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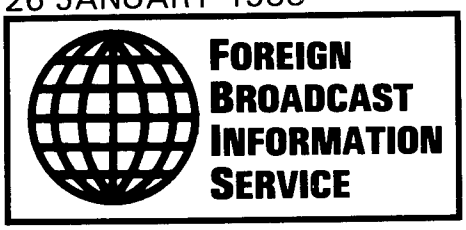

JPRS Report

Science & Technology

Europe & Latin America

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JPRS-ELS-88-003

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SCIENCE & TECHNOLOGY POLICY

ADVANCED MATERIALS

Philips Discovered New Material for Erasable CD's

3698a320 Amsterdam COMPUTERWORLD in Dutch 21 Jul 87 p 18

[Unattributed article: "Philips Discovers New Material for Erasable Optical Recording"]

[Text] Eindhoven—Researchers at the Philips Physics Laboratory have discovered a new group of materials for erasable optical recording of both analog and digital signals. They are semiconducting materials, such as gallium antimonide (GaSb) and indium antimonide (InSb), to which certain other elements are added.

A long time has been invested in the search for materials and methods with which information can be recorded, read, and erased on compact discs again and again. The difference in reflection between crystalline and noncrystalline (amorphous) states of like material proved to be a useful starting point.

The information is recorded by using a relatively powerful laser beam for rapidly heating small areas in a thin layer of crystalline material to just above the melting point. These areas then solidify into amorphous state (the "chilled phase"). The amorphous areas in the crystalline material procured in this way are optically detectable as a result of their difference in reflection. These differences are more than sufficient for digital reading and are also sufficiently clear to reproduce analog video signals.

Every material has a natural inclination to revert into crystalline form because that is its most stable state. This phenomenon can be used to erase the information on the disc. Laser beam heating to just below the melting point renders the material completely crystalline once again. The information can be erased and recorded approximately 1,000 times. That is more than sufficient for consumer applications, but not enough for professional use.

25044/9604

EURAM's 14 Priority Research Areas Listed

36980023a Paris L'USINE NOUVELLE (L'ANNEE TECHNOLOGIQUE 1987 special) in French Oct 87 pp 33, 35

[Article: "EURAM: From Casting to Ceramics"]

[Excerpt] [Box, p 35] EURAM's [European Research on Advanced Materials] 14 Target Areas

EURAM's principal objectives are based on three topics:

1. Metallic materials (seven targets):

-Light aluminum-based alloys (performance, reliability, nondestructive testing, powder metallurgy, aluminum-lithium, 1-micron particles, superplastic aluminum);

-Magnesium alloys (improvement of mechanical strength and resistance to corrosion, coatings, rapidly hardening alloys);

-Titanium alloys (aluminum-lithium and its applications in transportation, technology of semi-finished products);

-High-performance magnetic materials (replacement of samarium-cobalt by an iron-neodymium-boron alloy, magnetic alloy powder metallurgy, specific magnets);

-Materials for electrical contacts (replacement of silver and platinum, surface treatments);

-Porous materials (tungsten carbide);

-Surface coating materials for cutting tools (advanced materials, ceramics, materials for high speed machining, steel alloys containing more silicon, aluminum, and nickel) and thin-wall casting (improvement of the mechanical properties of nodular cast iron, molds with heat-resistant coating, new alloys for casting).

2. Ceramics (four targets):

-Improvement of technical ceramics (ceramics from specific powders, study of their properties, automation of mass production for engines, new nodulizing methods);

-Metal-ceramic interfaces (study of the dilatation of the two materials, special bonding materials, cermets manufactured using powder metallurgy, mass production of components);

-Reinforced composite ceramics (fibers, whiskers) for industrial applications (resistance to strain and improvement of engine applications, of nodulizing methods, and costs);

-High-temperature characteristics of technical ceramics (study of ceramic-ceramic friction and abrasion up to 1,500 degrees Celsius, development of a lubricant to be integrated in ceramics, improvement of the friction coefficient and of resistance to corrosion and oxidation).

3. Composite materials (three targets):

-Composites with organic, thermoplastic, and thermohardened matrices (production methods, nondestructive testing, structure design methods);

-Composites with metallic matrices (aluminum alloys, manufacture of raw components from aluminum and magnesium alloy composites);

-Advance materials for specific applications (memory-effect alloys, composites containing amorphous matrices of glass or glassy materials which are elastic for shock absorption).

25039/08309

AEROSPACE, CIVIAL AVIATION

Overview of Austrian Space Activities, Plans

36980062 Frankfurt/Main FRANKFURTER ZEITUNG/BLICK DURCH DIE WIRTSCHAFT in German 14 Oct 87 p 8

[Article by Eht: "Austria Seeks Linkup with European Space Business"]

[Excerpts] Vienna—Since 1 January of this year Austria has belonged to ESA, the European Space Agency. It took this important step at the same time as Norway because it hopes to make important progress in the key technology of space flight by working with the other West European countries.

The organization responsible for scientific, technological, and financial coordination of the Austrian space program is the Austrian Solar and Space Agency (ASSA), headquartered in Vienna. "Thus far, thanks to this organization, 98 percent of the money contributed to ESA has come back to Austria in the form of research and development contracts," stressed Research Minister Dr Heinz Fischer in the latest activity report. "However, at 0.004 percent of the gross national product, Austria's spending on space projects is still very low compared to the other small ESA countries."

An important prime industrial contractor for space activities in Austria is Oesterreichische Raumfahrt- und Systemtechnik GmbH (ORS). This was founded in 1983 as a joint subsidiary of Austria Metall AG and the FRG's Dornier System GmbH. ORS headquarters in Vienna directs the technical installation in Berndorf, Lower Austria; among the major areas of activity are cooling systems, microgravitation installations, and ground installations for communications satellite systems. "Since 1975 Austria has spent about DM45 million for space projects," explains Dr Georg Serentschy of ORS. "Our firm, for instance, supplied the special window for the European manned research laboratory, as well as important parts for the ground installations for the Giotto project to study Halley's Comet and for the Olympus multipurpose communications satellite." Since 1983 Schrack Elektronik AG has also been involved in Austrian space projects. At present this private company is working hard to expand in three main areas: microwave technology, optoelectronics, and rapid data processing. These technologies play an increasingly important role in radar observation of the earth's surface such as ERS-1, the first European earth study satellite, will carry out. For this project—as for satellite communications in general—it is necessary to process large quantities of data in a short time; also using higher frequency bands is expected to make this possible.

Space activity is increasing in Austria since that country joined ESA; it concentrates on, for instance, Eureca, the free-flying research platform; on the various windows for the Columbus space station; and on the water supply and kitchen equipment for Hermes, the planned European space glider. Austrian experts are making an effort to specialize in the study of biological processes in closed life cycles such as will be required for long space flights to the planets. "If we are to make a meaningful contribution to European space flight, however, it will be necessary to raise the Austrian space budget considerably, from DM35 million at present to DM70 million in 1990," stressed Dr Serentschy during his presentation to German space journalists. "Even then, Austria will be contributing barely 1 percent of the ESA budget." 12593

FRG Panel of Experts Sees No Self-sufficiency for Airbus

36980082 Munich SUEDDEUTSCHE ZEITUNG in German 24 Nov 87 p 21

[Unattributed article: "The Airbus as an Incalculable Risk"]

[Text] Bonn—According to the estimate of the expert panel for the evaluation of national economic development, the Airbus program has developed into an incalculable subsidy risk for the federal budget. In a special chapter of their 1987/88 Annual Report which was published on Monday and about whose contents the SUEDDEUTSCHE ZEITUNG reported yesterday, the "five wisemen" stress the fear that the airbus industry will be dependent for a long time not only on subsidization for aircraft development, but also for aircraft production. The panel believes that an industrial partner for the German Airbus GmbH is not likely to be found.

The experts readily concede that, with the help of subsidies, Airbus has been successful in securing a share of about 30 percent in the world aircraft market. Without wishing to denigrate the technical quality of the aircraft, as it is stated in the report, it must be pointed out that the Airbus program will not reach its profitability threshold in the foreseeable future. This is true at least for the A-300, A-310 and A-320 versions. The future is likewise totally uncertain for the A-330 and A-340 long-range versions. Even a technically high-quality product such as the Airbus remains economically questionable if it can only be sold on the market in the long term at a loss, which makes continuous follow-on subsidies necessary.

This danger, the expert panel stresses, is unmistakable in the case of Airbus. The demand that the Federal Government assume an exchange rate guarantee for the sale of Airbuses in the future shows that the prevailing series

production financing, for good or ill, will have to be continued for the new versions as well, since the present calculations for the Airbus are based upon a dollar parity of DM2. That kind of exchange rate guarantee, however, would not be defensible for the mere fact alone that other German firms would have to pay high fees for exchange rate credits in the framework of export insurance which the subsidy recipient Airbus industry would be spared. All in all, it says in the report, there is the danger that a problematical permanent subsidization would thereby develop out of the—initially economically justified—market access subsidy.

Confident of follow-on subsidies, the subsidy recipient's efforts in the direction of truly cost-saving production would remain few. It is symptomatic of this that the Federal Ministry for Economics is urging a reduction in costs, which are viewed as too high, on the part of the German Airbus manufacturers. That German manufacturers in the Airbus program require far higher development cost subsidies than, for example, the manufacturers in Great Britain, also does not indicate an efficient economic management. The experts emphatically admonish against a trade conflict with the United States. Inasmuch as European aircraft manufacturers also make their living to a great extent from military contracts, the argument that American aircraft producers are indirectly subsidized by military contracts is not convincing. If the Airbus subsidization is maintained, it is to be expected that the United States will erect trade barriers against the Airbus in its most important market for large aircraft. The U.S. semiconductor war against Japan has shown how the Americans react in such cases. If the American market were to be closed to the Airbus, then profitability for the entire program could no longer be attained at all.

The expert panel, "upon realistic consideration," considers it to be out of the question that the Federal Republic will end its participation in the Airbus in the foreseeable future. It can therefore only be a matter of enabling the state to gradually withdraw from the program without thereby endangering this European joint project. The panel sees an opportunity for this solely in a strengthened industrial involvement in German Airbus GmbH. If the Federal Government strives for this, then it will hardly avoid bearing in the future at least a portion of the sales risks resulting from Airbus programs to date. It would be great progress, however, if, for the new long-range versions, only a subsidization of development costs up to the point where they are ready for series production, would be considered.

Two further chapters, in which the expert panel advocates more growth through an opening up of markets and deregulation, deal with the areas of telecommunications reform and a liberalizing of store business hours. In both cases the five wisemen plead for a courageous poliltical implementation of the planned reforms.

13238/9738

CNES Subsidiary for Spot Images

3698a295 Paris LA LETTRE DU CNES in French 1 Jun 87 p 5

[Text] During its April 1987 meeting, the CNES board of directors approved in principle the creation of a new joint stock subsidiary—SCOT (Consultation Service for Earth Observation)—in charge of all technical, industrial, financial, or commercial operations aimed at consultation, counseling, and engineering in the remote sensing field. The main objective of these operations is to increase the use of remote sensing and, in particular, of SPOT images. National and especially international organizations in both the public and private sector will benefit from the activities of this new company. Although initially the new subsidiary's capital will be fully owned by CNES, it will rapidly have to find other partners, primarily the SPOT Image company, with which SCOT will have to reach close cooperation from the very beginning. The company, which is now being formally created, will have its headquarters in Toulouse. Isaac Revah is likely to become chairman of the board, with Jean-Claude Cazaux as the general manager.

25063/9604

COMPUTERS

French Military Accepting ADA Language

3698a284 Paris ZERO UN INFORMATIQUE in French 15 Jun 87 p 10

[Article by Didier Krajnc: "Following Contracts with Thomson and Matra: ADA Is Accepted by the Ministry of Defense"; first paragraph is ZERO UN INFORMATIQUE introduction]

[Text] A small revolution seems to be at hand among those responsible for data processing in the French Defense Ministry. Indeed, the ADA language may be accepted officially after having been ignored for so many years.

Although of French origin, the ADA language has never been favored by our military authorities. Yet it has been chosen by the American Department of Defense to replace Cobol and it has recently been established as a standard by the ANSI. Following in America's footsteps, most European countries (the UK, FRG, Sweden, etc.) are now also using ADA in their own military systems.

France, however, has always refused to conform for two reasons. The first is political: "We do not belong to NATO and we do not like anyone forcing an American software standard on us." The second is more technical: The very French LTR [Real Time Language] grew out of too much investment and hard work to be simply replaced by ADA.

In the meantime, this situation was embarrassing the official defense suppliers: Indeed, how can you export military systems based on a language which is so specifically French? How can you commercially justify such a lack of interest in the efforts to make ADA an international standard?

Manufacturers such as Thomson, Bull, or Matra, as well as data processing services companies such as Cap Gemini Sogeti or Syseca could not ignore the ADA phenomenon without seriously compromising their international strategy.

Submitting to pressure from their major suppliers, the French military authorities took a first step towards the acceptance of ADA when last year they announced the establishment of an ADA software engineering shop within the Entreprise "host structure" which was first designed for LTR-3. However, as Jean Ichbiah, father of the ADA language and president of Alsys, points out, although cohabitation is currently fashionable in France, a multilingual software development policy is not economically viable, even though technically feasible.

Jean Ichbiah is dividing his time between Boston, head office of Alsys' American subsidiary, and Paris, where the original La Celle-Saint-Cloud team led by Etienne Morel still has full control over development. Approximately 95 percent of Alsys' revenues come from outside France.

This situation might change in 1987, since Alsys has just signed two major contracts (one with Matra, the other with Thomson) which should lead to an increase in Alsys' sales figures on the French market. "Both Matra Datasysteme and Alsys are the leading French companies in their respective lines of business—i.e., scientific minis and ADA—so it was only natural that both companies should eventually cooperate," all the more because Norsk Data's mini is a key element in the European Hermes project. The fact that Alsys had already developed a compiler for Sun Microsystems workstations simplified its cooperation with Matra Datasysteme (whose MS-1300 and MS-2000 workstations were developed by Sun), at least in the initial stage. The second part of the agreement led to the formation of a joint team for the development of an ADA compiler for Matra's MD-500. The Thomson contract "was signed 2 days after the Matra deal was concluded," because Thomson-CSF urgently needed a real-time cross compiler for its MC-68000 machines within the framework of a NATO project.

Bull, too, has just announced the availability of an ADA compiler for the new SR-3000 version of its operating system for large G-COS 8 systems. This is because the G-COS 8 is being developed by its American partner Honeywell, which naturally pays close attention to DOD recommendations. Matra, Thomson, Bull: The major French manufacturers have thus de facto opted for ADA. The French Army cannot ignore that. Indeed, Jean Ichbiah is rather optimistic: "The ban on ADA dates back many years. Those responsible at the time have now left the DGA [General Directorate for Armament] and there is room for dialogue." This dialogue may very soon result in the official acceptance of the ADA language in its country of origin. The triumphant return of the prodigal son, as it were.

Actually the triumph is still rather modest, because Alsys' 1986 sales figure ("some $6 million") indicates a stagnation. Jean Ichbiah's company is still slightly in the red ("we will get out of it in 1987"). It has certainly been a turbulent business year for Alsys, because, after having raised some Fr 28 million in equity capital to finance its U.S. subsidiary, it had to cope with a changing market: "Formerly, we mainly sold directly to customers who wanted to evaluate the language; now we focus on marketing via distributors or OEM's [original equipment manufacturers]." This evolution is "normal for a product company moving from a pioneer to a more mature market...." For Alsys claims to be a product company: "We are not selling services, and if we do it is only to help certain strategic clients get started successfully with ADA (e.g., ADA in CAD/CAM)."

Soon New ADA Releases for PC and PS/2

What are these products? "One-third of the 100 or so now validated ADA compilers originate from Alsys" (taking into account Hewlett-Packard products which are actually based on Alsys technology). The ADA language is at its best in a distributed development environment ("a standpoint resolutely endorsed by the DOD").

The most popular compilers operate on Sun, Apollo, Hewlett-Packard, or PC/AT workstations. A cross compiler from a PC/AT towards a bare target machine (8086, 80286, or 80386), i.e., intended for airborne real-time systems, will be announced on 18 June 1987. In addition, the teams at Alsys are trying to make the Compaq 386 version of their compiler compatible with the PS/2 model 8380 (they have a prototype of the machine) and with a new PC version scheduled for this summer. "ADA is the only tool allowing the development of software for major PC applications." Some major users have even developed software containing 300,000 ADA code lines on a micro (McDonnell Douglas, for example). Besides the actual compilers, Alsys also sells ADA-related development tools such as editors, debuggers, etc. It also participates, alongside IST and Logica, in a EUREKA project involving a real-time ADA software engineering shop. But as far as software engineering is concerned, Jean Ichbiah prefers an ascending modular integration strategy ("it must be possible to use each tool independently while using the same man-machine interface") rather than the monolithic approach adopted by such large projects as PCTE [Portable Common Tool Environment] in Europe or CASE in the United States ("for which the entire environment of the software engineering shop must be known").

25039/9604

EEC Developing Optical Computer

3698a317 Paris FTS-FRENCH TECHNOLOGY SURVEY in English Jul-Aug 87 p 1

[Text] Professor Smith at the Heriot Walt University has asked for two million ecus (about 2 million dollars) from the European Community to develop holographic interconnections between optical computers and to build software architectures in full (notably parallel), optical processing. The project will be known under the name of ETOP (European Technology for Optical Computers Project) and will combine the forces of eight research centers in Great Britain, Germany, Italy, Belgium and France.

ETOP is the natural follow-up to EJOB (European Joint Optical Bistability) which made the development of devices for the optical processing of signals possible. ETOP should lead to the production of a complete computer system rather than discreet devices.

/9604

DEFENSE INDUSTRIES

SAR, VHSIC Circuits Featured in 'RDY' Radar at France's Thomson

36980095 Coburg MIKROWELLEN UND MILITARY ELECTRONICS in English Vol 13 No 6 1987, pp 623-624

[Text] While the 37th Paris Air and Space Show has opened its doors at Le Bourget, in-flight tests are being conducted at the Bretigny, center on the first of a new generation of multifunction Doppler radars: the RDY. Thomson-CSF has funded the production of several prototypes of this radar, drawing on the experience the corporation gained during the development of the RDM and the RDI radars. The program runs concurrently with the RACAAS air-combat and ground-support radar program conducted jointly by THOMSON-CSF and the Delegation Generale pour l'Armement. The principal contribution of RACAAS to the improvement of current radar technology is the recording of hundreds of hours of "ground clutter". This background return was used in the development of new processing algorithms that were later validated during tests on the first programmable signal processor (PSP), which underwent in-flight testing in Europe some years ago. The RACAAS program also involves development and testing of two types of passive electronic scanning antenna.

The RDY integrates the most recent developments in advanced radar technology, and features the functions and performance levels that will be required for the ACT-ACM radar program (tactical and maritime combat aircraft). The first prototype is already airborne, and subsequent units will undergo tests in the coming months.

Multimode Radar

The RDY is a multimode radar capable fo performing all the air-to-air, air-to-ground and air-to-sea functions that will be standard on all modern combat aircraft.

In air-to-air mode, the RDY offers long-range detection of very low-and very-high altitude penetrating targets, irrespective of angle of approach. The RDY's track-while-scan (TWS) function enables target tracking, presents the pilot with tactical situation analysis data, and identifies targets through interactive dialog with IFF interrogators. The radar thus facilitates firing of active-seeker MICA or AMRAAM missiles, and of missiles currently in service with a number of Air Forces (e.g. MAGIG, and SUPER 530 D missiles).

The RDY offers numerous possibilities in air-to-ground mode, including:

—all-weather low-altitude penetration, through extremely high-performance ground mapping and contour mapping functions,

—air support and direct on-sight assault,

—air support and assault in poor weather conditions against stationary or moving targets,

—resetting of navigation system.

In air-to-sea mode, the RDY detects targets, even in very high seas, and is utilized for firing long-range missiles (AM39 or KORMORAN 2 type).

The air-to-air function of the RDY multimode radar covers all waveforms currently in use, including multiple range-gate high, medium and low repetition frequency. Depending on the operational configuration, the RDY automatically selects the most appropriate wave-form. It is a recognized fact that forward-looking long-range detection of low-flying targets depends on multiple range-gate high repetition frequency waves utilized by Thomson-CSF for the RDY, and that long-range upward-looking detection of high altitude targets requires low repetition frequency waveforms. Medium repetition frequency waveforms are a compromise, and are used for medium-range detection of low-altitude targets approaching from the rear.

Utilization of these three wave-forms provides maximum air-to-air performance in all configurations. The range of possibilities is such that pilots can be presented with a considerable number of operating modes.

Making use of the most advanced digital technology, theradar automatically selects the mode that is most appropriate to the operational situation (threat, ECM, mission, armament, etc.), thereby reducing pilot workload.

High-Power Signal Processor

At the core of the RDY is a programmable signal processor (PSP), one of the most powerful airborne radar signal processor of its kind in the world. Its enormous computational capability is essential to process signals from the multimode radar operating in the EW environment of the coming decades. The vast quantities of data contained in a radar signal (several hundred megabits per second) have to be processed to provide read-out and simultaneous display of several targets being tracked at the same time. The PCP's computation speed of loo MCops (Million complex operations/s) (equivalent to five Cray 1 computers operating in parallel), and makes it the fastest radar signal processor in service or under development in the world. In spite of its awesome power, the PSP will occupy a volume of 38 liters in the series version of the RDY, due to extensive use of gate arrays and VHSIC (Very high speed integrated circuits) that have been under development since 1981 by Thomson-CSF specifically for the corporation's new radar programs. A new generation of VHSIC is currently under development to reduce the volume occupied by the PSP abroad the ACT/ACM aircraft to less than 20 liters.

The PSP is fully reconfigurable and can compute by FFT (Fast Fourier Transform) in multiple range-gate high repetition frequency mode, utilizing as many as 32,000 Doppler filters. The processor carries out target integration, detection, and read-out operations simultaneously. This technique, known as range-gated pulse Doppler, was already utilized by Thomson-CSF for the RDI. In this configuration, performance is higher than that achieved by successive high, medium, and low repetition frequency exploration, which has been adapted to other configurations. During the design phase of the RDI, Thomson-CSF recognized the vital importance of utilizing and perfecting this technique. Particular attention was paid to enhancing resistance to countermeasures.

The raid assessment mode allows the pilot to sort through a group of long-range targets, select a number of enemy aircraft and lock the track-while-scan function on to the most dangerous attacker. The RDY can thus distinguish targets that are only 30 m apart-a level of performance three times higher than that offered by any other radars currently available.

A second high-power computer handles data that does not require the enormous processing speed of the PSP. The processor of this computer, the programmable arithmetic unit, is nonetheless 4 to 10 times faster than on the RDM and RDI radars, and its memory has been increased by a factor of ten. Its computation capability allows for multitarget tracking with enhanced presentation (target speed, distance, altitude, etc.) and multitarget fire control.

Upwards Compatibility

The memory and speed of the UAP and PSP include a backup capacity which makes it possible to incorporate new operating modes, upgrades existing modes and integrate future developments in EW techniques. The RDY is currently both multimode and multifunction, and simultaneous operation in several modes (e.g. airspace surveillance during low-altitude terrain-following penetration) can be achieved through the addition of appropriate software modules and the installation of an electronic scanning antenna. The RDY is of modular design and can thus be adapted to meet mission-specific requirements, and, in the future, will be able to integrate the latest techniques and technologies that are currently under development.

In air-to-ground functions, the RDY makes wide use of the synthetic aperture radar (SAR) and Doppler beam sharpening techniques that were developed on the French Air Force's Raphael and on the RDM. In these modes, the RDY will provide a high resolution map that allows for easy identificiation of bridge, piers, roads, buildings, reservoirs etc.

The RDY features a compact, dual peak-power transmitter that optimizes power output across a broad spectrum of frequencies, irrespective of the operating mode of the radar. Further the radar provides levels of spectral purity in transmission and dynamic reception that are far superior to other radars of the current generation.

The RDY is equipped with a flat-plate low-inertia aperture antenna of an entirely new design, which offers excellent agility and very low levels of secondary lobing. This antenna may later be replaced by an electronic scanning antenna.

The RDY's modular architecture enables it to be broken down into line replaceable units (LRUs) that can be changed without adjustment or realignment. These design features, together with an integrated testing facility, allow for opltimized maintenance and maximum availability.

The expected MTBF will be higher than levels currently attained by any other radar with similar performance levels.

Towards a New Generation of Airborne Radars

The RDY is the first of a whole new generation of modern radars and will bring Thomson-CSF experience unequaled in Europe. The vital techniques that have been developed for the RDY will also be needed for the radar that will equip the ACT/ACM aircraft. In-flight validation will minimize risks in the development of the radar which will be derived from the RDY, and will include two important additions:

—A 20-liter PSP, making it possible along with other technical improvement, to house a complete, very high-performance radar in the nose of an aircraft such as the Mirage 2000 or the Rafale, where volume availability is considerably lower than in American jets of the same class;

—An electronic-scanning antenna which will make it possible to add an automatic terrain-avoidance function operating simultaneously with air-to-air functions. This type of antenna will fly very soon.

The PSP described above already has the extra capacity needed to ensure all the additional functions made possible by electronic-scanning techniques.

The PSP radar is based on totally new technologies. Tests have now confirmed Thomson-CSF's wisdom in its technological choices, and provide a further illustration of the relevance of the RACAAS development program.

The RDY will bring operational forces the multiple modes that require to fulfill all mission-critical functions. The RDY's flexible, modular architecture will make it possible to incorproate even more revolutionary functions as and when such functions are validated.

/9274

Italy: AMX Executive Board, Status of Aircraft

36980071a Rome RIVISTA AERONAUTICA in Italian Oct 87 p 88

[Text] Full operationality for the International AMX.—The executive board of the International AMX met in Turin on June 8 to deliberate on the final status of the company with the setting up of an executive committee consisting of a president, three vice presidents, and a general secretary. The positions are filled by Giandomenico Cantele (Aeritalia) (in the photograph), Giovanni Gazzaniga (Aeritalia), Franco Bonazzi (Aermacchi), Colonel Rogerio Passos dos Santos (Embraer), and General Elio Guarnieri. The primary objective of the company is to promote the aircraft on the international market.

In the meantime the production status of the AMX is progressing according to plan: the first aircraft in the series is presently taking shape on the Turin assembly line. The central fuselage section, made by Aeritalia, has already been connected to the front section made by Aermacchi and will soon be provided with the wings manufactured by Embraer, and the engine manufactured by Fiat and the Brazilian company Celma under license from Rolls-Royce.

For the time being the flight activities of the prototypes is progressing as planned: the AMX A02 is the first to have made more than 200 flights and the total number of flights already completed by the 6 prototypes is in excess of 600, with more than 800 hours of flight time. The 4 aircraft flying in Italy are presently completing tests on the avionics and weaponry systems including tracking tests and bomb dropping tests for various types of bombs, launching of AIM-9L missiles and in-flight firing of the Vulcan gun.

The test program in Brazil is progressing as planned and the 30-mm DEFA guns selected for the development phase of the Brazilian version have successfully completed testing. Development of the two-seater, which started in June of 1986, is moving along according to schedule and the first flight is planned for the second half of 1989.

The roll-out of the first AMX of the production series will take place in Cselle at the end of this year and the first delivery to the Air Force has been confirmed for the middle of 1988, in keeping with the schedule drawn up 4 years ago. The first AMX for the Brazilian Air Force will be delivered some time next year.

13312/9738

Italy: ACMA, New Consortium, To Contribute to Eurofighter

369890071b Rome RIVISTA AERONAUTICA in Italian Oct 87 p 88

[Text] This new consortium presents itself as a response of the international industry to the call for European cooperation in the Eurofighter program in the field of equipment items for the transport and dropping of underwing payloads. It is composed of 4 companies, one from each of the nations involved in the EFA: the Societa Aerea for Italy, CASA for Spain, MBB for West Germany, and ML Aviation for Great Britain.

Instead of being set up according to the usual structure of a prime contractor with subcontractors, the ACMA calls itself a joint venture with equal partners: each company will make its own contribution of industrial techniques, abilities, and experience and will be bound to the other companies in a collective responsibility to the buyer.

The consortium intends to solve all the problems connected with satisfying the technical specifications and performance requirements of the new aircraft's underwing payloads without resorting to technologies belonging to countries not involved in the EFA program.

Each member of the consortium will furthermore be capable of providing its own country's aeronautical industry with the response speed expected of a national supplier together with long term support, while, in the international arena, the ACMA will offer responses gauged to the requests for European cooperation and international weapon programs.

Societa Aerea, the Italian member of the consortium, is the national leader in this field: the most recent confirmation of this was given when the pylons made by Societa Aerea for bombs and rockets were chosen for the Italo-Brazilian AMX aircraft.

13312/9738

FACTORY AUTOMATION, ROBOTICS

New Robot Control System Developed at Bosch of FRG

39680051 Landsberg ROBOTER in German
No 5 1987 PP 50-52

[Article: "Intelligence from the Odenwald"]

[Excerpts] A comprehensive program of modern robot controls is being developed and produced in the Erbach/Odenwald Plant of Robert Bosch GmbH. The range of possible applications for Bosch robotics controls rho 1 and rho 2 with their various models extends from simple pick-and-place tasks using the intentionally inexpensive rho1 control to 8-axis track operation for detailed vehicle body painting using the rho2-control.

Bosch's factory-wide control program makes it possible for machine manufacturers to purchase all the control components needed for equipping their machines, such as robot controls, programmable controllers, and drive components, in compatible configurations from a single vendor.

All the members of the Bosch family of robot controls have a series of common characteristics.

Because an industrial robot or handling system generally is a component in a total system, e.g. consisting of feed and materials-transfer equipment and gaging or testing devices, a modern robot control should, in addition to providing actual robotics movement, be able to coordinate with this kind of peripheral instruments as well as. Consequently, all Bosch robot controls are equipped either with an integrated hardware programmable controller (PC) or with a bus coupling to the Bosch PC family. In this way control of robot peripherals can run as an actual parallel process to the movement program.

The new rho1 control was introduced initially at the 1987 Hannover Trade Fair. It is specially designed for application in loading and unloading machines or workpiece carriers, as well as for assembly and pallet handling tasks. It facilitates movement of 2-5 electrical axes (depending on the model level) as a point-to-point control with incremental travel gaging systems.

One of the major applications for the 5-axis control is its use as a portal control. The rho1 with integrated PC is standard equipment, equipped with 64 digital inputs and 40 outputs; a 128/80 I/O option is also available. The input and output signals can be used both in the PC (as a parallel operating process) and in the user program for movement sequencing. The integrated PC features optional 2 K or 4 K program steps, allows the use of 8 timers, 8 counters, and 1 K flag memory, of which 512 are remanent.

Where the power of the integrated PC is inadequate, there is the option of a bus coupling to the Bosch PC family (PC 400, PC 600, CL 300). The rho1 operating system is EPROM resident, with 32, 64, or 132 KByte buffered RAM memory available for user programs.

A hand-held programmer (PHG) is used for programming and operating the basic version of the control. The unit is equipped with an LCD display and a function keyboard. Even this basic configuration can be used to create and debug simple programs. For simple sequence controls, part of the memory operation for the integrated PC can be programmed in stepped cascade mode using the hand-held programmer. The hand-held programmer can also be used to assign parameters for pallet-handling cycles or customer-specific cycles.

An AT-compatible programmer is required for off-line programming in order to utilize the full power of the equipment. The entire command range of the BAPS language needed for point-to-point controls is available. User programming of the PC can also be carried out in BAPS. The software required for linking to the external programmer is already resident in the basic control model, so that the step to off-line programming can be made at anytime without retrofitting the control.

A floppy disk unit can be used to archive user programs or the off-line programmer can be user.

The Bosch rho2 family of robots—in use in its basic version for the last 3 years—has played a significant role in the success of Bosch assembly robots. The control is also equipped for other sophisticated tasks, for example, its successful application for detailed painting of auto bodies with painting robots.

The off-line programming feature for Bosch Robot controls offers the user the option of creating application programs independent of the robot and thus lowering robot downtime. The IBM-AT-compatible computer provides a user-friendly, menu-driven user interface module for editing programs, translating from the BAPS source code into either IRDATA or PC code, and debugging.

If the programmer is connected with the control, on-line tests and diagnoses can be conducted. Because all software modules can be called as stand-alone units using the standard MS-DOS disk-operating system, the machine equipment manufacturer or end user can customize his own user interface.

Through the use of the appropriate standard programmer, the builder or end user has access to the networking options of the MS-DOS environment.

Bosch offers uniform programmers as "system tools" for robot controls and programmable controllers. Devices like the new PG4 provide advantages for systems solutions in particular, where assembly systems are controlled in sequence by PCs and robots are used.

13127

Bull's Fully Automated Production Facility Described

3698a304 Paris ZERO UN INFORMATIQUE in French 29 Jun 87 p 21

[Article by Isabelle Durieux: "USINICA Integrated Production: Drive for Robotization at Bull"; first paragraph is ZERO UN INFORMATIQUE introduction]

[Text] The Bull-Transac facility at Villeneuve-d'Ascq is a model of CIM (computer-integrated manufacturing).

From the plant entrance where the raw material is received to the area where the assembled products are shipped, no item is moved or handled manually in the ultramodern Bull-Transac plant at Villeneuve-d'Ascq. Completed in October 1986 at a cost of approximately Fr 225 million, it is a fine example of automation.

The move of the Marcq-en-Baroeul industrial complex to Villeneuve-d'Ascq was accompanied by a radical change in production methods. In the new 22,000-square meter facility, the material is moved along a U-shaped circuit by a "wire-guided" system. The robots move slowly but surely, picking up the required parts in accordance with a sophisticated program. According to Philippe Bielec, director of robotics at Bull-Transac, "there are only six people in the data processing division and five of them are technicians." The payoff from high automation is JIT (just in time) or "critical flow." According to Bielec, "providing the required quantity on the particular day at the precise time has become essential for saving time and money in today's production facilities." It is toward this "zero stock" goal that the scheduling staff's efforts are directed. That staff works with much more efficient data processing equipment than at Marcq-en-Baroeul and is striving to optimize the plant's operation.

After "Just in Time," Flexibility is Required

The main characteristic of the Villeneuve-d'Ascq facility, however, is its flexibility. It was designed so that a production line could be reconfigured overnight. According to Bielec, "this is essential given the fluctuations of the market; products are mostly manufactured for a very brief period—18 months on average, sometimes 12 months."

Villeneuve-d'Ascq is not only a manufacturing facility; it includes the reliability engineering and testing of 300,000 to 400,000 items per year. Human operators are, of course, involved in the course of assembly.

Through this facility, Bull is affirming its capability in assembling preprocessed components and in turning out products that correspond to market requirements. This is made possible because of the flexibility of the computer resources that transmit orders to robots capable of selecting, from one day to the next, new elements for a different configuration. The average configuration assembly time is a half hour.

Over the past 3 years, Bull has spent more than Fr 3,200 million for the modernization of its industrial and commercial equipment.

25050/9604

LASERS, SENSORS, OPTICS

French CEA Concentrating on Uranium Enrichment by Laser

3698a302 Paris L'USINE NOUVELLE in French 2 Jul 87 p 25

[Article by Elizabeth Rochard: "Uranium: CEA Focuses on the Laser"; first paragraph is L'USINE NOUVELLE introduction]

[Text] Jean-Pierre Capron wants to push laser enrichment research. A world market at stake in contest against U.S. competition.

The Atomic Energy Commission [CEA] is decidedly confirming its entrepreneurial capabilities. Last year CEA Industrie made Fr 1.39 billion in profits (up 38 percent) for revenues of Fr 31 billion (up 9.5 percent). These results stem primarily from a combination of exceptional circumstances. There were losses in 1985 and profits in 1986. Operating results dropped by Fr 1.1 billion compared to the previous year. Jean-Pierre Capron, director general, keeps his head cool: "CEA Industrie is an attractive business but it would be unrealistic to promise sustained growth."

With Fr 21.2 billion in revenues, Cogema brings all its weight to bear on CEA Industrie. Currently, the nuclear fuels sector is developing in an environment made even more difficult by the drop in the dollar. In addition, the dispute with Iran means Fr 140 million in losses for Eurodif.

All the other subsidiaries, however, are making money or breaking even, including those that were in the red, i.e., SFEC (separation by membrane), ORIS (medical radiation), or CISI (computer technology), which will open up its capital to Cap Gemini Sogeti in the fall. Furthermore, this overture toward industrial partners should become widespread, "to the extent that the activity of the subsidiary is not directly linked to the nuclear sector and provided the operation offers opportunities for industrial cooperation," according to Jean-Pierre Capron.

The atmosphere in the CEA research body is more grim. Negotiations are currently in progress with the unions to reach agreement on changes in staffing. Jean-Pierre Capron's aim is for the "flow of departures" to be at a sufficient level to enable him to continue to hire every year.

Other causes for concern are uranium enrichment by laser and U.S. competition. Only two countries have an enrichment industry, the United States and France. CEA is only at the research stage, whereas the U.S. Department of Energy already has a pilot project. "We are 5 to 7 years behind the United States," estimates Capron. The industrial stakes are substantial. According to current forecasts, the cost of laser enrichment will be so much lower that gaseous diffusion processes will be rendered obsolete overnight, not to speak of ultracentrifugal processes which were already outdated before even having reached production stage. "If the lead of the Americans becomes too great, they will regain control of the world market by cutting prices." Therefore, it is essential that France maintain its research effort and that the budget axe does not come down too heavily on CEA funding for 1988.

25050/9604

MICROELECTRONICS

French Researchers Develop Organic Semiconductor

36980011a Paris SCIENCES & AVENIR in French Sep 87 pp 64-68

[Article by Jean-Louis Lavallard: "Birth of the Organic Transistor"; first paragraph is SCIENCES & AVENIR introduction]

[Excerpts] It had been the elusive electronic component: For almost 40 years scientists all over the world had tried to develop it to no avail. French researchers have finally succeeded in manufacturing it in a laboratory....

For the first time, in early May 1987, a French research team manufactured a transistor using an organic material: a feat which had been expected for many years, but which never materialized in spite of the efforts of numerous laboratories worldwide. Certainly it is still too early to evaluate the possible industrial applications of the new material used to build this transistor, but it is expected that lutetium and lithium phtalocyanine will become tomorrow's serious rivals of amorphous silicon.

Admittedly the quest had been disappointing, because nearly 40 years were needed to develop the first operational organic transistor on 7 May 1987. This result was obtained through the cooperation of several French laboratories within GRIMM (Group for Interdisciplinary Research on Molecular Materials) and in particular thanks to the work done by Jacques Simon (Ecole Superieure of Industrial Physics and Chemistry of Paris). Jean-Jacques Andre of the C. Sadron Institute of Strasbourg, and Monique Maitrot of the Claude Bernard University of Lyon.

A new method led to the production of a molecular semiconductor, lutetium bisphtalocyanine, which can be used to manufacture a transistor. This discovery was the result of a very precise analysis and definition of an organic semiconductor, which led the French researchers to state that, at least from an electronic point of view, all organic semiconductors manufactured so far by adding impurities to organic materials (doping phenomenon) were false semiconductors and should have been considered doped insulators which could not be used to manufacture transistors.

French researchers therefore defined three criteria for a truly organic semiconductor:

—The material must consist of molecules which can be synthesized separately and subsequently assembled in a condensed phase;

—The pure material's conductivity (without any impurities) must be within the mineral semiconductor conductivity range (germanium, silicon, gallium arsenide, etc.), i.e., between one-millionth and one-tenth ohm^{-1} cm^{-1};

—The material can be doped, i.e., its conductivity can be changed by either electron donor or acceptor impurities.

The lutetium phtalocyanine synthesized by the French has a rather complex structure. A lutetium (a rare earth) atom is sandwiched between two flat phtalocyanine structures.

The lutetium atom contributes a very exceptional characteristic: It transforms the complex compound (lutetium phtalocyanine) into both an acceptor and a donor of electrons, which explains its conductivity (semiconductivity). The electrons move from one metallic complex to the next and the electric current passes. Because the complexes interact slightly, the electric current is weak and conductivity is low, reaching only one-millionth ohm^{-1} cm^{-1}, i.e., the limit of the semiconductivity range mentioned earlier.

When at this stage acceptor (or donor) impurities are added, the material becomes slightly impure; it is "doped" as they say. The electrons can now move from one impurity to another. The current moving through will thus be higher. The material has become more conductive.

Thus, lutetium phtalocyanine has the three characteristics required for a transistor. This was verified on 7 May by GRIMM, which for the first time used phtalocyanine

in a field-effect transistor. The same researchers are now working on the development of other types of transistors, in particular bipolar transistors.

Does this mean that tomorrow conventional silicon transistors will be replaced by organic transistors? Certainly not. The electronic properties of lutetium phtalocyanine differ from those of silicon. Therefore, its use will be different, depending on how easily it can be applied.

It is indeed very easy to make phtalocyanine thin films. It only requires heating the substance: The matter sublimes, i.e., the solid turns directly into vapor which is then deposited as a thin film on any cold surface. Therefore, manufacturing an impurity-doped thin film requires only the simultaneous sublimation of the phtalocyanine and the doping agent.

It has been found that the electronic properties of the phtalocyanine thin film are almost as good as those of the crystallized product. Phtalocyanine can thus compete with amorphous silicon, which can also be used as a thin film for the production of photovoltaic solar cells and for displays (flat television screens, for instance).

Much progress is still possible. Lutetium phtalocyanine is only the first example of a new category of organic or molecular materials that are true semiconductors. At least one more already exists: lithium phtalocyanine. This compound consists of one lithium atom combined with a single phtalocyanine structure (instead of two). Its intrinsic semiconducting properties are better than those of lutetium phtalocyanine, but they are greatly reduced when the substance is transformed into a thin film. This obviously makes lithium phtalocyanine less interesting than lutetium phtalocyanine.

Further developments in this area depend on cooperation between chemists and physicists. Whereas chemists are indispensable to synthesize the new materials, physicists are needed to measure their properties and develop applications. Thus, there are prospects for fruitful cooperation between the two disciplines.

[Box, p 66]

A Natural Semiconductor

The phtalocyanine molecule comprises four benzene nuclei interconnected by nitrogen atoms.

The lutetium is linked to two of those molecules by nitrogen atoms.

In this configuration, the formed complex can easily acquire or lose an electron. It is this capacity that gives the compound its intrinsic semiconductivity.

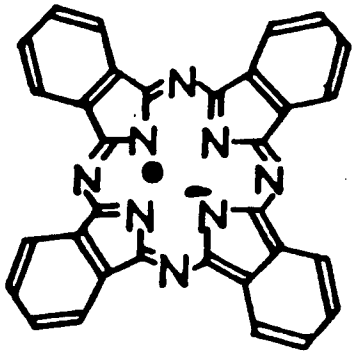

Figure 1. The phtalocyanine molecule comprises four benzene cylinders interconnected by nitrogen atoms (N). These atoms can combine with various other atoms such as lutetium or lithium.

Other elements such as zinc or nickel can also form complexes with phtalocyanine molecules, but it is much more difficult to add or withdraw electrons with these substances. Consequently, they become insulators rather than semiconductors.

25048/08309

France's ES2 Starts Production of 'Full Custom' IC's at Rousset

36980042 Paris INDUSTRIES ET TECHNIQUES in French 10 Oct 87 pp 41-43

[Article by Philippe Le Coeur]

[Excerpts] By next year, ES2 (European Silicon Structures) is likely to win the challenge announced 2 years ago. The recently inaugurated Rousset production plant will become fully operational in 1988. The factory has now begun to assemble and test circuits. Silicon wafer processing is still performed at the California firm Exel Microelectronics.

The long awaited ES2 (European Silicon Structures) factory at Rousset in Bouches-du-Rhone has now been formally inaugurated. This ceremony symbolizes the capstone in the construction of an "edifice" begun more than 2 years ago, whose myriad components have gradually fallen into place since then. In fact, it was in September 1985 that Jean-Luc Grand-Clement, Robert Heikes and Robert Wilmot announced the creation and objectives of ES2: to deliver prototypes of full custom IC's throughout Europe within 15 days at nearly one third the price customarily charged for this type of service. They also resolved to seek pan-European sources of financing for their company in the amount of $65 million for start-up expenses and an additional $100 million in funding over the next 5 years. In some circles, their gamble was regarded to be excessively bold. No one

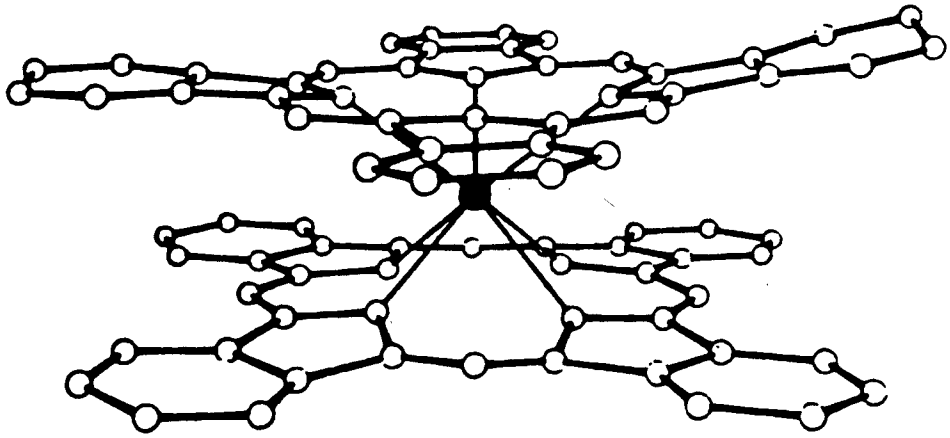

Figure 2. Lutetium phtalocyanine is formed by a lutetium atom (black dot in the center) sandwiched between two flat phtalocyanine molecules.

challenged the three men's knowledge of the semiconductor industry—far from it. J.-L. Grand-Clement had recently resigned from his position as vice president for Europe at Motorola. Before that, he managed Eurotechnique. R. Heikes was vice president for Europe at National Semiconductor while R. Wilmot was a former chairman of the board of ICL. In addition, the three men prudently sought the aid of various European experts in the sector. The doubts focused more on their ability to locate capital and to master the pioneer technologies that would serve as the foundation of this enterprise: silicon compilation and electron beam writing.

Prior to launching their venture, the founders of ES2 thoroughly studied and identified their market. From its inception, ES2 therefore focused both on meeting the needs of long-time users of custom IC's and on introducing and training newcomers in the field. To achieve these objectives, the firm successively opened design centers in London, Munich and Sevres (near Paris), supplied its know-how to franchised centers and initiated a variety of actions to promote its design tools, Solo 1000 and Solo 2000. Roughly 1,000 Solo 2000 units were thus placed in French universities. A "multitasking circuit" procedure was also developed to produce, on a single silicon wafer, a variety of circuits designed by students and researchers.

Meanwhile, production facilities were being developed. While awaiting completion of its own manufacturing plant, ES2 signed a contract with Exel Microelectronics, a California firm. There, in early 1986, ES2 tested its first direct writing system on silicon wafers using the Aeble 150, Perkin Elmer's latest model. Since April 1986, it has been used to process all ES2 circuits at a rate of four 125 mm diameter plates per hour on average. It will remain in service until the Rousset production line becomes fully operational at the end of 1987. "Meanwhile, the Rousset plant will begin to assemble and test IC's. These operations are currently performed in Great Britain," according to Bernard Pruniaux, ES2's vice president in charge of the Technology and Production division and currently manager of the Rousset factory. This gradual consolidation of all phases of component manufacturing into a single location should substantially reduce delivery times. "At present, the first prototypes are delivered 8 weeks after our centers receive the tapes containing the design data. Our delivery time will fall to 6 weeks by the end of 1987 and to 4 weeks by early 1988. The 2-week goal should be reached by the end of 1988," states Bernard Pruniaux. By that time, ES2 should also be able to offer its clients CMOS technology with 1.6 micron/2 interconnection levels. ES2 is currently working on this and is also preparing CMOS 1.2 micron technology scheduled for production in late 1988 or early 1989.

The founders encountered their share of problems while erecting the ES2 structure. It was developed during the worst recession in the history of the semiconductor industry. Furthermore, European manufacturers' demand for custom IC's failed to materialize on the anticipated scale and in the projected time frame. Finally, construction of the Rousset plant was delayed 6 months due to the change in government in March 1986. As a result, financial projections were revised downward: Revenues are not expected to exceed 50 to 60 million francs this year, while initial projections called for nearly twice this amount.

Seven Years of Experience

The Rousset facility has made its debut at a propitious time. Its opening should build confidence among existing and potential clients alike. The plant is located on 20,000 square meters of land and comprises 900 square meters of office space and 1,500 square meters of production area, over half of which is equipped. The wafers

are processed in class 100 cleanrooms (less than 100 particles larger than 0.5 microns per cubic foot of air) for engraving, layout, distribution, assembly, etc. Wafer writing and resin processing operations are conducted in class 10 cleanrooms. The total investment amounts to 30 million Ecus (1 Ecu = 6.9 francs): 10 million for the building, 20 million for equipment. The plant currently employs over 40 people, including a significant number of engineers with an average of 7 years experience in the semiconductor industry. "This type of expertise is a must at the outset, given the complexity of the processes and the sizable investment at stake," explains B. Pruniaux. Technicians and specialists are now being recruited to round out the engineering staff. Does this show that the managers of ES2 believe they have justified the basis of their business? Probably. In any event, they claim that "the sixty or so circuits that have been developed and manufactured demonstrate it." They must now show that the business is profitable.

12798

Alcatel NV Strikes Semiconductor Deal With SGS-Thomson Group

36980053a Paris ELECTRONIQUE ACTUALITES in French 30 Oct 87 p 1

[Unsigned article: "SGS-Thomson/Alcatel NV Telecom IC Agreement"]

[Text] Pierre Suard, president of Alcatel NV (CGE), announced on Friday 23 October in Geneva, the signing of a technical and commercial partnership agreement in the semiconductor field, with the SGS-Thomson group. "We want to position ourselves in the sector of specific components for telecommunications," explained Mr Suard.

According to the agreement, Alcatel NV guarantees SGS-Thomson a market volume in the field of specific semiconductors, and in exchange, Alcatel NV obtains from SGS-Thomson access to the manufacturer's know-how in the area of specific integrated circuit design.

Alcatel thus also obtains a second source for this type of components, since SGS-Thomson has agreed to transfer a portion of its tools activity (design procedures and CAD) to the Mietec company (in which Alcatel has a 50 percent share).

According to SGS-Thomson, "the commercial portion of the agreement will expand the trade relations that exist between the two businesses. SGS- Thomson intends to increase the share of components it sells to Alcatel." The latter would expand from 15 to 20 percent.

Mietec thus receives the 1.5 micron CMOS process, which it expected to have very promptly (see ELECTRONIQUE ACTUALITES of 2 October 1987. The Belgian company will also receive products intended for RNIS, and a cooperation is planned for joint product development. IST (Innovative Silicon Technology), a full subsidiary of SGS, will supply information to Mietec, which in the opinion of the officials will be able to place a production line in operation by the end of the first quarter of 1988. In practice, this is a second source agreement for RNIS components and other telecom products between ITS and Mietec, via Alcatel and SGS-Thomson.

11023

Alcatel NV Chief Suard Assesses 1987 Activities

36980053b Paris ELECTRONIQUE ACTUALITES in French 30 Oct 87 p 9

[Article by D. L.: "Mr Suard (Alcatel): 4.5 million E 10 and Systeme 12 Lines Delivered in 1987"]

[Text] Geneva—During the press conference he held in Geneva, Mr Suard, Alcatel CEO, presented a positive picture of the group's first ten months. Confident that he has solved the three thorny problems that existed at the beginning of the year (the situation of ITT's former subsidiaries in Spain, the performance of Systeme 12, and the activities of enterprise systems in the United States), Mr Suard is now devoting himself to the group's integration policy. The Alcatel president also disclosed two agreements reached by the company, one with Thomson-SGS on Telecom integrated circuits (see page one), and the other with Nokia and AEG to study and manufacture a digital cellular telephone.

Mr Suard stressed the good health of the Alcatel group, whose "order book has been totally revitalized, and which ends the year with a ledger at least equal to the one at the beginning of 1987." All in all, 2.5 million Systeme 12 lines, and a little over 2 million E 10 lines will be delivered in 1987.

Among the significant Systeme 12 orders, Mr Suard mentioned the 960,000 lines to be delivered over a five-year period to Belgium, the 400,000 lines for Norway, the 310,000 lines for Portugal, the record order of 193 million ECU for 79 Systeme 12 projects received by SEL in FRG—bringing its share of the digital switchboard market to 40 percent, and the 250,000 lines for Taiwan. Two new contracts were obtained for 90,000 lines in China assigned to Shanghai Bell Telephone, and 150,000 lines for Mexico (first Telmex order in three years). Moreover, Systeme 12 has just been accepted by Switzerland.

In E 10, Mr Suard announced the sale of switchboards to Egypt (two systems which will serve 50,000 subscribers), Yemen (13,000 lines), Rwanda, Gabon, and the Ivory Coast, added to which of course, are the French orders. As a whole, E 10 has brought orders of 150 million ECU for exportation, 1.7 million lines for DGT, and 130,000

routing circuits. Mr Suard also reasserted that Systeme 12 and E 10 will be retained in the group's catalog without giving preference to either of them.

11023

Philips, SMH To Establish Joint ASIC Factory

3698a303 Paris ZERO UN INFORMATIQUE in French 29 Jun 87 p 20

[Article signed M.R.: "SMH-Philips Agreement: A Joint Semiconductor Plant"; first paragraph is ZERO UN INFORMATIQUE introduction]

[Text] The Swiss SMH [Microelectronics and Watchmaking Company] and Philips have agreed in principle to merge their respective integrated circuit manufacturing capacities.

Initially, EM Microelectronic-Marin (Neuchatel subsidiary of the SMH group) and Faselec (Zurich company whose capital is primarily held by Philips) will be placed under joint management while each retains its own production capability.

Later, the partners plan to merge under the same roof and install a new modern and competitive production line. Neither signatory has disclosed information on the location of the future plant nor on the future integrated circuit output—a part of which will be used by SMH itself, the major Swiss user of chips. Domestically, the Swiss Army and Government will also buy part of the production. The rest will be exported.

SMH will hold the majority of shares in the new company. "Philips will, however, hold a 'major minority'," according to Nicolas Hayek, chairman of SMH.

The negotiations which led to the agreement in principle lasted 1 and 1/2 years. According to Hayek, the American and Japanese predominance in semiconductors continues to undermine Europe. The agreement between Thomson and the Italian firm SGS [General Semiconductors Company] is a valid response. "Our goal is not to compete with Japan and the United States. Manufacturing standard chips would be suicide," confides the SMH chairman. "We will only produce customized application-specific chips." In addition, this Swiss-Netherlands collaboration will enhance European industrial unity.

Philips, the European leader in integrated circuits, has several production plants. SMH, a leading Swiss watchmaking firm, will have access to them and will thus be able to broaden its know-how. Philips will also gain by acquiring in-depth knowledge in specific areas of EM Microelectronic expertise.

Faselec employs 550 people and produces about 120,000 circuits annually. SMH employs 450 in integrated circuits. Nearly 90,000 chips are produced annually by the Neuchatel plant.

25050/9604

ESPRIT InP Project Advancing

3698a316 Paris FTS—FRENCH TECHNOLOGY SURVEY in English Jul-Aug 87 p 1

[Text] The six-monthly meeting of the ESPRIT 263 Project, concerning the integration of InP-base optoelectronic components, was held at the CNET (French Telecommunications Research Laboratory) in Bagneux on 5 and 6 March last. There were some 40 scientists from Italy (CSELT), England (STL, GEC), Germany (HHI, SEL, Telefunken) and France (Thomson-CSF; CGE and CNET). It was an ideal occasion to give a detailed account to the European Commission representatives and examiners of the state of progress on this project.

At present, emphasis is mainly being placed on improving epitaxy techniques and the technological processes involved prior to producing integrated solid-state devices. Substantial progress has been made in epitaxy by the molecular jet and organometallic processes as well as laser mirror etching. The first tests in producing mixed integrated structures initially dealt with reception: photo-sensor guide (CSELT, Telefunken) p-i-n-photodiode-field-effect transistor (SLT, CNET). No integration has yet been possible for transmitters: the papers presented were, however, indicative of the major efforts being made in the field of distributed reaction lasers. For the first 3 years of this project, the various partners will now be able to attack the production of high-performance functional circuits both for multiplexing and demultiplexing as well as for transmitting and receiving.

/9604

New Thin Film Thermal Sensor

3698a322 Paris FTS—FRENCH TECHNOLOGY SURVEY in English Jul-Aug 87 p 7

[Text] The usefulness of microlithographic techniques for the integrated circuit industry is a well-known fact. Their use in other fields such as temperature measurement and control is opening the way to the design of complex tools with a low response time. It is in this respect, that the solid-state physic laboratory of the CNRS (French Scientific Research Center) has developed a thermometric material adapted to the needs of thermal measurement in basic physics.

The thin film material developed by the CNRS is characterised by a conductivity according to an exponential law, the exponent of which is approximately constant over a vast range of temperatures from 0.1 K to 320 K. It covers temperature ranges which were traditionally

the exclusive domain of metal thermometers, like platinum, and that of thermometers used for cryogenic temperatures, of the Germanium type. It may also be used in research laboratories and in certain equipment developed from cryotechnology which is beginning to appear on the industrial market.

The precise applications for such a material should be numerous. The CNRS concentrated on developing an effective thermal sensor. This micro-sensor now exists: it has been tested with satisfactory results at temperatures ranging between 4 and 320 K. Its existence makes it possible to envisage the construction of an apparatus designed to measure the thermal properties of samples with a volume of one tenth of a cubic millimeter. Among the other possible applications is a thermal imaging device which can be produced now since the laboratory's know-how makes it possible to integrate a very great number of elements on a small surface area thereby allowing for the interconnection of a set of bidimensional sensors.

/9604

Trends in Siemens' DRAM, ASIC R&D, Production Strategy

36980047 Paris MINIS ET MICROS in French 19 Oct 87 p 29

[Article by Elisabeth Feder: "From the Mega Project to Venus: Siemens Prepares the Future"]

[Text] It isn't easy to close up a gap of two years, especially when it concerns memories and when the competition comes from the land of the rising sun. Siemens is learning this now, but remains optimistic in spite of it. For the German company however, components represent only 5 percent of its income; yet its goal is to produce a greater number of complex logic circuits for integration into its systems (computers, telecommunications).

Having started its race against the Japanese semiconductor industry with its large-capacity DRAM Mega project, is this European company (in collaboration with Philips) beginning to gain some ground? It is difficult to say right now; in order to judge, we will probably have to wait for the market introduction of the 4 Mbit generation.

Overly Sophisticated Equipment?

When the company started its project, estimated at 2000 man-hours in 1983, it thought it would have to close a two-year gap. At first, the actual goal was to learn an advanced technology, and then to use it to design complex logic circuits for integration into the systems it manufactures. The 1 Mbit memory is available today, and only needs to be placed in production. This stage now appears more difficult than planned, but Siemens (still) remains confident, with an end of the year deadline.

Everyone knows that in order to catch up you have to move faster than the competition, but it is generally preferable to start on time (see La Fontaine's fable), and that was one of Siemens' tactics. After an exchange of information and know-how with Toshiba, the memory's development was rather fast. A significant investment of 1.7 billion DM (with 800 million DM in research and development alone) allowed among other things, the construction of a production facility at Regensburg (more than 800 million DM by itself), the most modern in Europe.

Designed from the start for fabrication on 150 mm wafers, this unit was equipped with the newest machinery, machinery which unfortunately is not yet ready for mass production. One of the critical problems on wafers of this size is to achieve excellent uniformity, which determines structure reproducibility and therefore yield. Since the beginning of the summer, Siemens has thus been busy tuning up this equipment. Toshiba had wisely remained faithful to its 125 mm production line.

In parallel, the development of the 4 Mbit DRAM resulted in the creation of prototypes as early as last spring. The use of 1 micron CMOS technology made it possible to obtain a chip with an overall area of less than one square centimeter (92 mm^2 to be exact). Introduction into production is planned for 1989, leaving a comfortable margin for completion. It is probable however that the first Japanese DRAM's of this size will be available by 1988. Siemens will thus have succeeded in closing up one- half of its gap.

In trying to help train design engineers, the German company is also investing in another field, that of ASIC's, which have become very fashionable in recent years. In practice however, its impetus is being broken by the fact that there are not enough engineers knowledgeable in the necessary design techniques. To remedy this, Siemens has developed the Venus CAD software package, which contains a library of 1.5 micron CMOS-technology cells (developed with GE USA and Toshiba), and which is available on Siemens mainframes and work stations (Apollo in fact). The company does not foresee installing Venus on other types of machines.

It demonstrates its originality by supplying Venus free to universities, with no other costs than the purchase of the equipment (whose price is nevertheless not negligible) necessary for its utilization. At present, about 20 universities in FRG, as well as the universities of Brunnel (Great Britain) and Peking (China) have selected Venus. Siemens estimates that by 1990, the number of engineers using Venus will be ten times higher.

Since its aim is to fabricate in silicon, the company builds in its production units the integrated circuits designed in the universities. In some cases, these circuits can end up being marketed if the companies are interested, but without Siemens' intervention.

11023

SCIENCE & TECHNOLOGY POLICY

Canada Participating in EUREKA Program on Microcircuits

3698a292 Paris ZERO UN INFORMATIQUE in French 22 Jun 87 p 22

[Article by Manon Brind'Amour: "Canada Is Participating in the EUREKA Program"; first paragraph is ZERO UN INFORMATIQUE introduction]

[Text] Some $20 million in federal subsidies will enable Canadian firms to participate in the European EUREKA program.

The initiative for interesting Canadian firms in the EUREKA program lies with the Ministry of Regional Industrial Expansion (MEIR) under Minister Michel Cote. It was last November during a mission to France on behalf of Canadian industry that Michel Cote persuaded the Europeans to accept Canada as a partner.

MEIR has developed the Technological Opportunities in Europe Research Program (PRPTE). This federal program has a $20-million budget over the next 2 years and enables Canadian firms to participate with European companies in advanced technology projects.

Calmos Systems To Participate in Microelectronics Project

In Canada as in Europe, the aim of the government is not to administer the project but to give the necessary help to competitive industries. Two types of assistance are offered under the PRPTE—subsidies to explore the potential for participation in EUREKA projects and subsidies for R&D expenses of participating Canadian companies.

The subsidiaries of Canadian companies in Europe should be able to participate in the program directly. Firms lacking subsidiaries in Europe will need to cooperate with the assistance of European partners.

MEIR assesses the eligibility of projects using criteria defined by the EUREKA program and submits them to the EEC Commission for approval. The areas of advanced technology involved are data processing and microelectronics, robotics, advanced materials, lasers, biotechnology, marine technology, the environment, and transport.

On 11 March, 6 months after the start-up of the PRPTE program, the first Canadian company became eligible for a $134-million EUREKA project. The company is the aeronautics firm Calmos Systems; it is associated with European Silicon Structures of London and with other European electronics giants: British Aerospace (UK), Olivetti (Italy), Bull (France), Philips (Netherlands), and Nordic Design (Norway).

The project calls for the development within 3 years of technology for automated production of integrated microcircuits by writing directly on silicon.

Calmos Systems, a medium-sized company in the Ottawa area, will receive a $3-million federal grant. The estimated impact will include the creation of 135 jobs, an annual doubling of export sales over the next 5 years, and an increase in dometic sales of over $3 million in the next 3 years.

EUREKA: A Vehicle for Contact Between European and Canadian Manufacturers

This new form of Canadian-European cooperation arouses, of course, lively interest in Canadian industrial circles which are aware that the EUREKA project represents R&D contracts on the order of $20 billion and a new opportunity to penetrate the European market. As far as the Europeans are concerned, Canadian participation in the EUREKA program could give them access to the North American market.

Canadian embassies are working actively to identify the leading sectors in the countries to which they are accredited. The Canadian Embassy is likewise the place where Europeans can begin the search for a potential partner.

25050/9604

Background on Europe's 'FAMOS' Automated Assembly Project

36980063a Frankfurt/Main FRANKFURTER ZEITUNG/BLICK DURCH DIE WIRTSCHAFT in German 12 Oct 87 p 8

[Article by khl: "European Cooperation in Automated Assembly Systems. To Make Capital and Consumer Goods More Competitive. 'FAMOS' Preliminary Study Complete"]

[Excerpts] Frankfurt—In many fields of industrial production, assembly costs account for up to 50 percent of manufacturing costs and the trend is upward. The degree of automation in assembly is still very low. European cooperation is urgently needed here if Europe is to meet the technological challenge of flexibly automated assembly systems (FAMOS) in the 1990's. To acquire a basis of reliable information on which to make decisions, the Federal Ministry for Research and Technology (BMFT) had a preliminary study into the possibilities of European cooperation in the area of flexibly automated assembly systems carried out (FAMOS Preliminary Study); work began in mid-1986. FAMOS is expected to form a major program within the EUREKA initiative.

The main goals of this study were to indicate the need for, and potential of, rationalization efforts in the field of flexibly automated assembly systems.

This preliminary study was carried out by the FRG (under the overall direction in this country of the Fraunhofer Institute for Production Technology and Automation IPA, in Stuttgart) along with France, Great Britain, Italy, Austria, Sweden, and Spain. The FAMOS Preliminary Study began in June 1986 and was completed in August 1987. The preliminary study began with an analysis of the current state of assembly automation and of its economic significance in Europe, and in the seven participating countries in particular. Information was gathered and evaluated from statistical agencies and economic research institutes, by direct inquiries at firms, and in original research.

Not only FAMOS' organizational framework but also its research and development goals were coordinated within EUREKA with the other European aid programs such as BRITE and ESPRIT. Points to be noted about FAMOS are that the activity for research and development work comes from industry, that the projects can be individually supported at the national level, and that it is making possible and stimulating goal-oriented international cooperation in an important specific field. To make effective and comprehensive cooperation possible, a computer-supported information and communications program was developed under the overall direction of the British partner to administer data on current and planned project activities.

While work on this FAMOS Preliminary Study was being carried out at the national and international levels, the first ideas for projects were being collected and discussed. These were exchanged among the partners and sent to interested parties in one's own country. In this way a total of over 40 project proposals were gathered; of these about five may attain EUREKA status in 1987.

The seven participating countries signed statements of intent guaranteeing the continuation of FAMOS first for the period of the preliminary study and then for the next 2 years. Regular meetings will guarantee that the communications and information exchange continues in the future. In the FRG the coordination of any projects will be taken over by the Production Technology Project Office at the Karlsruhe Nuclear Research Center. This will provide not only coordination but also support during the proposal phase. The procedure for FAMOS projects corresponds to that for EUREKA projects. The preliminary study laid the necessary groundwork for successful European cooperation in the field of flexible assembly automation.

12593

FRG Research Ministry Recommendations on Future Research Aid

36980063b Frankfurt/Main FRANKFURTER ZEITUNG/BLICK DURCH DIE WIRTSCHAFT in German 20 Oct 87p 8

[Article by G.U.: "'Research in the Federal Republic Must Become Even More Dynamic.' Federal Research Ministry's Views on Future Research Stimulation"]

[Text] Frankfurt—The Federal Research Ministry has presented the Conference of Land Economics Ministers with its views on future research stimulation. The details of the proposals are as follows:

1. The Battelle Institute in Frankfurt estimates that DM59 billion will be spent on research and development in the FRG in 1987. That is 5 percent more than last year. Research expenditures represent 2.9 percent of the gross domestic product. Therefore German research has largely maintained its position even in comparison with the United States and Japan. The largest portion of German research money comes from business itself: in 1987 its share is expected to be DM36.5 billion. Compared to 1981, business has increased its own research expenditures by about DM14 billion. At the same time, the percentage of financing provided by business is expected to rise to 84 percent for 1987. Only 14 percent will still come from public sources of financing and 2 percent from abroad.

Research and technology policy has, in the opinion of the Federal Research Ministry, made a real contribution to improving the climate for innovation and research: there has been steady support for basic research. The percentage of the Federal Research Ministry budget allocated to that has risen from 26.1 percent (1982) to about 37 percent (1987). Urgent tasks in the fields of environmental and preventive research (e.g. ecological and climate research) have been undertaken. General and specific indirect measures give small and medium-sized firms steady support in achieving technological progress. On the other hand, the total amount of market-oriented project aid has been reduced.

2. The FRG faces new challenges in research and technology policy. International comparisons indicate that the growth rate of research in the FRG is good but could be improved. For instance, for the period 1982-1987 the real annual growth rate for FRG research expenditures was 4.2 percent, which is higher than that of the United States but lower than that of Japan. Throughout the world considerable research efforts are underway in basic technologies, which are thought to have a major potential for uses and applications in business.

Research and technology policy faces the following important tasks:

—Research in the FRG must become even more dynamic so that the FRG remains attractive as an international partner and as a location for industries of the future.

—Science and technology must make greater contributions to the solution of urgent problems, as in the environmental sector, precisely in order to improve the environment-friendliness and acceptance of technology.

—Small and medium-sized firms must continue to recognize and seize the chances offered by new technologies in the future.

—The FRG's space research and technology must make an independent and appropriate place for itself within a European context.

3. The increase in the percentage of the Federal Research Ministry budget allocated to basic research indicates the importance which the Federal Government attributes to the task of supporting effective, world-class basic research. After agreement is reached with the Laender, the Federal Government will increase its share of the joint basic financing for the Max Planck Society by DM21.1 million, or 5 percent, for 1988.

Spending for preventive research remains a priority. The Federal Research Ministry's method in these fields is to develop goal-oriented applied and basic knowledge in individual problem areas in order to make practical contributions to the solution of urgent problems. Allocations for preventive research will be increased considerably once again for 1988, to DM985 million (Government draft).

In the area of the new key technologies, too, which are of particular importance to business, the Government's support is increasingly directed toward pure research. Above all, cooperation between business and science is to be strengthened and research results applied quickly. In biotechnology and materials research this plan has been followed from the start (basic research accounts for a 45-50 percent share in biotechnology). Allocations for physical technology research projects into the basic characteristics of new materials and technologies will also increase considerably.

In information technology, in some fields of which the FRG still lags considerably on the world market, the government statement announced an effort to reorient policy to place stronger emphasis on basic research. This trend is already clear in the 1988 budget proposal (Federal Research Ministry's individual plan) for information processing, where the allocation for project support falls by 3.7 percent but that for scientific research institutions grows by 12.8 percent.

The increased allocation for the Fraunhofer Society, which is jointly supported by the central government and the Laender in the ratio 90-10, will also help support the scientific infrastructure in the field of modern technologies. Scientific institutions are to be strong partners for cooperative projects and so guarantee that the FRG research landscape is attractive to business and to medium-sized firms in particular.

4. One of the primary reasons for the successes in strengthening private initiative in research is the fact that medium-sized firms, too, have increasingly recognized and seized the chances offered them by research and new technology.

Thus in the years 1981-1987, the Federal Research Minister provided for a good doubling of allocations to small and medium-sized firms, which went directly to the firms. In its specialized programs the Ministry's research aid aims particularly at helping recognize and exploit important key and basic technologies. A special attempt will be made in this to provide appropriate measures to meet the needs of small and medium-sized firms, too, to the proper extent.

5. According to the Ministry, the principle of temporary programs has proved itself in the personnel costs grant program and growth stimulation, which were used to stimulate the hiring of research and development staff by small and medium-sized firms. The goal of this stimulation has been to encourage the expansion of the potential for innovation, particularly the expansion of research and development staff capacity. The latest figures from studies of FRG science prove that the desired general expansion of research and development in small and medium-sized firms has occurred.

In 1980 to 1987, the approximately 16,000 firms in this category which received grants from the personnel costs grant program through 1985 increased the number of full-time research and development personnel from 2.7 to 4.4 on average and part-time staff from 4.6 to 6.4. Awareness of the increased importance of product and process innovation in maintaining competitiveness is so widespread that the Ministry feels unspecific aid of this kind will no longer be necessary. Therefore the personnel costs grant program can end this year, a year earlier than originally planned. Growth stimulation will run out as planned.

6. The successes thus far in stimulating research, development, and innovation in medium-sized firms cannot, however, conceal the fact that even after tax reform there are still unsolved problems in knowledge and technology transfer and that to some extent these firms are still not adequately aware of the problem. For instance, firms too often seek solutions to problems in isolation and at a high cost, when others have found the answer long ago or when a problem could be solved more easily and at less expense through cooperating with others or by contracting out the work. The Federal Government helps here by, for instance, stimulating contract and joint research.

Knowledge and technology transfer could be further improved by measures aimed at the following, for instance:

—Greater effectiveness of documentation, data banks, etc. and at facilitating access to these and to the knowledge in them (e.g. by expanding regional patent interpretation offices).

—Helping firms precisely formulate their concrete needs for technical solutions to problems and providing the necessary knowledge in a form adapted to practical problem-solving needs.

—The efficient gathering and processing of knowledge by firms.

The problems of setting up technology-oriented firms and financing innovation in new technology-oriented firms will be the subject of a model trial by the Federal Research Ministry through 31 December 1988. The purpose is to clarify how and with which measures and instrumentalities newly-established technology-oriented firms can be led to lasting success.

7. In connection with the tax relief planned for 1990, the Federal Government intends to dismantle or reduce tax preferences and special tax rules. The tax reductions will do much to guarantee and stabilize economic growth. The overall effect will be to facilitate firms' own initiatives and their efforts to prepare for the future.

12593

COMPUTERS

Poland Uses Computer To Map, Simulate Gas Explosiveness

26020007 Warsaw WIADOMOSCI GORNICZE in Polish No 8, 1987 pp 176-179

[Article by Andrzej Lipczyk, Marek Kossowski, and Andrzej Koziol: "Use of the ZX SPECTRUM Microcomputer for Determining the Explosiveness of Gas Mixtures in the Siersza Mine"]

[Text] Determining the threat of explosion is one of the important tasks when fire-fighting in a mine. Use of gas chromatography provides fast and safe analysis of the quality and quantity of flammable gases. The numerical results obtained, representing percent ratios by volume of individual constituent gases, are used for estimating the explosion hazard, and also for determining a safe strategy for ventilation control. The method for calculating the degree of gas explosiveness was worked out in 1982 at the Central Mining Lifesaving Station. This article describes the implementation of this method on ZX SPECTRUM microcomputer equipment developed at the Siersza Coal Mine Information Science Department.

1. Fixed Explosiveness Region Method

The basis of this method is the Coward-Hartwell diagram representing the explosiveness region of mixtures of methane (CH_4 in air (Figure 1). In practice, this region is approximated by the triangle drawn on it, whence the often-used common name—explosiveness triangle.

The triangle is described by the points D, G, and S. Each mixture of CH_4 and O_2 is represented by a point at coordinates corresponding to concentrations of CH_4 and O_2. A point within the triangle indicates the explosiveness of the mixture being considered.

By using an approach similar to the experiments of Coward-Hartwell, one can calculate the range of explosiveness of mixtures of other flammable gases with air.

The following combustible gases are considered fire hazards:

CH_4—methane CO—carbon monoxide H_2—hydrogen C_2H_4—ethylene C_2H_6—ethane

The following are inert gases:

CO_2—carbon dioxide N_2—nitrogen

With the calculated explosiveness ranges for these flammable gases oxygen in hand, a method was proposed at the Central Mining Lifesaving Station in Bytom for transforming the 6-dimensional space (O_2, CO, CH_4, H_2, C_2H_6) into a 2-dimensional space (O_2, Gp), where Gp is the concentration of these flammable gases. The effect of excess N_2 and CO_2 concentrations was also considered in the transformation. The proposed transformation provided:

—One common range of explosiveness for all flammable components, and

—one point P characterizing the explosive properties of the mixture being studied.

In effect, the range of explosiveness of a mixture of the gases O_2, CO_2, CQ, CH_4, H_2, C_2H_4, C_2H_6, and N_2, as well as point P are projected onto a plane. The susceptibility of the mixture to explosion is inversely proportional to the distance of point P form the edge of the range of explosiveness.

2. Calculations on ZX SPECTRUM microcomputer used is classed as a home computer. This determines its particular parameters. Application of the ZX SPECTRUM microcomputer to the determination of the explosiveness of a mixture of gases was dictated by the microcomputer's suitability for this type of calculation. The relatively low cost of the equipment is not without significance.

The basic configuration of the system is given in Figure 2. This configuration includes:

—microcomputer with keyboard, —Neptune 156 CRT display, —cassette tape recorder, —9V DC power supply.

Any black-and-white or color TV receiver can be used in tandem with the microcomputer, so long as the color receiver is PAL-compatible. The cassette tape recorder must have a high-quality head in order to function reliably with the computer. The basic ZX SPECTRUM microcomputer parameters are the following:

—Z80A microprocessor,

—3.5 MHz frequency meter,

—48 KB RAM dynamic memory,

—16 KB ROM permanent memory,

—64 KB address space,

—compatibility with PAL color TV receiver, monochromatic TV receive,r or a monochromatic monitor (UHF channel 36).

—compatibility with cassette tape recorder—data transmission speed 16 KB/100s,

—speaker with tunable sound duration and pitch control.

In practice, the ZX SPECTRUM microcomputer system was installed in a particular location in the Siersza mine in order to determine the explosiveness of gas mixtures. In this way, the computer system is accessible to levels and mine personnel such as the chief engineer, the senior mining engineer, the dispatcher, and the ventilation engineer and, in any event, is ready for immediate use.

2.2 Program Description

The program comprising the transformation algorithm described in point 1 was written in BASIC. It has built-in safeguards and self-analysis of user mistakes. The considerations underlying the structuring of the program were:

—to provide a lot of communicative capability with the user, assuming he is not computer-literate; this was accomplished by giving a so-called menu or procedural instructions for every situation, thus allowing a user, not having much training in the use of the program, to operate it;

—to control the correctness of entered data and to inform the user immediately in case they are incorrect;

—to present data or calculated results in a readable fashion; the program makes it possible to present results in three different ways and provides the use of 50 measurements.

The program is initiated using the access card shown in Figure 3.

2.2.1. Input Data

The results of chromatographic analysis of every measurement are entered into the program by the user and each receives a sequence number (measurement number). The CRT for entering input data is shown in Figure 4. After entering the concentrations of all constituents, the user approves (or rejects) the data he entered and the program proceeds with calculations. In case a mistake is made during data entry, the user can make corrections; either when entering the same constituent or during verification. He can change the concentration of the component or the entire measurement.

2.2.2. Results of Calculations

The end of the process is shown on the screen (Figure 5), with a tabular display of the coordinates of point P, input data, and program commentary concerning the location of point P with respect to the explosiveness triangle. Next, the user sees a screen (Figure 6) showing graphically the location of point P for successively entered measurements. The program cycles through all points sequentially, giving the measurement number, input data, and the point coordinates. The point itself pulsates in order to distinguish it from the other measurements. The run-through permits the user to analyze changes in the situation for sequentially obtained measurements. At any moment, one can stop the cycle on the current point or the last measurement and turn to entry of data or concentration graphs. Figure 7 shows a sample graph of the change in concentration with time for a given constituent. A similar graph may be had for every component.

3. Interpretation of Results

Observing the displacement of point P which characterizes the explosive properties of mixtures in relation to the explosiveness range and knowing the direction of changes in coordinates as a result of adding (mixing) or restricting other gases or mixtures such as air, methane, GAG-type gas aggregates, and nitrogen, one can offer directly a strategy providing:

—avoidance of the development of an explosive mixture,

—neutralization of an explosive mixture, if such has already appeared.

In Figure 8, points corresponding to individual gaseous components are shown (A—air, N—nitrogen, G—GAG-type gas aggregate, M—methane). Addition of any of these components causes a constituent shift of point P in the direction of the point corresponding to this component.

For example, adding nitrogen brings about a constituent displacement of point P toward the origin of the system of N coordinates (gF, gF). Sealing off an area containing a fire gives rise to a simultaneous decrease in the concentration of oxygen and an increase in the concentration of flammable components (resulting from the lack of oxygen necessary for combustion). This causes a shift in point P toward the point lying on the axes between N and M.

With the foregoing in mind, the entire range of changes of interest can be divided into subregions (I, II, III, and IV) in which safe ventilation strategies are determined a priori and thus:

—In region IV [error?] where P may be found [missing text?]...and the choice of one of them depends on the existing technical conditions.

—In region II, it is necessary to increase the amount of fresh air.

—In region III it is possible to isolate the area containing a fire or to add methane from demethanation pipelines.

—In region IV where point P may be found as a result of operations conducted earlier (low concentration of oxygen and flammable gases) one must endeavor to maintain this situation.

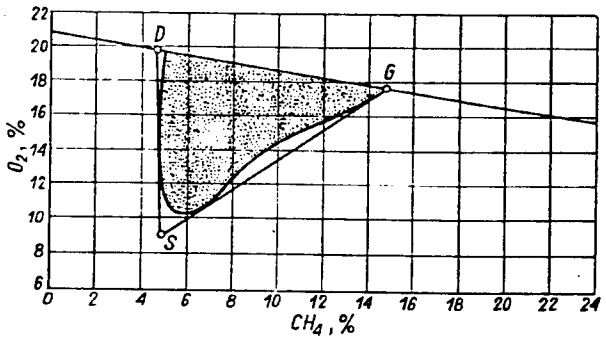

Figure 1. Coward-Hartwell diagram showing the range of explosiveness

It is possible to use the effect of GAG-type aggregate gases or nitrogen in all situations. Most often, these measures are employed when, as a result of actions undertaken, point P remains constantly in region I and a great explosion hazard exists.

4. Conclusions

The system developed meets the fundamental requirements, and such advantages as large-scale graphics and a color display give results which are clearer and more informative (in comparison with layouts where there is only a semigraphic display).

During the course of a year's use of the system, its operational advantages and great reliability were verified.

Literature

1. Instruction for evaluating the degree of explosiveness of flammable gas mixtures. Bytom CSRG [Central Mining Lifesaving Station], March, 1982.

Figure Captions

Figure 2. ZX SPECTRUM microcomputer

Figure 3. Display indicating readiness of the system for work

Figure 4. View of screen during input of measurement data

Figure 5. View of screen with data on the position of the point characterizing explosive properties of a mixture

Figure 6. View of screen with the position of the explosiveness triangle

Figure 7. Graph of changes in methane concentration with time

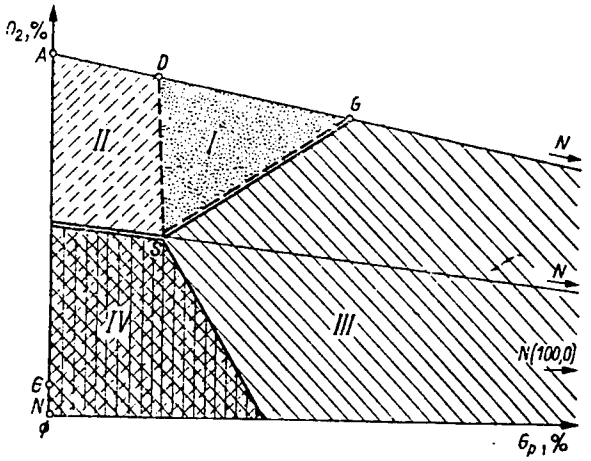

Figure 8. Critical points on diagram and ranges of permissible ventilation strategies

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SCIENCE & TECHNOLOGY POLICY

CAMAC/NIM/VME Devices in Bulgarian Automation

22020003a Sofia SPISANIE NA BULGARSKATA AKADEMIYA NA NAUKITE in Bulgarian
No 4, 1987 pp 18-21

[Article by Sr Science Associate, Doctor Lyubomir Antonov: "Automation of Scientific Research"]

[Text] In scientific research, as in many other areas, the chief means of intensification is automation. Its methods and equipment are being applied in virtually all phases of scientific activity.

Any scientific research commences with a certain idea and with a certain supposition concerning the possible discovery of new facts or new patterns in nature. An experimental verification of these ideas most often involves a great outlay of equipment and time. Because of this, mathematical models are first created which in the most accurate possible manner reflect the real phenomena. Only after a positive response from the modeling phase is the transition made to experimentation. In certain instances this is completely impossible and for this reason modeling remains the only way to the truth.

At present, the basic means for modeling in science is the use of high capacity computers which have high speeds on the order of billions of operations per second and gigabyte memories. In certain instances this speed is not sufficient, and thus it is essential to resort to hybrid systems which consist of physical models of their electric analogs created from analog computers combined with digital ones. The results of the modeling are provided not

only in the traditional formats but also on color monitors with a level of detail containing several million points and a color spectrum of more than 16,000 possible colors. Both two- and three-dimensional images can be produced. Broad-format colored plotters, laser printers with high separating capacity and so forth are employed.

The most difficult and labor-intensive stage in scientific research is experimentation. Research usually involves the derivation of an enormous amount of data about an object, their processing and the presentation of the results in a visual form. In certain instances, it is essential to introduce feedback to the object by means of an effect on certain experimental conditions depending upon the obtained results. All of this is performed by local computer systems hooked up to the test loop of experimental devices. Depending upon the complexity of the experiment, these can run from personal computers to supercomputers. To these are connected the required sensors for receiving the corresponding physical or other values. Most often, due to the low level of the signal from the sensors, it is essential to use preamplifiers or other analog equipment to boost the signal into a perceptible form and level. If the signals are continuous, then multiplexers can be incorporated. These scan and transmit the signals to an analog-to-digital converter which in turn transmits them to the computer in a digital form. The digital results output by the machine, when they are destined for automatic control, are converted into analog signals by a digital-to-analog converter and a demultilexer using appropriate amplifiers, converters or other analog equipment.

When the signals are pulsed and random, then their spectral distribution is of interest. For this, their amplitudes are measured and these are sorted into the appropriate memory cells by amplitude.

The electronic modules for the preliminary processing of the data from an experiment are extremely diverse. Two standards have basically been developed for the electronic modules: NIM for the analog and CAMAC for the digital and analog. Also standardized are the geometric dimensions, the electric couplings, the power voltages, the signal level, the method of data transfer and so forth, with the aim of providing compatible module operation regardless of their function. There is also a standard which makes it possible to connect various metering devices to the experimental unit, namely the IEC 625. In this standard the geometric dimensions of the equipment are not standardized and it is employed only for the couplers and signals for the information data transfer.

The CAMAC and IEC 625 standards provide a mainline organization for data transfer making them similar to the organization of computer systems also based upon a mainline principle. Fig. 1 shows a schematic diagram of the system for automating scientific research based on a computer with the standard CAMAC modules with a link to the research specimen.

The new standard adopted several years ago for the mainline-modular systems, or VME, combines completely the computer equipment with the monitoring and controlling equipment and due to the high requirements provides an opportunity to build very powerful systems for automating the scientific research. There is one other standard for creating super-fast electronics FASTBUS which is already being applied in high-energy physics. The larger systems for automating scientific research employ the capabilities of more than one mainline-modular system as is shown in Fig. 2. Here to the chief mainline of the VME they have connected several microprocessor subsystems built on an auxiliary mainline VSB (a part of the VME standard), independent monitors and a system monitor serving as the arbiter of the microprocessor subsystems. Connected to the same mainline are the monitors of the other mainlines FASTBUS, CAMAC and IEC 625. In even larger systems, particularly with spatial distance of the objects, it is possible to build systems based on local networks (Fig. 3).

Automation is also required in scientific instruments and for this purpose they most frequently use the built-in microprocessor systems or personal computers, in adding a monitoring and controlling part in the form of slots for which there are the provided couplings to the plate of the personal computer. Here a direct processor mainline is used.

During an experiment there is the desire to process the information immediately and produce only the results on the information carriers. With rapidly occurring processes, however, this is not always possible, because in a larger number of experiments, a large amount of information is accumulated on the magnetic carriers. Their processing is sometimes done on a computer connected to the experimental unit but most often they resort to powerful universal computers.

From what has been said up to now it can be seen that the equipment employed in automating scientific research is extremely diverse with hundreds of modules of different systems, the most diverse metering and controlling devices and computers in the broadest range, from processor systems with several chips and personal computers up to the super-powerful computers.

In the socialist countries, CAMAC, IEC and VME are being employed as the main mainline-modular systems for automating scientific research, with the CAMAC system the most widespread. Computer equipment in a rather broad range is also being produced, that is, there are good conditions for building modern experimental facilities and centers for modeling and processing the experimental information.

The extensive employment of this equipment in the work of scientific organizations, as international experience shows, can contribute to strong intensification of scientific research.

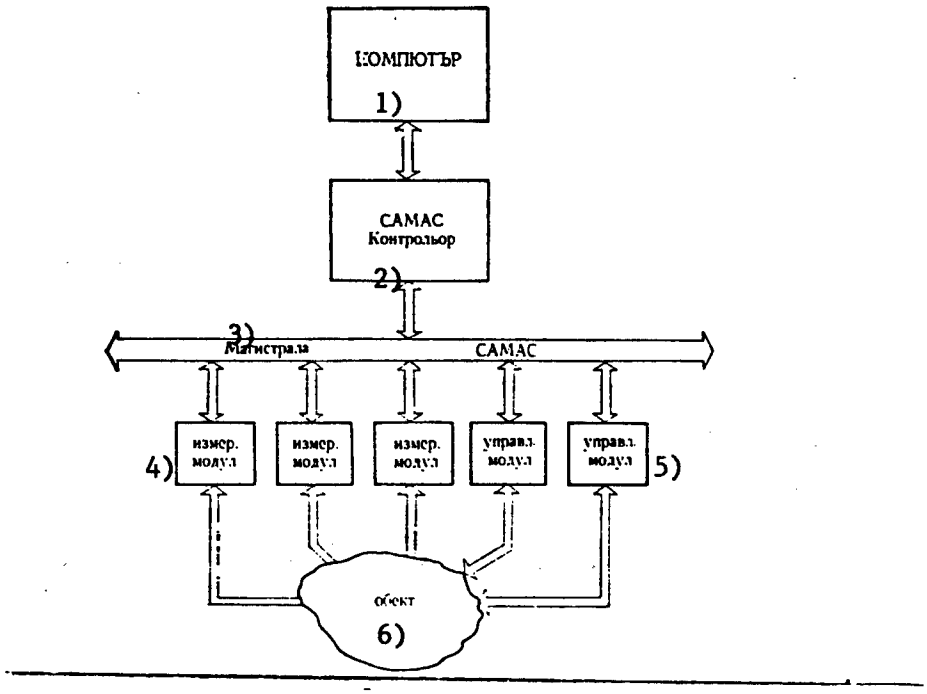

Fig. 1 Key: 1—Computer; 2—CAMAC monitor; 3—CAMAC mainline; 4—Metering module; 5—Control module; 6—Object

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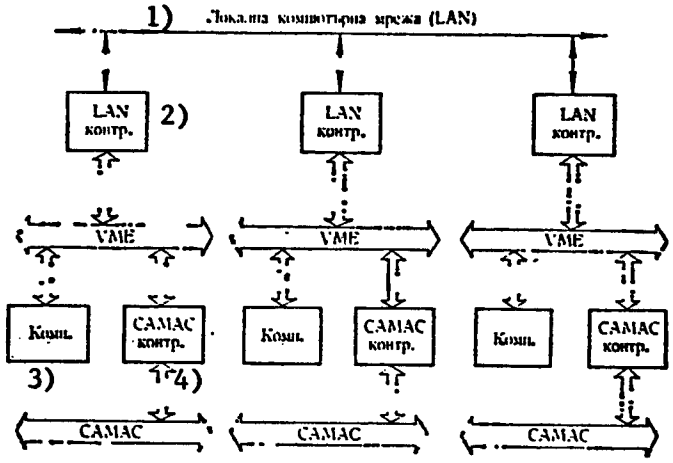

Fig. 3 Key: 1—Local computer network (LAN); 2—LAN monitor; 3—Computer; 4—CAMAC monitor

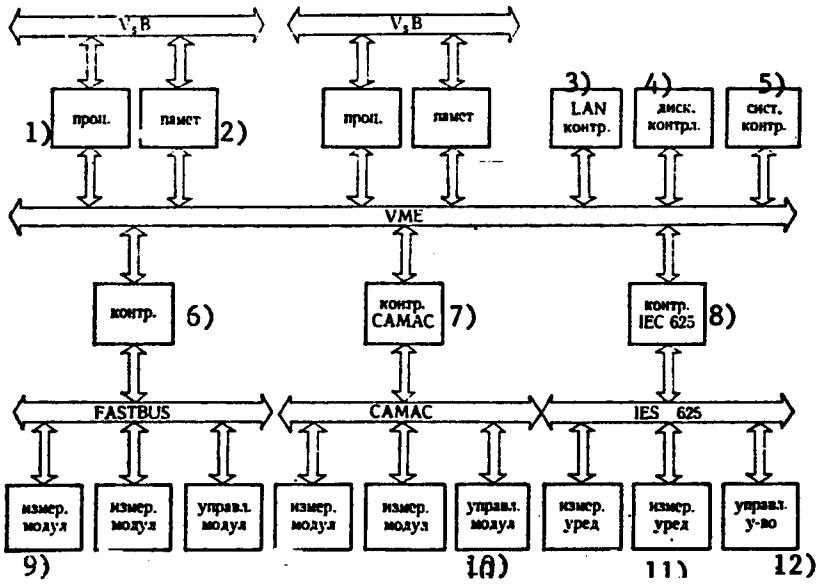

Fig. 2 Key: 1—Processor; 2—Memory; 3—LAN monitor; 4—Disc monitor; 5—System monitor; 6—Monitor; 7—CAMAC monitor; 8—IEC 625 monitor; 9—Metering module; 10—Control module; 11—Metering device; 12—Control device

ADVANCED MATERIALS

Brazilian Superconductivity

36990027 Sao Paulo ENERGIA in Portuguese Jul 87 p 7

[Excerpt] A number of research institutes in Brazil are seriously studying the phenomenon of superconductivity. Among all of them, USP's Institute of Physics, in cooperation with the Institute for Energy and Nuclear Research (IPEN), is now producing a superconductive ceramic wafer obtained from a compound of the chemical formula yttrium-barium-copper-oxide. According to the research scientists, the obtainment of that material, which becomes superconductive when cooled to a temperature of 92 degrees Kelvin, proves that the country's research institutes are capable of producing state-of-the-art technology with excellent results.

8568/9738

AEROSPACE, CIVIL AVIATION

Brazil's Sonda IV Launch Successful

36990019a Sao Paulo GAZETA MERCANTIL in Portuguese 12 Oct 87 p 5

[Text] At 2:30 Thursday afternoon, Brazil's infant space program took another step forward with the successful launching of the third rocket of the Sonda IV series, watched by President Jose Sarney.

The liftoff took place at the launching pad of Barreira do Inferno, in the northeastern state of Natal, and represented the culmination of $1.5 million in investments coordinated by the joint chiefs of staff of the armed forces (EMFA). Officials hope to be able to deliver small Brazilian satellites in space by 1990.

According to Brig Sergio Xavier Ferralho of the Aerospace Technology Center (CTA), Brazil needs to invest in this area because countries such as the United States and France will never transfer their sensitive know-how to Brazil.

The space program plans to open a second launching pad next year at Recantario, in the northeastern state of Maranhao.

12830

Launch of Brazilian Satellite Postponed

36990019b Rio de Janeiro O GLOBO in Portuguese 6 Nov 87 p 9

[Text] Sao Jose dos Campos, SP - The launch of the first Brazilian satellite, scheduled for February 1989 will be postponed for at least a year, making March 1990 the first tentative date for execution of the initial phase of the full Brazilian space program. Defined in 1980, this program calls for the launch, using Brazilian booster rockets, of two weather satellites and two satellites for remote sensing of natural resources.

The shortage of funds, along with technological barriers that are difficult to surmount, constitute the principal problems of the Brazilian space mission, a project budgeted at $1.1 billion. The program has become more expensive, since the research centers involved in the project had to invest more money in technological development in order to overcome the technological obstacles set up by the more developed nations. This was what happened with sodium perchlorate, a component of the solid fuel to be used by the Brazilian rockets. The United States refused to supply the compound, alleging that it would be used in long- range military rockets. It took 3 years to develop the substance in Brazil and transfer the technology to Andrade Gutierrez.

During the next few days, Brigadier Paulo Roberto Camarinha, chairman of the Brazilian Commission for Space Activities, Cobae, is expected to call a meeting of that body to decide on a new timetable for the full space mission. Before then, however, as minister and chief of staff of the armed forces, Brig Camarinha will report on the status of the program to President Sarney, formally notifying him of the impossibility of meeting the deadlines that were set earlier. Sarney is said to have expressed to the members of Cobae his personal and official interest in seeing the first Brazilian satellite launched during his administration, in February 1989.

Program scientists are certain that technological problems, will make it impossible to meet the launch date initially scheduled. Some even acknowledge that, with a 5-year mandate, it is unlikely that Sarney will see the launch during his term of office.

The discovery that there will be a postponement was merely a suspicion in August of this year, when one of the critical assessments of projects, in which both foreign and Brazilian specialists participate, was being made. Since that time, it has been suspected that the satellite booster rockets being developed at the Aerospace Technology Center would not be ready in time for a 1989 launch. Soon afterward, another evaluation at the Ministry of Aeronautics indicated that work on the Alcantara rocket launching base in Maranhao was 14 months behind schedule and that it would be very difficult to make up for the lost time.

Last month, Aeronautics Minister Brigadier Octavio Moreira Lima ordered that a Cobae support group be formed, composed of 3 representatives from each segment of the space mission—the Institute of Space Research, the Aerospace Technology Center, and the Alcantara Launch Site Installation Group. When they

met for the first time, day before yesterday in Brasilia, they heard formal presentations on the progress of the work in each segment and concluded that none of them are on schedule.

12830

Satellite Launch Site Construction Under Way

36990021a Rio de Janeiro O GLOBO in Portuguese 14 Oct 87 p 6

[Text] Sao Luis—Since the beginning of this century the town of Alcantara, located in the Maranhao lower land, 35 Km from the capital, and with a population of barely 3,000, has been overwhelmed by an attitude of indifference, stemming from a process of violent economic decay. Today, the situation in this city is radically different. A few kilometers from the city's historical center—a set of mansions, churches, and the 19th century ruins from the time when this area housed Maranhao's rural aristocracy—1,200 workers are engaged in the accelerated construction of the Alcantara Launching Center (CLA).

In addition to the personnel hired by the consortium of construction companies' Andrade Gutierrez and Mendes Junior, the Aeronautics Ministry—which is responsible for the Implementation of the Alcantara Launching Complex Group (GICLA)—has 230 specialized civilian and military employees in the area. The group is working hard on to complete the center on schedule. The center must place the satellite launching vehicle (VLS) into orbit in 1989. At that time, using the mastery of the space technology, Brazil will become the 7th country to join the club of manufacturers of rockets and satellites.

In order to join that select group in this decade, Brazil has been working since 1979, when the Brazilian Complete Space Mission (MECB) was created with the objective of sending four satellites into orbit using Brazilian-made rockets. The National Institute of Space Research (INPE), which is subordinated to the Ministry of Science and Technology, is responsible for building the satellites and for operating them.

The Aeronautics Ministry is in charge of preparing the physical infrastructure, building the laboratories, testing the satellites, operating the ground satellite tracking stations and the communication network, operating the control centers, and disseminating information to the consumers. The ministry is also in charge of developing a rocket with four solid propellent stages and building the Alcantara launching base.

According to GICLA chief Air Force Colonel Engineer Pedro de Araujo Sousa, Alcantara was selected as the site for the rocket launching base for technical reasons: The meteorological conditions and the position with respect to sea level.

Another major reason is the proximity to the equator (2 degrees and 18 seconds), where the tangential speed of the earth is at its maximum, allowing for a substantial saving in rocket fuel. Studies show that 25 percent of fuel can be saved because of this factor, comparing with the performance of, for example, the U.S. launch site. Another factor is the proximity to Sao Luis, which has an appropriate support infrastructure.

The project for the implementation of the launching center—including its operational stage—is budgeted at $215 million. Contracts covering 15 percent of the project have already been signed.

08309

PRC Official Discusses Building Satellite

36990021b Brasilia Domestic Service inPortuguese2100 GMT 3 Dec 87

[Excerpt] Brazil and the PRC might build a satellite to be used by the two countries for the remote monitoring of natural resources. This was discussed during the meeting today between Science and Technology Minister Luiz Henriquez da Silveira and PRC Aeronautics Vice Minister Gao Zhenning. Brazil would finance 30 percent of the cost of the satellite, estimated at $127 million.

During the meeting the two countries agreed to step up trade in space technology, with purchases to be paid for with merchandise.

08309

Brazilian, Argentine Cooperation on CBA-123 Detailed

36990019c Sao Paulo GAZETA MERCANTIL inPortuguese19 Oct 87 p IV

[Text] Ever since the beginning of July, a team of 60 Argentine technicians has been busily at work at the Sao Jose dos Campos headquarters of Embraer, the federally-owned aircraft manufacturer.

They are cooperating with more than 100 Brazilian specialists to design the CBA-123 19-seat turboprop commuter liner, Embraer's landmark joint venture with Fabrica Argentina de Material Aerospacial (Fama) of Argentina.

Beginning in February, when the Argentines return to Fama headquarters in Cordoba, the two teams will carry on with separate tasks that were clearly defined in an agreement signed in January of last year. The agreement calls for Embraer and Fama to split the cost, production, and marketing of the project on a 2/3 to 1/3 basis.

Out of a total investment of $300 million, Embraer will chip in two thirds, $130 million from Brazil's National Development Fund and $70 million from component suppliers and new stock issues. Fama will provide the remaining $100 million.

To integrate the production process, the Brazilian firm will develop and manufacture the plane's front fuselage, wings, rear cone, and the vertical part of the tail. Fama, on the other hand, will be responsible for the central and rear fuselage and the tail fins. The turboprop engines for the aircraft will be supplied by Garrett Turbine Engine company of the United States, as Embraer announced last month (October 5 issue).

During the production phase, the two firms will exchange parts to supply the aircraft assembly lines to be set up at Cordoba and Sao Jose dos Campos.

This division of labor extends to the area of marketing as well. Embraer will have the exclusive right to distribute the plane in Brazil, the United States, and France, while Fama's domain will cover Africa and the rest of Latin America.

Market research projects the venture will sell as many as 500 CBA-123's worldwide during the 1990's. Fama spokesman Enso Crisculo believes Argentina alone could absorb 100 of the aircraft, which is scheduled to hit the market in June 1991 bearing a $4 million price tag.

12830

Productivity, Quality Limitations Threaten Brazil's Embraer

36990020 Rio de Janeiro JORNAL DO BRASIL in Portuguese 2 Nov 87 p 12

[Text] Embraer ended the first 9 months of 1987 in an adverse economic/financial position. Although sales went well, delays in the delivery of new aircraft have reduced revenues and led to losses. Company sources say that reasons for the delay include labor productivity problems and a higher percentage of parts rejected because of defects.

Deliveries made after the deadlines have forced Embraer to take out loans in order to finance its working capital. This increases its financial outlays. As a result, the company showed negative profitability during the first 9 months of the year.

To deal with its present difficulties, Embraer has launched an internal campaign to contain costs. The plan calls for (a) reduction of inventory to a level required for production purposes, and (b) reduction of the number of man-hours employed in certain tasks. The figure of 32 man-hours per kilo of airframe is supposed to be cut to only 25 man-hours. This approximately 20 percent improvement in productivity would speed up the aircraft production cycle. Furthermore, administrative and marketing expenses are to be held down.

Embraer is still negotiating a long-term loan through the National Development Fund/National Economic and Social Development Fund (FND/BNDES), as an intermediate measure. However, according to sources at the factory, one of the steps under consideration as a means of bolstering Embraer's capital over the long term is the public sale of shares in the company on the stock exchanges. At any rate, the firm hopes to end 1987 with a reversal of its initial losses.

12830

BIOTECHNOLOGY

New Biotechnology Center in Rio de Janeiro

36990016b Rio de Janeiro O GLOBO in Portuguese 23 Oct 87 p 30

[Text] The Rio City Hall will take the occasion, next April, when the First National Biotechnology Fair and Congress are held at the Riocentro, to initiate the Rio Biotechnology Enclave, to be establishedon Ilha do Fundao, on an area of 200,000 square meters, with a capacity to accommodate 40 business firms. The enterprise will cost nearly $24 million (1.27 billion cruzados), and participating in it jointly will be the Federal University of Rio de Janeiro, the Oswaldo Cruz Foundation,the Rio City Hall, the Ministry of Science and Technology, and the private sector, represented by the Brazilian Association of Biotechnology Enterprises (ABRABI).

According to the president of ABRABI, Antonio Paes de Carvalho, the prospects for the return of business firms with investments in modernbiotechnology are currently $1 billion (53 billion cruzados).

According to the Rio municipal secretary of economic development, Jose Augusto Assumpcao Brito, the City Hall will provide for the infrastructural work and administrative premises with an investment of $1 million (23 million cruzados), in addition to exemption from the IPTU for 5 years, and from the ISS [Tax on Services] for 6 months.

2909

Brazil's Unicamp To Invest $14 Million in Biotechnology

36990016a Rio de Janeiro O GLOBO in Portuguese 16 Nov 87 p 10

[Text] Campinas—Brazil's largest integrated program for biotechnology is beginning to be implemented at Campinas State University [UNICAMP], with financing amounting to a million OTNs (nearly 463.5 million cruzados), released by FINEP [Funding Authority for Studies and Projects]. At the beginning of next year,

UNICAMP is due to receive $8 million (nearly 440 million cruzados) from the International Development Bank and, for apparatus alone, starting in 1988, will be investing $3 million in latest generation equipment.

According to the program coordinator and director of the Institute of Biology, Antonio Celso Magalhaes, over the past 10 years UNICAMP has invested in isolated projects, which will now begin being treated in amultidisciplinary manner. The team of 60 scientists and an additional 150 persons, including specialized researchers and technicians, areworking at the Molecular Biology Center, on which construction has begun, and at the Integrated Research Center, acquired from Monsanto.

Despite problems with the release of imported materials, in 2 years the coordinator expects to be showing the first results. The field of biotechnology applied to food should be one of the first to offer finished products, because it has a longer tradition. For example, projects are under way to develop biopolymers and enzymes used in food processing.

In the sector, which had already been carrying out projects, theproduction of pharmaceuticals will be accelerated, to meet the priorities for control of medicines, developing technology for the manufacture of antiinflammatory, analgesic, and cardiotonic products. In the field of vaccines, without attempting to duplicate efforts or to compete with traditional institutions, UNICAMP is working on the procurement of vaccines for animals, such as the one to immunize hogs against bacterium coli.

2909

Synthetic Skin: Brazilian Biotechnological Development

36990016c Rio de Janeiro C&T NOTICIAS in Portuguese Oct 87 p 1

[Text] Brazil is beginning to export a treatment for burns to the United States. The product is a temporary substitute for skin, and was developed by Biofill. It has been used for 3 years with complete success by the Cajuri University Hospital in Curitiba; consisting of a permeable cellulose tissue that allows for the passage of water vapor, but prevents the entry of microorganisms responsible for the infections commonly affecting burns patients.

This year, the University of Michigan Hospital, which treated the little girl, Cecilia Chican, the sole survivor of the Boeing that crashed in Detroit 2 months ago, has already started working with Biofill.

2909

COMPUTERS

Brazilian Electronics Firms Widely Unprofitable in 1987

36990026 Sao Paulo DADOS E IDEIAS in Portuguese Oct 87 pp 26-30

[Article by George Vidor: "A First Six Months in the Red"]

[Text] The numbers that are being shown in the balance sheets confirm that Brazilian informatics companies had a dramatic first six months, many times worse than the last months of last year (see No. 111, the DADOS E IDEIAS edition on the top 150). The companies show increased losses resulting from expenses and financing costs or heightened investments, none of these offset by equivalent sales of products or services. An exception was Itau Tecnologia S.A., one of the few, if not the only, firms to show a profit during the period.

In the face of this dangerous situation, the firms took precautions, renegotiating their debt, laying off people, closing branches, managing their inventories better, and, mainly, discussing further the prices charges by their suppliers. From what can be confirmed through the assessments made by the companies, themselves, the majority expect a recovery in the second six months resulting from the measures adopted or from market recovery. The firms hope that their financial costs will be reduced by the results of the anti-inflation program, and by a transformation of their short-term debt to long-term instruments, for example.

Itautec —

The only one among the firms evaluated to operate in the black during the first six months, Itautec, S.A. recorded a profit of 43.968 million cruzados. The main companies of the group—Itautec Informatica, Itaucom, and Itaucam—had gross revenues of 2.241 billion cruzados. According to the director of market relations of the holding company, Olavo Bueno, this performance was mainly the result of cost reductions, and the decision by the firm to avoid a price war by, "operating within reasonable limits."

SID —

Of the companies evaluated, SID Informatica (the largest government-financed informatics company), had the most severe losses. The financial costs of SID were so high during the first six months that they exceeded the company's total billings during the period. That is, the company worked for the entire first six months in order to pay the banks and its suppliers. The company's sales were very weak during the first four months as a reflection of the retraction in the market toward the end of 1986.

The solution found by the company to turn the situation around was diversification, a giving up of its dependence on automatic banking (the percentage of total billings that this market represented fell from 43 in 1986, to 23 during the first six months of 1987). General usage equipment now represents 51 percent of industrial sales, as compared with only 40 percent during the same period last year. Commercial automation and services rose to 23 percent of SID sales, compared with 17 percent in 1986. And the trend is that this market segment will increase even more because of contracts signed by SID with the large department store chains (Mesbla, among others, as reported elsewhere in this issue).

In the microelectronics sector, in spite of difficulties, SID managed to record a profit, possibly as a result of a real increase in sales of 45 percent as compared with the first semester of 1986. SID Microelectronic production for the informatics market rose from 18 percent of total sales in 1986, to 22 percent in this year's first semester. The industry recorded a drop in sales of components to the automobile industry which will certainly be reversed during the second semester due to increased production levels in the automobile assembly sector (the domestic market for cars began to improve as of June).

With liquid capital that is considerable, SID prepared itself to confront the crisis; so much so that its indebtedness level remained unchanged from last year to the first semester of 1987. Also, the level of accounts receivable exceeded the level of accounts payable for the short term and medium term. From what the numbers reveal, SID is not yet a cause for great concern to its shareholders.

FINANCIAL RESULTS FOR THE FIRST SEMESTER, 1987

Company	Revenues	Cost of Financing	Loss	Loss per Share	Cost of Financing as % of Sales	Cz$ Loss as % of Sales	Debt Level 87	Debt Level 86	Liquidity Index 87	Liquidity Index 86	Net Assets
Datamec	605.7	0.2	280.9	3.12	0.03	46.4	0.61	0.79	0.58	0.88	643.4
Edisa	479.9	376.1	232.4	1.67	78.4	48.4	1.23	0.96	0.58	1.14	766.8
Investec	——	——	165.5	2.42	——	——	0.01	0.01	93.4	0.10	558.7
Labo	533.7	141.4	207.5	n/a	26.5	38.9	n/a	0.87	n/a	0.65	n/a
Medidata	176.7	91.0	19.5	n/a	51.5	11.0	n/a	0.70	n/a	0.52	n/a
Racimec	341.2	128.0	78.5	0.23	37.5	23.0	0.73	0.76	1.42	0.69	604.2
Scopus	636.3	372.5	392.0	3.38	58.5	61.6	2.00	10.97	1.14	0.72	384.0
SID Informatica	777.9	781.4	563.7	1.60	100.4	72.5	0.64	0.63	1.06	0.54	2882.7
SID Microeletronica	401.6	n/a	(9.1)	(0.06)	——	——	——	——	——	——	1268.3
Tesis	198.1	50.1	108.6	n/a	25.3	54.8	n/a	n/a	n/a	n/a	n/a
Digitel	n/a	n/a	18.4	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a

Scopus —

In the case of Scopus Tecnologia, the first semester was terrible, with high costs and weak sales. During the second trimester, sales improved slightly, but financial costs continued to have an enormous impact on the company's balance sheet (for example, at the end of 1986, the company had a very high debt level; when interest rates exploded, Scopus immediately felt the consequences of its prior capitalization difficulties).

During the second semester, the company hopes to recover for three reasons: 1. All of its short term debt was traded for a long term loan from the National Bank for Economic and Social Development (BNDES), on which it will pay real interest of 6 percent per year, but it will have 29 months of exemption from paying against the principal—until then it will make interest payments only. At the end of that period, the loan will have to be amortized in 48 months, but even that arrangement is subject to negotiation.

2. The company has inventories evaluated at low price levels, which will increase its profit margins on sales of finished products during the second semester.

3. The launching of new products such as the PC 3274 (a nucleus for remote terminals that is compatible with IBM's model), the new line of TVA 3078 terminals—also compatible with IBM systems—the Nexus 3600 (a 16-bit

microcomputer that has the highest memory level and processing speed), and the Sine 3.2 operating system for Nexus.

LOSSES FOR THE FIRST SEMESTER
(In Decreasing Order)
In Millions of Cruzados

Sid Informatica	563.7
Scopus	392.0
Datamec	280.9
Edisa	232.4
Labo	207.5
Investec	165.5
Tesis	108.6
Racimec	78.5
Medidata	19.5
Digitel	18.4

Datamec —

Datamec, a subsidiary controlled by the Caixa Economica Federal, showed high loss levels because the prices for its services did not correlate with costs of equipment and of the materials it uses for data processing. Datamec has a low debt level, and its revenues have begun to exceed its financing costs (its debt level has actually been reduced).

Edisa —

Edisa also suffered greatly during the first trimester, with reduced sales levels and increased financing costs. Compared with the same period in 1986, Edisa's sales levels fell 3.8 percent in real terms during the first three months of this year. In the second trimester, though, sales improved by 40.3 percent, also in real terms, so that the company was able to close the first semester with a real growth level of 23.5 percent, thereby reducing its relative debt level. The losses continued because of its financing costs. The company expects to reduce these costs during the second semester, but in order to be able to do so it was obliged to cut almost in half the working capital secured from the financial system and from its suppliers. A contract with General Motors for the manufacture of onboard computers (designed especially for export vehicles) provided an injection of spirit to the company, which is also pinning its hopes on the commercialization of microcomputers launched toward the end of last year.

Tesis —

Tesis, controlled by Edisa, had a second semester that was worse than its first, with reduced sales and increased costs. During the Cruzado Plan, the company received many orders for calculators which later failed to be transformed into sales. In order to finance its inventories, Tesis needed working capital, and financing costs consumed all of its profits. In July, Tesis saw indications that its customers would be reinvesting, and, as a result, there would be increases in order levels.

COMPARISON OF THE FIRST TRIMESTER
WITH THE SECOND TRIMESTER
(Millions of Cruzados)

Company	Net Sales: 1st	Nest sales: 2nd	Loss: 1st	Loss: 2nd
Datamec	196.7	409.0	47.4	233.5
Edisa	101.0	378.9	104.7	127.7
Investec	——	——	65.0	100.4
Labo	182.4	351.3	74.1	133.4
Medidata	45.5	131.1	8.4	11.1
Racimec	150.5	190.7	23.4	55.1
Scopus	199.5	436.8	111.4	280.6
Sid Informatica	259.5	518.4	140.6	423.1
Tesis	81.4	116.7	29.0	79.6

Labo —

Labo Eletronica was another company that had large losses during the first semester (which was reflected in losses to Investec, which holds a 48.9 percent interest in the company). In relative terms, the second trimester was even worse for the company than the first, causing it to take drastic measures such as, for example, reducing its payroll by 30 percent (through layoffs of personnel), the closing down of departments, and the closing down of some of its branches.

Labo's sales toward the end of 1986 were made at prices fixed in cruzado terms, and the company was unable to renegotiate these values in 1987 to levels that could cover its financing costs. In the services area— which represents 50 percent of the company's billings—the problem was most serious, since the company experienced an increase of 43 percent in its costs, while being able to increase its prices by only 15 percent. Later, the 12th of June price freeze came, and the 23 percent imbalance could not be covered. This means that the company will continue to live with prices that are out of phase during the second semester.

Medidata —

Medidata (another company for whom Investec is an important shareholder, with an ownership level of 49.9 percent) experienced a real decline during the first six months of 28.7 percent in its gross revenues. However, a major portion of the losses during that period was the result of its participation in Elebra Computadores, which has been in the red for a number of semesters. Of its losses of 19.5 million cruzados, about 62.2 percent (13.5 million cruzados) were attributable to Elebra Computadores, and this is reflected proportionally in the

shareholder's balance sheet. For the second semester, Medidata anticipates sales of its supermulticomputers, of which it has sold five during the first semester, for delivery this year, at an average price of $200,000.

Racimec —

Racimec, which was always one of the most profitable companies in the informatics sector, had to absorb considerable losses in the second trimester of 1987. Even so, of the larger companies in the sector, it achieved good results. It is a company with a low indebtedness level and high liquidity, and the only major concern with regard to Racimec lies in the fact that its orders are concentrated in the Caixa Economica Federal (and selling to the government these days is always a problem).

The phenomenon of losses in 1987, causing the first great crisis in Brazil's informatics industry, is not limited only to domestic companies. After 70 years in Brazil, IBM, the giant of the industry, had its worst results this year; they were comparable with those of 1971.

That everyone did poorly there can be no doubt. What we need to know now is how each of the companies will be when the crisis is over.

12857

DEFENSE INDUSTRIES

Brazil's EMBRAMIL To Manufacture Tactical Rockets

36990022 Rio de Janeiro O GLOBO in Portuguese 22 Nov 87 p 51

[Text] Sao Paulo—Brazil is going to produce a new 81mm ballistic rocket beginning in 1988. Based on Swiss technology, the rocket will be manufactured by EMBRAMIL in Rio de Janeiro and will involve an investment of $12 million (720 million cruzados). Besides being used by the Brazilian Armed Forces, the new rocket will be sold mainly on the export market, and a plan already exists for selling 100,000 units abroad in 4 years.

The above information was provided by Admiral Aimara Xavier de Souza, EMBRAMIL's chief executive. The technology for producing the 81mm rocket was acquired from Oerlikon Buhrle of Switzerland, and it will be completely transferrred in 2 years with 100-percent local content.

"The idea is to produce that equipment in Brazil and export it. It is used by the principal armed forces of East Europe—the Warsaw Pact forces and China," Adm Aimara announced.

Oerlikon Buhrle is the same firm that is setting up the air defense system for the United States and Canada—the ADAT system, which is something new in the way of sophisticated weapons. Oerlikon is pledged to transfer all the technology to EMBRAMIL, and the national firm will be able to develop new ballistic products based on that technology.

The new rocket system is accompanied by a multiple launcher enabling it to be mounted on combat vehicles and even on helicopters. In other words, the new weapon can be used as a surface-to-surface or an air-to-surface weapon. An armed 81mm rocket weighs an average of 18 kg and has a range of from 8 to 10 kilometers. The multiple launcher can fire 30 rockets in 3 seconds. According to the admiral, the new equipment may be used on the AMX subsonic jet aircraft that is going to be mass-produced by EMBRAER [Brazilian Aeronautics Company].

11798

MARINE TECHNOLOGY

Brazil Manufactures Underwater Robots

36990017 Rio de Janeiro O GLOBO in Portuguese 7 Nov 87 p 29

[Text] Among the preparations being made by Petrobras to engage in the production of deep-water petroleum in the Marlin and Albacora fields—with reserves estimated at about 2 billion barrels—the most significant factor is the nationalization of the remote-control vehicles (robots) for inspecting and maintaining the platforms. At CENPES the expectation is optimistic regarding the test of the first prototype, manufactured by the Rio firm, CONSUB, and scheduled for testing at the middle of this month.

Antonio Claudio Sant'Anna, coordinator of the CENPES Underwater Robot Project, believes that the field of robot-production technology will be of strategic importance to the company. This would hold true not only through the application of the robot to various activities in addition to those related to platforms and deep-water production systems but also through the series of technologies which Petrobras succeeded in dominating during its development through the efforts of the CENPES research scientists.

Among these technologies, Antonio Claudio makes special mention of the preparation for underwater operation of electric motors and video chambers and also the development of buoyant equipment capable of withstanding enormous pressures, such as those found at the bottom of the sea. With the help of the Coordination Board of Postgraduate Programs in Engineering at the Federal University of Rio de Janeiro (COPPE-RJ), CENPES and CONSUB developed a special epoxy-based coating combined with fiberglass, a sort of hull, which permits the robot to float when necessary.

In 1985, the world began to recognize the great usefulness of underwater robots, especially at depths to which man cannot descend. A number of companies then emerged, specializing in the production of a broad line of equipment, including video chambers, hinge-pin and valve arrangements, mechanisms for cleaning the platforms and facilities for verifying the resistance of materials. In short, they specialized in equipment which would make the robots adaptable to the needs of the oil companies. Both the demand and market were thus established.

When Petrobras took its first steps in the exploration and production of deepwater oil, it imported a considerable number of robots. Upon discovering that the most promising Brazilian oil fields were located at depths of 250 to 2,000 meters, the company decided to include robots in the list of equipment designed to replace imports.

In July 1986, CENPES and CONSUB undertook to develop the first nationally produced underwater robot. The first Brazilian robot is basically an extension of the human eye and will be used exclusively to inspect equipment at depths up to 1,000 meters. In addition to a video chamber, the robot will have special equipment for evaluating the amount of corrosion which has occurred and, possibly, additional equipment capable of cutting steel cable—work which is frequently required at great depths.

All of this will be controlled by a computer located at the surface and linked with the robot through a cable. Through means of a joy-stick—a lever similar to that used in video games—the operator can control the movements of the robot, making it possible for the robot to proceed in any direction and even turn on its own axis.

If this project is successful, CENPES will begin to develop a second robot, this time equipped with a mechanical arm capable of making minor repairs at the bottom of the sea. At the beginning of the year, CENPES signed a contract with COPPE for conducting research over the medium term relating to the types of problems likely to be encountered in a mechanism of this nature.

"We must first convince ourselves. Learn what the problems are and try to resolve them. We shall then be capable of developing the robot," said Antonio Claudio.

According to Paulo Tupinamba, president of CONSUB, the contract signed by his company and Petrobras in July 1986 is in the amount of CZ$18 million and stipulates a period of 18 months in which to produce the prototype and manufacture two units. Industrial production is expected to begin in June 1988.

8568/9738

NUCLEAR DEVELOPMENTS

Organization of Brazil's Plasma Physics Program Described

36990012 San Jose do Campos ESPACIAL in Portuguese May 87 p 7

[Article by Antonio Montes Filho and Ricardo Magnus Osorio Galvao]

[Excerpt] At the beginning of February, the Brazilian plasma physics research community finally culminated a lengthy effort towards facilitating plasma physics activities in Brazil, an effort that has been in progress since the mid-1970's. Through a resolution signed by Science and Technology Minister Renato Archer, a working group was constituted to:

—Develop the National Program for Plasma Physics and Controlled Thermonuclear Fusion, defining its schedule and budget for the 1987/1990 period;

—Propose the creation of a National Plasma Laboratory and define its organizational structure; and

—Technically evaluate the available areas for the construction of this laboratory.

Initiative of Brazilian Scientists

Plasma physics research in Brazil began around 1975. There are currently six groups directly involved in this research, of which the largest is at the Associated Physics Laboratory of the INPE (LAP/INPE). In 1978 these groups developed a plan for the National Plasma Program and, since then, have been engaged in making the government aware of the need to establish a more intense research program in controlled thermonuclear fusion. Fortunately, with the creation of the Ministry of Science and Technology, a direct path was opened to the government. Minister Renato Archer was, during the 1950's, a firm defender of the creation of a truly Brazilian program of nuclear energy. During all these years, he has followed the development of the Brazilian nuclear program and witnessed the consequences of the lack of correct planning. As a result, he is well alerted to the problem of controlled nuclear fusion and eager to develop an appropriate program in this area, together with the scientific community.

On the initiative of the LAP/INPE researchers, meetings began to be held in April of 1986 involving representatives of the plasma physics community in Brazil, which resulted in the formulation of a new proposal for the development of the National Program for Plasma Physics and Controlled Thermonuclear Fusion. This program

anticipates the creation of a National Plasma Laboratory, directly linked to the Ministry of Science and Technology. By agreement with the community, it was suggested that LAP/INPE should serve as the nucleus around which the future National Laboratory and its provisional headquarters would be formed.

At the National Laboratory, the most important experiments planned for the National Program will be performed. The current research groups based in the universities should be maintained and should receive all possible support, in order to be able to continue with their essential training activities. They should also be responsible for the less important exploratory experiments besides participating in the major experiments that take place at the National Laboratory. In addition to the research aimed directly at achieving controlled nuclear fusion, the goal of the National Program is to develop various technological applications for plasma that are of immediate industrial interest. Among these applications are plasma abrasion (for cutting of metals, heating of ovens, and hardening of surfaces), plasma flows (for polymerization processes and ione implantation), high frequency and high potency radiation flows, ione propulsion, etc.

The proposal was delivered to the Ministry of Science and Technology in June of 1986, resulting in the recent resolution. We hope now that the National Laboratory will be established as quickly as possible, so that we could still effectively participate in the international effort. As long as we are all in Purgatory, this is still possible. But when some reach Paradise, we can be certain a great deal of restrictions will be imposed upon the science and technology collaboration that we need.

13026/7310

Brazilian Nuclear Submarine Technology

36990018 Rio de Janeiro O GLOBO in Portuguese 20 Nov 87 p 6

[Text] Brasilia—Brazil is already technically prepared for construction of a nuclear powered submarine, Navy Minister Henrique Saboia stated yesterday after the Flag Day ceremony in the Urban Military Sector of the Federal capital.

"Those who doubt our capacity to construct a warship of this type will be surprised. It is our only military program involving nuclear research. Those who think that we are attempting to build a nuclear weapon (atomic bomb) are deceiving themselves, as there is no program of that type in progress in the Armed Forces."

Henrique Saboia said that all technical obstacles for the construction of a nuclear submarine had been overcome, without outside assistance. And he noted that after the tests of the prototype, at Ipero, the submarine would be constructed with Navy budget funds. According to the minister, the nuclear reactor also could be used for the production of electric power.

"It is a classic nuclear reactor. It can just as easily turn a wheel around an axis as produce electric power for a city."

The Brazilian nuclear submarine program has faced several difficulties in the past. Among these were prohibitions, even during Minister Maximiano da Fonseca's administration, on the importation of special nylon technology developed by Toshiba of Japan. This material is used in ultra-quiet transmission boxes for submarines, although it has unlimited applications.

The Department of State of the United States discovered that this technology was being exported to Brazil, and demanded that the Japanese government intervene. Since that time, the Institute of Naval Research (IPqM) has developed an ultra-quiet nylon filament using its own technology. The alternative of coupling an electric motor and a generator to the nuclear reactor was studied by the IPqM, but will not be put into practice; although the submarine would be quieter, it would also be slower and heavier.

13026/7310

SCIENCE & TECHNOLOGY POLICY

Aeronautics Company Views U.S. Trade Relations

36990015 Sao Paulo O ESTADO DE SAO PAULO in Portuguese 18 Nov 87 p 22

[Excerpt] Sao Jose dos Campos—Brazilian Aeronautics Company (Embraer) President Ozilio Carlos da Silva yesterday criticized the Special Secretariat for Information Science (SEI), and said Brazilian plane purchasers were "astounded" to learn that Brazilian bureaucracy caused worsening of the country's trade relations with the United States. He also pointed out that SEI will only be able to meet to analyze such a serious problem next year, after carvinal.

Several plane purchasers have asked Embraer to include a clause in contracts that have already been signed stating that, if planes are surtaxed, "Embraer will bear the losses." One of these companies, Tax Air, purchased 20 planes but none has been delivered so far." The price per plane is $6 million, and if to this price a surtax of only '1 percent' is added, we will no longer be able to sell to the United States," Ozilio da Silva said. He explained that other companies offer prices and conditions that are almost similar, and a surtax would make Brazilian prices no longer competitive.

Embraer's president believes that, if surtaxes on planes are confirmed, "we will lose not only some purchasers but also the entire market that we conquered through hard work and investments. We are not running the risk

of reducing our market, we are risking the market itself." Ozilio da Silva said that these risks also apply to shoes and other national products.

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