



GENERAL ELECTRIC
Monogram
JULY-AUGUST 1980

**Edison
engineers:
strengthening
GE's
professionals**

PLUS:

'Why' of a new Group; New initiatives in Japan; GE joins Disney's EPCOT

GENERAL ELECTRIC
Monogram

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On the cover: commencement ceremonies for first Edison Engineering Program graduates took place this spring in Fairfield. Shown (l to r): John Herold, Edward Shih, Jean Pacelli, Wendy Wolfe, William McDonough, James Shepard, Kathleen Beard and John Ford. For story about GE's new infusion of technical talent, see pages 2-7.

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THE COMPANY

**New approaches
 to GE
 technological
 prowess**

The first 84 graduates of Edison Engineering Program are now at work. Within GE, recruiting, retention and retraining are key manpower objectives.

“**T**echnological leadership depends, first of all, on hiring, training and continuously providing new opportunities for outstanding people. The importance attached to General Electric's Edison Engineering Program is reflected by the name given to it when it was created during the Company's centennial year.”

The speaker is Dr. Arthur M. Bueche, Senior VP of Corporate Technology, who on May 30 delivered the commencement address in Fairfield for the program's first 84 graduates—coincidentally, the same number of graduates to complete the first Manufacturing Management Program 25 years ago.

In his graduation talk, Dr. Bueche observed that the Edison Engineering Program is evidence of GE's *technological renaissance*—“a reconfirmation of the basic idea that GE's future depends on innovation.” He noted that the program was one of the key recommendations of the 1977 Corporate Technology Study.

“Technical work is especially dependent on confidence—and on continuity of management support,” Dr. Bueche told the graduates. “Providing good technical people with the facilities, equipment and assistance they need is simply prudent business practice. Recently, Board Chairman Reg Jones pointed out that ‘as we head into another recession, we just *have* to protect our high-priority technical programs.’”



First graduates of Edison Engineering Program heard Senior VP Art Bueche on May 30 in Fairfield describe GE's desire to "turn technology to the uses of society." Right: Dr. Bueche presents program certificate to Douglas Hornbacker, now with Syracuse's Heavy Military Equipment Department.



The first two years after college graduation are crucial ones for career development, and today's graduating seniors know it. Repeatedly, they tell college recruiters they want to see their new professions "up close and personal," and learn from veteran engineers how specific jobs relate to a total business. They want varied experiences in order to focus on future areas of specialty—the chance "to be supervised but not stifled."

The Edison program—recognizing the value of entry-level training opportunities for engineers—is a two-year, rotating-assignment program designed to help its participants obtain breadth and depth of technical understanding through work experiences and education.

"Only outstanding engineering and science graduates are chosen for this program," remarks Fairfield's Walter G. Keating, the program manager. "With advanced training, these persons become qualified in the full spectrum of technical work, and thus are prepared for eventual leadership roles."

Upon joining GE, program participants must
(continued next page)



At a morning kaffeeklatsch in Fairfield, Edison program graduates Jesse Morrison (c) and Margaret Booher (r) visit with Jack C. Acton, staff executive—Industrial Products and Components Technology Operation.

Edison graduates (l to r) Fritz Schulz, William Zarbis and Wendy Wolfe talk with Dr. Bueche.



enroll in the "A" portion of the Company's three-year Advanced Course in Engineering. Last year, this course had a major facelift, including addition of 15 new chapters on the "pervasive technologies." By the time participants complete the Edison program, most have fulfilled both the "A" and "B" requirements of the Advanced Course, and can earn GE-tuition-paid master's degrees while completing the "C" portion, and through graduate study at local universities.

This fall's Edison program goal is 225 enrollees—up from 198 entrants in 1979 and 137 in 1978.

The number of participating GE components also has increased. "We expect some 40 components to affiliate with the program this year—up from 27 in 1979," comments Keating. "All 18 of our 'A' course locations offer GE class work accredited by local colleges and universities. Some of our Edison engineers already hold the M.S. degree, so they are encouraged to broaden their graduate education."

Work assignments of those in the Edison program are closely monitored. As they make the transition from school to industry, these new GE employees tackle a stiff work and academic regimen involving at least 60-70 hours of effort a week. Rotational assignments, each about six months in duration, are designed to increase technical skills.

"The 'A' course," Keating explains, "is an interdisciplinary, industrially-oriented engineering course that teaches Edison members how to approach a large problem by analyzing it, reducing it to its components, devising a mathematical model, and interpreting and reporting results orally as well as in written form. Members learn to allot their time by completing work within prescribed periods."

He continues: "One characteristic of the Edison program is its *flexibility*. The curriculum is designed to meet the changing needs of *both* the participating GE businesses and the graduates. Assignments vary according to a participant's interest and progress. Enrollees may hold B.S., B.A. or M.S. degrees in such diverse disciplines as electrical or nuclear engineering, chemistry or mathematics."

"Company-wide awareness of the Edison Engineering Program can facilitate GE's recruiting thrust," adds Schenectady's Dr. Paul Doigan, manager—Technical Recruiting. "If prospective new 'hires' approach GE operations that don't have job openings on the Edison program, these students now can be referred to some other component that has an Edison program which may be able to use their skills."

Graduation Day this spring for the first Edison class was the first time that program members from all locations had the opportunity to meet one another. At separate sessions in Crotonville and Fairfield, graduates heard General Electric executives define today's technological environment and discuss future challenges. Graduates, in turn, were asked to complete a questionnaire, describing how they "saw" the Edison program.

One overwhelming answer: the "A" course was hard—but they were extremely glad they took it.

Another finding: word about the program is spreading to the nation's campuses. One graduate helped recruit a 1979 enrollee. Another has a brother signed up for this fall.

The *Monogram* interviewed several graduates—as well as new recruits and currently enrolled members—about their view of the program.

Among first Edison program graduates (l to r): Cleveland's Kathleen Beard, materials development chemist; Valley Forge's James Shepard, a digital design engineer; San Jose's Wendy Wolfe, program manager-new hydrodynamic loads; and Schenectady's George Kaufman, development engineer.



Edison engineers: patent holders, long- distance commuters

Commuting to Indiana from Iowa and Illinois for each "A" class (below right) are two of the three Edison engineers in the Ft. Wayne course.

Thomas O'Keefe (center right), Switchgear Equipment Business Division in Burlington, Ia., flies to Chicago and then to Ft. Wayne to attend each bi-weekly class. Joseph Synnott (right), Appliance Motor Department in De Kalb, Ill., drives four hours each way.

Also pictured here: "A" course supervisor David Leo (left) and Edison engineer Kevin Truelove.



Edison engineers are receiving patents. Program graduate James O'Connor (left), when a "B" course enrollee at Louisville's Major Appliance Business Group, came up with the "O'Connor System"—a fail-safe method of igniting gas in a clothes dryer. The new system produces an annual cost reduction of \$170,000.



- Graduate James S. Shepard, B.S./Electrical Engineering, Princeton, now a digital design engineer with Space Systems Division in Valley Forge, Pa., notes: "The program attracted me because of its challenge and flexibility. Concurrent with my Edison work, I've been on the Space Technical Engineering Program, and am pursuing an M.S. in system engineering from the University of Pennsylvania."
- Kathleen R. Beard, dual B.A./Chemistry and Botany, Ohio Wesleyan, a graduate who is now a materials development chemist with Cleveland's Lighting Business Group, is working toward an M.S. in material science engineering from Case Western Reserve: "I left

school without a specific career in mind. The program's rotating assignments helped me discover I like to work with products and solve factory engineering problems."

- George A. Kaufman III, B.S./Electrical Engineering, Carnegie Mellon: "To my knowledge, the Edison program is a 'first' in U.S. industry. I'm now a development engineer at Schenectady's R&D Center, having completed two different kinds of assignments in Erie, Pa." The new graduate is finishing his MSEE from Rensselaer Polytechnic Institute (RPI).
- Graduate Wendy L. Wolfe, B.S./Nuclear Engineering, MIT, presently a program manager with Nuclear Energy Business Group in

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Edison program enrollees now beginning their second year (l and r): William Starr, in Binghamton, and William Wong, Bridgeport. Center: new Edison recruits Roy and Teresa Carter on the Virginia Polytechnic Institute and State University campus.




San Jose, remarks: "Rotational assignments introduced me to other endeavors, and I found that I like mechanical work. My M.S. degree, to be pursued at the University of California at Berkeley, will be in mechanical engineering."

- William Wong, B.S./Electrical Engineering, RPI, now on the program, has completed the "A" course and is continuing his MSEE work at the University of Vermont, while working for Burlington's Armament Systems Department. "The program is enabling me to rotate to Bridgeport's Corporate Consulting Services this summer, where I can receive transferable college credit at the University of Bridgeport."

- William G. Starr, B.S./Electrical Engineering, Rose-Hulman Institute of Technology, a program enrollee at Binghamton's Aerospace Control Systems Department, notes: "GE's structured program appealed to me, as I wanted exposure to various areas of digital hardware design. I'm now in the 'B' course, and working toward an MSEE from Syracuse University."

- Roy and Teresa Carter, M.S./Electrical Engineering and M.S./Industrial Engineering, respectively, Virginia Polytechnic Institute and State University, form a husband-and-wife team who will join GE this September, beginning the "A" course at Salem's Drive Systems Department. Notes Roy: "I need to gain a quick familiarity with many different areas of design engineering." Teresa: "Being an industrial engineer in an electrical company affords me a unique chance to diversify."

"You're responsible for your career," VP Frank P. Doyle of Corporate Employee Relations Operation told the Edison graduates the evening before commencement ceremonies. "The 1980s business environment will be different and difficult. It will affect you and your work. You must not limit yourselves only to technical excellence—more will be required of you. Leadership requires a broader vision than that available from any one discipline."

Delivering his commencement remarks, Dr. Bueche discussed some basic beliefs about the Company's technology. He told the graduates that one of General Electric's 'basics' is that "providing good technical people with opportunities to grow and keep learning is just as important as hiring good people in the first place. Training, retraining and opportunities for self-renewal are essential elements of our personnel programs. The Edison Engineering Program is an important part of the total picture—but it is only a part—and, in your case, just a first step." 



Developing computer-based program for hypothetical gas turbine, Columbia, Md.'s James Cox (seated) and Louisville's Donald Finley (standing) are senior engineers enrolled in "Computer Skills for Engineers" course. At center: Bridgeport course developer Dr. Pauline Jordan.



Benefits of GE Tuition Refund and Individual Development Programs are discussed by Chicago's Doyle Henke (l) and Joseph Whitehead.

Remarks engineer Henke: "At this early stage of my career, Tuition Refund is one of GE's best provisions. It's helping me study toward an MBA at the University of Chicago."

Notes Whitehead, a spot welder: "I'd eventually like to work for GE as a CPA, and am using IDP to earn an accounting degree."

Upgrading employees' skills

Recruiting this country's top university technical graduates, as dramatized by the Edison Engineering Program, is only one phase of the Company's drive to seize new technological initiatives.

Another primary effort focuses on employees already on the payroll: its purpose is to *upgrade* and *retrain* GE's technically trained people. Observes James F. Young, VP of Technical Resources: "U.S. colleges today do not graduate enough technical professionals to fill industry needs in emerging technologies. The meaning for GE is that we must increasingly look to retraining employees for such work."

One ambitious example of such technical-skills development has been undertaken by GE's Aerospace Electronic Systems Department in Utica, N. Y. In the late 1970s, a long-range look at the electronics needs of the department's military customers revealed a decided shift from analog computer technology to digital LSI (large scale integration). It was predicted that, by 1980, GE products would require twice as much digital circuitry as analog—the reverse of the existing pattern.

Young notes: "The inevitable choice for the department was to either hire new people or retrain present employees. After careful study, retraining won. Today, the technical staff is more than adequate to meet its customers' needs well into this decade. In fact, some of the retrained engineers have become so skilled that they are now

instructors for others at the LSI training center."

Other GE upgrading programs are under way:

- Bridgeport. Intensive "hands-on" educational programs designed to give GE engineers industrial computer experience are now in progress in Corporate Production and Operating Services' lab facilities. This May, the first "Computer Skills for Engineers" course was conducted—and a series of nine other on-site courses, under the broad title of "Electronics Applications Curriculum," have been held at nine GE plant locations.
- Valley Forge. Initiating an electronics "technology transfer" program in the late 1970s, Aerospace Business Group undertook an aggressive effort with various GE operations to improve GE's products and manufacturing productivity. For instance, in the consumer-products area, the Aerospace program has strengthened employee skills, and has led to highly reliable, low-cost electronic hardware.
- Louisville. Major Appliance Business Group has instituted a series of manufacturing seminars to update nearly 550 engineers in key areas.
- Evendale. Aircraft Engine Business Group, along with numbers of other GE components, continues to train engineers and draftsmen to use computer-aided design and manufacturing equipment.

Technical manpower shortages nationwide also can be addressed through continuing college education, and the Company's


awareness of this fact has caused it to make such programs more attractive.

GE's IDP (Individual Development Program) and Tuition Refund Program are examples of Company efforts to strengthen the technical skills of GE employees.

As of January 1, 1980, the annual tuition maximum under IDP was doubled—from \$400 to \$800. Under this program, hourly and nonexempt salaried employees are eligible to receive tuition refunds for satisfactory completion of manager-approved development courses. 'Satisfactory completion' means students must get passing grades—generally a C or better.

Last year, the Company payout for IDP totaled some \$614,000, with an almost equal split between hourly and nonexempt salaried employees. Six months of service are required of an employee to qualify for IDP benefits. IDP also is available for employees on layoff, which is an especially valuable feature under current economic conditions.

GE's Tuition Refund Program runs along the same lines as IDP. While there is no limit to the refund amount that may be paid per year, it applies to college-level study only. It also differs from IDP in that it is offered to exempt personnel as well as to hourly and nonexempt salaried employees.

A manager may consider tuition refunds for all courses required for completion of a degree. In 1979, Tuition Refund paid out \$2,261,000. 

New GE initiatives in Japan

From its early base in licensing agreements, the Company is branching into such new ventures as automotive plastics, credit financing, jet engines and information services.



Gerald F. Gould, GE-Japan President



Charles R. Carson (above left), Senior VP & Group Executive, Engineered Materials Group, and Hideo Sato, Managing Director of EPL, discuss auto market opportunities for GE plastics in Japan. At near right: Tosh Lee, President of Toshiba-General Electric Finance Corp. Far right: Henry Morozumi, head of the GE aircraft engine programs in Japan.

Majestic, snow-capped Mt. Fuji rises above the sparkling new Engineering Plastics Applications Center being dedicated at Gotemba, Japan. Inside the white building, a Shinto priest conducts the traditional ceremony inviting divine blessings on the center. Participating are Japanese businessmen, who, with their visiting American GE counterparts, raise cups of sake to toast the success of the venture.

Such smooth blending of the old and new, and the cooperative spirit that bonds both Oriental and Occidental partners, were clearly evident to a *Monogram* reporter during a recent trip to Japan.

The new Applications Center is the most recent example of General Electric's progress in diversifying its business in Japan. "Not so long ago," reports Gerald F. Gould, the Company veteran who is President and Repre-

sentative Director of GE-Japan, "GE business here was measured in only one dimension: revenues from licensing agreements. Our first joint venture, in air conditioning, was formed with Mitsui in 1966. Now the momentum is picking up here in the world's second-largest market. Including air conditioning, we have ten joint ventures: nuclear fuel, electronic systems, engineered plastics, silicones, drive systems, information services, specialty materials, lighting systems and our newest—credit financing."

Gould points out several interesting aspects of the Japanese business climate in which these ventures operate: "The economy is relatively stable as compared with the U.S., having grown an average of 6% annually over the last decade. This growth reflects a healthy partnership between government and industry and high worker productivity,

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Sparkling new applications center near Mt. Fuji helps customers with GE plastic and silicone applications. Dedication included Shinto priest leading ceremonies in which U.S. and Japanese managers participated.



An attractive display area in the new applications center showcases a panorama of the GE family of engineered plastics and silicones. Yasuyuki Yamada, manager of the center, points out one of the features.



A complete plastics molding facility is part of the well-equipped new applications center at Gotemba, Japan.

among other things.”

As a result of recent initiatives, GE is beginning to serve markets that traditionally have been the domain of Japanese firms—a point made by Howard R. Moffett, who, as managing director of GE-Japan, heads its marketing operations. “Japan always seeks products and systems incorporating new technology, and this provides a good market for GE,” he says.

New plastics markets: The new Plastics Applications Center at Gotemba is part of Engineering Plastics, Ltd. (EPL), a joint venture by GE’s Plastics Business Operations and Nagase & Co., Ltd. Also participating in the Center is Toshiba-Silicones (TOSIL), a joint venture between GE’s Silicone Products Business Division and Toshiba Corp.

On hand for the dedication of the Center was Hideo Sato, executive managing director of EPL, who also serves as Vice President of TOSIL. “One of the most successful GE joint ventures in Japan is EPL,” he says. Its origins date from 1966, when GE introduced PPO[®] and Noryl[®] resins with

the help of Nagase, a strong chemical trading company. The partnership burgeoned, recalls Sato, with formal incorporation in 1971.

“We’ve been profitable in every year, with the exception of the 1974 oil crisis,” he says. “Last year, our sales were up strongly, and this continued a growth pattern that has averaged about 20% a year.”

The first Japanese products to utilize EPL’s diverse market basket of engineered plastics were business machines and calculator housings. “These were our first major penetrations,” recalls Sato. “Then followed sales to electronic parts firms and, about six years ago, EPL became a big factor in the TV cabinet industry.

“When the Japanese television industry went offshore for its manufacturing, we faced the need to diversify, and targeted the automotive industry as a natural,” he said. “We developed a plan that aimed us at the high-volume applications such as wheelcovers and instrument panels.”

With the need for improved fuel economy a driving force in the Japanese auto market, as elsewhere, the amount of EPL engineering plastics being specified is expected to grow. To help auto customers, the new technical center near Mt. Fuji will be effective. “It will expand on technical services that are now provided in the field, and allow groups of customers to be brought in for seminars,” says Sato. “It fulfills the GE plastics marketing philosophy that intensive customer service is a cornerstone of fast market growth.”

TOSIL silicones: Like plastics, the Company’s silicone venture has produced good sales

growth and quality earnings. Sato attributes this primarily to the technology-transfer process.

“As in the U.S.,” Sato commented, “a major part of the growth of our silicone business is coming from the construction, automotive and electrical/electronic industries. Because of this commonality, we’ve been able to translate application breakthroughs developed in the U.S. and Europe to Japanese industry.”

The outlook is favorable, he adds, since in the face of rapidly escalating volume, TOSIL has adapted Silicone Division process techniques that are helping to position the Japanese silicone business for long-term growth.

New credit venture: One of Japan’s booming growth markets is consumer financing, and one of the newest companies to offer its services is Toshiba-General Electric Finance Corporation. The joint venture opened for business April 1.

“Our main products are direct loans, second mortgages and home improvement loans,” explained President and Chief Executive Officer Tosh Lee from his new offices high in the modern Shinjuku Center building in Tokyo.

“The consumer finance market in Japan is now one-seventh the size of the U.S. market, but two years ago it was only one-tenth,” he comments. “We feel that it could become one-third the size of the U.S. market by 1985.

“Both the GE and Toshiba names are well-known here, and are identified as reliable firms. Our venture partner, Toshiba Credit, is the fifth-largest Japanese finance company, with about 250 branch

offices and good distribution in this country. Another advantage is that we offer competitive rates and better terms in many cases. This results in lower monthly payments that our customers appreciate.”

Consumer credit is a relatively young industry in Japan, says Lee, with the Japanese more conservative in their spending. “But in Japan, where people are less mobile than in America, they live in one house for a long time and tend to have a lot of equity build up in home ownership. Such equity is available for those who wish to borrow money.”

Jets for Japan: Although the Company's aircraft engine interests have been represented in Japan since 1954, a new surge of growth has been touched off by a recent flurry of commercial engine orders.

“We have more than 200 CF6 engine orders on hand currently,” says Dr. Henry M. Morozumi, manager of aircraft engine programs in Japan for General Electric Technical Services Co., Inc. “One of the toughest competitions we ever fought was to supply CF6-80 series engines for 767 aircraft of All Nippon Airways. An order for 40 aircraft is one of the largest in the 767 program.” With two engines per plane plus spares, the total should top 100 engines. A letter of intent was signed on April 15.

Dr. Morozumi recalls that the first high-bypass GE engine to be sold in Japan was the CF6-45A, bought by All Nippon Airways in 1977. “The second competition was for Toa Domestic Airlines' A300 Airbus engines. We won again in early 1979. The third victory

was the 767 competition earlier this year.”

The outlook? “Our commercial business in Japan over the next ten years should be stable,” he predicts. “But we also see growth in the military engine market in seven-to-eight years, which will coincide with a slight slowdown in commercial market sales. Attractive military markets include those for GE T700 and F-404 engines.”

Information services: The ancient abacus is still seen frequently in modern Tokyo, despite the proliferation of hand-held calculators. In Japan, new technology coexists with tradition. This seeming paradox helps explain why the information services or remote computer services industry has taken longer to root and develop there than in the West.

Typewriters are also a rarity in Japan. Most documents are handwritten, using the kanji system of 20,000 ideograms borrowed from the Chinese. The concept of a manager seated at a computer terminal, entering data, might also be considered demeaning in some Japanese companies. And, getting fast results via computer is alien in Japan, where decision-making is a slow process.

“We had to do a lot of missionary work here to help develop the market,” comments GE's Robert A. Simmons, managing director of Information Services International—Dentsu, Ltd. (ISI-D), the joint venture with Dentsu Advertising. “Dentsu's reputation, contacts and marketing experience, coupled with GE's experience and worldwide scope of operations, have enabled us to achieve a significant share of the business here. Our clients

range from the largest industrial bank of Japan to major multinational firms like Toyota and Nissan.”

Simmons explains that success has required ISI-D to spend time with prospective clients, showing them how they can use the service to solve their problems. “Starting with a small group of inexperienced people in 1976, the year the venture began, we've made yearly investments in additional people, training, market development, and in localizing the product. It's paying off. Last year, our business grew over 25%. We expect to do even better this year.”

A final observation on doing business in Japan comes from Leonard E. Goldstein, a 30-year GE veteran who is Vice President—GETSCO, and heads its Far East Aerospace Operation.

“This culture is thousands of years old. The Japanese don't operate in the American way. For example, they're sponges for information. They do their homework, ask many questions, hold many meetings, and take their time. But once a decision is made, they go like mad!”

The outlook: The Japanese economy is expected to grow at 4-to-5% annually in real terms in the coming decade, according to forecasts from Gerald Gould. He sees Japan accounting for more than 12% of the world product and 20% of developed countries' product in 1985.

“We will continue export sales and expand investment in joint venture operations with an emphasis in the area of high technology in Japan,” he concludes. “This is an area that is becoming increasingly important to General Electric businesses.”



Walt Disney's greatest dream, an Experimental Prototype Community of Tomorrow, soon will be realized.

EPCOT Center, a vast new showplace for the technologies of tomorrow and the nations of today, will open at Walt Disney World near Orlando, Fla., on Oct. 1, 1982. The \$800-million project will be the fulfillment of Walt Disney's last and greatest wish—for a "community of ideas" that poses the challenges and previews the alternatives for communities of the future, and a "community of nations" that highlights the cultures and accomplishments of people the world over.

Once again, General Electric will be associated with the Disney organization and, as part of its long-term public relations planning, will be a part of EPCOT.

Groundbreaking for the 250-acre EPCOT Center, to be linked to the Magic Kingdom by monorail and accessible by car and bus, took place in mid-1979. GE, which soon will see construction of its 83,000-sq.-ft. pavilion, is working with Disney engineers and architects, as are a number of other large U.S. corporations and various countries.

"The Disney organization is absolutely superb in interpreting concepts important to GE's business in a dramatic, memorable and favorable way to the public," states Fairfield's David W. Burke, manager of Corporate Communications. "In the past, GE has achieved much public good will through operation of its 'Carousel of Progress', first at Disneyland and more recently at Disney World."

He notes that EPCOT is expected to draw 8-10 million visitors the first year and 100 million its first decade. Last year, 14 million people toured Disney's Magic Kingdom. "Participation in EPCOT will enable us to reach an influential segment of the public even more effectively. The house that Walt Disney built continues to be immensely strong and exciting!"

EPCOT—the largest commercial construction project currently underway in the U.S.—will offer a whole new generation of Disney entertainment that is larger in scope than any show in the history of Disney "imagineering." It will have two sections: Future World and World Showcase, laid out in figure-eight fashion.

The first of these will dramatize the challenges facing people today—providing a window onto the worlds of energy, transportation, the

seas, space, the land and other vital subjects. The latter will be the only permanent international exposition of its kind anywhere, focusing on the traditions of other peoples and generating greater cross-cultural understanding. Foreign countries will work with Disney to develop attractions for international pavilions.


GE's pavilion, to be centrally located within Future World, will include a triple-spheroid theatre designed around a unique projection system, believed by the Disney people to be the world's largest such projection device. During the 17-minute tour aboard four-person vehicles, GE guests will see a vast array of innovations—their "time machine" journey visually heightened by "wrap-around" views made possible by projecting pictures on spheres, each more than eight stories high. Guests should exit with enhanced feelings regarding the Company's

GE joins Disney's EPCOT

future orientation and its continued commitment to better living for all people.

A permanent showplace for science and technology—that's how Disney people envision the EPCOT Center. Managing EPCOT's creation, though, involves more than issuing marching orders to legions of construction workers.

The site first has had to be cleared of palmettos and swamp brush. Heavy equipment operators are literally rebuilding the earth that will soon support the pavilions and parking facilities. A 40-acre lagoon is being created as part of the World Showcase.

Rattlesnakes and alligators inhabit the swamplands and must be relocated. Also, Disney doesn't want to destroy the natural habitat of the region's rare cockaded woodpecker, a tiny bird that lives in dead tree trunks on the site. Disney staff environmentalists are working to save the birds' habitat. 



EPCOT Center will be connected by monorail to Magic Kingdom, and will encompass twice as many acres as the latter theme park. In above foreground is giant golden geodesic dome housing Spaceship Earth, which will introduce the Future World theme and its pavilions. Below: artist's rendering of new GE pavilion. Shown with GE pavilion model (left to right): GE's David Burke and James Rebeta with Disney's Donn Tatum, Martin Sklar and John Hench.



Monographs



Brasilia talks on BEFIEEX. BEFIEEX is an acronym for Portuguese words meaning "Government Agency Responsible for Providing Export Incentives." Recently, in Brazil's capital of Brasilia, GE Board Chairman Reginald H. Jones (center) met with Brazilian

President Joao Figueiredo (left) to discuss General Electric's plans in this rapidly industrializing nation. Also present: José Amorim, president of GE do Brasil (center left), and Allan Rayfield, formerly GE do Brasil board chairman.

This March, GE do Brasil

and the Brazilian government signed a 12-year, \$700-million BEFIEEX export program agreement, designed to help improve Brazil's balance of payments. For GE, BEFIEEX offers a unique opportunity for the Company's 19 participating components to obtain Brazilian export incentives, while applying an innovative total-GE-systems-integration strategy to meet the needs of the country.

In an interview with São Paulo's *Banas*, a leading financial weekly, Jones observed: "Clearly, Brazil has moved rapidly into the ranks of the industrialized nations, and the country's leadership is committed to sustaining this impressive growth. GE intends to strengthen its partnership role in Brazil's progress, so that it may assist in the fulfillment of the nation's manifest destiny."

Arizona highways. The point of this story could be—but is *not*—about a spunky, 56-year-old woman who awakens at 3:30 each morning to write about her illustrious Western-settler family, the Fish family of the Southwest. Nor is it about the same lady, who then plays a set of tennis at 5:15 a.m. before reporting to work at 7:30 at Phoenix, Ariz.'s Electronic Components Sales Division. Nor does this story go into detail about the dinners she prepares, or the laundry she does, or the evening tennis games she plays before "lights out" at 10 p.m.

What *is* of primary interest here is that GE secretary/sales

assistant Lorana Mineer, in meeting her feverish daily itinerary, rides a large motorcycle. Notes Mineer, who formerly had a phobia about noisy motorbikes of any



kind: "The 1974 gas shortage changed my life. Suddenly faced with long gas lines, hot tempers at the pumps, and the fear that I wouldn't be able to visit my five grandchildren south of here in Casa Grande, I enrolled in a college motorcycle course. Now I run errands on Arizona highways—day and night."

Perhaps Mineer's story should end here—but then, her roller-skating hasn't been mentioned. She's also a crackerjack skater, who at one time aspired to skate professionally. "I had to give it up—too much training time was involved. But I've certainly not let any grass grow under my feet," she laughs.



'Saggy Socks' vs. 'Woebegones.' Soccer may not be the first love of U.S. sports enthusiasts, but in most other countries, it's an all-consuming national mania. Recently—at the request of employees of South African General Electric Company (Pty.) Ltd. (SAGE) in Benoni, near Johannesburg—an intramural soccer match was held on the Company's premises. It proved so popular that the match may be "institutionalized" semiannually.

Security guard Eliam Ngubane, an avid soccer player for a community team in nearby Wattville, kicked off the idea for the match with Floyd C. Skelly, manager—SAGE Corporate Finance and

Employee Relations. Skelly and his financial colleagues quickly picked up the sporting gauntlet. Ngubane's team chose the name "Woebegones," and employee Denis Reah's team, "Saggy Socks."

After a hard-fought 5-4 game, losing captain Ngubane was noble in defeat and proclaimed the match "an exciting one." Said victorious captain Reah: "I hope we eventually award a floating trophy—and maybe even field a team against other business firms."

Summed up Skelly: "The Sunday afternoon soccer match was a resounding success—and now everyone is hounding me to do it again!"

Honors. The top award of excellence of the Public Relations Society of America—the Silver Anvil Award—has been presented to Lighting Business Group, for the publicity program for the energy-saving Electronic Halarc™ lamp.

- The Gold Medal of the American Institute of Chemists has been awarded to Dr. Arthur M. Bueche, Senior VP of Corporate Technology, for his service to the chemical science and engineering professions.

- Fairfield's William A. McAdams has been elected president of the International Electrotechnical Commission, the world's leading authority for international standards governing production, transmission and use of electrical energy.

- The San Jose plant of the Nuclear Energy Business Group has been presented the 1980 Electronic Industries Foundation Award for its efforts in hiring physically impaired people for full-time positions.

Correction: the May-June 1980 issue on page 5 ran a photo of Rio de Janeiro, Brazil's Claudio de Vasconcellos, Jr., instead of Abalen Abirached.

To the rescue. If an airplane gets in trouble over Ohio, GE retiree Lee Bricker, seated, is usually one of the first persons to know. As a Civil Air Patrol (CAP) major in Cleveland, he's helped rescue the pilots and passengers of several hundred downed aircraft during 22 years with the organization.

Backing Bricker up on many of these missions has been another GE individual—Steve Szabo, standing, a Lighting Business Group engineer. Also a CAP major, Szabo is a rescue

pilot who is now deputy commander of Group IV, responsible for four Ohio squadrons.

Bricker observes, "I've messed around with radios for 50 years, starting with a crystal set as a youngster. Since retiring, I've devoted my time to the CAP and am on 24-hour call seven days a week."

Szabo, who co-piloted a B-26 bomber in World War II and picked up downed flyers behind enemy lines, flies for the CAP most Sundays and at least one night a week. Why does he



do it? "Ever since I took my first flight in an open-cockpit biplane at age 15, I've been hooked on flying," he says.

PEOPLE

Robert Leightner: musical instrument maker nonpareil

The workroom is that of a master craftsman. Violins hang from the ceiling. A harp sits on the floor. A dulcimer with a broken string waits for repair. A book is opened to a page illustrating harpsichord construction. No—we are not in Renaissance Italy. We're in the Burlington, Vt., home of Bob Leightner, an Armament Systems Department advance systems engineer by day, and builder and repairer of musical instruments in his off-duty hours.

"I'd always wanted to play an instrument well," says Leightner, "but I started taking lessons too late. I felt it was more constructive for me to spend time repairing and building instruments rather

than playing badly."

Leightner built his first instrument, an electric organ, while in college. Since then, he has constructed more than a score of others, including a pipe organ, pedal and manual harpsichords, a virginal (early harpsichord), harps, clavichords and a serpent (a cornet/clarinet hybrid).

His favorite projects involve building rare and hard-to-find instruments, such as a bow psaltery (a violin-like instrument with a string for each note) for musician friends. "When an instrument like that is played," he jokes, "no one knows *what* it's supposed to sound like, so they can't very well criticize it!"



Valarie Schindler: voyaging to the Land of Lilliput

"To me, the most important thing about a dollhouse is authenticity. So mine has a flyswatter, an apple core on the kitchen sink, false teeth in a glass in the bathroom, and slippers by the bed. Clothes lie where 'the children' left them."

The speaker is Sunnyvale, Calif., secretary Valarie Schindler, employed by Advanced Reactor Systems Department, shown here with daughter Kristi. Currently president of The House That Wee Built, a club of dollhouse builders and miniatures collectors, she comments that "the greatest hurdle in my learning dollhouse construction was making furniture—it's so

small. Often you have to improvise and use fingernail files and emery boards." She adds, "I'm always looking for little items—the tops of cloves become pumpkins when they're painted orange; plastic tabs inside the lids of bottles become tiny plates; and hamster litter painted green is lettuce."

Room scenes that commemorate holidays and other special occasions are Schindler's specialty. One recent birthday-party scene, presented to her mother, included a cake, flowers, paper hats, cups with candy, horn blowers and a birthday card—complete down to the last detail.

August Smith: master stained-glass craftsman

His apprenticeship began as a boy when his mother was asked to create the stained-glass windows for a Louisiana church. She teamed up with artist Emil Francois Puz—and her son was their apprentice. He cut the glass, made the frames and helped fit the windows. During the next four years, one beautiful church led to another.

Now, Frankfort, Ky.'s August Smith, a press operator with Plastics Business Operations, makes stained-glass terrariums, lampshades, sculpture, and windows for homes and offices. He tries to avoid restoration because

"I don't like to work on someone else's creation." He notes that old glass is hard to restore—"the rich, jewel-like colors are difficult to duplicate. Lead compounds were used in creating them, and these tend to oxidize and pale with time."

Today's glass, says Smith, is extremely malleable. He enjoys experimenting, using oxides to dye his windows. He also grinds prisms and includes them in windows for a three-dimensional effect, and polishes thin slices of luminescent agates and geodes, which he uses with glass for lighting effects.



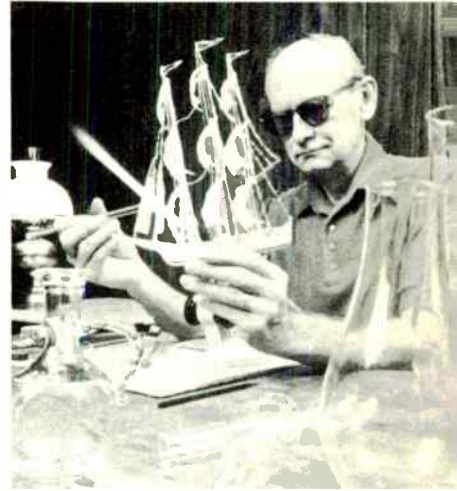
Edward Dunn creates gossamer glass art

Some artisans have turned hobbies into occupations. Schenectady's Edward Dunn, an R&D Center glass technician, has done just the opposite. Thirty-three years ago, Dunn joined the Center as an apprentice glass blower. Today, after fabricating laser tubes, retorts and quartz tubes by day, Dunn relaxes by blowing glass *objets d'art* evenings in a home workroom.

Why is he so enamored of glass blowing? "Few craftsmen today know how to create something beautiful using little more than their hands, fire, sand, silica and a pair of tweezers. It requires an innate sense of proportion, imagination and hand dexterity."

Dunn worries about his craft's future. "There are fewer than 800 first-class journeymen glass blowers in the U.S. After completing two years of college, each must serve an apprenticeship that can last up to eight years. Many secrets of the craft are not being learned and passed on."

A master glass blower, Dunn has models of Coolidge X-ray tubes on display in the Smithsonian. He has made many objects, including ships, animals, figures, flowers and airplanes, many of which are sold in a small shop run by his wife. His favorite creation? A glass spiderweb—complete with glass fly and spider, mounted inside a bottle.



GE's artisans

GE people are applying their artistic Muse to craft projects as diverse as medieval musical instruments and Lilliputian birthday scenes.

Aubrey Nelson's 'real gem' of a hobby

He started polishing stones in 1975 after a trip down a North Carolina mine shaft in which he found some interesting rock specimens. This led to lapidary lessons and then to instructions in jewelry making. A friend taught him the art of faceting stones.

Now, Cleveland's Aubrey Nelson is an accomplished jeweler who has walked away with First Prize for jewelry and metalcraft at the Cleveland Area Gem and Mineral Show. The die maker with Lighting Business Group observes: "I work with such stones as amethyst, garnet and tourmaline,

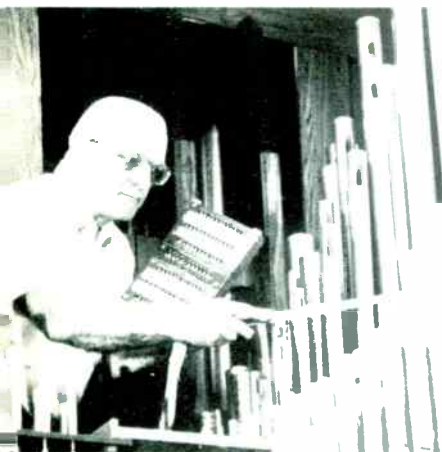
cutting them in various patterns such as emerald, brilliant, pear and marquise."

Cutting can result in a 40% loss of a stone's size, Nelson notes. "Satisfaction in this hobby comes when a rather ordinary stone, perhaps resembling a bit of broken glass, is turned into a beautiful gem."

Has he thought about a career in jewelry making? "Yes," he chuckles, "but to do that would mean quantity rather than quality. For me, the lapidarist's craft is just a hobby—a way to unwind at the end of the day."



(continued next page)



Eldon Cunningham builds gigantic church organ

The pipe organ at his Ft. Wayne church has 1,300 pipes, each individually tuned to pitch. There are 26 adjustments per pipe. Each must be painstakingly "voiced" to regulate both volume and tone.

The man who built this extraordinary organ, who crafted many of the parts including the solid oak grill work and case, and who checked out the "throat" of each pipe is Eldon Cunningham, a senior design engineer with General Purpose Motor Department. Since 1975, he has spent thousands of hours working on the project. The pipes were specially ordered, as every organ must be

scaled to the acoustic properties of the room in which it is played.

"I've always loved music," says Cunningham, "and over the years have read more than 50 books about pipe organs—and have taken apart about 10 of them." In addition, he has worked closely with professionals—accumulating a store of knowledge about his unique interest.

How does he tune pipes? "Usually, it takes two people. But I've put my mechanical engineering to use and designed a tuning board, with switches, so I can work 'solo' in the pipe area and use switches to hold down the organ keys."

Wood sculptor Fred Buyer: 'each piece has its own fingerprint'

He began by carving tiki gods out of driftwood when living in Hawaii. When he moved to California, he tried carving redwood. "I started experimenting—making carvings of ships, sunbursts, animals and Egyptian statuary. People liked my work and bought some pieces. I eventually began selling through a gallery."

So observes Frederick Buyer, manager of System Support Software with Sunnyvale, Calif.'s Space Systems Division. "My wood sculpturing begins with a careful selection of wood. I then trace or sketch my subject onto it, cut out the figure, and hand-carve and sand the wood. Next, I burn

the wood to create surface charcoal and scrub the surface with a stiff brush. Finally, I apply a number of coats of wax, buff, and—in the case of a wall hanging—mount on fabric and frame."

Art forms that show motion fascinate Buyer. "I love Mediterranean mythology. My current projects are Icarus and Pegasus. They intrigue me because they're soaring figures, symbolizing the striving of the human spirit."

He concludes: "Each piece of wood is distinctly different—like a fingerprint. When I sand and wax wood, it's almost like caressing it. I'm trying to instill in my sons this love of woodworking."



Barbara Hess: proficient in art of china painting

The decoration of china is a many-thousands-year-old craft. The Chinese were painting porcelain as early as 1027 B.C. Europeans gave china painting a new dimension in such places as Limoges, France. American colonial craftsmen also were extremely proficient china illustrators.

"In the last decade, china painting has made a comeback," observes Barbara Hess, a product plater with Semiconductor Products Department in Auburn, N.Y. "Hobbyists are discovering its versatility—a person may choose to work with bone, glazed or porcelain china, and can choose

such designs as flowers, winter scenes and abstracts."

Hess mentions that her mother taught her the art. From her, she learned to paint with enamel, liquid gold and "lustre" paints—decorating such items as demitasse and tea sets, clocks, vases, candleholders and dolls' heads. Hess explains her technique: "I first fire the china to set the color—and often have to fire up to 10 times because I'm using different colors or gradations of color, and different kinds of paint." She adds, "I recently bought a large kiln and am planning to mold my own china soon."



Gunsmith Karl Bell builds custom rifles

A genuine gunsmith is very hard to find these days, but Ft. Wayne's Karl Bell, a jig grinder for Motor Technology Operation, is such a person. He recently completed an 18th-century flintlock, or muzzle-loading rifle, and currently is restoring a Revolutionary War-era shotgun and an 1850s percussion rifle.

"One of the toughest parts of the flintlock-rifle project," states Bell, "was having the patience to get the right line and curve so the stock would look slender and graceful. I learned to view the flintlock as an 'art form' instead of as merely a handmade firearm."

Beginning with a solid maple blank stock, Bell spent many hours honing the blank with a router and woodworking tools. The rifle has a 42-inch barrel and a 14-inch stock. It weighs 10 pounds—about one-third more than most shotguns built today. He spent \$154 for materials, considerably less than the \$700 most similar reproductions bring at sales.

His flintlock features a brass, sandcasted butt plate, and a trigger guard with Mexican coin silver trim—all purchased in rough form and then filed and finished by hand. The rifle actually shoots, and when Bell gets a mold, he will make the balls, or bullets, for it, and test its accuracy.

Organization Changes

CORPORATE

Dale F. Frey elected a Vice President (effective June 1) and Treasurer of the Company (effective Sept. 1)

Richard C. Abington, Staff Executive—Corporate Strategic Projects

CONSUMER PRODUCTS AND SERVICES SECTOR

James F. West elected a Vice President

Robert J. Kalember, General Manager—newly established Major Appliance Product Service Operations

INDUSTRIAL PRODUCTS AND COMPONENTS SECTOR

William C. McCormick, General Manager—Distribution Equipment Division Manufacturing Department

INTERNATIONAL SECTOR

Edward C. Bavaria elected a Vice President

Arthur V. Puccini, General Manager—Export Sales and Trading Division

POWER SYSTEMS SECTOR

Nicholas Boraski elected a Vice President

Richard L. Burke, General Manager—Medium Steam Turbine Department (Engineering and Manufacturing)

John J. O'Connor, General Manager—Engineered Cast Products Department

TECHNICAL SYSTEMS AND MATERIALS SECTOR

Lee L. Farnham, VP—Defense Satellite Communication System Program

Ladislav W. Warzecha elected a Vice President

D. Rex Blanchard, Chairman of the Board and Chief Executive Officer—General Electric Plastics B.V.

Allan J. Rosenberg, General Manager—Space Systems Division

Francis J. Schilling, General Manager—Medical Systems Product Management Operations

Charles E. Barron, General Manager—Aerospace Control Systems Department

Arthur L. Glenn, General Manager—Computed Tomography Programs Department

Arthur J. Marks, General Manager—X-Ray Programs Department

UTAH'S EXPLORERS

How do geologists of GE's natural resources affiliate go about their searches for new oil and mineral wealth? Here's a report.

The cataclysmic bang that brought the Mount St. Helens volcano to life May 18 in Washington state was not heard by the exploration team, camped 22 miles northeast of the mountain in the McCoy Creek copper area. "All of a sudden," recalls one geologist, who was driving toward the camp from Randle, Wash., with a colleague, "an ominous black cloud came over the hill toward our vehicle. We stopped and took pictures. Then all hell broke loose!"

With volcanic debris raining down upon them, the men in the vehicle and at the camp—employees of the Vancouver, B.C., and Reno, Nev., exploration offices of Utah International Inc., General Electric's natural resources affiliate—quickly drove toward Randle. Rock, about one-half inch in diameter, struck the vehicles, and "tephra," a dust as fine as talcum powder, began interfering with the vehicles' air-intake systems. Finally, they reached Randle safely.

This Washington state experience of a Utah geological team can be added to a history of rugged outdoor adventures that include the time a grizzly attacked a geologist working

in British Columbia. The time an explorer with a leg injury had, literally, to crawl partway down from a high Montana peak. The time a pontoon airplane ran out of gas while en route from the Northwest Territories to the Yukon, but was skillfully glided onto a lake located near the MacKenzie Mountains. These adventures also illustrate a point made by San Francisco-based Ralph J. Long, Senior VP and manager—Mineral Exploration and Development Division.

"The world's most desirable oil and mineral resources increasingly are found in remote regions. Unlike the old days of the prospector with his grubstake and mule, today's explorers must be prepared for many more contingencies. Not only does their work require highly sophisticated training, but they have to be good mechanics on complicated equipment, know survival methods in various climates and terrains, stay abreast of mineral market conditions, and work well with people."

The mining industry, by nature, is a business continually depleting assets as each ton of mineral product is mined and sold, Long notes. "The lifeblood of the industry, therefore, is the acquisition of new mineral reserves to ensure growth in resource assets. At Utah, this is accomplished both by 'grass roots' exploration and by acquisition of

properties identified by others.

"Success," he says, "requires consistent, coordinated efforts in such areas as marketing research to define commodities of interest; geological and metallurgical research to identify targets; and field exploration to test properties quickly and economically."

Interviews with geologists at Utah bring out the changing nature of their profession. For one thing they are, frequently now, in pursuit of different resources in different geographical regions.

"Diversification has become an important element in Utah's exploration strategy," remarks Robert O. Wheaton, VP and outgoing manager of Utah's mineral exploration, who has been named to head both the affiliate's mineral exploration and acquisition activities. "For example, while we are maintaining strong exploration programs in the areas where Utah has established businesses—coal, uranium and the nonferrous metals, today the ferroalloy metals—tungsten, molybdenum, chrome and manganese—are taking an increasing share of the exploration budget."

Geographically, Utah also is expanding away from its traditional base in the U.S., Canada and Australia. "A decade ago," Wheaton says, "almost all of our efforts went into these areas. In 1980, this

(continued on page 22)

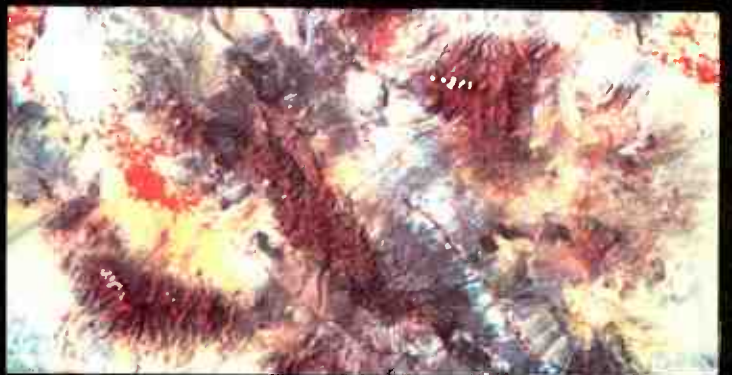


Worldwide energy and mineral needs have increased the scope of Utah's already vigorous exploration activities. Remote areas, reachable only by helicopter, and mountainous rock outcrops are carefully examined for surface indication of mineralization. Above: geologists John Deighton (l) and Andy Schmidt at field camp in British Columbia.



To aid exploration efforts, the GE Interactive Multispectral Analyzer (IMAGE-100) computer receives imagery from NASA's GE-built Landsat satellite and helps geologists seek clues to oil and mineral deposits.

IMAGE-100 enhancements show the differences in rock formations and reveal fault lines in land masses—all of potential geologic significance.



proportion has dropped to 62%. Geographic diversification has been spurred by awareness that the readily apparent near-surface deposits in the more accessible parts of North America and Australia have already been discovered. Consequently, programs have been initiated in Africa, Southeast Asia, the Middle East, South America, and the Yukon and Northwest Territories in Canada."

To meet market demands profitably and with minimal environmental impact, Utah uses a wide variety of innovative techniques and equipment. The company employs 125 mineral geologists and 60 petroleum exploration experts—the latter working for Ladd Petroleum Corporation, Utah's oil-and-gas subsidiary.

During preliminary stages of mineral exploration, areas of potential interest often are examined from the air. Then ground-level inspections of rock outcrops are made to define the geological character of the area. Geophysical and geochemical surveys may be conducted simultaneously to provide additional data for appraising the prospect. If an area appears to be of interest,

land is purchased or leased, or claims are staked, in preparation for more detailed mapping, surveying and drilling.

Ladd Petroleum's exploration work is more speculative in nature. Higher oil and gas prices have altered economic equations, and the subsidiary is sending its teams farther afield, equipped with a new generation of instruments and more sophisticated data processing methods. Ladd explorers, for instance, use seismic equipment to probe more complex and deeper geological formations, bouncing sound waves off underground rock strata to obtain data for subsurface maps. From the maps, geologists select for drilling certain rock configurations—perhaps a dome-shaped anticline or a fault—that may have trapped petroleum.

Satellites, computers and atomic analyzers are other technologies employed during Utah exploration teams' investigations. For example, data retrieved from Skylab, Gemini, high-altitude aircraft and NASA's Landsats—the latter GE-built satellites—help geologists in their evaluations.

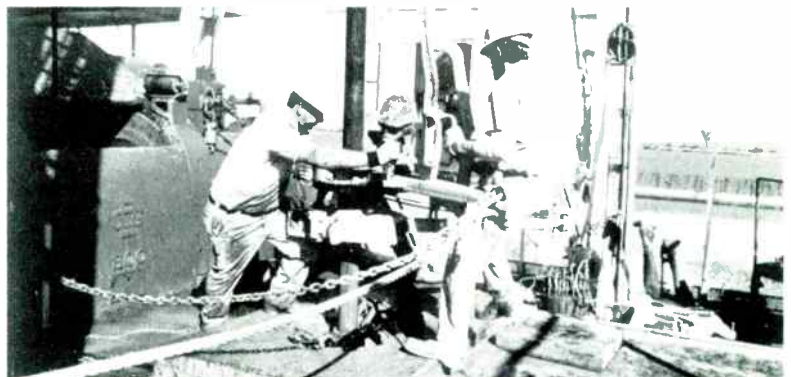
After new deposits or possible acquisitions are identified,

Utah explorers work closely with the Mining Technical Services department and the Minerals Laboratory staff of metallurgists and chemists in Sunnyside, Calif., who supply mining cost and feasibility studies, ore analyses, bench-scale and pilot plant tests, and, ultimately, the process flowsheets for each mine.

Allocation of more funds to research is another area of change. Oliver N. Warin, incoming manager of mineral exploration, notes that "in 1980, Utah has increased its mineral exploration budget 29% over 1979—expenditures two times greater than those recorded in 1975."

Warin previously headed exploration activities for Utah Development Company, the Australian mining affiliate, which conducts its own exploration program in Australia, and does some work on a contract basis for Utah International in selected areas outside that continent.

Interestingly, Ladd's annual exploration budget, because of the more speculative nature of its business, is higher than that for Utah's mineral activities. Its "wildcatting" appro-



Searching for mineral orebodies in Arizona, geologist Alex Ascencios (left) conducts field survey. Above: in its quest for new reserves, Ladd Petroleum plans to drill 65 "wildcat" wells in 1980. This compares with 45 drilled in 1979 and 29 in 1978. Last year, Ladd's success rate was high—39%.

priations were up 88% in 1979 and 33% this year—quadrupling 1975 expenditures.

Utah's stepped-up search for unacquired natural-resource deposits shows up in the sheer global span of its activities, as indicated by these highlights:

- In addition to broad-based exploration activity in Australia, efforts are under way to look for copper in Saudi Arabia, uranium in Africa's Upper Volta, coal in Indonesia and Malaysia, and copper on Indonesia's island of Sulawesi.
- In Chile's Atacama Desert, a search has begun for porphyry copper as part of a joint venture with Getty Oil Company. Utah explorers also are in Brazil, hunting for copper, manganese, lead, zinc and nickel. In South Africa, there are sizable steam coal and anthracite projects, and a bulk sampling program of a diamond "pipe"—the geological formation at the neck of an ancient volcano.

- Along the Alaska Highway in British Columbia, geologists in May began exploring for lead, zinc and precious metals, using helicopter transportation. Elsewhere in the province, work continues on coking coal and porphyry copper holdings. This summer, high in the Purcell and Coast mountains, exploratory drilling is beginning on two molybdenum properties.

- In Ontario's Abitibi mining belt, Utah is beginning a wild-cat mineral-drilling program in an area where glaciers have left 100-300 feet of glacial till. Hopes are to find gold and such other metals as copper, nickel and zinc. Copper exploration, meanwhile, continues in Québec, Newfoundland and Nova Scotia.

- A molybdenum drilling program is under way in Montana's Pioneer Range—all helicopter-supported. Elsewhere, near

the Bonneville Salt Flats in Utah, drilling continues for silver and copper. Exploratory work for tungsten at Indian Springs near Wells, Nev., also is in progress, and coal-exploration programs are under way in Colorado, Texas, Oregon, Montana and Iowa.

Ladd Petroleum has expanded its exploration activities to 15 states and three Canadian provinces. Offshore geophysical work has been done near the California, Texas and Louisiana coasts. In its first overseas venture, Ladd has a working interest in a drilling program in a promising area in the Congo. It soon will join in an exploratory drilling venture off Italy's east coast.

Some 32 geologists of Pathfinder Mines Corp., Utah's uranium-producing affiliate, meanwhile continue to seek new discoveries in the U.S., Canada, Africa and Australia.

The largest single block of reserves of undeveloped steam and metallurgical coal east of the Mississippi River recently was acquired by Utah International. More than 350 million tons of coal reserves in Kentucky and West Virginia have been purchased from National Steel Corporation. Since mid-1976, Utah's Knoxville exploration office has been conducting work in the region. This acquisition represents a major move by Utah into underground mining, with initial production anticipated late this year.

"The cost of exploration programs has increased dramatically, and lead times from inception of exploration to development are increasingly longer," states Maurice J. Young, manager of Utah's mineral and coal exploration work in North America. "Considering the uncertainties involved in long-term judg-



Training would-be prospectors to use a compass, make a map and stake a claim, geologist John Deighton (l) is one of several Utah employees who have volunteered to teach at the Prospecting and Mining School in Vancouver, B.C.

Sponsored by the British Columbia and Yukon Chamber of Mines, the prospectors' training classes include courses in mineralogy, geology and practical prospecting.

ments and the element of luck which does play a part in exploration success, we devise a balanced program that spreads the risks over a number of commodities and geographical areas. The ways of acquiring new mineral assets also are diversified."

"In the 1980s, Utah intends to continue doing what it's good at," Ralph Long concludes. "Our exploration efforts will continue to concentrate on commodities with established industrial demand and feasible extraction techniques. Utah's exploration personnel are second to none—employees who supervise the movement of huge machinery up narrow trails for winter drilling programs in subzero weather, and who, bumping through sagebrush and greasewood in four-wheel-drive trucks, spot the telltale mineral signs on mesas and along canyon walls. Applying their expertise, we will continue to capitalize on our opportunities." **AW**



Group Executive Don Grierson: aiming at synergy between electronic components and industrial systems.

◀ Production of numerical controls at Richmond—'areas of excellence' on which to base new growth.

Control system for American steel production—an example of advanced productivity that needs to be greatly multiplied.



The 'why' of a new Group

What's the thinking
behind the formation
of the Industrial Electronics
Business Group?
Senior VP Don Grierson
gives the answers.

Want to join a modern-day crusade? Just go to Charlottesville, Va., talk with Donald K. Grierson, and you'll come away convinced of the need for a drive that the United States should be launching with crusading zeal.

The crusade can be summed up in that much-used and much-abused word: productivity. But when the highly articulate Grierson finishes discussing it, the issue becomes more urgent and all-encompassing than it may have previously been viewed. For in Grierson's opinion, to put U.S. productivity into high gear will require more than investment dollars and technological advances. "What's needed is a climate that encourages reinvestment in U.S. industry," he says. "Every one of us who sees the seriousness of the problem must work at getting it recognized by the public and better understood in government."

Certainly at General Electric, the problem has moved up in priority. Formation of the Industrial Electronics Business Group, with Senior Vice President Grierson as Group Executive, is a manifestation

of the Company's belief that improving productivity is a task whose time is now.

"The story is getting across," Grierson believes. "People are becoming aware that the U.S. has no greater challenge than to modernize its industry, raise its levels of output per employee, and build this country's competitive strengths. We expect a strong renewal of investment in U.S. industry in the 1980s, and that renewal will present substantial new opportunities for the growth of this Group's businesses."

But if a U.S. resurgence in capital investment represents the Group's greatest potential, Industrial Electronics' future is by no means confined to American boundaries. "This is definitely an international business," Grierson says. "We shipped automation systems to customers in 59 different countries last year. We see our role as that of helping the world's industries achieve higher levels of output, with more effective utilization of labor, technology, and energy resources."

What's so different about the Group's approach? After all,

General Electric has been helping industry boost its productivity since electric motors took over from steam-driven belts and pulleys. What's new? Grierson ticks off the distinctions between past GE industrial programs and those of the new Group:

- "Formation of this Group is based on a top management commitment to increase resources directed at industrial electronics. With GE making substantial new investment in new electronic components and microprocessor technology, our task is to apply these new developments for the benefit of our industrial customers."
 - Research and development will be stepped up. "We have a substantial expansion of research in components and systems under way, and have added to our Group structure a new multimillion-dollar electronics development laboratory for developing and prototyping advanced industrial systems integrating those new electronic component advances."
 - The Group aims at a much broader product range than it now offers. "We have areas of
- (continued next page)*

excellence in industrial automation. GE was the early leader in numerical controls that have brought tremendous increases in the productivity of machine tools. We expect to continue to be a leader and to extend computerized numerical controls much more widely than their present penetration. Another area of leadership is in drive systems for industrial processes. GE has long been acknowledged as the world leader in systems for such applications as automating steel mills, paper mills, and offshore oil drilling rigs. We also have very good businesses developed in such specialized areas as controls for plastic injection molding equipment and control systems for electric-powered vehicles. Our new thrust will use these areas of excellence as bases on which to build systems to serve the whole range of automation needs of industry. The integration of order processing and design engineering, made possible by significant cost and performance advancements in computer hardware and software, will permit major productivity improvements in

the office and factory of the future. Today's technology allows engineering and manufacturing planning to be done on a cathode ray tube and then 'moved' to a factory workstation involving robots and other advanced numerically controlled equipment, inspected and tested by automatic non-destructive techniques—all through a computer-oriented data system. We intend to be involved in the whole automation spectrum."

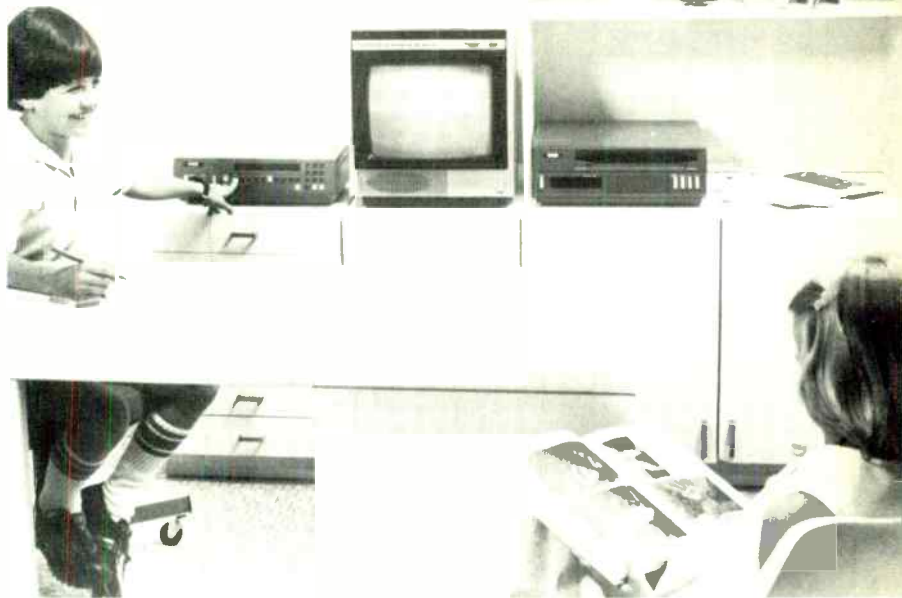
- Grierson sees an important distinction in terms of timing. "Earlier advanced automation systems were nice but not necessary. With unit labor costs less a factor, and material and energy costs low, industry in general had no overwhelming incentive to adopt advanced systems. Now the incentive is here. Systems that use the 'new electronics' can produce cost savings in labor, materials and energy. At the same time, the costs of storing and processing information have come down dramatically. The cross-over of these two trend lines makes

automating industrial systems a greater opportunity than ever before. We estimate that less than 25% of U.S. industry has felt the real impact of automation—it's a virtually untapped market for those who can meet industry's changing needs."

Don Grierson and his associates in the Industrial Electronics Business Group are responding to the challenge of change and growth. "Companies that respond to customers' needs for integrated systems, not just devices, will survive and prosper. These systems must satisfy requirements for enhanced productivity and efficient energy use. Our Group is committed to designing and producing both components and systems to allow us to fill those needs. With the support of the GE Research and Development Center and other new GE electronics-focused organizations, we believe our Group will fill the tough specification which we have defined as our mission—to be a very important building block in that factory of the future." **AV**



Industrial electronics employs advanced techniques in its own production. Left: an interactive graphics device in use by the Group. Above: a numerical control helps to automate circuit wiring.



Video discs are ideal for reaching specialized audiences, and GE plans to market a complete system next year.

A potential multimillion-dollar market, video discs may affect home entertainment and education habits.

From broadcasting to 'narrowcasting'

The lexicon of communications is being rewritten by modern electronics and marketing. In contrast to broadcasting, with its familiar mass coverage by radio and TV transmissions, a new word has been added: "narrowcasting."

"Narrowcasting encompasses the techniques of reaching smaller, more specialized audiences via cable TV, satellite, video cassette and, soon, video disc players," explains Nicholas J. Covatta, Jr., staff executive—Strategic Planning and Development Operation, Consumer Products and Services Sector. "GE is planning its entry into the video disc market by late 1981."

Covatta points out that video disc technology is part of a growing home entertainment and information systems market that could build from its present \$16 billion in annual sales to \$35 billion by 1985.

"The reasons for this growth," he says, "are rooted in three major changes in consumer buying patterns: the impact of inflation, growing time pressures—particularly in homes with working wives, and the lowering cost of electronic products."

Notes Covatta: "Today, consumers can easily own their own computers; about one million Americans have video cassette recorders and

another half-million are pay-TV subscribers. Narrowcasting is building."

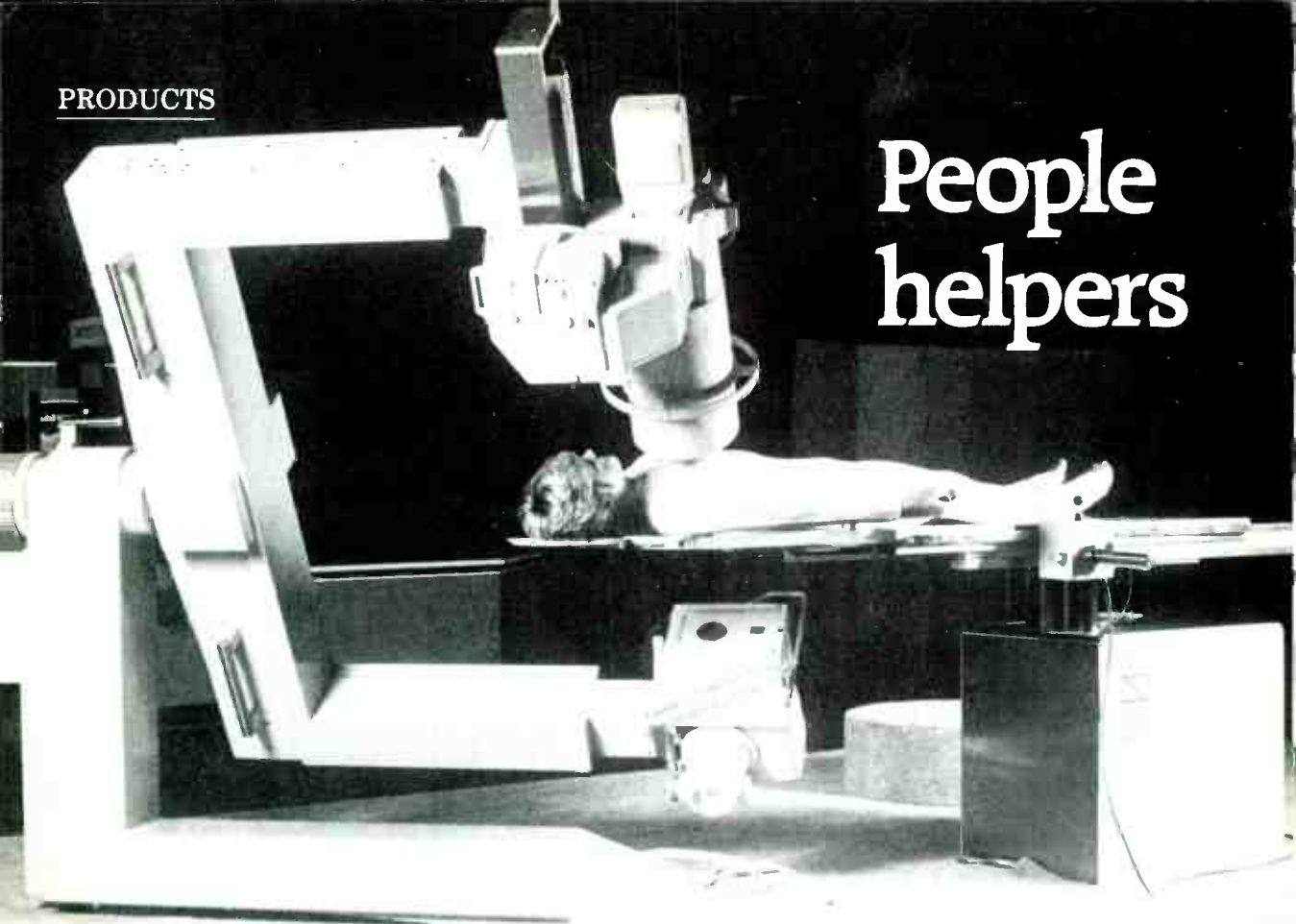
The video disc system that the Company proposes to market is called a video high density—or VHD—system that plays 10-inch, grooveless records to produce color television images with stereophonic sound. The system was developed by JVC, a member of the Matsushita group of Japan, and offers such special features as fast and slow motion, search, stop action and freeze frame.

"The video disc player will be priced at about \$500," says Covatta, "with discs selling for about \$15-to-\$20. A disc provides an hour of programming per side, and might contain a movie, TV special, musical performance, play, or even how-to instructions on improving your tennis or golf game."

The Company is currently negotiating for the formation of three jointly-owned companies with Matsushita Electric Industrial Co., Ltd. (MEI), Victor Company of Japan (JVC), and Thorn-EMI Ltd. of England to introduce the VHD system in the United States.

The joint ventures will include a hardware manufacturing company, an entertainment software company, and a disc-pressing company. Establishment of the companies is contingent upon corporate and governmental approvals. □

People helpers



A 'roadmap' for the body

Better images of the body's circulatory system are now achievable because of two new GE X-ray machines designed to show a "road-

map" of blood vessels and arteries. The L/U-Cardio system (above) is geared for heart examinations while the L/U-Angio system checks

for blockages and breaks in the vessels and arteries serving the brain. Both systems use a unique GE "isocentric" feature.



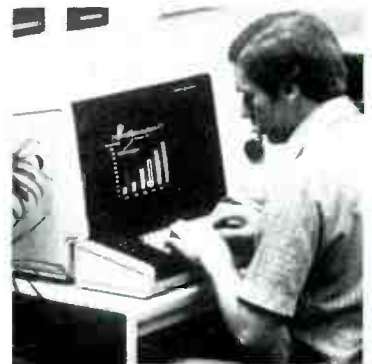
Meter with microprocessors

This microprocessor-based TM-80 time-of-use register, designed for metering residential, commercial and industrial loads, can be programmed for up to five years. It can accommodate as many as 10 holidays and four seasonal rate changes per year, as well as weekend schedules and daylight-saving time.



CB radio for non-CBers

When a car breaks down on a lonely road, what's a driver to do? Reach for Help!®, GE's latest citizen's band radio. When plugged into a cigarette lighter, it provides instant two-way communications over 40 channels. Equipped with a magnetic antenna that is mounted on the car's roof, the unit fits into a glove compartment.



Slide system for offices

The Genigraphics® Full-Spectrum Office Slide System brings the technology of computer slide production to the fingertips of customers in their own offices. The remote-entry color terminal offers such editing capabilities as color, scaling and type styles. It is capable of creating charts, graphs and word slides.



Safer railroad travel

Imagine riding on a train, looking out the window and seeing a cinder block hurtling toward you! If the window pane was one of three new Lexgard[®] and Margard[®] sheet glazing material systems designed by GE, then the block would bounce harmlessly away. Designed to meet strict Federal Railroad Administration regulations dealing with ballistics and large-object impact, the GE glazing systems can withstand the impact of a 24-lb. cinder block and a 22-caliber bullet.



Orchestra door chime

A novel way to greet guests is with the GE 60-tune Orchestra Electronic Door Chime, a micro-processor-controlled doorbell that plays a tune for almost any occasion—"Auld Lang Syne" on New Year's Eve, say, or "Silent Night" at Christmastime. Other tunes include the "William Tell Overture" and "Dixie."



Powerful food processor

Preparation of large quantities of food is easier with the new FP6 Food Processor Supreme. Powered by a rugged direct-drive induction motor, the FP6 permits almost endless slicing, shredding and chopping with its continuous-flow food chute.



Easier ironing

Ironing will be almost effortless in the 1980s with the new GE series of Light 'n Easy[®] irons, which average 2.6 lbs.—lighter than comparable metal irons. Among the models is a compact iron which is just 1.6 lbs., but has most of the features of the full-size irons.



Improved bathroom seal

Mildew-resistant and watertight bathroom repairs are easier with improved Bathroom Caulk & Seal—the latest addition to the Company's family of silicone

household products. Caulk & Seal stays white and flexible, has no unpleasant odor and bonds well to porcelain, ceramic, glass, fiberglass and most plastics and metals.



High-efficiency cooling

A highly efficient way to battle summer heat is with the Executive II Weathertron[®] heat pump. Able to run on low speed 90% of the time and then automatically shift to high speed during peak demand, it has a programmable thermostat control.



Large-screen clarity

A 1,003-sq.-in. screen is what GE is offering with its new Widescreen 3000 Home Television Center. Housed in a cabinet, it features VIR broadcast controlled color while specially manufactured float-glass mirrors produce a virtually distortion-free image.



Campaign strategists Roger Clement (center), his wife Jacqueline and State Rep. Porter E. Leighton

The Company's

From coast to coast,

Is it true that citizen apathy in America is on the rise? Consider the number of voters in the last Presidential election, for example. It was a paltry 54%—compared to Britain's last general election, when 76% of the electorate went to the polling stations.

Individuals willing to serve endless hours on local, state and federal boards, commissions and agencies—or tirelessly campaign for candidates—or just simply exercise their right to vote are on the decline. Does this mean that the “constructive citizen” is dead?

The answer that comes from a cross section of General Electric employees is a resounding “No!” As the following examples show, many GE people are unselfishly working to make their towns, states and nation better places in which to live.



Oakland's Delano Morgan (center)

“It's easy to sit back and criticize politicians and government policies. But it's difficult to give up your leisure time in order to work for political change—especially on the local level; that's where you can make things happen.”

Those are the sentiments of Roger Clement, who practices what he preaches. The specialist—Advanced Methods for Large Steam Turbine-Generator Department in South Portland, Maine, has been chairman of the Zoning Board of Appeals in Naples, Maine, where he lives, and has also served on the Town Budget Committee. This year, he was chairman of the Naples delegation to the Republican First Congressional District convention and then to the state convention. And, with his wife, he worked for the reelection of State Representative Porter E. Leighton.



Hoosier Mayor Jackson Higgins



Political supporter Florence Joseph

Donald Page (right) and principal Bert Roger



“I've become increasingly concerned with the caliber of the people elected to public office,” says Clement. “Once in office, they tend to forget why they're there—too many of them lose a sense of fiscal responsibility, cater too much to the interests of special groups, and neglect the interests of the great majority of the people. Taking an active role in local politics is the only way we can change that.”

Clement's 16-year-old son, Roger Jr., is getting a head start on following his father's

'constructive citizens'

GE employees are fulfilling their democratic duty of good citizenship.

advice. He was one of a dozen Maine students chosen by the Republican Party to attend the Republican National Convention as part of a national GOP youth education program.

When "Measure H" won a smashing victory in the Oakland, Calif., election on June 3rd, with 63% of the vote, Delano Morgan had good reason to be happy.

An account representative for the General Electric Information Services Company (GEISCO) in San Francisco, he had spent most of his after-hours time since last November chairing the committee which backed "Measure H"—a provision changing the method of electing city council members. Previously, council seats were filled on the basis of citywide voting. Members are now elected by winning in their own districts only.

"Our victory," beams Morgan, "means that individual council members can now be held directly accountable by voters in each district. Also, running for office will be less expensive, since each candidate will have to campaign in only one district. And individual sections of Oakland will be more equitably represented."

Working for the passage of "Measure H" was infectious. Morgan is currently involved in the reelection campaign of a California Congressman.

No mayor was ever reelected in the 160-year history of Mount Vernon, Ind. That is—until Jackson "Jack" L. Higgins, a shift leader for GE's local Lexan Products Division plant, came into office. The Democrat has now governed the town of some 7,000 for nine years.

"I grew up in this community," explains Higgins, "and I saw things that needed changing. But the only way I could get things to happen was to run for office."

Since Higgins took office in 1971, Mount Vernon has built an 84-unit senior citizens' housing complex and a senior citizens' center, and is refurbishing homes for the elderly and low-income segments of the community. Separating GE business from town business, Higgins has, on occasion, coaxed fellow-

employees into getting involved in local affairs.

An ardent campaigner for a Presidential hopeful this spring, Arlington, Va.'s Florence Joseph believes political involvement is important; but only if it is done for the right reasons.


"Unfortunately," she says, "too many people do it either because they hope to benefit from their candidate's patronage or because they are just looking for something to latch on to for awhile. If you're going to get involved, it should be because you really believe in the candidate. If you have a personal commitment, then you're going to do a good job."

A member of the marketing staff for Space Systems Division, Joseph recently spent Saturday afternoons and Monday evenings serving the local campaign—tirelessly answering correspondence which could not be answered with a form letter, handling switchboard duties, and canvassing from door-to-door.

Would she do it again? "Absolutely," she says.

The cost of education is one of the hottest issues in any town or city in the U.S. Finding capable citizens to serve on school boards is not easy. But fortunately for the people of Swampscott, Mass., they found Donald Page.

Manager of TF34 Engineering Program Control for Aircraft Engine Business Group in Lynn, Page is a member and past chairman of the Swampscott school board. Despite inflation, mandated programs, renovation projects and wage increases, he was able to take a modest \$5.5-million budget and overhaul the educational system while maintaining a low student-teacher ratio. He saved the town \$100,000. A community that demands good education (85% of its high-school graduates move on to higher education), Swampscott named Page its "Man of the Year."

"It's important for people to become involved in their community, their government," Page asserts. "The attitude in many towns today is one of disenchantment. If I can do nothing more than restore the confidence of people in their elected officials, I feel that I've made a contribution." 



STADIUM BY THE SEA. In the ancient Dalmatian city of Split, Yugoslavia, overlooking the Adriatic Sea, stands a graceful giant—Gradski Stadium. With the help of General Electric Lexan® polycarbonate sheet, Gradski is one of the world's most modern sports arenas.

Designed to capture the striking contrast between the mountains and the sea, Gradski was dedicated on Sept. 15, 1979, by the late President Marshal Tito, and was the site of last fall's 15-nation Mediterranean Games—the first major inter-

national sporting event held in Yugoslavia.

The roof, glazed with Lexan sheet, covers the seating area and is believed to be the largest structure of its kind in the world. The transparent, "solar bronze" sheet not only offers protection for 50,000 spectators from the blazing sun, but enhances

television coverage by eliminating vast shadows on the playing field.

The Lexan sheet was chosen because it could be easily processed and shaped on site to fit the sweeping, arcing design of the Gradski Stadium.

