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IN THIS ISSUE

FRANCE/USSR: Cooperation in Space Page 1

The French and Soviet Governments are collaborating on a manned mission scheduled for 1988 and on several unmanned space programs

UK/FRG/ITALY: Panavia's Tornado ECR Page 3

Advanced avionics technology is being used to develop the Tornado ECR (electronic combat and reconnaissance), a tactical reconnaissance fighter-bomber designed to challenge the supremacy of similar aircraft.

WEST EUROPE: ES2 Begins Chip Production Page 4

European Silicon Structures (ES2) has entered the application specific integrated circuit (ASIC) market with the delivery of its first custom-designed chips

(Contents continued on Inside Cover)



The French will use expertise gained from a joint mission aboard the Soviet Mir space station to bolster their role in the European Space Agency's Hermes program. (See Feature Article on page 1.)

SPECIAL DATA BASE ISSUE

(Contents continued)

FRG: Siemens Seeks Competitive Edge..... Page 5

FRG: Fraunhofer Defense Research..... Page 7

WEST EUROPE: Computer-Based Research Networks..... Page 8

DATA BASE SURVEY..... Page 10 **DEVELOPMENTS**..... Page 12

This issue of PERSPECTIVES was prepared solely from information provided by the FBIS Antwerp and Milan S&T Units from searches of European commercial data bases. Some of the translated material used in this issue will appear in the JPRS serial EUROPE/LATIN AMERICA REPORT: SCIENCE AND TECHNOLOGY. Comments and queries may be directed to the Center Chief or to

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SOURCE GUIDE

This issue of PERSPECTIVES is derived from information provided by the FBIS Antwerp and Milan S&T Units from searches of the following European commercial data bases:

AGRA, produced by Agence France-Presse in Paris, contains French-language full-text news items describing current European developments in *aerospace, electronics, advanced materials, and science policy.*

ATSA/SDAA, a French- and German-language full-text data base provided by the Swiss Press Agency in Bern, provides *general science and technology reporting* of current interest.

L2iO1 carries French-language full-text issues of the Paris-based LA LETTRE DE L'INDUSTRIE INFORMATIQUE (Letter of the Information Technology Industry), which covers *companies, products, and business leaders involved in France's information technology industry.*

SIGLE, produced by France's CEA (Atomic Energy Commission) and CEN (Nuclear Studies Center) in Saclay, contains French-language bibliographic citations to grey literature from the EC countries and Sweden covering all aspects of leading edge technology, notably *aeronautics, aerospace, electronics, computers, advanced materials, and communications.*

TELEDOC, produced by France's CNET (National Telecommunications Studies Center) in Issy-les-Moulineaux, provides French-language bibliographic references to European research reports, conference papers, and periodicals in the fields of *telecommunications, electronics, and computers.*

VOLKSWAGEN LITERATURE DATA BASE, produced by Volkswagenwerk AG in Wolfsburg, is a German-language bibliographic data base which cites European research reports, conference papers, books, and periodicals covering *advanced automobile technology.*

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FRANCE/USSR: COOPERATION IN SPACE

Key Points: French-Soviet space flight cooperation over the next several years will focus on a joint one-month mission aboard the Soviet Mir space station and on a series of unmanned launches, according to AFP reports from the AGRA Data Base. Although both countries are emphasizing the scientific and technical importance of this collaboration, the French expect the Mir mission to provide experience that will bolster their role in the West European "Hermes" and "Columbus" manned space flight programs.

Following a 3 November meeting between representatives of CNES (French National Space Studies Agency) and its Soviet counterpart Intercosmos, French officials stated that French astronaut Jean-Loup Chretien will participate in piloting the Mir and in managing Soyuz-Mir docking operations. The mission work schedule calls for Chretien to perform flight activities during all phases of the mission, planned for late 1988. This schedule contrasts sharply with the 1982 French-Soviet mission aboard Salyut-7, in which Chretien participated only as a passenger.

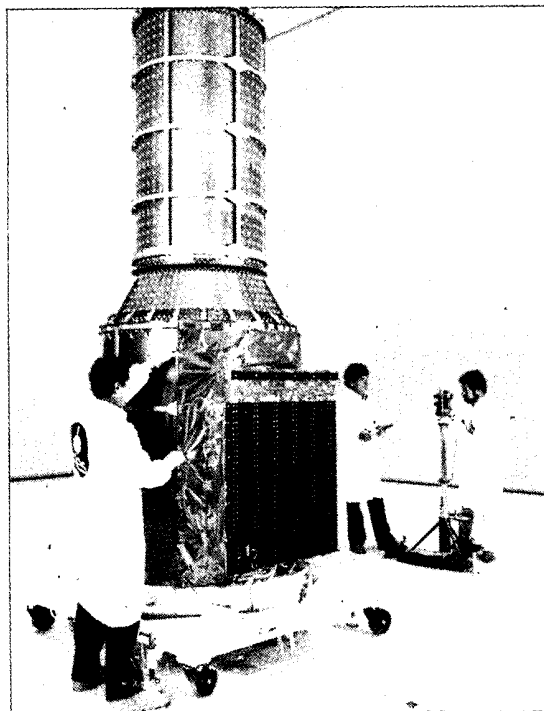
Chretien and his backup, Michel Tognini, left France on 15 November for two years of intensive preparation at Star City, the Soviet manned space flight training center near Moscow. French officials commented on 3 November that Chretien and Tognini will be expected to apply their training and flight experience to the European Space Agency's Hermes and Columbus programs, scheduled for operation in the 1990s. Hermes will function as a space shuttle for satellite deployment whereas Columbus will be a module designed for use in conjunction with the planned US space station.

The Mir crew will perform some 10 experiments in the fields of physics and medicine. They will evaluate the effect of heavy ions on high-density integrated circuits, measure gamma and neutron radiation inside the Mir, and will place "samples" (not further identified) outside the spacecraft to study the effects of cosmic radiation over a six-month period. In the medical area, the crew will conduct studies on blood circulation, hormonal balance, bone decalcification, and neurosensory response in weightlessness. (For current Soviet medical research in support of long-duration manned space flight, see SCIENCE AND TECHNOLOGY PERSPECTIVES VOL. 1, No. 12 pp 7-8.)

Mission planners have scheduled an EVA by Chretien to deploy an antenna (not further identified). Reports indicate that Soviet scientists are interested in French-developed techniques for antenna assembly and deployment in space.

In the area of unmanned space flight cooperation, the French have designed equipment and several experiments for inclusion aboard the Mars probe PHOBOS and the Mars-asteroid belt probe VESTA, scheduled for launch in 1988 and 1992 respectively. Moreover, the French are providing the SIGMA space telescope for the Soviet project GRANAT, slated for launch in 1988 to study gamma radiation. The two countries are also collaborating on the Soviet INTERBOL satellite (slated for launch in 1990), which will study solar effects on the Earth's magnetosphere.

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French SIGMA space telescope

The French Government has allocated Fr120 million for the Mir mission with an additional Fr74 million in 1986 alone for the joint unmanned programs.

Paris AFP—AGRA Data Base, Oct/Nov 86 (Antwerp Unit)

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FOR OFFICIAL USE ONLY**UK/FRG/ITALY: PANAUIA'S TORNADO ECR**

Key Points: The Tornado ECR (electronic combat and reconnaissance) fighter-bomber will feature leading-edge computer architecture and sophisticated tactical displays and weapons systems, according to an MBB (Messerschmitt-Bolkow-Blohm) research paper entitled "Transferability of Technological Advances on the F-4 and TORNADO to Future High Performance Aircraft (October 1985)," cited in the SIGLE Data Base.

The Panavia consortium (composed of the UK, the FRG, and Italy) has launched an R&D program to develop the Tornado ECR. The FRG was the first consortium member to identify the need for an ECR version of the Tornado IDS (interdictor strike). This so-called "first upgrade" of the Tornado IDS is being driven by the need for avionics technology that will deliver powerful information processing and display capabilities suited to future reconnaissance and weapons systems requirements. The consortium is focusing its R&D efforts on onboard computer architectures, CRT display technology, and advanced weaponry. The innovative systems being developed for the Tornado ECR will also be evaluated for inclusion in the European Fighter Aircraft of the 1990s.

The Tornado ECR's advanced avionics is based on a "decentralized" computer system that will increase onboard computer performance over that of the Tornado IDS. The paper attributes this boosted capacity to a CPU-data bus interface (a central processing unit linked to various terminals). Developed in accordance with Military Standard 1553B, the bus controller function can be passed to a number of remote terminals should the primary bus controller unit malfunction. The interface also permits the simultaneous broadcast of noncritical data to all terminals. The computer architecture will boost onboard memory by 128K bytes, double that of the Tornado IDS. The system is further enhanced by a floating point processor with an improved instruction set. The avionics package will also feature mission and load-monitoring RAM (random access memory) computers.

The aircraft will be equipped with advanced displays for tactical reconnaissance. Originally designed for the Airbus A-310, the Panavia system uses a RAM symbol generator that provides a simultaneous CRT display of alphanumeric characters and a grid or map. Three other CRTs will display monochromatic or color symbols.

Panavia has spent DM440 million on a test bed that will be used to evaluate the Tornado's weaponry as well as provide data on the integration of weapons systems for future combat aircraft. The test bed has a computer-aided flight simulator with display and control units and a readout system that provides reduction and analysis of test data collected on a real-time basis.

Saclay SIGLE Data Base, Oct 86 (Milan Unit)

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WEST EUROPE: ES2 BEGINS CHIP PRODUCTION

Key Points: In late October the European custom chip consortium European Silicon Structures (ES2) delivered its first ICs fabricated at its rented facilities in California. ES2 expects to begin production in Europe by the summer of 1987, according to French and Swiss data base reports.

The goal of ES2 is to revolutionize the European market in custom ICs by introducing an extensive network of design centers throughout Europe. The firm's first custom chips were delivered in October, according to ES2 cochairman Jean-Luc Grand-Clement. Quoted in COMPUTABLE of 24 October, Grand-Clement would identify ES2's first customer only as "a large French concern." He stated that current production is taking place at a small facility in California rented from Exel Electronics. Staffing at the California site is limited to 17 of ES2's 150 engineers and integrated circuit designers.

ES2 uses a software package which creates the chip from design to mask production. The fabrication process produces 2-micron CMOS chips having two metallization layers. ES2 plans to utilize direct electron-beam writing on silicon wafers using CAD/CAM technology. The firm will emphasize rapid prototype production with a two-week turnaround time. ES2 will be the first European electronics firm to use direct-write technology and the first EC company to combine the design and fabrication functions for application specific integrated circuits (ASICs).

ES2 is currently building its first European plant at Rousset near Aix-en-Provence, the French L2i01 Data Base reported on 3 September. Financing was secured through an 8.7 million ECU loan from the European Investment Bank in conjunction with the Banque International of Luxembourg, according to the Swiss ATSA Data Base of 21 October. The loan will run for 10 years at an annual interest rate of 7.9 percent. The total finance package for the Rousset facility could reach Fr480 million. Although plant construction is three months behind schedule, production is slated to begin by the summer of 1987 and ES2 has already established a European sales network, the French GRAPPE Data Base reported in mid-September.

Created in 1985, ES2 is headquartered in Luxembourg and is involved in the Eureka program. The firm is a multinational venture formed with the joint capital investment of major electronics companies such as Bull, Philips, Olivetti, British Aerospace, Brown Boveri, Saab, and Telefonica.

Grand-Clement commented that ES2 would reach the break-even point in two years with annual sales of \$25 million and that annual profits would reach \$100 million by 1990.

Paris L2i01 Data Base, Nov 86 (Antwerp Unit)

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REPORTS

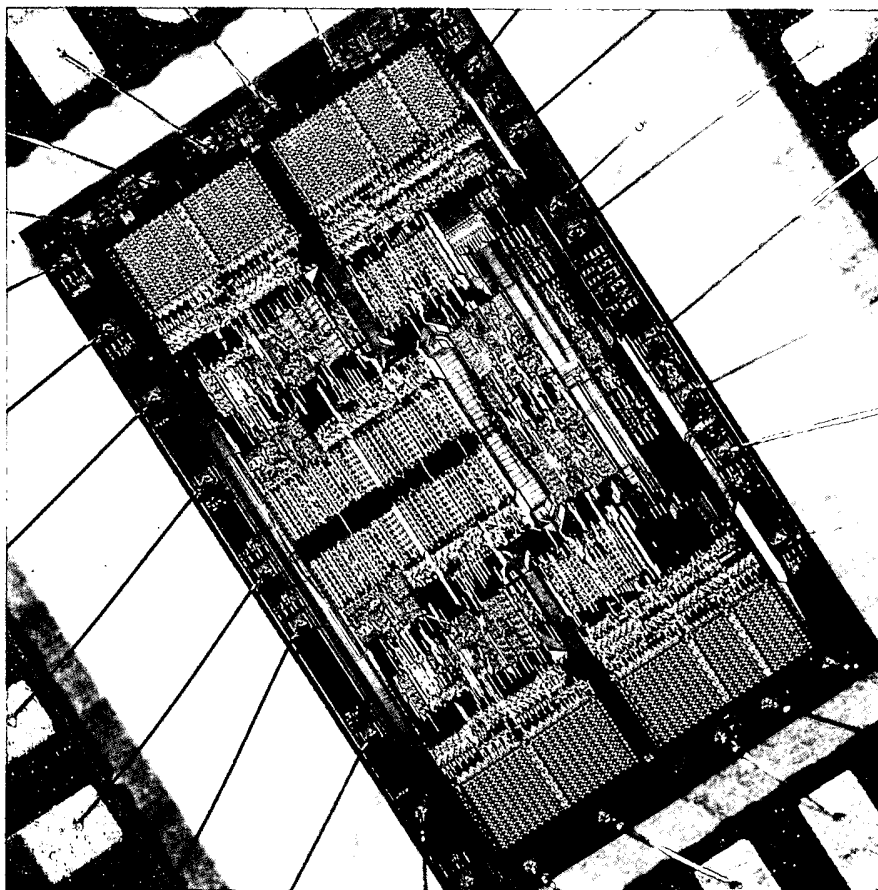
REPORTS surveys science and technology trends as detailed in reports, books, and journals. The following items were identified from searches of European commercial data bases.

FRG: SIEMENS SEEKS COMPETITIVE EDGE

Siemens, one of the world's six largest electrical firms, focused its 1985 efforts on chip production, design of high-performance office automation systems, and on a variety of R&D programs. To remain competitive, Siemens emphasized diversification and R&D partnerships with other major electronics firms, according to the "Siemens 1985 Annual Report" cited in the SIGLE Data Base.

Components

Siemens in 1985 was able to recover from a depressed chip market largely through sales of ICs for public and private communications systems. Profits from these sales rose 10 percent (to DM2.3 billion) over the previous two years and accounted for about 4 percent of company revenue. Siemens designed and manufactured chips for use in ISDN (integrated services digital network) communications systems. The firm reportedly was a world leader in high-performance logic circuits for general purpose computers, producing chips with 10,000 gates and delays of 200 nanoseconds.



This Siemens CMOS chip is a microcontroller for ISDN communications systems. It contains 32,000 transistors on a 28-square-millimeter surface.

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Office Automation

Siemens' high-performance office systems largely accounted for a 17 percent increase (to DM8.2 billion) in company orders and a 19 percent increase (to DM7.9 billion) in sales during 1985. This equipment included general purpose computers, laser printers, and telephones.

To compete with equivalent technology, Siemens boosted the performance of its 7500 series general purpose computer to 27 MOPs (million operations per second) through integration with the BS2000 operating system. Siemens also marketed a personal computer that uses BS2000. In late 1984 the firm introduced the "Hicom" switching system for private ISDN communications. The system provides voice, data, text, and image services on a single network. Siemens sold more than 100 Hicom systems last year.

Research and Development

During 1985 Siemens reinvested in R&D about 9 percent of its sales revenues. Government funding accounted for only 3 percent of the firm's R&D expenditures. Siemens concentrated on the development of office systems, fiber optic communications networks, and automation technologies such as image processing and sensors and control systems for application in robotics. The firm allocated DM4.8 billion for microelectronics and software research in support of its computer, communications, and automation programs. An additional 3,000 scientists were assigned to R&D areas.

Siemens heavily funded its Mega-Project (a joint venture with Philips) for the development and production of 1- and 4-megabit chips. The firm also concluded a cross-licensing agreement with Toshiba to accelerate development of the 1-megabit chip. (For recent reporting on this agreement, see SCIENCE AND TECHNOLOGY PERSPECTIVES Vol. 1, No. 13 p 2.) In cooperation with the Fraunhofer Association, Siemens continued development of X-ray lithography techniques for circuit miniaturization.

Last year Siemens began construction in Munich of a design center for integrated circuits and invested DM120 million in its Somerset, New Jersey plant to expand laboratory facilities and build a gallium-arsenide components production line.

Saclay SIGLE Data Base, Sep 86 (Milan Unit)

FOR OFFICIAL USE ONLY**FRG: FRAUNHOFER DEFENSE RESEARCH**

Defense research at the Fraunhofer Association over the next year reportedly will emphasize R&D in the areas of microelectronics and infrared (IR) materials. Microelectronics research will focus on the development of new compounds derived from so-called "III/V technology" (the periodic table designation for key elements used in this research). In addition, the Fraunhofer's defense research staff will be expanded (by 21) for the first time in several years. The new personnel will be assigned to projects involving the military application of gallium arsenide, according to the association's "Research Plan 1986" cited in the SIGLE Data Base.

Fraunhofer defense research is conducted at six of its 35 institutes: the Hydroacoustics Research Group, the Fraunhofer Institute (FI) for Propellants and Explosives, the FI for Transient Dynamics, the FI for Applied Materials Research, the FI for Trend Analysis in the Natural Sciences and Technology, and the FI for Applied Solid State Physics (FIASSP). The FIASSP in Freiburg has the largest budget of the six institutes (having received DM22 million for new equipment alone in 1986). The FRG Ministry of Defense and the Ministry for Research and Technology have tasked the FIASSP with spearheading defense-related research in III/V materials technology, particularly in gallium-arsenide and gallium-aluminum-arsenide semiconductors. Some 37 of the institute's 134 scientists are engaged in III/V microelectronics research, making it the institute's largest endeavor. The scope of the institute's microelectronics research includes epitaxy processes and ion implantation, optical contact lithography for submicron structures, electron beam lithography, ion beam etching, molecular beam epitaxy with simultaneous ion implantation, mercury-cadmium-tellurium monocrystals, and liquid display technology. The institute also coordinates West German R&D in ultrahigh (300 to 3,000 MHz) and extremely high (30 to 300 GHz) frequency electronic components and integrated circuits. Commercial spinoffs of this research will be transferred to private industry.

FIASSP is also involved in IR technology. Research projects include the development of passive IR transparent materials, nonlinear optical IR materials, and active IR sensor components for use in ECM equipment.

The boost in Fraunhofer research activity is the result of increased government allocations for defense-related R&D. The Fraunhofer's defense research budget will increase 21 percent from DM68.6 million in 1986 to DM83 million in 1987. Defense research allocations in 1986 accounted for 15 percent of the Fraunhofer's overall budget of DM414 million and involved 500 of its 2,600 employees. The Ministry of Defense financed all of the association's military R&D. Eighty percent of these funds were spent on association-generated projects, while the other 20 percent was earmarked for government-sponsored programs.

Saclar SIGLE Data Base, Oct 86 (Milan Unit)

FOR OFFICIAL USE ONLY**WEST EUROPE: COMPUTER-BASED RESEARCH NETWORKS**

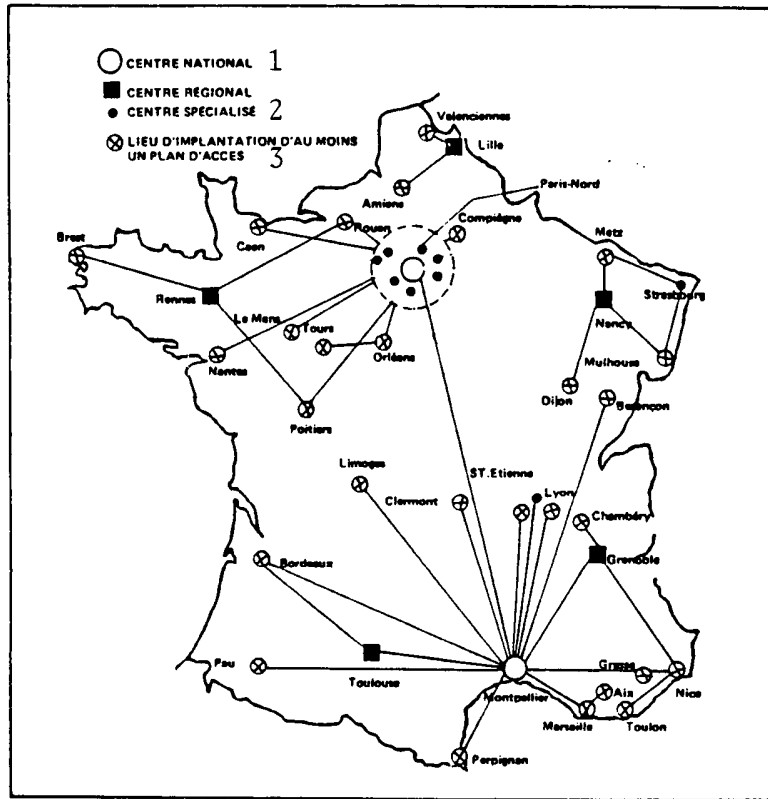
European cooperative research in high technology, such as the ESPRIT project, as well as independent national R&D efforts have prompted European companies and governments to establish transnational and local area computer networks to facilitate information exchange. High-speed, high-volume data and image transmission is the main feature of these networks, according to a February 1986 report from the BULLETIN DE LIAISON DE LA RECHERCHE EN INFORMATIQUE ET EN AUTOMATIQUE (Joint Bulletin of Data Processing and Automation Research), cited in the TELEDOK Data Base.

The ROSE and HELIOS projects are two of the most extensive intra-European research networks. With Bull of France as project coordinator, ROSE (Research Open System for Europe) links GEC (General Electric Company) and ICL (International Computers Limited) of the UK, Olivetti of Italy, Siemens of the FRG, and research organizations such as France's INRIA (National Institute for Data Processing and Automation Research) and the ECRC (European Computer Research Center) based in Munich. Part of the larger IES (Information Exchange Project) that will eventually link all ESPRIT participants, ROSE will allow data exchange among centers such as ICL, Bull, Olivetti, and the ECRC. ROSE will provide document exchange, software sharing, remote data processing, and remote file manipulation services.

In 1982 the French Government began the HELIOS project. Using France's Telecom 1 satellite, the HELIOS network provides high data rate transmission among dissimilar computers and among local area networks. As a tool for large European research laboratories, HELIOS allows data to be transferred among powerful computers, such as the IBM 3090 and Cray supercomputers, at rates of up to 1 million bits per second. A second version of the HELIOS system for data base access and image transfer is under development. With the CEA (Atomic Energy Commission) of France as project coordinator, HELIOS provides information exchange services for CERN (Nuclear Study and Research Center, France), ESA (European Space Agency), DFN (FRG Research Network), ESPRIT participants, and the University of Brussels. The French Government is also sponsoring FNET and MIDI-NET. FNET, an electronic mail and news distribution service for data processing centers at French universities, research centers, and private firms, has been operating for three years. The system is linked to EUNET (European Network), which joins 12 European countries (FRG, Austria, Belgium, Denmark, Finland, France, UK, Greece, Netherlands, Norway, Sweden, and Switzerland). MIDI-NET, a 10-year program just under way, will facilitate information exchange between research laboratories and commercial firms in France and will interface with transnational networks in providing data processing, message, teleconferencing, file transfer, and data base services.

France has also established several local area networks for some of its major research institutes. The map below shows research centers linked by the "Data Processing Network for Establishments of Higher Education and Research," which uses IBM and Bull equipment. In 1985, France's CNET (National Telecommunications Studies Center) started its own research network, SMARTIX, aimed at providing nationwide message, electronic mail, and teleconferencing services to CNET scientists. INRIA has been conducting a two-year project called RELIS (Local Integrated Services Network). Slated to conclude in 1987, RELIS is designed to provide data, image, and graphics transmission for scientists at INRIA's Rocquencourt facility.

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Research centers linked by the "Data Processing Networks for Establishments of Higher Education and Research"

- 1) National Center
- 2) Regional Center/Specialized Center
- 3) Site with at least one access point

Issy-les-Molineaux TELEDON Data Base, Sep 86 (Milan Unit)

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DATA BASE SURVEY presents an annotated list of documents compiled by the FBIS Antwerp and Milan S&T Units from searches of European commercial data bases on specific technical topics suggested by consumer requirements. Additional searches and full-text translations of the documents cited below can be provided on request.

The following list is the result of Antwerp Unit searches of the Volkswagen Literature Data Base for citations on *new materials* research and applications. This FRG data base provides bibliographic references to information on the technical, manufacturing, and economic aspects of the automotive industry.

TOPIC & TECHNOLOGY	DESCRIPTIVE
CERAMICS Turbocompressor Blades	A December 1985 article in <i>INGENIEURS DE L'AUTOMOBILE</i> describes the development of a turbocompressor with improved response to acceleration. One of the techniques investigated is use of lightweight ceramic impellers.
Diesel Engines	Conference papers from the May 1985 "Sixth Vienna Engine Symposium" highlight current internal combustion engine research, including the use of ceramics in adiabatic diesel engines.
New Materials	A 1985 article in <i>MANAGEMENT-WISSEN</i> describes the FRG program for new materials development in ceramics, powder metallurgy, vitreous metals, high polymers, and composite materials. It also provides an overview of their properties and potential uses.
COMPOSITE MATERIALS Leaf Springs	An article in <i>KUNSTSTOFFE</i> 75, Vol. 6, 1985 details the state of the art in development of glass-fiber-reinforced plastic leaf springs for commercial vehicles.
Metallized Fibers	"Composite Materials with Metallized Reinforcing Fibers," an article in <i>KUNSTSTOFFE</i> 76, Vol. 3, 1986, discusses studies conducted at Bayer on effectiveness of nickel-plated aramid, glass, and carbon fibers in fiber-reinforced plastics for shielding against electromagnetic waves and as a lightning protection medium.

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Carbon Fibers

A 1985 article in KUNSTSTOFFE 75, Vol. 2, highlights work under way at MBB on the properties of carbon-fiber reinforced composites with directional fibers. Methods of fiber alignment, production of laminates, fiber content and density at various temperatures, and possible applications are discussed.

**OPTICAL SENSORS
Measurement**

HARD & SOFT, Vol. 4, 1985 includes an article on the use of optical sensors in measurement. Among the topics are integrated optical gyroscopes, laser gyroscopes, fiber optic strain sensors, production methods, and analysis of sensor signals. The article also explores the use of fiber optic sensors in vehicles.

**PLASTICS
Manufacturing Technology**

Conference papers from the March 1986 "Thirteenth Conference on Plastics Technology" in Aachen highlight manufacturing automation and the use of processes such as infrared radiation and reaction injection moulding (RIM).

Wolfsburg VOLKSWAGEN Data Base, Nov 86 (Antwerp Unit)

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DEVELOPMENTS

DEVELOPMENTS highlights worldwide S&T events reported in the foreign media. Items followed by an asterisk will be published by FBIS.

- Airbus A-340** (France) Airbus Industrie (AI) and CFM International (a joint subsidiary of General Electric and SNECMA) have signed an agreement to equip the A-340 with CFM 56-5S2 engines, which can develop 12.9 tons of thrust. The choice of the CFM engine now allows AI to begin marketing the A-340. First deliveries of the engine are scheduled for 1990 with the A-340's maiden flight slated for 1991. (Paris AFP—AGRA Data Base 3 Nov 86) Antwerp Unit
- Biotechnology** (France) Using genetically altered organisms, the French biotech firm Transgene has developed a process that will allow industrial-scale production of hirudin. An anticoagulant, hirudin dissolves blood clots as effectively as similar compounds but reduces the chance of hemorrhaging. Transgene is testing the genetically engineered hirudin on rats using subcutaneous injections and is working on an orally administered version. With the development of methods for large-scale production, the industrial phase will be carried out by a pharmaceutical company (not further identified) using the Transgene patent. (Paris AFP—AGRA Data Base 3 Nov 86)* Antwerp Unit
- Computers** (FRG) Early next year, Siemens and BASF will establish a joint venture to compete more intensively with IBM by marketing IBM-compatible mainframes, peripherals, and software. The joint venture, to which each firm will contribute DM40 million in start-up capital, will be based in Mannheim and have a worldwide staff of 1000. (Bern SDAA Data Base 5 Nov 86) Antwerp Unit
- Materials** (France) In July, Pechiney's Voreppe Laboratory, in cooperation with the French National Center for Scientific Research (CNRS), developed a method for the industrial-scale production of aluminum-lithium mono-quasi-crystals. The crystals are expected to play a major role in the development and use of aluminum-lithium alloys in the aerospace and information technology industries. The substance has been labeled a quasi-crystal because it displays a morphological structure having five crystal axes—an unprecedented crystallographic arrangement. (Paris AFP—AGRA Data Base 6 Nov 86)* Antwerp Unit
- Microelectronics** (France) In 1987, Pechiney will begin industrial production of indium phosphate for the electronics industry. The Pechiney subsidiary Metaux Speciaux SA will manufacture the compound under license from the French National Center for Telecommunications Studies (CNET). Indium phosphate is used in the manufacture of optoelectronics devices, high-speed ICs, and high-frequency components. (Paris AFP—AGRA Data Base 30 September 1986) Antwerp Unit

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(FRG) Telefunken has built a metallo-organic chemical vapor deposition (MOCVD) device that reportedly produces gallium-arsenide and gallium-aluminum-arsenide monolithic integrated circuits with "industrially acceptable" surface morphology and uniformly deposited layers. The MOCVD device allows the creation of layers with consistent characteristics and controls the growth of extremely thin layers through specially determined gas flow rates, reactor pipe geometry, and the graphite substrate's angle of inclination. (Karlsruhe BMFT RESEARCH REPORT T86-038: BASIC TECHNOLOGY FOR MONOLITHIC INTEGRATED GaAs COMPONENTS, April 1985—SIGLE Data Base) Milan Unit

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