



GENERAL ELECTRIC
Monogram
SEPTEMBER-OCTOBER 1979

Utah's Canadian copper center

PLUS:

**Changes at the top;
Upgrading professionals;
World of GE hams**

GE management: new responsibility



Responsible to Reginald H. Jones, Chairman and Chief Executive



W. A. Schlotterbeck
Senior VP, General
Counsel and Secretary



A. O. Way
Senior VP
Finance



Responsible to John F. Burlingame, Vice Chairman and Executive



R. R. Frederick
Executive VP and
Sector Executive
International Sector



A. M. Wilson
Chairman of
the Board and
Chief Executive
Officer
Utah
International Inc.



Responsible to Edward E. Hood, Jr., Vice Chairman and Executive



C. T. Kastner
Executive VP and
Sector Executive
Technical Systems and
Materials Sector



T. A. Vanderslice
Executive VP and
Sector Executive
Power Systems Sector



Responsible to John F. Welch, Jr., Vice Chairman and Executive



J. A. Baker
Executive VP and
Sector Executive
Industrial Products
and Components Sector



P. W. Van Orden
Executive VP and
Sector Executive
Consumer Products and
Services Sector

THE COMPANY

Management for the 1980s

Announcement that the present Vice Chairmen, Walter D. Dance and Jack S. Parker, shown at right with Chairman Reginald H. Jones, plan to retire on December 31, 1979, has been followed by a series of top-level organization changes.

These changes are, in Reg Jones' words, "preparing the organization and the people to meet General Electric's long-range growth opportunities in the decade ahead."

(continued on page 4)

assignments

Officer, are:



T. P. LeVino
VP
Executive Manpower

Officer, are:



D. J. Fink
Senior VP
Corporate Planning
and
Development



L. C. Maier, Jr.
Senior VP
Corporate
Relations

Officer, are:



A. M. Bueche
Senior VP
Corporate Technology

Officer, are:



R. B. Kurtz
Senior VP
Corporate Production and
Operating Services



GENERAL ELECTRIC Monogram

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Contents

On the cover: Quatsino bear pole at Utah International's Island Copper Mine on Vancouver Island, B.C., commemorates effort of local residents in developing and operating mine. Norman Charlie, hereditary chief of Quatsino Indians, dedicated the pole in 1974. Story begins on page 24.

THE COMPANY 2-13
Changes at the top/Upgrading GE professionals/Small hydro/GE inventors in limelight/Monographs

TECHNOLOGY 14-15
Eyes in the sky

THE BUSINESSES 16-18
The GE-Cox merger plan: update

PEOPLE 19-23
Steinmetz winners/Infinite variety/Organization changes/The world of GE hams

NATURAL RESOURCES 24-28
Port Hardy: copper town

PERSPECTIVES 29-31
Ingenuity goes to work

The Monogram's purpose is to keep its readers informed on General Electric activities so that they may more effectively represent the Company in its relationships with the public. It is published bi-monthly by Corporate Public Relations Operation—Douglas S. Moore, Vice President. Editorial supervision is by David W. Burke, Manager, Corporate Communications, and J. Hervie Hafler, Manager, Corporate Editorial Programs. Request permission to reprint articles from the Monogram Editor, Fairfield, Connecticut 06431. Copyright 1979, General Electric Company.

On August 5, the Board of Directors elected three new Vice Chairmen, John F. Burlingame, Edward E. Hood, Jr., and John F. Welch, Jr., effective October 1, 1979. Coincident with the year-end retirement of Dance and Parker, the Board plans to elect Vice Chairmen Burlingame, Hood and Welch as Directors of the Company.

More than forty other high-level changes followed from these elections. Appointments effective October 1 included the following:

- Robert R. Frederick succeeds Burlingame and has been elected Executive Vice President and Sector Executive, International Sector.
- Christopher T. Kastner succeeds Hood and has been elected Executive Vice President and Sector Executive, Technical Systems and Materials Sector.
- Paul W. Van Orden succeeds Welch and has been elected Executive Vice President and Sector Executive, Consumer Products and Services Sector.
- James A. Baker succeeds Stanley C. Gault and has been elected Executive Vice President and Sector Executive, Industrial Products and Components Sector. Gault will join Rubbermaid, Inc., effective January 1, 1980, until which time he will be Senior Vice President, reporting to the Chairman.
- Thomas A. Vanderslice has been elected Executive Vice President and continues as Sector Executive, Power Systems Sector.


Concurrent with the Executive VP and Sector Executive assignments effective October 1, the following GE officers will assume new titles and duties at Corporate Staff or Group level:

Daniel J. Fink, Senior Vice President, Corporate Planning and Development Staff; Louis V. Tomasetti, Senior Vice President and Group Executive, Aerospace Group; Ralph D. Ketchum, Senior Vice President and Group Executive, Lighting Group; John A. Urquhart, Senior Vice President and Group Executive, Power Delivery Group, a newly established Group in the Power Systems Sector; and Brian H. Rowe, Senior Vice President and Group Executive, Aircraft Engine Group, succeeding Fred O. MacFee, Jr., who plans to retire from the Company.

In addition, the following Group Executives have been elected Senior Vice Presidents: Roy H. Beaton, Nuclear Energy Group; Charles R.

Carson, Engineered Materials Group; James P. Curley, Industrial Products Group; Richard O. Donegan, Major Appliance Group; Herman R. Hill, Turbine Group; and Van W. Williams, Component Products Group.

Among other changes taking effect on October 1:

- In the Consumer Products and Services Sector: Lawrence A. Bossidy, Executive Vice President and Chief Operating Officer, General Electric Credit Corporation, reporting to John W. Stanger as the GECC President and Chief Executive Officer; William L. Grim, General Manager, Major Appliance Contract Sales Division; Donald K. Grierson, Vice President and General Manager, Lamp Products Division; David O. Gifford, General Manager, International Lighting Division; and Walter W. Williams, General Manager, Housewares and Audio Business Division.
- In the Industrial Products and Components Sector: Bruce O. Roberts, Vice President and General Manager, Apparatus Service Business Division, with Peter C. Van Dyck, Vice President, serving as Consultant to the Sector Executive.
- In the International Sector: Paolo Fresco, Vice President and General Manager, Europe and Africa Operations, a new component.
- In the Power Systems Sector: Robert H. Goldsmith, Vice President and General Manager, Gas Turbine Division; Warren H. Bruggeman, Vice President and General Manager, Nuclear Products Division; and Richard W. Kinnard, Vice President and General Manager, Transformer Business Division.
- In the Technical Systems and Materials Sector: James E. Worsham, Vice President and General Manager, Commercial Engine Operations; Neil Burgess, General Manager, Airline Programs Division; Harry C. Stonecipher, General Manager, Commercial Engine Programs Division; James N. Krebs, Vice President and General Manager, Military Engine Operations; William J. Crawford, General Manager, Military Engine Projects Division; Orville R. Bonner, General Manager, Marine and Industrial Projects Division; Frank E. Pickering, General Manager, Aircraft Engine Engineering Division; Alastair C. Gowan, Vice President and General Manager, Metallurgical Business Division; and Donald J. Meyers, General Manager, Mobile Communications Business Division. 

To update employees' electronics skills, Utica's Aerospace Electronic Systems Department has established a Technical Renewal Program. Shown: participants Edwin Johnson (left) and Louis Myers (far right) with instructors Leonard Viens (center left) and Richard Abbott.



Upgrading GE professionals

A number of new GE programs are helping exempt employees build their technical skills.

Opinion surveys among GE professional employees, personnel research to gain a better definition of "challenging work," a variety of new career-development courses—they're all aspects of a powerful new effort quietly under way at General Electric to strengthen the technical skills of GE professionals.

"Yes, we're carefully examining how we can best assure that General Electric technical employees will maintain and enhance their professional competence," says Dr. Lindon E. Saline, manager—Human Resources Systems Development of Corporate Employee Relations Operation (CERO). "That's a top-priority Company goal within the area of exempt employee relations. We see exempt programs as important to meeting the needs not only of our technical employees, but also the goals of GE businesses for boosting productivity, confronting multinational competition, and helping seize new technological opportunities."

Observes CERO's George H. Hupman, manager—Professional Relations: "*Recruiting, retention and retraining*—the 'Three Rs' addressed by GE's new Professional Technical Skills Program—are essential for the Company in meeting its need for technical skills as set forth in last year's Corporate Technology Study and the 1979 Corporate planning challenges."

Hupman remarks that "our task is to assess the changing skills needed by GE's technical manpower, and develop a strategy to support the Strategic Business Units in recruiting and training new technical employees, and retraining and retaining current employees."

A review board—composed of Corporate, Sec-

tor and SBU people—is looking at data which tell how many engineers and scientists GE has now, how many are required during 1980 and beyond in each SBU, and in which "critical and pervasive technologies" they will be needed. The report also estimates expected losses, new college and experienced "hires," and persons to be retrained.

"As a second part of this program," mentions Hupman, "we recently hired a consulting firm to study GE's image on college campuses. We want to know how juniors and seniors 'see' the Company, in order to find ways to make our recruiting effort more effective."

Already, the consulting firm has completed a study which examines the Company's image among GE entry-level people—and comparable people who didn't join the Company. The next phase will be conducted later this fall on many campuses where GE recruits.

"Our program's ultimate goal is to develop well-researched recommendations to make sure that GE will always have enough of the particular technical skills needed to carry out the Company's strategic plans," Hupman explains.

Barriers to providing challenging work for GE professional employees are presently the subject of other research directed by CERO's Dr. Thomas D. Hollmann, manager—Personnel Research. The Corporate Technology Study, and related independent research, found that the first assignments are critical to career development. People who have experienced challenging work and are well counseled tend to be more productive and stay with the Company.

(continued next page)

Remarks Dr. Hollmann: "Beginning in 1978, we set out to carefully define 'challenging work' by interviewing exempt employees with two to four years with GE. We talked with engineering, manufacturing and marketing people, discussing their most and least challenging work experiences, and what managers had done to spur their career development."

The definition of challenging work that resulted, explains Hollmann, "underlined the importance of job content, skill utilization, personal involvement, opportunities to interact with others, and a sense of accomplishment."

Since the intent was to help managers *provide* challenging work, CERO next identified four department-level businesses—each in a different Sector—and began interviews with each component's managers. Says Hollmann: "We wanted to know the barriers to providing challenging work, so we showed the definition for such work first to unit managers, then to their subsection managers, and finally the section managers. Each group was asked to verify the definition, list problems in providing challenging work to subordinates, and offer solutions. Comments were shared among the groups."

CERO has now compiled a list of the common barriers and suggestions for overcoming them—and the four operations involved are studying the suggestions, estimating the cost of implementing them, and designating which should be addressed at the Corporate or operational levels. When the report is done this fall, CERO plans to share it with every component.

New exempt work force thrusts which address such topics as the work climate and performance appraisals also are under way:

- **Work Climate Assessment Program.** In the largest such GE survey ever conducted, 12,000 exempt employees were questioned in September on such topics as GE work practices, salary and benefits, opportunities for advancement, career counseling, and the effectiveness of supervisors and managers. Explains Hollmann: "Our goal is to furnish all SBU general managers with information on how their employees feel about their work environment. We plan to analyze the data by year end, and invite SBU representatives to a workshop to discuss the results and begin action planning."
- **Performance Appraisal Program.** "Employees and managers in any corporation generally agree on the value of performance appraisals, but they are almost uniformly unhappy with present appraisal systems," remarks Selig M. Danzig, program manager—Human Resources



Re-applying employee skills gained in other Company businesses has helped Medical Systems Business Division develop diagnostic aids such as the CT/T scanner. Shown: GE employees retrained from other components (l to r): Alexander Grant, Werner Sharp, Stephen Engle, James Ashby and Marvin Brosz.

Systems Development. "Recognizing this, GE has a major performance appraisal research project under way that differs significantly from research that already has been done on this subject."

A survey this fall of managerial and subordinate perceptions will seek to determine the degree to which current performance appraisal systems *influence* employee performance, and serve to *motivate* exempt employees to help achieve the strategic business objectives of their components, notes Danzig. "We also are examining the validity of some of the basic assumptions we have traditionally made about performance appraisal systems: 'all employees want an appraisal,' 'performance appraisals can influence productivity,' etc." Based on results of the study, which should be ready early next year, CERO expects to provide guidelines which will help design improved performance appraisal systems that are more responsive to employee and business objectives.

Planned career development for GE exempt people is receiving major Company attention in the form of varied work assignments, classroom instruction, workshops and seminars. Limited space permits only a sampling of the new courses now offered or soon to start:

- **Advanced Course in Engineering.** "The three-year advanced engineering program has had a major face-lift, including addition of 15 new chapters on the 'pervasive technologies'," states Dr. Donald R. Mack, program manager—Technical Education. "We have expanded the program from 10 to 15 GE locations, and our classes are now accredited by local colleges and universities. Employees who complete the program also earn master's degrees. This fall, 340 GE people began the program—up from 220 last year, and 197 the year before."

• *Edison Engineering Program*. “The Corporate Technology Study—recognizing the value of entry-level training programs for engineers—called for a new two-year, rotating-assignment program,” states the program manager, Walter G. Keating. “The program was begun in 1978 to help young engineers obtain breadth and depth of technical understanding through education and work experiences.”

• *Professional Employee Management* course and *Technical Manager’s Course*. Developed by CERO and Corporate Consulting Services (CCS), respectively, these companion programs are aimed at first-time managers—to help them develop managerial skills, establish dialogue with subordinates, allocate resources, manage projects and measure results. Some 1,000 GE managers already have completed the 15-hour Professional Employee Management course, which began a year ago.

Observes CCS’ Leonard A. Morgan, manager—Engineering Consulting: “The Technical Manager’s Course began this April, and two more classes are being conducted this fall. Like PEM, it is being offered regionally, to enable as many people to attend as possible.”

• *Electronic Application Course*. To get underway in early 1980, this CCS program “is targeted at generalists, not specialists,” notes Morgan, “though anyone who completes all nine parts will have a detailed grounding in electronic applications.” The course’s purpose: to give engineering, manufacturing and marketing people enough knowledge so that they can effectively apply electronics in their work assignments. Says Morgan: “The course is offered in modules, to let employees select those segments which are most applicable to their businesses.” It will be taught in cooperation with GE’s Manufacturing Engineering Consulting and Applications Center (MEC&AC).

• *Industrial Robot Applications Workshop*. Begun this fall, this workshop trains GE engineers to plan and implement industrial robot applications. Observes Dr. Jules A. Mirabal, manager—MEC&AC: “Our purpose is to provide state-of-the-art technical skills to engineers so that they can apply robots successfully.” Already in its third year is a CCS-sponsored Annual Robotics Seminar to inform GE people of developments in the robotics industry. This spring, a special robotics workshop was held for Industrial Products and Components Sector personnel, to identify possible new robot applications.

• *Product Planning Course*. Set up in 1978, this CCS course is designed to help GE people

increase their product-planning expertise by learning to screen new products and get good ones promoted within GE. John B. Bradbury, manager—Marketing Consulting, remarks: “Our program is interfunctional—open to people from various disciplines who have product accountability. A major teaching aid is a ‘competency model,’ developed from interviews with successful practitioners.”

• *Conference on Advanced Marketing Planning*. Also set up by CCS last year, this program is targeted at senior marketing managers who graduated from GE’s Advanced Marketing Management Seminar more than five years ago. Says Bradbury: “The conference is held annually, and is focused on upgrading managers in the areas of international market development, financial implications of marketing decisions, and computer modeling.”

• *Production Systems Exchange and Manufacturing/Business Information Systems Workshop*. “Effective computer systems and their applications for production/inventory planning and control are the focus of these CCS companion programs,” notes Alfred P. Taylor, manager—Manufacturing Management & Quality Control Consulting. “The exchange’s purpose is to familiarize managers and specialists with the best systems in use, and to provide them with knowledge and analytical techniques for selections suitable to their own operations. The workshop—designed to help participants introduce and carry forward systems applications—is aimed at both manufacturing and information systems people, and emphasizes the means for a productive relationship between the two groups.”

In cooperation with GE’s Production Systems Applications Center, the first exchange was held in 1978, and two are scheduled this year. The workshop, with the assistance of the Corporate Computer Planning Operation, was first held this August, and at least two sessions are slated for 1980.

• *Software Engineering Program*. Started this summer, this Computer Management Operation (CMO) program involves an intensive six-month curriculum for entry-level employees schooled in computer science and engineering. James T. Duane, manager—CMO, states: “We saw a need to give computer-oriented graduates at least six months of industrial computer experience before they go on to operational assignments. In lab facilities, we now furnish ‘hands-on’ computer experience, assigning real projects to enrollees who complete them working in teams with seasoned professionals.”

Small



A Lyndonville, Vt., hydro plant was recently upgraded by adding a GE furnished 1,350-kw unit. Inspecting GE control equipment: utility manager Kenneth Mason (l) and I&SE field engineer Timothy McPartlon.

To the prevalent idea that the U.S. has already developed most of its available water power resources, a number of General Electric people are saying "Not so." Elmer D. Gates, general manager—Large Motor and Generator Department (LM&G), points out, in fact, that "the U.S. is using only about 35% of its potential hydro capacity. Some of the underutilized resources consist of smaller hydro sites. There are 50,000 small dams in the U.S. If only 10% were developed at 5,000 kilowatts each, it would save at least 6% of present U.S. oil imports."

Capturing a major portion of this small-hydro potential is the objective of a new General Electric effort. In the U.S., GE recently formed an internal joint venture to focus specifically on small hydro plants up to 15,000 kw of power.

Behind the resurgence of interest in small hydro is the changing economics of energy.

With fuel costs a critical item in the cost of generating electricity, the drastic increases in imported-oil prices have made smaller hydro plants economically competitive.

States Norman M. Clapp, former head of the Rural Electrification Administration, in the May/June *Public Power* magazine: "Not only is small hydro attractive to those who are fervently searching for the so-called 'soft' or 'appropriate' technologies based on renewable energy sources as alternatives to present patterns of power supply, but the technology has also now been given a kind of 'Good Energy Seal of Approval' by the Federal Department of Energy in designating it as one of the technologies with near-term commercial potential."

The bottom line of today's energy economics is how great a reduction can be achieved, realistically, in oil imports. Based on information avail-

able on dams with no hydro capacity, Clapp says, it's known that "for every megawatt of small-hydro capacity developed, which on a 50% plant factor basis replaces oil-fueled electric generation, 7,930 barrels of oil will be saved annually. At the average price of \$13.40 per barrel for crude oil in 1978, this is a saving per megawatt of \$106,000 in our import bill."

Multiply this by the 33,600-mg potential ascribed by the U.S. Corps of Engineers to existing dams without developed generating capacity. Clapp adds, "and one gets an outside saving of 266 million barrels of oil annually, costing \$3.6 billion in the foreign market at 1978 prices." Sharp increases in oil prices in 1979 further boost these estimates.

How to exploit this small-hydro potential? GE experts are at work on a range of technologies: adding new small-

hydro

Today's changing 'energy economics' is spurring a new look at small hydroelectric plants—and GE is responding with a major new venture program.



Looking like a large ship propeller, these hydro-runner blades were repaired by Apparatus Service Shop specialists Mike Tatti (l) and Al Barton as part of recent GE rebuild of a 2,000-kw hydro unit at Clinton, Mass.

hydro stations, rehabilitating abandoned sites, and uprating and modernizing present operating hydro systems. They see each phase of these programs yielding economic payoffs.

Observes Gates: "General Electric enjoys a number of strengths in its current hydro marketing thrust, in that GE has manufactured hydroelectric equipment for more than 80 years. The Company has built and installed more than 2,000 units at more than 1,000 sites during that time."

Notes Robert G. Beadle, general manager—Electrical and Electronic Service Department, part of Installation and Service Engineering Business Division (I&SE): "GE is uniquely positioned to take

(continued next page)

At Beaver Falls, N.Y., I&SE field engineer Andrew Kopach (l) and Clifford Olney, a subcontractor, discuss civil work for new 1,000-kw plant at abandoned hydro power site.



advantage of the small-hydro opportunity by being able to offer a total package—engineering, manufacturing, field work and project management.”

Capturing a major portion of this small-hydro bonanza is the objective of the new three-way venture between LM&G, I&SE and Apparatus Service Business Division (ASBD).

“The intent of the venture is to give the pooled sales organizations, Electric Utility Sales Division and Industrial Sales Division, an attractive hydro package that they can offer their customers, which utilizes the strengths of the venture partners,” says Harold Bongarten, general manager—Apparatus Service Programs Department, part of ASBD. “To coordinate activities, a Hydro Council has been established, which meets regularly to review each opportunity and recommend the best strategy for securing the order.”

Declares Beadle: “We want to sell our hydro customers on the system approach rather than a piecemeal approach, where appropriate. Our venture strategy is to offer a broad system that few, if any,

competitors can match. Entrepreneurship is encouraged. The venture recognizes each partner’s strengths, and challenges us to get the job done.”

Impressive small-hydro successes are being regularly reported by GE operations.

Case in point: recent disassembly, inspection and repair work completed by Boston’s Apparatus Service Shop for the Metropolitan District Commission at its Wachusett Reservoir power plant in Clinton, Mass. The plant dates back to 1908, when a masonry dam was built across the south branch of the Nashua River.

GE was asked to rebuild one of the two 2,000-kw hydro-turbine generators at the station. After carefully removing the unit from operation, Service Shop specialists rebuilt the critical hydro-runner blade assembly and repaired the hydraulic control system. The electric generator also received a thorough overhaul.

A second example: rehabilitating an abandoned hydro power site for Boise Cascade at Beaver Falls, N.Y.

This project is underway, and involves constructing and

equipping the entire 1,000-kw power station, since only the foundation and water passages remained. A standardized module approach is being used for cost-effectiveness. LM&G is furnishing overall engineering direction as well as the 500-kw turbines and generators and other equipment. I&SE is responsible for civil-engineering work, powerhouse design and erection, equipment installation, construction of a transmission line, and startup testing.

A third example: GE upgrade work involving the addition of a new 1,350-kw hydroelectric power station for residents of Lyndonville, Vt. An old unit, rated at 600 kw, had been installed in 1915. Now finished, this enlarged municipal hydro facility includes a 1,350-kw turbine-generator and other equipment furnished by LM&G. I&SE installed all the GE supplied equipment.

Bongarten remarks: “These recent applications illustrate that, while the development of small-hydro capacity is by no means the complete answer to U.S. energy needs, small hydro can be economically attractive. Planning and implementation time for small-hydro units is short—usually about one to two years, depending on the project scope. Hydro plants typically operate in excess of 50 years, and their forced outage rate, measured at about 1.5%, is the lowest of any major power generating source.”

Concludes Gates: “Incremental additions and uprates of small-hydro units in the U.S. are needed to plug the gap of delay which now threatens various power-generation projects. We are excited and optimistic about supplying many customers with small-hydroelectric systems.”



At Clinton, Mass., Service Shop’s Peter Buonauro (foreground) performs repair work inside generator stator of hydro-turbine, while Mike Tatti tightens connections on generator rotor.



GE inventors in limelight

Two outstanding recognitions for invention have come to the Company in recent days.

Dr. Douglas Houston—recipient of the 50,000th U.S. patent assigned to General Electric.

Two sets of signal honors recently were bestowed upon General Electric when the Company became the first corporation to earn 50,000 patents—and when, in a ceremony in Washington, D.C., GE was presented with National Inventors Hall of Fame award plaques which commemorate the work of GE scientific giants Edison, Coolidge and Steinmetz.

Over the years, General Electric has consistently led all other companies in obtaining U.S. patents. In 1978, for example, GE inventors received 865 patents, hundreds more than were awarded to any other company.


So it was by no means a surprise when General Electric became the first corporation in history to be assigned its 50,000th U.S. patent. Granted to Syracuse's Dr. Douglas E. Houston, manager of Advanced Development at the Discrete Semiconductor Device Center, it covers a process for creating fine grids in semiconductor devices. Dr. Houston made the invention covered by the 50,000th patent while

working as a physicist at Schenectady's Corporate Research and Development Center.

"This 50,000th patent is a tribute to the spirit of innovation that has characterized the men and women of General Electric since the earliest days of the Company," stated Dr. Roland W. Schmitt, Vice President for Corporate Research and Development, when the historic patent (U.S. 4,159,916) was announced. Observed Dr. Houston: "I'm proud to have achieved this milestone patent, which is just one of many contributions to the Company's ongoing innovative work."

Acclaiming the work of General Electric pioneers Edison, Coolidge and Steinmetz, the National Inventors Hall of Fame award plaques were presented to the Company in Washington by U.S. Assistant Commissioner of Patents Rene Tegtmeyer of the Department of Commerce's Patent and Trademark Office. Fairfield's Harry F. Manbeck, Jr., general patent counsel of the Company, accepted the plaques.

The Hall of Fame, established in 1973 by the National Council of Patent Law Associations and the Patent Office, honors those U.S. inventors who have made outstanding contributions to the nation's welfare. Inventors are picked by a selection committee composed of representatives from national scientific and technical organizations.

Remarks Manbeck: "General Electric has led the list of companies receiving U.S. patents every year since records have been kept. We are producing more at nearly a thousand a year—nearly four patentable inventions every working day. Some 17,000 of the 50,000 patents assigned to GE over the years are unexpired and still in force." 

At a Washington ceremony, GE's Harry Manbeck (right) received the Inventors Hall of Fame award plaques from Rene Tegtmeyer of the U.S. Patent and Trademark Office.



Monographs

Hooray for GE athletes!

At the annual Corporate Cup Relays this summer in Berkeley, Calif., General Electric runners notched second place out of 52 corporations. In eight events, the Company took three firsts, a second, a third—and set two intercorporate national records! Only San Francisco's Pacific Gas & Electric scored more points.

GE racers included two vice presidents among its tally of managers, engineers, technicians and secretaries, notes GE team captain, William G. Meinhardt, with San Jose's Nuclear Energy Business Group. "Our national records came in the Master's Relay



(for runners over age 40) and the Open Relay." Shown above: NEBG's William Clark. Employees interested in try-

ing out for the GE Corporate Cup Team should contact Meinhardt at NEBG, 175 Curtner Ave., San Jose, CA 95125.



Ms. Fixit. "I like people. I like to fix things. I like to drive. If I had to define the perfect job, this would be it," says Judy L. Carmack, a service technician at the Portland, Ore., Major Appliance service center.

Carmack started working for GE two years ago, after brief stints as a motorcycle mechanic, tire salesperson and secretary. She says her male colleagues take her in stride. She admits though: "Some customers think I've come to

verify that the appliance is *indeed* broken—and believe that the real serviceman will arrive later!"

Carmack has learned to deal with her customers' eccentricities. She has fixed a dishwasher with a pet rat perched on her shoe, separated the fingers of a woman who had glued them together, and responded to a service call to find a man beating his parakeet with a fly swatter because it wouldn't take a bath!

Olympic bobsled? Hard at work at Schenectady's Union College on a student project to modify the design of U.S. Olympic bobsleds, Thomas D. Allen (right), project specialist with Gas Turbine Division, discusses his recent work with the project director, Union professor David Ullman.

As part of his senior course



work for a B.S. in engineering, Thomas has helped develop a new one-piece aluminum chassis for the bobsled that has elated Prof. Ullman: "Give us a few more years and we'll break every course record in the world!" Historically, the U.S. has never been a world bobsled threat—last time placing 17th among 18 teams.

Knows his beans about coffee. Given the continued popularity of the General Electric Coffeematic® coffeemaker, housewares reporters have been descending upon Bridgeport's Olle E. Haggstrom to quiz him about his thoughts on design.

"If I've determined one thing in my 31 years with GE, it's to have faith in the judgment of American homemakers," remarks the industrial design manager of Housewares and



Audio Business Division. "How does the consumer feel about the product? To make sure I had the right design for this coffeemaker, we surveyed 600 people in New York City

and San Francisco—one-third of them men. What emerged was a practical, compact machine."

What does Haggstrom see ahead for small appliances? "It's a challenging time for designers. Plastics and electronics are on a growth curve. With energy conservation, we will have to look at new materials, processes and electronics that will allow us to develop improved products for the consumer."

Help with horseshoes. In filming the upcoming PBS television movie, "Golden Honeymoon," starring actors James Whitmore (right) and Steve Elliott, the producers faced a problem. Elliott had to be shown knocking a leaning horseshoe off a stake and scoring a ringer—in a single toss!

The solution? The good right arm of General Electric pensioner Frank Bohun of Erie (standing left of Whitmore).

Bohun, who retired from GE's Locomotive Operations in 1975, was vacationing in St. Petersburg, Fla., when he was spotted pitching horseshoes. He was recruited as Elliott's double—and it took Bohun just one toss to turn the trick.

Adapted from a short story by Ring Lardner, "Golden Honeymoon" will be shown Feb. 4, as part of the PBS series of "Great American Short Stories."



Photo Credit Ken Howard

Honors. With five new GE products chosen as winners, the Company has once again taken top honors in the annual IR-100 competition, sponsored by *Industrial Research/Development* magazine. Since the IR-100 contest was established in 1963, GE has won 123 awards—twice as many as any other company.



• Fairfield's Robert L. Fegley, staff executive—Chief Execu-

tive Officer Communications in Corporate Public Relations Operation, has been named "PR Professional of the Year" by subscribers to *Public Relations News*, the international public relations weekly.

- New York's Panagiotis "Takis" A. Argentinis, manager—Countertrade, Barter and Consortia in International Trading Services Operations, has received the Distinguished Service Award from the Office of The Comptroller of The Currency, for his work with the President's Executive Interchange Program.
- Valley Forge's Thomas L. Fagan, market development manager for Space Division, has been named a Congressional Fellow by the IEEE, and will serve a one-year term

as a Congressional committee staff member.

- Schenectady's Dr. Roland W. Schmitt, VP—Corporate Research and Development, was recently appointed director of the New York State Science and Technology Foundation.
- Schenectady's Joe H. Chow, an application engineer with Electric Utility Systems Engineering Department, has received the 1979 Donald P. Eckman award from the American Automatic Control Council.
- Burlington's Stephen E. Krakosky, an Armament Systems Department buyer, is serving as a member of the 1980 Olympic Winter Games organizing committee, responsible for testing electronic timing devices.

Eyes in the sky

Not only can GE-developed air and space survey technologies compile data on the earth's pollution, weather and resources—they hold promise for monitoring illicit operations.

Ever since satellites were first fired into orbit 22 years ago, they have served mankind in the most extraordinary ways. Tracking oil spills is just one example. As the world's worst oil slick recently blackened the Gulf of Mexico, *Nimbus 7*—the GE-built NASA satellite orbiting 700 miles high—tracked and monitored the giant spill twice daily as it swept toward the Texas shore.

Launched less than a year ago, *Nimbus 7* flashed information to NASA's Goddard Space Flight Center in Maryland that kept rescue personnel alerted on the spreading globular oil, and aided oceanographers in their study of plant and fish life affected by the oil spill.

But can satellites detect ocean pollution the moment it occurs? Zero in on oil tankers deliberately fouling the high seas? Or, going a step further, provide law enforcement agencies with sophisticated methods of combating drug smugglers? Help put the lid on illegal aliens entering the United States?

According to GE technologists—yes!

Satellite observation and airborne surveillance, designed by GE's Space Division in Valley Forge, Schenectady's Signal Electronics Laboratory at Corporate Research and Development, and Utica's Aerospace Electronic Systems Division, are altering the way the United States tackles the problems of ocean polluters, illicit drug traffickers and illegal aliens.

Built by Space Division for the NASA Goddard Space Flight Center, *Nimbus 7*, for example, carries electronic sensors which gather data from the atmosphere and oceans. Sensor data are analyzed by scientists and investigators in nine countries, enabling them to obtain global information on air and water pollution. One of the sensors, called a "Coastal Zone Color Scanner," can identify and track oil spills over 11 major ocean areas traversed by tankers. The sensor covers 500,000 square miles in two minutes. By determining water color, oceanographers can spot pollution.

GE also has built the *Landsat* spacecraft used to survey and inventory worldwide natural resources. Three *Landsats* have been

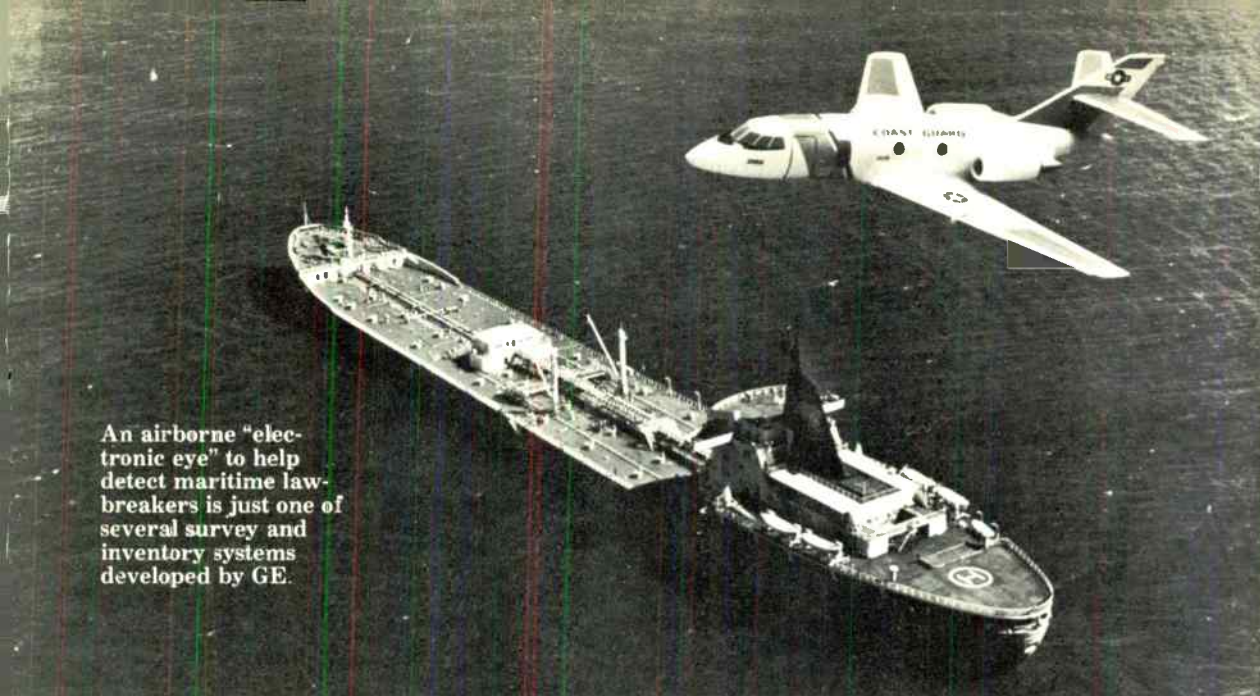
launched since 1972.

A yet-to-be-launched GE Satellite Surveillance System, patented by Roy E. Anderson, consulting engineer at Corporate Research and Development, has the potential to aid drug enforcement agents by overcoming line-of-sight radio transmission problems. It means that a central office could both talk to agents in the field and track "bugged" vehicles from one end of the country to the other, because a geostationary satellite covers as much as 43% of the earth's surface. Able to pick up weak radio signals from a mobile transmitter atop the roof of a truck, say, the satellite amplifies the signal and sends it back to earth.

Field tests by Anderson and members of the CRD Laboratory, under contracts with the U.S. Drug Enforcement Administration, Immigration and Naturalization Service, and NASA, used two satellites and a method known as "tone-code ranging." It not only demonstrated the effectiveness of the relay system, but also showed that in seconds it could locate within 600 feet a vehicle carrying a transmitter. Thus, Federal agencies could track down drug operations as well as direct their men—with the aid of topographical maps—across rough, unknown terrain to intercept illegal aliens.

To work, however, the vehicles involved (both the "good" and the "bad") must carry transmitters. Developing a transmitter small enough to be placed in a vehicle without arousing suspicion is still being worked on.

"Whether GE will get into the satellite sur-



An airborne "electronic eye" to help detect maritime law-breakers is just one of several survey and inventory systems developed by GE.

veillance business is still indefinite at this time," explains Theodore W. Dietze, manager of Signal Systems Branch. "But Roy Anderson's work showed what could be done with relatively modest additions to the electronics associated with present systems. With a little more research, there's no reason at all why coast-to-coast and oceanwide position surveillance can't be developed."

Electronic "pollution detectors" in the offing? Again the GE answer is affirmative. A sensitive new airborne "electronic eye" to help identify law violators, including ocean polluters, is being developed by Aerospace Electronic Systems Department. Called "Active Gated Television," or AGTV, it's so sensitive that it can provide visual evidence of maritime lawbreaking by starlight or through light fog or haze.

"The GE AGTV system has high resolution capability," points out Frank Mitchell of AESD electro-optical sales. "It can detect a ship's light 10 miles away, read the name and registry markings of surface vessels at 300 to 500 yards and pick out small details on deck that are no larger than a coffee cup."

Work at Utica is being done under a U.S. Navy contract for the Coast Guard on a prototype AGTV system that will be flying in 1980. It's part of a new Airborne Remote Instrumentation System (AIREYE) designed to help the Coast Guard's environmental protection mission, providing object identification in real time, day or night and even bad weather. It can also help in all-weather search and rescue.

The AGTV system will be flown in a modified Falcon twinjet, with its camera mounted in a special turret with a new lead-vapor laser for illumination. Sophisticated electronics are used to direct the camera to a target, "locking on" automatically to maintain it in the field of view. The TV screen shows a real-time display, with videotape recorders connected for permanent records and video disc to "freeze-frame" scenes passing before the camera.

The system incorporates unique GE technology. The AGTV principle of a pulsed illuminator and a synchronized camera "shutter" is a derivative of a 1969 patent by AESD engineer Lou Lego. The discharge-heated, lead-vapor laser was developed at the GE Space Sciences Laboratory at Valley Forge, PA.

"The new laser is a technological breakthrough, says Jim Juliano, AESD project engineer. "It doesn't require liquid nitrogen cooling as in previous systems in which the laser temperature had to be greatly reduced cryogenically. Additionally, the GE laser has a small beam diameter that greatly simplifies the packaging of the AGTV system."

Penetrating fog to produce a usable television picture is accomplished by synchronizing the laser with an internal electronic shutter on the low-light-level camera. The laser illuminates the target using a principle similar to that of radar, and the camera shutter opens at the precise microsecond the light returns. By ignoring all other light or "backscatter," the Coast Guard is able to see a clear TV image despite the fog's blanketing effect on the human eye. **AV**

THE BUSINESSES



Signing ceremonies of an agreement reached between GE and the local chapters of the NAACP and the ACLU, petitioners against Cox Broadcasting stations in Atlanta, recently brought together (l to r): Gene Guerrero, ACLU; Jondelle Johnson, NAACP; Benjamin Hooks, executive director-NAACP; Clint Deveaux, ACLU; Georgia State Senator Julian Bond; and GE's Norm Blake.

Broadening the benefits of the GE-Cox merger plan

Minorities would become first-time broadcast owners—
and receive training in communications as well.

The proposed merger of General Electric and Cox Broadcasting Corporation has moved a step closer to completion with the recent vote of approval by Cox shareholders. The merger, which must be approved by the FCC and other Governmental agencies, is expected to be completed in the first half of 1980. The transaction would combine Cox Broadcasting with the GE radio-and-television broadcasting and cable-television businesses.

As an innovative part of the agreement, station sales necessitated by the merger will

go mostly to new entrants in the broadcast field, with 11 stations changing hands. The deals also are distinguished by the appearance among the buyers of several minority groups.

"Since the combined stations of General Electric and Cox would exceed the limits prescribed in the FCC rules on the ownership and location of broadcasting stations," observes Vice Chairman John F. Welch, former sector executive of Consumer Products and Services Sector, "our approach to the divestiture program was to help meet the FCC's ongoing

General Electric's television station in Nashville, WNGE, has tentatively been sold to a subsidiary of North Carolina Mutual Life Insurance Company. Pictured (l to r): Cicero Green, NCM vice president-treasurer; William Kennedy III, NCM president and chief executive officer; GE Vice Chairman Jack Welch; and GE's Norm Blake.



objective of broadening ownership of the broadcast media by including groups not presently represented."

He continues: "As currently proposed, *more than two-thirds* of the affected stations would be owned by new entrants into the business. *More than half* of the stations would be locally owned, and *more than three-quarters* of the stations would have minority participation. *More than half* would have minority control."

A new, autonomous foundation will also be established, Welch notes, which "will provide significant assistance to enhance participation by minorities, women and others in broadcasting, and provide public access to programming. GE donations will come from proceeds from the sale of its divested stations."

Cox Broadcasting is a high-growth, profitable company engaged in television and radio broadcasting, cable-television systems, automobile auctions, business publishing and motion-picture production.

States Norman P. Blake, staff executive—Consumer Products and Services Broadcasting and Business Development Operation: "Cox Broadcasting is well recognized as an industry leader in broadcasting, having major holdings in the 'Top 50' markets and having been in

the forefront of growth in the cable-television industry. The integration of these businesses represents a logical extension of General Electric's well-established broadcasting and cable businesses."

Under the merger agreement, Cox common share owners will receive 1.3 shares of GE stock for each share of Cox, subject to some adjustments based on the closing prices of GE stock. In no event will such share owners receive less than \$68 nor more than \$75 worth of GE stock for each Cox share, as valued by the merger formula.

GE Chairman Reginald H. Jones, commenting on the agreement when announced last October, said: "General Electric has been a pioneer in radio and television broadcasting. We welcome this opportunity for GE to extend its broadcast services by building upon Cox Broadcasting's fine record of entertainment and public service through the electronic media."

Garner Anthony, executive committee chairman of Cox Broadcasting, stated that a major factor in his company's favoring the combination was "the increasing regulatory pressure on common ownership of different media in

(continued next page)

GE-Cox merger properties:

Location of Station	Original Owner
Albany/Schenectady/Troy: WGY-AM	GE
Atlanta: WSB-TV	Cox
Baltimore: WLIF-FM; WCBM-AM*	Cox; Metromedia*
Boston: WJIB-FM	GE
Charlotte: WSOC-TV	Cox
Dayton: WHIO-AM-FM	Cox
Denver: KOA-AM; KOAQ-FM; KOA-TV	GE
Los Angeles: KFI-AM; KOST-FM	Cox
Miami: WIOD-AM; WAIA-FM	Cox
Philadelphia: WWSH-FM	Cox
Pittsburgh: WIIC-TV	Cox
San Francisco/Oakland: KTVU-TV	Cox

*To be obtained in exchange for WSB-AM (Atlanta)



In Schenectady, local GE employees are five of the tentative purchasers of GE television station WRGB. Members of newly formed Group Six Broadcasting Inc. shown here (l to r): GE's David Lynch, to become the new firm's VP and treasurer; Henry Wright, a businessman; and GE's James Delmonico, VP and station manager—WGY-WRGB-WGFM, to become the firm's president.

the same market area." A separate Cox company, Cox Enterprises, Inc., owns newspapers throughout the U.S.

Says Blake of his merger work since the agreement was announced: "In putting together such a large broadcasting transaction, GE has undertaken some first-of-a-kind steps to serve 'a compelling public interest.' We have sought to allow the broadest range of potential buyers to compete for the purchase of disposed properties. All things being equal, we've favored local ownership over large group broadcasters and media interests."

He continues: "Our programs allow the entry of first-time players representing local and minority ownership. We are providing a pricing package to permit minority buyers the opportunity to compete. We are setting up an independent foundation to assist minority-education programs in broadcasting. And we're improving programming through increased public-affairs programs, 'access spots' for the public, and public-service announcements at the stations which GE will retain."

Entry, equity and expertise—the three goals of General Electric efforts in the station divestiture program—have been constantly addressed by a GE management team during negotiations. States Blake: "Beginning in January, some 300 inquiries were screened for the

affected stations, and 75 applicants were personally interviewed. Price was only one of the determinants. We also looked at FCC policies favoring new entrants and minority and local ownership, treatment of GE employees, and continuity of management."

A "two-sided equation" was applied during these negotiations, remarks Blake. "We were responsible to General Electric share owners—and socially accountable to our prospective buyers and the communities involved."

As for the foundation, GE is working with interested minority groups to structure it as an autonomous organization that will help train minorities in broadcasting and communications, provide scholarships, and set up internships and pilot projects.

Initial foundation costs will be seeded by \$7.9 million of equity derived from the sale of five GE and Cox stations to minority groups. The fair market value of such equity contributions at the end of 10 years is estimated to exceed \$25 million.

Recently, Pluria Marshall, chairman of the National Black Media Coalition, made the following public statement to various Governmental agencies and public interest groups: "What General Electric will have accomplished by the consummation of the Cox Broadcasting/General Electric merger in terms of diversification of ownership and the furtherance of public interest is unparalleled in the history of broadcasting, and something the public sector has been unable to accomplish in the last 50 years."

GE stations under contract to be sold:

- WNGE (TV) Nashville, to Nashville Television Inc., a part of black-controlled North Carolina Mutual Life Insurance Company.
- WSIX-AM-FM Nashville, to The Katz Agency Inc., a New York station-representative firm which is a "new entrant" to broadcast operations.
- WRGB (TV) Schenectady, to a subsidiary of Group Six Broadcasting Inc., which includes five local GE station executives and a Schenectady businessman.
- WGFM-FM Schenectady, to Mountain Radio, Inc., owned by Albany broadcaster Antony Mason.
- KFOG-FM San Francisco, to Cardinal Communications Corporation, which is principally owned by Gene Washington, a Detroit Lions football team member, and country-and-western singer Charley Pride.



Lewis



Eastcott



Adamson



Howell



Scheper



Samsel



Wiley



Horvay



Velasquez



Snyder



Steinmetz Award winners announced

Ten scientists and engineers from five Company sectors have been named winners of the fourth biennial Steinmetz Awards. They will be honored at a banquet at Corporate Headquarters on Oct. 17.

Started in 1973, fifty years after Charles P. Steinmetz' death, the awards program honors people whose technical contributions have helped shape both a better Company and a better society. Recipients will each have a \$5,000 donation made in their name to the college of their choice. The winners are:

Consumer Products and Services Sector

- **J. Benjamin Horvay**, for innovations in refrigerator engineering and design, including a unique way of operating a thermoelectric cooling unit, and for contributions as an educator.
- **Emmett H. Wiley**, for the invention, development and application of a wide range of light sources, including high-brightness, compact incandescent lamps and the tungsten-halogen, regenerative-cycle lamp.

Industrial Products and Components Sector

- **E. Keith Howell**, for work on the circuitry for the first GE portable TV, cassette tape recorder, and cadmium-sulfide photoelectric control.
- **Carl B. Lewis**, for contributions to transportation products, among them a power control for aircraft turbo-chargers, and an electric-

hydraulic engine governor.


International Sector

- **Peter de H. Eastcott**, for inventions and improvements in the mine friction-hoist business, including safety concepts recognized in Canada's Ontario Mining Act.
- **Francisco Velasquez**, for adapting more than 20 consumer and light industrial products to meet Colombia's geographical, altitude and low-voltage electrical requirements.

Power Systems Sector

- **George W. Scheper, Jr.**, for his design modifications to gas turbines and compressors, which have contributed to GE's worldwide reputation as an industry leader.
- **Thoma M. Snyder**, for contributions in the fields of nuclear engineering, reactor fuel and core design, including a concept to extend power reactor fuel life.

Technical Systems and Materials Sector

- **Arthur P. Adamson**, for concepts in developing electric motors, guided missile autopilots, electronic controls, rocket propulsion systems, and the CF6, T700 and TF34 jet engines.
- **Richard W. Samsel**, for inventing sonar systems transducers and the electro-optical apparatus for a fire control system, as well as for his contributions in defense technology. 

Infinite variety

The off-hours interests of GE people carry them into strange and wonderful activities.



Soprano Emma Massara: starring roles in opera

As a child, Syracuse's Emma Rita Massara sang for visitors to her parents' home. Today, she's singing in such places as New York City's Cooper Union Hall and Syracuse's Inter-City Opera.

The Semiconductor Products Department process checker, a dramatic soprano, has a repertoire that includes operatic roles ranging from the vampish Carmen (below), to the innocent Santuzza in "Cavalleria Rusticana."

After obtaining a degree in voice from the Syracuse Conservatory, Massara auditioned for the lead in "Lucia di Lammermoor." She got it and others followed. Her most recent triumph was in a new opera, "Cinderella and the Fairy." "To me," Massara reflects, "opera is what they said about Caruso: 'a heart that sings.'"



Jerry LaMoore paints the town—literally!

Jerry A. LaMoore likes a large canvas when he paints—a wall, a garage door, the side of a van. A part-time muralist, the Medical Systems Business Division mobile stock attendant has covered Milwaukee with his landscapes, seascapes, and cartoon characters.

Using special sponge brushes and a high-quality indoor/outdoor latex enamel, LaMoore paints a traffic-stopping garage door in only four or five hours. His favorite commissions, though, are children's rooms: "Kids request everything from racing cars to storybook scenes. Once, I did one for a little girl who wanted Mickey Mouse. Her father kept asking her, 'Don't you want Bugs Bunny?' She kept saying no. It turned out that her father liked Bugs Bunny. She's now got both characters!"



Lee Noon: ready to rescue fellow cavers

Waynesboro's Lee H. Noon keeps two backpacks beside his front door—one crammed with food, water and clothing; the other with a rope, wet suit, tools and medical supplies. The packs are ready because the Data Communication Products Business Department technician never knows when he'll be called to rescue a person trapped or injured in a cave.

A regional coordinator for the National Cave Rescue Commission, Noon directs operations in five Mid-Atlantic and Southern states. In one spectacular rescue, his unit helped free a man trapped in a Maryland cave. "In spite of help from more than 200 cavers and local authorities," Noon reminisces, "it took 39 hours to free the fellow—who was dangling from a rope inside a narrow cave."



Mike Skreiner: 'mountaineering is akin to engineering method'
 "I like activities that have a measurement for success," says Switchgear and Distribution Transformer's K. Michael Skreiner, Philadelphia manager-Applied Physics and Mechanical Engineering. "In engineering, it's making things work. In mountaineering, it's reaching the summit. Mountaineering, like engineering, requires step-by-step procedures."

Although he's been mountaineering for six years, Skreiner's interest in climbing began as a youth, when his family moved from Australia to Austria, where he grew up in the Alps. He recently completed a three-week expedition to the Yukon, where he planted an Australian flag on 20,000-foot Mt. Logan (left).

**Ross DeJohn:
 His Honor the Mayor**

The wee hours of the morning often find Cleveland's Ross C. DeJohn atop a speeding fire truck, making rounds in a police cruiser, or riding in the cab of a snowplow. DeJohn, a Health Services project leader in Lighting Business Group by day, is an activist mayor of Mayfield Heights, Ohio, by night.

Fifteen years ago, in response to urging by fellow city council members, DeJohn ran for mayor as an independent, ousting a four-term incumbent. Over the years, he has initiated many capital improvements including sewer systems, road expansion and the building of a recreation facility, all without raising taxes.

"People ask me why being mayor is worth 35 hours a week of my spare time," says DeJohn. "I simply enjoy serving my town."



Organization Changes

In addition to those Company announcements reported in the lead article on pages 2-4 are the following organization changes:

CONSUMER PRODUCTS AND SERVICES SECTOR

John C. Truscott, General Manager—Major Appliance Applied Research and Engineering Division

Gary L. Rogers, General Manager—Lamp and Electronic Parts Products Department

INDUSTRIAL PRODUCTS AND COMPONENTS SECTOR

Roy L. Beaver, General Manager—Locomotive Manufacturing Department

James A. Meehan, General Manager—Appliance Motor Department

INTERNATIONAL SECTOR

Israel Mentcher, President and General Manager—General Electric Philippines, Inc.

Manuel M.C. Frias, General Manager—General Electric Portuguesa S.A.R.L.

John A. Hinds, General Manager—International Projects Department

POWER SYSTEMS SECTOR

William A. Anders, VP—Special Projects

A. Philip Bray, VP and General Manager—Nuclear Power Systems Division

Bertram Wolfe, VP and General Manager—Nuclear Fuel and Services Division

Robert E. Hoffman, Staff Executive—Power Systems Strategic Planning and Development Operation

George R. Brown, General Manager—I&SE International Department (GETSCO)

George A. Senn, General Manager—Nuclear Control and Instrumentation Department

TECHNICAL SYSTEMS AND MATERIALS SECTOR

Donald S. Beilman, VP—Aerospace Technology Development Operation

Charles B. Clarkson, General Manager—Undersea Electronics Programs Department

George R. Tappert, Product General Manager—Carboloy-Europe Operation



Devere Logan

Fairpress Photo



Mr. and Mrs. William Shanks



James Burkhart



Dr. A. Harry Sharbaugh

The world of GE hams

More than 1,000 strong, GE amateurs even have their own "Saturday Morning Network" to maintain contact around the globe.

In a corner of his basement in Fairfield, Conn., a corner he calls his "radio shack," sits amateur operator Devere E. Logan. Before him is a short wave radio console designed after the consoles at the Cape Kennedy Space Center. Hunching forward, his hands gripping a microphone, Logan uses his call letters W1HEO—as personal to him as his own name. He is on the air.

In Montevideo, Uruguay, patrolling the air waves for call letters beginning with W1 (the New England "area code" for amateur radio stations) is Bill King, a Massachusetts native. For 15 of the past 30 years, King has been living outside the United States. But he's made a habit of listening for W1 broadcasters. They keep him in touch with his New England homeland.

"What's your QTH?" King asks.

"Fairfield, Conn." comes the reply.

"General Electric's located there," says King.

"I know—that's where I work," announces Logan, consultant for corporate editorial communications.

"I work for GE, too," says a surprised King, vice president and financial manager for General Electric Argentina S.A.

A chance meeting of two General Electric hams, separated by thousands of miles? Perhaps. But GE hams are everywhere. From New England to California. From Denmark to Brazil. It's estimated that well over 1,000 General Electric employees are hams. There's even a "GE Saturday Morning Network." General Electric and the short wave, it seems, go together as naturally as ham and cheese.

"Sure it's natural," says pensioner Howard "Bing"

Crosby, former project engineer for Electronic Systems Division, Syracuse. "GE is one of the pioneers responsible for development and promotion of radio communication."

One of the backbones of the "Network," Crosby built his first radio out of Model T Ford parts, copper wire and a telegraph key as a boy in 1913. Today, Crosby is still very active. Every Saturday morning at 11 he flicks on his set, tunes it to 14.33 megaHertz and leans into his mike.

"QRZed," he says. "The GE Network is on the air. This is W2CCG. Is anybody on this morning?" And indeed there is!

The "Net," which claims close to 60 members, has about 15 hams working any given broadcast. James Burkhart, applications engineer for the Electric Utility Sales Division, St. Louis, helps Crosby manage the "Net." His central location aids network communication. He serves as anchorman, providing a nationwide relay system—an important task when conditions limit transmitting distances.

Most GE hams enjoy talking to anybody, anytime, anywhere. And the farther away the better. Schenectady's Dr. James L. Lawson, consultant for Corporate Research and Development, for example, thrives on international long-distance competition. Last year his station (W2PV) captured two U.S. titles in worldwide contests. The objective is to contact as many hams in as many countries as you can within a specific time span. The trick to winning is in the antenna. Lawson's antenna system, the pride of GE hams, consists of three major masts—one towering 180 feet. Each mast has between six to 12 antennas. Says Lawson: "The

antennas give you the edge on the other guy."

While Lawson is winning contests, Dr. A. Harry Sharbaugh, manager of Arc Physics and Dielectric Technology Branch for CRD, Schenectady, is fiddling with super-high frequencies. He holds the world's distance record for two-way transmission on 21,900 megacycles. Set in 1965, the mark is 27 miles—quite a leap over the 800-foot record that Sharbaugh and Robert L. Watters, consulting engineer for Solid State Applications Operation, Syracuse, first obtained in 1946.

Notes Sharbaugh: "I'm itching to go into the attic, dust off my equipment and take another crack at the record."

Overseas, General Electric hams are also active.

At Storno, the Company's mobile radio affiliate in Copenhagen, the VHF Club boasts 52 licensed members. One, Jorn Ottosen, a Follow-Up Section development engineer, is believed to be the first Dane to design a home-built frequency-synthesized transceiver with sophisticated microcircuits. "I didn't have a synthesizer," comments Ottosen, "and so to save money I decided to build my own."


Ottosen also takes off on "DXpeditions," traveling to another country, setting up a temporary station and going on the air. Ottosen has broadcast from Gambia, West Africa, and the Atlantic island of Madeira.

ECCO Limited, the Electronic Components Business Division's affiliate in Dundalk, Ireland, sponsors a station which broadcasts only 10 days a year. Known as Dundalk Festival Station, it airs exclusively during the May Day celebration. States ham Hugh McGivern, Test Equip-

ment Maintenance and Plant Facilities manager: "We go on the air for as long as possible, including an entire weekend. Hams from all over the world want to contact us because our station is so rare."

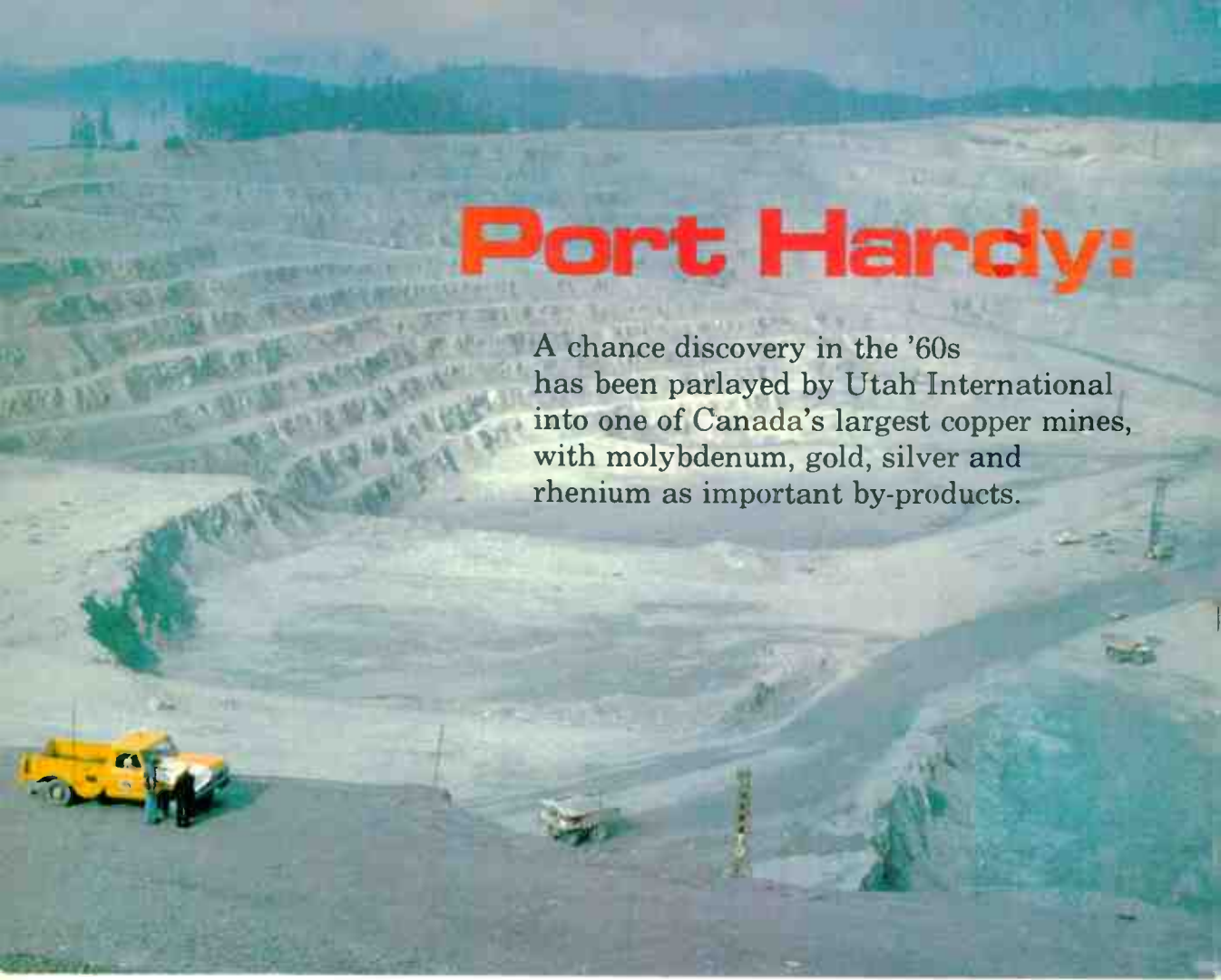
Not all overseas hams have it so carefree. Lynchburg's Joseph F. Nuccio, manager of Mideast, Europe and Africa, Mobile Communications Business Division, was five years ago privileged to be a ham in a "rare" country—Lebanon. When he switched on, hams clamored to make contact. In three months he chatted with 5,000 people and then during the Christmas holiday filled out as many QSL cards (confirmation of radio contact) and mailed them to the hams.

When the Lebanese Civil War raged in the mid-'70s, Nuccio kept up communication with the outside world, letting Lebanese people in the U.S. and Europe know if their relations were unharmed in the fighting. When General Electric evacuated its employees, Nuccio, expecting to return, left most of his belongings—including \$10,000 in radio equipment. He never went back.

Phyllis Shanks, wife of GE ham William Shanks, resident site engineer at the Grand Gulf Nuclear Power Plant in Mississippi, has, like Nuccio, used her radio to aid people. In 1964, an earthquake rocked Alaska. Mrs. Shanks moved into her bedroom where she had the radio and went to work. She coordinated communication between Alaska and stateside relief agencies. She stayed by her radio for as long as she was needed, including a 48-hour stretch without leaving her home. She was officially commended for her work. 

Port Hardy:

A chance discovery in the '60s has been parlayed by Utah International into one of Canada's largest copper mines, with molybdenum, gold, silver and rhenium as important by-products.



When Utah's Island Copper Mine began operation in 1971, it culminated years of exploration and hope for large copper finds on Canada's Vancouver Island in British Columbia. Initial reserves were estimated at 280 million tons of copper-bearing ore.

Attracted to air bubbles, copper floats to surface of flotation cells at Island Copper's mill where it is skimmed off and collected for further processing. The by-products eventually obtained from the mine's copper-bearing ore account for 30% of total revenues.



copper town

Searching along the northern tip of British Columbia's Vancouver Island, a prospector spotted a small piece of copper ore between the tangled roots of two overturned trees. The year was 1965. It was the start of what is today one of Canada's largest copper mines—and a source of wealth and growth for the nearby town of Port Hardy.

Back then, Port Hardy's 1,200 residents relied on fishing and logging for their livelihood. Once a week a coastal steamer—loaded with groceries, and with people returning from weekend trips to cosmopolitan Vancouver—stopped at the town.

Recently, on a visit there,

this *Monogram* reporter saw a town that has nearly quadrupled in size. Hundreds of attractive new homes overlook Hardy Bay. The coastal steamer doesn't stop here anymore, since scheduled jet service has put Vancouver just one hour away. The dock still services freighters, but the real activity on the waterfront centers on two new marinas where sailboats and power cruisers far outnumber the local fishing boats.

Much of the new look and feel of Port Hardy can be attributed to the arrival of Utah International Inc., General Electric's natural resources affiliate. Utah's Island Copper Mine started operation in

(continued next page)

Island Copper's Carman Thompson (right) and his family stroll through neighborhood before enjoying backyard barbecue in Port Hardy, B.C. To help house its employees, Utah has built a 400-unit subdivision in town.



A six-pound coho salmon is the afternoon's reward for Jimmy Cameron, son of mine training coordinator James Cameron. Right: Clem Pelletier, mining services manager, fishing aboard motorboat with his family.





Canadian GE motors power the operation's six behemoth grinding mills.



Assay lab technician Gyanandra Kumar analyzes ore samples.

1971 on the shore of Rupert Inlet, 11 miles from the town. Today, Island Copper employs 850 people at its open-pit mine and adjoining mill. Moreover, the mine's copper comes with some highly interesting "impurities": molybdenum, gold, silver and rhenium. These by-products now account for 30% of total revenues. Observes Glen F. Andrews, VP and general manager of Utah Mines Ltd.: "In 1966, Utah acquired

an interest in mining claims in the area. By mid-1969, an orebody containing more than 280 million tons of copper-bearing ore had been defined, and Utah began construction of what is today one of Canada's largest copper mines."

Gigantic logistical feats were required to develop Island Copper. Lacking a railroad or an adequate highway in this scenic but remote region, Utah



Every 84 hours, the big haul trucks are brought into shop for lubrication and inspection by mechanics such as Simon Lee (top). Right: truck driver Kathy Duncan.



Molybdenum concentrate is packed in steel drums for shipment to U.S. and Europe.

made the most of the site's position on the edge of Rupert Inlet. In late 1969, a temporary barge grid was built to accommodate vessels that could deliver most of the building products. Later, a permanent facility was built to receive railroad cars for off-loading.

Unusually wet weather conditions hampered site-clearing activities, and imposed hardships upon other construction personnel. Buoyed by occasional relief from the rain and sleet, crews were able to complete the major phases of the project on schedule. Water, power and sewage-disposal systems were completed, as was a road to link the minesite with the provincial highway to Port Hardy.

At the same time, an analysis of the environmental impact of the operation was completed, and necessary environmental procedures were established in cooperation with the provincial Pollution Control Branch and the federal Department of Fisheries.

In December 1971, the first shipload of copper concentrates destined for customers in Japan sailed from Rupert Inlet—*just two-and-one-half years* after Utah's announcement of its plan to mine.

States Andrews: "While the Island Copper project was still being studied, Utah began considering the housing and service needs of its future employees as well as the needs of nearby residents. To provide housing for Island Copper people, Utah has constructed a new 400-unit subdivision of houses, duplexes, townhouses, garden apartments and a mobile-home park."

Designed as part of a permanent townsite plan, these residences have been fully landscaped, with telephone and electrical services placed under-

ground for added attractiveness. Utah also has donated land for a hospital, park and ecumenical church.

Continues Andrews: "By helping finance town facilities and providing substantial tax revenues, Island Copper is playing an active role in the region's economic life. Our employees are closely involved in community affairs, serving as aldermen and supporting local service and volunteer organizations. An Island Copper electrical superintendent, Brian Welchman, is now Port Hardy's mayor."

Twenty-four hours a day, seven days a week, ore containing copper and significant amounts of molybdenum, gold, silver and rhenium is mined.

The ore, averaging 0.5% copper and 0.015% molybdenum, is obtained using conventional open-pit methods. The oval-shaped pit is worked in 40-foot "benches" or terraces, with some 160,000 tons of ore and waste removed daily.

This *Monogram* reporter, accustomed to the technological complexity of GE's manufacturing, found the same high degree of technical sophistication in Island Copper's minerals extraction. Briefly, the process:

- Ore and waste are loosened by drilling and blasting. Huge electric shovels then load the ore into 120-ton and 170-ton diesel-electric haul trucks—which employ General Electric motorized wheels—and the ore is transported to the crusher.

- The crusher, driven by a 500-hp Canadian General Electric induction motor, processes up to 3,000 tons per hour and reduces the material to a maximum size of nine inches. The rock is then transported along a conveyor system and screened prior to distribution in stockpiles. Tunnel conveyors

carry the material from beneath the stockpiles into six semi-autogenous grinding mills.

- Each of these grinding mills is driven by two 3,000-hp CGE wound-rotor motors which can process 320 tons of material hourly. The milling operation is controlled from a central control room where closed-circuit television cameras follow the ore through each phase.

- After the ore is further prepared, it is processed through a network of flotation cells. The finely ground ore particles are treated with reagents which make the copper material attractive to air bubbles; attached to the bubbles, the copper floats to the surface of the cells where it is skimmed off and collected for more selective treatment.

- While the grinding and flotation steps are in progress, chemical analyses are conducted in adjacent metallurgical and assay labs to determine the mineral recovery and quality of the various products. Such scientific apparatus as atomic absorption- and x-ray fluorescence spectrophotometers are used to assay mine and mill samples.

- To isolate the molybdenum, reagents are added to the copper mixture in a separate series of flotation cells, where the copper mineral is depressed and the molybdenite is floated, filtered and dried.

- The copper concentrate is then pumped to a thickener before being filtered, dried and conveyed to a storage facility where it is stockpiled until loaded aboard a Japan-bound vessel. The molybdenum product is packed in steel drums for shipment by rail barge to Vancouver.

What happens next to the concentrates? What about the gold, silver and rhenium by-

(continued next page)

products? What are the uses for molybdenum and rhenium?

"When we conduct mine tours at Island Copper, these questions continually crop up," notes Andrews. "Visitors stand at our dock watching the concentrates being loaded and wonder where they go from here."

He elaborates: "The 235,000 tons of copper concentrate that we produce each year are sent to smelter and refinery operations in Japan. Since the concentrate is only 23% copper at this point, it is smelted to remove certain waste products. What is left is 'blister copper,' relatively pure copper which contains traces of gold, silver and other elements."



Mine environmental specialists conduct extensive monitoring tests of Rupert Inlet's aquatic life.



At city hospital, one of Port Hardy's youngest residents, Victoria Thornbury, is shown with mother, Sharon (l), and nurse June Gold. The women's husbands are Utah employees. Utah donated land for the hospital.

The next step is electrolytic refining. Such "impurities" as gold and silver are separated from the now 99.9% pure copper, and Utah is reimbursed for these metals. Island Copper ships its copper concentrates to Japanese customers under long-term sales agreements. Prices of copper, gold and silver are based on London metal market quotations.

As for what happens to the 2,500 tons of molybdenum concentrate produced yearly by Island Copper, Andrews explains by tracing its shipment via Vancouver to plants in Europe and in Denver, Colo. "At these processing facilities, the concentrate is roasted to drive off sulfur, producing molybdenum trioxide. Used as an alloying agent by the steel industry, this material also can be further processed to yield catalytic agents for the chemical industry."

The rare metal, rhenium, is found in Utah's molybdenum concentrate, notes Andrews. "Although Island Copper's ore contains only about 0.5 parts per million of the substance, this is one of the highest rhenium contents in copper ore mined anywhere in the world. During the roasting process, rhenium is converted to ammonium perrhenate. The ammonium perrhenate is then sold primarily to oil companies which use the material in the production of low-lead gas."

Island Copper's emblem, a design of a killer whale derived from Indian artwork, symbolizes Utah's commitment to an ecologically compatible environment. Killer whales are often sighted by area fishermen.

States Andrews: "Protecting the environment at Island Copper is the full-time job of the mine's environmental department. As a condition of its

original permit to operate, Island Copper established a contract with the University of British Columbia under which a team of oceanographers, marine biologists and other scientists acts as an independent monitoring agency to evaluate the environmental program."

The mine's mill tailings, composed mainly of harmless quartz and feldspar, are mixed with sea water and discharged into Rupert Inlet 165 feet below the surface. "Almost all of the reagents used in the milling adhere to the concentrates, so those remaining in the tailings are at innocuous concentrations," Andrews notes.

"On the land side of the operation," he observes, "the overburden and waste rock removed from the pit are dumped as land fill along the Inlet's shore, adjacent to the pit. As the pit is mined to its outer limits at various points, these areas are seeded and planted in an ongoing reclamation program. Also, along the north rim of the pit where the orebody ends, new plant growth from reclamation is quite evident."

Andrews summarizes the challenges and accomplishments at Island Copper: "The mine's location in northwest British Columbia has necessitated the development of a high degree of self-sufficiency. We're fortunate to have employees who can meet the challenges and enjoy the opportunities this region affords. Our work force comes from across Canada and from such countries as Australia, the Philippines, Yugoslavia, Chile, the U.S. and Britain. With copper prices trending upward, and the mill continuing to set production records, we can look forward to many profitable years ahead as a reliable supplier of copper and its by-products." ■

Ingenuity goes to work

Today's energy costs! As revealed on these pages, many General Electric employees have shouted "Stop!" to the incessant gas raids upon their pocketbooks, and with a flair for the innovative, are forsaking the single-occupant automobile.

This is something the U.S. Department of Transportation has been advocating for years as part of its commuter ride-sharing programs. Nevertheless, occupancy of cars on the nation's highways today averages only 1.3 persons. Typically, during peak periods on urban highways, 70-90% of autos carry only one person, the driver. Private autos alone account for 34% of all petroleum used in the U.S.

As the GE people on these pages demonstrate, conserving energy isn't without its rewards—financial and otherwise.



Jeffrey Mann:
rolling in to work
on time

"You don't see many people roller skating to work wearing a three-piece suit," admits Milwaukee's Jeffrey J. Mann, an instructor at the Medical Systems Institute. "But I immensely enjoy roller skating, started skating to work at the end of June, and haven't fallen down yet—knock on wood!"

Mann, who lives two miles from the Institute, said he thought about riding his bike to work, but there really wasn't any place to put it in the office where it wouldn't get in somebody's way. His solution: indoor outdoor "disco" skates that fit neatly underneath his desk.

"I'm saving at least \$5 a week in gas, so my \$41 skates are already paid for," remarks Mann. "Going to work, people stare and give me the 'thumbs up' signal. Loading-dock workers have cheered me. Little kids without skates are jealous."



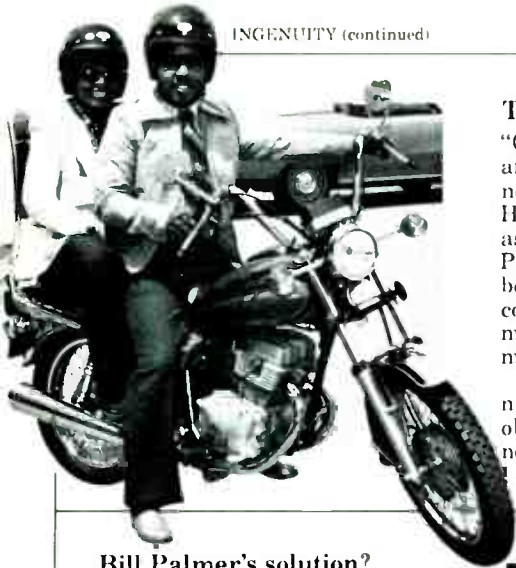
Harold Hampshire: six wheels cheaper than four

"When gas went to 50 cents a gallon, that cinched it!" exclaims Ft. Wayne's Harold C. Hampshire. "I bought a bicycle to commute four miles a day to my job with a previous employer. Now—employed by GE—I live 13 miles away, so I drive to a shopping center four miles from the GE facility, park the car, and pedal my bike the rest of the way. Since gas has climbed to \$1 a gallon,

I'm pocketing substantial money even for so short a distance."

Sales people who call on Hampshire, a senior buyer for Appliance Components Business Division, kid him about his penchant for pedaling. "After passing me in their cars, they say things like, 'I missed you this time, but I'll try to come closer next time.' In actuality, though, most drivers are very courteous!"

(continued next page)



The Holloways: enjoying 60 mpg better mileage

"Our larger car was a gas guzzler and the smaller one had died," notes Schenectady's Linda C. Holloway, an administrative assistant in Insulating Materials Product Section. "We'd always been interested in motorcycles so, confronted with the gas crunch, my husband and I bought a motorcycle."

Their energy-saving solution is netting them \$25 a week in gas, observes husband Harold, an engineer with Electric Utility Systems

Engineering Department. "We're getting 60 miles per gallon better mileage than with our big car, and it's easier to find parking."

The only problem Linda finds with the arrangement is she can't wear heels or dresses to work. "So I compromise. I wear flat shoes while I'm riding and carry the heels so I can change at work." Adds Harold: "The only negatives about motorcycling are the obvious ones: the weather and the greater degree of caution needed."

Bill Palmer's solution? his own electric car

A lifelong interest in cars, a career in electrical engineering, and the present gas shortage have combined to turn San Jose's William W. Palmer (center left) into an outspoken advocate of electric cars. Here, with his carpool members (l to r)—GE's William Brown, Robert Wong and Earl Smith—he peers beneath the hood of his electric-powered 1972 Chevrolet Vega. Palmer converted the car from gas to electricity, which is supplied by 12 golf-cart batteries and controlled by a system he built himself.

"In 1967, with my son's help, I designed my first electric car, a replica of a 1904 Oldsmobile," remarks Palmer, a senior applications engineer with Nuclear Power Systems Division. "I'm still working out some bugs in my electric Vega, but it handles well, accelerates quickly to 55 miles per hour in third gear, and will easily exceed the legal speed limit in fourth. Range between chargings is about



60 to 80 miles, and it costs a third to a half as much to operate as a gas-powered car."

Palmer, who takes a keen interest in General Electric's recent work with the Centennial Electric and ETV-1 (Experimental Test

Vehicle-One), says you wouldn't know his blue compact from any other unless you look for three tell-tale signs. One is a special license plate that says "ELECTRC." The other two: almost noiseless operation and no exhaust.



Yeats and Archer: ferrying across San Francisco Bay

"It's one of the most beautiful commutes in the world!" declares San Francisco's Mary L. Yeats, a GE Information Services Company (GEISCO) secretary. "I get a splendid view of the Golden Gate Bridge and sailboats bobbing in San Francisco Bay—and arrive at work refreshed. I may have to get to the ferry a little earlier than if I drove, but I can read, talk or sleep during the ride."

Timm W. Archer, a GEISCO recruiting specialist, echoes these sentiments: "Before trying the

ferry, I was driving 30 miles roundtrip to work each day. In addition to saving money—the Bridge toll alone is \$1—I can read, play cards, and listen to dance bands or Dixieland groups on the ferry in the evenings."

Riding the ferry daily, Yeats and Archer both have "rescue" stories to relate. Archer's story ends in heroics: "One night we stopped to pick up a man who had gone overboard from his boat. Both crew and passengers were recruited to haul him aboard with ropes."



Barbara Chavis vanpools her way to work

Portsmouth's Television Business Department is one of the most active GE participants in vanpooling. At last count, 18 vans—11 pri-

vate and seven owned by a local public transit authority—were helping bring local employees to work. Here, Barbara Chavis, a

components processor, steps out of a van which provides her with door-to-door transportation from home to GE plant.

"Driving a car to work last year, I paid \$20 a week," notes Chavis. "With the van, I pay only \$8—and have the added pleasure of friends to chat with during the ride. With the energy shortage, it feels good to know I'm helping conserve."

Observes the van's driver, Carol Harris, a plastics processor: "We have 14 women in our van pool, who begin work each day at 7 a.m. In order to complete the 17-mile commute on time, I leave home at 5:45. Since everyone lives in the same area, we're usually on our way to General Electric by 6—exchanging funny anecdotes much of the way!"

Leon Davis buses 40 people to work daily

Louisville's Leon R. Davis is no newcomer to driving a bus to work. He started commuting by bus 14 years ago—and because of today's costly gas problems, has now increased his load to 40 employees including himself.

"Many of us own farms which we keep up after work—some farms as far away as 85 miles from the GE plant," observes Davis, a stock keeper in Room Air Conditioner Department. "Some people say we're crazy to drive so far for employment, but GE is a great place to work. Even if we have to leave for work at

3:30 a.m., to arrive at 6 for the start of the 6:30 shift, it's worth it!"

He recalls: "When I started driving, we had a cantankerous old bus which broke down at least twice a week; we ended up hitching rides with tractor trailers and cattle trucks. Now, we own a modern bus and operate our own private industrial bus line." He estimates that it would cost each of his riders \$50 in gas per week to go by individual car, so together they are saving \$2,000 weekly. The Company provides the bus with a special parking space.




Robert Frascatore's air bike makes travel a breeze

It's his own invention—a "swamp bike" assembled by souping up a three-speed bicycle with a go-cart engine and a car-radiator cooling fan. The bike can cruise at 15 mph after being pedaled a bit until the go-cart engine and fan take over. It even has FM stereo!

Says the Schenectady inventor of the bike, Robert Frascatore, a generator winder with Large Steam Turbine-Generator Department (LST-G): "The energy crisis is keeping many people home more, and they're unhappy about

it. But I enjoy puttering around. I built this air bike at home from ordinary materials. My dad constructed the cage for the fan—and the sprocket to hold the fan in place was designed by a friend who races dragsters, Mike Ledley, also a winder at LST-G."

Continues Frascatore: "My bike is not as perfected as a moped, but on the other hand, it costs less. The bike was redesigned for under \$200, and is powered by an engine which runs on gasoline and gets 100 miles per gallon." 



Photos courtesy of Jet Propulsion Laboratory

JUPITER'S MOONS. Photographs taken by the Voyager II spacecraft this summer of three of Jupiter's four Galilean satellites—Io (left), Europa (bottom left) and Ganymede—reveal surprising surface activity. Electric power for the NASA space probe's scientific experiments, including the on-board cameras, is supplied by three General Electric radioisotope thermoelectric generators built by the Space Division. Aircraft Equipment Division provided the equipment to control the spacecraft in flight and to conduct "flyby" experiments.

Voyagers I and II—both similarly GE-equipped and -controlled—left Kennedy Space Center in 1977 on a 12-year odyssey through the solar system. Earlier this year, Voyager I discovered a Saturn-like ring around Jupiter, and photographed clouds near Jupiter's Great Red Spot.

Now, Voyager II also has recorded dramatic views of Jupiter's ring, found changes in the Red Spot, and monitored active volcanos on the moon Io.

