



GENERAL  ELECTRIC
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**Overseas
construction**

GENERAL ELECTRIC Monogram

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On the cover. With the grit of an acrobat, a SADE-Brazil employee works on a transmission line in the jungles outside São Paulo. For a story on SADE/SADE/MI, GE's overseas construction affiliate, see pages 2-7. Photo by Daniel P. Montross.

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THE COMPANY

An Italian-based affiliate sparks the Company's role as a major worldwide builder.

CONSTRUCTION of a deep-water port in Brazil ... a high-voltage direct-current transmission line strung across the jungles of Zaire ... responsibility for the bricks and mortar as well as the steam turbine-generators of a new power plant in Egypt—these large-scale projects have a common denominator: they're all managed by General Electric.

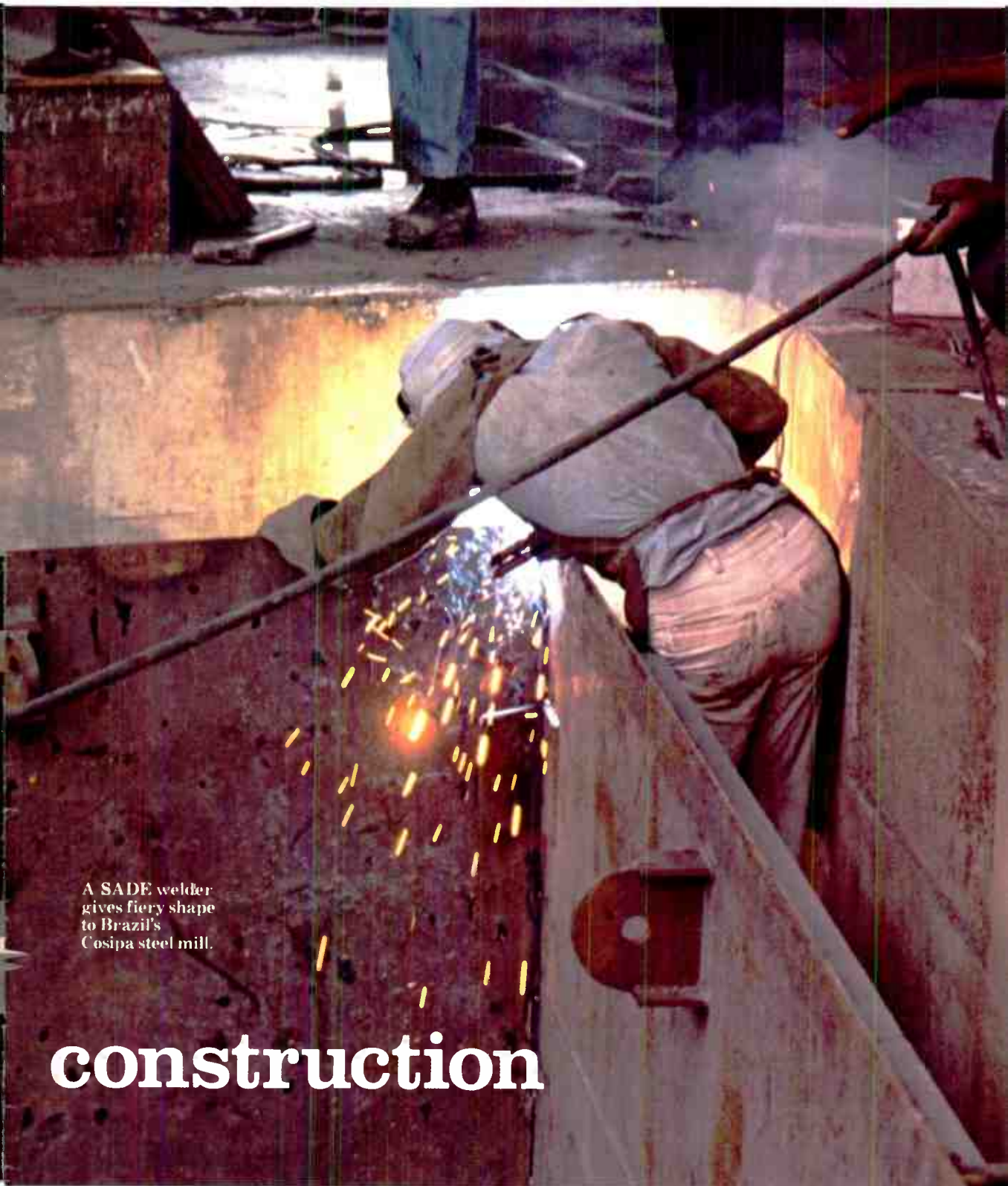
Without much fanfare, GE has become a major builder throughout the world, offering the capability to engineer a construction project, hire the workforce to get the job done, and provide project management through the whole construction cycle.

The GE component adding construction to General Electric's array of services businesses is the Construction and Engineering Services Group (C&ESG) of the Power Systems Sector, headed by John A. Urquhart, Senior VP and Group Executive.

A talk with Edward F. Roache, C&ESG's VP for Planning Integration Operation, establishes the fact that, for GE, construction is a big busi-

(continued on page 4)

Overseas



A SADE welder gives fiery shape to Brazil's Cosipa steel mill.

construction

ness that C&ESG is bent on making still larger and more profitable.

"C&ESG's mission, as we see it, is to put General Electric into profitable participation in project management, construction, erection, installation, operation and maintenance markets on a worldwide basis," Roache recently told a *Monogram* reporter, in his Westport, Conn., office, the hub of C&ESG's far-flung activities.

Roache sees a dual responsi-

bility in C&ESG's work: "The Group has a key role as a business in its own right. But we also provide extended-scope services, including turnkey project management and implementation, that enhance the sale of GE products and services. Our operations lead the way for other GE businesses and enable them to participate in markets not otherwise available to them."

The story behind GE's entry

into construction services traces back to 1960. That year the Company acquired majority ownership of the Italian electrical manufacturer, Compagnia Generale di Eletticit , or Cogenel. One of the assets of that acquisition was a group of affiliated companies named SADE/SADEMI (the names SADE and SADEMI are acronyms—SADE, for example, comes from the Spanish 'Sociedad Argentina de Electrificaci n,' the first



In the Morundu mountain range, SADE is erecting a transmission line that will link S o Paulo and Rio to the world's largest dam: Itaipu.

Close-up: SADE- Brazil



company in the group of affiliates.) Investigation determined that this group, based in Italy, Spain and South America, was doing a capable, profitable job of conducting construction projects in many parts of the world.

The originator of SADE/SADELMI was the man who is still in charge of it: Vittorio Orsi, an Italian electrical engineer and entrepreneur. Orsi, just after World War II, went to Latin America to give the

managerial and entrepreneurial thrust to the investors of a small Argentine company established to build electrical-mechanical installations.

Orsi expanded by establishing a SADE subsidiary in each country where he had projects. In a few years, he was busy all over Latin America and was taking on many other types of construction activities.

“Each SADE subsidiary is an integral part of the country in which it is located,” he

explains, adding that he made entrepreneurship work in the developing nations by taking into account the risks, recognizing the circumstances and then adapting. “Thus, we have become an element, an ingredient, of whatever country we have been in.”

Vittorio Orsi’s younger brother, Giorgio, soon joined the organization. While Vittorio directed mainly Latin American field operations, Giorgio provided the SADELMI base in Milan initially to handle purchases of materials and components needed in SADE projects, as well as supporting engineering activities. Vittorio Orsi also added manufacturing operations to his construction activities by building SADE manufacturing plants in South America to produce electrical and mechanical components (switchgear and switchboards in Argentina, for example, and steel manufacturing in Brazil).

Under the Orsi brothers, SADE/SADELMI kept expanding, both geographically and in terms of the types of projects for which it assumed responsibility. Dams, airports, industrial plants, government and university buildings—SADE took them on throughout Latin America and, increasingly, in Africa and the Middle East. The Orsis merged their business with Cogenel in 1957. Cogenel then became a part of General Electric in 1960. Today, SADE/SADELMI is composed of 16 individual companies.

Observes Orsi: “Construction must be an essential part of any company with the mission to be international.”

There’s no great secret to SADE’s success, Roache

(continued next page)

IN THE MOUNTAIN JUNGLES west of São Paulo, a crack construction team from SADE-Brazil labors under the scorching sun. It is February, Brazil’s summer. The temperature is past 100 degrees and sweat boils from every pore as the men work furiously on a transmission line that will connect São Paulo to Itaipu, the world’s largest hydroelectric power plant now being built on the Brazil-Paraguay border.

The section of line the men are erecting is 247 kilometers long. The terrain is some of the roughest in Brazil. Usually, the team can string 12 kilometers of line in a week. The pace for this project has been just six kilometers a week. But the team is confident it can meet its spring 1982 deadline. Building transmission lines is a SADE specialty.

Of all the SADE/SADELMI companies (there are 16), the Brazilian affiliate is the largest. It employs nearly 14,000 people—about half the entire SADE workforce.

It is also one of the largest and busiest construction firms in Brazil. Along with the above-mentioned transmission line work, SADE-Brazil is currently involved in some 60 other projects—from hydro construction, including the Itaipu dam, to steel mills to deep-water ports.

But where SADE-Brazil shines brightest is in transmission line construction.

The teams it sends into the field are among the finest in the world. The men it hires are the free spirits of General Electric.

Says Silvio Cunha, coordinator of the Itaipu transmission line project: “They’re adventurers who think nothing of traveling 3,000 miles into the jungle to put up 200-foot-high towers. It takes four years to train our crews and, in many cases, they assist other SADE affiliates in Latin America and Africa.”

To date, SADE-Brazil transmission lines crisscross Brazil’s mountains and jungles for 40,000 kilometers. Business is

(continued next page)

believes. "They have earned their way by providing dynamic, dedicated, experienced, capable management of construction projects. SADE has built a reputation for on-time quality performance in difficult environments. They have proved they can do the whole job — engineer the design of the plants, hire and train the workforce, obtain the equipment and materials they need, and push the project through on schedule and within their budget. They have learned to cope with different languages, different religions, different cultures, different currencies. SADE SADELM I is one of the most truly international operations imaginable."

Roache sees great benefits accruing from the interaction of SADE SADELM I people and the other components and management teams of C&ESG. "This is an interaction where the word 'synergy' has much more than the usual meaning. The combination of SADE's great depth of construction expertise and the General Electric experience we bring to the equation — the knowledge of GE technologies, of GE strategic planning, of risk analysis, of the whole range of opportunities presented by GE operations — is adding up to much more than the sum of the parts."

Working together, C&ESG and SADE managers are planning construction thrusts into new parts of the world and new types of projects. Says Roache: "SADE's growth has been on a pragmatic, intuitive, country-by-country basis. Today we see our task as taking a larger view. We believe there are more opportunities for SADE SADELM I in the oil-rich Middle

East countries and in the Far East. We believe SADE will be more of a factor in telecommunications projects, secondary oil recovery, environmental and pollution control projects, petrochemical plants, mining, agro-industries, mass transit. We're helping SADE strengthen its organization and corporate structure to meet the needs of the future. Above all, we are providing the interface by which SADE can enter into joint projects with GE components."

GE's new approach to energy markets includes a vital role for C&ESG. In VP Urquhart's view: "One of General Electric's basic strategies today is to look at energy as a much larger market than power generation and power delivery equipment, important as these are. Now the attitude is that GE will participate in energy across the board, from Utah International's mining of natural resources to the repair and maintenance services of the other C&ESG

SADE-BRAZIL, continued

expected to keep booming as Brazil's population — ranked sixth in the world — calls for more and more electricity.

Outside São Paulo, SADE-Brazil crews are racing each other through the Morundu mountain range. Heavy rains and environmental restrictions that limit the width of their path from the standard 70 meters to a narrow 30 meters are slowing the pace down. Over deep-rutted, slippery roads — some no more than a scratch on the jungle surface — SADE-Brazil hauls heavy pieces of machinery and lengths of steel for its towers. Built on site, each tower weighs 15 tons. For this project, 370 towers will be built. It takes 22 men to put up a tower. They are already a month ahead of schedule.

Some 500 miles to the west, another race is under way — the construction of the Itaipu dam.

An Indian word meaning "singing stone," Itaipu is a joint venture between Brazil and Paraguay. Construction firms from all over the world are battling a 1983 deadline to get part of the dam on line — or else São Paulo, the largest city in South America, will begin a rash of blackouts.

Among the 17,000 Brazilians now working at the massive site on the Paraná River, 1,000 are from SADE. Forming part of a consortium, SADE is helping to construct the dam's electromechanical work.

Itaipu, however, is just one of many hydro projects SADE-Brazil is working on. It is planned that, by 1985, 89% of Brazil's electricity will be generated by water.

Not all of SADE-Brazil's construction jobs are tied to power projects. The GE affiliate is also erecting steel mills, deep-water ports and an automotive manufacturing plant.

In the past decade, Brazil has tripled its steel production. Old steel mills are being renovated and rebuilt so they can

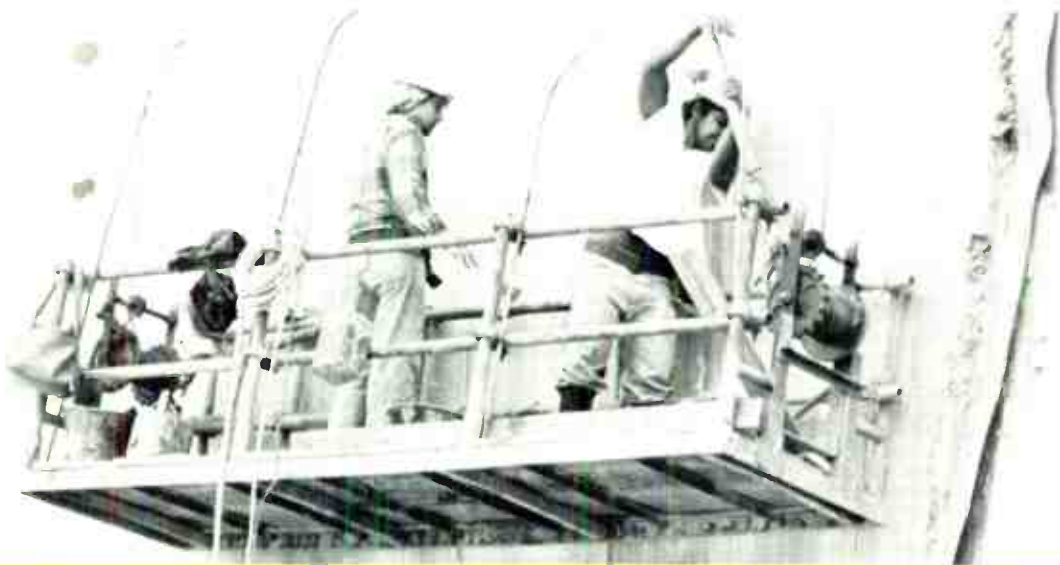
components—Installation and Service Engineering and the Apparatus Service Division. To this broad spectrum, we add a whole range of construction technologies in engineering and building power plant structures, transmission lines, substations, distribution networks, lighting systems and the like. The new Company perspective on energy is grist for our mill.”

The integration of SADE within C&ESG gives General

Electric businesses another important advantage, according to Roache. “We have a long-term, established presence in more than 20 countries, with our primary focus on the developing nations of Africa, the Middle East and Latin America. To have a strong presence in these countries is important, because the most attractive international construction markets are in the less-developed countries with great needs for developing their

infrastructures. The effect of this presence will, again, be a strong pull-through for GE products and services.”

What’s ahead for C&ESG? Roache has no doubt: “After we weather the present period of depressed economic conditions in many countries of the world, we foresee a new period of growth for C&ESG. We’re planning to grow through new business development and diversification, both geographically and technologically.” **AW**



The Itaipu dam (above) is being built with SADE help. Below: a construction crew works on conveyor belt at Port of Sepetiba.

produce more steel. SADE is working at two mills, including Brazil’s second-largest steel plant, Cosipa. Located about 60 miles southeast of São Paulo, Cosipa makes most of the steel plates used for building cars. SADE is doubling the size of the plant — constructing a new sinter unit, adding new coal and iron ore yards, and setting down 12,000 meters of conveyor belt.

Although Brazil has thousands of miles of coastline, it has few natural harbors. SADE is helping to solve that problem at the Bay of Sepetiba, some 70 miles southwest of Rio de Janeiro, where a deep-water port is being constructed. When it’s finished, the port will welcome ships carrying coal and grain. The coal will be loaded onto SADE-built conveyor belts and shuttled several miles to a SADE-built coalyard.



Monographs



Back in the saddle again. Many cowboys, rodeo riders and horse show enthusiasts can sing that Gene Autry tune

because of Martin Bergin. He's the only saddle-maker left in St. Louis, once the national capital of saddle-making.

A renewal parts analyst for Medical Systems Business Operations' St. Louis District, Bergin handmakes saddles for customers around the country during his spare time. "Most saddles today are factory-made, but some people still insist on handmade ones," he adds.

Bergin can build a customized saddle in 16 hours, but that must be stretched over three weeks so the leather can be wetted, dried and shaped. He begins with a saddle tree, or wooden frame, and makes a

paper pattern for the saddle skirts, seat, fenders, stirrups, Cheyenne roll and other saddle pieces. After cutting, tooling and carving the leather pieces, he hand-sews them together into a saddle worth between \$500 and \$1,200.

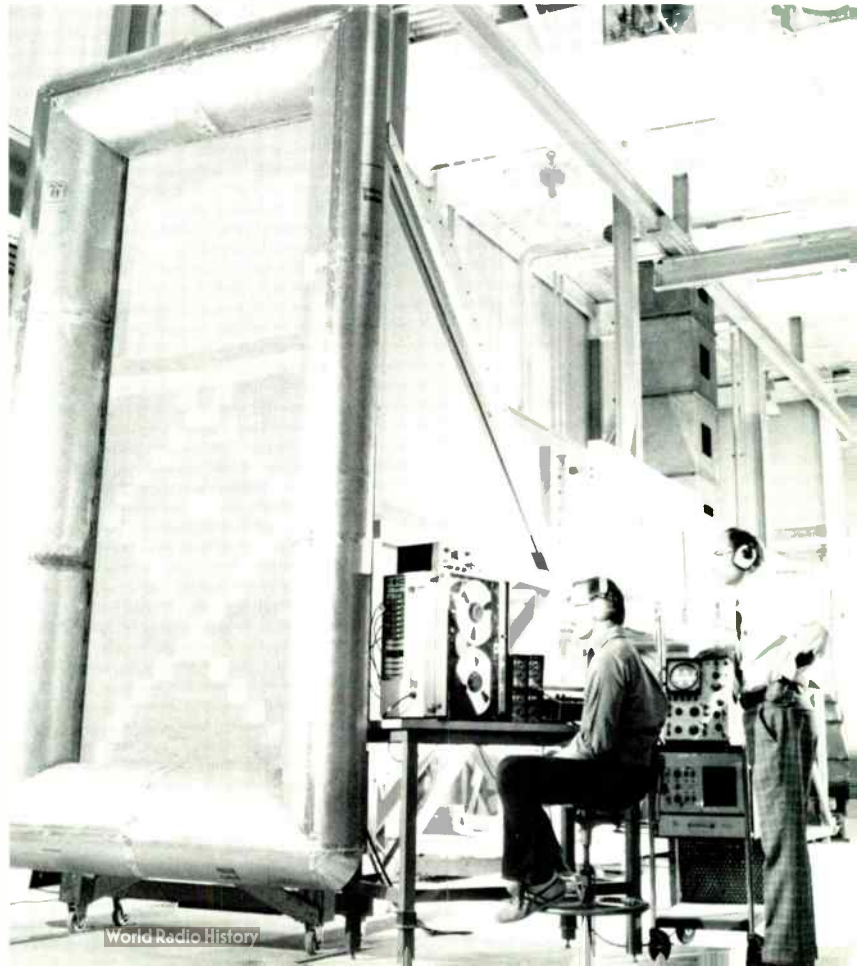
"I've been making saddles for 25 years," says the Texas native. "As a young boy, I'd hang around saddle shops and listen to the cowboys. Then I began repairing saddles, and finally I began making them."

He's used them too. For 25 years, Bergin competed in rodeos, riding bulls and broncos, and suffered "at least 22 broken bones" before retiring.

Listening to the wind. Technician Walter Chesaniuk (seated) and Dr. Sudhir Savkar, manager—Engineering Mechanics Unit, collect acoustic data from a giant wind tunnel located in the new Combustion and Fluid Mechanics Building at Schenectady's Research and Development Center.

The \$7 million addition to the Center's energy research facilities is designed to help speed development of advanced power systems for electric utilities and the aircraft industry. The addition features eight computer-controlled test cells for evaluating new types of combustion systems, including those fueled by coal-based synfuels.

The building also has a high-bay area for aerodynamic studies, including the wind tunnel for studying air flows through turbines, and an experimental "cyclone" for examining gas cleanup systems.





Chips for GE. A new \$8 million Programmable Processing Facility opened recently at Syracuse's Solid State Applications Operation (SSAO).

Containing the latest in computer-controlled processing and test equipment, the facility will produce prototype amounts of customized integrated cir-

cuits, or chips, for GE products. The facility's extensive computerization allows its equipment to be easily reprogrammed from one semiconductor to another.

"The number of processes for fabricating integrated circuits has proliferated in recent years, dictating the kind of flexibility that's built into our facility," says Dr. Walter J. Butler, manager—SSAO.

The new facility is designed for processing state-of-the-art, four-inch wafers like those being loaded by Shirley Nitzke (left) into the computer-controlled diffusion furnace.

Wiring: for help. A new 100-page booklet from General Electric's Wiring Device Business Department is designed to help homeowners understand their home electrical system and perform many electrical

projects around the house.

Filled with tips, diagrams and step-by-step procedures, the booklet shows how to add circuits, replace switches and plugs, install fixtures, install outdoor wiring, and test the

wiring. Safety and proper tool selection are emphasized.

Entitled "Wiring for the Do-It-Yourselfer," the guide is available at nominal cost wherever GE wiring devices for the home are sold.

Honors. For the 12th year in a row, General Electric took first place in the *Industrial Research and Development* magazine competition to select the 100 most significant technical innovations of the year. GE had eight winners in 1981, bringing the Company's total to 137 awards since the competition began in 1963.

- The American Society for Nondestructive Testing gave its Technical Achievement Award to Dr. Henry J. Scudder III, an information scientist at GE's Research and Development Center in Schenectady, for his innovative work in using computed x-ray tomography for testing aircraft engine turbine blades and other manufactured components.

A 'barrowing' experience. It was a mild winter's night on a lonely stretch of road in north-western Australia. Suddenly, out of the dark, came the Flying Fleas... and the Baler Bullets.

Two teams of 14 primary school children each, the Fleas and Bullets were coming down the road, taking turns pushing wheelbarrows filled with 24 pounds of iron ore. Their destination? Port Hedland, almost 70 miles away.

Sponsored by Australian General Electric Limited, the Fleas (right) and Bullets were competing in the 11th Black Rock Stakes, an annual all-night wheelbarrow race from Goldsworthy to Port Hedland that has raised more than \$100,000 in pledges for medical and charitable services in this



rugged part of Australia.

Incidentally, the Bullets flew faster than the Fleas this year, covering the distance in 6 hours, 33 minutes. The Fleas, however, flew off with the trophy for the team that raised the most money.



Ulrich Schiller

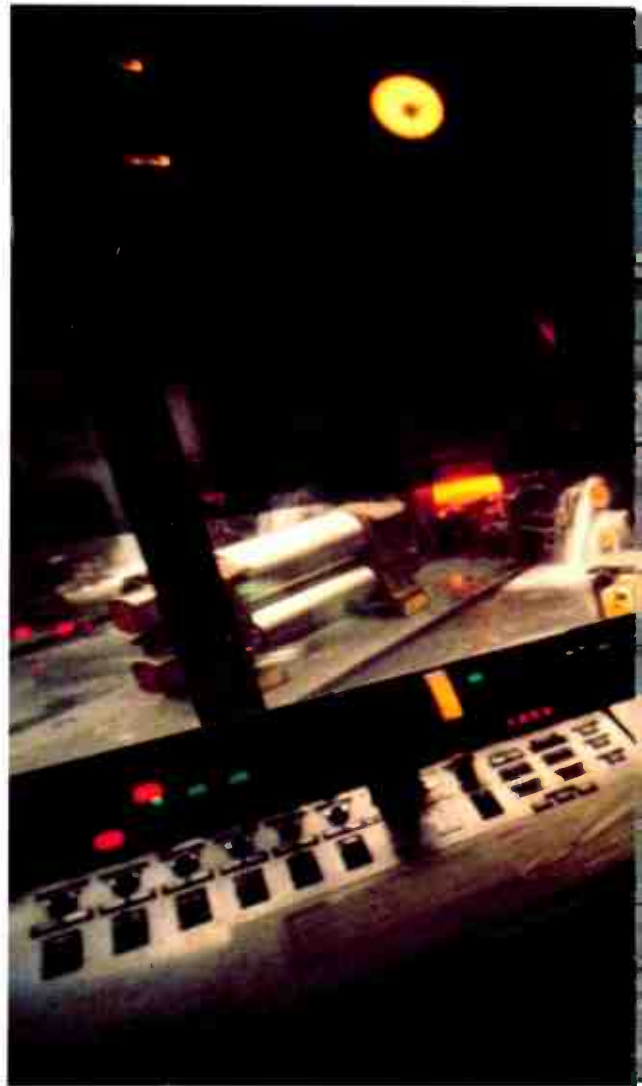
Making steel tough again

GE is playing an important role in revitalizing America's steel industry.



Arthur Arazien

GE motors and drives (above) run hot rolling mills (below) and other steel equipment, while GE computer process controls (right) automate the steelmaking process.



STEEL. The very word exudes strength, toughness, visions of America's industrial might.

In recent years, however, the American steel industry has hit upon iron-hard times. Overall, it is no longer the world's most efficient steelmaker, and hasn't been for the past decade. Japanese and European competitors have nibbled away at its markets, both at home and abroad. And, to compound the situation, nearly one-fourth of America's steelmaking capacity is obsolete.

According to a government report entitled "U.S. Industrial Competitiveness," issued this summer by the Office of Technology Assessment, the domestic steel industry is at a critical point. To survive competitively, the report states, the industry must modernize its plant and equipment



by installing technologies — such as continuous casting and computerized process control — that improve yield and productivity, and lower operating costs.

Furthermore, President Reagan has called the revitalization of the American steel industry “the first step in the industrial revitalization of our country.”

The industry is responding. As noted in *Iron Age* magazine, steel producers have committed almost \$5 billion this year to plant expansion, modernization and efficiency. That’s more than the industry poured into capital expenditures during the preceding two years, and the biggest spending splurge in the industry since the early 1960s.

“We’re seeing an awakening of the American

steel industry, and we’re ready to capitalize on it,” says General Electric’s Joel Tenzer, general manager — Drive Systems Department.

Located in Salem, Va., Drive Systems supplies the steel and metals industries with high-technology process controls and automation systems. In addition, it serves as the Company’s “lead” into this market for other GE product departments. These include the Large Motor and Generator Department, DC Motor and Generator Department, Small AC Motor Department, Speed Variator Products Operation, General Purpose Control Department, Industrial Control Department, Distribution Equipment Division, Medium Transformer Department, and Specialty Transformer Department.

“Drive Systems can put together an entire electrical package for a steel plant,” adds Frank

(continued next page)

P. Ziemkiewicz, manager—Metal Industries Sales Region. “That’s to our advantage, because steelmakers like to have one electrical supplier.”

Other selling points include Drive Systems’ technological leadership and its demonstrated performance.

“We have supplied the metals industry with automation systems for many years,” explains Tenzer. “Our control and automation systems already exist in mills throughout the world, from Australia, Taiwan and Korea to France, Italy, the Netherlands, Sweden, Poland and Brazil. We’ve demonstrated overseas what we can do for the American steel industry.”

Tenzer singled out three areas—quality, productivity, energy—where GE systems, using computer software based on the Company’s own process models, will help steelmakers. For instance, new computer process controls for shape, thickness and temperature will improve quality and yield in hot strip mills. And furnace temperature controls improve heating efficiency, keeping a mill’s energy costs down.

The “awakening” mentioned earlier by Tenzer has already meant increased business for GE. For example, among the orders and commitments received by the Company in 1981 are:

- \$18.5 million from United States Steel Corp. for drive systems, dc motors, motor control centers, and medium transformers for a new pipe mill to be built in Fairfield, Ala. The GE equip-

ment will help the 600,000-ton mill produce seamless pipe, primarily for the oil well drilling industry. The mill is scheduled for completion in early 1984.

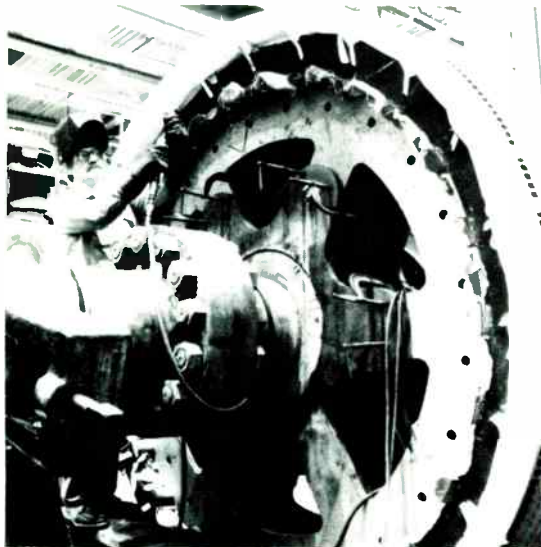
- \$6.6 million from CF&I Steel Corp. for drive systems and dc motors to be used in a new seamless tube mill in Pueblo, Colo. The mill, scheduled for a 1983 startup, will expand CF&I’s oil tubular capacity from 200,000 tons to 350,000 tons.

- \$4.3 million from Wheeling-Pittsburgh Steel Co. for drive systems and related equipment for a new two-strand slab caster at its Steubenville, Ohio, plant. This facility is expected to provide steel for 90 percent of Wheeling-Pittsburgh’s flat rolled products.

- \$9 million from Carpenter Technology Co. for drive systems and dc motors for a complete new bar mill at its Reading, Pa., facility. This is part of a \$400 million program to increase Carpenter’s capacity by 50 percent.

On the above orders and commitments, the Drive Systems Department is working with Italian, American, Japanese and German OEMs, respectively.

“It’s a good example of the importance of our participation in the international market,” concludes Tenzer. “If we hadn’t supplied these systems to foreign steelmakers, we wouldn’t have maintained and improved our capabilities, knowledge and technology—and we would not have been able to participate in this reindustrialization of the American steel industry.”



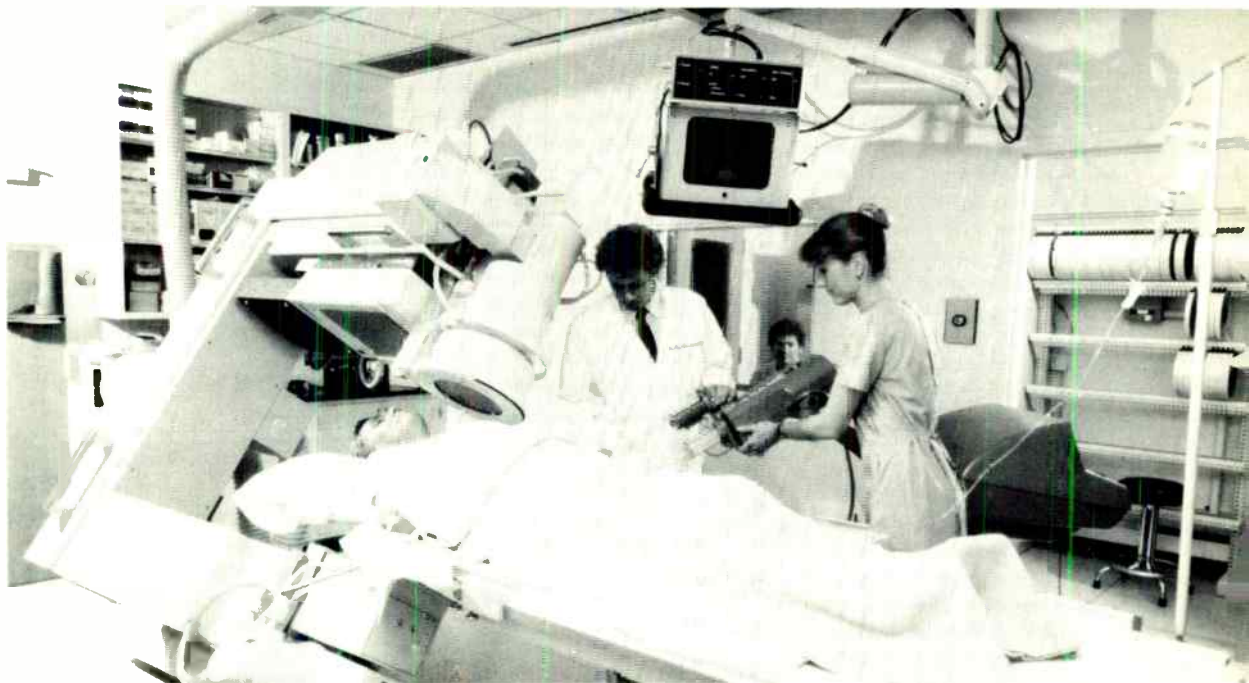
ASBD employee prepares to weld a dc mill drive motor used by the steel industry.

Steel services spotlighted

Another benefactor of steel’s reindustrialization is the Company’s Apparatus Service Business Division. Its network of on-site machining centers can reduce costly downtime in a steel mill by on-site repair, modification and testing of a mill’s equipment.

The Division’s on-site machining services were spotlighted at the recent Iron and Steel Exposition in Pittsburgh. The GE exhibit also featured the SILTRON[®] power conversion and control system, the new Kinematic[®] CD4000 motor, a new line of low-voltage motor control centers, the new AKD-8 low-voltage switchgear, and the Series 6 Programmable Controller.

The right diagnosis



GE Digital Fluoricon 3000[®] enhances x-ray images for analysis.

A look behind one of the Company's fastest-growing businesses reveals that Medical Systems' response to a crisis brought about a recovery.

X-ray photography opened a new era in medicine at the turn of the century by giving physicians their first tantalizing glimpse inside a living body. General Electric immediately recognized x-ray's potential and by 1920 its medical systems business was among the world's leading manufacturers of medical and dental x-ray equipment, a position it occupies to this day.

By 1974, however, Milwaukee's Medical Systems Business Operations (MSBO) was facing a crisis. Offshore competition was eroding its market share in x-ray equipment. And a number of firms had introduced computer-aided tomography (CT) scanners, a revolutionary diagnostic device that wedded x-ray technique with computer technology to provide cross-sectional, three-dimensional views of internal body structures—not just bones, but

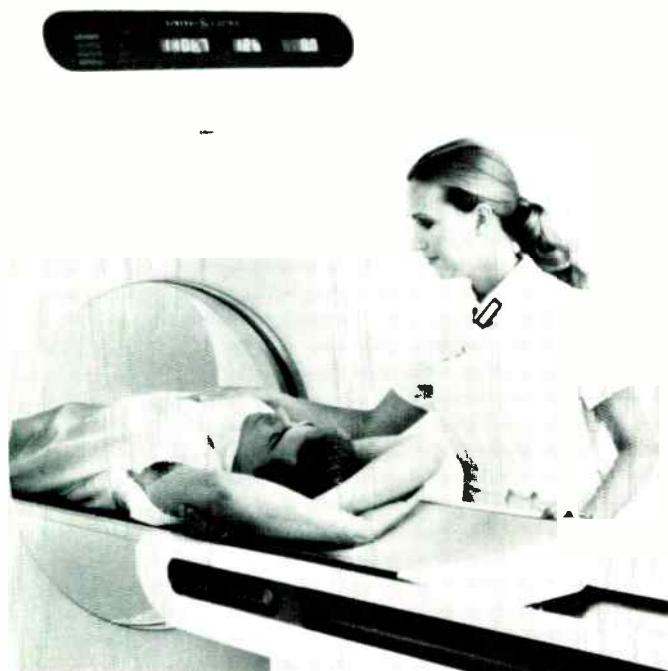
soft tissue as well. General Electric had no product with which to compete.

How could the Company gain back market share in its core x-ray business while meeting the CT challenge?

Newly-appointed MSBO VP and General Manager Walter L. Robb chose a two-pronged strategy. First, he would rely on Medical Systems' biggest strength—sales and service—to get a significant share of orders for the existing products, and second, MSBO would embark on a joint research project with Corporate Research and Development (CRD) in Schenectady to perfect a new kind of whole body scanner. Both steps would be supported by new quality improvement programs to ensure the finest products possible.

The result of these two strategies?

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CT 9800[®] scanner takes more images—faster—than any other CT.

GE's U.S. x-ray share increased by 40% from 1974 to 1980. And further improvement is expected with the introduction of the new Digital Fluoricon 3000[†] digital x-ray unit. The first such unit was recently installed at Stanford University Medical Center, and is generating excitement among radiologists for its ability to pinpoint trouble in the vascular system without an angiogram, a risky and painful process in which a catheter is inserted into a patient. The machine processes and displays images on a screen—rather than recording them on film as in traditional x-rays—so diagnostic information can be enhanced for analysis.

A foray into the CT scanner market in 1976 was even more successful. Rather than emulate existing units, GE introduced a revolutionary "fan-beam" scanner, in which both the x-ray tube and the information-gathering detectors were made

to rotate together.

Initially, there were imaging problems, but these were resolved within the year and an improved scanner called the 8800 was introduced. It had more detectors and a bigger, faster computer than the first model.

"This is important," says Arthur L. Glenn, general manager—CT Department, "because the more detectors there are, the greater the detail resolution. More detectors also permit more data samples in a given time, requiring a larger computer to process the additional information."

The 8800 was an unprecedented success. Early U.S. government criticism that CT scanners were too expensive and would raise the cost of medical care slowly gave way to realization that the use of CT scanners can shorten hospital stays and reduce exploratory surgery, thus cutting hospital costs. Further, to allay fears of

obsolescence in purchasers of the equipment, MSBO provided a design that enabled early production units to be upgraded as improvements were developed. U.S. sales rose very rapidly, and GE now enjoys a high share of the CT market in this country.

Worldwide, the impact was also great. Notes Paul V. Bachand, general manager—International Department: "The Company gained a position in many key markets where it had never sold medical equipment before. The 8800 scanner became the flagship for worldwide penetration in Japan, Germany, Scandinavia, China and Australia, providing an entrée for other Medical Systems products."

Next year, GE will ship its first CT 9800[®] scanner, which was unveiled at Chicago's Radiological Society of North America show in November. The 9800 was praised by radiologists for its ability to provide four times as much data as other CTs, with greater speed. Show attendees were also impressed by the unit's ability to produce images of much smaller body structures than is currently possible, providing data about tissue not discernable before.

Development work also is being done on possible CT applications for industry, including the testing of small metal components.

In the two remaining diagnostic imaging areas, nuclear and ultrasound, the picture is also bright.

GE entered the nuclear medical equipment market in 1975. Unlike x-ray machines, which project a beam of radiation through the patient, then capture the "shadow" on film, the nuclear camera emits no radiation. Instead, it detects the ra-

diation given off by specific organs after the patient has been given a small dose of radioactive solution. A body organ, for example, that absorbs almost none of the radioactive material indicates an abnormality.

After selling nuclear cameras for five years, the Company began offering the industry's first single-source, total nuclear imaging package in 1980 with the addition of the Star System[™], a high-speed data processor for nuclear diagnostics. The Star has helped boost sales for all GE nuclear equipment and world market share has increased significantly.

In ultrasound — the fastest-growing segment of the diagnostic imaging market — a different marketing strategy was followed. In this case, CRD and MSBO helped improve the product of a small ultrasound company located in California. Unlike other diagnostic imaging systems, ultrasound uses sound waves, rather than radiation, to form a picture. The first GE ultrasound scanner was a so-called "static" scanner. It has been joined by two "real-time" units over the last year: the Dataline[™], used primarily in obstetrics, and the Datason[™] real-time module, used for abdominal exams. A third real-time unit for heart scans is now under development.

Overall, Medical Systems has realized a two-fold increase in sales over the past six years and a seven-fold increase in net income over the same period. Its products are everywhere from India to Indianapolis. The key to this success story has been General Electric's technological excellence, but it also involves the support that MSBO's sales, service, quality control and marketing provide.

The sales force is painstakingly trained in the applications of machines it sells. The service organization operates the largest repair training center of its kind in the world. MSBO's 1980 acquisition of EMI Medical's former sales and service network outside the U.S. was an additional step in keeping GE a worldwide medical equipment leader. Quality enhancement programs range from reliability tests to vendor workshops that stress the need for quality components. And MSBO's marketing operation produces one of the most widely-read periodicals in the field of radiography: *Clinical Symposium*, a compilation of case histories submitted by physicians who use General Electric diagnostic imaging equipment.

Medical Systems Business Operations is not resting on its laurels, however. The search for the "next CT" is continuing.

Research in NMR — Nuclear Magnetic Resonance, a potential new diagnostic tool, is being jointly done by Medical Systems and CRD. Though early

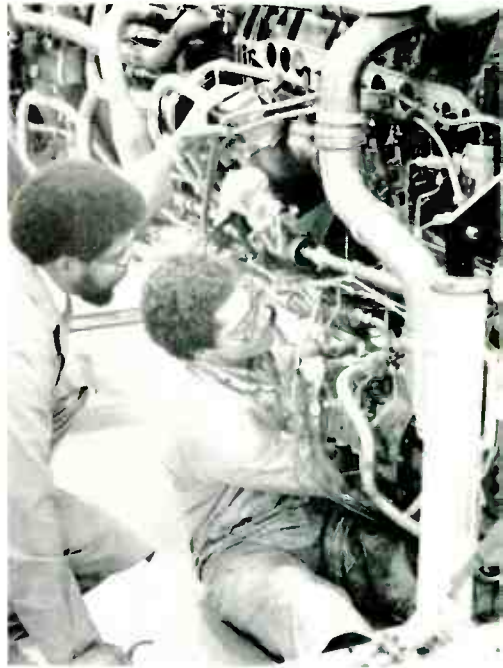
work indicates that NMR scans aren't quite as detailed as CT scans, for some parts of the body — particularly areas of the brain covered by thick sections of bone — NMR scans seem to work better than CTs. And unlike CTs and x-rays — which rely on ionizing radiation — NMR uses a combination of magnetic fields and radio waves that so far seem to be risk-free, even with frequent use.

"But what is especially intriguing about NMR," says VP Robb, is that it provides mathematical measurements that allow doctors to analyze tissue and the functioning of organs from outside the body."

"With our current product offerings and NMR on the horizon," concludes Robb, "we plan to be one of the technology leaders in diagnostic imaging in the decade ahead. Whether a patient is in an accident, preparing for heart bypass surgery, having obstetrical trouble, or undergoing diagnosis for an ulcer or a tumor, General Electric medical equipment will be there to support physicians in their critical tasks." ▲

Dataline ultrasound scanner is used in obstetrics.





Evendale's Rick Richards (left) watches students inspect an engine's interior using a bore-scope while Jim Broadnax (above) guides a student through engine disassembly. Below: Lynn's Fred McGarry leads classroom discussion on compressor components.



Teaching engine care

Students from around the world receive special education at Aircraft Engine's technical training schools.

THE STUDENTS come from New Zealand and Thailand... from Egypt and Ecuador... from Cameroon and Greece... from the United States and just about anywhere else airplanes land and take off.

Some arrive wearing military uniforms; others come dressed in shorts or pin-striped suits. Most are men in their 30s or 40s, but classes sometimes have a coed or two. They speak a variety of languages, and their backgrounds produce a colorful mosaic of the world's cultures.

All differences aside, the students have a common determination to learn about General Electric engines, which is why each year hundreds of them enter the Aircraft Engine Business Group's technical training schools in Evendale, Ohio, and Lynn, Mass. There they learn the latest techniques in troubleshooting, disassembly, assembly, maintenance, repair and operation of GE's aircraft, marine and industrial engines.

"Our mission is to teach customers how to operate and maintain GE engines," says A.E. (Ed) Langhorst, manager—Evendale Technical Training School.

Adds John Sullivan, his counterpart at Lynn: "The better trained their people are, the better our engines will perform."

Customers include commercial airlines worldwide; aircraft manufacturers; U.S. and foreign military organizations; industrial firms, such as oil companies, particularly those involved in offshore drilling and exploration; and commercial charter jet, corporate jet and commercial helicopter operators. Government agencies charged with inspecting and regulating aircraft also send representatives. So do suppliers of engine components. And, over the years, many GE service engineers, and factory and field support personnel have joined the alumni ranks.

Because each school is responsible for training operators of GE engines built in that particular plant, Evendale's classes are usually composed of commercial airline customers while Lynn's classes are usually filled with military personnel and small commercial engine operators. In either case, the students typically hold supervisory positions and, upon graduation, return to their home bases to train their own people.

Courses vary from a few days to several weeks, depending on the students' needs, with different groups of students arriving and leaving throughout the 51-week school year. ("We'll even stay open between Christmas and New Year's if a customer requests it," says Langhorst.)

Highly qualified instructors—there are 12 at Evendale and 10 at Lynn—use training manuals, textbooks and modern visual aids in their classroom presentations.

Only one-fourth of the time is spent in the classroom. "They spend most of their time here in the workshop," notes Langhorst, touring the newly expanded Evendale facility. In it, groups of students—usually four or six from the same organization—can work on full-scale, production model engines. Lynn has a similar "hands-on" area.


"We may spend three to five days lecturing on the engine's construction, specifications and how its systems operate," says Lynn's Sullivan, "and then we take them into the shop area where they disassemble, inspect and reassemble the engines just as it would be done on the job."

Students are tested on what they were taught to help them assess their proficiency and confidence in the subject matter.

The schools provide off-campus instruction, too. Faculty members from Lynn and Evendale have even taught classes in Africa, Europe and Asia.

Videotapes produced in the schools are sold to customers for their own training classes. Marketing groups use the schools to put on demonstrations showing customers how easy it is to disassemble and assemble GE engines.

"We feel we have a competitive edge with this type of quality facility," says Evendale's Fred W. Preston, manager—Commercial Engine Support Services. "Students who come here can see and handle the equipment. They learn up-to-date procedures on the newest equipment."

"We can build the best engines and produce the best maintenance manuals," adds Lynn's Alfred J. Morin, manager—Support Services, "but, to keep it that way, mechanics must receive the best training. We teach them to take care of our engines." 

PRODUCTS

More good things



Computerized dishwashing. Imagine a "smart" dishwasher that shows the relative energy used for various cycle options, so the cycles can be regulated to save energy. Or a dishwasher that diagnoses problems, such as a clogged drain, and warns users when something goes wrong. Well, it's here. General Electric's new 2500 Dishwasher brings microprocessor technology to cleaning dishes. It even "remembers" the last wash-rinse-dry setting, so the cycles can be repeated by merely touching the "start" pad.



Lights, action. And here's the camera. The new GE color video camera features a power zoom lens, macro focusing down to two inches, a high-speed lens for low-light conditions, and an automatic iris control for proper picture contrast at all times. The camera also comes with telescoping boom microphone, adjustable shoulder mount, and a six-foot flexible cable.



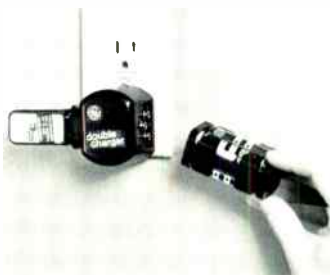
Your kitchen companion. Need to slice vegetables, shred cheese, chop nuts? The new Meal Fixer[®] slicer-shredder can do it, and much more. The versatile countertop appliance has three stainless steel cutters for slicing, shredding, and grating. All removable parts are dishwasher-safe, and the chute folds down for easy storage.



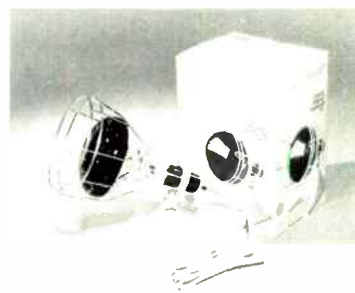
Decorative plant light. A new fluorescent plant light not only promotes plant growth, but also has a decorative shade in wood-grain finish. The Hi-Light Gro & Sho[®] unit can be mounted horizontally or vertically and the shade rotated for the best light pattern. It has a six-foot cord, and comes with a replaceable GE Bright Stik[®] Gro & Sho fluorescent.



Stereo on the go.
Or at home. With the new Home 'N Go compact stereo unit, General Electric delivers great sound indoors and outdoors. It features five-inch woofers and piezo tweeters, separate bass and treble control, and telescopic whip antenna. Optional accessories are available, too. Lightweight, decorative unit operates on batteries or ac power.



Twice the charge.
The Double Charger offers twice the charging capability of previous GE miniature chargers. Plugged into an ordinary household outlet, it can charge two, four or eight AA size batteries, two or four C or D size batteries, and one or two nine-volt batteries. It charges different size batteries at the same time, and works 25 percent faster than previous GE chargers.



Chase the chills away.
GE has a warm spot for you with its Chill Chaser[™] Deluxe Heatlamp Kit. Its infrared bulb can warm cold bodies or comfort weary muscles, especially when thermostats are turned down to save on energy costs. Another portable lamp, the Warm Up[®], is designed for spot-heating frozen pipes, wet distributor caps, etc. Both have wire lamp covers with hooks for easy hanging.



Dial S for Small.
Using the latest in microprocessor technology, this touch pad control unit for GE's new radio telephone is so small it can be mounted on the dashboard for extra convenience and safety. The control unit and handset are connected to a trunk-mounted mobile radio unit, which provides access to the public telephone network.



Out of sight.
A push-button retractable cord and handy hang-up ring make the GE Out of Sight 1400 hair dryer easy to store. Other features include six separate heat/air settings and 1400 watts of drying power.



Wash and dry extras.
A new Extra Cleaning Cycle available on all GE multi-speed, large-capacity washing machines is specially designed for use of extra detergent to take out heavy soils on

modern synthetic fabrics. All large-capacity GE dryers also have an Extra Care option that helps keep clothes wrinkle-free if the clothes cannot be removed immediately.



Alberto O. Alvarez



Melvin Bobo



O. Clark Coho



Kenneth C. Cotton



Russell L. Crowther

TECHNOLOGY

1981 Steinmetz awards honor innovators

ELEVEN scientists and engineers from five Company sectors were named winners of the fifth biennial Charles P. Steinmetz Awards. Sponsored by Corporate Technology Staff, the awards honor people whose technical contributions help GE and society. This year's selection brings to 49 the number of medals granted since the program was started in 1973. In addition to the award, each recipient has \$5,000 donated to the college of his choice.

The late Dr. Arthur M. Bueche, who was GE's top technical officer, hosted the awards ceremony at Company headquarters in Fairfield, Conn., just before his death in October. The winners are:

- **Alberto Ortiz Alvarez**, for pioneering contributions that led to the development of computerized transformer optimization programs, permitting

standard design practices for transformers produced by Latin American Operations.

- **Melvin Bobo**, for his sustained record of technological achievement, including 21 U.S. patents in the design of aircraft gas turbine engines for both military and commercial applications.

- **O. Clark Coho**, for motor technology, including the development of an improved method for commutation performance analysis that led to the invention of the "symmetrical radial tangential" windings used in dc traction motors, and the design of the first locomotive traction alternator which revolutionized the diesel-electric locomotive.

- **Kenneth C. Cotton**, for worldwide leadership in steam turbine performance testing and flow measurement. His technical

**Dr.
Arthur
Bueche**
GE's
technical
leader



Dr. Arthur M. Bueche, Senior Vice President—Corporate Technology, died in October after a brief illness. He was 60 years old and lived in Bridgeport, Conn.

A principal technical officer and member of the Corporate Executive Council, Dr. Bueche joined General Electric in 1950. He was elected a Vice President in 1965, an appointment that coincided with the combining of the former GE Research Laboratory and General Engineering Laboratories into the Research and Development Center, which he then directed for 13 years.

Under his leadership, a wide variety of discoveries and inventions were developed into



Raymond L. Dills



Major A. Johnson



William Peil



Jacob G. Rabatin



Paul J. Roumanis



John A.I. Young


contributions include development of improved methods for fluid flow measurement and nuclear steam turbine testing.

- **Russell L. Crowther**, for contributions spanning the entire history of the nuclear power business within GE. His key contributions range from the development of efficient methods of calculation for complex nuclear designs to inventions directed at reducing nuclear fuel costs and assuring compliance with safety requirements.
- **Raymond L. Dills**, for key contributions to the development of refrigerators and ovens, including the creation of the first large refrigerator compressor, a design that is still in use after 27 years, and the final design for the self-cleaning oven.
- **Major A. Johnson**, for pioneering work on radar systems design, including his conception

of an early “track-while-scan” radar technique, development of early missile guidance systems, and efforts in redesigning the mortar locator radar. He also invented the Johnson Scan for phased-array radar.

- **William Peil**, for contributions in linear and digital solid-state circuits and systems for both military and commercial products. His 37 patents include ones for development of the first single-chip AM/FM integrated circuit receiver system and an inexpensive ballast for fluorescent lighting systems.
- **Jacob G. Rabatin**, for discovery of high-efficiency X-ray phosphors that reduce patient exposure, as well as for research that has improved manufacturing productivity and lamp phosphor quality, and for efforts in the development of electronic phosphors for the television and

cathode ray tube industries.

- **Paul J. Roumanis**, for the design of the world’s first steel mill drive system employing solid-state power conversion, as well as a system that permits integrated control of the steel-making process through coordination of some 500 individual drives with electronic logic control and process computers.
- **John A.I. Young**, for leadership in the advancement of semiconductor technology in Canadian General Electric’s drive systems business. His contributions include development of the world’s first transistorized logic system, pioneering work in the application of thyristors to dc machines, and development of a two-phase cycloconverter that allows ac machines to operate in parallel without individual drive tachometers. 

major commercial successes in such areas as engineered plastics, improved lamps, new medical technology, solid-state electronics, data-handling techniques, and innovations in the generation, delivery and utilization of electrical energy.

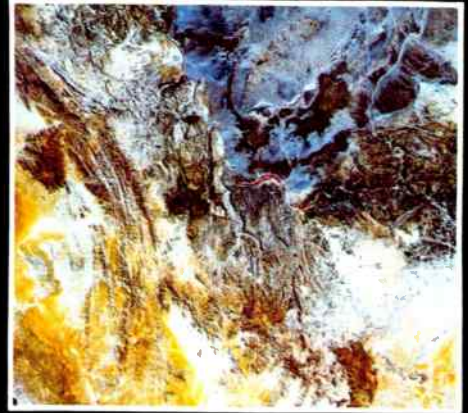
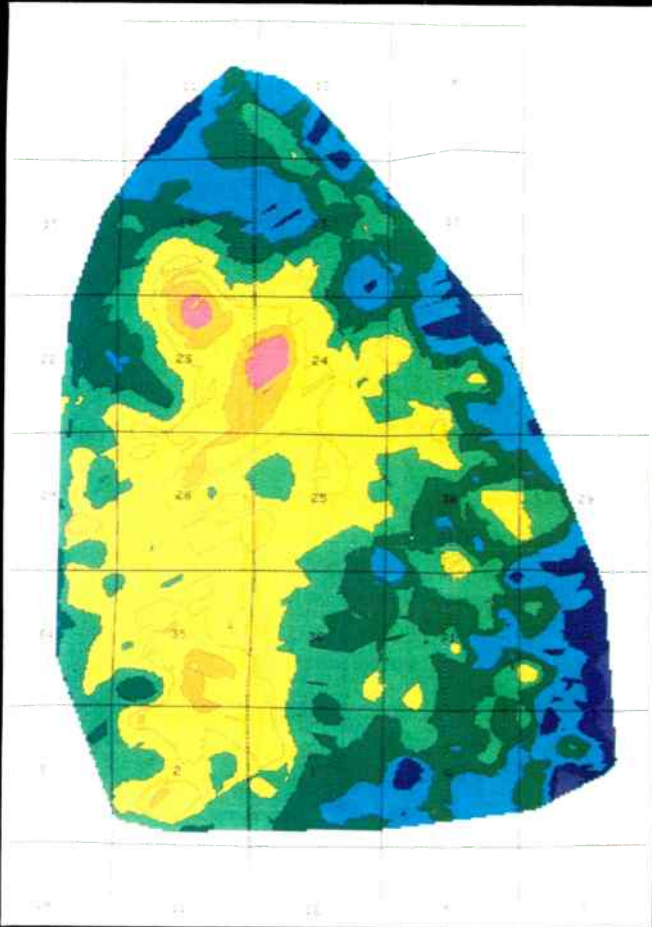
Dr. Bueche pioneered the development of new techniques for speeding technical opportunities from the laboratory to commercialization, was recognized as a major innovator in the planning and management of technical activities, and became an internationally known spokesman in the areas of technology and energy policy.

Just prior to his death, he received two honors.

The Polytechnic Institute of New York presented its Award of Merit to him for “distinguished technological achievement” and The Franklin Institute awarded its 1981 Fahrney Medal to him for leadership in science and technology.

Dr. Bueche also served on the Executive Committee of the National Academy of Engineering.

“The untimely death of Art Bueche has shocked and saddened us all,” wrote GE Chairman Jack Welch to all Company officers. “His contributions to the technical community, both internally and externally, were outstanding. We will miss him as a person and business associate.”



Left: Colors in this computer-drawn contour map from GEISCO represent different elevations in underground oil reserve. Above: Landsat image of southwestern Africa is color-enhanced for rocks and soils. Below: Irrigation map made by Genigraphics.



New dimensions in

LET'S TAKE A TRIP. We're going to places like Rockville, Md., and Tulsa, Okla.; San Francisco, Calif., and Lanham, Md.; Daytona Beach, Fla., and Syracuse, N.Y.

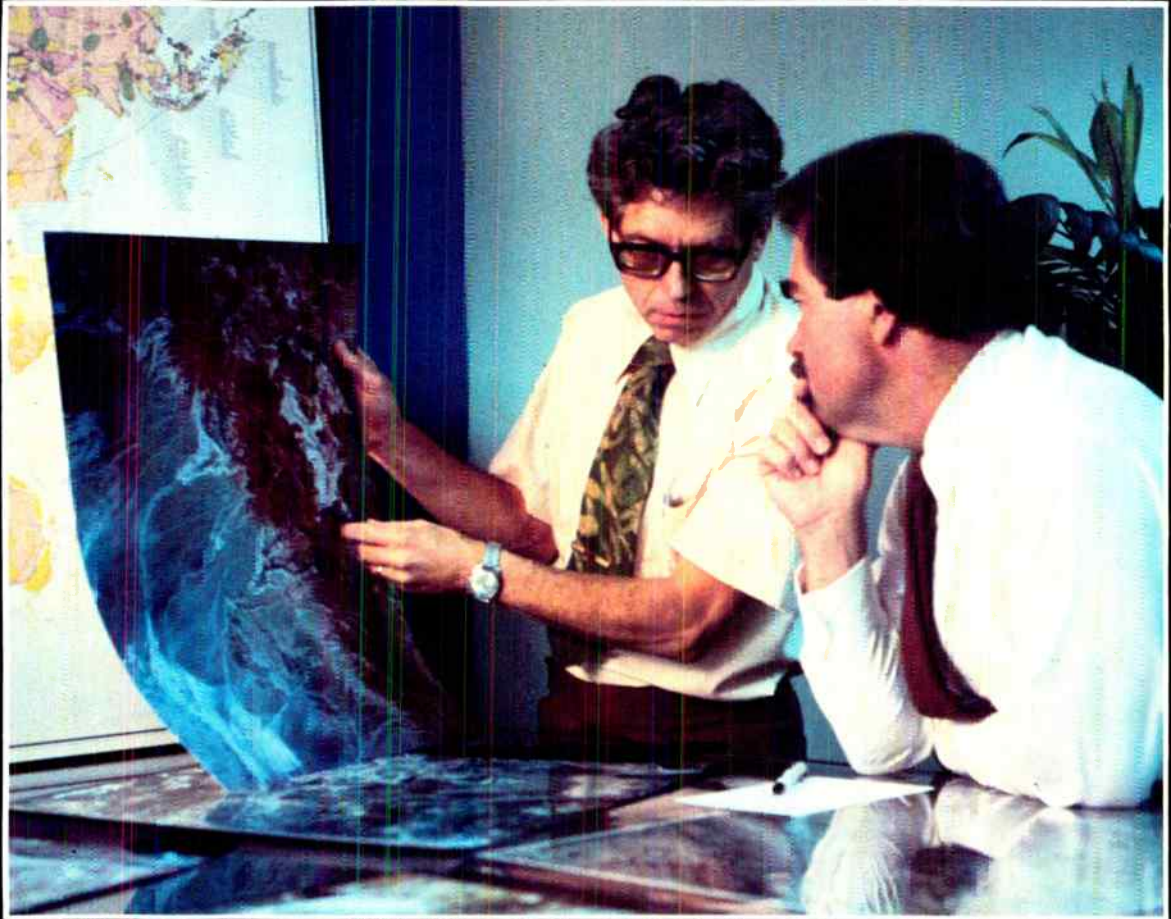
Obviously, the first thing we'll need is a map — which is apropos since we're taking this whirlwind tour to see some of the ways General Electric is involved in cartography. We'll see how GE provides maps for government, military, and

commercial uses; and how the Company uses maps to explore for mineral resources.

So, let's unfold the map and start in...

Rockville, Md. — and the headquarters of General Electric Information Services Company. Among the many computer services provided by this GE affiliate are specialized software packages with mapping capabilities, such as SAS/GRAPH.

A product of SAS Institute in North Carolina, and offered worldwide through GE Information Services' software library, the SAS/GRAPH package can produce color-enhanced, three-dimensional maps that graphically portray population densities, consumer trends, and other statistical information. One Canadian company, for instance, used this package to show the consumption — province-by-



Utah's Dr. John Gabelman (left) and Oliver Warin study Landsat images for possible mineral deposits.

cartography

A quick trip around GE explores the modern world of map-making.

province—of its cigarettes vis-à-vis the competition's.

SAS/GRAPH can display data on every continent by country, the United States by state, and every state by county. Current users include U.S. and foreign governments, public and private universities, corporations and associations.

For a look at a different mapping service, let's go to:

Tulsa — and the office of Josh

Thomas, GE Information Services senior account representative for MCS—the Mapping-Contouring System marketed by SCAI, an engineering consulting firm in Tulsa.

"MCS is a unique computer program which starts with random data obtained from oil wells or mining core samples, and makes maps of underground mineral deposits—to help management know what's there," explains Thomas.

Although many computer programs can make maps, MCS is the only system that honors every data point every time. It also makes maps that look hand-contoured. "It makes the prettiest maps on the market," adds Thomas.

GE Information Services started offering MCS last year. Today, its customers include petroleum companies, for oil and gas exploration; mining companies searching for coal,

(continued next page)

copper, uranium, phosphates, and gold; a west Texas bank (for analyzing mining reserves used as loan collateral); and GE's Nuclear Products Division for mapping radiation levels in a nuclear complex.

Another GE user of MCS is in...

San Francisco—the headquarters of Utah International Inc., the Company's natural resources affiliate.

"We just started using MCS," says Utah's Diane Grant, a senior systems analyst—Mineral Exploration and Development. She adds that Utah utilizes several in-house computer software programs—for mapping the data from core samples; geochemical surveys of surface samples; and geophysical surveys based on magnetic, electromagnetic and seismic studies of subsurface structures.

"Geologists produce maps of both surface and underground features that are essential to the discovery of new ore bodies," adds Ray Morley, district geologist—Mineral Exploration and Development.

Another mapping tool used extensively by Utah and its wholly owned subsidiary, Ladd Petroleum, are the earth images from the Landsat satellites built by GE's Space Systems Division. Utah is using Landsat images to detect copper deposits in Chile, molybdenum in British Columbia, and coal in the western U.S. Ladd uses the images to search for oil and gas reserves worldwide.

"The Landsat images cover huge areas; and its cameras look at the ground in certain wavelengths, that can detect anomalies associated with mineral deposits," notes Morley.

What's new with Landsat? Let's go back to...

Maryland—and Space Systems' Lanham Center Operations. The Division recently introduced GEOPAK[®], a standardized package of Landsat-derived information for use by energy exploration companies worldwide.

"With GEOPAK, a customer can get a quick, economical evaluation of hydrocarbon resources in large land areas anywhere on earth," states Lanham's Bill Conroy, manager—Applications Programs Marketing. The customer selects the area—approximately 5,000 square miles, or the size of Connecticut. In three to 10 weeks, the customer receives a GEOPAK containing both color-enhanced and black-and-white Landsat images of that area, along with a geologic interpretation of surface features. The GEOPAK costs less than \$6,000, compared to the \$20,000 it would cost to map and search a similarly sized area by plane.

Speaking of planes, let's fly down to...

Daytona Beach—and the Company's Simulation and Control Systems Department. This year it unveiled the Tactical Mission Planning Console, which provides military pilots with a realistic, bird's-eye view of the terrain they'll be flying over.

"Previously, pilots had to use ordinary maps when planning their missions," explains Daytona Beach's Bob Towles, program manager—Advanced Programs. "This system gives them a colorful, two- or three-dimensional picture of what to expect."

The compact, inexpensive

unit takes only seconds to produce scenes from a stored digital data base. Pilots can add symbols for friendly and enemy forces, radar coverages, gun emplacements, missiles, tanks, and roads to the picture to help map the mission.

Although the console was developed for the military, firms that plan and construct power lines, pipelines and TV transmitting towers are beginning to show commercial interest in the system.

And, now, let's make a final stop in...

Syracuse—and General Electric's Genigraphics Product Section.

Developed by the Electronic Systems Products Division, the Genigraphics[®] image generation system produces computer slide artwork, basically for business presentations. Maps, naturally, are needed frequently.

"Our maps are aesthetically pleasing, not precise," says Walt VonSeggern, product general manager—Genigraphics Product Section. "We custom-design them to be informative, but also to communicate effectively."

A sampling of some maps made by Genigraphics shows what he means. A map of the United States, used to illustrate candy consumption, drips like a lollipop. Another shows Mexico's physical relationship to South America, but highlights Mexico by giving it a three-dimensional perspective. A third map uses graphic symbols for oil refineries in one part of Texas, which is enlarged and superimposed on a map of the state.

"The computer," concludes VonSeggern, "has really revolutionized the art of map-making." ▲

PEOPLE

Applying innovation for the disabled

A GE contest spurs development of a special telephone device for the deaf.



Ed Underkoffler (left) taps "hello" to Dr. Frank Starkey.

40 30 5# 5# 6#. By tapping that combination of buttons on a Touch-Tone telephone, you can say "hello" to a deaf or hearing-impaired person on the other end of the line. And that person can "hear" you by reading the message displayed on a small, battery-operated device the size of a pocket calculator.

Invented by Edwin C. Underkoffler, the device took first place in the AID (Applying Innovation for Disabled People) contest sponsored by General Electric's Research and Development Center in Schenectady, N.Y. In addition to his \$1,000 prize, Underkoffler, a computer systems specialist at the Center, will have his invention either produced by GE or made available for licensing to an outside organization.

"With the United Nations designating 1981 as the International Year of Disabled Persons, we wanted to direct our creative talents at the Center to helping those with impediments," explained Dr. Frank D. Starkey, the contest administrator. "Our underlying theme is that, with the aid of technology, a disability need not be a major handicap."


The AID contest drew 30 other ideas from Center employees. Runner-up prizes were awarded for a thermometer for the visually impaired and for a communications system for those who have lost the ability to speak. Other ideas included a braille thermostat, a "child

alarm" for deaf parents (it lights up when a child cries), and a device to help the disabled open doors.

Underkoffler's invention has two basic advantages over the teletype keyboard printers currently used by the deaf or hearing-impaired to communicate via telephone. First, his invention is truly portable. Easily carried, it can be hooked up to a phone anywhere — even in a telephone booth. Second, only the deaf or hearing-impaired person needs the device, whereas keyboard printers must be located at both ends of the conversation in the teletype system.

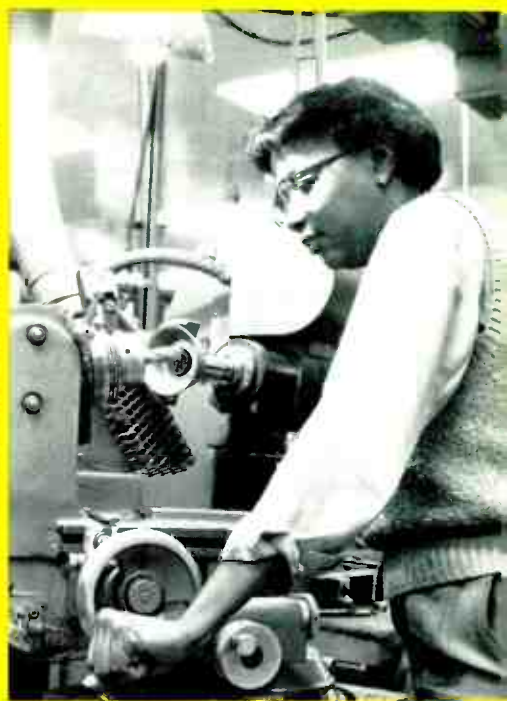
To make his system work, Underkoffler devised a "language" using the 12 keys of a Touch-Tone phone. The top three rows contain letters of the alphabet above most numbers; the bottom row contains the star, zero and pound symbols.

To talk to a deaf or hearing-impaired person, the caller must depress two keys for each letter: the first being the key with that letter; the second being the star (left), zero (middle) or pound (right) key, depending on the position of the desired letter. For example, to say "we" the caller would tap out 9* 30. Other combinations are used for punctuation, the letters Q and Z, and spacing between words.

Now, if you understand the system, it's time to say 4* 6# 6# 3* 20 9# 30. 



James Coton (l) and co-worker Maurice Cumm

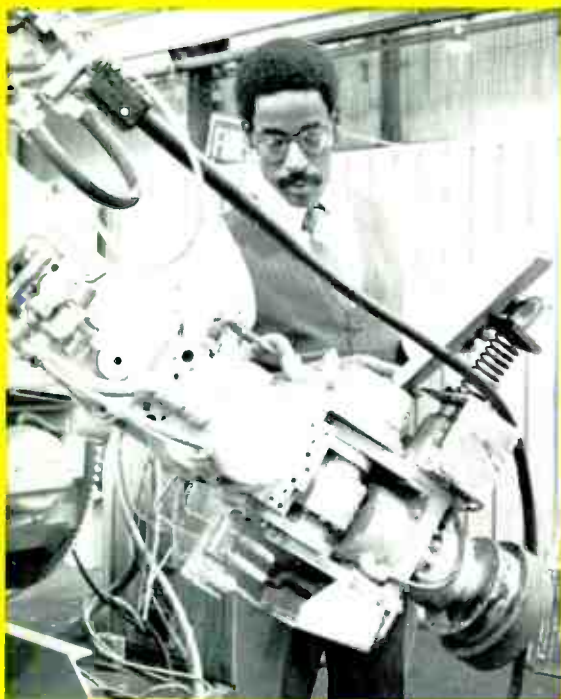


Marcia Haynes

Learning by doing

The ancient art of apprenticing is alive and well at General Electric.

Blair Simmons



Robert Tuller (l) with tool-and-die-maker Jack Pace



SHOUTING OVER the sound of a grinding machine, apprentice Marcia Haynes tries to explain her fascination with machinery.

"I love the challenge of taking raw materials and creating something," she says. "I've always been fascinated by what goes into making things."

Haynes, an all-around machinist apprentice with Lynn, Mass.'s Industrial and Marine Steam Turbine Division, is one of more than 1,000 employees currently enrolled in the Company's apprentice training program. And, despite rigorous requirements of up to 6,800 hours of on-the-job training and an additional 600+ hours of related classroom work, there is a waiting list of hundreds more.

Since 1897, when the first apprentices began training in Lynn, the apprentice program has been expanded to include 29 locations, offering courses in skills as diverse as tool-and-die-making, drafting, glassblowing, cabinetry and foundry work. At a time when skilled labor is in short supply and getting scarcer, General Electric is taking steps to insure a new generation of craftsmen, of whom Marcia Haynes is one.

In her second year with the program, Haynes, 26, has another year remaining until graduation. Before joining the program, she had received an associate's degree in business from a small college in England and worked as an accounting supervisor at a small engineering company. She currently is working on a mechanical engineering degree at Northeastern University.

Haynes believes the apprentice program is a good way to get ahead: "You're exposed to many areas of the Company

and form a network of contacts." And how does it feel to be a woman in a field dominated by men? "Going into a non-traditional occupation, I think we're watched a little more closely, so your motivation has to be high, your commitment strong. But there's a great deal of satisfaction in doing a good job in a field where there are very few women."

For James Coton, 19, a machinist apprentice at Schenectady, N.Y., there was never any doubt as to his choice of career.

On the program almost a year, Coton is a typical apprentice: "I've always liked machines," he says. "I live on a farm and when I was young, I started fixing the machinery we used. Later on, I worked in the machine shop at my high school. And when I finish the program, I hope to become a toolmaker here."

Coton particularly enjoys the opportunity to do real work while in training, noting that "I can immediately apply the things I learn in the classroom."

"What we're offering here is a college-level program — complete with credit — plus experience," says Sam Gintz, manager — Manufacturing Training and Education Programs at Erie, Pa. Gintz, who has worked with apprentices for 35 years, notes that GE's focus is gradually changing from electromechanical to electronics. "We hope to meet the Company's need for skilled workers in such fields as robotics, computer-aided design and manufacturing, and automated test and inspection by training a new kind of apprentice."

Erie's Blair Simmons, a graduate electromechanical apprentice who is now a maintenance supervisor with the Locomotive Operations, is one of that "new breed."

Simmons had taken technical courses in high school and at a local university before joining the apprentice training program in 1976. "The program has made my opportunities virtually limitless," he enthuses. "The field that I'm in has really opened up with the increased use of robotics, electronics, and computers, as have many others."

The 28-year-old Simmons, who is pursuing an engineering degree at Gannon University's night school, is the quintessential apprentice graduate: since he completed the program in 1979, he has taught apprentice courses in electronics, digital controls, transistors and digital logic.

Robert Tuller, 34, of Hendersonville, N.C., used the apprentice program to pursue a career that goes back two generations.

Now a tooling specialist with the Lighting Systems Department, Tuller graduated from the tool-and-die apprentice course in 1977 and the Manufacturing Studies Course in 1979.

Originally a high-school science teacher, Tuller changed careers after a long hospitalization in 1973. After being involved in a plane wreck with his wife, mother and father, Tuller spent a great deal of time "thinking about what I wanted out of life. I decided that I wanted to come home to Hendersonville and learn tool-and-die-making like my father and grandfather before me."

Why? "The exactitude. When I was a teacher, I was never sure


(continued next page)

of the influence I was having. The rewards were elusive. But after creating something with your own hands, you can establish whether or not you've done it perfectly. To do something 100% right and be able to know it is a very tangible reward."

For Floyd Benally, 27, an apprentice electrician at Utah International's Navajo Mine in Farmington, N.M., the apprentice program offered a chance to plan a secure future.

Prior to working at the mine, Benally had been the overseer of a calf operation at a Navajo Indian irrigation project. "Cattle prices were down," he observes, "and I didn't see a future in cattle-ranching. I decided that the next profession I entered would allow me to get another job, should something go wrong."

Four years ago, Benally applied at the Navajo Mine and worked as a laborer for two months before being accepted into the apprentice electrician program, from which he and four classmates graduated in November. Though he admits that completing the program was "one of the hardest things I've ever done, particularly making up classes when I worked swing shift," Benally believes that meeting this responsibility gave him new self-confidence.

"I had to take a cut in pay to enter the program," he concludes, "but my wife and I decided that the potential warranted it. And I've been very happy with the results. We've been given a good general background in electricity, welding, diesel mechanics and engineering. Now the rest is up to us." 

Organization Changes

CONSUMER PRODUCTS SECTOR

Guy L. Fougere, Staff Executive—Consumer Products Technology Operation

Robert A. Forino, General Manager—Refractory Metals Department, Lamp Components Division

Stanley S. Shaffran, General Manager—Housewares Engineering Department

INDUSTRIAL PRODUCTS SECTOR

Kertis P. Kuhlman, VP—Industrial Products Distribution Studies

John C. Dwyer, General Manager—Locomotive Marketing Division

David M. Engelman, General Manager—General Electric Supply Company Business Division

Marion S. Richardson, General Manager—Locomotive Products Division

Jess C. Ball, General Manager—Contractor Equipment Export Marketing Department

Jurgen F. Niffka, General Manager—Western Sales and Distribution Department, GESCO

POWER SYSTEMS SECTOR

Edward F. Roache, VP—Construction and Engineering Services Planning Integration Operation

William G. Gingrich, General Manager—Meter Business Department

SERVICES AND MATERIALS SECTOR

Norman P. Blake, Executive VP—GECC Financing Operations

Dennis D. Dammerman, VP and General Manager—GECC Real Estate Financial Services Operations

Gary C. Wendt, VP and General Manager—GECC Commercial and Industrial Financing Division

Michael D. Lockhart, VP and Manager—GECC Strategic Planning and Development Operation

TECHNICAL SYSTEMS SECTOR

Robert W. Baeder, Staff Executive—Technical Systems Strategic Planning and Development Operation

Mark B. Barron, Staff Executive—Technical Systems Technology Operation

Richard M. Masselink, Staff Executive—Technical Systems Finance Operation

Howard A. Laffler, General Manager—Mobile Communications Marketing Department

Winston C. Stalcup, General Manager—Mobile Communications Manufacturing Department

Transferred



As a recent survey points out, relocating in an uncertain economy poses some problems to GE employees — problems now being eased by new Company policies.

WHEN RICHARD HART was offered a promotion to product planning specialist for the Specialty Motor Department, it meant a transfer—uprooting his family from its home in the Chicago suburb of Woodridge and moving 140 miles east to Fort Wayne, Ind. Before accepting the promotion, Hart had several things to consider.

Could his wife, Barbara, also a professional, find another job? Could his two teenage daughters be happy in a new community? And, with the housing market in such disarray from coast to coast, could he afford the move?

“It was *not* the best time to be moving,” Hart told the *Monogram* recently. “Where we were living, it was taking six months to sell a house. And

(continued next page)

then we had the high mortgage interest rates to worry about.”

Hart turned over his house, a three-bedroom, two-bath Cape Cod, to Homequity, the nationwide relocation service company. Under contract to GE, Homequity purchases the homes of transferees at appraised market value. The appraisal that came in, based on the average of two independent appraised values, was less than Hart had expected.

During the two years Hart had lived outside Chicago, the real estate market had gone topsy-turvy. In some areas of the country, the prices of houses had become so bloated only the rich could afford them. Yet, in other areas, prices sank like stones in water. The only sure thing was the ever-increasing interest rate for mortgages. Since Hart had purchased his Woodridge home, those rates had leaped more than two percentage points.

Thus, the major obstacle between Hart and his promotion had turned out to be the cost of a house.

This story (which has a happy ending as you’ll soon see) was similar to others heard frequently around GE during the past year or so as exempt employees faced transfer decisions in an uncertain economy.

What were the thoughts of these employees as they made their moves? How did they fare in their last transfer? Were Company benefits sufficient to ease the burden of relocation? To find out, Corporate Employee Relations Operation conducted a survey of people who had moved in the last two years.

As the survey — the most detailed ever undertaken by GE to

study transfer practices and the attitude of exempt employees toward job mobility— was being conducted, the Company was planning to strengthen its relocation benefits.

A report on the survey and the new benefits, as well as what happened to Richard Hart, follow.



Obviously, the transfer is a way of life in the corporate world. Not only does GE encourage geographic mobility; the Company counts on it to put the right person in the right job, to provide more career development opportunities and promotions, to meet manpower needs within GE, and, if employees fall into such program categories, help them find work when facing layoffs.

In 1980, some 5,000 exempt employees transferred. The survey came up with this composite profile:

The transferee probably was male (93%), 37 years old, in the Company fewer years (11) than the average person (17), and moved to increase his level from a 10 to an 11. He had a technical degree. He was married, had two or three children under the age of 18 and lived in an \$80,000-\$85,000 house. Of all the transfers, 59% were made because the employee was being pro-

moted. The rest were lateral moves (37%) or demotions (4%). Although two-fifths of the respondents said their spouses were employed when they moved, only half of those working spouses found new jobs.

How did these people feel about their last transfer? Would they be willing to move again if the opportunity came up?

According to the survey, 70% were satisfied with their transfer, and almost half of those interviewed said they would be willing to move again for a better job. However, nearly 25% found the move stressful because of financial burdens they incurred, or their dealings with Homequity, or the undesirability of the place they were going to. Of those people who incurred a financial burden, 30% said they would not move again if they had to face the same money problems.

The survey also asked what factors, besides job and salary, employees would consider before deciding on their next move. Four things topped the list: high housing costs, undesirable relocation area, home sale assistance and the high cost of living.

How did the employees view the Company’s transfer policy — a policy that has since been improved?

The majority were satisfied with the many features of the policy. For example, more than 75% liked the Transfer Expense Reimbursement Policy, while 52% rated the Mortgage Interest Differential Allowance good to excellent.

Homequity received a 55% vote of confidence, although 75% of the survey’s respondents felt the appraised value of their

homes had been too low.

"In contrast to this perception," notes Schenectady's Hank Bauer, manager—Financial Analysis and Employee Relocation Services for Corporate Operating Services' Financial Services Operation, "GE statistics show that home inventory carrying time is approaching six months and subsequent resale losses are almost 3% of the appraised value offered to employees."

"The survey," according to Joyce A. Lawson, consultant for CERO's Human Resources Programs and Practices, "showed us that employees are satisfied with their moves and that they are willing to move again. That came as good news to us. The survey also identified some areas for improvement in helping them transfer."

Lawson also points out that "on the minds of the transferees are housing costs and quality of life."

"They're looking for a life style that is right for them," she says. "When an employee compares the new job and finds all things are equal, it's the quality-of-life factors that help make the final decision."

Before getting back to Richard Hart, let's look at the latest improvements in the GE transfer policy.

Briefly, the new policy consists of:

- A change in the way the Mortgage Interest Differential Allowance (MIDA) is calculated so that employees get more money from GE. (This change is effective for employees who closed on their new homes after August 31, 1981.) It also includes three

yearly MIDA payments at 100% and two additional yearly payments at 50%.

- A hike in the maximum allowable mortgage origination fee from 2% to 3% (for new homes closed after August 31, 1981), provided that the fees are the established practice of the lending institution in the area.



- Plus, several new and improved features in the Home Sale Assistance Program. Among them are a new "pre-transfer offer" that provides an appraised value offer valid for 15 days; increasing the time allowed for accepting the Homequity purchase offer from 60 to 90 days; extending the period in which employees may try to better the Homequity offer on their own, from three to nine months; a change in the length of time appraisers use in establishing current market value, from 90-120 days to a "reasonable time to sell" approach; and tightening the disparity between appraisals from 7.5% to 5% before authorizing a third appraisal.

"From the employees' point of view," says H. Edward Michl, consultant—Exempt Compensation, "the new changes in the transfer policy respond to both real and perceived problems. It addresses the depressed hous-

ing market and high interest rates."

Michl is with the Personnel Accounting Operation in Fairfield which helped draw up the improved changes.

Adds Bauer, whose operation administers the Home Sale Assistance and Rental Management Service programs, "The new policies take the pressure off employees to sell right away. They're not being forced into a decision. They have more time, and that time can be used to leverage the sale—to get more money for their houses."


"The new GE policy," Michl says, "continues to be among the very best in industry today."

Now, back to Richard Hart.

When the Harts arrived in Fort Wayne in March 1980, they found a buyer's market. They also found a four-bedroom, three-bath colonial. They bought the house.

"Without the support of the Company's transfer program, especially the mortgage interest differential, and prompt payment from Homequity for our house in Woodridge, we could not have bought our new home," he said.

Still, the first year in Fort Wayne was tough. The Harts had to keep a tight belt, watch their spending. Then Hart's wife, Barbara, resumed her professional career by landing a job as an information systems specialist at another company. And perhaps best of all, their youngest daughter, Shonda, fell in love with Fort Wayne.

Concluded Hart: "If I had not been able to afford the move, I probably would have lost my promotion." 

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NIGHT BEACON. As dusk settles over Rio de Janeiro and lights twinkle on in the shops and office buildings and the apartments and resort hotels along the beaches of Ipanema and Copacabana, Christ the Redeemer watches over Brazil's great port city. Newly bathed in the golden glow of 44 GE Lucalox® lamps—32 are 400-watt lamps and 12 are

1,000 watts—the 98-foot-high statue sits atop Corcovado Mountain; beyond are famed Sugar Loaf Mountain and Guanabara Bay. Built in 1921 as part of Brazil's centennial celebration of independence, it has been lit by General Electric for 50 years as a gift to Rio. The new lighting system saves the city \$3,000 a year in electricity costs.