36980011 Paris ELECTRONIQUE ACTUALITES in French 18 Sep 87 p 2

[Text] At Philips, a "group board" has just been instituted; from now on, for the components, consumer products and datacommunications sectors, it will be the international management organ.

This board will have direct responsibility for production planning, production development, logistics, manufacturing and marketing—for all the national subsidiaries.

These subsidiaries will be retained, but they too will be restructured and their responsibilities will be modified.

The international administrative bodies of the group, in the Netherlands, will also be heavily reorganized.

The new "group board" consists of twelve members.

12666

SCIENCE & TECHNOLOGY POLICY

France Increases 1988 R&D Budget to Boost Competitiveness

36980021a Paris L'USINE NOUVELLE in French 1 Oct 87 pp 4-7

[Article by Marc Chabreuil: "Betting On Companies"]

[Text] After this year's drastic cuts, research will recover its place in the 1988 budget. A financial boost that must be followed by an innovative effort on the part of businesses. It is now up to small and mid-size businesses to keep the ball rolling. That is the price of competitiveness.

R&D expenditures, number of researchers and businesses involved, etc. All indicators are in the red. French industrial research is still lagging far behind that of the

other industrialized countries. This finding, fraught with consequences as far as the competitiveness of our businesses is concerned, caused the government to react strongly and to modify its 1988 budget.

The limits to state disengagement have become apparent; this year, research appropriations were cut drastically. Next year, research will again be a national priority, and the research budget will be accompanied by a series of fiscal measures and measures affecting the various sectors, all designed to irrigate the industrial fabric as a whole. The success of this attempt to boost research is in the hands of the businesses...

We should not expect a rapid reversal of the situation; the disease is too deep-seated. But 1988 will be valid as a test to the extent that we shall know whether or not a boost from the government will be multiplied at company level. Jacques Valade, minister delegate in charge of research and higher education, is optimistic; he expects businesses to increase their R&D efforts by 4.75-5.5 percent, while investments should progress by only 4.5 percent.

With an 8.5 percent increase in commitment appropriations—an exceptional amount for a state that purports to reduce its expenditures- -the R&D budget effort (i.e. all appropriations for this field) would amount to Fr90.2 billion. Military research, which keeps increasing, will alone receive Fr33.3 billion. A considerable amount, 50-60 percent of which will be redistributed to businesses in the form of contracts. In spite of an effort made by the Ministry of Defense to channel some of these funds to small and mid-size businesses, the large groups will be the primary beneficiaries of this manna. The same will be true of "large civilian programs," which get the lion's share: over Fr17 billion will be devoted to the aeronautical, space, nuclear and telecommunications sectors. "Airbus, Ariane, Hermes, etc., will come first, as usual. The 1988 budget does not break with previous trends," Christian Dambrine, general delegate of the National Association for Technical Research (ANRT) regrouping the heads of private research organizations, regretted. "It is true that the civilian budget will increase by Fr4 billion, but 80 percent will be diverted to large programs," he added, wondering in passing whether all of them are of interest to the industrial world.

A direct consequence of this policy is that state money will benefit essentially the larger companies. Thus, close to 68 percent of state financing will go to 64 companies with over 5,000 employees each, and 14 percent to 136 companies with between 2,000 and 5,000 employees; the spinoffs for subcontractors are usually limited to a modernization of their production plant and to the discovery of quality.

At the Ministries of Industry and Research, people emphasized the effort that will be made next year for businesses as a whole, small and large, traditional and "high-tech." "The essential goal of this budget is to develop the industrial applications of research," Jacques Valade indicated. The measures announced last week and those that were submitted yesterday to the ANVAR [National Agency for the Implementation of Research] board of directors are indeed presented as a remedy for the three ills that plague French industrial research: the small number of businesses engaged in research, the lack of communication between public and private research, and the withdrawal of businesses into themselves.

It is a French tragedy that businessmen lack enthusiasm for research; only 2,700 of them, including 1,500 small and mid-size businesses, are engaged in research (that is 4 times fewer than in Germany). With a budget appropriation increased from Fr1.1 billion to Fr1.6 billion, the research tax credit (2,700 beneficiaries) should contribute to improve the situation. The restructuring of the current formula and the implementation of the "experimental R&D tax credit," which will last 3 years and will be based on research volume and, to a lesser extent, on the increase in that volume, should encourage 1,000 businesses per year to engage in a research "experiment"; and to get to like it... The first targets are the small and mid-size businesses on which the ANVAR, which has now changed its orientations, will lavish its attention next year. "1988 will mark the end of the dialogue with the large groups," Christian Marbach, general manager of the agency, said somewhat regretfully; next year, the ANVAR budget will be close to Fr1 billion. Enough, among other things, to offer a bonus of about Fr150,000 to any manufacturer hiring a researcher, and enough to choose an ambitious goal: having 1,000 researchers hired during the first year.

Another roadblock is the divorce which practically exists between the world of research and the world of industry. For decades, they have been opposed in everything: culture, vocabulary, objectives. But money is often helpful in patching up things, and fiscal measures have been adopted. For instance, next year the ANVAR will set aside Fr120 million (Fr40 million this year) for technical centers and research companies working under contract. It will offer them a fixed allowance proportional to a percentage of their sales (about 20 percent). And large organizations—in particular the CNRS [National Center for Scientific Research] would give a bonus of about 1 year's wages to any researcher leaving to the private sector. As for the CIFRE agreements [Industrial Agreements for Training Through Research] (training of the future authors of theses on themes assigned by the companies signing these agreements), they should increase from 360 to 500 per year by 1990. "However, our main objective is to maintain, or even improve, the success rate of these operations which is now 75 percent (for 1,400 agreements)," we were told at the ANRT, which manages the CIFRE agreements.

To strengthen collaboration among businesses and cooperation between industries and laboratories, the ministries will earmark Fr800 million for the EUREKA [European Research Coordinating Agency] program (Fr400

million this year). In addition, Fr1 billion will be paid to the European communities for technolocal programs (ESPRIT [European Strategic Program for Research and Development in Information Technology], BRITE [Basic Research in Industrial Technologies for Europe], EURAM, etc.). These amounts will generate over Fr2 billion in national industrial research. Another operation will also encourage businesses to open up to research: the ANVAR will provide financing of a few thousand francs to any business hampered by a scientific or technical information problem (technlogical watch, bibliographic research, patent priority, etc.).

Make no mistake: what is truly at stake is the competitiveness of businesses. Indeed, France is the only major OECD country whose exports to its partners are dominated by sales of so-called low-technology products. For instance, Germany exports 1.9 times as much high- technology products as we do (and 2.4 times as much medium-technology products). France has relied for too long on exports of turnkey facilities. That was a way to conceal our technological weaknesses under the knowhow of our best engineers.

Today, lacking "wealthy" clients, we must fall back on product sales. But competition is keen; it will get still keener starting in 1992, when the last remaining custom barriers in Europe will be lifted. A preferred way to remedy this situation as soon as possible will be to purchase foreign licenses and patents: these purchases will be included in research expenditures when the tax credit is computed. It is one way to develop innovative products rapidly or to improve productivity. But it is a makeshift solution.

To be ready in the mid-term, the ANVAR will issue invitations for bids on multi-sector subjects which, at present, are hampered by technological roadblocks but for which there is a buoyant market. In particular, Jacques Valade has set up a series of 11 "national programs." Financed by the Research and Technology Fund (Fr930 milllion, i.e. a 23-percent increase), these programs will cover biotechnologies as well as electronics and data processing, technologies and production, chemicals, materials, etc. (see below our interview of the minister delegate in charge of research, Jacques Valade). That way, the government will encourage businesses either to make up for the ground lost in technology, or to retain their leads in promising, or even in strategic, sectors (superconductors for instance).

"In 1988, France will be in the lead among industrialized countries as far as tax incentives for industrial research and innovation are concerned," we were told at the Ministry of Industry. Will that be enough to provide the impetus needed? The ANRT presented bolder proposals (awarding a large percentage of public contracts to small and mid-size businesses; computing the tax credit of smaller businesses solely on a volume basis, etc.). It was not followed by the government, which did not settle the question and did not set priorities.

It remains to be seen whether the government and the businesses really recognize the importance of research; whether manufacturers are willing to prepare the future by investing in laboratories rather than making immediate profits. We shall present a first assessement in one year from now.

[Box, p 6]

Interview With Jacques Valade, Minister Delegate in Charge of Research and Higher Education

Jacques Valade is pleased: he has managed to restore research as a budget priority in 1988. He would like the research effort of businesses to be the primary beneficiary, especially through the 11 large national programs that he will launch during the first quarter, and also thanks to the incentives offered to public sector researchers to transfer to private laboratories. *[Question] You have announced 11 large national programs. When will they be launched?*

[Answer] I intend to go very fast. Some programs being given priority will continue programs started under other names. But we shall launch at least 25 percent of entirely new programs. We have already started with AIDS in July and superconductors in October. Thanks to the redeployment of the ministry's budget appropriations, we shall spend Fr60 million on national programs already before the end of this year. Of the Fr930 million of the 1988 budget, after deduction of our various European, regional and other commitments, close to Fr0.5 billion will be left for our programs. Later on, interministerial credits could be added to this amount. Because our dossiers will be carefully prepared, all invitations to bid for the 11 national programs will be issued already during the first quarter of next year. *[Question] How will these programs operate? And how long will they last?*

[Answer] There will be one or several scientific committees per program, depending on the program complexity. In these committees, we shall have representatives of the industry and of the public sector. The committees will prepare the invitations to bid, issue them, study the projects and submit proposals. After that, the minister will decide. I also expect the scientific committees to assess the results of research done under these programs. These committees will be supported by the Higher Council for Scientific and Technical Research, which will fully play its role of orientation and evaluation.

As for how long these programs will last, that is very difficult to determine a priori. I am in favor of an initial launching period of one year. After that, the scientific committee for the program will assess the results: it will be up to the committee to decide whether the contract has been fulfilled and whether the results expected in that period of time have been achieved.

It will also be up to the committee to decide whether the theme of a program is still current. Indeed, fantastic accelerations sometimes occur in certain fields. In that

case, we may have to reset our goals on short notice, or even to give up subjects whose expected results would be obsolete. After completion of this stage, the program could be developed for a period of 3 years, for instance. I am wary of programs which are perpetuated without anybody ever questioning whether they are actually justified. It is a sound practice to throw them back into question at regular intervals. *[Question] You want businesses to attract researchers. Are researchers ready for that type of mobility?*

[Answer] Strong inertia is prevailing among researchers hired by large civilian research organizations. They are afraid to give up the protection afforded by government jobs. We must therefore find incentives to encourage them to transfer temporarily or permanently to the private sector. To encourage permanent transfer to the industry, we are offering a bonus whose amount has not been fully decided yet. As far as temporary transfers of researchers are concerned, whether from the public sector to the private sector or the reverse, we believe that there is no global solution. The problems resulting from discrepancies in salaries and statutes can however be solved in each individual case, if both sides are flexible. Finally, there are young researchers, for whom the situation is quite different. Public research is not the only solution for them: they can also make a career as researchers in the private sector. It is to enhance the latter possibility that we are trying to increase both the number and the amount of research allocations. *[Question] Is it possible to encourage industrial research without penalizing basic research?*

[Answer] Opposing basic and applied research is now pass. Manufacturers contribute to the effort in basic research. For instance, if it had not been for the major breakthroughs achieved by large groups of companies, as well as by universities, we would not rank as we do among the leaders in superconductivity. Conversely, researchers in large French public facilities have understood that they could increase their resources by getting an industrial group interested in their research.

Therefore, we do not have basic research on one side and applied research on the other. But we do have public research and private research. And since the French industry does not devote enough efforts to its research, compared with its main competitors, provisions were made in the 1988 budget to remedy this competitiveness handicap. Certainly, the increase in the public research budget is only moderate. Major efforts have been made in the past, and I believe that our setup as a whole is performing very well. We must further improve the competitiveness of French research. The representatives of the scientific and industrial community have readily understood that this budget is aimed at reducing the gap between research efforts in the public and in the private sectors. In our country, that gap is still far too wide.

9294

France's R&D Tax Credit Revamped

36980021b Paris ELECTRONIQUE ACTUALITES in French 2 Oct 87 p 2

[Article: "Research Tax Credit Restructured"]

[Text] The research tax credit, which will account for an expenditure of Fr1.7 billion (+45.5 percent) for fiscal year 1988, is about to be extensively restructured.

Among the measures approved, we should mention the creation of a new formula; it is no longer based on the increase in R&D expenditures, but merely on their volume.

From now on and until 1990, companies will be allowed to deduct from their taxes 30 percent of their R&D expenditures, up to Fr3 million. Note, however, that companies which are now registered for the "traditional" research tax credit will have to stay with it and will not be allowed to use the new mechanism. As for the other companies, they may choose whichever formula their prefer.

Other measures were announced: The base used to compute the research tax credit has been expanded to include patents acquisitions, and the ceiling applicable to "external" R&D expenditures has been increased from Fr5 million to Fr10 million in order to encourage relations between the industry and public research organizations. Finally, if the R&D expenditures of a company should decrease for a given year, the company will no longer have to reimburse the corresponding research tax credit.

9294

TECHNOLOGY TRANSFER

Ansaldo Sells Automated Assembly Lines to USSR, PRC 1

36980028a Milan RIVISTA DI MECCANICA in Italian Jul 87 p 344

[Text] The Automated Production Technologies (TAP) unit of Ansaldo Componenti has been awarded three substantial contracts in the industrial and technological field for a total value of more than 16 billion lira.

The first, after international competition with participation also by Japanese, German and Swedish companies, involves supply to the Soviet Autopromimport corporation of a flexible robotized line for production of steam turbine vanes, integrated into a CIM (Computer Integrated Manufacturing) system, intended for the L.M.Z. plant in Leningrad. This order follows a similar one received for the Charkov plant of which delivery was recently completed.

The innovative configuration of the line uses features of the most modern FMS (Flexible Manufacturing system) achievements, with processing stations managed independently by their own control system of dedicated software, coordinated by a supervising system with the function of managing the progress of production and of producing/storing the work programs of the operation stations.

In regard to quality and productivity, the most significant aspects of this line are the use of a robotized laser cutting station, which makes it possible to achieve the perfect geometric location of nozzles, and the use of three robotized stations for vertical welding (Ansaldo patent), which enable increase in productivity and further reduction in dead time.

The second and third contracts are for supply of the following: to the Chinese Shanghai Boiler Works an automatic center for Saw Narrow-Gap welding, plating and grinding; to the Harbin Boiler Works, a similar center and two self-adapting robots for automatic welding of gates of 300 to 1,000 millimeters by the Saw procedure.

These two acquisitions indicate a clear technological choice by the Chinese manufacturing industries, which chose Ansaldo Componenti over the competitors ESAB and Hitachi as suppliers of the processing centers for the new nuclear plants. 9920

Italy's Esacontrol Sells Automation Technology to USSR

36980028b Milan AUTOMAZIONE E STRUMENTAZIONE in Italian Jul 87 p 100

[Text] Esacontrol, the Genoa company of the Selenia-Elsag (IRI-STET) group, which is a leader in the market of automation and control of continuous processes, has received from Ansaldo Sistemi Industriali the order to supply to the Soviet Union the basic automation systems for a steel plant and for three continuous casting lines.

This supply, which is part of the order won by Italimpianti for "turnkey" construction of the Voljski pipe-making plant, is based on the Network 90 system of distributed control, which Esacontrol produces and markets under license from Bailey Controls.

The order was won, not only because of the intrinsic characteristics of the system (flexibility, reliability, redundancy, and self-diagnosis), but also because of the substantial credentials and capabilities that Esacontrol has been able to accumulate in the just over 2 years since its establishment.

9920

COMPUTERS

Hungary's Computer Base, Trade Overview

3698A271 Amsterdam COMPUTERWORLD in Dutch 16 Jun 87 p 9

[Article: "Hungary: Little Hardware But Good Software"; first paragraph is COMPUTERWORLD introduction]

[Excerpts] Amsterdam—In East bloc countries computer distribution is limited. The most liberal East bloc country, Hungary, is no exception to the rule. Often, an entire science department has only one IBM-compatible PC at its disposal. This hardware shortage is in marked contrast with a highly developed software industry.

This is why discussions about the Hungarian automation industry invariably change course whenever the subject of software is broached. Representatives of the Hungarian hardware industry make the frustrated comment that although the equipment is not the latest on the market, it still works well. However, as soon as software comes up they warm to the subject.

They speak enthusiastically about how Hungarian companies are successfully sending staff abroad. Szamalk, which we wrote about in a previous issue of COMPUTERWORLD, and Softcoop are repeatedly mentioned. Hungarian programmers have obvious advantages: They are both cheap and well trained.

However, the quality of Hungarian software cannot be judged by an outsider. An insider would claim that "the future of Hungarian automation lies in knowledge-intensive branches such as custom-made chips, software, and personnel assignment."

Nevertheless, the entire Hungarian computer installed base consists of some 400 mainframes, a handful of DEC-compatible minicomputers, 60,000 IBM-compatible PC's, and an unknown number of Commodore home computers for a population of about 10 million. By comparison, in 1985 some 230,000 people were working on PC's in the Netherlands.

Of the 400 mainframes, some 40 are Western-made, and are usually of the IBM-370 type. The U.S. computer giant's connections with Hungary date from before World War II. The International Business Machines Corporation has had a subsidiary in Budapest since the punch card era. Other Western computer manufacturers, such as ICL and Olivetti, also have subsidiaries in Hungary.

Besides the innumerable Commodore computers, most computers used in Hungary are manufactured in East Europe. Countries behind the Iron Curtain have a single computer brand, UCS. This name is used by the various countries which manufacture computers.

Hungary produces the ES2-10, a minicomputer manufactured by the state-owned Videoton company. Poland and Bulgaria jointly manufacture the ES2-20-30 mainframes, which appear to have run into problems with their disk storage. ES2-1040-57 mainframes are being manufactured in the GDR and—confirming prejudices—these turn out to be the best models of the entire product line. The ES2-1060, a mainframe from the Soviet Union with an extremely bad reputation, tops the range.

Outdated

Balint Bessenyey, marketing manager of the small Hungarian Pont monitor manufacturing company, makes the following comment about the joint computer line: "In Hungary the manufacture of mainframes is decreasing. The Hungarian minicomputer can carry out most tasks which until now required foreign-made mainframes. This is a clear indication that ES2 mainframes are indeed slightly outdated."

Hungary's largest computer manufacturer is Videoton, which also manufactures television sets and radios as well as computers. Almost every Hungarian owns something carrying the Videoton label. From January to March the company's computer division was unable to operate due to a shortage of components. Fifty percent of Videoton's computer components originate from the West and when there is a shortage of foreign currencies, the Hungarian authorities impose a ban on imports from the West.

Import Restrictions

The Szekesfehervar-based Videoton Elektronikai Valalat has a yearly output of some 5,000 PC's, but this figure can vary a lot because of import restrictions.

L. Gelesz, Videoton spokesman, says that the shortage of components due to import restrictions is being solved by replacing Western IC's with Hungarian imitations. The construction of machines may thus be simplified, but the operational quality is matched. "We cannot deny, however, that Hungarian machines are lagging behind the latest developments," the Videoton spokesman says.

Pont, a small manufacturer of monitors, has a different solution to the extreme shortage in foreign currency. Pont produces high-resolution monitors exclusively manufactured with Philips components. A temporary ban on imports has disastrous consequences for the company. By ensuring that part of the production is sold in the West, the company builds up "a small reserve" in hard currency of its own. As for the export of monitors, Pont (meaning "point" in Hungarian) has connections with Philips' Electric Components Export department in Brussels.

Soldering Iron

Pont, a semiprivate company, started manufacturing a monitor line with a small amount of equity capital (about 10 percent) a few years ago. Now its Budapest

plant employs 20 Hungarians, mainly trained in electrical engineering. The greater part of monitor production is being subcontracted. As the regular income of many Hungarians is insufficient, moonlighting provides the much-needed additional income. A popular method is to acquire a soldering iron.

An IBM-compatible Videoton PC/XT costs 18,000 forints in Hungary; it takes an average Hungarian employee 2 and 1/2 years to earn this. A Videoton AT is almost twice as expensive.

Smuggling

The price of a PC is driven up by the import duties levied on its foreign-made components. Even holidaymakers who want to bring along a cheap clone from the West have to pay substantial duties to Hungarian customs. For instance, tourists wanting to import an Amstrad/Schneider bought in the Netherlands for 2,000 guilders will have to pay an additional 3,000 guilders at the border.

Sometimes the demand for computers is so high that companies resort to placing large orders with groups of travelers. Thus, the Hungarian OAD is frequently asked to bring along a number of new computers. Although 30 percent in import duties must be paid at the border, companies are often quite willing to do so to get hold of the most recent computer models.

Components that are easy to smuggle such as cords, cards, and memory extensions are available in abundance on the second-hand market at prices so high that they make Netherlands dealers turn green with envy.

25024

Winning Hungarian Firms Begin Cheap PC Production

25020009a Budapest
COMPUTERWORLD/SZAMITASTECHNIKA in Hungarian No 19, 23 Sep 87 p 1, 6

[Article by Gitta Takacs: "Pressed For Time"]

[Text] When the results of the PPC [professional personal computer] contest published by the OMFB [National Technical Development Committee], the National Materials and Price Office and the Ministry of Industry were announced in February, after almost half a year of impatient waiting, it was stressed even at the press conference that they would systematically evaluate and study the work of the interested manufacturers and vendors, and with wide social publicity, to aid maintenance of the proper level and quality. At the time of this writing the calendar shows the end of August, but however we look at it it is too early for an evaluation and comparison of the PPC's. That must wait until the "favored" machines reach the market....

Of the five "winning" associations of the PPC contest four received import permits in July-August; the fifth has not received a permit yet.

The number of PPC orders of Videoton, scheduled for delivery within 6 months, is around 2,500, and since the first of June they have delivered about 500 machines to customers.

Csepel Electronic is making 500 XT compatible machines within the framework of this contest, and they are sticking firmly to the 159,000 forint price undertaken in the contract. (In the course of our survey we found that there are differences regarding prices and configurations from the data published in the contract, sometimes down sometimes a bit up, which, of course, we note just for the sake of the fact and not as an objection.)

The people at Csepel have finished development of a power unit and have already received an MEEI [Hungarian Electrotechnical Control Institute] certificate but they are not delivering machines with their own power unit because that would further prolong the already quite drawn out delivery time limits. They have accepted about 200 orders; the number of bid requests and reported needs is several times this. (Of course, it is also certain that a good number of the computer purchasers, fed with promises of cheap PPC's, reported needs to several manufacturers at once.)

The members of the Electromodul-SZKI [Computer Technology Research Institute and Innovation Center]-Communications Engineering Cooperative "threesome" are dividing up the tasks according to their profiles. Accordingly the Communications Engineering Cooperative will put the "series" on the market (the MEEI is now testing the prototypes), and the SZKI, in accordance with its business policy, will not sell the machines "bare" but rather will deliver complex configurations in a system, supplied with software and services for demanding customers. PerComp is also manufacturing machines in the assembly hall of the Instrument Technology Small Cooperative. They feel that they will be able to sell 2,500 units without trouble.

But it would not be a truly worthy multi-act "play" without a new dramaturgical turn.... MTA SZTAKI Cosy [Cooperative Systems subsidiary of the Computer Technology and Automation Research Institute of the Hungarian Academy of Sciences] still has only a promise of state support.... It contracted to deliver 200 XT's and 100 AT's in mid-winter, primarily to supply Academy research institutes. Since then a contest connected with the informatics infrastructure and announced within the framework of the National Scientific Research Fund has concluded, they are working primarily on research programs for the Seventh 5-Year Plan, and they would need the computers. But the researchers can now investigate—as they would say—the causes of their being put into the background....

Wherever the PPC affair is discussed the word mentioned most frequently is "time." They must produce within 3-4 months the machines which they had planned to manufacture in 8-10 months. And the computers must be put into operation too. In some places the question has been raised whether the market is really so hungry as to be able to consume a series larger than planned in the last 1-2 months of the year. Is it possible that the year-end inventories of the manufacturers will be raised by a few hundred units? In the meantime the purchasers, who longed for the appearance of cheap prices for almost a year, are counting the weeks and months before they get their machine (or machines).

Everyone is pressed for time. Everyone?

The market adjustment resolution of the Economic Committee appeared at the end of July last year; those judged to be involved were informed of the contest in September; who was to be "favored" was decided in February; and they got the support in mid-summer—those who got it....

Allegedly computer technology is the most swiftly changing, developing area of industry.

8984

FACTORY AUTOMATION, ROBOTICS

GDR Uses CAD Workstation for Factory Layout, Planning

26020001a Warsaw PRZEGLAD MECHANICZNY in Polish No 12 1987 pp 22-24

[Article by Hans Schmagilla et al.: "Analysis and Planning of the Layout of Technological Facilities: Using CAD-Compatible Photogrammetry for Layout Planning" (Footnote) (Prof Dr Hans Schmigalla, Dr Eng Werner Faulhammer, Engineer Harald Schreiber, and Engineer Andreas Korittnik work at the Friedrich Schiller University in Jena, GDR). Article translated into Polish and edited by Engineer Adam Rogowski on the basis of the paper "Special Solutions of Computer-Aided Layout Analysis and Design," presented at the Sixth Scientific Conference on Computer-Aided Design, Rydzyna 1986]

[Text] The database and software package for a CAD workstation (graphic data input device — a digitizer, a personal computer, and an x-y plotter) at the Friedrich Schiller University in Jena are adapted for layout planning on the basis of a dialogue between the designer and the computer. This interactive dialogue is accomplished with the aid of a special digitizer menu program. The present article describes a method for programmed menu-function conversion as exemplified by a program for analyzing the layout, input, or manipulation of objects.

The design workstation is equipped as follows:

— a CZ-MS U 880 modular computational system with a monitor and disk drive;

— a SKR E 100 computer with a monitor, a tape recorder, a disk drive, and punch-tape reader;

— an HDK K 6401 digitizer;

— a DZT 90x120 RGS plotter;

— a printer, a menu, templates (Fig. 1).

The CAD workstation is a functional whole. It is divided into sectors corresponding to standard design task complexes. Sector 1 comprises alphanumeric interactive dialogue with the computer, the preparation of alphanumeric design documentation, and other forms of text processing; sector 2, alphanumeric dialogue on the SKR computer; sector 3, interactive analytic dialogue for analysis and planning of graphic design documentation; and sector 4, graphic output (production) of design documents on the plotter or printer.

Input and Manipulation of Floor-Plan Components

The concept of floor-plan components is construed here to mean two-dimensional models of technological facilities, e.g., models of machine tools, linking and feeder components, storage and transport facilities, office and factory equipment, and construction installations (Fig. 2).

Computer-aided designing of floor plans consists of the following stages:

— feeding of floor-plan components into memory, combined with recording their parameters in a permanent database that is independent of any particular project;

— extraction of data from the permanent database for the needs of a particular project;

— manipulation of floor-plan components;

— monitoring the positions of the floor-plan components.

Two-dimensional models represent the minimal graphic description. The model elements are: polygon, arc of a circle, text, and symbol. For polygon and arc-of-circle models two different line thicknesses are distinguished with respect to continuous, dashed, single-dot, and double-dot lines.

Symbols are construed as uncomplicated composite structures that recur frequently, e.g., symbols of workstations, reference points, etc. The models may be fed into the computer memory with the aid of the keyboard or the digitizer.

Keyboard Input. The input dimensions of the two-dimensional model are determined in a particular manner, either by means of measurements or by pasting the model onto millimeter-graph paper. The coordinates thus derived are fed to the computer by means of a corresponding interactive procedure of the data input program. The dialogue is menu-driven. The menu asks the user to select a particular model element and line type. The accuracy of all the recorded coordinates is correct to 0.05 mm.

Digitizer Input. The user-computer dialogue is conducted by means of menu templates placed on the digitizer (input) and monitor (output). Measurements of the object are fed in by means of the digitizer in which the corresponding coordinates are recorded with the aid of the probe (cursor).

The software includes an algorithm for equalizing the perpendicularity and parallelism of polygons within the line-thickness tolerances, or in relation to the identify of the points linking various model elements, e.g., the transition from an arc to a polygon. The digitizer assures an accuracy within 0.05 mm.

The recorded models are stored in the source database (a standard double-sided diskette can store 1,000 average models — about 0.35 kilobyte per model). The name of the model serves as its identifier in the database. Graphic corroboration of identity of the stored models by means of the plotter or the graphics monitor is possible.

Manipulation of Floor-Plan Components. Manipulation is construed here as deliberate mutual alignment of discrete two-dimensional models. The manipulated floor-plan components must first be transferred from the source database to the database linked to a particular project. Floor-plan manipulation includes the possibility of graphic verification (display) of every object manipulated and its recording on the ordering list. Three principal kinds of manipulation are distinguished:

— new ordering of the object (object of the same name is relocated);

— repositioning of the object (object is ordered in a new position);

— elimination of the object (from the ordering list).

The manipulation is performed with the aid of the keyboard or the digitizer. First the name of the object to be manipulated is given, or it is identified by "pointing" to a model. Following the selection of the kind of manipulation the position of the model is defined (by specifying a reference point and angle or by fixing on the digitizer a reference point and one auxiliary point).

Application of Photogrammetry

As the proportion of rationalizing and redesigning projects increases, it is necessary to construct databases for recording existing equipment and facilities as well as their positions inside buildings. Using CAD-compatible industrial photogrammetry provides a means for reducing the time-consuming conventional input of information on objects and their positions, as well as for utilizing the thus obtained information for further processing in combination with automatic plotting.

Photography of Objects. Bird's eye-view photographs taken with the aid of conventional cameras provide pictures of the outline of the photographed objects. This produces the division of the image on the basis of a comparison of mutually corresponding distances in the object and in its image (Figs. 4 and 5). The procedure may be as follows:

— planning the photographs (identification of objects to be photographed, selection of camera, determination of auxiliary equipment, determination of sites of photography);

— identification of "points of fit" (for an unambiguous ordering of the obtained images);

— photographing.

In the case investigated (factory room, 150x18x7 m) 50 photographs were taken. Two persons took 4 hours to install camera and fix "points of fit" plus 5 hours to perform the photographing.

Using Floor-Plan Photographs. The contours on each photograph, with each contour corresponding to a particular purpose of the analysis, are recorded with the aid of the digitizer and stored in the memory, or are used as the basis for plotter printouts (Fig. 6). A semantic utilization of the floor-plan photographs also is possible. With the aid of metric analysis, databases recording the position of the facility can be established. The program prepared performs metric analysis of floor-plan images and their design, until complete drawings are obtained by means of special techniques used in geodesy.

Owing to the computer-aided use of photogrammetric images, considerable progress in floor-plan analysis is possible, chiefly owing to:

— minimal interference with ongoing manufacturing processes;

— computer-aided selective recording of measurement data;

— simultaneous processing and recording of the measurement data corresponding to the plant database;

— marked reduction of data-recording and -conversion time.

The proposed solution makes it possible to dispense with the use of special cartographic equipment and is based on special software that allows linkage to model-design programs.

Fig. 1. CAD Workstation. 1 — graphics monitor; 2 - graphic data input device; 3 - alphanumeric monitor; 4 - keyboard; 5 - central unit; 6 - external disk drive; 7 - plotter; 8 - printer; 9 - punchtape reader; 10 - magnetic tape reader.

Fig. 2. Input Elements: a) Two-dimensional model of a machine tool; b) sketch of factory room

Fig. 3. Alignment of Cameras. Camera 1; camera 2.

Fig. 4. System of "Points of Fit"

Fig. 5. Plan of Photographs With the Loci of Cameras Marked

Fig. 6. Floor-Plan Obtained With the Aid of the Plotter

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1386

MICROELECTRONICS

Hungary: Microwave Transmitter, Receiver for Distance Meter

25020013 Budapest FINOMMECHANIKA, MIKROTECHNIKA in Hungarian No 6-7, 1987 p 161-168

[Article by Dr Imre Mojzes, Dr Karoly Kazi, Dr Adam Tichy-Racs, Dr Imre Gyuro and Zsolt Horvath, of the Technical Physics Research Institute of the Hungarian Academy of Sciences: "Development of a Microwave Transmitter-Receiver Assembly For Use In Distance Measuring Equipment—An Applications Example from Microwave Technology"]

[Excerpts] Summary

As a result of the GaAs based microwave semiconductor development started in 1972 we are now producing efficient and powerful Gunn diodes, varactor diodes offering favorable tuning parameters and Schottky mixing diodes with a small noise factor. We use all three devices in a microwave unit for a distance meter. The article describes the microwave unit and the technological and theoretical information needed to produce these devices.

Introduction

Exploiting the possibilities offered by domestic development of gallium arsenide (GaAs) based devices we developed a microwave movement sensor, a drop counter for blood clotting measurements, a university demonstration device, a microwave vehicle sensor and a microwave measuring device suitable for grading absorbent materials.

These did not require new, special semiconductor devices; the parameters of devices developed earlier proved suitable for the requirements.

Microwave distance measurement is a promising use of microwave technology. In this case the distance measurement does not take place by using the radar principle but rather one uses a specially developed signal modulated at several frequencies to measure the distance between three devices according to the so-called triangulation method.

Because of the curvature of the Earth the distance meter is placed on a 30 meter high mast. The special use area of the equipment poses the following requirements for the MK-1 microwave assembly being developed and for the semiconductor devices used in it:

- —good efficiency, relatively small power use;
- —great temporal stability, reliability;
- —exchangeability of one with another;
- —extreme climatic parameters;
- —small weight.

These requirements made necessary the development of new semiconductor devices which required the high level solution of a number of materials science tasks in the areas of both basic material and device technology.

To solve these tasks we developed a very efficient Gunn diode, a linear tuning varactor and a low noise Schottky LID diode and then using these we built a Gunn oscillator and a microwave mixer. We realized all these devices using GaAs epitaxial wafers we produced ourselves and using or perfecting device technology steps created earlier.

7. Summing Up

Our achievements can be summarized as follows:

—We created an epitaxial technique which can be reproduced well by using equipment which can be obtained commercially.

—We developed a very efficient Gunn diode.

—We produced an LID Schottky diode with a small noise factor.

—We developed a low loss varactor diode with good tuning properties.

—Using the above elements we produced a modern microwave assembly satisfying the most modern technical conditions.

8. An Expression of Thanks

We express our thanks to the colleagues of the Geoplotting Department of MOM [the Hungarian Optical Works] for the cooperation offered during development.

We owe thanks to Karoly Somogyi for his work in producing the epitaxial films, to Dr Balazs Kovacs, Mrs Tibor Nemeth and Dr Bela Szentpali for their work in developing the semiconductor devices, to Ferenc Csanyi and Laszlo Dobos for their work in developing the assembly, to Sandor Biro and Robert Veresegyhazy for their work in developing the computerized measurement program and to Istvan Jaszberenyi and Antal Olah for their work in assembling and aligning the assembly.

We especially thank the leaders of the Institute, Academician Elemer Nagy, director, and Dr Ivan Szep, scientific deputy director, for their scientific support and attention, and Istvan Horvath, economic deputy director, and Gyorgy Reisinger for their technical-economic support and attention.

8984

Electronification Seen Essential to Hungarian Industry

25020018 Budapest FINOMMECHANIKA ,MIKROTECHNIKA in Hungarian No 9, Sep 87 pp 257-258

[Unsigned report: "Forum Concerning the Electronification Economic Development Program"]

[Text] The forum was held on 25 June 1987 at the headquarters of the MTESZ [Federation of Technical and Scientific Associations].

We reported about the forum in our "News and Novelties" column, Issue No 8, 1987. We publish below brief extracts from the speeches and comments voiced. The speeches and comments would practically fill an entire issue so we can publish only a fraction of what was said. We ask the speakers and our readers to forgive us if what we stress is subjective. The texts of the speeches given are available in our editorial offices to those interested.

The forum was organized by the MTESZ, the Ministry of Industry, the Central Statistics Office, the Electronics Office of the Hungarian Chamber of Commerce, the Central Committee of the Hungarian Communist Youth Federation, the Hungarian Post Office, the Ministry of Culture, the National Technical Development Committee and the National Council of Trade Unions at the initiative of the MTESZ committee sponsoring electronification.

The list of those participating in organizing it is enough to illustrate the timeliness and manifold influence of the theme.

The forum was opened by Janos Sebestyen, deputy chairman of the OMFB [National Technical Development Committee].

After greeting those present he said:

"I would like to emphasize that the purpose of this forum is to give us and allow us to give an overview of domestic electronification efforts on the basis of the results thus far in realizing the electronification economic development program. The organs guiding the main areas of the program and those sitting here on the presidium will answer the questions of those present and together with you we would like to discuss the future tasks of domestic electronification and the conditions for implementation.

"The fact that such a government program as this is being discussed in the headquarters of the MTESZ in the presence of representatives of the MTESZ, the SZOT [National Council of Trade Unions], the Chamber of Commerce and the KISZ [Communist Youth Federation] indicates the social background of and the significance of the social background in electronification and therein the responsibility, interest and possibilities of the experts gathered in the MTESZ for the acceleration of technical development in this area and for making electronification more effective."

This was followed by an opening address by Academician Dr Tibor Vamos, from which we extract the following:

"The Electronification Economic Development Program (hereinafter the EGP), with the programs associated with its various aspects, is the largest government program now under way. If we compare the EGP with the activity of countries incomparable with us in research, development, investment and conquest of markets then it appears to be a very small program. If we note that the government has decided on a number of measures which significantly support this area out of the limited material resources available then we are talking about a sum no longer small.

"We are struggling with incredibly serious contradictions in this area. It is completely clear that we must take cognizance of electronification as a user country; this became a truly strong motive when it was discovered that agriculture and industry are impossible without electronification. At the same time we should also recognize that with such an electronics industry as Hungary has there is relatively very little hope of success on those markets where we have real import needs, from which we can import higher technologies and higher quality semifinished products. This puts a gigantic burden on the country, because our export market is made up primarily of countries which on the one hand have less ability to pay and on the other hand pay with goods which in general do not raise our technological level. And we can be competitive even on these markets only if we increase our import. So it cannot be said that we should concentrate all the existing and ever decreasing resources of the country on this area, which could cause additional serious problems in an indirect way, given our structural problems, because we would have to deal with them and there is a question as to what size they would assume. In general we have to pay for import shipments out of areas which are pulling back their low yield conservative structures. This is one of the most serious contradictions for further development. I could go on. All this shows that the task cannot be approached in a simple way with simple arguments. It is also characteristic that there is a debate in Hungary regarding small plants versus large plants. We should recognize that smaller plants and small undertakings have a role in a number of ways in the area of electronification. True enough, but the truly significant forces in electronification are wielded by multinational enterprises compared to which even the largest Hungarian plant is a dwarf—at least it would count as a small plant, primarily if we approached the question not from the side of number of employees but rather in regard to how many dollars the total product would represent per year on a competitive world market. Our additional debates and problems include the extent to which we can create an assembly industry in Hungary and what weight we should put on the parts industry, as the 'heavy industry' of this area. It is clear that we should not be entirely at the mercy of others, and this applies to parts too; we should not be entirely at the mercy of others in electronification in any way, so we cannot undertake to cover the domestic needs exclusively from import in the long run, however uneconomical domestic production is, however uneconomical the volumes are, however uneconomical the export possibilities are.

"Last but not least one of our most serious economic and economic policy contradictions is the question of the short and long run. From many viewpoints it is obvious that the problems which can be solved in the short run are the more significant, but there are also long-range goals, not least of all in the area of education, and this applies not only to higher education but also to the education of the entire nation, where we must look ahead, not 10 years but rather 20, 30, 50 years."

In the name of the editors we would like to join here with what Academician Tibor Vamos said in connection with education. Several members of the editorial committee participated in the committee organizing the Electronics Technology'87 Symposium. At the request of industrial experts the organizing committee decided to organize a round-table conference concerning the training of electronics industry experts within the framework of the symposium. We completely agree that education must receive special treatment from every viewpoint in our short and long-range programs.

With its fellow associations the OPAKFI [Optics, Accoustics and Film Technology Association] is placing great emphasis on aiding the training of electronics experts. We make this reference here because it is organically linked with the material of the special issue on the symposium in regard to the question of education.

In our next issue we will publish excerpts from the speech of Laszlo Pal, chief of a main group in the OMFB.

8984

Design of Microwave Power Meter Head With Semiconductor Diodes

55003001b Budapest HIRADASTECHNIKA in Hungarian No 8, 1987 pp 357-367

[Article by Dr Gabor Matay, Microwave Communications Engineering Faculty of the Budapest Technical University: "Design Considerations for a Semiconductor Diode Microwave Power Meter Head"]

Excerpts] Summary

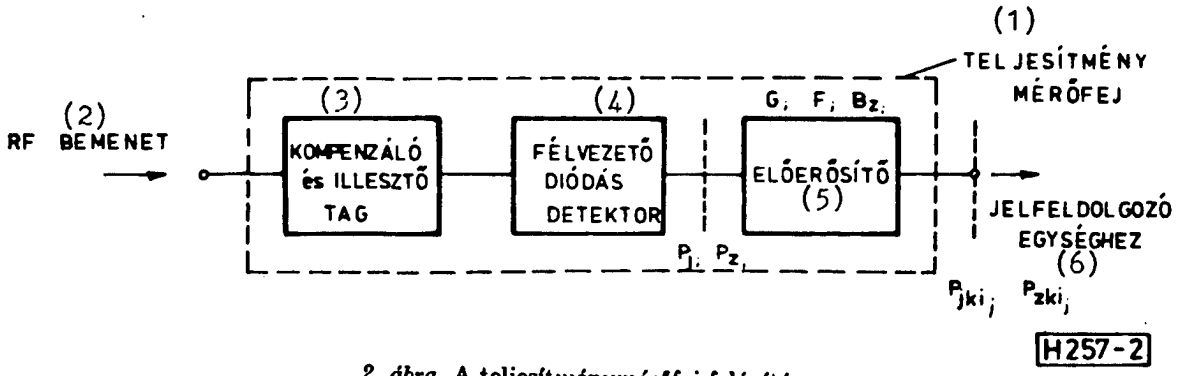
The article discusses design questions for broad band semiconductor diode power meter heads. It deals in detail with an analysis of the detector used as meter transformer and examines the effect of the cut-off resistance of the detector on the dyanamic range and on the limit sensitivity of the meter head. The results obtained facilitate the design of broad band detectors and diode power meter heads.

3. Design of the Power Meter Head, A Discussion of Questions Arising In the Course of the Design

The designing of a power meter head can be broken down into the designing of a broad band detector and the designing of the subsequent pre-amplifier on the basis of Figure 2.

Designing of a broad band detector can be done in the following steps:

—selecting the type of microwave diode, —selecting the structure of the detector (serial or parallel diode detector) and deciding on the method of biasing, —optimal selection of the direct current cut-off of the detector in the interest of attaining the greatest level range, —



2. ábra. A teljesítménymérőfej felépítése

Figure 2. Structure of a Power Meter Head

Key:
1. Power meter head
2. RF input
3. Compensating and matching member
4. Semiconductor diode detector
5. Pre-amplifier
6. To signal processing unit

determining the input impedance of the detector, — designing the compensating and matching stage, — studying the temperature dependence, and —deciding whether the meter head should contain a one or two diode detector.

The next step is design of the pre-amplifier and the mechanical design of the meter head.

Carrying out the above designing procedure requires an analysis of the detector on the basis of which one can determine the output voltage and optimal direct current cut-off resistance of the detector, its dynamic range and the temperature dependence of its output signal. In the course of the analysis, in the interest of a simpler discussion, the determination of the above characteristics will be done at a low frequency, at which the detector can be regarded as a voltage controlled device. When determining the frequency dependence of the output signal of the detector and when designing the compensating and matching stage we will take into consideration the internal impedance of the RF signal source by presuming that $Z_g=Z_0$. We will not discuss the designing of two diode detectors (which can be inferred from the designing of two single diode detectors) but will summarize only their most important properties.

When determining design factors for the pre-amplifier we will study the signal-noise relationship of a system consisting of a preamplifier and a detector having a direct current cut-off resistance which is optimal from the viewpoint of the dynamic range.

We will not discuss questions of mechanical design because this might far exceed the frameworks of this article.

6. The Devices Constructed and the Measurement Results

The theoretical questions arising in the course of designing a semiconductor diode power meter head were cleared up.

Using the theory which figures in the article and using the computer programs prepared we designed broad band detectors and a meter head for a narrow band power-density meter.

The meter head for the power-density meter consists of a two diode (2 x 1ST 1403 G) detector and a low noise pre-amplifier. Because of the narrow band operation (2450 MHz plus or minus 100 MHz) the matching of the detector diodes took place with a matching stage which can be regarded as loss-free. The input standing wave ratio of the meter head is r equal to or less than 1.45 in the operational frequency range. Its dynamic range is 43 dB; its sensitivity is -53 dBm in the 10 Hz video bandwidth as measured by the DC meter amplifier of the power-density meter. A photograph of the meter head can be seen in Figure 16.

A photograph of one of the broad band detectors built can be seen in Figure 17. The detector operates in a frequency band extending from 30 MHz to 4 GHz and it has a matching-compensating stage with the structure which can be seen in Figure 14. Its input standing wave ratio is r equal to or less than 1.35; the frequency dependence of the output signal is less than 1.5 dB; its dynamic range is 40 dB; its sensitivity is -48 dBm (measured with a selective amplifier with a mid-band

frequency of 1 kHz and a band width of 40 Hz). The 1ST 1403 G diode of the TKI [Telecommunications Research Institute] was also used in the detector.

On the basis of the measurement results it can be established that with optimal selection of the video side cut-off resistance the upper limit of the dynamic range can be increased by about 9 dB (the upper limit is -18 dBm in the case of a cut-off resistance of a few Mohm), although this value falls short of the theoretically calculated 13 dB. It was also proven by experiment that in the case of R_{opt} one gets the highest value for the upper limit of the dynamic range.

The measurement results for devices built with a point contact diode justify the theoretical results obtained in the course of the analysis, so we plan to build in the future a two diode power meter head working with a zero bias Shottky diode.

Biographic Note

Dr Gabor Matay obtained his electrical engineering degree at the Budapest Technical University in 1967 and his microwave special engineering degree in 1970. He defended his university doctoral dissertation in 1975, the theme being "Design of medium power UHF power dividers with special regard to reducing the geometric dimensions."

He has taught at the Microwave Communications Engineering Faculty of the Budapest Technical University since 1967. He is a university assistant professor. He is co-lecturer for the course "Microwave Measurements and Instruments," in the microwave branch he is responsible for the course called "Theme Laboratory," and he is organizer of the branch laboratory activity. He teaches "Measurement and Instrument Technology" in the special engineer's program. His research areas are CATV systems, high frequency radiation measurement, UHF and microwave circuit technology and high frequency measurement technology.

8984

TECHNOLOGY TRANSFER

Austria Tightens Technology Transit Laws

80202042 Vienna DIE PRESSE in German 7 Oct 87 p 9

[Article by Herta Scharsach: "Transit to be More Tightly Controlled; Better Access to High Technology"]

[Text] Vienna—By further amending its foreign trade legislation, Austria now wants to ensure access to modern development in high technology and more rapid implementation. After the beginning of the year export licences will be required from the Ministry for Economic Affairs for those technology products which will be listed in the foreign trade law, even when Austria is merely a "transit station" for processing (temporary import trade) or marketing (restricted trade). In so doing Austria—following the example of Sweden and Switzerland—wants to close the last loopholes for prohibited technology shipments, for instance to the East.

As early as 1985 Austria complied with the wishes of the Unites States and embodied in its foreign trade laws the requirement for international import certificates and sanctions providing for prison sentences up to 2 years, as well as fines of up to 360 times the defendant's daily income. The export license requirement was extended to cover computers and replacement parts for them.

Austria is now taking the second step, announced by Minister for Economic Affairs Robert Graf after his visit to the United States. An initiative proposal by the government parties was introduced in Parliament and is to be discussed on Thursday in the Finance Committee. Since expert opinion is not necessary, the new regulation could take effect on 1 January 1988.

In present practice the domestic importer applies to the Ministry for Economic Affairs for an import license that often is also needed by the U. S. exporter for his customs declaration. Re-exportation of the imported goods to third countries needs only the approval by the domestic Ministry of Economic Affairs in the form of an export license. Above all for exports intended for the East the U. S. supplier in some instances had to get permission from the U. S. Commerce Department and sometimes even from the U. S. Defense Department.

If the goods were further distributed domestically, the buyer had to certify that no re-exportation was planned without permission from the Ministry ofb Economic Affairs. This will no longer be necessary. Instead, the foreign trade law was expanded by an extensive "Appendix C," which includes all the technological products for which future export licenses must be obtained. These comprise about one-tenth of all technological exports, according to an estimate by the export companies. Listed there besides computers, various other equipment and accessories, are also optical glasses and hydraulic fluids.

In the future the licenses must be obtained for both export and transit traffic. Customs authorities will not only be urged to check the licenses but can also require expert opinions.

According to Walter Ertl of the Federal Chamber Department for Trade Policy and Foreign Trade, the advantages of the new regulation lie primarily in the "psychological area." In the future Austria could save the additional license by the U. S. Defense Department. For re-exportation "general permits" could henceforth eliminate further inquiry to the Cocom [Coordinating Committee for East-West Trade Policy, a NATO body] nations. The United States, Japan, Canada and European countries have formed the Cocom group and founded a coordinating committee for multilateral

export control. The requirements for further inquiry are likely to remain for certain exports to the East, however. It will become easier than before for domestic firms to obtain "collective licenses" for import products instead of time-consuming individual permits.

According to information by the Manufacturers' Association, one is interested in having the law passed as quickly as possible.

11949

Poland Acquires Computer Parts from Taiwan

26020004a Warsaw ZYCIE WARSZAWY in Polish 16 Oct 87 p 2

[Article by (b.k.): "What Can Be Bought at the Science Department Store: Computers That Are 'Tailored to Measure,' Laser Printers"]

[Text] (P) (Own information). The computer market in Poland is, after the vegetable-fruit and flower markets, the third open market on which private initiative is decisive to the volume of sales and prices fall in proportion to meeting the demand.

One and one-half years ago the Computer Technology and Research Automation Center made its appearance on that market. This Center is part of the Science Department Store, a company established by the Polish Academy of Sciences. Currently a 32-bit computer assembled at the Center can be viewed at the hardware and software exhibition. That computer had its world premiere in the United States in 1986 and was exhibited in Europe at an exposition in Hanover and subsequently last May simultaneously in Singapore and Warsaw.

"This year we have greatly reduced the barrier separating the computer equipment used in Poland from the high-class equipment produced abroad," the Center's staff declared.

Computers assembled by the Center's staff already are operating at 300 institutions in Poland. The largest number, more than one-half, is used at research institutes, chiefly those of the Polish Academy of Science. Some were acquired by POLRES for ticketing reservations in domestic and foreign transportation, and several score are used by industry.

Professional computers assembled at the Computer Technology Center are based on parts supplied by the ACER Company in Taiwan, a company whose standing on the Far Eastern market is equal to that of the American IBM company. Only components, not entire computers, are being acquired from it. Discrete modules are so selected as to assure considerable flexibility of assembling.

Piotr Kuznicki, deputy director of the Center, terms it "tailoring to measure." The inner configuration of computers is adapted to the needs of the particular user. Discrete modules may be, like Lego blocks, assembled into computers suited to the most varied applications — for office needs, for control of experiments in solid-state physics, or for industrial process control. Such multifunctionality of discrete subassemblies helps to reduce the prices of hardware, which in Poland are still very high.

To assure a high quality of the purchased modules and their adaptation to the needs of Polish users, regular contact is maintained with the producers in Taiwan and Singapore. The same components are tested concurrently at these companies and at the Computer Technology Center in Warsaw.

The team which put the Center into operation came from the Institute of Physics, Polish Academy of Sciences. These computer scientists had at one time faced the computational barrier. They could no longer work with the computer hardware they had used till then. More sophisticated research programs required using computers for several or even a score hours at a time, which these old computers were not capable of. It was thus necessary to acquire computers with greater computational power.

The current staff of the Science Department Store commented, "We said to ourselves that that equipment is no good anymore, that computers comparable to IBM ones were needed. But the Institute of Physics could afford neither purchasing suitable computers nor assembling them. Hence we set up a major enterprise as part of the Science Department Store."

After a year, 20 staff members brought on a situation in which the computers they have sold are being operated by 300 different users. They provide free training for two persons with every computer sold, along with bundled software, free access to software libraries, and expert servicing that includes installation, repair, and maintenance.

At the exhibition opened at the Institute of Physics, Polish Academy of Sciences (Al. Lotnikow 36, Warsaw) one could view not only the 32-bit ACER 1100 computer but also multi-user systems assembled in Poland and such high-technology peripherals as a laser printer and networking systems.

For just one year of the Center's operation, that was a lot to accomplish.

1386

TELECOMMUNICATIONS

Transmission Impairments of Data With Tandem PCM Channels

5500300la Budapest HIRADASTECHNIKA in Hungarian No 8, 1987 pp 345-351

[Article by Andras B.-Kiss, Postal Experimental Institute: "Effect on Speech Band Data Transmission of Transmission Quality Deterioration of Tandem Linked PCM Channels"]

[Excerpts] In connection with the work of the CCITT we performed measurements to determine what effect the transmission characteristics of tandem linked PCM channels had on the data transmission error rate. In what follows—after a brief review of research connected with the theme—we will describe the results of measurements done with tandem linked PCM channels between data modems using different modulation systems (FSK, PSK, DPSK) and various speeds (1200 bit/s and 2400 bit/s).

4. A Study of the Link Between the Data Transmission Error Rate and the PCM Channel Characteristics

In the course of our studies we tried to get as clear a picture as possible of the effect of individual PCM characteristics on the data transmission error rate, but neither could we ignore the combined effect of them. In order to eliminate accidental quality deterioration (e.g. exchange pulse noise, line breaks) we connected in tandem the channels of two 30 channel (CMB-30) PCM adapters under laboratory conditions.

4.1. Tandem Connection of the PCM Channels

In the case of the CMB-30 adapters available to us it is not possible to switch to four wire operation of the channels but in order for the inversions created when linking several PCM channels and the increased insertion attenuation not to limit data transmission only four wire operation is suitable. So we connected together by the proper poles the impedance simulating points and the two-wire points of the 2/4 wire terminating units of the PCM channels, ignoring the impedance simulating element of both terminations at the place of connection (see Figure 1). In this case the hybrids act as a simple transformer.

4.2. Measuring the Quality Characteristics of the Tandem Linked PCM Channels

We monitored the quality characteristics of the PCM channels in accordance with what is set forth in Recommendations G.712 and M.1020 in the case of tandem linking of a maximum of 18 channels. The boundary limits suggested in Recommendation G.712 were intended for speech, but by monitoring them we can get a precise picture of the quality deterioration deriving from tandem linking of the PCM channels and of how this influences the data transmission error rate. For the studies we used the HP 3776A PCM Terminal Test Set and the Wandel und Goltermann group run time distortion (delay-frequency distortion) and attenuation distortion measuring instruments, which we connected to the transmission and reception points of the arrangement seen in Figure 1.

4.2.1. Attenuation Distortion Measurement

We set the PCM channels so that their residual attenuation together with the measuring hybrids should be about 1 dB at 810 Hz.

We have shown (Figure 2) the deviations, compared to the residual attenuation, measured at f=810 Hz in the band together with the attenuation limits given in Figure 1 of Recommendation M.1020. In our case the limits suggested in the Recommendation were still met when connecting five PCM channels, but increasing the number of channels further causes peaking.

4.2.2. Changes in Amplification as a Function of Input Level (Linearity)

Two methods figure in the recommendations to study amplification change (delta G) as a result of changes in input level. According to one method, if we apply white noise between the -60 dBmO and -10 dBmO levels to the input of the channel then the amplification change of the channel compared to the amplification belonging to the -10 dBmO input level should fall between the mask boundaries shown in Figure 3.

According to the other method, if we apply a sinusoidal signal between -55 dBmO and +3 dBmO between 700 Hz and 1100 Hz (e.g., f=810 Hz) to the input of the channels then the amplification change compared to the -10 dBmO input level should fall between the mask boundaries given in the literature.

We performed the measurements with both methods, but we have shown in Figure 3 only the results of the measurements done with white noise because there is no substantial deviation between the two. With an increase in channel number the amplification change is greater in the lower (under -40 dBm) level range, but this does not influence the data transmission.

4.2.3. Noise Measurements

In Table 1 we have summarized the noises of an empty channel (weighted and a single frequency) and a loaded channel (with the noise measurement tone) and the results for noises deriving from intermodulation distortion. The weighted noise values refer to psophometric weighting, the limit value of which can be -65 dBmO, according to Recommendation G.712. The single frequency noise in the empty channel is the level of noise measured selectively at 810 Hz, which should not exceed -50 dBmO.

Table 1. Results of Noise and Intermodulation Distortion Measurements. (Row A gives the number of PCM sections; row B is the measurement of psophometric noise, dBmOp; row C is the measurement of selective noise, dBmOp; row D is the measurement for noise plus tone, dBmOp; and row E is the measurement of intermodulation distortion, dB. All figures are negative figures.)

A	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
B	79	75	72	70	70	69	69	69	68	68	67	66	66	66	66	65	65	65
C	95	90	86	84	84	84	84	84	83	83	83	82	82	82	82	82	82	82
D	41	40	37	35	34	33	32	32	32	31	30	30	30	30	29	29	29	29
E	47	45	42	39	38	36	35	34	34	33	32	31	30	30	29	30	29	29

When measuring the loaded channel a 0 dBmO input level 810 Hz signal is given to the channel and, filtering out at the output, we get the value of the psophometric noise produced by the signal.

We measured the intermodular distortion with the two tone method (470 Hz and 620 Hz; P_{in}=-4 dBmO) the prescription for which is that the PCM channels cannot produce a $2f_1$-f_2 intermodulation product the level of which is greater than the level which is under by 35 dB one of the levels of the two input signals.

It can be seen from the table that even in the case of connecting together 18 PCM sections the psofometric and single frequency noise recommendations are met, but the intermodulation distortion permits connecting together at most six sections.

4.2.4. Phase Jitter Measurement

We measured jitter with an "A" (20-300 Hz) and a "B" (3-300 Hz) filter. Figure 4 illustrates the results of the measurement for the maximum 18 PCM channel case, according to which the value of the phase jitter does not exceed the 10 degree or 15 degree values cited already in point 3.3.

4.2.5. Quantization Distortion and Pulse Noise Measurements

We have drawn the values of quantization distortion measured with noise into the mask from Recommendation G.712 (Figure 5). It can be seen from the figure that the signal/distortion deterioration develops according to a 10 lg N interdependence, where N is the number of channels connected in tandem.

We measured the pulse noises deriving from quantization distortion with the method described in point 3.5. Applying a 0 dBmO level 810 Hz signal to the input of the PCM channels and filtering out at the output with a narrow band filter we recorded the distribution of the number of noise pulses deriving from the elevated quantization noise (an average for 5 minutes of measurement) at various threshold levels (Figure 6).

Simultaneous with the pulse noise measurements we also monitored the amplification and phase transients in accordance with what was described in section 3.6. During the time of the test (about 400 five minute measurements) we did not observe amplification or phase jumps.

4.2.6. Measuring Group Run Time and Group Run Time Distortion

The group run time increases linearly with the increase in the number of channels (Figure 7).

The limits for group run time distortion develop as in Figure 8 according to Recommendation M.1020. On the basis of the measured values the connecting together of five PCM channels counts as the limit case; if more sections than this are connected in tandem one can experience a gradual deterioration in the range above 2 kHz.

4.2.7. Data Transmission Error Rate Measurement

We measured the error rate with an HP 1645 error rate meter with pseudo-random bit sequences of 511 bits in accordance with what is suggested in Recommendation CCITT V.52. In the course of the studies we connected the PCM channels, in the arrangement which can be seen in Figure 1, between 1200 bit/s and 2400 bit/s data modems using FSK, PSK and DPSK modulation.

We examined how the data transmission error rate developed in the case of different types of data modems when we changed the number of PCM channels connected together. In the case of the 2400 bit/s phase modulation (PSK) data modems the data stream to be transmitted is divided into a series of bit pairs (dibits) following one another. Each dibit is recoded into a phase change compared to the phase of the signal element immediately preceding it. In the receiver the dibits are decoded and the original order of the bits is restored. Recommendation V.26 provides two possible versions, "A" and "B", of this coding. We had an opportunity to compare the interference sensitivity of both versions, but, as we can see in Figure 9, there is no substantial difference between the two from the viewpoint of error rate.

We regarded $5*10^{-5}$ as the limit value for error rate, as suggested in Recommendation V.53, which is valid for 1200 baud data modems operating on leased telephone circuits.

Taking the above stipulations into consideration it is possible to connect five PCM channels together; in the case of more channels than this one can experiemce a swift error rate deterioration. There are two exceptions among the types studied; in these cases the error rate is independent of the number of PCM channels connected together. In one case (TAM 600) the frequency modulation solution (FSK) and in the other case (AM-12 TD/S) the mixing and filter unit solution explain the corresponding value of the data transmission error rate. We should note that the mixing and filter unit of the AM-12 TD/S data modem performs the desired spectrum limitation of the signals at both the transmitter and receiver end, with the selection of filter characteristics which help balance out amplitude and phase distortions occuring in the transmission path. This phase distortion balancing, as we will see in the next point, 4.3, fundamentally determines the development of the data transmission error rate.

4.3. The Link Between Bit Error Rate (BER) and Group Run Time

From the measurement results described in points 4.2.1 through 4.2.7 we can learn of the quality deterioration deriving from connecting PCM channels together and of the limits up to which the prescriptions are fulfilled. Our goal was to learn whether there is an interdependency between the qdu (quantization distortion unit) and the BER. In accordance with the definition described in point 2 the PCM channels studied by us cause one qdu of quality deterioration and we can study the effect of this on the BER only if we eliminate the effect of every transmission characteristic, in addition to the quantization distortion, which might significantly influence the development of the BER. Of these the transmission characteristic which most influences data transmission is group run time distortion, which can be balanced out.

Using the measurement setup shown in Figure 10 we have shown in Figure 11 the group run time distortion measured when connecting together 14 PCM sections with a compensator and without a compensator, and for 18 sections with and without a group run time distortion compensator which is optimal for 14 PCM's. We also balanced out the attenuation distortion in a setup corresponding to the former, as shown in Figure 12. In the above measurement setup the data transmission error rate without a compensator is worse by several orders of magnitude than the prescribed value (Figure 9), but with a compensator, even in the case of 18 PCM's, the BER is 10^{-6}, at a data transmission speed of 2400 bit/s.

The optimal group run time compensation for a given number of PCM sections gives a 10^{-6} bit error rate for plus or minus 4 PCM sections at a data transmission speed of 2400 bit/s and for plus or minus 9 PCM sections at a data transmission speed of 1200 bit/s. We also performed studies regarding the circuit location of the group run time distortion compensator. The result was that the error rate did not depend on whether the compensator was connected in front of, among or after the PCM sections.

In order to prove that in our case the BER depends only on the group run time distortion, or which of the other operational conditions might have an influence, we connected a TLN-1 telephone channel simulator in place of the PCM channels (see Figure 10/b). With the simulator the steepness of the group run-through time distortion curve can be varied in the transmitted frequency band.

Thus one can set on the channel simulator characteristics of the group run time distortion the course of which approximates that of the PCM channel and for which we get error rate values of an order of magnitude similar to a real connection.

On the basis of the above results the error rate, at a 2400 bit/s data transmission speed, deteriorates significantly if the group run time distortion exceeds the limit value given in Recommendation M.1020. At a lower speed, at 1200 bit/s, the sensitivity to group run time distortion differs so that the mask limits of Recommendation M.1020 are doubled; for example, in the 1 kHz-2.6 kHz range the distortion limit within which the BER is still acceptable increases to 1 ms instead of 0.5 ms.

5. Conclusions

On the basis of the measurement results it can be established that up to a data transmission speed of 2400 bit/s it is not possible to demonstrate a correlation between the data transmission error rate and the qdu recommended for design of speech transmission.

After tandem linking of PCM sections the data transmission error rate depends primarily on the group run time distortion among the transmission characteristics changed.

All these findings are valid in the case of linking together perfect PCM channels set in accordance with the CCITT recommendations. We did not take into consideration the quality impairing effect of stochastic characteristics arising during operation (such as transients deriving from the switching equipment). But these interfere with the transmission of all information.

In the final analysis the PCM channels designed for speech are perfectly suitable for data transmission, if we compensate for the phase distortion which causes swiftly rising BER deterioration.

Biographic Note

Andras B.-Kiss won his plant engineer's degree at the Transportation and Telecommunications Technical College. He has worked at the Postal Experimental Institute since 1970, in the Systems Technology Department. Recently he has been dealing with the effect on the transmission characteristics of telephone networks produced by the introduction of digital transmission paths and digital switching equipment and with the effect of quality impairments influencing data transmission which arise in analog-digital mixed networks.

Figure Captions

1. p 347. Tandem linking of PCM channels.

2. p 347. Attenuation distortion of tandem linked PCM channels.

3. p 347. Changes in amplification as a function of input level.

4. p 348. Phase jitter.

5. p 348. Quantization distortion (with measurement noise).

6. p 348. Frequency of noise pulses deriving from quantization.

7. p 349. Absolute run time.

8. p 349. Group run time distortion of tandem linked PCM channels.

9. p 349. Development of data transmission error rate with an increasing number of tandem linked PCM channels.

10. p 350. A study of the connection of error rate and group run time distortion.

11. p 350. Group run time distortion of tandem linked PCM channels with a compensator (DLZ-1) and without a compensator.

12. p 350. Attenuation distortion of tandem linked PCM channels with and without a compensator.

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ADVANCED MATERIALS

Brazilian Superconductivity R&D Centers Named

36990001a Brasilia AGENDA CNPq in Portuguese Jul 87 p 2

[Text] Eight Brazilian research centers are presently devoted to the study of superconducting ceramics capable of transmitting electricity with no loss. As a result of these studies, our country has achieved results similar to those of the most advanced research centers. According to the international press, the discovery of the superconductive properties of ceramics ranks in importance with the creation of the electric light bulb and the transistor. The difference is that when those were created, there was no one in Brazil who was even able to understand how they functioned, much less produce one themselves.

In response to the great number of inquiries we have received, we have published below a listing of the Brazilian research centers working in this sector, including the name of a member of each study team and the telephone number where he can be reached:

- - USP/Sao Carlos-Heitor Basso-(0162) 71-5755
- - USP/Sao Paulo (in conjunction with IPEN)-Becerra-(011) 815-5999, ext. 288
- - IPEN/CNEN (in conjunction with USP/Sao Paulo)-Spero Morato-(011) 814-9282
- - Unicamp-Sergio Gama-(0192) 39-1301, ext.2275
- - UFSCar-Edgar Zanotto-(0162) 71-1100
- - UFRJ-Roberto Nicolsky-(011) 270-1191
- - CBPF-Alberto Passos Guimaraes-(021) 541-0337
- - UFPE-Gilberto Sa-(081) 271-0111

12857

Brazilian Interest in Advanced Materials

36990001b Sao Paulo FOLHA DE SAO PAULO in Portuguese 8 Aug 87 p A-16

[Text] Brazil is at the forefront of the field of new materials that have the durability of metal and the weight of plastics, according to what we were told on Thursday in Rio by chemist Angelo Simionato of the Aerospace Technical Center, located in Sao Jose dos Campos (97 Km northeast of Sao Paulo). "In the case of carbon fiber, for example, we have already reached the stage of transferring technology to industry through an agreement reached with Fibras Sinteticas da Bahia (Fisiba)," said the researcher. The new materials are also called composite materials, since they are usually the result of plastic combined with reinforcers—carbon fiber is a type of reinforcer.

With regard to titanium and some special kinds of ceramics, the level of research is already quite advanced, according to him. The various institutions that are working in the field of new materials will receive Cz$ 500 million from Financing for Studies and Projects (Finep) this year, and Cz$ 1 billion next year.

According to Simionato, who works with carbon fiber, the major obstacle to local development of research into this material is the lack of polyacrylonitril that meets the purity standards required in the production of the fiber. "For some time, research was interupted by the lack of raw materials. We had to fall back and develop the production of the raw material, a process we have now transferred to Fisiba, at the petrochemical complex in Bahia."

He calculates that that Bahian company—which already produces polyacrylonitril for the textile industry—will need to invest $8 million (about Cz$ 400 million) to complete the carbon fiber cycle from raw materials to the final product. Widely used in the aeronautical industry (390 kg were eliminated from the Brasilia-class airplane through its use), carbon fiber bonded with plastics is not yet produced in Brazil.

The Brazilian Aeronautical Company (Embraer), also in Sao Jose dos Campos, built a factory to produce parts made of composite materials for its own use and for sale to others. Last June, during the Air Show in Paris, Embraer signed a contract worth $120 million (Cz$ 6 billion) to furnish wing flaps for the tri-jet MD-11, built by the U.S. firm, McDonell Douglas. In the Brasilia-class airplane—a pressurized, 30-seat, turbo-prop built by Embraer—composite materials are used in the manufacture of wing parts, console surfaces, flaps, engine housing, prop tips, and the auxiliary power unit. The AMX, Tucano, Bandeirante and Xingu, other aircraft produced by Embraer, also have parts made of composite materials.

In a lecture delivered yesterday morning at Finep headquarters in the center of Rio, engineer Franz Luiz Lukschal Amaral spoke about the titanium project, begun almost 20 years ago by CTA. The process of chlorination of titanium will begin to be applied by the Vale do Rio Doce company under an agreement signed recently. Vale, like Fisiba with regard to carbon fiber, will pay small royalties to CTA. At this time, titanium is being obtained only in sponges, but Amaral foresees the possibility of applying it in the petrochemical and naval areas in the near future, because of its great resistance to corrosion.

As for special ceramics, the CTA team is working on the first phase of an 8-year program. "We are researching the extraction of zirconium reactive powders." Because of their resistance to high temperatures, ceramics are being used in some countries as motor components. "Because they have a very high combustion threshold, they allow for efficiencies of function and for fuel efficiency. This economy is also assured by their lightness," said engineer Carlos Alberto Cairo of the special ceramics division of CTA.

12857

AEROSPACE, CIVIL AVIATION

Missile To Be Built With British Aerospace

36990004a Sao Paulo O ESTADO DE SAO PAULO in Portuguese 29 Sep 87 p 2

[Excerpt] Rio de Janeiro—The MSA-3, a missile made in Brazil with British Aerospace cooperation, will be ready for launching in 18 months. This information was released yesterday in Rio de Janeiro by experts from the British firm, and confirmed by Air Marshal David Evan, who is the British Aerospace military adviser and a member of Princess Anne's retinue visiting Brazil.

Evans, whose main mission to Brazil is to sell BA-146 airplanes to companies that operate the Rio de Janeiro-Sao Paulo commuter flights, said that the first talks between Brazil and British Aerospace about the MSA-3 began early 2 years ago, when the "Brazilian Army showed interest in developing an air defense system. Embraer [Brazilian Aeronautics company] and British Aerospace then formed the Orbita company to develop the project."

The air marshal said the Brazilian and British company is currently developing the economic part of the project and that the missile will be launched for the first time, in a year and a half. During this time frame, according to British Aerospace experts, Brazil will be able to start offering this new missile in the international weapon market.

Evans said his company's main interest was not only to sell the missile to the Brazilian Armed Forces. "We must consider that Brazil is the world's fifth largest weapons exporter, that is why we decided to transfer to it the manufacturing technology of the MSA-3. We also discussed the possibilities this country has in the international market."

According to British Aerospace experts, the MSA-3 is "only the beginning of what may become a long relationship between the company and the Brazilian Armed Forces." According to them, the next project to be jointly developed is a military communications satellite.

/12232

Sonda IV Rocket Launched

36990004c Brasilia Domestic Service in Portuguese 2200 GMT 8 Oct 87

[Excerpts] The Sonda IV rocket has been launched successfully in the presence of President Jose Sarney. The operation "Petropolis" that marked the launching of the Brazilian-made rocket Sonda IV was successful. The rocket was launched at 1430, from the Barreira do Inferno Launching Center in Natal, at a speed of 3,000 meters per second.

From the official podium, President Jose Sarney, accompanied by Governor Geraldo Melo, ministers, and special guests, attended the launching and applauded the successful operation.

Aeronautics Minister Otavio Moreira lima stated today in Natal, after the rocket's launching, that satellites [as heard] represent a vital importance for Brazil, and development in the aerospace sector will provide technological training to Brazilian technicians and engineers. He also referred to the low cost of this technology in Brazil.

[Begin Moreira Lima recording] Today, the launching of this rocket will facilitate the launching of rockets such as the Ariane. We paid $100 million for the Ariane project. With our current technological development, we will be able to launch our own satellites at a much lower cost. This, of course, will represent for the country, not only savings of resources, but also the technological training of our technicians. [end recording]

/12232

DEFENSE INDUSTRIES

Space Program To Have 'Military Objectives'

36990004b Sao Paulo FOLHA DE SAO PAULO in Portuguese 8 Oct 87 p 8

[Text] The Brazilian space program will probably have military objectives in the future. This is because the Sonda IV rocket and the Satellite Launcher Vehicle (SLV) will be able to carry, as a pay-load, conventional or nuclear warheads instead of the scientific research equipment it is carrying today.

Regardless of its limited performances as far as range and precision are concerned, the Sonda IV has a command system that can guide it to a given objective. A fixed target, for instance, can be hit with a certain degree of accuracy, because of the computers that guide it. Although it was designed mainly to serve as a propelling engine of the future SLV, the Sonda can carry on its "nose" a nuclear warhead instead of scientific equipment. Its range, however, is limited to some 610 km.

/12232

FACTORY AUTOMATION

Overview of Brazilian Advances in Factory Automation

36990002a Sao Paulo MAQUINAS E METAIS in Portuguese Jul 87 pp 24-32

[First paragraph is MAQUINAS E METAIS introduction]

[Text] Three simultaneous events are going to put the various sectors of industrial automation in the spotlight this August. Not only will the annual seminar on numerical control and related equipment be held then, but also

scheduled are a symposium that will include participation by foreign experts and a technical exhibition.

Considering that the number of machines with computerized numerical control has increased ninefold in less than 7 years, it can be expected that a great deal of interest will surround that industry's main event, which will take place from 11 to 13 August this year. That event—the Seventh Seminar on Numerical Control in Brazil, sponsored by SOBRACON (Brazilian Numerical Control Association)—is to be held in Sao Paulo, where two other events—the Third International Symposium on Industrial Automation and the Fourth Exhibit of Numerical Control and Related Equipment—will also be held at the same time.

By the end of this year, Brazilian industry will probably be using nearly 4,000 CNC [computer-numerically controlled] machines, including imported machines and machines already installed. That is about equal to the annual output of one or two NC [numerical control] manufacturers in Japan, for example, but it is quite significant in terms of Brazil, considering that until 1980, only 478 CNC machines had been registered as installed.

If SOBRACON's forecasts are confirmed, the domestic equipment industry should produce about 1,000 CNC-equipped units this year. Everything will depend on the performance of the economy, of course, but the share of CNC machines in billings by those firms has risen steadily from 10 percent in 1980 to over 50 percent today.

The event should attract about 600 people. Because of the country's economic situation, that is fewer than last year, when 840 people registered. But that will not dampen the enthusiasm for topics now popular in the field of automation, the exchange of information among participants, and the new knowledge concerning the latest trends that will be picked up from addresses by international speakers.

The number of papers submitted—about 190—was also quite high. Of that number, 20 were chosen for presentation in the form of addresses. One fairly prominent topic among those to be discussed is the programming of numerical control machines and DNC (direct numerical control). Other subjects are the linking of NC to CAD/CAM [computed aided design and manufacture], the optimization of machining processes, CAE (computed-aided engineering), and CIM (computer-integrated manufacture).

The Third International Symposium will include the participation of 11 foreign lecturers who will discuss various topics "that are important for staying in closer contact with what is being thought and done abroad and thus helping automation planners in domestic firms," says Thomas Michael Lanz, chairman of SOBRACON. He points out that the presentation of Brazilian papers will also make possible an intensive exchange of information and experiences among companies and institutions which apply, manufacture, and study automation. There will also be two round table conferences, one on the "Policy for Higher and Technical Education in the Industrial Automation Sector" and the other on "Industrial Automation and Employment Level in Brazil."

Over the past year, activity at SOBRACON has been intense, according to Lanz. In November of last year, the organization opened its Southern Regional Office in Porto Alegre, Rio Grande do Sul. Together with the main unit in Sao Paulo, that office provides support throughout its region by sponsoring lectures, training courses, and technical tours. And last July, the Rio de Janeiro Regional Office was also opened.

Another activity mentioned by the chairman of SOBRACON was the First Seminar on Industrial Automation for the Northeast Region, which was held in Salvador, Bahia last April. "It was one of that region's first opportunities to discuss its problems, describe the experiences of a few firms that have already started installing automated systems, present the results of research at the Federal University of Bahia, and also hear about nationwide trends in this area," he said.

"No one can be unaware that we are setting up working groups for such things as CAD/CAM and machining technology and sponsoring various courses, free lectures, round table conferences, and other events that have contributed to the training of manpower. Incidentally, the latter is one of the sector's most serious problems. It is vital that the government become more aware of the strategic importance to the country of training professionals skilled in industrial automation and that it enable the research and development groups to survive, otherwise part of the original purpose of the informatics policy will be defeated. The SEI (Special Secretariat of Informatics) and the Ministry of Science and Technology need to pay more attention to the sector's problems. They should have more sectoral plans in the field of informatics because differing priorities exist," he emphasized.

Also on the subject of SOBRACON's activities, he mentioned the statistical survey of industrial automation in Brazil that has contributed to the planning of activities by many firms. Agreements have also been signed with the SME (Society of Manufacturing Engineers) and AIMTECH (Association for Integrated Manufacturing Technology), both of which are U.S. organizations concerned with industrial automation. Those agreements are already resulting in an exchange of papers, studies, and even lecturers, the idea being to develop closer relations between Brazil and those organizations for the purpose of exchanging information.

In a brief analysis of his industry's performance in Brazil, Lanz said that in the area of numerical control, 1986 was a year in which manufacturers strengthened their position, since 833 machines equipped with domestically produced controls were delivered in that year. That was about double the number supplied the year before, when the score was 413 units. He said: "The market is mature now, and at the next National Engineering Fair, we will probably have some new additions in the way of controls and even suppliers—Nakata and Altus, for example."

Although the only data available to him are those for last year, he believes that CAD/CAM has been one of the fastest growing areas because the suppliers of peripheral equipment such as plotters and digitizing boards have had difficulty keeping up with demand. The market in the field of robotics has been less significant, "but this is only a matter of time." On the other hand, the sales performance of programmable controllers has been quite significant under the impetus of user needs and the introduction of smaller units.

"Expressing an opinion on the market and making predictions is always difficult, but I believe that despite the economic slowdown that has occurred recently, firms which have export commitments will have to keep up their investments in industrial automation," he said.

EXPOCON

Parallel with the seminar and the international symposium, the Fourth Exhibition of Numerical Control and Related Equipment [EXPOCON], with nearly 30 exhibitors, will also be taking place.

Altus is taking advantage of that event to introduce the market to the basic hardware for its next product, which will be a four-axis CNC system. It will also exhibit the AI-1000/512, which is a medium-sized programmable controller with 512 inputs and outputs and can work with a Z-80-based coprocessor, permitting processing in parallel with the main processor to control such special functions as, for example, the generation of graphics and synoptic charts on video. In addition, it will exhibit its AL-3800, a software package for microcomputers that is dedicated to the generation of programs for the CP, making communication possible between the microcomputer and a network of CP's and capable of documenting the programs and monitoring the performance of the CP's.

COMICRO will present a new work station (Model ETC-9010/70), based on a microcomputer compatible with the IBM PC-XT and using a mouse, and the ETC-9010/80, which is based on an AT-type microcomputer and comes equipped with a digitizing board. Another featured item is the DNC system known as the DDNC-8000, which, when connected to a microcomputer, makes it possible to send and receive CNC programs to and from as many as 16 CNC machine tools. COMICO's software systems will be shown operating in an ETC-9021 station.

COMPUGRAF will be demonstrating its most recent product, the Euclid-IS, in an EG-40 station using a high-resolution monitor, a digitizing board, local memory of from 1 to 4 MB and a CPU compatible with a microcomputer of the AT type. The firm emphasizes that this new version of the Euclid provides more interactivity, since function selection can be carried out directly on the screen using the cursor and the characters are in Portuguese.

Although intending to launch four more new industrial automation products, CTL is exhibiting its reader/coder for bar codes. The Model 3001 CNC system will also be exhibited.

DIGICON has one of the most diversified product lines, making it hard to believe that they will all fit into its stand. But the plotters and digitizing boards, the Model P-20 CP, the digital rules, the CN-TX-8, and perhaps the editing station for CNC and CAM programs will put in an appearance.

Besides a number of systems related to automation, an NC teaching lathe will be a part of FEMAT's exhibit, while Index is going to spotlight its line of automatic CNC lathes, which are used to shape small workpieces using up to four command axes. The maximum machinable diameter is 30 mm, and the drive motor has an output of 10.5 kW.

Since the premises will not support the installation of heavy equipment, Nardini will present a number of photographs and videos of its line of equipment—for example, its Turn-Tru machines, which have already been a success thanks to their performance. They use controls manufactured by the MCS.

Romi is going to emphasize its new Interact-4 milling machine, which, because of its precision, is used mainly for toolwork.

For its part, Villares will emphasize its CAD/CAM/CAE services. The innovation in its CAE services is that the customer can have access to programs generating meshes of finite elements through a PC terminal installed on the customer's own premises, with the more complex calculations being sent back to the main frame.

ITAUTEC will be operating its Cadtec, which is graphics software for the generation of bidimensional drawings, although as part of MAXITEC's Progmax programmer. The object is to present the interface between manufacture and design.

As it has at other exhibitions, Monarch will use video to present machine tools that have no domestically produced equivalents. Among them are NC vertical bench lathes whose precision is measured in microns.

The series of Contar feeler gages for in-process measurements will be displayed at the Marposs stand. Marposs has a new line of optical sensors that should also attract the attention of visitors.

Master, which specializes in measurement systems, will display its system for monitoring measuring stations. That system provides statistical quality control and remote management of the production process.

The new family of MCS numerical controls for milling machines and machining centers will be at the exhibition. This includes the version with video for that type of equipment: the Model MCS-350, with continuous-path control and resolution in the millimeters. It can be configured in four controlled axes. A microcomputer-based CNC program editor has also been developed. According to the firm, it prevents problems with syntax or program rejects.

Since Multicad has just introduced its Multicad-2000 line, that will be its featured product. According to the firm, the new line offers larger computing capacity, a 32-bit CPU, up to 8 MB of memory, and modularity and enables the user to expand the system as his requirements grow.

PROMACON will present its ATP/T, ATP/2D, and ATP/3D versions of a preprocessor for determining a workpiece's geometric configuration and milling parameters. It will also exhibit its dedicated postprocessors for each type of CNC operation. In addition, this firm, which focuses mainly on software, will present its line of specific programs, while SISGRAPH will have an Interpro-32 stand-alone station for applications in finite-element generation and numerical control.

STROMAG, which has been in the domestic market for 25 years, will show its newest products in the field of servomotors as well as its controllers.

Traubomatic will emphasize its recently introduced MAHO-700-C, which is a CNC tool milling machine with a 10-kW drive motor and a working space of 700x500x600 mm.

Rocco's chief product is its 10V3 vertical machining center, introduced in April of this year. It has a drive power of 10 kW, rapid advance of up to 10 m/mn, and a working space of 600x380x505 mm.

Wotan, which has one of the largest lines of machining centers in the country and a representative line of milling and boring machines, will use audiovisual means to present some of its equipment. The focus may be on its newest line of vertical machining centers called Ex-Cell-O.

Besides exhibiting a demand controller incorporating a new and more efficient computation for limitation (of demand), Chronos will also show a programmable mini-controller called the SPC-2000. With 16 inputs and 8 outputs that can be expanded to 48 inputs and 24 outputs, this new CP is designed for applications that do not involve a high cost.

The Sandvik stand will have a number of new products, among them the new series of SMA and H13A hard-metal tips, both for milling. Also to be shown is the U-Lock system, in which the tip used for cutting threads in a lathe is set in place across an excentric screw that rotates 180 degrees. The advantage of this system is that it reduces tip handling time during changeovers.

MAXICON is going to bring its numerical control line and its MXT-130 programmable controller to EXPO-CON. Progmax, which is another of this firm's products, will be in service as part of a CAM demonstration at the ITAUTEC stand.

11798

SCIENCE & TECHNOLOGY POLICY

Brazilian Experimental Package on Soviet Mir Space Station

36990003 Brasilia BRASIL CIENCIA in Portuguese 10 Sep 87 p 1

[Text] A proposal was received from INPE/MCT regarding the growth of semiconductor crystals under near zero gravity conditions; such conditions would permit mastery of this little known process for the production of such materials, and the verification of theoretical models of fluid dynamics. Brazil will participate in the scientific studies of the Soviet "Mir" space station, beginning in 1988, along with the United States, the Federal Republic of Germany, the Netherlands, Belgium, Switzerland, Japan and other countries. This was confirmed during a visit to Moscow by Cesar Celeste Ghizoni, Director of Space Engineering and Technology, and Jose Marques da Costa, head of the Department of Geophysics and Aerospace of INPE. They were invited to the celebration of the 30th anniversary of Sputnik, the first artificial earth satellite.

12857

Brazil Invests in Advanced Ceramics R&D

36990001c Brasilia BRASIL CIENCIA in Portuguese 19 Sep 87 p 1

[Text] The MCT, through FINEP, began the implementation of the new materials program with an investment of more than Cz$ 100 million for research in the field of advanced ceramics. It is estimated that such research will produce results within 2 years.

With this in mind, agreements were signed between MCT/FINEP as one party, and as the other party the following: CETEC-the Minas Gerais Technological Center, the Physics/Chemistry Institute of USP/Sao Carlos, the Chemical Institute of UNESP at Araraquara, and the IPEN Institute of Energy Research of Sao Paulo.

There are several other projects being considered at FINEP, involving research groups at the Sao Carlos Federal University, UNICAMP, the IPT Institute of Technological Research, and CTA, the Institute of Technology and Aeronautics. The respective agreements should be signed shortly.

Investments in ceramics will amount to Cz$ 400 million within 2 years.

12857

END

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