

Wed, March 4 Dirksen Blog. 8:45-9:30 a.m.

November 26, 1991

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\$2,000

Yvonne Hopkins Executive Assistant Office of Senator Robert Dole 141 Hart Senate Office Building Washington, D.C. 20510

Dear Yvonne,

I am writing this letter to confirm our earlier telephone conversation regarding the possibility of <u>Senator</u> Dole making the keynote address at Siemens' Washington Information Seminar on March 4, 1992.

As you indicated when we talked, it is too early to firm up his schedule for next March, but we do want to make the request now.

This year's seminar -- the seventh -- will be held in the Dirksen Building. Approximately 70 Siemens operating company presidents and senior management people will attend.

The purpose is to acquaint our top people with political trends and legislation that may affect the way in which they conduct their businesses throughout the United States.

Ideally, we would like Senator Dole to speak from 8:45 to 9:30 a.m. His speech would be informal, with about 20 minutes of remarks followed by Q&A.

The general subject of the seminar is implications for U.S. business of global economic trends. However, any timely issues on which Senator Dole would like to comment would be welcome.

We will contact your office again early in January, or whenever it is convenient for you. In the meantime, if you have any questions, please give me a call.

Sincerely,

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Barbara A. Bankoff Consultant, Environmental Affairs

Siemens Corporation

Par - F

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Mr. Krister Willgren

Sibag Investments, Inc. 1301 Avenue of the Americas New York, NY 10019 (212)258-4000 TO: Senator Dole

FR: Kerry

RE: Remarks to Siemens Washington Info Seminar Wednesday, March 4, 1992

*You are scheduled to speak to speak to approximately 60 Presidents and Executive Vice Presidents of Siemens operating company presidents and senior management people.

*Siemens Corporation is a conglomerate of electronic and telecommunication companies...a list is attached.

*The general subjects of the Washington seminiar are trade and competitivness. Our contact asked that you give a short informal update of "what's up on Capitol Hill," and then take Q&A.

*Let me know if you need any further information or talking points.

<u>1992 Siemens Washington Information Seminar</u> <u>Participant Address List</u>

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SIEMENS

Siemens '91

A Review of Siemens Businesses in the USA







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Siemens Corporation, with headquarters in New York City, is the holding company for Siemens operating companies, their subsidiaries and other legally independent entities in the United States. The corporation provides centralized staff and service functions, and has the responsibility for developing, coordinating and maintaining the overall business strategy of Siemens in the U.S.

Chairman's Letter 2 Siemens U.S. Companies 4 Siemens Markets 6 Communications and Information Systems 8 Electronic Components 12 Automotive and Transportation 14 Energy and Power 18 Medical 22 Automation 26 Other Markets 28 Research and Development 30 Siemens Worldwide 32 Siemens in the U.S. IBC

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Attentive students at Wellesley (Massachusetts) High School and the Central Middle School (lower) in Quincy, Massachusetts, participate in innovative math and science programs developed by 1990 Siemens Award recipient, Dr. Robert F. Tinker of TERC.

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Shared Concerns

ith some 35,000 employees in the United States, Siemens shares the common concerns of all Americans, especially the three Es: Education, Energy, Environment.

If we are to continue to provide products based on advanced research and technology, we must encourage educational excellence. To that end, Siemens provides significant financial support to a number of educational initiatives. These include Jobs for America's Graduates, a program that encourages high-risk youth to remain in school and graduate; and Vision 2000, the Society of Automotive Engineers' program that

stimulates interest in mathematics and science at all education levels, from elementary grades to graduate school.

Siemens Automotive has instituted an Adopta-School program with elementary and secondary schools in the Detroit area. Other Siemens companies provide employee-volunteer instructors to local schools to encourage math and science programs. Still others offer in-house employee programs in remedial math and reading.

Siemens Corporation sponsored the "Siemens Information Technology Leadership Award for Science Education" (part of the Computerworld Smithsonian awards program), which recognized Dr. Robert F. Tinker, chief science officer, Technical Education Research Centers (TERC) for developing innovative science and mathematics programs incorporating computer technology. These programs, to date, have reached more than 125,000 students.

Siemens Corporation is also active on behalf of the Foundation for Student Communication, which promotes student/business cooperation at more than 200 U.S. colleges and universities.

Energy and the environment are other vital concerns. Siemens Solar Industries, OSRAM **Corporation and Siemens** Power Corporation, among others, have developed new products that help to conserve energy and to also produce clean energy. Siemens has created a corporate-wide networking council so that our companies can communicate with each other about environmental management and compliance. Siemens companies are also aggressively pursuing alternatives to environmentally destructive chlorofluorocarbons. Siemens Stromberg-Carlson, Siemens Private Communication Systems, Potter & Brumfield and ROLM Systems are well on their way to the complete elimination of CFC 113 in the manufacturing process. Siemens Automotive, which produces advanced fuel injection and emission sensors, is actively involved in clean air and fuel economy initiatives.

In terms of the three Es, Siemens is committed to translating shared concerns into action.

Chairman's Letter

uring this time of momentous world events and economic

problems, Siemens continues its long-term growth and maintains an optimistic view of the future.

For the 1989/90 fiscal year (10/1/89–9/30/90), our U.S. sales reached \$4.1 billion, a 16 percent increase over those of the previous business year. Orders, the indicator of future business, stood at \$4.4 billion, up by 14 percent over those of fiscal 1989. Included in these figures are record sales of \$1.4 billion by Siemens Medical Corporation and \$1 billion by Siemens Energy & Automation.

The Siemens investment in the United States, some \$2.5 billion since 1984 alone, has enabled us to establish and develop a significant position across a broad range of industries. And, as our operating companies in these industries have matured, their financial positions have improved.

Although new and significant responsibilities in unified Germany and in Eastern Europe have presented themselves, Siemens remains steadfast in its commitment to investing in and developing its businesses in the United States.

Internal growth is the foundation for our success, but we will also consider investment, acquisitions or joint ventures should the proper opportunities arise. During the past year, we created two new holding companies. One, Siemens Medical Corporation, is responsible for all medical equipment activities in the U.S. The other, Siemens Private Communication Systems, Inc., is responsible for private (PBX-related) network communications activities.

Siemens Communication Systems, Inc., our public telecommunications company, merged after the close of the fiscal year with Stromberg-Carlson Corporation, a GPT company, which is a subsidiary of The General Electric Company, plc, of Great Britain. The new joint venture, Siemens Stromberg-Carlson, with sales of approximately \$400 million. is an important supplier to the Bell Operating Companies, as well as to independent telephone companies.

Several additional companies in the United States now bear the Siemens name. One, Siemens Nixdorf Information Systems, Inc., is a subsidiary of Siemens Nixdorf Informationssysteme AG – Europe's leading computer company. The parent company is majority-held by Siemens AG.

Siemens Nixdorf Information Systems, Inc. has an excellent reputation and allows Siemens to enter several new and promising markets in information technology, such as government, retail, financial and manufacturing. During the year, the new company also acquired Recognition Equipment, Inc.'s OCR Wand Division, forming OptoWand, Inc.

USA Total Sales (\$ in billions)

















35.0*

*Includes joint venture companies in which Siemens ownership is at least 50 percent

Note: Fiscal year begins October 1, ends September 30.

Siemens Nixdorf Printing Systems, L.P., which serves the high-speed, non-impact printer market, was formed as a limited partnership between Siemens Nixdorf Information Systems, Inc. and Storage Technology Corporation.

Siemens Transportation Systems was created to participate in rail transportation, a business in which there is a revived interest in response to national concerns regarding the environment and energy conservation.

This renewed concern about energy conservation has developed into an increasingly important business opportunity for Siemens.

Siemens has developed highly efficient gas turbines and combined-cycle power stations distinguished by their environmental compatibility and unsurpassed efficiency. This should translate into increased orders for Siemens Power Corporation, formerly Utility Power Corporation. Siemens' turbines will be used in a new gas-fired 315-megawatt electric power plant planned for operation in Virginia in 1994.

Developing alternate energy sources continues to be a major interest. In that regard, Siemens Solar Industries, which was ARCO Solar, Inc. and acquired from Atlantic Richfield, has expanded its operations to include a facility in Vancouver, Washington. This new location will support the company's Camarillo, California, headquarters in the manufacture of photovoltaic solar electric products. Siemens Solar Industries exports about 75 percent of its U.S. production.

Another member of the Siemens U.S. family, OSRAM Corporation, produces energysaving light sources used effectively by a number of electrical utilities in promoting energy conservation.

In the automotive sector, Siemens Automotive has positioned itself as a respected international supplier of automotive electronics, and is an integral part of Siemens' worldwide business activity in this market sector. It has expanded its Newport News, Virginia, facility and has acquired the MACI Industries Group, a Canadian-based manufacturer of fractional horsepower electric motors and related components.

Siemens Components, with a diverse product line, is successfully operating in an industry hard-hit by the recession. The company has been able to find and develop important niche markets with favorable results.

As of October 1, 1990, Dr.-Ing. Rudolf Hell GmbH was merged into Linotype AG, with Siemens retaining a minority control of 33 percent in the new Linotype-Hell AG. The U.S. activities of both companies have been combined. Accordingly, fiscal year 1989/90 is the last year in which Hell Graphic Systems is included in our U.S. Group.

Although our continued

expansion in the United States has required a substantial financial investment, this year's performance has resulted in a marked improvement in our bottom line.

Siemens' growth, not only in the United States, but in North America as a whole, is reflected in some recent management changes within Siemens Corporation.

As Chairman of Siemens Corporation, and as the representative of North America on Siemens AG's Central Managing Board, I will continue to play an active role in shaping the future of Siemens, not only in the United States, but now also in Canada and Mexico.

In addition, some further management changes have been implemented to ensure our continued progress. Former President Hans Decker's many years in the U.S. will enable him to bring an important perspective to his new role as Vice Chairman of the Board and as our representative to major national and international audiences.

To carry on the day-to-day activities of guiding Siemens Corporation, we will have Albert Hoser as President and Chief Executive Officer. Previously, he had served as President and Chief Executive Officer of the Siemens operation in Japan, and, later, in the same capacity at Siemens Limited in India. His international experience will provide additional impetus in helping us to meet the collective challenges that lie ahead.

We have advanced significantly toward our goal of being a major participant in the U.S. electronics and electrical markets. Superior quality standards for our products and, more importantly, the support of our customers and employees, make us confident of the continuing success of Siemens in America.

Horst Langer Chairman Siemens Corporation

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Siemens U.S. Companies

Siemens Components, Inc.



Siemens Energy & Automation, Inc.



Siemens KWU, Inc.



Siemens Medical Corporation



Siemens Private Communication Systems, Inc.



Siemens Stromberg-Carlson



Siemens Components, Inc. provides a diverse line of products, including integrated circuits, discrete semiconductors, passive

Siemens Energy &

equipment and sys-

tems, ranging from

Automation, Inc. pro-

duces a wide variety of

electrical and electronic

circuit breakers for low-

voltage residential use

to high-powered sub-

station applications,

Siemens KWU, Inc. coordinates the activi-

ties of its operating

companies, which are

mission, nuclear fuels

involved in energy generation and transcomponents, and laser and tube products. The company includes the Integrated Circuit Division, Optoelectronics Division and Special Products Division. Heimann Systems, also a division, supplies

cesses. The company

consists of six operat-

manufacturing facilities.

Products are marketed

manufacturing, services

development and man-

ufacture of photovoltaic

modules, and lasers for

materials processing.

Siemens KWU companies include Siemens Power Corporation,

for nuclear and fossil

fuel power plants,

ing divisions and 20

 Products Division.

 Heimann Systems, also a division, supplies

 motors from one to 10,000 horsepower, and automation equipment for small- to large-scale manufacturing pro domestically through 100 sales and service locations, and globally via the International Business Unit. Siemen

locations, and globally via the International Business Unit. Siemens Analytical X-Ray Instruments, Inc., a subsidiary, manufactures research grade scientific instruments.

X-ray security systems.

Crystal Technology,

Inc., a subsidiary, is a

lithium niobate crystals

leading supplier of

to world markets.

Siemens Solar Industries, Advanced Nuclear Fuels Corporation and its subsidiary company, Universal Testing Laboratories, Inc. and Rofin-Sinar, Inc.

Siemens Medical diag Corporation is active in diol research, manufacturing, marketing and rad export of products for tistr the healthcare market. nati It serves many major sup hospital/medical specialities, including par

Siemens Private Communication Systems, Inc. is responsible for Siemens' PBX-related activities in the U.S. Subsidiaries include ROLM Systems, developer and manufacturer of ROLM® digital communication sys-

Siemens Stromberg-Carlson provides telephone operating companies with advanced, high-quality public telecommunications networks. The company designs, mandiagnostic imaging, cardiology, critical care, surgery, anesthesiology, radiation therapy, dentistry and audiology. The nation's most diversified supplier of medical electronics, the company supplies products ranging from magnetic

tems, and **Tel Plus Communications Company,** which markets and services the SATURN[®] PBX line, HCM 200[™] digital hybrid communication system and key systems from Siemens. It also represents the Siemens

ufactures and markets the EWSD® central office digital-switching system, packet-switching systems and fiber-optic transmission equipment. One of the leading suppliers to North America's public telephone network, resonance imaging systems to hearing aids. Its medical products are manufactured and assembled domestically in 12 production centers and marketed nationwide through direct sales offices and authorized dealers.

interest in the 50-50 joint venture with IBM, **ROLM Company,** which markets and services ROLM products. Other functions include developing, manufacturing and distributormarketing the Siemens product line in the U.S.

Siemens Stromberg-Carlson is dedicated to the development of highly intelligent networks that provide innovative switching technology for tomorrow's telecommunication needs.

Systems, Inc.	Ű
Siemens Automotiv	/e

OSRAM Corporation



Potter & Brumfield, Inc.



Siemens Nixdorf Information Systems, Inc.



Siemens Transportation Systems, Inc. is responsible for all Siemens rail transportation operations in the U.S. The company pro-

is one of only three

independent first-tier

suppliers capable of

providing the interna-

industry with the full

OSRAM Corporation

manufactures and

markets innovative.

technically-advanced

and energy-efficient

light sources for the

commercial, industrial,

residential, automotive,

theatrical and specialty

Potter & Brumfield,

facturer of electro-

Inc. is a leading manu-

mechanical and solid-

state relays, as well as

thermal and magnetic

circuit breakers. Cus-

Siemens Corporate

Research, Inc. con-

technologies funda-

product areas and

mental to Siemens AG

specific Siemens U.S.

Siemens Nixdorf Infor-

mation Systems, Inc.

and markets computer

systems products and

peripherals for the U.S.

market. It is an integral

develops, manufactures

ducts exploratory and

applied research in key

tional automotive

vides a broad array of rail technology, including safety and control systems, catenaries and transmission lines and rolling stock for mass transit and main lines. It is also involved

in both the mechanical and electrical aspects of rail vehicles, from high-speed trains and locomotives to light-rail vehicles.

electrical components

25 of the world's largest

28 car builders, includ-

ing all of the top ten

for 70 percent of all

automotive industry is

discharge headlamp

the revolutionary D-1 gas

system. The company is

well-known throughout

the television, motion

picture and theatrical

film projection lamps

and HMI® light sources.

Potter & Brumfield, spe-

cializes in a full range of

fiber-optic components,

including transmitters,

receivers, transceivers,

connectors and fiber-

optic relays.

industries for its Xenon

automotive sales.

vehicle builders in the

free world, who account

for vehicles. It serves

Siemens Automotive the most advanced electronic systems: they enhance safety, ensure optimum engine control and ultimately increase overall driving comfort. The company supplies spectrum of needs for more than 700 products covering the entire range of electronic and

> lighting markets. Primary products include the DULUX® family of compact fluorescent lamps, tungsten halogen lamps and HQI® metal halide lamps for display lighting. Currently under development with the

tomers include original equipment manufacturers of automobiles, appliances, industrial controls and instrumentation and office equipment. Siemens Fiber Optic Components, a division of

businesses. Research and advanced development is carried out in selected areas of computer and information sciences, emphasizing certain aspects in artificial intelligence (AI), including symbolic learning, neural net-

contributor to research and development for the international market. It has more than 110 sales and service, research and development, and manufacturing locations nationwide. The company is the U.S.

works and expert systems. Exploratory, feasibility, and technology transfer projects are conducted in imaging, software engineering and tools, and learning systems.

subsidiary of Siemens Nixdorf Informationssysteme AG, a publicly traded German company in which Siemens AG holds 78 percent of the shares.

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Siemens Markets

iemens is a major international designer, developer and manufacturer of electrical engineering and electronics systems. It serves a number of dynamic industries with a comprehensive range of products and systems, including public and private telecommunications systems, medical systems, energy generation and distribution systems, automation, transportation systems, automotive electronics and electronic components.

Filament for OSRAM energy-efficient lamp is examined by an experimental inspection system developed at Siemens Corporate Research, Inc. Communications and Information Systems includes equipment for both private branch exchange (Pex)-related businesses and public network digital voice and data-switching products.

Electronic Components offers a comprehensive line of integrated circuits, discrete semiconductors, passive components, laser and tube products, and optoelectronic devices.

Automotive and Transportation supplies electronic and electro-mechanical components and systems for vehicles, plus a broad array of rail-transportation technology.

Energy and Power provides electrical and electronic equipment to control and distribute electrical power, products for energy generation and transmission, photovoltaics, and nuclear fuels.

Medical features a highly diversified line of medical electronics, ranging from diagnostic imaging and radiationtherapy systems to patient-monitoring and respiratory-care equipment.

Automation focuses on state-of-the-art automation products and systems for manufacturing processes, and numerical controls for machine tools and advanced production equipment.

Other Markets include specialized market sectors, such as lighting products, airfield lighting systems, music recording equipment, research instrumentation, and security systems.

Research and Development concentrates on specific projects focusing on selected areas of computer and information sciences, with the emphasis on artificial intelligence.





















Communications and Information Systems

ast year's merger of Siemens Communication Systems, Inc.

with Stromberg-Carlson Corporation created the thirdlargest public network supplier in North America, **Siemens Stromberg-Carlson**. Its customer base includes the majority of the seven Regional Bell Holding Companies, as well as Alltel, GTE-Contel, and some 400 other independent customers, in addition to voice and data carriers.

Prior to formation of the new company, Siemens Communication Systems, Inc. increased sales by 20 percent during fiscal 1989/90, with a 10 percent rise in packet-switching sales. It also won its first contract to replace the 1A ESS analog system, for years an industry standard, with its EWSD® public telephone digital-switching system. A primary goal during the next year will be to increase its share of this estimated 60million-line replacement market. Approximately 1.5 million lines of EWSD equipment have been installed or are on order, with some 400,000 lines shipped during fiscal 1989/90.

The company concluded a major sales agreement to install its EWSP[™] advanced packet switch as part of INFONET's worldwide data network, and has installed its Metropolitan Area Network in Philadelphia under an agreement with Bell Atlantic. It also installed its larger-capacity 914 EX digital loop carrier transmission system in GTE territory last fall. The EwsD switching system and the DCO[™] switch from Stromberg-Carlson are highly complementary, addressing, respectively, the high and low ends of the central office market spectrum. Siemens' CP 113 processor, with elements of both switches, should provide an evolutionary common switching platform planned as the foundation for the next generation of switching systems.

In the increasingly competitive private communications markets, **Siemens Private Communication Systems, Inc.,** responsible for Siemens' private branch exchange (PBX)-related communications activities in the United States was formed. It represents Siemens' interest in **ROLM Company,** a 50-50 joint venture with IBM. Subsidiaries include **ROLM Systems** and **Tel Plus Communications Company.**

A successor to Siemens Information Systems, Inc., Siemens Private Communication Systems also develops and manufactures the SATURN[®] digital PBX for mid-size, standalone or distributed applications. The CorNet[™] worldwide networking protocol, based on Integrated Services Digital Network (ISDN) technology, is now available for SATURN PBXs.

Sales of ROLM® products – marketed, serviced and distributed by ROLM Company – increased significantly. The major reason for this improvement involved strengthening of the ROLM direct field marketing organization and field sales management, and the begin-

Siecor products developed for a variety of permanent and restoration fiber-optic splicing applications include the CamSplice™ low-loss mechanical splice for singlemode and multimode fibers. It requires no adhesives or epoxies and is now in field testing at several telephone companies.



Mervyn's, a 228store retailer and Tel Plus customer, has installed more than 100 SATURN® IIE digital PBX systems for their cost savings and applications potential.

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A B B.

Children III

ROLMphone® 240E multi-line digital telephone, developed and manufactured by ROLM Systems, has a two-line by 24-character display, 24 buttons that can be programmed and other features designed to enhance communications productivity. ▲ ROLM Systems in Austin, Texas, uses surface-mount technology on circuit boards made for a selected member of the ROLMphone® family of digital telephones, and its ISDN family of telephones. C

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ning of volume installation of new products. Of special significance are products providing links between the ROLM 9750 business communications system and computers, allowing ROLM customers to combine voice and dataprocessing applications for inbound-outbound calls.

ROLM Systems, a whollyowned company acquired from IBM more than one year ago, develops and manufactures the ROLM 9750 business communication systems and peripherals. During the year, it focused on enhancements to the 9750's automatic call distribution features, which have greatly improved agent capacity and management tools. More than 1,000 units of its new MODEL 10 were shipped.

Tel Plus Communications Company, which markets the SATURN[®] digital PBX, also grew significantly; its HCM 200[™] digital hybrid PBX is popular with small- to medium-sized businesses and those with Centrex telephone service.

Siecor Corporation, a joint venture with Corning Incorporated, is the leading independent U.S. supplier of fiber-optic cable. During the year, it introduced tapered cable for loop applications, plus slotted core ribbon cable for use by NTT, Japan's largest telecommunications company. Siecor continues to work closely with various U.S. telephone companies, its primary market, to assess field trial results involving fiber to the home.

Design innovations by the Integrated Circuit Division of **Siemens Components, Inc.** have led to the development of a broad range of ISDN chips and, as a result, increased sales to various telecommunications companies.

Potter & Brumfield, Inc., the leading relay manufacturer in the U.S., expanded its T91

power relay family and introduced the all-new w6/w9 series magnetic circuit breakers. Both have broad application, including controlling and protecting power supplies in communications equipment. The company will continue to market its solidstate and electromechanical switching components.

Siemens Fiber Optic Components, a division of Potter & Brumfield and a leader in multimode fiber-optics, concluded multisourcing agreements with both AT&T and Hewlett-Packard. It also introduced FDDI-(Fiber Distributed Data Interface) compatible transceivers, and FDDI MIC connectors and FDDI relays, and continued its high-volume production of the IBM-compatible transceiver and connector.

Last year, Siemens AG acquired a majority interest in what is now Siemens Nixdorf Informationssysteme AG. With the transfer to it of the Siemens AG computer business, it became one of the world's leading computer companies. Its U.S. subsidiary was renamed **Siemens Nixdorf Information Systems, Inc.** The Peripheral Systems and PC divisions of Siemens Information Systems became the responsibility of this subsidiary.

Siemens Nixdorf introduced and markets many state-ofthe-art products, from PCs to high-performance workstations and superminicomputers, including many targeted to the UNIX platform market.

As a continuing commitment to the high-speed, low-impact printer market, **Siemens Nixdorf Printing Systems, L.P.** was formed as a limited partnership between Siemens Nixdorf Information Systems, Inc. and Storage Technology Corporation.



Siemens Stromberg-Carlson technician, Peter Mueller, examines a DCO line card during testing of a central office switch at the company's Lake Mary, Florida, manufacturing and assembly facility. The com-

pany's EWSD and DCO central office products and EWSP packet switching systems will be produced at the facility, which is currently undergoing a multimillion dollar redesign and renovation to accommodate these additional products and to improve manufacturing efficiencies.



CamLite™ connector, the result of a Siecor Corporation technological breakthrough in optical fibers, provides high-quality, lowloss field connections without epoxy, fiber sizing or field polishing.



First EWSD® digital central office switching system used as a 1A replacement has been installed in metropolitan Philadelphia for Bell of Pennsylvania. One of the largest EWSD switching systems in the U.S., it has more than 45,000 subscriber lines.

4

Electronic Components

dvanced technology has solidified the

market position of Siemens Components, Inc., a supplier of high-quality next generation products.

In 1990, Siemens and IBM signed an agreement for the joint development of 64-Megabit (Mb) Dynamic Random Access Memories (DRAMS). Siemens is also increasing production on its 4-Mb DRAM, and has placed a number of 16-Mb DRAM prototypes at customer sites for evaluation.

The Integrated Circuit Division recorded strong sales in one-Megabit (1-Mb) DRAM chips, and Siemens enhanced its ADVANCELL[™] CMOS standard cell ASIC (application specific integrated circuits) product line with the introduction of 1.0 micron technology. A full range of gate array products based on the "Sea of Gates" concept was also introduced.

At the same time, the division successfully introduced a 32bit RISC (reduced instruction set computing) processor chip set, based on MIPS Computer Systems, Inc. architecture.

The Special Products Division recorded significant sales growth in tube products, especially helium neon (HeNe) gas lasers for bar code-scanning applications. It also grew in discrete semiconductors, particularly in surface-mount devices (transistors, diodes and tuner components), and in its HEIMANN® product line (trigger coils for photographic applications and IR [infrared] detectors for security installations).

The division entered two new markets, introducing highpowered laser diode arrays and power supplies, as well as a diversified line of sensor products.

At the Optoelectronics Division, an eight-character Intelligent Display® system, capable of producing 256 different symbols, ranging from scientific to Katakana, moved into full production during 1990. Low profile versions of this dot matrix LED (light-emitting diode) display are used in Motorola cellular phones.

The custom-applications business, which has successfully developed non-invasive medical critical care monitoring products, is diversifying. One new project involves the development of a cockpit display for an airplane collision avoidance radar system.

Crystal Technology, Inc. is the world's largest supplier of lithium niobate crystals used in high-technology components such as SAW (surface acoustic wave) filters and optical devices. In 1990, its business activities were organized into two divisions, one for crystal growing and wafer fabrication, the other for components utilizing these materials.

Potter & Brumfield, Inc. introduced new electromechanical and solid-state relays for application in high-volume markets.

Siemens Fiber Optic Components, a division of Potter & Brumfield, Inc., offers a full range of fiber-optic components and devices for systems support.



Status panel section from a personal computer manufactured by Everex Systems, Inc., Milpitas, California. It features an eightcharacter Intelligent Display® module with built-in CMOS integrated circuit chips developed by the Optoelectronics **Division of Siemens** Components.

> The agreement between Siemens and IBM to jointly develop 64-Megabit DRAM integrated circuit chips has shown significant progress. The joint research teams, with a goal of producing a world standard 64-Mb semiconductor memory chip by the mid-1990s, have begun to produce test 200-mm silicon wafers.

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Helium neon laser tubes, a key component of bar code scanners, are supplied by Siemens Components' Special Products Division to NCR in Cambridge, Ohio, a major manufacturer of supermarket and department store slot scanners.



Automotive and Transportation

ven though vehicle production in North America during

1990 was six to eight percent lower than in the previous year, the demand for automotive electronics continued its upward trend.

Siemens Automotive, too, continued its sales growth of previous years. It increased exports from the U.S. as well, delivering products and systems to automotive manufacturers in Sweden, Spain, Italy, Germany, France, Korea and Japan.

The company's plant at Newport News, Virginia, Siemens Automotive's center of world expertise for precision actuators, fuel injectors and ABS (anti-lock braking systems) solenoids, was responsible for a majority of the export activity.

Ground was broken at Newport News for a new 61,000square-foot manufacturing addition that will allow the company to meet the increased worldwide demand for its fuel injector systems. Output from the facility for 1991 is expected to increase by 37 percent.

Air bag sensor production, launched at the Chatham, Ontario, Sensor Systems facility in 1989, has already doubled in output as a result of the demand from General Motors. Production of emission controls there will grow considerably following more stringent legislation enacted in North America and Europe. This facility was one of 10 suppliers worldwide awarded the prestigious Chrysler Penta Star award for the sixth consecutive year.

Siemens Automotive, to satisfy its growing North American customer base for motors, has acquired the MACI Industries Group from Magna International Inc. MACI, located in London, Ontario, manufactures fractional-horsepower electric motors and related components.

Siemens Automotive has expanded its fuel injector technology base with the DEKA[™] II model that allows the engine designer to lower the height of the engine; and the miniature DEKA[™] III model is now undergoing testing by Japanese automakers.

Siemens Components, Inc. received the coveted Ford Q1 award, establishing it as a preferred vendor and recognizing it as a supplier of quality automotive electronics. The Integrated Circuit Division was cited for its products used in radios and tuners. The Special Products Division was recognized for its metallized film capacitors and continued to merit Q1 status in discrete semiconductors, which are used in radios and engine control applications.

The Integrated Circuit Division's gear tooth sensors and Hall-effect sensors are used in ABS systems and contactless ignition systems. It also continues to supply smart SIPMOS® devices (high current switches with intelligence) and, using its smart cell library and semicustom capability, can tailor



Ongoing development and evaluation of Anti-lock Brake System (ABS) solenoids takes place at the Siemens Automotive facility in Newport News, Virginia. The solenoids, sophisticated control valves, help to control the hydraulic pressure in the ABS brake system.



Two Rofin-Sinar 5-kw CO₂ lasers are used at State Industries, Ashland City, Tennessee. Laser welding technology helps develop more cost-effective manufacturing techniques.



▲ Siemens Automotive engineer observes dual spray pattern of the DEKA™ I fuel injector during testing at Newport News, Virginia. Fuel injector is designed to spray fuel into engine cylinder at precise location and time for maximum combustion.

Fuel injectors, the high tech alternative to carburetors, improve engine performance, lower fuel consumption and reduce exhaust emissions. They are supplied by Siemens Automotive to domestic and international automakers.





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Security and alarm systems are one of the fastest growing OEM and aftermarket applications for Potter & Brumfield's automotive relays. Typical systems feature remote control of interior lights, door locks and a variety of audible and silent alarms.





CSRAM Corporation began manufacture of the 9005 and 9006 replaceable halogen headlamps at its Maybrook, New York, production facility. These lamps are used in four headlamp systems on aerodynamically-styled automobiles.



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Vehicles for an innovative light-rail system in Sacramento, California, were supplied by Siemens Transportation Systems and Duewag Corporation. This generation of light-rail vehicles is intended for urban transportation, as well as for service between city and suburbs. The vehicles are airconditioned and provide easy access for handicapped persons. Up to four vehicles can be coupled together for multiple operations. smart SIPMOS devices to the automotive customer's needs, reducing IC design time to six months from two years.

Potter & Brumfield, Inc., the leading relay manufacturer in the U.S. and a prime supplier to the automotive industry, set new relay quality standards. It has experienced rapid growth since entering the market sector five years ago.

The company's new series of Pc board-mount and socketmount relays switch highpower loads reliably in rigorous automotive applications. Its relays are typically used in engine control module, fan control, power window, power seat, door lock, cruise control and sun roof applications.

Potter & Brumfield is currently developing new relay products for a wide range of OEM and aftermarket automotive applications.

Siemens Solar Industries is developing photovoltaic technology-based applications for the automobile, one of which is a semi-transparent sun roof combining a photovoltaic module with an air ventilation system.

Siemens Transportation Systems, Inc. was established as a Siemens U.S. operating company on October 1, 1990. Responsible for Siemens' rail transportation operations in the U.S., the company provides a broad array of rail technology for mass transit and main lines, and is involved in both the mechanical and electrical aspects of rail vehicles.

Siemens, in a cooperative venture with General Motors' Electro-Motive Division, has developed an alternating current (AC) traction motor for diesel-electric locomotives. Two of these locomotives have been delivered to Amtrak.

Siemens also is a leading supplier of electrical equipment to a consortium of companies developing high-speed trains and magnetic-levitation systems.

Duewag Corporation is a leader in the light-rail market. It has installed innovative lightrail systems in Sacramento, California and in St. Louis, San Diego, and Pittsburgh.

OSRAM Corporation, a manufacturer and supplier of innovative headlight lamps, recently expanded its plant in Maybrook, New York. Facilities have been built for the manufacture of the replaceable 9004, 9005 and 9006 halogen automotive headlamps.

Rofin-Sinar, Inc., the world's largest supplier of industrial carbon dioxide (CO₂) laser equipment, has increased its market share and expanded its product line. The company's laser equipment is used primarily for cutting and welding applications in the automobile manufacturing industry.

During the year, Rofin-Sinar introduced a new 5000-watt co_2 laser, which has captured a majority share of the automotive welding market, and a new line of compact 1200- and 1700-watt lasers used in metalcutting applications.

The company also brought to market its first Nd:YAG laser with fiber-optic beam-delivery and pulse-shaping capabilities.

Energy and Power

iemens companies continue to maintain their leadership in the U.S. energy and power markets.

Siemens Energy & Automation, Inc. manufactures and markets electrical and electronic equipment and systems for three major energy and power markets – commercial and residential construction, industrial, and electric utility.

The company's Circuit Protection & Controls Division performed well in the fiscal year despite a sluggish residential construction market. It introduced several new products, including the U.S. Series[™] starter, giving the company one of the industry's most advanced and comprehensive motor control product lines.

The division also introduced an industrial-duty disconnect switch that features an exclusive double-break visible blade design, ideal for demanding steel mill and other heavy industry applications.

The Electrical Apparatus Division introduced the Siemens Advanced Motor Master System, or SAMMS[™] system, which provides superior motor protection and control capability; it can be integrated with the company's electronic communications system introduced last year.

Motors continue to play an important role. The Industrial Motor Division (renamed as the Motor & Drives Division) posted sales gains in both NEMA and above-NEMA motor-frame sizes, and initiated a major manufacturing upgrade program at its Norwood, Ohio, plant.

The Power Products & Systems Division introduced a new 242-kv puffer breaker for the utility market. It also focused on reactive compensation projects to increase a utility's ability to transmit electric power. The division's Jackson, Mississippi, plant further improved its productivity performance.

Siemens Power Corporation changed its name from Utility Power Corporation last year to emphasize its Siemens affiliation and its commitment to the entire power-generation industry. The company also expanded its market focus to include the industrial turbine and hydrogenerator industries.

Part of **Siemens KWU**, Inc., and a recognized leader in power-generation technology, Siemens Power Corporation has developed a gas turbine that offers one of the most advanced benign emissions technologies in the world; it is well positioned to capture a significant share of the fastgrowing U.S. combustion turbine market. Since 1987, the company has installed or received orders for 14 combustion turbines.

The company, which also rebuilds or replaces existing steam turbine-generator components, delivered and installed a replacement generator midsection for Florida Power Corporation's Crystal River #3 generator. It also replaced, with Siemens/KWU components, high-pressure and low-pres-



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Advanced Nuclear Fuels' 9 × 9 BWR nuclear fuel assemblies undergoing final inspection prior to shipment to Pennsylvania Power & Light Company's Susquehanna 2 nuclear power plant. Each assembly. containing 380 pounds of lowenriched uranium ceramic pellets, has the energy equivalent of about 97,500 barrels of crude oil or 23.500 tons of bituminous coal.

Innovative debrisresistant lower tie plate structural component for nuclear fuel assemblies, designed and developed by Advanced Nuclear Fuels, features a parallel array of curved blades which prevent unwanted debris from entering fuel assemblies and causing damage.



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Technician wires one of the I-T-E® switchboards that provides electrical control for the lighting, heating and cooling systems, and other uses of power in Albuquerque's new 246,000square-foot convention center. A Newly-constructed Albuquerque Convention Center in New Mexico is equipped with Siemens Energy & Automation products and systems that distribute and control the flow of electricity throughout the building.

sure turbines plus control systems at Missouri Public Service Company's Sibley #1 plant.

Advanced Nuclear Fuels Corporation, a subsidiary of Siemens KWU, Inc., significantly expanded its role in the U.S. nuclear power market last year; all Siemens nuclear plant-related product and service activities were consolidated into the company.

As part of the restructuring, Universal Testing Laboratories, Inc., another Siemens KWU, Inc. company, became a subsidiary of Advanced Nuclear Fuels. Universal Testing Laboratories provides specialized high-technology engineering, inspection and repair services for U.S. nuclear electric utilities.

Advanced Nuclear Fuels designs, manufactures and supplies nuclear fuels for both Boiling Water Reactors (BWRs) and Pressurized Water Reactors (PWRs) operated by nuclear electric utilities throughout the U.S., Western Europe and the Far East. In 1990, the company delivered its 20,000th nuclear fuel assembly. The company also provides technical services relating to nuclear fuels.

Advanced Nuclear Fuels continues to emphasize advanced fuel designs that enable the industry to achieve better quality fuel performance. The 9 x 9-IX and 9 x 9-9X BWR fuel designs and the High Thermal Performance and debrisresistant fuel designs for PWR fuels are examples. The company also received a Quality Vendor Award from Florida Power & Light Co., attesting to its quality achievements.

During the year, Advanced Nuclear Fuels received Nuclear Regulatory Commission approval for advanced calculation methodologies to support its fuel designs. It also developed the POWERPLEX[®] II advanced core monitoring software system for BWRs. Universal Testing Laboratories conducted the first application of its phased array ultrasonic testing technology in inspecting nozzles at the Perry reactor of the Cleveland Electric Illuminating Company.

Siemens Solar Industries, formerly ARCO Solar, Inc., was acquired from Atlantic Richfield in February 1990. The company is the world's largest developer and manufacturer of photovoltaic modules that convert sunlight to electricity. It provides complete photovoltaic solar electric power supplies for loads ranging from as low as 25-watthours/day to multimegawatt installations.

Utilities are increasingly using Siemens Solar Industries' standalone solar electric power supplies for internal transmission and distribution loads. Often, these utilities find that line power or conventional remote power diesel-generator systems are unavailable or costly within their own grids.

The company is currently focusing on larger grid-tied photovoltaic generating systems for decentralized demand-side management in the 250-kw to 500-kw peak range.

Both stand-alone photovoltaic solar electric and hybrid photovoltaic/diesel power systems from Siemens Solar Industries are increasingly used for international telecommunications applications.

In October 1990, Siemens Solar Industries dedicated a new production facility in Vancouver, Washington. This expands the company's manufacturing capacity by 50 percent and will enable it to meet the growing market demand for its products.



Low pressure turbine rotor, part of a giant steam turbinegenerator supplied by Siemens Power Corporation, undergoes inspection at the Grand Gulf nuclear power station. It is located in Port Gibson, Mississippi, and owned by Entergy, Incorporated. Inspection was performed by Siemens Power Corporation at the plant's recent refueling outage #4. The Grand Gulf steam turbine-generator, rated at 1306megawatts, is one of the largest in the country.





Photovoltaic solar electric modules, which convert sunlight directly into electricity, are the key component for remote power supply facilities that must generate electrical power. Here, they undergo quality inspection at Siemens Solar Industries' Camarillo, California, production facility.



or the 1989/90 fiscal year Siemens Medical Corporation

recorded sales exceeding \$1.4 billion, positioning the company as one of the leading U.S. medical-equipment suppliers. Record sales were accompanied by further gains in domestic manufacturing and export activities. Siemens' medical products are manufactured at 12 sites across the nation, with a significant portion exported to countries around the world.

With research and development expenditures at approximately 10 percent of sales, Siemens continues to maintain its broad technological leadership in medical electronics. The company is also making a major investment to assure the proficiency of its field-service technicians into the next century; to that end, a new training facility will soon be built in the Research Triangle area of Raleigh-Durham, North Carolina.

Although diagnostic imaging remains its largest activity, Siemens' products also serve critical-care, surgery, anesthesiology, radiation therapy, dentistry and audiology. Sales of non-imaging products are steadily increasing on their own accord, and as a result of new product introductions and acquisitions.

As the need for inter-system compatibility increases with developments in the emerging medical information environment, Siemens is ready with a broad product line and a continuing emphasis on uniform engineering standards.

In 1990, the LiteBox[™] imagedisplay workstation was added to Siemens' line of PACS (Picture Archiving and Communication Systems), which store, distribute and display medical images and patient information from multiple diagnostic modalities. An entry-level unit, the LiteBox workstation features many of the same operating functions in today's most user-friendly PCs.

Other new imaging products include the company's SOMATOM[®] PLUS-S and HiQ[™]-S high-performance computed tomography imaging systems. In nuclear medicine, Siemens' leading market position has been strengthened with the introduction of the DIACAM™ rectangular detector camera and a neurofocal collimator for brain studies. Under development are a triple-head SPECT™ camera system and the ICON™ computer for desktop image processing, diagnostic reporting, and data management. To complement the ECAT[™] positron emission tomography scanner, the company introduced the CYCLONE 3[™] compact cyclotron for Oxygen 15 radioisotope production at customer locations.

While new products are essential for growth, continuous upgrades through newapplication software and product enhancements are also required. In magnetic resonance, major software releases included the TURBOFLASH[™] MB



Beverly Lang, R.N., nurse manager of the Intensive Care Unit at Sacred Heart Hospital in Cumberland, Maryland, was the recipient of the 1990 Critical Care Nurse Recognition Award, the result of a nationwide search co-sponsored by Siemens. She was also presented with a U.S. Congressional proclamation.



Mobile heart catheterization laboratory enables participating hospitals in rural areas to provide high technology healthcare on a "shared services" basis. This particular mobile laboratory, equipped with a COROSKOP® C cardiac imaging system, travels through the state of Nebraska.

Nuclear Medicine services at Loyola Medical Center in Chicago feature the new DIACAM[™] rectangular detector gamma camera imaging system. It is designed to serve larger hospitals having a high volume of patients.



imaging technique, the fastest commercially available, with important applications in cardiology. The clinical utility of Siemens' ultrasound systems was improved with a number of cardiology enhancements and the release of the ENDO-P™ imaging probe. In mammography, a new stereotactic biopsy system, an accessory for the company's MAMMOMAT® 2 breast-imaging system, permits biopsy procedures to be performed in the radiology department without surgery.

For cardiology and criticalcare applications. Siemens continues its development of patient-monitoring systems to assist in the handling of increasing patient caseloads. An already significant position in the electrophysiology recording market has been strengthened with the new PC-AVD, a PC-based ventriculography product. A new DOS-based ECG management system is expected to improve Siemens' position in the electrocardiography market.

Continued growth in cardiac pacing has resulted in groundbreaking for a new 206,000square-foot facility in Sylmar, California, for the domestic manufacture of all Siemens cardiac rhythm management products. In 1990, six new cardiac pacemakers and a multi-telemetry pacemaker programmer were made commercially available to cardiologists. The company's first implantable defibrillator will undergo clinical trials in the future.

Siemens' new digitallycontrolled accelerators for cancer treatment have received wide clinical acceptance. More reliable than conventional devices, they are easily upgraded to incorporate enhancements such as the company's BEAMVIEW[™] precision-localization technique. Siemens' digital technology now makes possible the transfer of images and data throughout all phases of patient care in hospitals, from diagnosis to treatment.

The company's dental operations were streamlined further in response to long-term changes in the dental marketplace affecting U.S. dental practitioners and their methods of practice. Several major products are being prepared for introduction to this market in the coming year.

In audiology, Siemens prepared for future growth with the opening of a new production facility in Piscataway, New Jersey, which has also become the national headquarters for all hearing-aid operations.

During 1990, Siemens restructured its medical organization worldwide. In the U.S., all medical operating companies are now responsible to a new holding company, Siemens Medical Corporation. Last July, Siemens acquired Quantum Medical Systems, Inc. of Issaquah, Washington, a manufacturer of ultrasound imaging equipment whose products will enhance Siemens' position in the radiology, OB/GYN and peripheral vascular markets.

OSRAM Corporation, a manufacturer of technicallyadvanced light sources, supplies lamps for medical applications. The intense source brightness and high luminous efficacy of the OSRAM HTI metal halide shortarc lamps make them ideal for fiber-optic illuminators used in endoscopic applications. Xenophot[™] tungsten halogen lamps, with their increased lumen output and higher color temperature, are also used for fiber-optic illumination in medical applications.

Healthcare professionals and specialists frequently visit the fully-operational product demonstration rooms at Siemens Medical Systems' headquarters in Iselin, New Jersey. Siemens marketing manager Lynne Groves, shown here, demonstrates the features of the ANGIOSTAR™ vascular imaging system to one group of visitors.





Automation

ince entering the automation business in 1984.

Siemens Energy & Automation, Inc. has steadily improved its market position through the introduction of new products and technology. In 1990, with the addition of the Numeric Motion Control business, the company also entered the high-tech field of controls for machine tools, robots and other advanced manufacturing equipment.

Each of the company's main automation product lines has provided new and improved technologies. In digital DC drives, the state-of-the-art, cost competitive SIMOREG[®] converter features precise control capability and ease of operation. And, in 1990, the final development phase for two new SIMOVERT[®] P series digital AC drives was completed.

Distribution, which plays an important role in marketing these new drives, was also responsible for the continued growth in the PLC (programmable logic controller) business. Superior product features, plus programming and communications capabilities played a major role. Support of networking protocols conforming to international standards and cooperation with third-party systems integrators also enhanced market position.

The systems area saw the start-up of the first Bucyrus-Erie shovel using Ac drives with GTO power-semiconductor technology; multi-microprocessor controls were installed at Shamrock Coal Co. Siemens' leadership role in the aluminum-rolling industry was reinforced by securing a drive-system order for a threestand tandem cold mill. In addition, a leading paper manufacturer selected Siemens' high-precision digital Dc drive systems to control its coater and associated equipment.

The Special Equipment Division introduced several new gas analyzer products, including one for the automotive industry that precisely measures gas exhaust components. It also has been successful in marketing a full line of Surface Mount Assembly equipment.

In 1990, the Automation Division and the Special Equipment Division, together with the Atlanta Technical Service Center and certain Field Service functions, relocated to a new 275,000-square-foot headquarters and manufacturing facility in the north Metropolitan Atlanta area.

The Special Products Division of **Siemens Components**, **Inc.** supplies many devices for automated surface-mount assembly, including SOTs (small outline transistors), SIOV® devices (varistors for overvoltage protection), capacitors and ferrites.

A large segment of the **Potter** & **Brumfield**, **Inc.** product line is used in the industrial controls market and includes surfacemount components to deliver the reliability and performance demanded of key elements in today's automated processes.





Siemens Energy & Automation was the single-source supplier of all motion and programmable logic controller equipment for a machine line at the General Motors Power Train Division's Willow Run Plant in Ypsilanti, Michigan. Siemens Energy & Automation provided American Spring Wire in Cleveland, Ohio, with SIMOREG® drives, ranging from 7.5 to 150 horsepower, which control the rolling mills' production of wire that will be converted into spring products for the automobile and housing industries.



This document is

Other Markets

number of Siemens companies address

specialized markets such as lighting, airport lighting systems, music-recording equipment, research instrumentation, and security systems:

During fiscal 1989/90. **OSRAM Corporation** not only recorded an increase of more than 30 percent in sales, but also completed a 32,000square-foot expansion at its Maybrook, New York, manufacturing facility to house the company's DULUX® compact fluorescent-lamp manufacturing equipment and new automotive-lamp production lines. This year, the company received the largest order in its history-300,000 DULUX® EL electronic light bulbs - from Boston Edison.

These compact lamps last approximately 13 times longer than conventional incandescent bulbs, and use 75 percent less electricity. The POWERTRONIC[™] electronic ballast, a lightweight ballast that extends lamp-life, was developed for the commercial and industrial markets.

ADB-ALNACO, which manufactures computerized airport lighting control systems, increased sales last year by more than 60 percent through its acquisition of National Airport Equipment Company. The company, which also manufactures and markets airport lighting products and guidance signs, plus a new computerized airport lighting control system, received major contract awards for airports in Cincinnati, Las Vegas, Phoenix and Pittsburgh.

NEVE, an industry leader in the total sound-mixing console market, manufactures audio consoles for multitrack music recording, film and video postproduction, and television broadcast/production. The company recently developed its computerized Recall system, used with its vR Series consoles, which reduces operating time from hours to minutes in recording music and audio for video post-production.

A wholly-owned subsidiary of Siemens Energy & Automation, Inc., Siemens Analytical X-Ray Instruments, Inc. manufactures and markets X-ray fluorescence and diffraction instruments. During the year, the company implemented a system for superconductor process control, opening a major new application and market for its products in hightemperature superconducting thin films.

Heimann Systems, a division of Siemens Components, Inc., steadily increased sales of X-ray security scanner systems in the U.S. Major markets include air cargo facilities, airlines, nuclear power plants, correctional facilities and corporate mailrooms. The company has also installed mobile trailers containing these systems at several major U.S. airports to allow increased flexibility among various airline terminals.

OSRAM Corporation manufactures automotive, theatrical and general lighting products, such as the DULUX® line of compact fluorescents, at its recently expanded Maybrook, New York, production facility.



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audio console with Flying Faders Automation, at Capitol **Recording Studios** in Hollywood, California, is a computerized music-recording console that can store and recall alterations made to audio signals.

sophisticated

HI-MAT® X-ray secu-rity system helps

security personnel

search hand bag-

gage at the Federal Bureau of Investiga-

tion's visitor's lounge

in Washington, D.C.

Research and Development

uring the year, Siemens' U.S. companies spent in

excess of \$400 million, roughly 10 percent of overall sales, on various research and development activities. Ranking among the 10 corporations granted the most U.S. patents annually, Siemens has a tradition of commitment to developing leading-edge technology to support a broad spectrum of markets.

Siemens Corporate Research, Inc. continued to conduct exploratory and applied research projects in support of Siemens' operating companies. These projects included image and signal processing, software engineering and tools, learning systems, and the modeling and simulation of systems and components.

Expertise in neural networks, which mimic the brain's ability to interpret data and information, was strengthened. A Test Specification Language (TSL) was developed, offering the test engineer a new means of formulating a structured, organized specification of the test to be executed. TSL greatly improves the quality and reliability of software systems.

Several joint projects were undertaken with the operating companies. The co-development of the SAMMS[™] electronic pan control for motor control systems offers an improved method for protecting motors from adverse operating conditions, including overheating and short-circuiting. These controls, marketed by Siemens to large industrial concerns, are helping to create the motor control centers of the future.

The company participated in the design of large software systems for next-generation patient monitoring systems. As an application of the research in systems technology, a software architecture was developed for creation of generic work cells, which help to computerize factory automation processes more efficiently.

As part of a continuing dialogue with the operating companies, Siemens Corporate Research organized and hosted workshops and seminars to stimulate the exchange of information on new and promising technologies, and to encourage technology transfer.

The company again contributed some \$1 million to industrial liaison programs and projects at leading U.S. colleges and universities to enhance its own research and development efforts.

Spectroscopy Imaging Systems Corporation, a Siemens joint venture company with Varian Associates, Inc., is a market and technology leader in medium-bore magnetic resonance imaging spectrometers used in biomedical research, as well as pharmaceutical research and development. During the year, the company delivered a 4-Telsa whole-body system, including the world's largest magnetic resonance magnet, to the University of Minnesota for clinical research.



Engineers at Siemens' ISDN development laboratory in Boca Raton, Florida, monitor the ISDN network in place at the site. They are developing ISDN telephones and systems in close cooperation with their ROLM Systems colleagues in Austin and Santa Clara.

> "Robby," shown in graphic sequence, is an eye-hand coordination system that a neural network has learned to control. It can, in real time, bring Robby's 3-D eye to bear on its fingertip at the end of its multi-iointed arm. It is part of a series of studies Siemens Corporate Research is conducting in advancing learning algorithms in complex environments.











▲ Siemens Corporate Research's joint research programs with U.S. universities include the "Programmer's Apprentice," where AI techniques are applied to software development, a project with Prof. **Richard Waters** (above) of MIT. Also, MIT Prof. Ronald Rivest and Siemens' Dr. Stephen Hanson (right) collaborate in learning systems research.





◄ "Ghengis," a six-legged robot learning to negotiate complex terrains, is an example of Siemens and university learning systems research collaborations where the emphasis is on adapting learning systems to increasingly complex and realistic-scale problems.

Siemens Worldwide

hanging economic and political influences notwithstanding, the business of Siemens AG outside of Germany was positive. Orders outside Germany in the 1989/ 90 fiscal year rose to DM 39.3 billion, up 11 percent over the previous year. This represents 58 percent of the entire business of the company. Siemens' international sales rose seven percent over the previous year. reaching DM 34.8 billion for 1989/90.

Our global business philosophy continues to focus on providing high-technology products and systems manufactured to uncompromising quality standards, and on remaining extremely responsive to our customers. Of the 373,000 Siemens employees, some 143,000 are stationed outside of Germany, working in 198 manufacturing and assembly locations.

At the year's outset, business in Western Europe and in the United States made up some three-quarters of the company's business. While this is still true, the unification of Germany and the emergence of Eastern Europe has created a new set of business opportunities.

Several significant developments will greatly influence the future. The merger of the Data and Information business unit (DI) of Siemens AG with Nixdorf Computer AG has created the second-largest computer company in Europe. Siemens has strengthened its position in railroad car technology through its acquisition of the majority shares of Duewag AG and a minority interest in Krauss-Maffei-Verkehrstechnik GmbH.

In microelectronics, Siemens has long been a leader among European companies. During the 1989/90 fiscal year, Siemens doubled its 1-Megabit DRAM output to more than 40 million chips, while initiating mass production of 4-Mb products. The 16-Mb version is presently in the development cycle, while technology for a 64-Mb memory chip, a joint project with IBM, is on schedule.

The company's earnings and dividends reflect the positive nature of business. Earnings maintained a rising trend, increasing by six percent to DM 1.67 billion. The proposed dividend was increased by four percent, to DM 13.

Worldwide Sales (DM in billions)



Worldwide Employees (Thousands)







Worldwide R&D Employees (Thousands)



Note: Fiscal year begins October 1, ends September 30.

Siemens in the U.S.

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Electrical Apparatus Division 7000 Siemens Road Wendell, NC 27591 Tel: (919) 365-2200 Fax: (919) 365-6363

Power Products & Systems Division 444 Highway 49 South Richland, MS 39218 Tel: (601) 939-0550 Fax: (601) 939-3763

Motor & Drives Division 4620 Forest Avenue Norwood, OH 45212-3396 Tel: (513) 841-3100 Fax: (513) 841-3290

Automation Division 100 Technology Drive Alpharetta, GA 30202 Tel: (404) 740-3000 Fax: (404) 740-3250

Special Equipment Division 100 Technology Drive Alpharetta, GA 30202 Tel: (404) 740-3000 Fax: (404) 740-3250

Siemens Analytical X-Ray Instruments, Inc. 6300 Enterprise Lane Madison, WI 53719 Tel: (608) 276-3000 Fax: (608) 276-3015

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Siemens Power Corporation P.O. Box 180 Bradenton, FL 34206-0180 Tel: (813) 723-4100 Fax: (813) 723-4210

Siemens Solar Industries 4650 Adohr Lane Camarillo, CA 93011 Tel: (805) 482-6800 Fax: (805) 388-6395

Advanced Nuclear Fuels Corporation Pacific First Plaza, Suite 800 155 108th Avenue NE P.O. Box 90777 Bellevue, WA 98009-0777 Tel: (206) 453-4300 Fax: (206) 453-4446

Universal Testing Laboratories, Inc. 5959 Shallowford Road Suite 531 Chattanooga, TN 37421 Tel: (615) 499-0961 Fax: (615) 894-2456 Rofin-Sinar, Inc. 3333 North First Street San Jose, CA 95134-1995 Tel: (408) 432-6133 Fax: (408) 943-1523

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Eureka X-Ray Tube, Inc. 600 W. University Drive Arlington Heights, IL 60004-1818 Tel: (708) 394-5800 Fax: (708) 394-5903

Siemens Medical Instrumentation, Inc. Zurich Towers 1450 East American Lane Schaumburg, IL 60173 Tei: (708) 240-9400 Fax: (708) 240-9401

Siemens Burdick, Inc. 15 Plumb Street Milton, WI 53563 Tel: (608) 868-6000 Fax: (608) 868-4676

Siemens Hearing Instruments, Inc. P.O. Box 1397 10 Constitution Avenue Piscataway, NJ 08855 Tel: (908) 562-6600 Fax: (908) 562-6696

Siemens Medical Electronics, Inc. 16 Electronics Avenue Danvers, MA 01923 Tel: (508) 750-7500 Fax: (508) 777-3398

Siemens Medical Laboratories, Inc. 4040 Nelson Avenue Concord, CA 94520 Tel: (415) 246-8200 Fax: (415) 246-8284

Siemens-Pacesetter, Inc. 12884 Bradley Avenue Sylmar, CA 91342 Tel: (818) 362-6822 (800) 432-5611 Fax: (818) 362-4687 Siemens Ultrasound, Inc. 2527 Camino Ramon Suite 100 San Ramon, CA 94583 Tel: (415) 277-3300 Fax: (415) 277-3333

Elema-Schonander, Inc. 2360 North Palmer Drive Schaumburg, IL 60173-3887 Tel: (708) 397-5900 Fax: (708) 397-5943

Quantum Medical Systems, Inc. 1040 12th Avenue N.W. Issaquah, WA 98027 Tel: (206) 392-9180 Fax: (206) 391-9161

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ROLM Company P.O. Box 5017 Norwalk, CT 06856-5017 Tel: (203) 849-6000 Fax: (203) 849-6805

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Duewag Corporation 3035 Prospect Park Drive Building A, Suite 150 Rancho Cordova, CA 95670 Tel: (916) 348-0155 Fax: (916) 348-0158

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