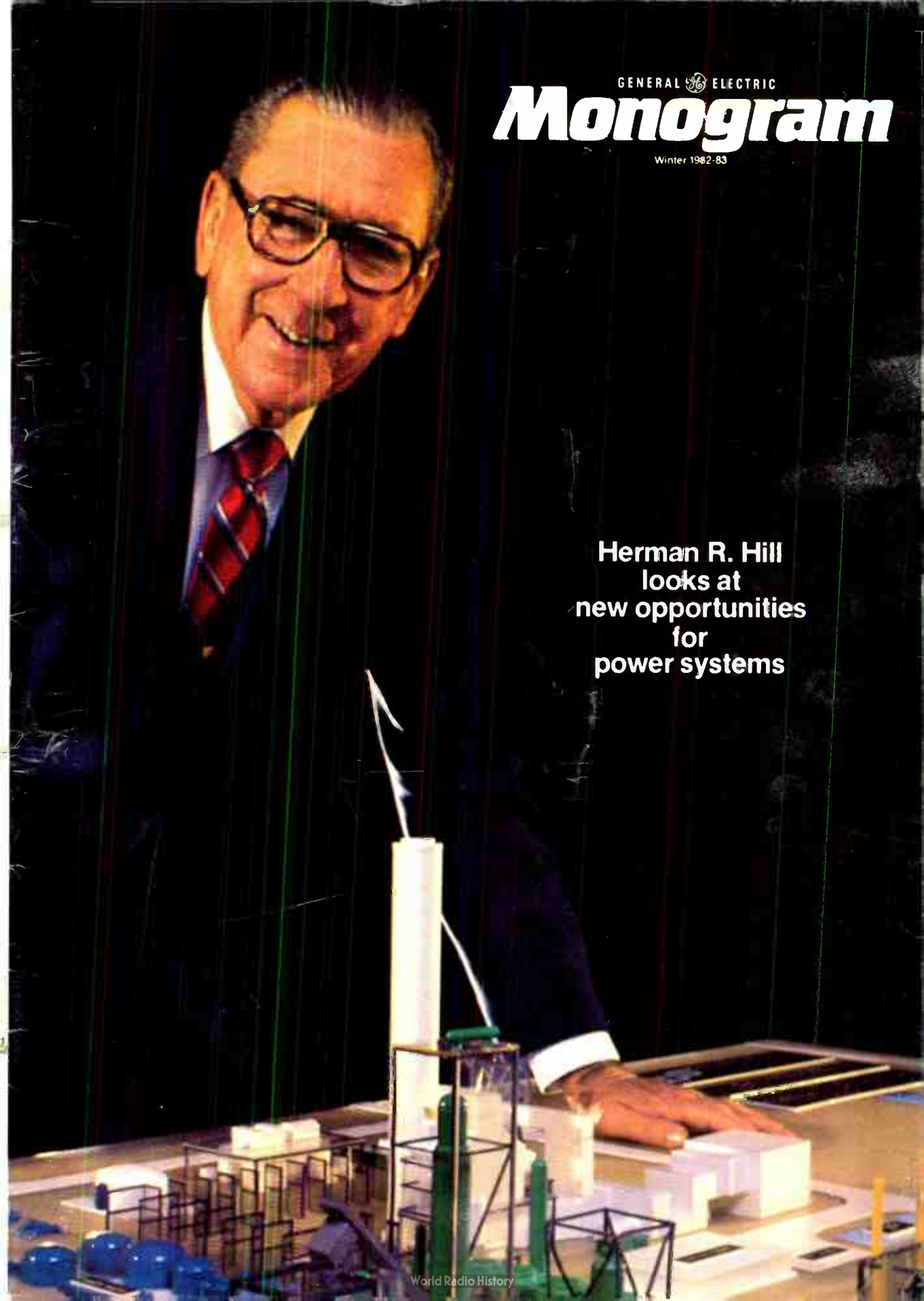
GENERAL ELECTRIC

Monogram

Winter 1982-83



Herman R. Hill looks at new opportunities for power systems

Photo by Tom Hollyman

New Opportunities for Power Systems

Photo by Stan Blanchard

Herman R. Hill

Executive Vice President Herman R. Hill, Sector Executive for the Power Systems Sector, retires this month. A graduate of the Virginia Military Institute and an armored infantry officer under General Patton during World War II, Hill has been with General Electric for 41 years. Elected to his present position in October, 1979, when the power systems businesses were reeling from one of their worst decades, Hill and his associates helped engineer a remarkable turnaround. From his vantage point as one of the Company's senior executives, Hill discusses the new opportunities for these businesses in this Monogram *interview.*

Interview by Robert H. Thomas

Q: After such a discouraging turn of events in the '70s—the oil embargo, the depressed economy, high inflation, the anti-nuclear climate—the power systems businesses will be reporting sharply higher net income for 1982. How were your people able to turn things around?

Hill: Obviously, we had to face reality. We had to diversify our market offerings, and we went after more international business.

Q: Facing reality is a major management philosophy here at GE. How did you confront the realities of such a changing marketplace?

Hill: After so many years of steady growth and profitability, we were forced to drastically adjust our plans and forecasts downward from the large market that was to the much smaller market that is. And I can tell you that hope for an upturn in a depressed economy is not part of our strategic plan. Every business, without exception, took a hard-nosed look at its costs, its productivity, break-even points, market potential and manufacturing capacity and started downsizing its operations to serve the smaller markets of the '80s.

Q: Can you give us a for instance?

Hill: I'll give you two—large steam-turbine and nuclear. Ten years ago, Schenectady shipped 19,000 megawatts of new steam generation capacity. Today, the available *world* market calls for only about 10,000 megawatts. To survive, large steam reduced its break-even point by more than 60%. Costs related to design, assembly and service were cut sharply, and solid increases in productivity were achieved. Part of this productivity improvement came from Schenectady's computer-aided CAD/CAM systems that can move a new design from engineering to the factory floor without generating a single sheet of paper. The balance came from our highly skilled work force, determined to work smarter in reducing costs and to protect our worldwide reputation with customers for quality and reliability.

Q: And nuclear?

Hill: The "reality" we faced here was a dramatic change in the marketplace, especially in the U.S. where there have been no orders for nuclear steam supply systems since 1978—and in the present political and regulatory climate, we don't expect a change any time soon. We're obviously going to deliver the reactors we still have in our backlog. But the other side of "reality" is this: The plants in operation today, plus those coming on line, will raise the total of GE and GE-licensee units in operation to about 100 in the 1990s—an important market for our

refueling and services businesses. We are investing in new fuel designs and a variety of other technical and engineering services including operator training, instrumentation upgrades and retrofits for existing systems.

Q: You also mentioned diversification into new energy-related products, systems and services.

Hill: Yes. The list is long. We entered the industrial compressor market and now provide a full line of units for oil and gas pipeline pumping and petrochemical applications, for example. We're developing a program to help relieve the financial pressure on our domestic electric utility customers. It will enable them to restore their older plants to their original efficiency and availability at significant savings. This plant life extension program is an excellent fit with our design, engineering, installation and service skills. And it will help us maintain our technical and production base until the domestic market improves.

Photo by Steve Dunwell

Cogeneration: In Maine, forest products unfit for paper are used to drive a GE steam turbine-generator.

Q: There's a lot of talk about cogeneration. What is it, and why do you see opportunities there?

Hill: Cogeneration, or "over-the-fence" power as I call it, is where a large industrial plant decides to generate its own electricity and steam and then sell the power it doesn't need to the local utility. This reduces the cost of the power for the industrial plant and saves investment dollars for the utility. The growing interest in cogeneration could help stimulate the dormant U.S. gas turbine market through the use of more efficient combined-cycle power plants.

Q: We talked a lot about HVDC 10 years ago. Is this a dormant technology?

Hill: Hardly! The proven reliability of our high voltage direct-current equipment for transmitting bulk power and interconnecting AC power systems helped us secure orders for more than $150 million of new equipment in 1982 in this growing market. We expect additional opportunities as Canada's 25,000-megawatt James Bay hydropower project is developed.

Photo by Tom Hollyman

CAD/CAM: Calma's interactive graphics play a key role in designing power systems' products.

Q: These sound like show stoppers. How are we going to follow these acts?

Hill: We entered the flue gas cleanup business and received the largest order ever placed for such equipment from the Intermountain Power Agency in Utah. We're also participating in a $300 million project to build the nation's first large-scale plant for converting coal to clean gas to drive a combined-cycle system of steam and gas turbines.

Another project calls for the development of the first water-cooled, high-temperature gas turbine. Used with a steam turbine, this machine would be up to 25% more efficient than the most advanced generating system available today. Still in the laboratory is a utility-size battery that can be charged during the night to meet daytime peak loads—much like pumped hydro. And a molten carbonate fuel cell that can convert coal into electricity in an environmentally attractive way. And we're continuing work on some longer-range solar and wind technologies.

Q: We also understand that we're going into the communications business.

Hill: You mean the telephone business. It won't be on the grand scale of Ma Bell and others. But the market for customer-premises, telecommunications systems is being completely deregulated, including multibuilding, multilocation installations. This will be another excellent fit with our installation and service capabilities. We plan to source equipment from multiple vendors and integrate their equipment into complete voice and data systems tailored to the individual customer's needs. Then, as those needs change and expand, additional functions can be added to the existing system.

Q: You mentioned more international business. Does this diversification extend to the overseas market for power equipment and systems as well?

Hill: You bet! Take gas turbine, for example. When the price of oil shot up after the Arab embargo, the domestic market collapsed. To survive, this domestic business had to quickly reorient itself internationally—or there would be no business. GE is

now the number one supplier around the world of heavy-duty gas turbines.

Q: How does the Construction and Engineering Services Group fit into all of this?

Hill: Very profitably. It currently accounts for more than $2 billion in revenue, and, you can see why with businesses in 38 countries and five continents. We're involved in everything from simple motor rewinds to the installation of steam and gas turbines and nuclear reactors. We build petrochemical plants, airports, pipeline pumping stations, large hydro projects and power transmission lines. And we have the largest service shop network in the world, the largest force of skilled technical advisors in the power systems business and one of the 10 largest international construction companies.

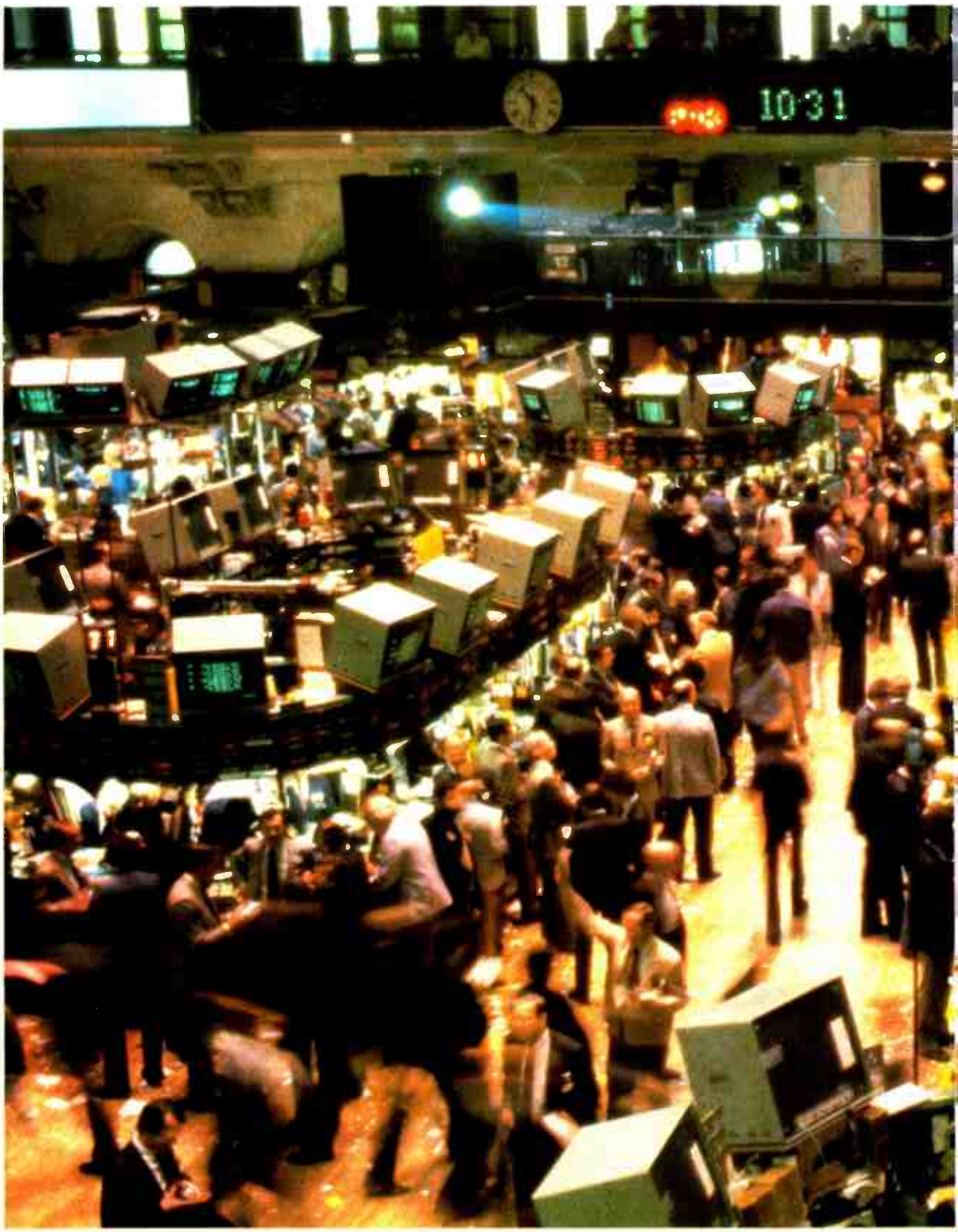
Q: If you could put your finger on one thing that's led to these successes, what would it be?

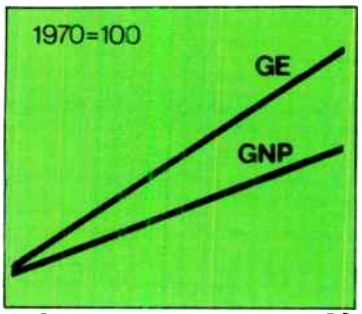
Hill: It's really two things—people and our changed perception ception of the world around us.

We have some of the most skilled, dedicated men and women in the Company. I'm proud of every one of them and their truly professional dedication during this time. They're combining advanced technology and innovation on a diversified, cost-effective basis to serve the power equipment markets around the world.

With respect to perception, we stopped crying in our beer wishing for the return of "the good old days" and turned our attention to the future. As a result, these businesses are broadening their vision and steadily extending their scope from the simple hardware approach of yesterday to the more sophisticated and profitable systems approach needed in today's world markets. Anyone can sell hardware. The valuable plus that we have is the problem-solving systems expertise that puts it all together to serve the needs of our customers. I'm personally proud that we were able to help stimulate that improved perception. It's the road to the future. I will be watching the results very closely from my rose garden.

Effective Jan. 1, 1983, Louis V. Tomasetti, formerly Executive VP and Sector Executive-Industrial Products Sector, succeeds Hill as Executive VP and Sector Executive-Power Systems.





Shaking the GNP image

AS THE ECONOMY goes, so goes GE.

For a long time, that's what investors believed about General Electric. GE was a GNP company—a company whose earnings growth was tied to the growth of the gross national product.

But today on Wall Street that image is changing. GE is outpacing the GNP. In fact, outpacing the GNP is nothing new for the Company. It's been doing it for years. But shaking the image of a GNP company

→

has been another story. Until recently.

What's so wrong about being a GNP company—particularly for a company with the financial strengths of General Electric?

In recent years, the GNP, which is the market value of the nation's total output of goods and services, has not been growing at a rapid pace. When the economy is doing poorly, as it is now, the implication is that a GNP company will do poorly as well.

This GNP image—that of a slumbering giant mired in mature businesses—has long hurt the Company's price/ earnings ratio.

What the financial analysts are saying.

"Reality, excellence and ownership—this trinity forms the blueprint for the truly successful company of the '80s."
—Stan Rubin of Merrill-Lynch

"It's now obvious that a number of GE's businesses are not tied to the economy."
—Russell Leavitt of Smith Barney

"GE is using technology to be more productive and to get costs down."
—Robert McCoy of Kidder, Peabody

This paradox had to do with perception—not fact.

Today, with corporate profits down nationwide, unemployment up, consumers not buying and industrial production dropping to its lowest level in five years, investors are seeing General Electric quite differently. And their new perception has done more than allow GE to just ride along with a bull market—it permitted GE to pull away from most of the pack early in the year.

In the first 11 months of 1982, while the Dow Jones Industrial Average went up 19% and Standard and Poor's 400 some 13%, General Electric's stock price rose 61%.

What happened? Why did investors suddenly change their minds about the Company?

"Perceptions take a long time to change in our business," points out Stan Rubin, financial analyst for Merrill-Lynch. "GE moved through 1980 with a good bottom-line performance. Ditto in '81. And then, in even more difficult '82, it did it again. Under Jack Welch's leadership, you get a message—reality, excellence and ownership. As you move along, it's increasingly being understood both by people inside GE and by external investors that this trinity forms the blueprint for the truly successful company of the '80s."

Alan Benasuli of Drexel Burnham Lambert agrees. "Under Reg Jones, and particularly under Jack Welch, management has been very aggressive. GE is into high-technology businesses. GE is concentrating on markets where it's number one or number two in market share. GE is doing phenomenally well. It's a testament to the superb management and diversity of this company."

"There's been a reappraisal of GE," adds Russell Leavitt of Smith Barney, Harris Upham and Company, "and it

goes like this: If GE is a proxy for the economy then why isn't it performing the way a proxy for the economy, should? Well, for one thing, it's now obvious that a number of General Electric's businesses are simply not tied to the economy —are not tied to the GNP."

To GE Chairman Jack Welch and his colleagues in the Corporate Executive Office, the General Electric they envision, the company they have been describing to share owners, security analysts, customers and the like, is "more high-spirited, more adaptable, more agile than companies that are a 20th or even a 50th of our size. These values will permit us to maintain our common heritage, our common culture, but, at the same time, to give ownership to those managers who are leading, operating and building our stable of number one and number two businesses."

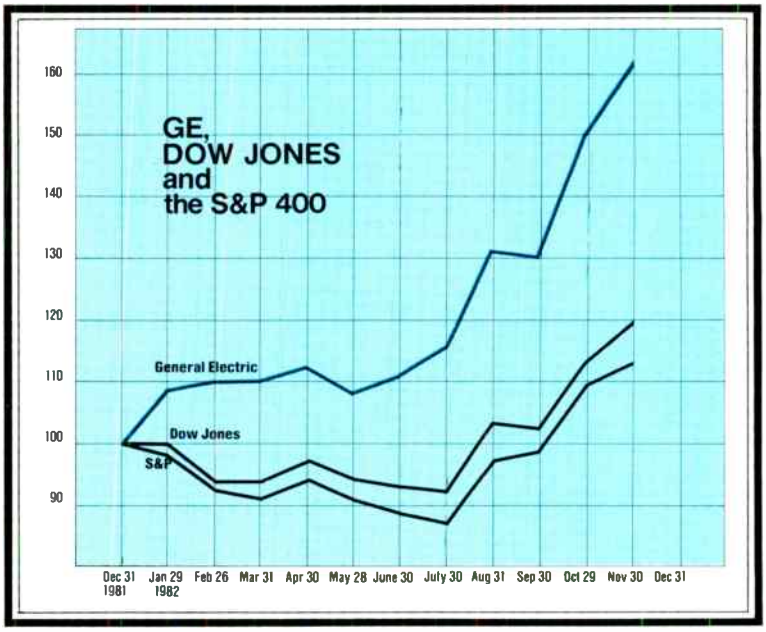
A year ago, Welsh told analysts: "By any measure, we outperformed the GNP and the S&P 400 by a good margin in the '70s. We have the commitment and the potential to do better in the '80s."

Thus, by deed and word, investors perceived a renewed emphasis at GE on technology, and management making reality, excellence and ownership the "basis for a pervasive operational atmosphere in which people will dare to try new things."

Financial Analyst Robert McCoy of Kidder, Peabody and Company says: "First, there's this emphasis on technology—both internally and externally. GE is using technology to be more productive and to get costs down. And it is tying technology to its products. Second, management has captured the imagination of investors. GE is doing a lot of things differently. There's a new approach to almost everything."

Morris Mendelson, finance professor at the University of Pennsylvania's Wharton School —believes that "the United States is waking up to the fact that it is behind in many markets, and perhaps there is a feeling that GE can help many American industries play catch-up. This may lead investors to think GE is a good bet in the long run."

For analysts last year, Jack Welch summed it up: "For those of you who like in some way to associate GE and the GNP—if anything, we will be a locomotive pulling the GNP, not a caboose following it."



Monographs

Drawing by Howard Munce

Payroll across America

How do you effectively administer compensation and benefits week after week for almost 300,000 U.S. employees located in every state, the nation's capital and Puerto Rico?

The answer? Create a Corporate Personnel Accounting and Relations System, or C-PARS.

For a year-and-a-half now, a select project team has been developing for General Electric a state-of-the-art system to meet the needs of all the Company's domestic payrolls.

For GE, which has 40 separate payroll organizations that essentially do the same thing, and more than 200 employee relations operations which use information in the files, it means a single, or common, system.

Using the latest computer hardware, C-PARS starts up early in 1984 at Aircraft Engine Business Group and, by 1988, will be Companywide. Its one system—instead of the present 40 systems—will provide consistent payroll processing, protect the confidentiality of every employee, consolidate personnel and payroll data, lower the cost of maintenance, and be more timely. And it will be easier to add new pay practices, benefits, government requirements and the like, as they change.

Also, through a technique known as "electronic fund transfer," it will be possible to deposit employees' pay directly into their banks—wherever those banks might be.

Organization Changes

Corporate
Jack O. Peiffer, Corporate Executive Office Vice President

Consumer Products Sector
Richard E. Schlegel, General Manager—Lighting Systems Department

Charles J. Vaughan, Staff Executive—Consumer Products Finance Operation

International Sector
Alberto F. Cerruti, Staff Executive—International Finance Operation

Power Systems Sector
James R. Birle, Senior VP and Group Executive—Construction and Engineering Services Group

Services and Materials Sector
Francis J. Kennelly, Jr., VP and Manager—GECC Employee Relations Operation

GE CT scanner does its job

How good are GE products? Ask Iver J. Petersen, Vice President-Central Regional Relations. He owes his life to one—the CT 8800 scanner.

A year ago, Petersen was finding it hard to swallow and his right side was going numb. He couldn't eat solid foods. Doctors conducted a battery of tests, but failed to diagnose his ailment. As Petersen's condition grew worse, he was examined with a CT scanner, and a small tumor on his brain stem was discovered. Then, using the scanner to pinpoint exactly where the tumor was, neurosurgeons removed the growth in a very delicate operation where chances of survival are one in four.

Now back at work, Petersen says: "I'm a walking endorsement for the GE CT scanner. The doctors told me that without the scanner, chances are I'd be dead. I'm sure that would have been true."

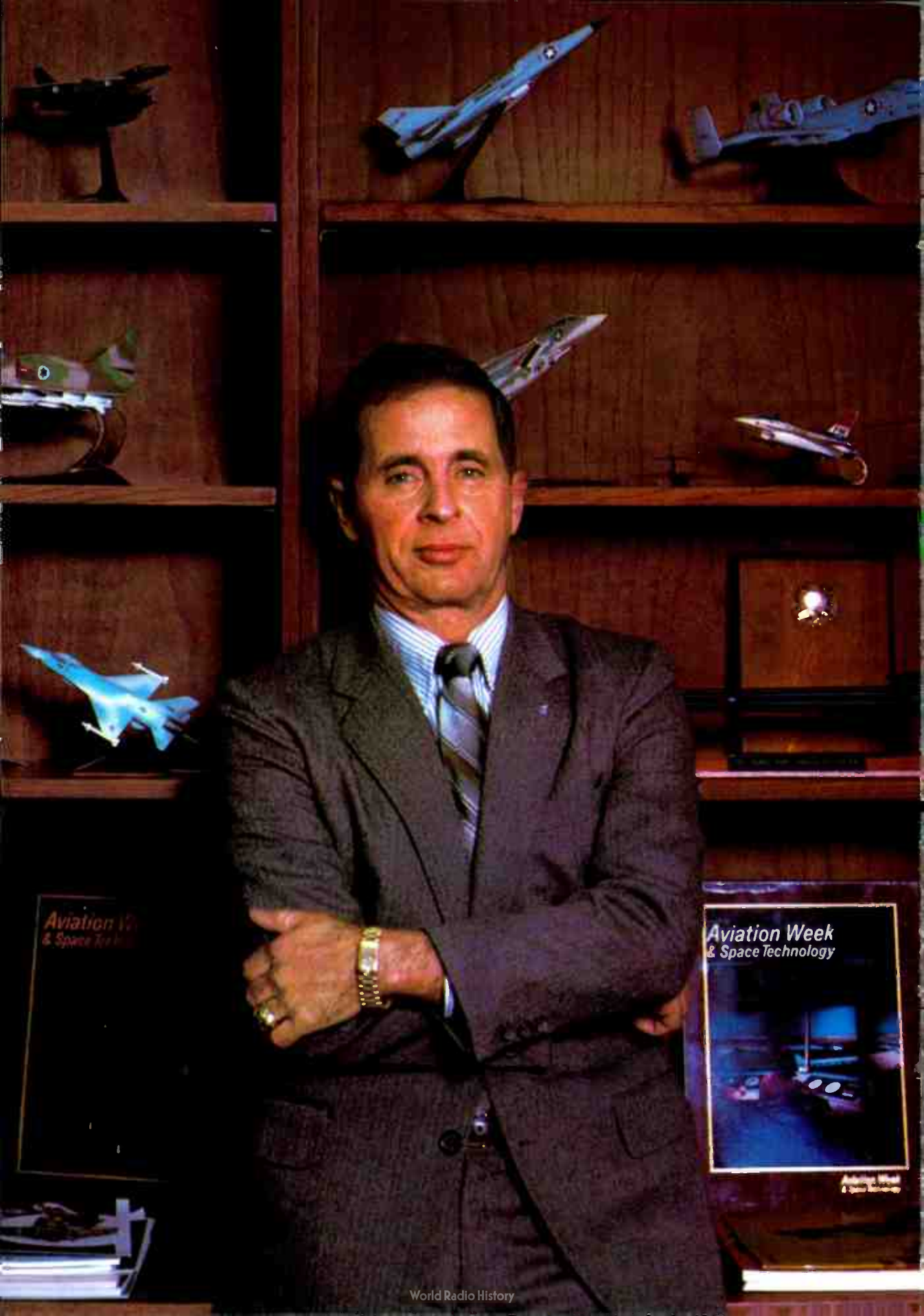
Awards

Among the 100 most significant technical innovations for 1982, as selected by *Industrial Research and Development* magazine, six were developed by General Electric scientists and engineers. Since the magazine's award competition was established in 1963, GE has won 143 awards—more than double those of any other organization. The Company has also placed first for the past 13 years. This year's innovations from GE: the Single Axis Control Module, Computer Assisted Ultrasonic Microscope, Enhanced Two-Level Resist Process, Synchronous Rectifier (see photo right), TermiNet 8000 and Digital Fluoricon 3000.

In another technical award, Medical Systems Business Operation's CT 9800 was judged the best-designed scanner in the world by the Industrial Design Society of America.

John R. Campbell, a customer service manager for GE's Marine and Industrial Engine and Service Division, was presented the 1982 U.S. Navy Reliability, Maintainability and Quality Assurance Award.

General Electric was selected by the Japan Management Association as one of the top 15 marketing companies in the U.S. for both 1981 and 1982. R. Howard Annin, Vice President of Northeastern Regional Relations, formerly President of GE Japan, accepted the award.



The right stuff

GE and Bill Anders

As the 10-year-old son of a Naval officer stationed in California during World War II, Bill Anders eagerly read about the exploits of aviation heroes like Jimmy Doolittle, Chuck Yaeger and Pappy Boyington, and watched enviously as real pilots from Hamilton Air Force Base roared overhead in their P-38 fighters.

As Bill grew up, his interest in aviation grew also. Following in his father's footsteps, he graduated from the U.S. Naval Academy, but "jumped ship" to fly for the Air Force. After tours as a fighter-interceptor pilot, flight instructor and engineer, he joined the U.S. space program and co-piloted Apollo 8, the first lunar mission.

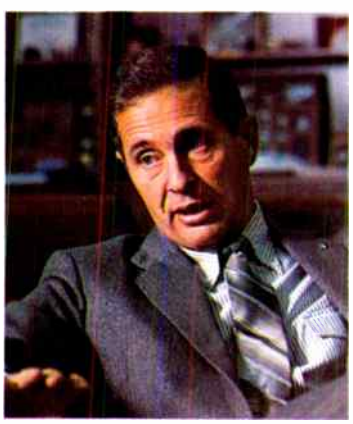


Photo by George Glod

Today, as VP and general manager of General Electric's Aircraft Equipment Division (AED), William A. Anders has a new mission: to apply new electronics technology to meet the mission, avionics and control systems needs of his customers.

Always interested in the equipment and hardware necessary to perform an aviation mission, Anders is determined that his four businesses will lead what he sees as a major technological revolution in aviation products.

"The advent of the microelectronic chip is making it possible to build a whole new generation of aircraft equipment," he explains. "It's always been difficult for a pilot to handle flight control and mission control simulta-

By Donna R. Carpenter

neously. It's like trying to play every position on a baseball team at once. But integrated circuits are enabling us to build 'smart' planes that aid the pilot in assuming more the role of the umpire."

As a pilot and engineer, Anders is attuned to the features that flyers find most useful. Moreover, he's gained enormous insight into what tomorrow's aircraft may need through his service in the Air Force Reserve. A major general, Anders is mobilization augmentee to a Deputy Chief of Staff at the Pentagon, holds advisory positions at NASA and the National Academy of Science, and is on the Defense Science Board. Careful to avoid any conflict of interest that these positions might create, Anders scrupulously excuses himself from involvement in matters concerning GE products.

He stumps continuously with customers, however, emphasizing the high quality and diversity of AED products and, as an advocate of the aviation and aerospace industries, is much in demand as a speaker. Under his aggressive leadership, the Division's sales climbed nearly 40% from 1980 to 1982 and net earnings more than doubled. Anders has challenged his organization to triple the 1980 earnings in 1983. This is representative of a turnaround in both the Division and its parent Aerospace Business Group: prior to the 1979-80 period, the Group had been generating lackluster sales, although its technology was considered a vital national resource and an asset to the Company.

But new priority-setting, and relentless pressures for better cost control and use of new technology by George B. Farnsworth, Senior VP and Group Executive — Aerospace Business Group, paved the way for better returns and a better competitive position.

"This adds up to a better deal for our stockholders and for our customers," Anders emphasizes.

The Aircraft Equipment Division is a major subcontractor on the F-18 fighter built for the Navy and Marine Corps. It supplies the flight control, electronic generator and fuel flow systems, as well as engine instrumentation and temperature detectors — "in short, the heart and brains of the plane," says Anders.

After years of flying planes, how does Anders feel about helping to build them?

"I'm in an area I enjoy, involved in a market I know," he replies. "And I feel that what we're doing here is important — to the country as well as the Company."

Making a contribution has always been important to Bill Anders.

As an Air Force pilot, he flew high-

NASA courtesy Life magazine

As Nuclear Regulatory Agency Chairman, Anders was responsible for nuclear plant safety. Here he testifies at NRC hearing. (At left) Anders receives last-minute instructions from NASA flight technician prior to liftoff of Apollo 8, nation's first lunar mission.

performance fighter-interceptors and was encouraged to widen his technical background. He received a master of science degree in nuclear engineering from the USAF Institute of Technology. Armed with operational and technical training, Anders was accepted by NASA in 1963.

"The space program changed my way of thinking," he admits. "I had been like Ptolemy, who was convinced that everything revolved around the earth. The Apollo flight gave me a more Copernican view of the earth, of the universe, and of myself."

Anders recalls that, as a boy, he was interested in science, astronomy, exploring and snakes. "The space program brought together all these interests—even snakes," he laughs. "I had to eat one during jungle survival training."

As executive secretary of the National Aeronautics and Space Council from 1969 to 1973, Anders influenced the post-Apollo space policy that led to the Skylab, Viking and Space Shuttle projects.

Because of his effectiveness on the Council and his background in nuclear engineering, he was appointed a member of the Atomic Energy Commission in 1973. While on the Commission, he encouraged a balanced, realistic assessment of nuclear energy. His effective spokesmanship prompted a Presidential appointment as the first chairman of the Nuclear Regulatory Commission, where his task was to get the Commission organized and functioning effectively.

When he had accomplished that, Anders was asked by President Ford to accept an ambassadorial appointment to Norway and from there, he entered the private sector where, he says, it's much easier to tell whether or not you're being effective. Anders looked for a company that would challenge him and develop his managerial skills. Thus, in 1977, he accepted a job as GE's general manager—Nuclear Energy Products Division.

Aircraft still remained his first love, though, and when he was offered his present position in 1980, he accepted with alacrity, and a year later found himself working with one of the P-38 flyers he had once watched at Hamilton Air Force Base, George Farnsworth.

After almost three decades of accomplishment as a pilot, astronaut, presidential advisor, ambassador and businessman, what new worlds remain to be conquered?

"Well, I'm hoping to someday move into a business where I'll be able to fly more often," says Anders with a twinkle. "But first, with the help of 9,000 great employees, we're going to break $1 billion in sales. This should prove that the Aircraft Equipment Division has the right stuff."

Photo by Bill Skumursky

In 1982, Anders earned promotion to major general in the Air Force Reserve (above). At Utica, N.Y., Anders and Northrop Corp. Chairman John Bierwith watch technician using laser to trim electronic components.

New CRD facility (below) includes advanced computer area to help scientists and engineers advance the frontiers of electronics, factory automation, communications and medical diagnostics.

THEY RECEIVE, on average, one patent every working day. They have invented almost everything from high-performance plastics to the world's best-selling computed tomography x-ray scanner. They represent nearly every technical discipline—from chemistry to computer science, from electronics engineering to microbiology. They hold 425 PhDs. One is a Nobel laureate. They are the 2,100 men and women of General Electric's Schenectady-based Research and Development Center—an "invention factory" famous throughout the world.

And one afternoon last October, they cele-

Photo by Jack Marx

Photo by Donna Burch

A place for people with new ideas

By Peter Van Avery

brated the completion of a $130 million building and capital equipment program that has increased the Center's size by 50% in the past three years and stocked its laboratories with state-of-the-art research equipment.

Speakers at the dedication were General Electric Chairman Jack Welch, Vice Chairman Edward Hood, Jr., GE Director George Low and Dr. Roland Schmitt, Senior Vice President for Corporate Research and Development.

The centerpiece is a two-story structure housing one of the world's most advanced electronics and computer science laboratories.

Said Jack Welch: "It would be hard to overstate the importance to all of us of American leadership in the kinds of new electronics technologies—new ways to achieve productivity and quality—that this facility has been built to help discover and develop."

In this world-class research facility, engineers and scientists will take on two basic challenges—to custom-design and fabricate advanced microelectronic chips, and to assist GE components in putting these chips into productivity-boosting automated factory equipment, "smart" jet engine controls and a wide range of other products.

"One of the key targets is the next phase of the electronics revolution—very-large-scale-integration, or VLSI," Schmitt points out. "This will put hundreds of thousands of electronic switches on chips that today hold tens of thousands."

To put VLSI into perspective, just consider that today's circuits represent the equivalent of putting a street map of San Francisco on a single quarter-inch chip. Tomorrow's circuits will be as complex as a street map of all of California on one chip. And, if the VLSI revolution continues its present pace for another decade, it will give you the equivalent of a street map of the entire U.S. on a single chip.

The environment inside the Center's new VLSI process facility will be carefully controlled. At VLSI dimensions, a single mote of dust can be as damaging as a plunging boulder to a mountain climber. Boxcar-sized filtration equipment in the lab's "attic" will provide its "clean rooms" with air containing only 100 dust particles per cubic foot—compared to 100,000 per cubic foot in the air of your living room.

Another enemy of the VLSI circuit-in-the-making is vibration. Even the slightest tremor of the floor can blur the process in which tiny circuit lines are printed on chips. Thus, the photolithography section of the VLSI process facility rests on its own footings, and its floors and walls are cushioned with foam rubber against vibrations from the rest of the building.

Quips an R&D scientist: "An elephant could walk down the corridor outside the lab and we wouldn't feel a thing."

"But VLSI application is an even bigger challenge for us than making chips," Schmitt notes. "The key talents in the electronics revolution will be *both* the underlying technology *and* the vision to identify markets—to know what VLSI can do and to create winning products and systems. That's the kind of strength General Electric has."

One of the critical areas to feel this strength will be the automated factory. The Center is working closely with Calma Company to create powerful new computer-aided design and engineering systems that will

Electronics researchers (above) are developing smaller and more powerful integrated circuits. To keep them abreast of

Photo by John Burke

fast-moving technologies, the Center's library can provide information from more than 200 electronic files.

Photo by Wayne Lennebacker

allow an engineer to design—and then test—a part before a prototype is even built.

That's just for starters. Next, the specifications will be transferred to an automated machine tool that will cut the metal to make the part. Then, by means of sensors, the computer will inspect the finished part for defects. The goal: to speed ideas into products.

A second big target is to make factory machines more "intelligent" by supplying them with built-in sensors and hooking them to computers, which will then keep track of what the machines are doing and issue corrective commands if they stray off course.

Also, researchers are making robots more human-like—equipping them with such senses as "sight" and "touch." A fist-sized TV camera invented at the Center can be teamed with a microcomputer to provide a welding robot with rudimentary eyesight. The Center is working on sensors that will permit a robot to roll a part in its "fingers"—identifying which end is up.

The home, too, will see exciting new electronics applications. Last fall, for example, the Television Division unveiled an advanced electronic system—invented at the Center—that will permit cable TV system operators to "squeeze" up to twice as many channels through existing cables.

Another key target will be medical diagnostics. A major technology—nuclear magnetic resonance, or NMR for short—is coming over the horizon fast. Combining powerful magnetic fields and radio waves, it permits radiologists to see into the body without x-rays.

In addition, the people of the Center are counting on the unexpected—the big discoveries that nobody can anticipate. At the dedication ceremony, GE Director George Low, President of Rensselaer Polytechnic Institute, commented: "I will be just terribly disappointed if something completely new does not emerge from this laboratory in the next ten years...something we cannot even imagine today... something important... something of great value to the world and its people."

GE's Venture

Photo by George Glod

The GEVENCO Team: President of GE's venture capitalists, "Mac" McClary (sitting center) is flanked from left to right by Vicki Meyer, Fred Sindel, Tim Foster, Eric Young, Larry Robinson, Jim Fitzpatrick and Tony Abbott.

Capitalists

By Louis V. Marsh

GEVENCO is General Electric's venture capital company, an operation that vigorously pursues leads for investment in small, high-tech companies. The leads often come from GE scientists and engineers, the people most likely to recognize where state-of-the-art developments are taking place.

"There's nothing new about the idea of venture capital," says Terence E. (Mac) McClary, President of GEVENCO.

"In 1878, J. P. Morgan and several other influential financiers staked Thomas Edison to the tune of $300,000. Edison formed the Edison Electric Light Company, even though there wasn't yet an electric light.

"What Morgan and the others did then," says McClary, "isn't too different from what GEVENCO is trying to do today—buy a piece of the action early in companies with promising new technologies."

Photo by George Glod

Here are four promising companies →

"Non-Stop" Computers

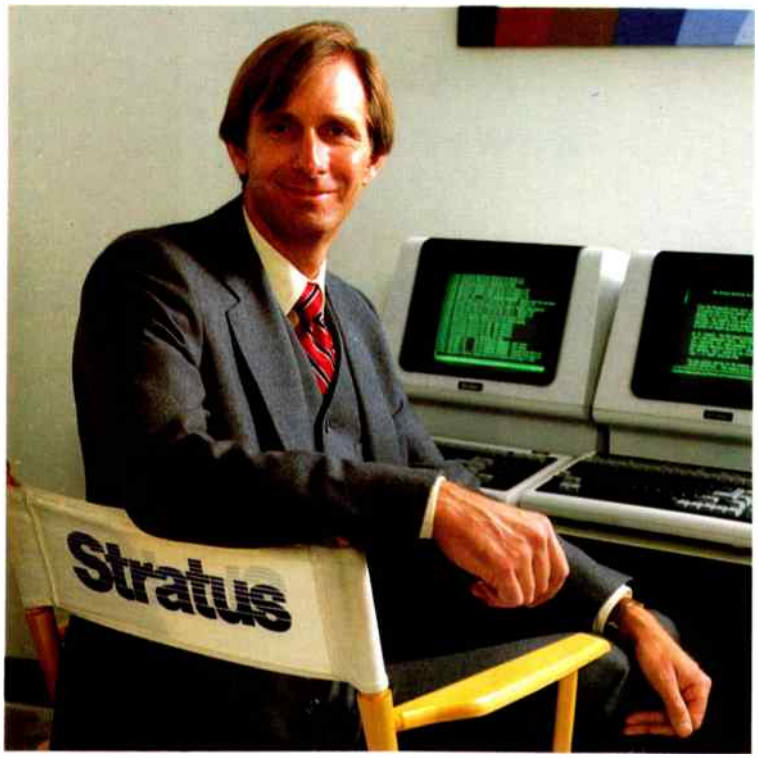


Photo by Robert Garibaldi

Bill Foster
Founder of Stratus

One such company is Stratus Computer, Inc., located in Natick, Massachusetts. This company was started in 1980 after the founders had followed the phenomenal success of Tandem Computers over the previous several years.

Tandem, since its founding in 1974, had had no competitors. They produced a "non-stop" computer—one that would keep working even when part of the hardware failed. In 1974, hardware was very expensive, so Tandem relied on *software* techniques to achieve the non-stop feature. Bill Foster, the president and a founder of Stratus, had worked for many years at Hewlett-Packard, and in fact knew all of Tandem's key players, who also came from HP.

"HP always stressed the importance of making a 'technical contribution' with its R&D projects," says Foster. "When I decided in 1979 to start a new company with a 'non-stop' computer product, my HP training said that we had to use a new, technically superior approach, rather than just make improvements over Tandem's design."

The most important change that had taken place from 1974 to 1979, when Foster put together the initial ideas for Stratus, was the dramatic decline in the cost

of *hardware*, particularly logic. Stratus took advantage of this cost decline to build all of the non-stop features into the hardware, a technique which had been considered for many years but had not been possible due to high logic costs.

"Since we introduced our product in February 1982, the interest from the market has been very high," says Foster. "People like the fact that they can program our computer as they would a 'normal' computer (one that stops when there's a failure). This, combined with a low price and high performance achieved by using latest technology, has given us a real edge over our competitors.

"One day, nobody will make computers that fail," Foster went on to say. "In the meantime, our challenge is to move ahead as fast as we can, both in marketing the current product and in developing new ones that are equally unique."

Commenting on Stratus, McClary said, "If Stratus Computer is anywhere near as successful as Tandem, where we multiplied our initial investment twenty-fold, we'll be very, very happy."

Improving Computer Memories

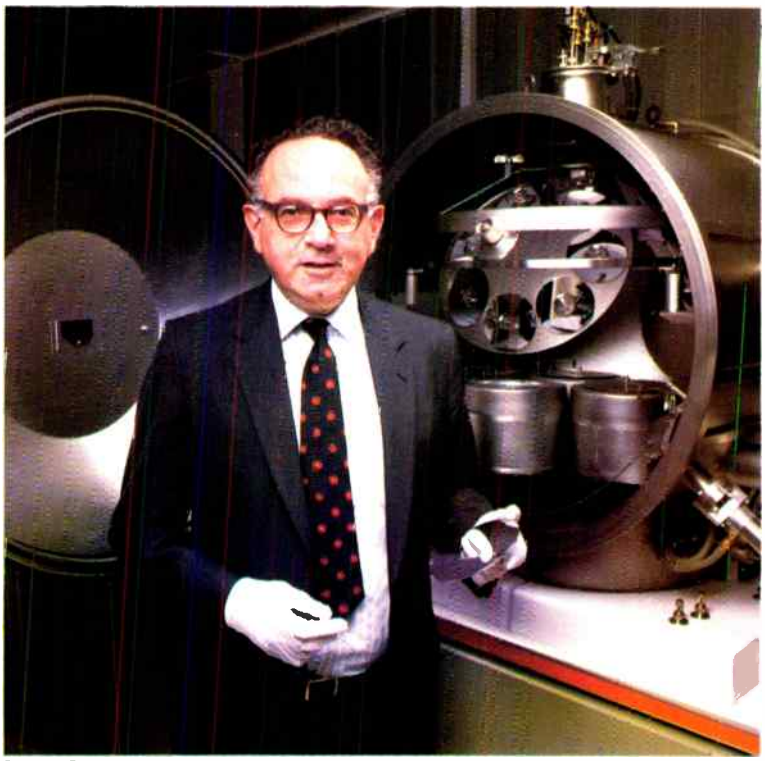


Photo by David Monley

Jack Taranto
AIM president

Today's data-storage capability is trailing badly the rapidly growing demand for greater computer memory capacity. The physical space devoted to computer data storage is often several floors in a corporate office building.

A small, California-based company called AIM (Applied Information Memories, Inc.) has been formed to address the storage problem, and GEVENCO has established an early position through purchase of a significant equity interest.

In conventional data recording, iron oxide mole-

cules are aligned horizontally like tiny bar magnets end-to-end. AIM is seeking a vertical, metallic crystal structure that can provide perhaps 10 times the storage capacity.

They have assembled a technical team with extensive background in vertical recording technology. Jack Taranto, formerly vice president of operations at IBIS, heads up the team.

The market for computer memories is huge—about $7 billion this year and triple that five years out. "We're confident," says Taranto, "that the technology is practical now and that it can be moved from the laboratory to production—and we can move into the black—in two years."

If he's right, GEVENCO's return-on-investment will be well worth waiting for.

State of the Art

Photo by David Monley

Jim Morgan
Applied Materials president

Another company of great promise, according to McClary, is Applied Materials, Inc., headed by James C. Morgan. This is a "state of the art," Silicon-Valley-type company supplying plasma etching and chemical vapor deposition systems to major semiconductor manufacturers in the United States, Europe and Japan. "When economic recovery comes," states McClary, "a lot of savvy people feel that the chip business and that of its suppliers are going to explode, and GE is going to benefit from the technology and financial performance of a company like this." He adds, "Our increased investment is helping them through a temporary trough, but the venture capital industry sees the GEVENCO/Applied Materials connection as an exciting and mutually beneficial one."

SEEQ

"*Conventional EPROM devices require costly on-site servicing activity—and have nowhere near the versatility of E²ROM.*"

It's another language! Impenetrable to the layman but dramatically meaningful to electronics engineers. The words come from the Annual Report of SEEQ Technology, Inc., another company GEVENCO has invested in.

Translated, the above quote means that you don't have to remove the chips from the air terrain navigation computer of an F-18 fighter plane, for example, every time you want to reprogram it. EPROMS (Electronically Programmable Read Only Memories) must be removed from the aircraft circuit after every mission and exposed to ultraviolet light to erase the program—a time consuming process.

SEEQ's E²ROM (Electrically Erasable Read Only Memory) in the F-18 computer can be programmed for flight over the Colorado Rockies for one mission, and then be electrically reprogrammed for the next mission over the North Carolina Piedmont without removing the chips from the plane's computer, all in a matter of seconds. Also, according to Gordon Campbell, SEEQ president, the chips are "non-volatile," meaning the program won't be lost if the power fails.

Photo by David Monley

Gordon Campbell
SEEQ president

Send in the Referrals

"Stratus, AIM, Applied Materials, SEEQ—these are all examples of the kinds of companies we're looking to invest in," says McClary. "Obviously, we can't find such excellent candidates all by ourselves. We know that many GE people run into entrepreneurs in the course of buying or selling products or at professional meetings. We need help—that is, referrals—from knowledgeable individuals throughout the Company."

THE Fehan family of Bloomfield Hills, Mich., and a turbocharged, polymer car are causing a stir on the twisting, looping race tracks of the Sports Car Club of America.

The car is a custom-built Ford Mustang, nearly covered from fender to fender with GE automotive materials.

In its first five races this year, it has finished in the top five positions — roaring to second and third place in two races at Waterford Hills, Mich., and grabbing two fourth-place spots at Nelson Ledges, Ohio. In its second race, the car set a new Sports Car Club of America track lap record on the mid-America GT 1 Circuit.

Not bad for a first-year car.

And where does the Fehan family fit in all this? For three generations, the Fehans have been involved with cars, and today Douglas R. Fehan, his brother Robert K., who races the car, and their father Robert J. own a complete fabrication and painting facility called Bojax Hi Tech. The elder Fehan started the business as an auto body repair shop and later expanded it so his family could manufacture high-performance cars. They built and raced this GE-equipped Ford car.

"This is the most powerful, predictable, stable car we've ever built," says Doug Fehan.

"The General Electric Prepared Ford Mustang Racer," as it's called, has not only caused a stir at the race tracks, but also at auto shows and at the Fehan's shop, where they have to cordon off an area around the car to give them room to work.

"I've never seen anything that attracted as much attention as this car," Doug proclaims.

Photos by John Blakemore

for General Electric. Products from the Engineered Materials Group and the Plastics Business Operations can be found in almost every car in the world.

What's so remarkable about the GE-equipped Ford is the fact that it's not really a racing car. The many parts that make it go are not designed for racing.

The engine is a modified, 500-horsepower, four-cylindered, intercooled, turbocharged machine that can reach 178 mph.

GE automotive materials, both inside and outside, help the car gain its competitive edge on the grueling courses, where 20 to 25 racers jockey for position at speeds in excess of 100 mph.

The exterior has fender flairs, rear spoiler, the front air dam, and the rear and side windows made of Lexan® resin. The windows are protected with a silicone hard coat and sealed with silicone. The rear view mirror housing is molded from Noryl® resin, while the windshield housing is Valox® resin.

Even the engine is loaded with GE automotive materials—the distributor cap is Valox, the quick wiring connectors are Noryl, the wiring harness connectors are both Valox and Noryl, and the suspension and control arm bushings are Ultem® resin. Silicone products make up the car's brake fluid, connectors, spark plug wiring and connectors, gaskets, water hoses and the fuel cell bulkhead.

Why did GE automotive materials get involved?

"Consumer awareness and education," answers Plastics' Gene Thomas, who was responsible for GE's initial involvement with the Fehan family.

The racing Fehans of Bloomfield Hills, Mich., Douglas (left), Robert R. and father Robert K., in the shop of their family business—Bojax Hi Tech.

Photos by John Blakemore

"We wanted to show that our polymers are not inferior substitutes—that they can hold up under the most trying conditions," he says. "Car manufacturers today are designing engines that can hold up for 200,000 miles. We're out to show that our products can last—that they have the endurance to go that distance."

Adds Lowell Hull of the Silicone Products Division: "As the automobile evolves into a longer-lasting, fuel-efficient product, its link with silicone becomes stronger. Silicone's primary benefit is its long-life durability."

Inside and out, this GE-equipped Ford Mustang is made up of plastic and silicone products. Here, the car is fine-tuned for a race at Nelson Ledges, Ohio.

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