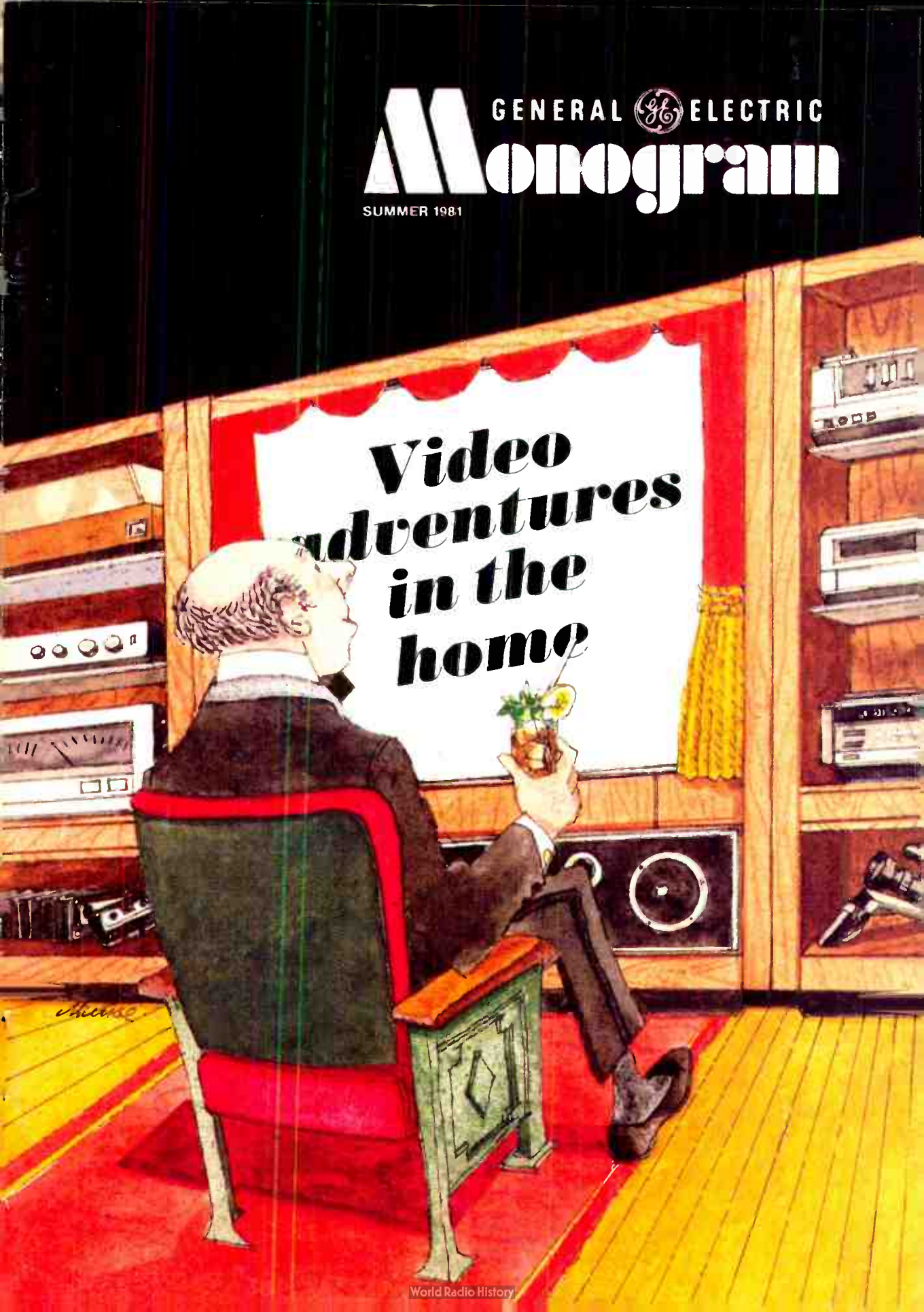
GENERAL ELECTRIC

Monogram

SUMMER 1981



GENERAL ELECTRIC
Monogram

Summer 1981 Vol. 58, No. 3

Stephen L. Harris, *Editor*
Raymond K. Andresen, *Associate Editor*
Donna R. Carpenter, *Editorial Assistant*
Ron V. Taylor Associates, *Design*

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On the cover: GE is helping to usher in the new age of home entertainment. For a story on the Company's latest video products, see pages 2-5. Cover illustration by Howard Munce.

The Monogram's purpose is to keep its readers informed on General Electric activities so that they may more effectively represent the Company in its relationships with the public. It is published bi-monthly by Corporate Employee Relations Operation—Frank P. Doyle, Vice President. Editorial supervision is by Frederick N. Robinson, Manager, Corporate Editorial Programs. Request permission to reprint articles from the Monogram Editor, Fairfield, Connecticut 06431.

Video

From widescreen to video cassette recorders, GE television is entering a new age.

THE AGE OF "home entertainment" is upon us.

Video cassettes. Video discs. VCR cameras. Prerecorded movies. Vast numbers of cable TV channels. Communication satellites wheeling overhead. Home computers. Video games. And, as the centerpiece, television—a product that has been around for nearly half a century.

Today television and its adjunct accessories are riding a wave of unprecedented popularity.

"Sales of television sets and other video

adventures in the

equipment are expected to set records this year," *The New York Times* has noted, "and surpass forecasts made as recently as six months ago. The industry expects that 11 million sets will be sold this year. Sales of home video cassette recorders, meanwhile, are running 86% ahead of last year."

A major source for these exciting products is General Electric.

"We see the home entertainment center as a major business opportunity," says Lud Huck, marketing general manager for GE's new wholly owned subsidiary, General Electric Video, Inc., headquartered in Portsmouth, Va. "We're positioning our product line-up and our image around this concept, and we're planning to be among the leaders in innovative home entertainment systems and products."

Huck made his remark as GE was introducing its array of 1982 products this spring. Among the GE line-up, which will help make the "home entertainment" concept a reality, are:

- The new GE Widescreen 4000 45-inch rear-projection set with stereo-capable amplifier, complete "jack-pack" for easy connection of a variety of video and audio accessories, and a comb filter designed to provide 320 lines of resolution—15% more than last year's model;
- Superband cable capability on 11 GE television models, including the Widescreen 4000, which

(continued next page)

allows the viewer to receive up to 35 channels of unscrambled compatible programming with no converter box;
• Three entirely new video cassette recorders with features such as video scan, slow and quick motion playback, freeze frame and frame advance;
• GE's first color video camera with power zoom, a macro lens which can focus on objects two inches away, electronic viewfinder, shoulder mount and a built-in microphone;
• VHD video disc system (see July-August 1980 *Monogram*), to be introduced in January, which offers the consumer the chance to build a library of movies, plays and instructional materials; and
• GE 25-inch console television sets with sophisticated electronic systems, VIR broadcast controlled color, dual-mode remote control and high-fidelity sound.

Over the past five years, according to Huck, GE has established itself as a significant force in the television marketplace. GE-brand color sales, for example, have jumped more than 85% in that time. "And," says Huck, "our reputation for quality and reliability continues to grow." (See accompanying article in this section.)

How has General Electric engineered this dramatic turnaround—particularly in time to be a major part of the "home entertainment" boom? Obviously, the answer is not simple. Answers Huck: "Build a high-quality product at a competitive cost and tell people about it."

One step was the establishment last year of GE Video.

"The formation of General Electric Video," notes VP Fred R. Wellner, general manager of the Company's Television Business Division, "allows GE to serve the rapidly expanding home video products market by focusing its resources on the entire spectrum of emerging video products."

Another step, involving quality, is through a system known at the Television Business Division as "selective innovation."

Explains Huck: "The television business is one of rapid technological change. New products and features using microprocessor technology proliferate. It is very tempting to look at all that can be done technologically and be carried away developing a whole raft of clever features that in the long run have little to do with the wants and needs of the consumer. Maintaining a consumer focus while uniquely applying technology is the key to selective innovation."

Part of selective innovation is a plan to introduce, every 12 to 18 months, a new consumer-oriented feature that, says Huck, "will sell and improve the TV image of the Company."

Some examples of selective innovation include:
• 1976—GE is the first company to introduce VIR broadcast controlled color, and receives an Emmy for this accomplishment;
• 1977—GE is the first to offer remote control activated by infrared light;
• 1978—GE is the first major company to offer rear-screen projection in a giant TV set;
• 1979—GE introduces its Energy-Conscious Chassis, reducing energy consumption in its large-screen, direct-view products by 30%; and

Quality:

TO A GROWING NUMBER of value-minded American consumers shopping for new television sets, General Electric offers quality comparable to the best in the video marketplace.

Such news is encouraging to employees of the Company's Television Business Division, where quality has been the main strategic driver in a seven-year plan that is paying off in bigger sales and market share.

"Research is showing that quality is recognized by today's consumer," comments Fred S. Aaron, manager—quality control.

The challenge, he points out, is to produce a high-quality television receiver while controlling costs and insuring high reliability. The goal gets harder to achieve as new sets are designed with more consumer features that can make the product more complex.

"We have to maintain an 8-9% improvement in reliability each year just to stay even," he says. "But we're making progress. Yield is up. Costs are down. We've cut our failure rates for in-warranty work in half and

• 1980—GE brings out its Widescreen 3000 which is three times brighter than its predecessor.

"These are just highlights," Huck points out. "Throughout this five-year period, there have been evolutionary developments in chassis and picture tube that have contributed significantly to the overall quality and innovation thrust of the business."

"The surge in sales of televisions," wrote the *Times*, "reflects the new role of television as the centerpiece for a home entertainment center. The television, in addition to displaying network broadcasts, is increasingly being used to play programs from cable TV, video cassette recorders and video disc players as well as to display information from home computers, video games and text information broadcast over the air or sent through the telephone lines."

Forecasts Huck: "The lines between television, audio and peripheral products are rapidly blurring. In the not-too-distant future, we may be receiving direct satellite-to-home broadcasts, have access to large computer banks of information, be able to do our shopping via an interactive terminal, or even vote from our homes in a national election. The next five years are going to be very exciting for the consumer and this industry."

GE television's seven-year itch

A new TV chassis that is the product of joint design and manufacturing engineering is inspected by Paul Pelczynski, seated, and, standing from left, Sanjar Ghaem, Richard Swanson and Fred Aaron.

we established record high factory yields in the first quarter of this year in terms of percentages of sets accepted off the assembly line."

Aaron stresses that quality is a total effort involving all employees plus vendors. "It must be a top-to-bottom commitment," he says. "Believe me, it's easier to build quality into a product than to rely on inspection to spot troubles at the end of a line."

How is quality being improved? Aaron provides some examples:

"Take the design phase. While sets are more complex, we're simplifying our designs. One chassis being introduced this year uses 30% fewer parts, requires fewer adjustments and consumes less electricity.

"Using more automated parts placement techniques is helping us boost the accuracy of assembly and gives us better solder connections as well.

"And by applying microprocessors and minicomputers in our test equipment, we've improved the accuracy of tests and cut the time needed to perform them."

That quality also translates into GE jobs is a point made by Jack Sundlie, manager of plant operations at Portsmouth. "GE television has a quality image, and this business lives on image," he says. "We manufacture a highly complex, technical product that receives high exposure to the public. That quality image means sales, and those sales mean job security."

Sums up Aaron: "Our quality strategy was responsible for our dramatic improvement in market share, and it's going to remain an important strategy. Quality is the name of the game, and it's the only game in town!"

PIMEG provides the spark

GE program helps direct minority students into engineering careers.

IT HAPPENED TO Robert Richardson when he was a college sophomore. For Sonjia Brooks, the spark came during her senior year in high school.

In both cases, the spark behind their engineering careers was ignited by PIMEG: General Electric's Program to Increase Minority Engineering Graduates.

"PIMEG is invaluable in telling minority students what engineering and other technical programs are all about," says Richardson, who has progressed through several engineering positions at the Company's Appliance Motor Department in De Kalb, Ill. "My PIMEG counselors helped me plan my course work and find summer jobs at GE, which gave me a realistic insight into industry and the engineering profession."

Adds Brooks: "I had done well in math and science at high school, but I had never even thought of engineering. Then I was encouraged to apply for a PIMEG scholarship." She won the scholarship, sponsored by GE's Schenectady-area components, and then studied engineering and management at Union College. Today, she's a quality process engineer at the Company's Lamp plant in Ravenna, Ohio.

Richardson and Brooks are two of the many success stories to come out of PIMEG.

Now in its ninth year, the program was born when top officers and recruiting managers in GE realized that the pool of minority engineering graduates would have to increase greatly if minorities were to take advantage of the professional and managerial opportunities available in industry.

From that beginning, PIMEG was expanded into a nationwide effort involving many large corporations, technical societies, educational institutions, minority groups and government agencies.

Today, more than 28,000 elementary, high school and college students are participating in a variety of PIMEG programs sponsored by GE components in 48 cities and plant communities throughout the United States.

Along with scholarship aid, PIMEG provides minority students with summer technical assignments, co-op and work-study programs, engineering role models, plant tours, career days, parent information meetings and tutoring.

What counts, of course, are results. General Electric now employs more than 200 minority youths on summer, co-op and work-study programs. And last year the Company hired 66 minority students who had graduated from GE PIMEG programs. Furthermore, the nationwide effort sparked by GE has helped quadruple the number of minorities enrolling in engineering schools around the country.

"It's important to start early with disadvantaged kids, before negative attitudes about education are irreversibly set," says Marcus

Robert Richardson (above) and Sonjia Brooks (right) found PIMEG invaluable.

Rudy Juarez helps guide

Cummings, manager—Applied Computer Systems at General Electric's Aircraft Engine Business Group in Evendale, Ohio.

Six years ago, Cummings tried to persuade local high-school students to consider careers in engineering. But it was too late. They had shunned the math and science courses. Turning next to junior-high students who still had time to take the necessary subjects, he found that many had already made up their minds against math and science.

So, realizing that he had to start even earlier, Cummings embarked on a campaign to reach bright youngsters in Cincinnati's Washington Park elementary school. In the enrichment program for these children he uses such teaching tools as closed-circuit television and computers to make education exciting.

Another GE volunteer involved in a PIMEG program is Albuquerque's Rudy Juarez, who helps Hispanic and American Indian high schoolers from all over New Mexico to prepare properly for engineering careers.

"With proper direction and guidance," says the process control engineer for Aircraft Engine, "youngsters are saved a lot of needless work and can direct their effort where it counts."

It wasn't long ago that Juarez was in the same boat as the young people he now counsels. As an undergraduate in engineering school, he didn't get adequate guidance and it "took me a heck of a lot more work than necessary to get through." He did form counseling groups at college, and he's been at it ever since.

Juarez and Cummings illustrate both the spirit of individual PIMEG contributors and the variety of ways to run a program. The following describes a few of the 80 PIMEG programs involving GE participation:

- Massachusetts Pre-Engineering Program. Developed by Boston-area industry, public schools and universities, it provides assistance and encouragement to disadvantaged city students with an aptitude for engineering and science.
- Engineering for Disadvantaged Youth Program (EDY). Headed by a University of Bridgeport (Conn.) engineering professor, it helps students who are not academically or financially ready for engineering colleges. EDY provides scholarship aid, work-study, a summer enrichment program and "Reachback"—an early-acceptance program for high-school juniors. Six EDY graduates have since joined GE.
- Mathematics, Engineering, Science Achievement (MESA). Mexican-American, black and Asian students receive remedial help in high-school math, science and English in this program involving the Company's Nuclear Energy Business Group in San Jose, Calif. Last year the Group funded nine engineering scholarships. This year two more scholarships will be added for handicapped students.
- Future Engineers Program. Run by the Component Motor Division in Fort Wayne, Ind., it provides local students with an introduction to engineering. For 10 days, some 25-30 junior- and senior-high-school students view films and participate in seminars, plant tours and mini-courses at Fort Wayne, Evendale and Cleveland. Other Fort Wayne activities include summer internships, career days and student-teacher tours.

youngsters into engineering careers.

Marcus Cummings makes education exciting.

Monographs

In the Navy now. Drawing stares instead of salutes, a General Electric LM2500-30 marine gas turbine engine enters Rickover Hall at the U.S. Naval Academy.

The Aircraft Engine Business Group donated the engine to the Academy's Engineering Department for use in training midshipmen in the fundamentals of gas turbine ship propulsion.

"We trust the training opportunities afforded by this engine to all midshipmen will prove highly beneficial during their service on current and future LM2500-powered vessels," said O.R. "Bud" Bonner, VP and general manager—Marine and Industrial Engine Projects Division, at the April presentation ceremonies.

Five classes of U.S. Navy ships currently use the LM2500-30. The engine also powers frigates, corvettes, patrol boats, gunboats and aircraft carriers for 11 other countries.

Soccer goal. Like other boys in Lima, Peru, Julio Salas grew up playing soccer. Emigrating to the United States as a teenager, he became an accomplished amateur player and even had several tryouts with professional teams. Then, in 1970, he broke his leg in two places and decided to retire.

But only as a player. Today, the supervisor of Solar Collector Fabrication in Valley Forge's Advanced Energy Programs Department ranks among the top soccer referees in the U.S.

"I call it a hobby, but it's like a second job," says Salas, whose "hobby" keeps him flying to distant soccer fields on weekends and then running six miles on weekdays to stay in shape. He recently served as goal judge at the Major Indoor Soccer League championships and has been the on-field official for numerous college and pro playoff games.

"My goal," Salas adds, "is to become a FIFA (Federation Internationale de Football) referee." FIFA is the world governing body for soccer, and its referees get to work the Olympic Games, the World Cup, the Pan-Am Games and various international matches.

Photo courtesy NEWSWEEK — Lester Sloan

Annie's daddy. Andrew Quinn, a production systems specialist in the Re-entry Systems Division, has a new identity. He's Annie's daddy. Or, to be more precise, he's the father of nine-year-old Aileen Quinn, who will play the title role of "Annie" in the movie version of the award-winning Broadway play.

Aileen, shown here with co-star Carol Burnett, was chosen after a nine-month talent search in which 8,000 young girls were auditioned. "She's a natural for the part," says her obviously proud father. "She can act, sing and dance. And she's got the look they wanted."

Quinn's wife Helenann, a former actress herself, has been chaperoning their now-famous daughter since rehearsals began in March. The movie is being filmed in New Jersey and California, and will be released in April 1982.

Another GE book. The Elfun Society's Hall of History completed its four-volume photo history of GE with publication of *Pathways of Progress, 1947-1978*. Previously published were *The Edison Era, 1876-1892*; *The Steinmetz Era, 1892-1923*; and *On the Shoulders of Giants, 1924-1946*.

Copies of the soft-covered books may be obtained by sending a check for $3.00 per copy ($10.00 for the four-volume set) to the Hall of History, GE Research and Development Center, P.O. Box 8, Schenectady, N.Y. 12301.

Honors. Owen D. Young, GE Chairman (1922-40, 42-44), was named to the Hall of Fame for Business Leadership by *Fortune* magazine's editors.

- Schenectady's Walter C. Huening, consulting application engineer—Industrial Power Systems Engineering Operation, was elected a Fellow of the Institute of Electrical and Electronics Engineers (IEEE). The IEEE also awarded its 1981 Nikola Tesla award to Schenectady's Dean B. Harrington, manager—Generator Advance Engineering for the Large Steam Turbine-Generator Division.
- The University of Texas named Robert L. Fegley, staff executive—Chief Executive Officer Communications, as the 1981 Public Relations Professional of the Year.
- The Motor Business Group presented its first Alger Award, for excellence in the field of rotating machinery, to Ralph G. Rhudy, consulting engineer—Advanced Engineering at Schenectady's Large Motor and Generator Department.

Arabian double feature. Several GE components recently participated in two Middle East trade shows.

Representing the Company at the first Middle East Electricity Exhibition in Jeddah, Saudi Arabia, were the Distribution Equipment Division, Distribution Transformer Business Department, Large Steam Turbine-Generator Division, General Purpose Control Department and Jamjoom Electrical Distribution Assemblies Company, a GE affiliate.

Meanwhile, at the Middle East Oil Show in Manama, Bahrain, visitors (above) heard facts about the Company's advanced equipment and technologies for oil applications. The Gas Turbine Division, the Installation and Service Engineering Business Division and Middle East Engineering Limited, a GE affiliate, participated in the show.

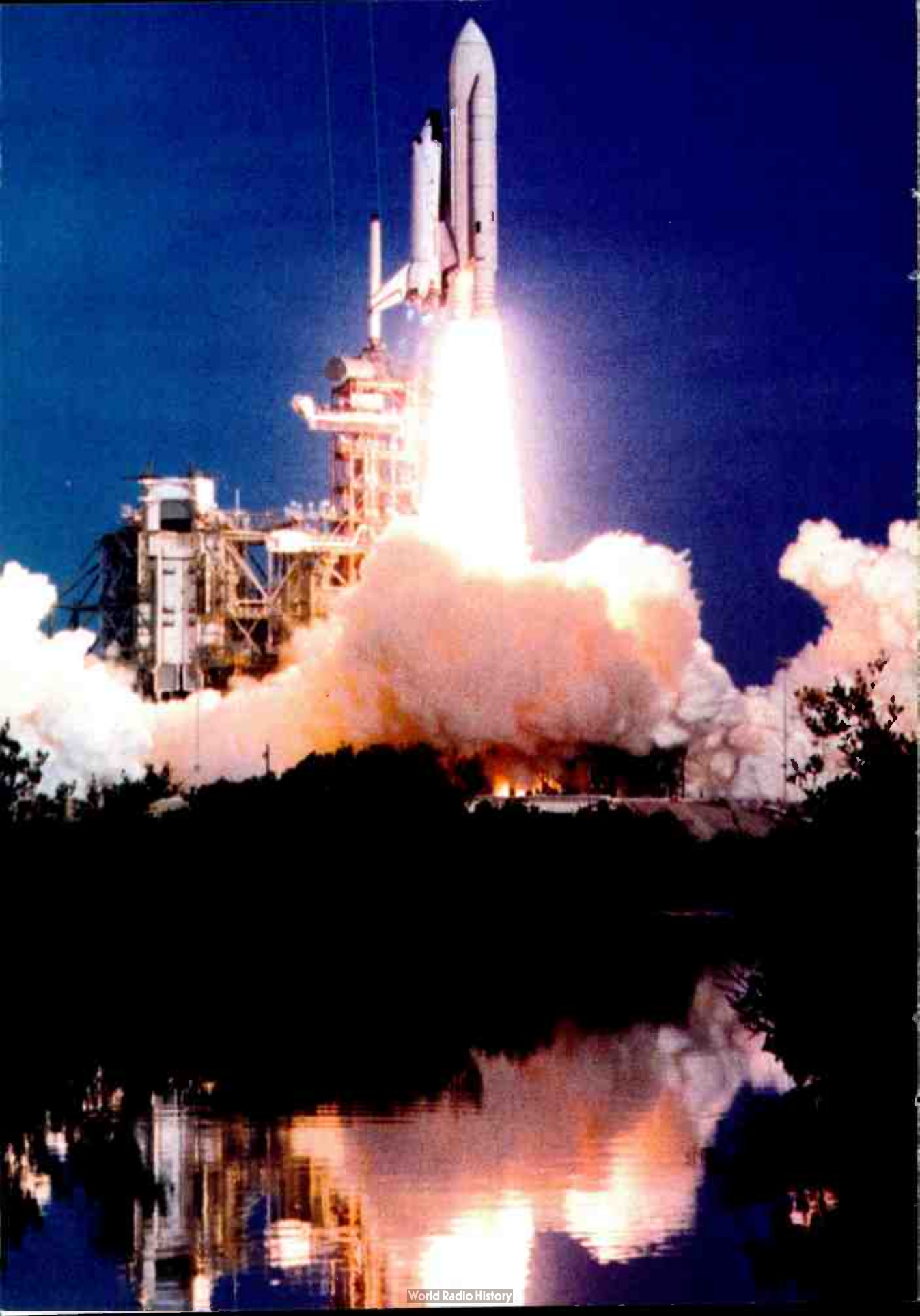


Photo courtesy NASA

All aboard the space shuttle

GE products and services help launch a new space age.

AMID PLUMES of smoke, a new space age dawned on April 12, 1981, when the space shuttle *Columbia* roared into the bright morning sky above Florida's Cape Canaveral.

In the future, according to shuttle planners, this flying-orbiting-rocketing machine will make regular commuter runs to space. There its crew of astronauts, scientists, engineers and technicians will perform experiments in near-zero gravity, launch satellites into higher orbits, and study the earth below and heavens above. Some space visionaries even foresee the day when shuttles ferry passengers between earth and orbiting space stations, to be assembled by shuttle crews.

"This country has entered a new and exciting era of space travel, exploration and experimentation," exclaims General Electric's Allan J. Rosenberg, VP and general manager—Space Systems Division.

The Division, part of the Company's Aerospace Business Group, is working or has worked on a variety of shuttle contracts. For example:

Space Systems employees in Palmdale, Calif., maintain the computer-driven test equipment used during the integrated test and checkout of each orbiter. This Acceptance Checkout Equipment (ACE) was built by GE for the Apollo Program almost 20 years ago, and has been continually updated.

"Our Palmdale unit played a vital role in testing the *Columbia's* complex electronic and mechanical systems prior to its shipment to Cape Canaveral," says William J. Beittel, manager—Houston Operations, a Space Systems component. "They're currently working on the next orbiter, the *Challenger*."

Another ACE computer complex was used at the Johnson Space Center in Houston for testing of the shuttle's guidance, navigation and control system. General Electric also provides support services at Houston's Thermal Vacuum Laboratories, where extensive tests are run on shuttle systems in a simulated space environment.

A Space Systems subsidiary, Management and Technical Services Company (MATSCO), has a long-term contract to provide life sciences experiments aboard the European-built Spacelab, to be mounted in the cargo bay on future shuttle flights. These experiments will study the effects of outer space on humans, plants and animals. MATSCO employees work with the experimenters, developing and testing equipment, and analyzing the results.

GE also has designed a light detection and ranging (LIDAR) system for shuttle-based studies of clouds, aerosols and pollutants in the earth's atmosphere. In addition, the Company built the equipment for producing microscopic latex particles of uniform size—one of the materials-processing projects planned for the shuttle.

Furthermore, the Defense Satellite Communication System (DSCS III) spacecraft being built by GE is designed for launch either from a rocket booster or from the shuttle, which also is designed to retrieve Landsat D, an earth observation satellite being developed by the Company.

The shuttle's maiden flight included several GE products, too.

Space Systems provided the waste collector and oxygen sensor aboard *Columbia*. It also will supply the shuttle galley (see *Monogram*, Sept.-Oct. 1980) on future flights.

Storage trays and dividers for stowing cameras, clothing and other crew equipment aboard *Columbia* were made of Lexan® sheet from the Company's Plastics Business Operations. Lexan sheet also was used in the astronauts' helmets, and to protect the tiles during construction of the shuttle.

Finally, the special tile system, which succeeded in protecting the shuttle during re-entry, incorporated GE silicones as a sealant and thermal reduction material.

The solid status of GOSAM

Donald Shattuck (l) and John Harnden review some of GOSAM's 2,000-plus technical papers.

WHEN DON BOCK, an engineer with Erie's Locomotive Operations Engineering Department, began designing a rapid transit power converter, he read an interesting GE technical paper by Kurt Hedel of Utica's Aerospace Electronic Systems Department, describing a similar circuit. It was just what Bock needed. With several modifications, he increased the power rating and his converter was complete.

The publisher of that technical paper was a unique General Electric organization called GOSAM: the Group On Solid State Applications and Measurements.

"GOSAM is a technical

◀ **GOSAM trio of (from left) Jack Wright, Wesley Waldron and Scott Cutler checks new integrated circuit assembly.**

society composed exclusively of General Electric people," explains John C. Wright of Pittsfield's Ordnance Systems Department, the group's 1980-81 chairman. "It has 3,562 members, and its basic purpose is to enhance the GE position in solid-state electronics through improved communication across the Company. It does this through symposia, newsletters, technical papers and informal Dial-Comm discussions."

While electronics is currently receiving increased attention throughout the Company, GOSAM has, for nearly a quarter-century, been promoting solid-state technology across organizational lines in a Company whose decentralization sometimes made it difficult.

"GOSAM was formed at a time when GE had a 'no committees' rule, practically making it an ad hoc organization," recalls John Giorgis, a technical manager in Cleveland's Fluorescent Systems Department and a pioneer member of the group. The first meeting was in April 1957, nine years after the invention of the transistor. Eleven engineers from seven GE components met informally in Schenectady's Van Curler Hotel. The first formal meeting, one year later, featured 31 papers presented by 14 organizations.

"We represented a cross-section of GE's electronics departments, but our initial interests focused on the application and measurement of transitors," says that meeting's chairman, Wesley K. Waldron of Corporate Research and Development's (CR&D) microcomputer controls unit.

"GOSAM is an ideal vehicle for exchanging information," says Giorgis, "and if it didn't exist, it would be tough to get the word around. Without GOSAM, we would keep reinventing the wheel."

How has Giorgis been helped by the organization? "When I was at the Military Electronic Systems Operations in Syracuse, we were interested in running a test on switching transistors and, through GOSAM, I heard about a similar test at Utica. So we went down to talk to the guy who did the work, and we saved a tremendous amount of time and money."

"General Electric has made many contributions to solid-state technology, with GOSAM playing an important role," points out John D. Harnden, Jr., manager of Technology at CR&D's Advanced Electronic Products Operation. "GOSAM and the silicon controlled rectifier (SCR) were born simultaneously, followed by the triacs, all-plastic transistors, Mini-Mod® assembly technology, the amplifying gate thyristor, and many more," he says.

Harnden, who is called "Mr. GOSAM" by his associates because of his long and enthusiastic support of the group, explains that while Dial-Comm conferences are good for one-on-one exchanges, the group also has technical panels to promote the exchange of ideas within specific areas of solid-state.

"Our technical panels cover such things as communications, digital electronics and large-scale integrated circuits, microprocessors and new technology. These panels meet on their own during the year."

GOSAM is sponsored by CR&D, which establishes the operating budget and provides a secretary-treasurer, currently Donald P. Shattuck, and an administrator, Wendy Fedor. All GOSAM meetings are self-liquidating, and, in the words of one veteran member, the group does not rely on management to plan its activities.

GOSAM's many benefits include such "spin-offs" as establishment of the Integrated Circuits Center, now the Solid State Applications Operation, in Syracuse, and development of in-Company courses such as those on microprocessors.

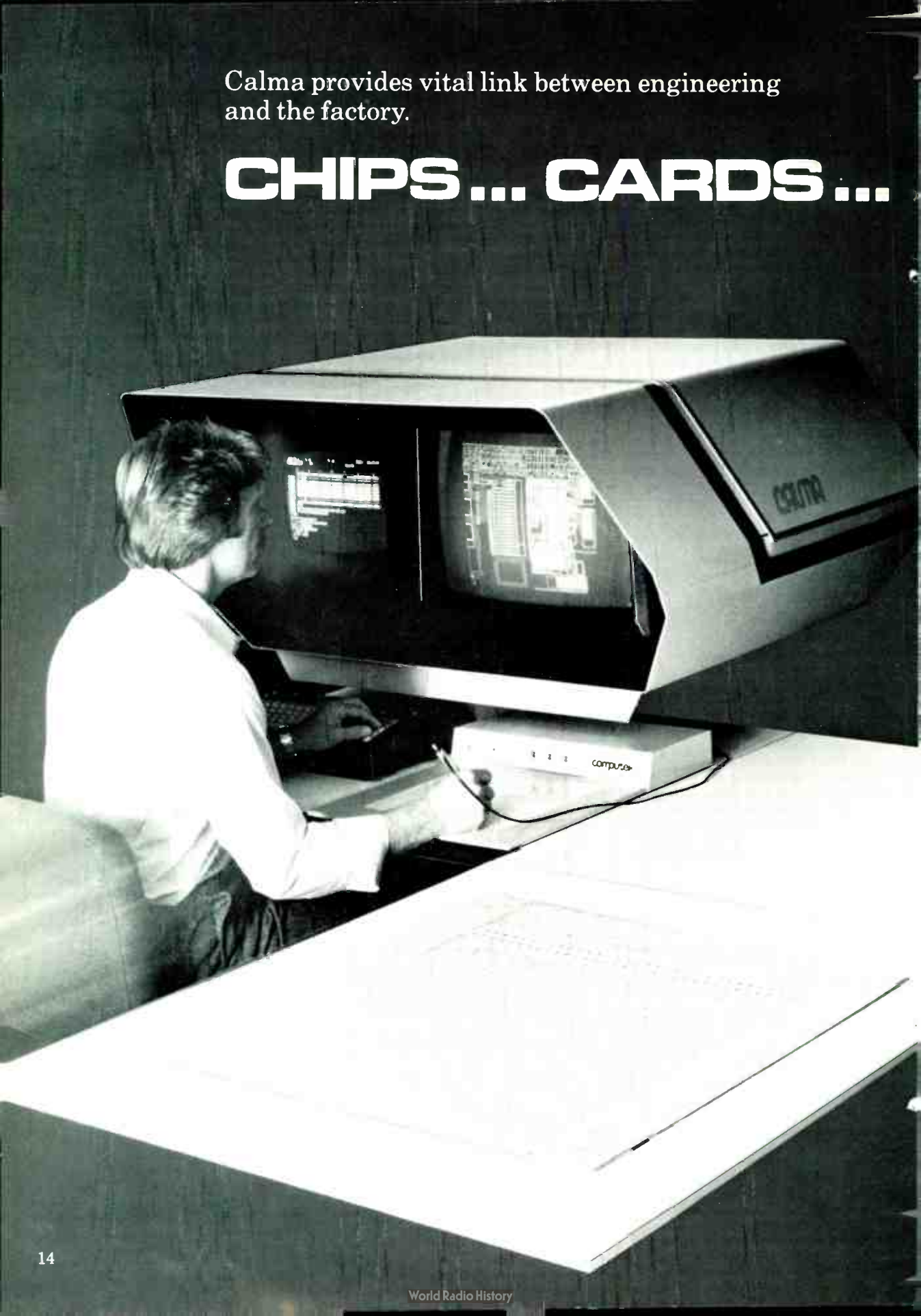
A leader of the microprocessor panel of GOSAM is Marshall C. Kidd, manager of Technology Analysis in Bridgeport's Special Purpose Computer Center. Says Kidd, "GOSAM is unique in the world and strictly a 'bottoms up' organization. Every year it features something new. When Reg Jones spoke to the group in 1975, it was a turning point at which GOSAM emerged as a recognized force critical to the Company's electronics growth."

Addressing the May 1975 GOSAM symposium, then-Chairman Jones said, "Whenever I attend a meeting like this, I am struck by the dazzling array of talent that we've gathered in this Company. The creative potential is almost beyond measure.

"Individually, we can probably outperform most of our competitors most of the time. But when we begin to share our insights as you are doing at this symposium, and find that military has something to teach consumer products, or that utility people have something to learn from aerospace, or that three discoveries put together make a fourth that no one ever dreamed of—then we are really doing what justifies the existence of the General Electric Company."

Calma provides vital link between engineering and the factory.

CHIPS... CARDS...



STICKS... TALKIES...

SOUNDS LIKE a set of games, or a group of rock bands.

Instead, those are some of the products offered by Calma Company, which was acquired by General Electric from United Telecommunications, Inc., in April. GE agreed to pay $100 million for Calma and up to $70 million in additional compensation, based on Calma's sales over the next four years.

Headquartered in Sunnyvale, Calif., Calma is a major producer of interactive graphics systems for the computer-aided design and manufacturing (CAD/CAM) market, and a key ingredient in GE's plans for the "Factory of the Future."

"We expect to be a significant factor in equipping the automated factories of the future," explains GE Vice Chairman Edward E. Hood, Jr. He notes that Calma's systems are "a vital link in closing the gap between engineering and the factory" because they allow engineers to design, test and change products on a video display terminal, and then transfer instructions into the GE numerical controls on machines that make the products.

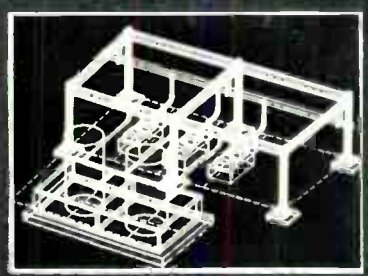
"Using interactive graphics, we can lop years off the design and process planning cycle, improve efficiency, and put out a better product as well," adds GE Senior Vice President, Donald K. Grierson, group executive—Industrial Electronics Business Group.

For a closer look at Calma, the *Monogram* visited four of its facilities in California's Silicon Valley. The new GE subsidiary has sales offices in 20 U.S. cities and 10 foreign countries, employs about 1,000 people, and had 1980 sales of $62 million.

Founded in 1964, Calma serves three major markets: the electronics industry; the mechanical industry; and the architectural, engineering and construction businesses.

Calma's Electronics Division, its largest, supplies systems for the design and layout of integrated circuits and printed circuit boards. As Calma President and Director Robert Benders says, "The complicated process of designing a whole computer on a single integrated circuit that can fit on a fingertip is practical only with a CAD system."

Chips® (for integrated circuits) and Cards® (for printed circuit boards) are two of its innovative software packages in this area. Sticks® is a new system that allows designers to work with symbols instead of complex geometries, speeding up the integrated circuit design process. And Talkies®, another Calma first, lets operators use voice commands in designing integrated circuits.



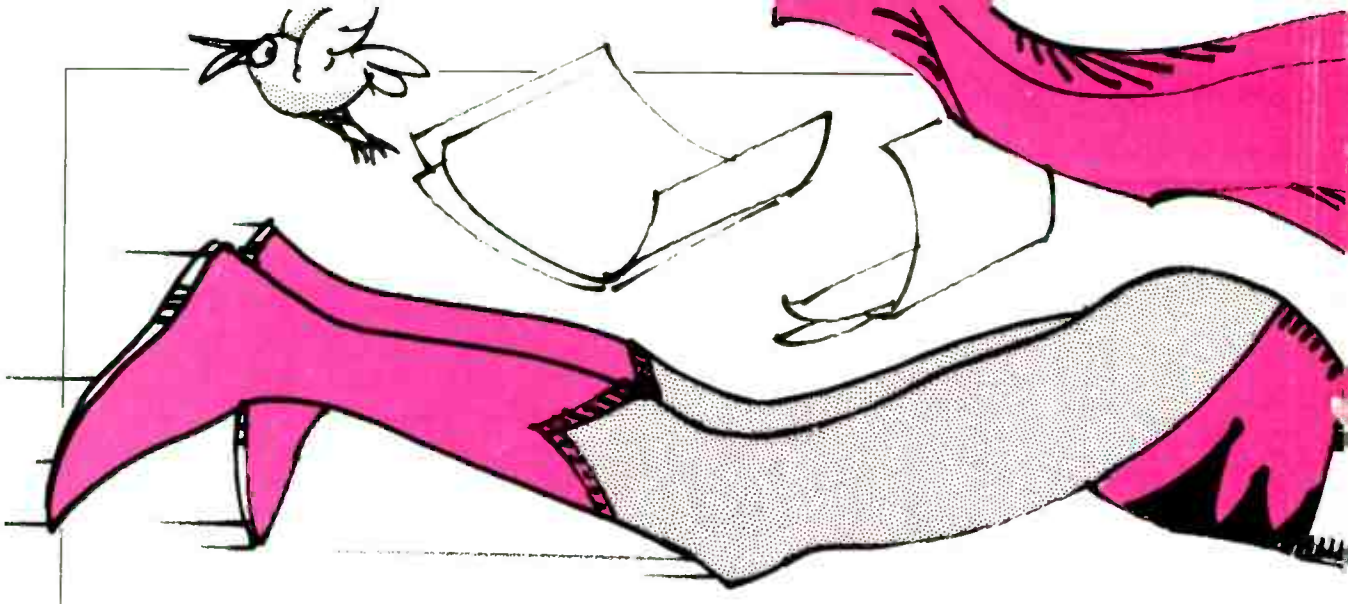
Calma's systems can produce architectural drawings (above) and integrated circuit designs (left).

In the mechanical area, Calma's DDM (design, drafting and manufacturing) system connects the three processes. Its "model-to-drawing" concept, first in the industry, allows designers to work with three-dimensional models on the screen, then generate blueprints in a single step. This system can also be used for checking clearances in the production process, and for preparing numerical control tapes.

The DDM system is also being introduced to the architectural, engineering and construction (AEC) markets—a relatively new field for Calma.

"Most of our future growth probably will come in the mechanical and AEC markets," says Calma's Donald C. Stewart, vice president—Corporate Development. "The financial and technical resources of GE should help us expand our markets, and we're excited about our part in the 'Factory of the Future' concept."

In addition to acquiring Calma, GE also announced in April the formation of Automation Systems Business to market a broad line of robot systems. Its first product, a multiarmed programmable assembly robot called Allegro, will be available this year.



Speeding through paperwork

The new Expedite system is changing the way GESCO does business.

WITH APOLOGIES to the Yellow Pages, General Electric Supply Company's sales people now let their fingers do the walking through GESCO's 175 warehouses around the country via XPD™ Service. An abbreviation for Expedite, XPD is transforming GESCO—changing not only the way its employees perform their duties, but altering the scope of their jobs.

GESCO, a division of General Electric headquartered in Bridgeport, Conn., is among the nation's largest electrical distribution firms. With nearly 100,000 customers, it handles millions of orders a year.

Now, through a data processing system that provides real-time order entry and inventory control, GESCO sales people can advise customers—in about five seconds—of local product pricing and availability. They can even arrange same-day shipment, because the need to manually prepare orders, warehouse "picking" tickets, shipping papers, invoices and inventory adjustment documentation has been eliminated.

"From a customer's point of view," observes Vice President Kertis P. Kuhlman, GESCO general manager, "our service is judged by our ability to provide the right stock, at the right time, in the right quantities, and for the right price. The XPD Service enhances our capability to meet all of these measurements."

Representing a multimillion-dollar investment in hardware and programming, the XPD system, which went on line last year, was developed jointly by GESCO and General Electric Information Services Company (GEISCO). It provides GESCO maximum flexibility in responding to customer needs—which can range from a simple over-the-counter cash sale to supplying millions of dollars worth of lighting and apparatus on a major construction project.

To make this system work, GESCO has more than 800 video display consoles (MARKLINK Intelligent Terminals from GEISCO) which are tied directly, by a communication network of leased telephone lines, to GEISCO's MARK III® Service in Rockville, Md. The XPD system can handle some 1,600 transactions an hour.

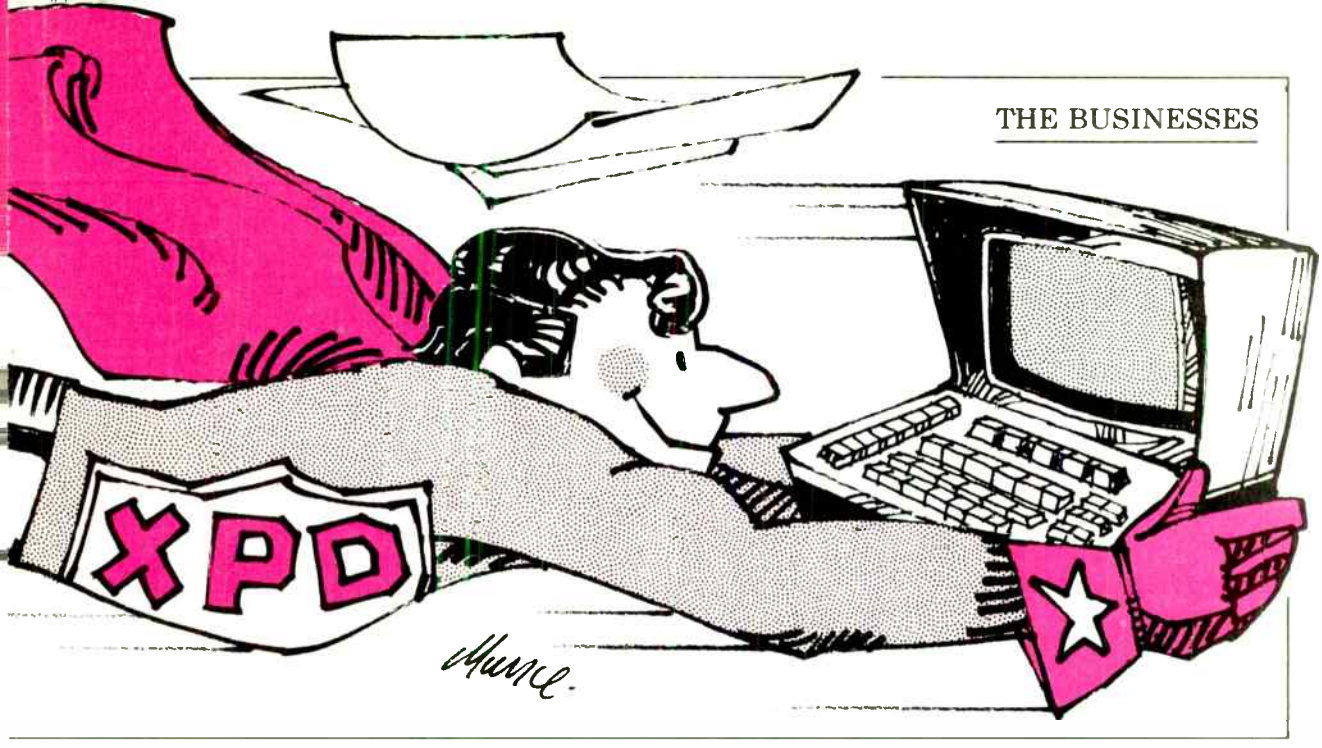
Notes Kuhlman: "The customer gets answers on the spot, when he needs them—not minutes, hours or days later."

As the following examples show, XPD is revolutionizing the way GESCO does business:

Sales jumped sharply in the Chicago area after eight months with the XPD system. In one day, Penny Bakken, supervisor—Contractor Inside Sales, sold a personal record $30,000 worth of GESCO distributed goods. She has since had several $20,000 days.

"Customers have come to rely on XPD," she says. "They know there are lots of oddball items we can find with the help of the system."

Case in point: A five-inch grounding bushing



(a fitting for a pipe that holds high-voltage cable) was requested by a client. Normally, a call would go out from salesperson to local vendor and then to warehouses around the country until the bushing was found —a process that could take as long as two days. Bakken found the bushing in GESCO inventory in just seconds and a sale was made.

"A lot of times the customers are on the line while we're trying to get them the right information," adds Bakken. "If they get an immediate response, then we get an immediate sale."

"XPD has improved customer service," states Birmingham's Olen Vickery, manager—Customer Service, "by eliminating the human error factor."

He continues: "Before, the customer called in and told us what he wanted. Whoever was taking the order would have to get up from the desk, go to the warehouse, see if we had it, return, go through a 2,000-page stock price book, locate the item and give the price. If it wasn't in stock, we'd have to find out how long it would take to get it. And that could involve guesswork, calling the factory or another GESCO location, and then calling the customer back.

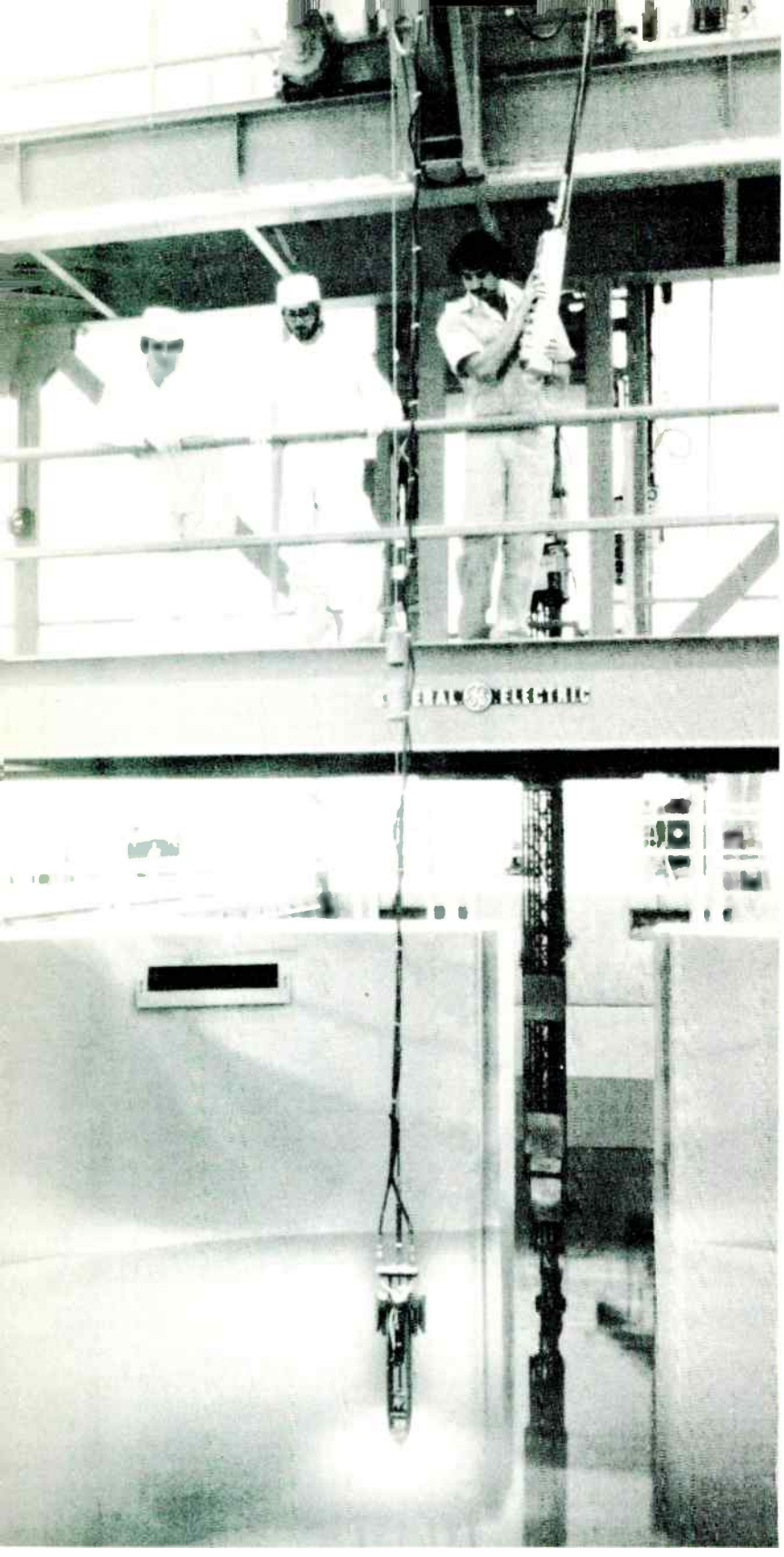
"Today we can go into XPD without getting up from our desks, enter the material, and in seconds we know the availability and the price. If we don't have the material, we can go into a search pattern within GESCO and find out who does have it."

Vickery concludes: "There are a lot fewer billing errors, invoices go out quicker, and we're able to find materials in a matter of seconds rather than telling the customer, 'I'll call you back.'"

"It's the most positive thing that's ever happened to GESCO," is the report from Portland, Ore.'s Arnold Penrice, district manager—Seattle Region. "It's an outstanding sales tool, another competitive edge we have in the marketplace."

What impresses Penrice most? "The system immediately gives operation managers a profitability report showing each sales transaction so that we can react and make adjustments in pricing and keep our competitive edge. The old way, we would receive two-week-old computer reports and would then have to analyze the results. Now, we know our status by the next morning. XPD keeps us better in tune with the marketplace."

And what about the future? Predicts Dallas' David Steed, manager—Industrial Sales: "There'll be a day when you won't see too many people inside an office. They'll have terminals in their homes. With a remote CRT, salesmen will be able to access a customer's history on the spot. They'll be more professional. The days are gone when it was sufficient to tell a prospect 'I don't know.' Salesmen will have to be supermen selling ideas and concepts instead of putting customers on hold while they hunt through reams of paperwork to handle their orders."



Students practice nuclear fuel reloading at San Jose's new Services Training Facility.

New

A spare parts bank is latest innovation from GE Nuclear Services Department.

FINDING SPARE parts for a car or appliance usually presents no problem. But obtaining them for a nuclear power plant is another matter. A spare motor or major pump, for example, can cost up to a million dollars and be on order from six months to two years.

"No single utility," says General Electric's Neil L. Felmus, general manager—Nuclear Services Department, "can afford to keep these high-cost parts in inventory, nor can it afford to wait that long for a new part. When a nuclear plant is shut down because of equipment failure, it can cost the operating utility $400,000 per day for replacement power."

To protect utilities against such costly outages, the Company's Nuclear Energy Business Group devised an innovative spare parts bank known as PIM: Pooled Inventory Management. Organized in January, PIM will allow member utilities to share in a central inventory of expensive, long-lead-time parts.

So far, 12 utilities—owning 22 of the 25 BWRs (boiling water reactors) operating in the United States—have signed up for the program. They are the Boston Edison Company, Carolina Power & Light Co., Commonwealth Edison Co., Detroit Edison Co., Georgia Power Co., Iowa Electric Co., Niagara Mohawk Power Corp., Northeast Utilities Service Co., Philadelphia Electric Co., the Power Authority of the State of

services for nuclear industry

New York, the Tennessee Valley Authority, and Vermont Yankee.

Here's how PIM is organized:

A new company, BWR Equipment Inventory Company (BEICo), will own the inventory. The Morgan Bank will lend money to BEICo to finance inventory purchases. Member utilities will pay a monthly fee for access to that inventory. And GE will manage the program, run the warehouse facility (in Memphis, Tenn.) and procure, maintain and insure the equipment.

Initially, PIM will have an inventory worth about $20 million. In addition to being high-cost and having long lead times, the equipment selected must be suitable for use by at least two of the member utilities. Some 25 major pieces of equipment (motors, pumps, drive turbines, piping, etc.) have been approved for purchase and are being ordered for delivery starting next year.

"GE can supply some of the equipment, so we may participate as both manager and potential supplier," notes Frederick R. Hemeon, manager—Nuclear Services Marketing.

"In the future," adds Hemeon, "a utility will call the program manager (GE) if a pump or major part fails. We'll contact the warehouse, ship the part and install it. The utility will buy the part, which will be replaced in inventory by a new one, and also pay GE for any servicing we do."

PIM isn't the only innovative idea to come out of the profitable Nuclear Services Department, which has grown rapidly since 1975. For instance:

- A new BWR Services Training Facility opened at Group headquarters in San Jose, Calif., last fall. The $7.4 million facility, the only one of its kind in the nuclear industry, is designed to train technical personnel in nuclear plant refueling and maintenance activities. Trainees come from operating utilities and from the Company's Installation and Service Engineering Business Division, which helped fund the project.

"We have everything you'd find in a nuclear plant except radioactive fuel," says Ivan F. Stuart, manager—Nuclear Training and Technical Services. "However, the trainees have to wear radiation protective clothing and follow all safety procedures, just as they would in a regular plant."

According to Stuart, the facility will help utilities save time and money—and improve safety—by giving technicians hands-on experience in a realistic setting. The facility can also be used to test retrofitting projects and other programs without having to shut down an operating reactor.

- Also opened in 1980, a new training center near Tulsa, Okla., teaches BWR/6 operators how to handle normal and abnormal situations in the newer GE-designed plants. An older facility at Morris, Ill., has trained more than 1,000 nuclear plant operators since it opened in 1968.
- The BUG is a remote-controlled, acoustic device that crawls around the outside of a pressure vessel, testing for flaws. It produces a computer analysis of the welds and a three-dimensional picture of any flaws. Leased by GE to utilities, the BUG replaces both manual inspection of the welds and other devices that traveled special tracks added on to the vessel.
- AMPS (Advance Maintenance Planning Service) is another unique service program. It helps plant owners streamline their outages with a customized maintenance plan.

Concludes Felmus: "We try to use our technology to come up with better products and programs to serve the utilities."

New control-room simulators near Tulsa help train plant operators.

Janis Willis uses GE cassette recorder/player, designed expressly for use by the blind.

Little Carah Best (l) can hear laughter of other children, thanks to GE-powered hearing aid.

Customized products

GE businesses are giving new meaning to the words "made to order."

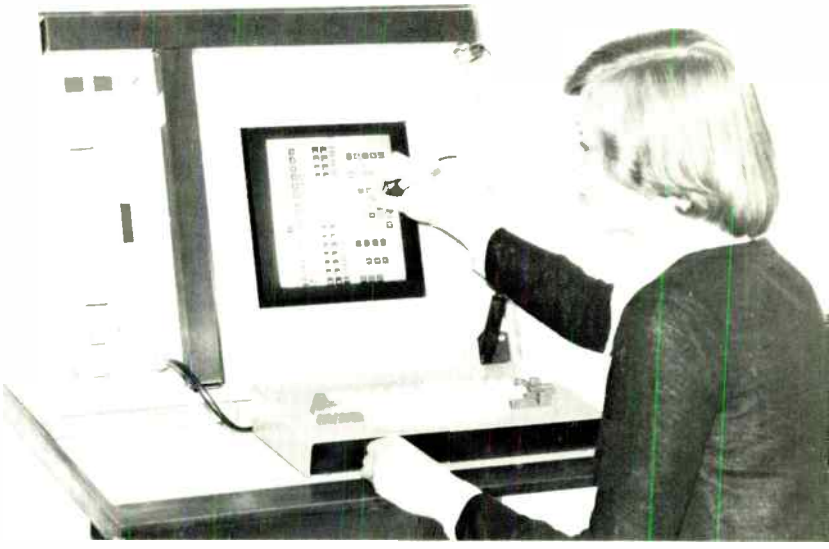
WHEN JANIS WILLIS was in school, a tape recorder/player sat on her desk. She often recorded notes on it, and took tests by recording answers to questions that were taped on it. Blind since birth, Janis found the recorder/player an indispensable part of her life. There were, however, a number of problems with it: Janis found it hard to remember which keys controlled the various recorder functions and would sometimes erase important notes from tapes. Second, since she often wanted to take Braille notes from recordings of class sessions, she would have to start and stop the player frequently. Then, too, she had to carry a number of tapes with her because each cassette holds only 90 minutes worth of material. Lastly, she was often frustrated trying to find the particular section of a tape that she needed to hear.

Louisville's American Printing House for the Blind was aware of the problems that Janis and others faced. In 1972, it asked General Electric's Audio Electronics Products Department if an existing Company recorder/player could be customized to make its use by the blind easier.

The Syracuse component responded with the 3-5194a cassette recorder/player, featuring special Braille markings, variable playing speeds, a button to index tapes by putting aural tones on them, and the capacity to record six hours' worth of material on a 90-minute tape. Thousands of the units have been sold by the American Printing House, which also uses them to test the quality of recordings for the blind.

The 3-5194a is only one of hundreds of customized products made by the Company, however. Despite being one of the most diversified organizations in the world, General Electric often receives orders for products so specialized that they must be custom-tailored to the client's specifications. Many of the resulting products are, therefore, unique.

At Gainesville, Fla.'s Battery Business Department, for example, batteries small enough to power a hearing aid and large enough to keep a satellite transmitting are customized, for client companies and government agencies. In the case of Phonic Ear, Inc., the Mill Valley, Calif., company wanted a rechargeable battery for a



Specially designed General Electric Training System, used by U.S. Navy to train sailors for submarine duty.

hearing-aid transmitter that sends voices over an FM frequency. The transmitter is worn by teachers who have hearing-impaired students in their classes. The students "hear" the teacher through a receiver worn in their ears and powered by a portable battery pack.

Phonic Ear was so pleased with the rechargeable 9-volt transmitter battery unit provided by the Battery Business Department that it is now working with the Department to develop a battery receiver unit that can be recharged nightly.

The Department also provides special battery cells for communications, weather and exploration satellites, and its cells provided the power for the Pioneer, Venus, Viking and Nimbus spacecraft. "And," notes Battery Business Department General Manager Delbert L. Williamson, "the Nimbus unit, in orbit since 1969, is still sending back data, its batteries fully operational after 12 years in space."

In the Power Systems Sector, a particularly unusual request sent Schenectady's Large Steam Turbine-Generator Department to the drawing board for special design and development work. The Pacific Power and Light Company and the Black Hills Power and Light Company wanted a steam turbine-generator for their Wyodak Power Plant, located in an arid area of Wyoming.

In 1978, a 330,000-kilowatt GE steam turbine-generator employing a new, low-pressure turbine section went on-line at Wyodak, making it the world's largest air-cooled power station. A normal power plant of its size would use three-to-four thousand gallons of water a minute; Wyodak uses only 200-400 gallons a minute, freeing the scarce water in its region for agricultural and residential use.

In a case of government/industry cooperation, Pittsfield's Ordnance Systems Department designed and manufactures a computerized training console for the U.S. Navy to fill the latter's need for "hands-on" submarine training without the use of costly hardware. The General Electric Training System (GETS) represents a departure from traditional computer-aided instruction in its stand-alone independence from a central computer. Its presentation of realistic, real-time scenarios allows GETS to serve as an intermediate training station between classroom and work environments. As a mark of the system's versatility, a modification of the unit as a maintenance assistance system for Navy technicians will soon be available, and three General Electric components have purchased consoles for industrial training. The day cannot be far off when the Company that now boasts 135,000 different products can literally say: "If we don't have it, we can make it."

Restoring art treasures

GE products are helping works of art stand the test of time.

IT'S BILLED as the world's biggest painting. Standing 42 feet high and stretching 360 feet in a circle, the painting depicts the Civil War Battle of Atlanta. Seventeen European artists took two years to complete it. The ravages of time took a century to almost destroy it. But today the city of Atlanta is saving this giant work of art and General Electric is helping.

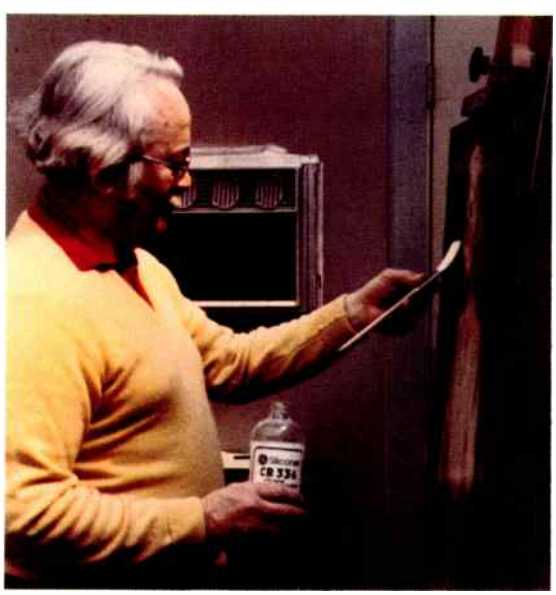
The four-year project, headed by New York art restorer Gustav Berger, is complex — involving many unorthodox restoration methods, including the use of GE Lexan® polycarbonate sheet. Although it is not the only project in which Company products are being used to save art treasures, it is one of the most unusual. This story, as well as that of a Cape Cod conservator who uses a special GE silicone adhesive, follow:

The Atlanta Cyclorama. Giant paintings were the rage in 1885, the year the artists, all from the American Panorama Company of Milwaukee, descended upon Georgia's capital. Hundreds of panoramas — yesterday's version of wide-screen movies — were done in the United States and Europe. Today only a handful have survived, among them Atlanta's Cyclorama. But it deteriorated over the years until the city decided to save it a decade ago. Finding a conservator who wanted to tackle the job, however, was not easy. Berger took up the challenge in 1978.

The key to restoration, Berger felt, was to keep the five-ton painting in its suspended state because taking it down might harm the old, brittle canvas. Special equipment was designed, including 48-square-foot easels of Lexan sheet. The painting is held taut to the sheet by electromagnets so that conservators, laboring on a five-story scaffolding, have a secure, steady surface to work with.

Berger explains: "Lexan provides a stable, flat, seamless surface which is free of distortions. It comes in very large sheets and is indestructible. We use it to back paintings and to protect them from humidity and temperature changes as well as from impact."

Six easels of Lexan are being used in the restoration project.



Art Conservator Robert Fieux applies GE silicone adhesive during restoration project.

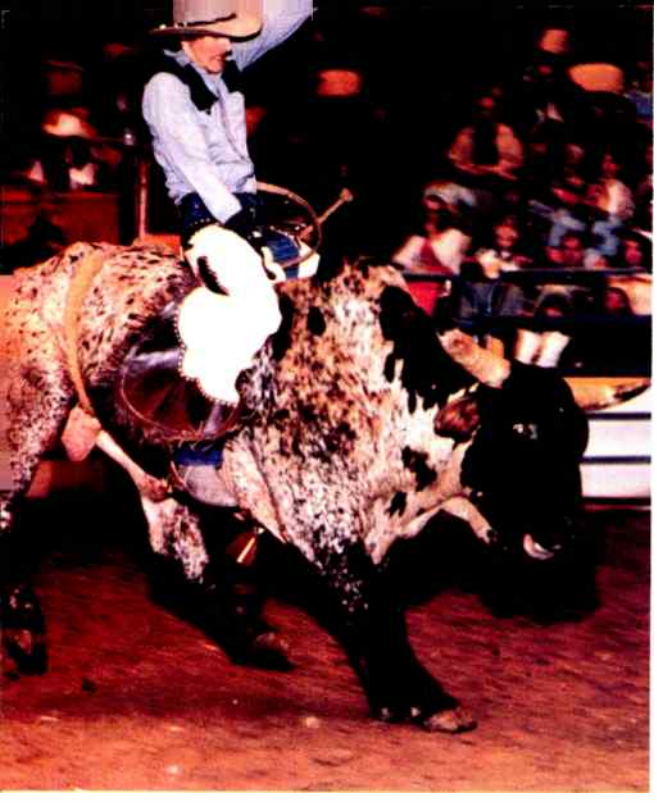
Cape Cod conservator. At the Fieux Restoration Laboratory in West Barnstable, Mass., Robert E. Fieux relies on a special silicone adhesive when restoring works of art. Fieux developed adhesive and varnish applications with the help of GE's Duane F. Merrill, a technical marketing specialist for the Silicone Products Business Division in Waterford, N.Y.

Conservators are always seeking better methods for restoring art treasures — methods that can repair such age-caused damage to oil paint as cracking, crazing, lifting, cupping and flaking. One adhesive that Fieux came up with is made of fully cured, cross-linked GE silicone pressure-sensitive adhesive on Teflon-coated fabric (Fabril-Sil). It enables a fiberglass cloth lining to reinforce canvas.

Fieux also uses GE silicone (FS-2) as an adhesive in liquid form so it can be applied with a spatula or rubber squeegee, holding the damaged paint to the canvas. A silicone resin (Varni-Sil) is used for varnishing paintings.

Observes Fieux: "These applications are the first time silicones have been used in restoration."

Adds Merrill: "The results of such art restoration have been so successful that major museums, including the Metropolitan Museum of Art in New York City and the Museum of Fine Arts in Boston, are using GE silicone lining and repair methods."



It seemed like a safe bet. A rodeo company would pay $1,000 to the winner of a mechanical bull-riding contest if that winner could also stay on a real, snorting, bucking bull for the professional rodeo limit of eight seconds.

Safe, that is, until Robert Huff entered the contest. A carpenter at Aircraft Engine's Evendale, Ohio, plant, he's been riding in rodeos since age 15. He easily won the mechanical side of the event and then climbed onto a live, 2,000-pound adversary at the Longhorn Rodeo in Cincinnati's Riverfront Stadium.

"The bull looked mean," recalls Huff. "It had stepped on one rider, breaking seven of his ribs."

But Huff hung on for the required eight seconds and rode off with the cash.

"In bull riding, you have to hold the reins in one hand and hang on without letting your free hand touch you or the bull," explains Huff, who ranked among bull-riding's top 15 money winners earlier this year. He also has competed in bareback bronc riding. "Bull riding is more difficult. If you make one mistake, you could be on the ground with that animal on top of you."

PEOPLE

You do WHAT?

For the uninitiated, a bare bow champion does not walk naked through the woods.

"Bare bow is a type of archery where you don't use any sighting devices or other mechanical aids," explains Jerry Haynes, the reigning Massachusetts Bare Bow champion. The hourly training coordinator at Aircraft Engine's plant in Evendale, Ohio, Haynes also ranks among the top 50 nationally in freestyle competition.

"In freestyle, you can use telescopic sights, stabilizers, mechanical releases and other aids," says Haynes, who owns 10 different bows. Among them are several compound bows, which use eccentric pulleys to lessen the strength required to hold the bow at full draw.

Haynes also is an archery and bowhunting instructor.

"There's an aesthetic beauty to the sport, watching an arrow sail down the range," he says. "There's also a lot of precision required to hit a bullseye the size of an apple from 50 yards away."

HEH-OOOO, YEEDLE-YEEDLE, HEH-OOOO. With those and similar shouts, Christine Jackson took first place in the ladies' callin' division at last year's National Hollerin' Contest in Spivey's Corner, N.C.

"My daddy taught me to holler," says Jackson, who works at the Lighting Business Group's Carolina Welds plant in Goldsboro, N.C. "We lived on a farm and he'd holler on his way home. It was the way farm folks communicated across the fields."

Jackson describes her winning holler as "loud with a beat to it, sort of like a yodel. The judges love a beat. Others holler songs or sayings or just give a good yell."

After shouting to victory before 12,000 listeners, Jackson was flown to Hollywood for a guest "call" on the Mike Douglas Show. She's also hollered, via the telephone, on radio programs around the country.

As a former champion, Jackson is not allowed to compete in future National Hollerin' Contests. However, she's teaching her grandson to holler "to make this a family tradition."

Instead of playing tennis or golf, some Company employees like to test their skills in some rather unusual competitions.

If you ask Glen Crockett to give you a lift, he might just do it with his bare hands.

The 48-year-old Crockett, who weighs only 163 pounds, had a combined best lift of 1,272 pounds last fall to capture the National and World Masters Powerlifting titles for middleweights in the 45-to-49 age category.

Powerlifting consists of three events: squat, bench press and deadlift. In the championships, Crockett shouldered 480 pounds while doing a deep squat. He bench-pressed 295 pounds while lying flat on his back. And, in the deadlift, he hoisted 497 pounds cleanly off the floor.

The victory capped a tremendous comeback by Crockett, a Navy stockroom clerk at the Drive Systems Department in Salem, Va. Once a champion weightlifter, he had been out of competition for 15 years before picking up the weights again in 1978.

"I never thought I could do it at my age, but I found out you can build yourself back into shape if you're in good health," says Crockett.

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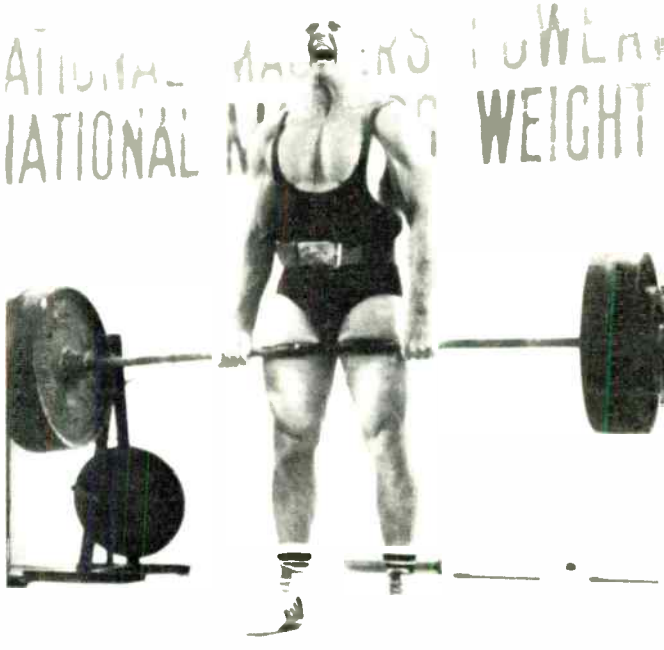


Ready, aim, fire. And when the smoke cleared, Robert Nelson had bagged his first National Muzzle Loading Rifle Association championship.

A toolmaker at the Appliance Motor Department in De Kalb, Ill., Nelson was among 2,000 sharpshooters who converged on Friendship, Ind., last August for the week-long matches.

"There's shotgun, rifle and even some pistol events," relates Nelson, who has made 28 appearances at the nationals. "In each event, the gun has to be muzzle-loaded and you have to use black powder."

Nelson won his title in the "Quail Walk," a shotgun event. "You walk down a path with your gun pointed at the ground, and they release clay birds from behind trees and bushes," explains Nelson, who hit nine of 10 birds to beat 13 other finalists.

The little, single-engine plane does a loop and a roll. Then it goes straight up, aiming at the stratosphere, until it reaches the apex of its climb, turns on its axis, and comes diving back to earth at 150 miles per hour. With ground rushing up fast, the plane goes into another roll and then tips its wing to the crowd below.

This is aerobatics—the sport of precision flying—and behind the controls is Jacqueline McLaughlan. A secretary with the Advanced Reactor Systems Department in Sunnyvale, Calif., she's been competing in regional aerobatics meets for the past three years.

In aerobatics, she explains, the pilot has to execute a set of maneuvers at speeds up to 200 mph and within a specific area, usually 3,000 square feet on the horizontal plane and 2,000 feet on the vertical axis.

"You're judged on the difficulty of the maneuver and on how well you execute it," says McLaughlan, who recently finished fourth at a meet in Arizona. It was her first time in the intermediate category, having moved up from the sportsman class where she's won several first places. "Someday, I hope to reach national prominence," she adds.

Kenneth Hutchins would like to dispel two myths about dogsled racing.

"We don't say 'mush'," he begins. "That's for the movies. And the dogs don't hate pulling the sled. In fact, they enjoy it. It's fun for them."

It's also fun for Hutchins, a tool engineer at the Aircraft Engine plant in Hooksett, N.H. For the past 12 years, he's raced his Siberian huskies throughout northern New England, winning a few trophies along the way.

"You've got to have good dogs with a desire to run and pull," says Hutchins, who owns 18 adult huskies. "Some are leaders and some are followers. For a good team, you need a super leader up front."

A good team of dogs, he adds, will average 15 miles per hour while pulling rider and 28-pound sled over an 18-mile course. But even a good team can be distracted. "My dogs have taken after squirrels or run me into a tree," admits Hutchins, "and I know one guy whose dogs chased a cat right into a barn."

Take a right. Then a left. Back up. Go forward. Pick up a pallet. Drive down the aisle. Stack a load. Unstack it. And don't crash into the wall.

That's how to become a forklift champion. Chester Haines, a group leader in the Specialty Motor Department shipping area at Fort Wayne, Ind., came close last November when he placed sixth in the third annual North America championships, sponsored by Clark Equipment Company.

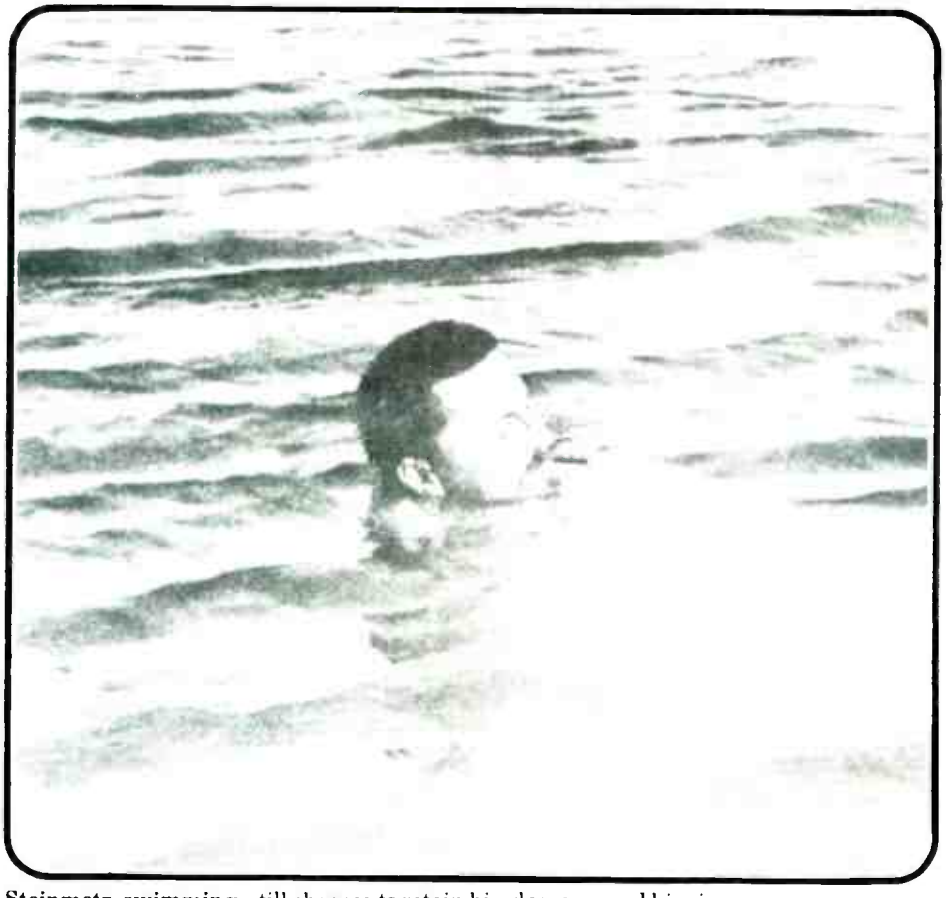
The championships, involving 33 finalists from regional contests in the U.S. and Canada, are designed to test a forklift driver's skill, speed and safety over a 10-event course that simulates on-the-job conditions. Points are deducted for striking or overturning pallets or obstacles.

In the finals at New Orleans, Haines made just one mistake in an otherwise perfect run, but four other drivers had perfect scores and he finished out of the money.

Now, back on the job, he has to be extra careful. "If I bump a pallet now, I know I'll get razzed by the other drivers," he says.

GE's historical photos: 4

Rare glimpses of the great

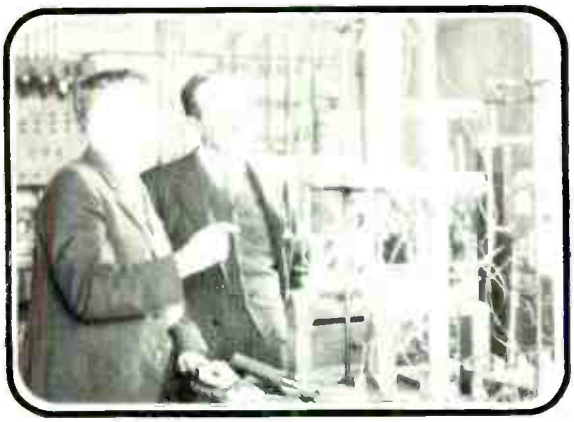


Steinmetz, swimming, still chooses to retain his glasses — and his cigar.

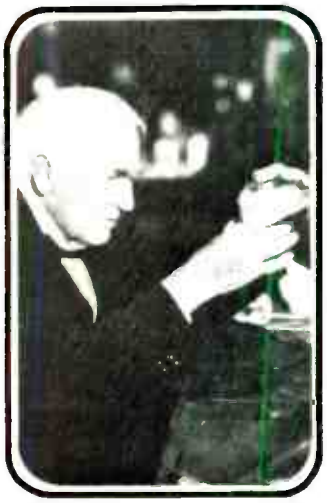
One of the thrills of poring through the million-plus images that make up General Electric's historical photo file, now being restored and catalogued, is to come upon the faces of great figures of the past. Edison, Einstein, Marconi, Steinmetz and on through the years to Walt Disney and Harry Truman — all were captured on film by GE cameramen of yesteryear.

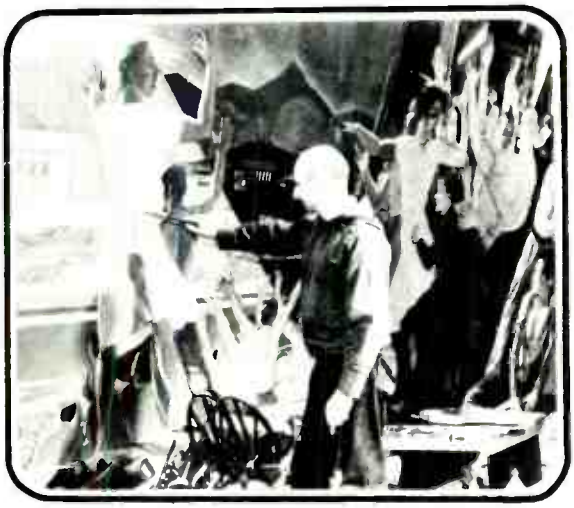
And, in the case of Steinmetz, there's the added thrill of discovering photos of his signed manuscript pages describing his new developments.

Here's a small sampling of these rare glimpses of the great.



Guglielmo Marconi, father of radio telegraphy, hears GE Nobel Prize winner Irving Langmuir explain GE experiments. Harry Truman speaks on WGY's Farm Forum in 1936.





Tom Edison re-enacts, in 1929, his experiment leading to the discovery of the filament for his incandescent lamp. Rockwell Kent works on mural for GE building at 1939 World's Fair.

Walt Disney uses a General Electric recording spectrophotometer in his Hollywood studios. Einstein visits GE laboratories — and has Steinmetz as his guide.

Dr. Israel Jacobs (r), fellowship committee chairman, discusses atomic structure with English scientist Hywel Davies (c) and Dr. David Worden, manager of university relations at the R&D Center.

Visiting Researchers

At the GE Research and Development Center, a fellowship program is fostering scientific cooperation.

QUESTION: What do these scientists have in common? Dr. Joost Manassen, professor of chemistry at the Weizmann Institute of Science in Israel. Dr. Jens Feder, professor of physics at Norway's Oslo University. Dr. Robert Caviness, professor of computer science at Rensselaer Polytechnic Institute in Troy, N.Y. And Dr. Hans Wallings, assistant professor of electrical engineering at Twente University of Technology in Enschede, the Netherlands.

ANSWER: General Electric.

Although they do not even know each other, they are connected through the Company's Visiting Research Fellowship Program, sponsored by the Research and Development Center in Schenectady.

Now in its fourth year, the Fellowship Program was created by the Center to promote its interaction with outside research communities in the U.S. and abroad, to foster the "interdisciplinary nature of scientific and engineering research," to stimulate new areas of research and expand existing areas. Scientists, such as the ones mentioned above, are nominated by, and work in partnership with, GE staff scientists.

Eighteen visiting scientists have participated in the program. Among their projects:

- To develop a technique to help physicians detect cancer in its earliest stages;
- To study fundamental mechanisms taking place in high-pressure electronegative gases;
- To analyze high-quality quartz tubing for optical fibers; and
- To investigate the problem of corrosion in photoelectrochemical solar cells.

Responsibility for running the Fellowship Program belongs to Dr. Israel S. Jacobs, GE staff scientist and chairman of the program's Fellowship Administrative Committee. In fact, it was Jacobs who also was most responsible for developing the program.

"It actually started," recalls Jacobs, "when Dr. Ivar Giaever (co-winner of the 1973 Nobel Prize for physics) and I invited scientists to

Schenectady at the same time. It then seemed natural for the Center to institute a fellowship program for visiting scientists. A modest proposal was made, and the first scientist arrived on June 15, 1978. He stayed for three months."

That scientist is Professor Joseph A. Johnson III of Rutgers University's Serin Physics Laboratory. Through his work at GE, he developed new insight into all unstable gas-dynamic systems and presented a paper on the subject to the American Physical Society.

"There is no doubt in my mind," Johnson later wrote to Jacobs, "that the fellowship concept as you have conceived it, and as you are applying it, is innovative and correct. My tenure as a fellow was very fruitful."

Another of the early "fellows," Professor Peter P. Silvester of Montreal's McGill University, studied numerical methods of electromagnetic field analysis. He observed: "General Electric, in instituting and operating the Fellowship Program, is playing a particularly constructive role in industry-university relations, as well as in providing a mechanism for communication and collaboration in the broader scientific world."

This year five scientists will visit the Center as "fellows." Two are already on board—Drs. Joost Manassen and Hywel Davies.

Manassen, on leave from the Weizmann Institute in Israel, is investigating the problem of corrosion in photoelectrochemical solar cells. His sponsor is GE's Dr. Ronald H. Wilson, a physicist in the Center's Electrochemistry Branch. They met at a technical conference four years ago, and Wilson suggested that Manassen apply for a Visiting Fellowship.

The two scientists are now together, studying changes that occur in cells in which sunlight is converted into chemical or electrical energy by the process of photoelectrochemical reactions. In order to accomplish this conversion, however, a semiconductor and liquid are employed inside the cell and, as a result, the semiconductor corrodes. Manassen and Wilson hope to find a way to prevent this corrosion.

Meanwhile, Davies, a professor at Sheffield University in England, is studying the structure and properties of rapidly quenched alloys.

GE's Dr. Lyman A. Johnson, manager—Amorphous Metals Program, had known Davies for several years through technical conferences and learned he would be taking a sabbatical leave from Sheffield in 1981. He invited the British scientist to apply for a fellowship.

States Davies: "It was an offer I really did not want to pass up. General Electric's research operation is first-class, and I believe I will benefit greatly during my stay here."

Davies and Johnson hope their efforts will improve the understanding of the solidification mechanisms and properties of rapidly quenched metallic glass and microcrystalline alloys. Upon further development, these materials have the potential of improving the energy efficiency of transformers and gas turbines.

Visiting researcher, Dr. Jens Feder (above) of Norway, found working with GE scientists "inspiring."

Among this year's visiting scientists is Dr. Joost Manassen (above) of Israel. Professor Joseph Johnson (below) of Rutgers University was the first person in the fellowship program.

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Produced by General Electric's Closed Circuit Television Operation in Owensboro, Ky., the Nite Gard cameras have found wide acceptance at parking lots, dams, power plants and other sites where large areas must be kept under surveillance despite light levels often too low for human sight.

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