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Science and Technology Perspectives

DEVELOPMENTS

Aircraft

(Israel) Elbit Computers, Ltd. is playing a major role in the "Phantom 2000" project to upgrade the combat capabilities of Israel's Phantom aircraft. Elbit has developed an advanced head-up display and radar as well as an airborne digital computer to support the aircraft's weapons system. A computer derived from the ACE/3 will be installed for data processing. Elbit also is developing avionics integration stations (AIS) and a flexible operational flight program (OFP) that will tie into the aircraft's weapons system. (Tel Aviv BITA'ON HEYL HA'AVIR No. 54, Nov 86) Andrea S. X2830

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FEATURE ARTICLES

REPORTS

PERSPECTIVES selections are based solely on foreign press, books and journals, or radio and television broadcasts. Some of the materials used in this publication will appear as abstracts or translations in FBIS serial reports. Comments and queries regarding this publication may be directed to the Managing Editor (Craig M. [redacted] or to individuals at the numbers listed with items.

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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. The contributor's name and telephone number are provided.

A-340 Engine

(France/International) Airbus Industrie will equip the A-340 with a more powerful engine than previously announced. Airbus and the International Aero Engines consortium (Pratt and Whitney, Rolls Royce, Japan Aero Engines, MTU, and Fiat Aviazione) have concluded an agreement to use the Superfan engine, which delivers 13.5 metric tons of thrust as opposed to the 12.9 metric tons delivered by the US-French CFM-56-5-S2. (Paris AFP—AGRA Data Base 26 Dec 86) Antwerp Unit/Sharon W. X2519

Ariane Extended Stage

(France/FRG) A modified version of the Ariane 5 upper stage called Aries (Ariane Extended Stage) is being proposed by Matra Espace of France and MBB Erno of the FRG to transport supply modules to a US space station. The Aries would be equipped with onboard telemetry and command systems and an S-band antenna. The Aries could maintain the supply module in orbit for 48 hours during which it would be powered by a 300-kilogram lithium battery. Direct Aries-space station docking, a robot arm, or a free-flying spacecraft are the options being studied to bring the supply module aboard the space station. (Stuttgart FLUG REVUE Dec 86) Eva L. X2519

Computers

(PRC) Six Chinese information technology firms (not further identified) will participate in a new company, China Computer Development Corporation (CCDC), whose goal is to become the "Chinese equivalent of IBM," according to its director, Wang Zhi. Current plans call for the CCDC to conduct R&D, manufacture a "wide variety" of computers, train computer specialists, create a national computer sales and service network, and handle the import and export of components. (Paris AFP SCIENCES 18 Dec 86) Eva L. X2519

(France) In early 1987, PSA (Peugeot SA) will install a Cray XMP/14 at its Citroen Data Processing Center in Neuilly. The Cray will support design analysis to improve engine performance, aerodynamics, noise control, and safety features. The machine will increase the center's computing power tenfold and double PSA's overall computer capacity. PSA paid Fr50 million for the Cray and will be the first European automaker to use this computer (although Opal and Saab are using variants of the Cray 1). (Paris L'USINE NOUVELLE 2 Jan 87) Antwerp Unit/Sharon W. X2519

ECM Program

(Belgium) Belgium's military budget will give priority to RAPORT III (Rapid Alert Programmed Management of Radar Target), a program to equip Belgian F-16s with advanced electronic countermeasure systems. The

LORAL firm will be the prime contractor with Bell-ACEC, MBLE (Belgian Lamps and Electronic Equipment Manufacturer), Philips, and SABCA (Belgian Aeronautic Construction Corporation) as subcontractors. RAPORT III will cost 8 billion Belgian francs over a six-year period. (Brussels LE SOIR 26 Dec 86) Antwerp Unit/ Sharon W. X2519

Eureka

(Portugal) At the recent Eureka conference in Stockholm, Portugal offered to participate in two draft projects (seen likely to be approved) in the areas of telecommunications and software for CAD/CAM. The firm INESC (not further identified) and the Porto Faculty of Engineering would spearhead the Portuguese effort. Portugal currently participates in six Eureka projects in robotics, telecommunications, and environmental protection. (Lisbon EXPRESSO 20 Dec 86)* Rosa M. X2676

Factory Automation

(Sweden) ASEA's new IRB 2000 robot arm incorporates mechanical innovations which give it six axes of movement (including to the rear), a speed of three meters per second, and a lifting capability of 10 kilograms. Modular construction (in which three of the arm's eight structural elements are identical), alternating current motors, and integrated wiring inside the arm increase the robot's speed by 30 percent over the IRB 6, ASEA's most innovative robot arm to date. ASEA is also developing the IRB 3000, which is capable of lifting a 30-kilogram load. (Paris INDUSTRIES & TECHNIQUES 10 Dec 86) Eva L. X2519

Metallurgy

(Hungary) The Lenin Metallurgical Works at Diosgyor, which produces 80 percent of Hungary's highly alloyed steel, has installed a Soviet-made electron microscope to monitor the structural quality of its steel. The microscope also will be used at the research center of a ferrous metallurgical center planned for Diosgyor. (Budapest NEPSZAVA 19 Dec 86) Sari P. X2907

Neutrino Project

(USSR/US) The first section of a neutrino trap has been installed in Lake Issyk-Kul. The section includes optical detectors and framework components in a vast lattice trap designed to detect the passage of neutrinos through the Earth to the lake from accelerators at the Fermi National Laboratory in Batavia, Illinois and the Brookhaven National Laboratory in New York. The equipment was assembled on land and lowered to the bottom of the lake. The trap is the initial phase of the joint USSR-US neutrino research project BATISS (Batavia and Issyk) that will assess the value of the neutrino for Earth and space studies. (For previous reporting on the neutrino trap, see FB PN 86-160.) (Moscow TRUD 12 Sep 86) John H. X2723

Robotics

(Hungary) The electronic control unit for the Beta robot will be built by the Robot Development Department of the Tungsram firm. The unit will be manufactured to Soviet specifications as part of CEMA's robotization program. (For previous reporting on the Beta robot, see SCIENCE AND TECHNOLOGY PERSPECTIVES Vol. 1, No. 15 p 3.) (Budapest MAGYAR HIRLAP 23 Dec 86) Sari P. X2907

Semiconductor Laser

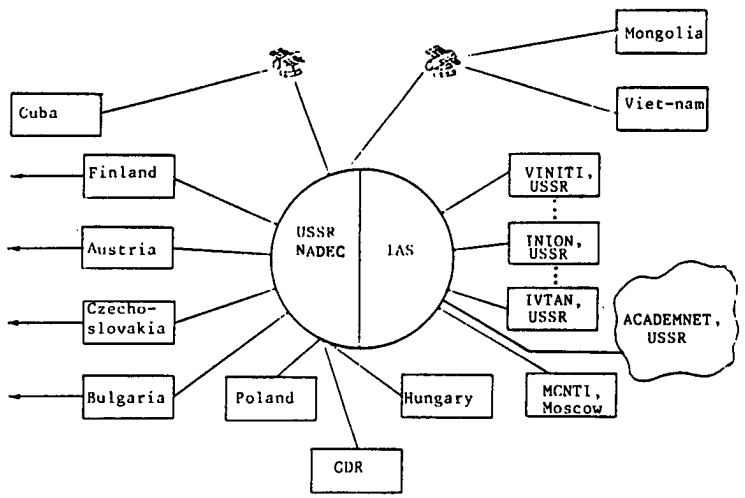
(FRG) Siemens has increased the output of a semiconductor laser to 1.5 watts, far beyond the current maximum of 50 milliwatts obtained with conventional techniques. The increase was achieved by arraying some 40 semiconductor lasers on a single crystal. (Amsterdam COMPUTABLE 19 Dec 86) Antwerp Unit/Sharon W. X2519

USSR: NON-BLOC ACCESS TO SOVIET DATA BASES

Key Points: The Soviet ADEC (Automated Data Exchange Center) interfaces with non-Bloc computer networks through the DATAPAK firm of Finland and the telecommunications nodes of Radio Austria and is accessed by CEMA countries through a system of NADECs (National Automated Data Exchange Centers). The Soviets plan to expand ADEC beyond the five Soviet scientific centers currently linked to the system, according to a paper by O.L. Smirnov of the Soviet Institute for Automated Systems and a report by Sauli Laitinen of the Technical Research Center of Finland made available in December at the London 10th International Online Meeting.

The Soviets have developed a computer-based network called ADEC, an information system designed to attract increased non-Bloc interest in Soviet data bases. Through the ADEC system users can access data bases hosted by the Computer Center of the USSR Academy of Sciences, INION (Institute for Scientific Information on Social Sciences), IVTAN (Institute of High Temperatures of the USSR Academy of Sciences), MCNTI (International Center for Scientific and Technical Information), and VINITI (All-Union Institute of Scientific and Technical Information). [Finland's Ministry of Foreign Affairs and the USSR's State Committee of Science and Technology also have a cooperative agreement whereby the State Research Center in Helsinki, using terminals with a cyrillic keyboard and display, can do online searches of VINITI data bases over a packet-switched line. VINITI reportedly offers online access to parts of REFERATIVNYY ZHURNAL and other data bases intended specifically for non-Bloc users.] Soviet planning calls for the ADEC system to integrate other information and scientific centers (not further identified).

Non-Bloc users can subscribe to the current ADEC system through Radio Austria or DATAPAK of Finland. CEMA countries (including Cuba, Mongolia, and Vietnam) participate through individual national links (NADECs).



VINITI - All-Union Institute of Scientific and Technical Information
INION - Institute for Scientific Information on Social Sciences
IVTAN - Institute of High Temperature of the USSR Academy of Sciences
MCNTI - International Centre for Scientific and Technical Information

The Current ADEC System

ADEC's hardware consists of general-purpose microcomputers and personal computers that transmit data at baud rates of 300, 1200, 2400, and 4800 over leased, dial-up, and packet-switched telephone lines and modems. CCITT (International Telephone and Telegraph Consultative Committee) telecommunications protocols serve as regulatory guidelines for ADEC communication with non-Bloc information centers and computer networks.

With the planned use of advanced minicomputers and personal computers, the Soviets hope to expand ADEC's capacity through the development of four interconnected local area networks (LANs). LAN 1 will provide "local and remote" users with access to ADEC's shared information and computer resources. LAN 2 will be dedicated to ACADEMNET, a computer network linking Soviet scientific centers. LAN 3 will support the "internetwork" gateway node between Soviet information centers and non-Bloc computer networks. LAN 4 is envisaged as a specialized network designed to support a "distributed intelligent" gateway node. This node will feature a software subsystem that analyzes the user's information requirements to develop an optimal search strategy, that modifies a natural or applied language into a general command language, and that translates information retrieved from the system's command language into the user's native language. Other LAN 4 software subsystems will provide computer-aided training on the operation of ADEC hardware and software as well as file exchange, electronic mail, and teleconferencing services. The software for the LANs will be compatible with ISO (International Standard Organization) guidelines.

Antwerp Unit/Eva L. X2519

USSR: MOTOR-MEMORY RESEARCH

Key Points: Researchers from the Institute of Experimental Medicine in Leningrad claim that vasopressin controls motor activity on the right side of the body and facilitates the treatment of memory disorders caused by trauma, according to LENINGRADSKAYA PRAVDA (24 Nov) and DOKLADY AKADEMII NAUK SSSR (Vol. 291, No. 3, Nov 86).

Vasopressin is a peptide hormone long known to be an antidiuretic and to have a vasoconstrictive property, thereby increasing arterial blood pressure. The unexpected role of vasopressin in regulating motor activity was identified by G. A. Vartanyan, director of the Physiology Department of the Institute of Experimental Medicine. Scientists have demonstrated that motor disturbances caused by damage to portions of the brain which control movement on the right or left side can be induced in an animal by injecting cerebrospinal fluid taken from a brain-damaged animal. This suggested that a chemical factor was involved. Vartanyan and his colleagues reportedly have demonstrated that the factor is identical to arginine-vasopressin (with arginine in the eighth position).

Isolated from the pituitary gland of rats following right-side hemisection of the spinal cord, this factor caused flexion of the right hind limb (postural asymmetry) when injected into healthy animals. The researchers postulate that the symmetrical distribution of muscle tone in the body is due to the action of right-side and left-side factors which are normally balanced. This is supported by the fact that extracts from the right or left hemisphere of healthy animals cause postural asymmetry when injected into recipient animals, whereas whole brain extracts do not have this effect. Unilateral damage to the central nervous system or introduction of additional amounts of one of the factors into an intact system results in postural asymmetry and a biochemical imbalance.

The director of the Institute of Experimental Medicine, N. P. Bekhtereva, believes that during recovery from trauma or disease, the human brain must proceed through all the stages characteristic for learning and memory in which memory pathways must be reformed with fewer neurons. Experiments at the Kirov Military Medical Academy have shown that vasopressin is very effective in treating memory disorders caused by trauma and that it apparently accelerates the formation of these neural pathways.

Soviet research suggests that vasopressin could be used to treat motor disorders on the right side of the body. However, further testing is necessary before its clinical use will be permitted. The Soviets are also trying to isolate and identify the factor that controls left-side motor functions.

Marilyn B. X2725

REPORTS

REPORTS surveys science and technology trends as detailed in articles, books, and journals. It also includes summaries and listings of articles and books which may serve as potential sources for future research. Conference proceedings will occasionally be presented in this section.

BRAZIL: CERAMIC ARMOR R&D

Brazil's Military Engineering Institute (MEI), which has been engaged in ceramic armor R&D since 1978, currently is pursuing research in the areas of sintered alumina, isostatic pressing, and compacting, and may begin development of agglomerates, according to REVISTA MILITAR DE CIENCIA E TECNOLOGIA (Mar 86).

Tensile Strength

One of MEI's goals is to optimize the tensile strength of ceramics by developing a technology that will yield laboratory quantities of sintered alumina from unidirectional cold-compacted powders. These powders are heated short of their melting point in a process that converts them into coherent masses of alumina, an essential component of ballistic armor.

Alumina Refinement

MEI is attempting to produce a higher density, less porous alumina through isostatic pressing. Less porosity increases the specific energy required to initiate propagation because pores lessen resistance to cracking. The result is a fracture-resistant ceramic suitable for the manufacture of ceramic armor. An additional benefit of isostatic pressing is the elimination of defects produced by friction between the powder and the matrix wall—a characteristic of high-pressure unidirectional compacting.

MEI also has developed an alumina production process that uses compacting to reduce porosity. The report does not provide details of this process but does mention that test specimens of alumina obtained through this technique show low concentrations of silica characteristic of reduced porosity.

Surface Machining

In a related effort, the institute is studying the effects of surface machining processes on the mechanical strength of ceramic materials. This research indicates that the quality of ceramic armor could be improved with a machining process that uses diamond grinding.

Future Research

Future research may focus on the development of fracture-resistant alumina-tungsten agglomerates. This would involve an alumina matrix, produced by compacting, surrounding a tungsten wire network whose structure would increase the agglomerate's tensile strength. In addition, MEI plans to produce high-tensile-strength alumina for mixing with pure zirconium.

Nate D. X2676

BRAZIL: GUIDE TO PHYSICS INSTITUTES

The Brazilian Government has issued the second edition of its GUIDE TO BRAZILIAN PHYSICS INSTITUTES (1986). Published by the Brazilian Center for Research in Physics, the 211-page report is based on information from questionnaires sent to some 130 departments at 64 institutes.

The report provides the organizational structure of each institute, the names of undergraduate and graduate program directors, and the names of laboratory managers. It also lists types of laboratories and equipment available and provides a description of research programs.

The report is organized alphabetically by state, city, and name of institute and is cross-indexed for easy reference.

A full translation of the report will appear in the JPRS serial EUROPE/LATIN AMERICA REPORT: SCIENCE AND TECHNOLOGY.

Nate D. X2676

NETHERLANDS: PHILIPS SEEKS COMPETITIVE EDGE

Philips, one of the world's leading IC producers, has invested a half billion guilders in a new integrated circuit R&D center in Eindhoven, according to DE VOLKSKRANT of 6 December. The facility, which is part of the Mega-Project launched by Philips and Siemens in 1984, is dedicated to the development of 1-megabit and 4-megabit memory chips with feature sizes of 0.7 microns. Philips regards the marketing of submicron technology as essential to retaining its international competitive edge.

The center, which began operation in early December, is divided into a design section and a pilot production plant (with some of the chip fabrication equipment having been developed by Philips). Philips is also building a billion-guilder fabrication plant in Nijmegen, which will begin mass production by the end of the decade, and Siemens plans to build a new plant in Hamburg.

In the 1990s, Philips plans to continue its efforts in chip miniaturization and expects to produce a new generation of chips with a 0.2-micron feature size by the year 2000. To promote development of this next-generation chip, Philips would like to launch a joint R&D project within the framework of Eureka. As a result, Philips is conducting talks with Siemens and has approached Thomson of France. Philips believes that enormous development costs and the need for outside expertise make collaboration with other European companies a necessity.

Sharon W. X2519

SOUTH KOREA: RESEARCH REACTOR PLANNED

The South Korean Government plans to build a nuclear research reactor as part of a program to attain eventual self-sufficiency in various nuclear technologies, according to November reports in the Seoul press.

SEOUL SINMUN reported that in order for the domestic nuclear industry to build and operate nuclear power plants, Korea must have a high output nuclear research reactor. Although the Korea Advanced Energy Research Institute has a 2-megawatt testing reactor and Kyonghui University has a small reactor, these are for educational purposes only. According to the report, a 30-megawatt Multipurpose Research Reactor (MRR) will be constructed by a team of Korean scientists and engineers in the Taedok Science Town to develop technologies, currently provided by foreign sources, related to nuclear fuels, materials, and components. Some 80 percent of the MRR design work is already completed and construction is scheduled to begin in early 1987.

Fueled with low-enriched uranium, the MRR will be used to assess the efficiency of domestically produced nuclear fuel, to produce various radioisotopes and semiconductor materials, and to conduct basic and applied research related to nuclear power. The MRR, which is expected to be operational in the 1990s, will reduce Korea's need to import radioisotopes, saving the country $6 to 7 million in foreign exchange annually. MAEIL KYONGJE SINMUN reported that with the completion of the MRR, Korea may be able to export various radioisotopes to Latin America, the Middle East, and Africa.

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DATA BASE SURVEYS

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 Milan Unit searches of the Sigle, Dechema, Pascal, and Inspec bibliographic data bases. The French-language Sigle data base deals exclusively with grey literature from the European Community and Sweden, while the FRG's Dechema focuses on biotechnology and chemical engineering. The French-language Pascal data base includes research in electronics, biotechnology, and metallurgy, while the UK-based Inspec provides information on international scientific and technical research.

TOPIC & TECHNOLOGY	DESCRIPTIVE
AEROSPACE	
"Texus" Project	This 1986 article provides an overview of the biotechnology experiments planned for the FRG's "Texus" Project, a series of suborbital sounding rocket missions. Also covered are the FRG biotechnology experiments in cell fusion, cell cultivation, and protein crystallization which will be placed aboard the US space station. (Dechema)
BIOTECHNOLOGY	
Government Regulation	This 1986 CHEMISCHE RUNDSCHAU article discusses the FRG Benda Commission's assessment of the ethical and legal aspects of genetic engineering and the resulting government guidelines for the development of genetically engineered microorganisms. (Dechema)
FACTORY AUTOMATION	
Esprit CAD/CAM Project	A March 1986 report by the Karlsruhe Nuclear Research Center details the progress achieved in the development of CAD/CAM interfaces in Esprit (European Strategic Programs for Research and Development in Information Technology) Project 322. Particular attention is given to test results of high volume data transfers between the MEDUSA and BRAVO systems. (Inspec)
FRG-Norway CAD/CAM Project	A 1985 progress report by the Karlsruhe Nuclear Research Center and the Norwegian Technical Research Center covers developments in the joint Advanced Production System project for the application of CAD/CAM methods in mechanical engineering. (Sigle)

MICROELECTRONICS

Ion Mass Spectrometry	A 1986 final report from the FRG's BMFT and Fraunhofer Institute for Solid State Technology details FRG use of secondary ion mass spectrometry as a method of nondestructive evaluation for microelectronic components. (Sigle)
Silicon Technology	From its 1986 comparative study of state-of-the-art bipolar and MOS (metal oxide semiconductor) technologies, Thomson Semiconductors of France predicts potential developments in advanced silicon-based electronic components. (Pascal)

Saclay SIGLE Data Base, Karlsruhe DECHEMA Data Base, Paris PASCAL Data Base, London INSPEC Data Base (Jan 87). Milan Unit/Eva L. x2519

PREVIEWS

PREVIEWS is an annotated list of selected science and technology items being translated by FBIS. The list may also contain previously published items of wide consumer interest.

EUROPE/LATIN AMERICA REPORT: SCIENCE AND TECHNOLOGY

SPOT IMAGE PLANNING NEW LAUNCHES, WIDER MARKET

Spot Image, which markets the SPOT 1 satellite photos, reports Fr20 million in revenue during its first nine months of operation. The article provides the launch schedules for SPOT 2, 3, and 4 and a general description of the marketing efforts and business operations of Spot Image. (Paris LIBERATION 24 Dec 86)

CNES IMAGE PROCESSING SOFTWARE, HARDWARE DESCRIBED

This document describes the design of the software and hardware systems used by CNES for processing images from the SPOT remote sensing satellite. (Toulouse CENTRE NATIONAL D'ETUDES SPATIALES, no date given)

ESA ANNOUNCES FINANCING, CONTRACTING FOR HERMES

During the Technospace show, the European Space Agency announced the financing for and major participants in the Hermes project. (Bern ELSA Data Base 4 Dec 86)

EUREKA SUBMICRON PROJECT ADVANCING

The article concerns the current status of UCB Electronics, a start-up venture seeking to develop photosensitive techniques able to produce 0.4-micron features on integrated circuits. (Kalmhout INDUSTRIE Jan 87)

EC'S ROLE IN TECHNOLOGY DEVELOPMENT OUTLINED

The article presents a brief resume of the goals, composition, and future of Europe's major technology programs and organizations, including ESA, Columbus, Ariane 5, Hermes, Arianespace, Eutelsat, CERN, Airbus Industrie, Eureka, and others. (Brussels ATHENA Nov 86)

FRG PUBLISHES R&D GUIDE FOR MEDIUM-SIZE COMPANIES

Procedures for obtaining government or bank subsidies for high-tech R&D in the FRG are outlined in this BMFT (Federal Research and Technology Ministry) publication. (Cologne RATGEBER FORSCHUNG UND TECHNOLOGIE 1986, Aug 86)

FRG INSTITUTE EXPLORES LASER CHEMISTRY APPLICATIONS

Article details laser R&D at the Max Planck Institute for Quantum Optics, where the application of lasers in electronics and isotope separation is being studied. (Duesseldorf VDI NACHRICHTEN 14 Nov 86)

FRG SCIENTISTS VIEW POTENTIAL SEMICONDUCTOR LASER

Outline of papers presented in October by scientists from Siemens, Philipps University in Marburg, and Telefunken on current laser research as applied to gallium arsenide components and optoelectronics. (Duesseldorf VDI NACHRICHTEN 14 Nov 86)

EUROPEAN PLANS FOR 'EUROFAR' ROTORCRAFT

Article examines the main features of the European Future Advanced Rotorcraft (EUROFAR), which will be developed by Italy and five other European countries within the framework of the EUREKA program. (Rome AIR PRESS 20 Dec 86)

FRANCE ANNOUNCES REORGANIZATION OF RESEARCH MINISTRY

In an effort to streamline management and reduce staff, France has reorganized its Ministry of Research and Higher Education. Article details the ministry's new departments and their responsibilities. (Paris AFP SCIENCES 18 Dec 86)

ESA APPROVES ECU 1.5 BILLION BUDGET FOR 1987

Article examines, by area of activity, ESA's 1987 budget and comments on its space station negotiations with the US and on Hermes development plans. (Paris AFP SCIENCES 18 Dec 86)

FRANCE, EC LEGISLATE GENETIC ENGINEERING, PHARMACEUTICAL PATENTS

Series of articles outlines background of France's decision to place a three-year ban on genetic experiments using human embryos and discusses new EC legislation to expand patent protection for medicines developed through biotechnology. (Paris LE MONDE 16,17 Dec 86; Paris AFP SCIENCES 4 Dec 86)

WORLDWIDE REPORT: TELECOMMUNICATIONS POLICY, RESEARCH, AND DEVELOPMENT

GOVERNMENT LIMITS FOREIGN OWNERSHIP OF CGCT

Article examines impact of the French Government's decision to limit to 20 percent foreign ownership of the General Telephone Construction Company (CGCT). (Amsterdam COMPUTABLE 12 Dec 86)