



First elements of  
Company's Centennial

GENERAL  ELECTRIC  
**Monogram**  
NOVEMBER-DECEMBER 1977



The big announcements,  
plus an analysis of  
the system's evolution


# Evolving the GE Management System

Behind the announcements, a three-year study aimed at providing the Company with 'a measured path into the 1980s.'

On November 21, Chairman Reginald H. Jones announced completion of the realignment of General Electric's operating and corporate staff structure. This series of changes, begun earlier this year with the establishment of the Consumer Products and Services Sector, became effective December 1.

Commenting on the realignment, Chairman Jones said: "The evolution of this structure and staffing culminates a three-year study by GE of how best to meet the long-range growth opportunities and manageability challenges of the next decade. The way the Company has grown and as we see it growing in the future, we believe it is prudent to prepare the organization and the people to make the most of our opportunities."

As indicated at right, the Corporate Executive Office, composed of Jones and Vice Chairmen Walter D. Dance and Jack S. Parker, remains unchanged. *(continued page 4)*

November-December 1977		Volume 54, Number 6
Linn A. Weiss, <i>Editor</i> ; Richard J. Knoph, <i>Associate Editor</i> ; Donna R. Carpenter, <i>Editorial Assistant</i> ; Ron V. Taylor Associates, <i>Design</i> .		
<p><b>On the cover:</b> A giant step for General Electric is the new Management System put in place to keep the Company unified, manageable and profitable through the 1980s. Note: at press time, changes in GE nomenclature were too new to be incorporated throughout the issue.</p>	<b>Contents</b> THE COMPANY .....2-13 GE organizes for the next decade / New approach in Canadian appliances / Monographs THE BUSINESSES .....14-16 Technology takeoffs CENTENNIAL .....16-24 First elements of our 100th anniversary / The story of light PEOPLE .....25-29 PIMEG celebrities / GE broadcasters / Recruiters on campus / Organization changes TECHNOLOGY .....30-31 New try at the electric car NATURAL RESOURCES .....32-35 A profile of Ladd Petroleum PERSPECTIVES .....36-39 Legislators need business facts / Travel travails of the business woman	
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 Haufler, Manager, Corporate Editorial Programs. Request permission to reprint articles from the Monogram Editor, Fairfield, Connecticut 06431. Copyright 1977, General Electric Company.		

## GE management: new reporting responsibilities



Reporting to Reginald H. Jones,  
Chairman and Chief Executive Officer, are:



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



**A. O. Way**  
Senior VP  
Corporate Finance  
Staff



**T. P. LeVino**  
VP  
Executive Manpower  
Staff



Reporting to Walter D. Dance,  
Vice Chairman and Executive Officer, are:



**S. C. Gault**  
Senior VP and  
Sector Executive  
Industrial Products &  
Components Sector



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



**J. F. Welch**  
Senior VP and  
Sector Executive  
Consumer Products &  
Services Sector



**H. Cross**  
Senior VP  
Consultant to  
W. D. Dance



**E. R. Frederick**  
Senior VP  
Corporate Planning &  
Development Staff



**R. B. Kurtz**  
Senior VP  
Operating Services  
Staff



Reporting to Jack S. Parker,  
Vice Chairman and Executive Officer, are:



**J. F. Burlingame**  
Senior VP and  
Sector Executive  
International Sector



**E. E. Hood**  
Senior VP and  
Sector Executive  
Technical Systems &  
Materials Sector



**A. M. Wilson**  
President  
Utah International Inc.



**L. C. Maier**  
Senior VP  
Corporate Relations  
Staff



**C. E. Reed**  
Senior VP  
Corporate Technology  
Staff





## MANAGEMENT (continued)

The new structure establishes the Sector as the highest level of decentralized operating management and planning in the Company. Sectors generally consist of one or more Groups, as well as Divisions, Departments and Affiliates.

To provide background information for General Electric people, the *Monogram* reviewed the management realignment with those involved in its planning. The following sums up the main points of these reviews.

### How has the GE management system evolved?

As General Electric has grown, the complexities brought about by increasing size and diversity have consistently challenged managers to develop new approaches, systems and organization structures to meet our goals more effectively.

In the early 1950s, for example, GE segmented its total business into a decentralized organization structure, in which each building block—the Department—had essentially the same growth objectives as the others. As expected, decentralization provided greater organizational flexibility and gave more people the opportunity to develop their managerial abilities. It encouraged managers to take a more entrepreneurial approach. As a consequence, decentralization was an important factor helping the Company to achieve strong growth during the favorable economic climate of the '60s.

But that period also pointed up the fact that growth in sales is not necessarily accompanied by a commensurate growth in earnings. Investing in too many areas that did not yield profitable growth was an experience shared by many of the "Fortune 500." This experience pointed up the need to be more selective in the allocation of resources.

The response of GE management was to introduce, seven years ago, our Strategic Planning system. In essence, this system recognizes the need to *differentiate* among businesses. For a diversified company, some operations can best serve by generating earnings, while others, with strong growth prospects, offer better investment

opportunities over the longer term. This system gave us the means to allocate resources according to the varying potentials of GE's many businesses.

Organizationally, we overlaid on our traditional structure of Groups, Divisions and Departments a structure for planning based on a new building block—the Strategic Business Unit. SBUs were defined as self-contained businesses with identifiable external competitors and with General Managers who could implement both long- and short-term business strategy.

In addition, a planning process was designed by which each SBU submitted its strategic plans for review and resource allocation at the Corporate level.

Thus in the 1970s the system helped GE improve its profitability, and return on investment has been rebuilt to a healthier level. In the last recession, General Electric's earnings dropped much less than the overall decline for industry generally.

### With things going so well, why change the structure?

Management has to look ahead to the next decade. The decision to introduce the revised system now is based on General Electric's experience that it's better to anticipate change than just react to it. The changes are being implemented at this time when our corporate health has seldom been better, not hastily in response to crisis. As Reg Jones told share owners at the Company's recent Information Meeting, the basic needs of management continuity and manpower development must be met. Present management needs to lay the groundwork for the next generation of management. The new organization accommodates that.

There will be many new pressures imposed on management in the 1980s. The slowing of world economies foreseen over the next several years will demand greater selectivity in the allocation of resources, will increase competitive pressures, and is likely to increase government involvement in the business process. Thus General Managers will have to expand their scopes of responsibility and their political and environmental sensitivity so as to deal increasingly with issues—social, political, international—that impact on the business. The pace of decision-making will be accelerated, thereby increasing the demand for contingency planning, development of alternate scenarios and rapid response

systems. Finally, business challenges will require increasing international sophistication.

In short, our present structure has been in place for several years now and the time seems appropriate to again take some significant steps, thus enabling the Company to evolve a measured path into the 1980s.

### **What are the objectives sought in the new structure?**

Out of the studies conducted over these past three years, two kinds of organizational objectives emerged: aspects of our present structure and system that we wanted to be sure to retain; and aspects we desired to change or improve.

Let's look first at things we desired to retain:

- Retain our "One-Company" image. Any possible structure that would have lessened the Company's unity and coherence was firmly rejected. The heritage and value of the Monogram simply precludes such an approach.
- Retain a structure in which each higher echelon of the Company demonstrably adds value. We set as one of the objectives of the new structure to examine rigorously the roles and relationships at all echelons to ensure that each was adding value and that redundancy and ambiguity were minimized.
- Retain the multiple-role top-management structure. Our experience with a Corporate Executive Office involving shared responsibility and authority now spans over a decade. In our planning we considered this a necessary element, because no single individual, however competent and hard-working, can possibly cover all the bases in our rapidly changing business environment. This is particularly true when one considers the significant amount of time and effort which Chief Executives need to devote today to national government and overall industry affairs.
- Retain time-honored and well-understood organizational nomenclature, including Group, Division, Department, etc. While the content of these familiar terms has changed somewhat since they were introduced back in the 1950s, most GE people have grown to know and accept evolving definitions of these terms and it was agreed that we should build upon them rather than obsolete them with new nomenclature.

### **What new design objectives emerged from the studies?**

Several areas that needed to be changed or

improved came out of our studies:

- Improve overall Company manageability by reducing the number of operating components reporting directly to the Corporate Executive Office. The Company's projected growth would have led, as new Groups were established, to too wide a reporting span at the top level. Our choice among the available possibilities was to create a new organizational component larger than a Group—a component that could contain Groups, Divisions and Departments—and have a smaller number of these report directly to the CEO. The term "Sector" was utilized since it was descriptive yet had no widespread use across the Company.
- Improve the Company's manageability in terms both of delegation and linkage down the management chain. Our earlier Strategic Planning structure involved reviews of the strategies of over 40 SBUs at the Corporate level, requiring a considerable amount of CEO and Corporate Staff time, while in some cases resulting in less than optimum attention to specific SBUs. The new Sectors structure was seen as an opportunity to arrive at a more manageable cycle for reviews of strategic and resource-allocation plans by delegating more of these responsibilities to the Sector Executives.

It was also foreseen that the Sectors provided the opportunity for an integration of Corporate strategies with SBU strategies.

And lastly, the burden imposed on the CEO by the need for Corporate spokespersonship could be reduced by delegating some of this responsibility to the Sector Executives.

- Provide a system that would facilitate upward organizational mobility without precipitating frequent realignment of the Corporate structure. A clear need was to provide flexibility within the structure to allow components to grow without disrupting the Sector structure.

### **How have these objectives been translated in terms of organization structure?**

The highest organization and planning level continues to be the Corporate Executive Office, which is composed of the Chairman and two Vice Chairmen. The CEO is responsible, of course, for overall Corporate leadership and direction.

The next level of management and planning is the Sector, which represents a macro-business or industry area composed of a number of SBUs with similar strategic challenges, based on such

*(continued next page)*



## MANAGEMENT (continued)

factors as markets, products, customers or technologies. The six Sectors that have been established are sufficiently broad in scope that it is anticipated that the growth of the Company can take place within them for many years without necessity for basic restructuring.

The Sector provides a new level of strategy integration above the SBU. Thus, in addition to SBU plans, there will be Sector Plans and, overall, a Corporate Plan. Review of SBU plans at the Sector level is expected to result in more comprehensive and meaningful attention applied to SBU strategies, resource allocation and resource control, since the Sector Executive's portfolio of SBUs will be considerably smaller than those formerly reviewed by the Vice Chairmen.

The Sector Executive becomes GE's spokesman for his industries, allowing the CEO to concentrate to a greater extent on broad internal and external issues and the representation of the Company as a whole.

Below the Sector, the SBU continues to be the basic business entity. In many cases, SBUs will report directly to the Sector, regardless of whether they are Departments, Divisions or Groups. As one means of providing opportunities for organizational growth and the development of managers, SBUs can "grow in place"—from Department to Division to Group level—without major restructuring. In the revised management system the role of the SBU general manager has not significantly changed.

Within some SBUs, there are components which have unique strategic requirements. The new system recognizes these as "Business Segments." They have many of the same characteristics as an SBU, but due to other considerations, such as size, market requirements or changing environmental factors, can be more effective by being aligned with an SBU. This further business segmentation maintains their identity and management visibility so that resources can be adequately allocated to their needs, which may vary somewhat from the SBUs of which they are a part.

One Sector, the International Sector, has a dual role. In addition to managing specific country affiliates, this Sector is responsible for the integration of international resources and capabilities in support of other Sectors' international strategies. Working with the other Sectors and Corporate staff components, the International Sector helps assure that individual SBU strategies are consistent with and supportive of the Company's worldwide business objectives.

The traditional organization designations—Group, Division, Department, etc.—will be retained as an indication of SBU size and as the nomenclature for units within an SBU.

Essentially, our revised management system moves General Electric from *strategic planning* as a process designed for *one* level—the SBU—to *strategic management* as a system for *all* levels.

### Does the new management system involve changes in staff responsibilities?

The senior Corporate staff positions announced are expected to continue and enhance the contributions of seasoned operating executives in dealing with Company-wide issues.

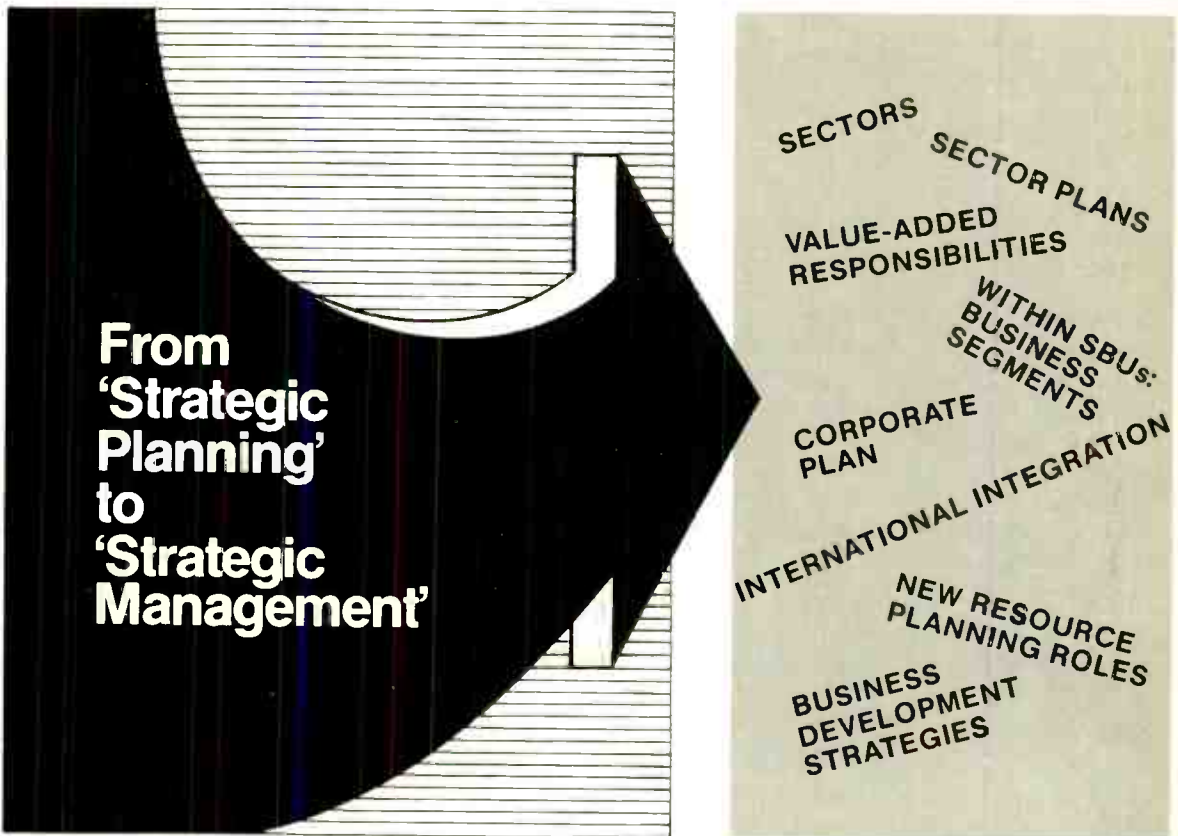
The new system involves significant additions to the planning process—particularly in the areas of resource planning, business development and international integration—all of which require increased staff participation.

As for resource planning, General Electric has vital internal strengths, including human, financial, technological, production, marketing and many others. The strategic plans of each level—SBU, Sector and Corporate—should contain consideration and assessment of these resources and plans for their development, in order to keep the Company strong.

It's an area where functional staffs add value by assuring the adequacy of the critical resource planning that goes into the business plans.

The importance attached to this aspect of planning is indicated by the formation of the new Operating Services Staff, whose responsibilities include monitoring the production resources of the Company. Heading this staff is a Senior Vice President whose depth of experience in production will now be applied across the whole spectrum of the Company's production resources.






Main thrust of GE Management System has engendered new concepts, new terms.

A second important addition is in business development. In effect, we are making venture planning an integral part of the management system by encouraging managers to include business development strategies and plans in every strategic plan at each level. The first step toward seizing new growth opportunities is to identify and quantify new sources of earnings in every SBU. Additionally, it is expected that Corporate staff components will identify and exploit opportunities that lie between or beyond the Sector's purview.

The third significant addition is the requirement for a response to the Company's international planning challenges. We face increasingly difficult conditions and competition in world markets and, accordingly, must increase our coordination of international planning Company-wide. Each SBU will be asked to evaluate

and develop worldwide plans in context with overall Company opportunities and concerns. In this way, we take advantage of our total international strengths and, again, reflect the value of our unified Company.

While the details involved in carrying through this revised GE management system already fill a book, these are the main elements. They indicate the major objectives sought in this change, which are to provide managers with the tools, the channels of communication and the timely information to cope with the new management environment of the 1980s. Strategic management, together with the emphasis on value-added management roles, the variety of supportive integrated systems and the new organization structure, will help achieve our most important objective—a unified and strong General Electric Company. 



# New approach

Headquartered in a Toronto suburb, Canada's newest and largest major appliance company, C.A.M., demonstrates a new way that GE is doing business abroad.

At the end of 1976 the trends of the Canadian major appliance industry were not encouraging. Sales were fragmented among a host of companies, none of which had a sufficient market share to realize the economies of large-scale production. Westinghouse Canada's consumer appliance operation remained in limbo because its U.S. parent had gotten out of the appliance business. For Canadians, most ominous of all





# in Canadian appliances

was the fact that their country's appliance imports were growing swiftly—from 5% in 1965 to 20% in 1976.

What to do?

A bold new answer came on January 4 this year with the formation of C.A.M. (Canadian Appliance Manufacturing Company Limited). The idea behind the new company: put together enough of Canada's appliance manufacturing

and marketing capacity to enable the new entity to hold its own against any competitor.

C.A.M. pulled together the household appliance operations of Canadian General Electric and GSW Limited/Limitée—the latter being the largest Canadian-owned appliance company. The new 3,500-employee C.A.M. acquired Westinghouse Canada's 2,000-employee consumer appliance operation on June 30.



A bold new approach to Canadian major appliance manufacturing came this year with the formation (above) of the Canadian Appliance Manufacturing Company Limited. The new company—incorporating the household appliance operations of CGE, GSW Limited and Westinghouse Canada—represents an estimated one-third of the Canadian market. Since purchase of Westinghouse left confusion over rights to its trademark, the Hotpoint name was chosen for the redesigned product lines.



(continued next page)

GSW and CGE each hold 50% of C.A.M.'s voting shares. Non-voting shares are held 63-37 by CGE and GSW, respectively, resulting in an equity split which reflects their relative contributions of assets and resources.

Overnight, C.A.M.'s formation created a company with an estimated one-third of the Canadian major appliance market. States GSW chairman Ralph M. Barford, who also is C.A.M.'s new board chairman: "For the first time, Canada has a major appliance manufacturer that can hold its own competitively. The merger encourages investment in the most advanced manufacturing equipment and processes, and will help improve Canada's balance of trade."



Some 190 C.A.M. product models were redesigned in six weeks. All models were in production by April.

At the outset, one major marketing problem had to be dealt with—namely, a great deal of confusion concerning rights to the use of the Westinghouse trademark. In order to retain the market share previously held by Westinghouse, it was necessary to create a new brand of appliances and seek to market these through the existing Westinghouse dealer organization.

What name to give the new appliances? C.A.M.'s organizers quickly re-introduced the oldest appliance brand name in North America, General Electric's Hotpoint, which had been absent from Canada for more than 20 years.

Timing was crucially important. Some 190 product models were redesigned in just six weeks, and a company that was formed in Jan-

uary had *all* of its models in production in April.

Observes Canadian-born William D. Rooney, C.A.M.'s new president and chief executive officer: "We achieved a major plant rationalization in a time frame most people would consider impossible," noting that by April the new company had also moved its dishwasher production to Hamilton, Ontario, and had consolidated most of its automatic laundry production in Montreal.

The quick plant specialization was necessary to protect against a scheduled cutoff of White-Westinghouse parts, to reduce product costs and to facilitate a balanced employment program, which the merger partners promised the Canadian government.

The former CGE division manager notes that "the Hotpoint brand incorporates the same people, plants, service organization, warehouses and product distribution that Westinghouse had in the past."

He emphasizes that the Westinghouse dealer organization received the Hotpoint line with great enthusiasm. "Of the total Westinghouse accounts, better than 90% converted to C.A.M.'s Hotpoint franchise, and of our key accounts, 97% converted. Some 1,525 Westinghouse dealers have signed Hotpoint franchises to date, and we're exactly on target for where we thought we would be."

Declares Rooney: "The former Westinghouse personnel's morale in effecting the switch to Hotpoint has been outstanding—better than we could have hoped for. Sale of Westinghouse Canada's consumer appliance business to C.A.M. ended a long period of uncertainty for Westinghouse employees and dealers—a situation which had prevailed since March 1975, when Westinghouse proposed to sell its Canadian household appliance interests to the U.S.-owned White Consolidated Industries." The Canadian government ultimately disallowed that sale.

The Hotpoint brand name was introduced to Canadian consumers in June via a hard-hitting billboard and radio campaign. A jazzy, high-stepping jingle, "Hello, you beautiful Hotpoint," emphasized the new product line's superb styling.

Stresses Canadian William C. Luton, a former Westinghouse Canada vice president who is now C.A.M.'s VP—Hotpoint Appliances: "The new Hotpoint line is not just the Westinghouse line with another name—nor is it a replica of



Canada's new Hotpoint product lines combine the strengths of all three C.A.M. merger partners.

GE's domestic Hotpoint. It's a combination of the strengths of all three merger partners."

C.A.M. is selling its Hotpoint appliances independently of the company's other existing lines: GE, Moffat and McClary. The latter two brand names derive from GSW's appliance business and are long-time prestigious names in Canadian appliances.

"We chose the Hotpoint brand name because it is already known in Canada—particularly in the Western provinces where there tend to be more Americans," notes Luton. "Also, U.S. advertising and promotional efforts for Hotpoint have a 'spill-over effect' in Canada."

Improved productivity in the country's major appliance industry has long been a top government concern. C.A.M.'s creation was favored by both the Canadian government and the country's trade unions.

Canada's major appliance market is presently one-tenth the U.S. size, and the typical U.S. factory worker is supported by 50% more capital investment than the Canadian worker.

Jean Chrétien, Canada's minister of industry, trade and commerce, said the merger would "contribute substantially to the creation of a dynamic, high-technology secondary manufacturing industry in Canada."

Notes Bill Rooney. "Over the next five years, C.A.M. plans to spend millions of dollars on industrial rationalization. We plan to integrate product lines and concentrate production of individual products in single plants."

He states that "appliance research and development will be increased, and ongoing technical support from GE research labs and Louisville's research and technical people—as well as from the C.A.M. organization which includes Canada's largest number of appliance engineers and technicians—will be strategically utilized."

Presently, about 95% of C.A.M.'s Hotpoint appliances are made in Canada. Louisville provides valuable parts and technical support, and also produces certain product lines not made locally.

"The C.A.M. merger represents a new level of international business sophistication for GE," maintains Alton S. Cartwright, CGE's chairman of the board and chief executive officer. "C.A.M. illustrates another way of making the most of the technological strength of parent companies, while strongly emphasizing a partnership relationship with a national company, and still not abdicating one's share owner obligations."

Cartwright is one of two Americans on C.A.M.'s 10-member board of directors. The other: GE's Stanley C. Gault, VP and Sector Executive—Consumer Products and Services Sector.

The CGE board chairman notes that "the new company now has the opportunity to achieve much larger economies of scale in Canada's major appliance field, thus supporting the needs and aspirations of Canadian industrial development." He adds, "C.A.M. is pioneering a new mode of GE international business operations by integrating our technical resources with a strong Canadian company on a full-partnership basis." ▲



New company's architects (l to r): former CGE chairman Walter Ward; CGE chairman Alton Cartwright; GSW chairman Ralph Barford; C.A.M. president William Rooney; and William Luton, C.A.M. VP-Hotpoint.



# Monographs



**Outer space connection?** Could outer-space creatures have founded the pre-Columbian civilizations of the Western Hemisphere? Nela Park's Robert Van Der Velde knows it sounds ridiculous, but is withholding judgment. "As a youth, some 20 years before von Daniken's *Chariots of the Gods*, I traveled in Mexico and was continually fascinated by what seemed to be outer-space clues in southern Mexico's jungles."

This summer, the *GE News* editor and his wife drove 3,000 miles to southern Mexico where they hired a bush pilot to fly them into the interior. There they set out with mules and a guide for an arduous jungle trek to the land of the Lacandons—Mayan descendants.

Observes Van Der Velde, "A thousand years before Galileo and Copernicus, the Maya were charting the course of the heavens. A huge Mayan stone slab discovered in 1952 looks remarkably like an ancient astronaut in a spaceship, right down

to instrument panels and rocket-like flames."

Who's to say?

**A 'bionic' Santa.** Despite a 1967 farm accident that forced Ft. Wayne's Charles E. Best to have his left hand amputated, he still fills Kriss Kringle's boots splendidly.

Best, a process inspector at Ft. Wayne's Wire Mill, explains that he acquired his St. Nick costume by way of last year's Bicentennial celebration.



His woolly whiskers won prizes in four separate beard contests, and his uncanny likeness to Mr. Claus encouraged his wife to sew him a Santa suit. Co-workers, delighted with his appearance at a Christmas party, later asked him home to visit their children.

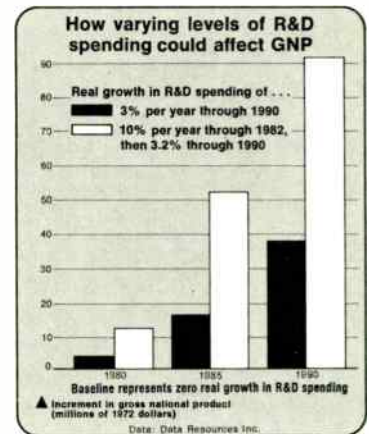
A 30-year employee, Best enjoys the response to his yuletide antics. His favorite Santa task: listening to grandson Matthew's Christmas shopping list.

**R&D benefits.** If the U.S. stepped up its present R&D growth rate, by 1990 there could be a potential \$90 billion impact on the economy. So states Dr. Thomas A. Vander-

slice, VP and Group Executive of Special Systems and Products Group, who has just released a new study conducted at the Company's request by Data Resources, Inc.

"Not only is it possible to estimate the impact of R&D funding on potential GNP, productivity and inflation," Vanderslice says, "but it can be shown that between two plausible R&D funding scenarios over the next 13 years, the difference in potential GNP might amount to more than \$90 billion."

Reports the GE vice president: "If U.S. R&D expenditures continue at current levels, the economic and social consequences by 1990, compared to



the baseline case shown above, will be a loss of 1.2% in U.S. productivity, a 2.9% increase in price levels and a 1.8%—or \$38 billion—loss in potential GNP."

The fraction of America's GNP devoted to R&D has declined for over 10 years, and despite recent increases the relative decline is expected to continue through 1986.

**Future broadcasters.** Six Tennessee State University communications students are serving as interns this semester behind the scenes at Nashville's WNGE-TV, a General Electric Broadcasting Company station. They are studying TV news-gathering techniques, program production and station operation.

Remarks WNGE-TV's Mary-



ann Moore, public affairs programming director: "Our new intern program is based on a successful Explorer Scout project that's been in effect since

1972. More than 50 Scouts have observed station operation here after school hours, and two have been hired."

WNGE-TV has worked with TSU several years as part of GE's participation in a Cluster program created by the National Alliance of Businessmen. The project joins businesses and colleges together to improve job chances for minority graduates.



**Honors.** The Emmy, television's highest honor, has been presented to General Electric for outstanding achievement in engineering development of the VIR broadcast controlled color

television system. John Cannon (left), National Academy of Television Arts and Sciences president, presented the award to Fred R. Wellner, Television Business Department general manager.

- General Electric's 1976 *Annual Report* has received an Oscar as "Best in the Electrical Equipment Industry" in the annual competition sponsored by *Financial World* magazine.
- On behalf of the Western Region's Power Systems Sales Operation, H. M. "Hank" Lawson, VP-Western Regional Relations, recently accepted the Institute of Electrical and Electronics Engineers (IEEE) regional "Large Company of

the Year Award."

- Recently elected national president of the American Business Women's Association was Louisville's A. Joan Daugherty, a finance operation supervisor for the Major Appliance Business Group.
- The Electronic Industries Association has named International and Canadian Group's Peter R. Levin, Manager of International Trade Policy Development in New York, as the fifth recipient of its Distinguished Service Award.
- The 1977 Achievement Award of the Industrial Research Institute has been presented to the R&D Center's Dr. Robert H. Wentorf, Jr.

**Apollo lunar pilot.** Former NASA astronaut Dr. William A. Anders has left a 21-year government service career to join GE as general manager of San Jose's newly-established Nuclear Energy Products Division.

In 1964, Anders joined NASA, serving as the lunar module pilot aboard Apollo 8—the first flight around the moon. In 1969, he was appointed Executive Secretary of the National Aeronautics and Space Council.

Anders joins GE from his most recent position as U.S. ambassador to Norway. A

nuclear engineer by training, he also was the first chairman of the U.S. Nuclear Regulatory Commission, 1975-76, and was a commissioner of the U.S. Atomic Energy Commission, 1973-74.

**First Alaska oil.** On August 1, the first tanker loaded oil from Alaska's 800-mile pipeline at the port of Valdez. The 120,000-ton tanker Arco Juneau, powered by propulsion equipment built by Lynn's Industrial and Marine Steam Turbine Operations, took on some 840,000



barrels of North Slope oil, and then departed on its 3½-day trip to a refinery at Cherry Point, Wash.

The tanker is one of three Atlantic Richfield sister ships, each powered by IMSTO equipment.



GE "spinoff" businesses match surplus GE products and processes with employees eager to form new companies. Three GE spinoffs, clockwise: Microx Corp., updatable microfilm systems; Nuclepore Corp., microfiltration products; and Instructional Industries, classroom response systems.



As a growth-oriented company, GE sponsors new businesses, invests in outside technologies, and markets its extra know-how.

## Technology takeoffs



Three GE venture-capital investments, clockwise: Applicon, Inc., computer graphics systems; Tandem Computers, Inc., "non-stop" computer systems; Rockland Systems Corp., electronic test equipment.



*Situation 1:* A General Electric general manager decides to discontinue a technical development. The employees involved express an interest in forming their own outside business using Company patents and equipment.

*Situation 2:* The president of a promising new outside business is seeking investors, and approaches the Company for venture capital.

*Situation 3:* An outside entrepreneur inquires at GE about buying or leasing certain patents and technology which GE is not currently using.

Today, all three situations can be handled by General Electric. It's just part of the Company's strategic program to remain a dynamic, diversified company—while staying abreast of world technological developments and getting the most from its R&D dollars.

**GE product stepchildren.** If a good idea doesn't blossom into a new GE technical enterprise,



that doesn't have to be the end of it. One recourse: Fairfield's Technical Ventures Operation (TVO), part of Business Development Services, Inc. (BDSI), the wholly-owned GE venture-capital subsidiary.

TVO, established in 1971 by Corporate Research and Development's VP Dr. Arthur M. Bueche, has helped form external companies to utilize technology that GE remains interested in but doesn't wish to pursue directly.

"Too often in most companies, inventors and entrepreneurs simply quit and start their own businesses," states BDSI president Pedro A. Castillo. "There is no mechanism whereby their companies can sponsor them, share in profits and retain technology and market contacts."

TVO's purpose: to match extra GE products and processes that look commercially viable in a small business environment with employees who are eager to start their own companies.

To these new ventures, or "spinoffs," GE contributes assets and technology—but not cash. In return, the Company receives a commensurate minority interest in the new enterprises, as do the founders and outside investors.

Funding for GE spinoffs is obtained from outside capital sources. GE does not serve as broker for the would-be entrepreneurs, but does help them develop a business plan and introduces them to prospective outside investors.

Six of GE's eight spinoffs

have survived: companies that sell educational instruction equipment, superconductive materials and magnet systems, microfiltration products, updatable microfilm systems—as well as firms that offer uranium exploration services and secondary oil recovery technology.

"TVO's results and prospects are very satisfactory and promising," maintains Castillo.

**New outside technologies.** If TVO's in-house spinoffs keep the Company informed about its own technological stepchildren, outside venture-capital activities help GE stay apprised of new external developments.

Fairfield's BDSI was formed in 1968 with the objective of investing in attractive young companies outside GE.

"Individuals and new small companies have contributed important innovations in the past, and they continue to develop significant new products and processes," remarks Castillo. "These new enterprises need venture capital to nurture them, and thus afford opportunities for investment. BDSI enables General Electric to make risk capital available to new and deserving companies. Venture capital can be a very profitable activity in a favorable market environment."

To date, BDSI has made 22 investments in businesses engaged in data processing, automation, medical devices, instrumentation, communications and security systems. GE holds from a 4 to 44% minority in-

terest in these companies.

As Castillo explains, "Outside venture activities help GE learn the economics and problems of new businesses, while at the same time helping these young companies get off to a good start. If they are successful, the Company profits and gains valuable insights into new technologies and markets. BDSI works actively with its portfolio companies and can call upon the manpower and technical resources within GE for assistance."

A typical investment is Boston's Applicon, Inc., a manufacturer of minicomputer-based interactive graphics systems, in which GE has invested more than \$1 million. Applicon's annual sales rate is now in excess of \$20 million.

BDSI's latest investment: the San Francisco Bay area's Tandem Computers, Inc., a minicomputer company that manufactures "non-stop" computer systems, whereby if one part of the system fails, work is redirected without interruption or loss of information.

**Extra GE know-how.** Besides in-house spinoffs, another way of moving GE technology outside the Company is through licensing or sale. Schenectady's Technology Marketing Operation, part of Corporate Research and Development, was set up in 1965 and now has access to the world's most active patent portfolio.

TMO's marketing service offers external companies a host of opportunities ranging from

*(continued next page)*

spun-off GE product lines to underutilized know-how and patents.

“The average company has many patents that can be utilized more broadly,” observes TMO manager Edward G. Fronko. “In 1976, industry spent 15 billion R&D dollars, which is more than the net income of the top 20 corporate income producers in 1975. If a particular technology doesn’t fit GE’s marketing strategies, we try to recover the most from our R&D dollars by licensing it or spinning it off.”

Examples offered for licensing to date include: aluminum lubricants, conveyor systems, ultra-thin semipermeable membranes, spin-type air cleaners, continuous-flow gas calorimeters and fluxless aluminum brazing.

How does TMO identify unneeded technology? Internal searches are made among the

various GE product departments. TMO works closely with approximately 100 patent counsel to find potential leads, and then seeks to convince department managers that the time is right for licensing or sale. “Successful transfer of technology outside GE depends largely on its development,” Fronko notes. “It’s very unusual to license a patent whose invention hasn’t been actually reduced to practice.”

To date, TMO has negotiated some 200 licensing agreements and also has completed 25 product-line sales. Many of these agreements will continue to provide royalty income over the 17-year life of the patents.

TMO’s most recent sale: this summer’s transfer of Schenectady’s Specialty Fluidics Operation, a small General Purpose Control Department component producing fluidic industrial devices, to the Connecticut-based TriTec Industries, Inc. **▲**

**N**early a hundred years ago, in 1878, the forerunner to General Electric—the Edison Electric Light Company—was formed. Now, on the eve of our 100th anniversary, the first elements of the Company’s Centennial celebration are being unveiled. A specially-designed 1978 GE calendar has been completed, and the *Monogram* here gets into the Centennial mood by offering the first of six chapters on the Company’s historical highlights—beginning with Edison’s invention of the incandescent lamp in his Menlo Park laboratory.



Extra GE technology includes Qualigard® fluidic industrial device (left), sold to TriTec Industries; and electric furnace wall material (below), licensed to the Babcock & Wilcox and Carborundum companies.



# The Story of Light



World Radio History



# The Edison Years

One hundred years ago next October 15, a company was formed to support Thomas Alva Edison's inventive genius as it transformed a tiny carbonized sewing thread sealed in a glass globe into a practical product and launched a new electrical era, transforming the lifestyles of people throughout the world. Today, descendants of that incandescent lamp glow in silent tribute to Edison and the company—General Electric's earliest predecessor—whose financial backing made that invention possible.

Public recognition of Edison's genius arrived when he was only 23, following his invention of an improved stock ticker. During his creative life he would receive 1,093 patents covering such devices as the phonograph, motion pictures, the electric pen, waxed paper, and, of course, the incandescent lamp.

In 1878, at the age of 31, Edison was well-established as a fulltime inventor, having moved to his Menlo Park, NJ, laboratory two years earlier. Edison had begun experiments on the "electric light problem" in the fall of 1877, a period when the gas-light provided conventional home illumination.

"I realized that an electric lamp, to be commercially practical," wrote Edison later, "must, of necessity, bear a general comparison with the gas jet in at least two points: first, it must give a moderate illu-

mination, and second, such a lamp must be so devised that each one could be lighted and extinguished separately . . ."

Sharing Edison's vision of an electric lighting system was New York attorney Grosvenor P. Lowrey, counsel to the Western Union Telegraph Company and a good friend of the inventor. In October of 1878, Lowrey organized the Edison Electric Light Company with a capitalization of \$300,000. Edison received half the shares of the company and, in return, agreed to develop his incandescent lighting system. Biographer Matthew Josephson would later observe: "The launching of the Edison Electric Light Company by such sponsors is noteworthy in that it inaugurated a phase of increasingly close relations between big business and technology in this country . . ."

Edison plunged into his work. His wizardry thrived, not in isolation, but among a team of equally hard-working Menlo Park assistants, each of whom was a specialist in his field. Among these were Charles Batchelor, an English machinist; the congenial Swiss clockmaker John Kruesi, who could decipher Edison's crude sketches and transform them into the desired apparatus; Francis Upton, a mathematical physicist; and Francis Jehl, a former clerk in Lowrey's law office who became a



## Key Dates in GE History

1878—The Edison Electric Light Company is founded on October 15 to support Edison's incandescent lamp research at Menlo Park, New Jersey—home of the world's first industrial development laboratory. 1879—The first practical incandescent lamp is invented by Edison, who also constructs his first dynamo. 1880—Edison is granted incandescent lamp patent. Trial runs of Edison's first electric railway are made. 1881—Edison Machine Works is established in N.Y.C.





The Menlo Park Laboratory of Edison, moved board-by-board from New Jersey, as it may be seen today at Greenfield Village, Dearborn, Michigan.



trusted laboratory assistant of the inventor. Experiments proceeded along several lines. In addition to a practical electric lamp, Edison realized that he would need a complete *system*. It was necessary to invent everything: dynamos, regulators, meters, switches, fuses, fixtures, and a host of other detail parts, even down to the insulating tape.

Upton's calculations using Ohm's law pointed to the need to develop a lamp with a high-resistance filament to insure the success of the lighting system. It was Edison's filament—a very thin thread or wire that would highly resist the passage of electric current—that would be his greatest contribution to lamp design. He experimented with platinum as a filament material and secured patents on two such lamps early in 1879, but their high cost, intricate construction and limited efficiency eliminated them as a commercial possibility.

Edison then turned to carbon. He performed experiments on hundreds of carbonized substances before selecting a simple cotton sewing thread for a filament. On Sunday evening, October 19, 1879, current was turned on. Edison and his associates began a long vigil, taking turns watching the glowing bulb. Two days later, it was still burning brightly, and by 2:00 p.m. Tuesday, October 21, it had remained lit for over 40 hours. Success showed in their faces, and the inventor declared: "If it will burn that number of hours now, I know that I can make it burn a hundred!"

Edison's success was announced to the world by the *New York Herald* on December 21, 1879. While scientists rejected the report as a fake, gas stocks fell drastically while stock of the Edison Electric Light Company soared—eventually hitting \$3,500 a share. Edison demonstrated his electric lighting system at

Menlo Park on New Year's Eve to a crowd of 3,000.

### Manufacturing begins

The transition from laboratory triumph to commercial success would require extensive manufacturing facilities, so in 1880 Edison formed a separate company to furnish lamps to the parent company and opened a small factory near his laboratory. He turned to Bergmann & Company of New York for sockets, switches and other components and to the new Edison Machine Works in 1881 for dynamos and other heavy machinery.

The popularity of the Edison lighting system grew with each new installation, with requests for dynamos and lamps increasing rapidly.

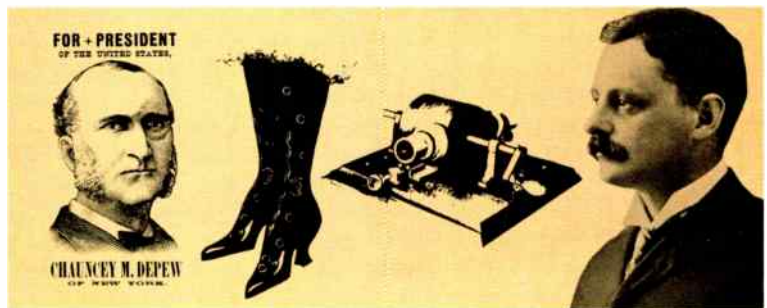
The first commercial installation was made, not on land, but on the steam ship "Columbia" of the Oregon Railway and Navigation Co. in 1880. The first individual or "isolated" system was installed in the printing plant of New York's Hinds, Ketcham and Co. in 1881.

While the first full-scale public introduction of the Edison system was in London at the Holburn Viaduct early the following year, the crowning achievement was the unveiling in New York of the Pearl Street Station on September 4, 1882. It would eventually furnish electricity to 946 customers and 14,311 incandescent lamps.

Edison's successful installation at Pearl Street was recorded by the *New York Times*, which wrote: "The giant dynamos were started up at three in the afternoon, and according to Mr. Edison, they will go on forever unless stopped by an earthquake." To a *New York Sun* reporter the inventor would say simply, "I have accomplished all I promised."



1882—Pearl Street Station—the nation's first central station—begins operation in New York City. Sprague develops under-running street railway. 1883—The Thomson-Houston Company is formed from the American Electric Company. 1886—Edison Machine Works moves to Schenectady. Stanley perfects electrical transformer—proves AC distribution practical. 1889—Edison General Electric Company is formed. Thomson-Houston purchases Brush Electric Company.







**Thomas A. Edison's laboratory, in which he invented the practical light bulb and over 420 other devices. In 1929, Edison re-enacted his moment of success (insert) with Francis Jehl, President Herbert Hoover and Henry Ford in attendance. The event was a highlight of the dedication of the Henry Ford Museum and Greenfield Village and celebrated the Golden Jubilee of electric light.**



# A century of lighting

In 1889, the Edison Electric Light Company was consolidated with several of the inventor's other companies to form the Edison General Electric Company. In 1892, the merger of this firm with the Thomson-Houston Company symbolized the end of an era and the beginning of another. Edison turned his attention from lighting to developing a new iron ore milling process at a mine near Ogdensburg, New Jersey. As for lighting, its continued development would rest with innovators of the fledgling new General Electric.

From the young GE Research Laboratory in 1904 came news of another advance in the carbon filament. Dr. Willis R. Whitney produced a new metallized carbon filament or GEM (for General Electric Metallized) lamp with 25% higher efficiency than regular carbon lamps. GEM lamps were sold from 1905 through 1918.

The search for better filament materials begun by Edison continued, with tungsten increasingly recognized as an ideal metal of high melting point but also a stubborn, brittle one that was costly to fabricate. In 1905, Dr. William D. Coolidge, an M.I.T. associate of Whitney, joined the GE Research Laboratory

and soon accepted the challenge of taming tungsten.

For two years, Coolidge patiently experimented with tungsten. He hammered, squeezed, rolled, pressed and then drew the material, each time observing its brittleness and pliability. Finally, in 1908, by employing a special swaging process before drawing the tungsten through hot diamond dies, Coolidge produced commercially-practical ductile tungsten that could be drawn to specific diameters.

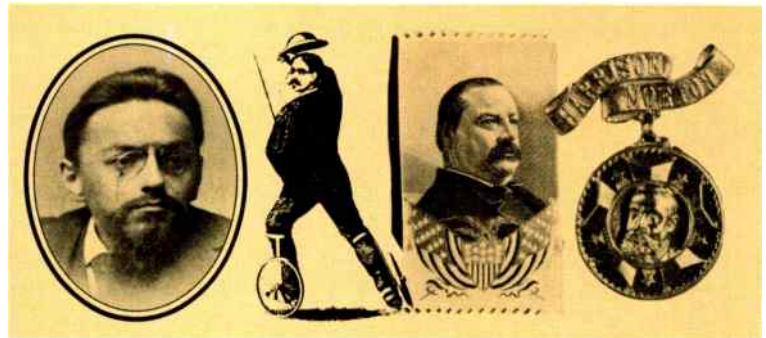
Public announcement of Coolidge's success was made in 1910, following his development of techniques for producing ductile tungsten in commercial quantities. The result was a lamp with twice the output of the GEM design, and with a rugged filament that could take

the shocks and vibrations of automobiles, railroad cars and street cars. The Coolidge process, with only slight modifications, is still in use today.

In 1913, Coolidge's GE associate Dr. Irving Langmuir produced a light bulb filled with inert gas, following extensive studies of the gases occurring in the internal atmosphere of lamps. The gas-filled bulb—introduced commercially as MAZDA C—again doubled efficiency plus providing a bonus of



1891—Stanley Electric Manufacturing Company is formed at Pittsfield, Massachusetts, and first transformer shipped. Edison wins key patent suit on incandescent lamp. 1892—The General Electric Company is formed through the merger of Edison General Electric Company and Thomson-Houston Company. Charles A. Coffin is the first president. Charles P. Steinmetz joins the Company at Lynn. 1893—GE transmission line work begins with opening of Redlands-Mill Creek power line in California.



## The Evolution of Lamps



1879  
Edison Carbon  
Lamp



1911  
Ductile Tungsten  
Lamp



1925  
Inside  
Frost



1930  
Photoflash  
Lamp



1934  
Mercury  
Vapor



1938  
Fluorescent  
Lamp



1940  
Sealed  
Beam



1961-1977  
Lucalox<sup>®</sup>  
High-Pressure  
Sodium Line



1965-1977  
Multi-Vapor<sup>®</sup>  
Line

reduced bulb blackening. Today, nearly all lamps of 40 watts or higher contain inert gas.

Expanded lighting research resulted from the addition of the Nela Research Laboratory, part of the campus-like Nela Park in Cleveland, Ohio, that opened in 1913. Continued lamp and lighting improvements followed, including tipless lamp construction (1919), inside frost (1925), depressible-beam dual filament automobile headlamp (1924), the S-1 sunlamp (1929), the high-pressure mercury lamp (1934), and the coiled-coil filament (1936).

Over several decades, major technological breakthroughs would emerge from General Electric's laboratories. Significant among these were:

- The first U.S. photoflash lamp (1930) confined to professional use, but later miniaturized (1939) in the number 5 flashbulb, the M2 (1954) and the AG-1 (1958), joined with sophisticated electronics in the flashbar 10 (1972) and Flip Flash array (1975).
- The high-pressure gaseous discharge lamp line began with mercury vapor types (1934) and with the Bonus Line construction (1960) its performance and economy improved, followed by improved color in the deluxe white mercury (1965). In 1962 the Multi-Vapor<sup>®</sup> metal halide lamp appeared, providing about twice the light per watt as mercury types and improved color. The highest-efficiency general

lighting source today is the high-pressure sodium lamp (1961) which was invented by General Electric.

- The fluorescent lamp was introduced by GE in 1938, produced light at twice the efficiency of incandescents and generally lasted twice as long. The popularity of fluorescents grew with such innovations as instant starting (1944), Circline (1945), deluxe colors (1949), Power-Groove<sup>®</sup> (1956), Mod-U-Line<sup>™</sup> (1968), Watt-Miser<sup>™</sup> (1974), Bright Stik<sup>™</sup> (1976) and Watt-Miser II (1977).
- The Sealed-Beam automotive headlamp, which combined an incandescent filament with a molded glass reflector and lens assembly was introduced in 1939. This new lamp revolutionized automotive headlighting world-wide because it provided excellent beam control and "did not grow dim with age."

### Lighting the future

What's ahead for lighting? Some answers come from Dr. James R. Donnalley, manager, Lighting Research and Technical Services Operation, Lamp Business Group. The operation's applied research, involving chemistry and physics, seeks to develop tomorrow's lamps and lamp-making technology.

"Lamp R&D efforts now and in the foreseeable future will be concentrated on the effective use of energy," says Dr. Donnalley, "providing light



sources that give increasingly more light for the lighting dollar. One result of this effort will be the increased use of fluorescent lighting and other types of efficient light sources."

Fluorescent research is concentrating on color to match the warmth of incandescents, new shapes, miniaturization of ballasts and new units that can be easily installed in screw-in incandescent sockets.

"Flashbulb research is directed toward new multi-flash products providing better light for less," he says. "We're attempting to reach this goal through innovative product concepts and less expensive materials."

While the Lucalox® and Multi-Vapor® high-pressure lamps are both highly efficient light sources, researchers feel that there is still room for additional improvement. As for the incandescent lamp, improved reflector types will enable lamps of lower wattage to handle bigger lighting jobs.

While it's conceivable that entirely new ways to produce light will be found, Dr. Donnalley reports that there's nothing new on the horizon at present. "Electroluminescence and light-emitting diodes have been explored, but to date their efficiency has been poor and their applications in general illumination have been limited.



"While we've made a lot of progress since Edison's original lamp, we have a long way to go in the conversion of electrical energy into light. Lamp technology is still in relative infancy, and every forward step we take saves energy dollars for our country, and for our customers."

Edison's inventive genius was honored often. However, no greater tribute was tendered than on October 21, 1929 at Greenfield Village in Dearborn, Michigan. To celebrate "Light's Golden Jubilee," Henry Ford welcomed 300 world dignitaries, including President Hoover, Orville Wright, Madame Curie, Will Rogers, Harvey Firestone and others. Although weak and fatigued, the aging inventor addressed the guests briefly, reflecting upon the 50th anniversary of his famous lamp:

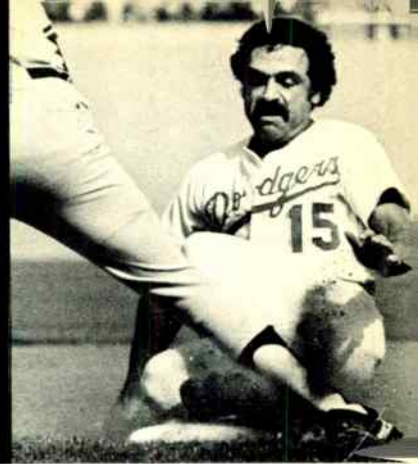
"I would be embarrassed at the honors that are being heaped upon me on this unforgettable night, were it not for the fact that in honoring me, you are also honoring that vast army of thinkers and workers of the past and those who will carry on, without whom my work would have gone for nothing.

"If I have spurred men to greater efforts, and if our work has widened the horizon of thousands of men and given even a little measure of happiness in the world, I am content."

"If I have spurred men to greater efforts, and if our work has widened the horizon of thousands of men and given even a little measure of happiness in the world, I am content."



The Lighting Institute at Nela Park, known as The University of Light, hosts thousands yearly.



Celebrities back career planning: Roberta Flack, Walt Frazier (with Corporate's Nick Komanecky), and Davey Lopes.

PEOPLE

# Celebs support PIMEG

## Sports, music stars join in guiding minority youth toward engineering.

Big names in sports and entertainment are the most visible role models for today's minority youth. But many celebrities are aware that their fields offer careers to only a fraction of young aspirants. Result: top athletic and entertainment personalities are lending their support to PIMEG—General Electric's Program to Increase Minority Engineering Graduates.

Basketball giant Walt Frazier, baseball heroes Davey Lopes and Dave Concepcion, and recording star Roberta Flack are helping GE get its career message across at two levels: magazine ads aim at parents of black and Hispanic youngsters, while radio commercials address minority audiences of teens and adults.


GE is expanding its reach with this latest PIMEG effort. For the past five years, attention was directed primarily to youngsters and educators. Now, with print campaigns in *Ebony*, the leading magazine in the black adult market, and *Nuestro*, an Hispanic publication, nearly 1.5 million parents join the target audience. Why? The Planning Commission for Expanding Minority Opportunities in Engineering has found that relatives and friends influence more than 40% of engineers in their career choice.

The ads ask the question: "Is your kid living in a dream world?" And readers are beginning

to take a genuine interest in the answers. Case in point—a letter to GE from a concerned parent in Knoxville, Tennessee:

*"I recently viewed your ad in the November, 1977 issue of Ebony. My son, age 14, is living in a dream world of rock entertainers and 'Star Wars' heroes and villains. . . . Since grade school, I have been discussing the importance of education to him. Now would be a great time for him to hear such points from someone else concerning education, career and upward mobility regarding professional and social status. Please write my son and show him the opportunities that are available for one who studies. He has often talked of engineering and architecture. There are four engineers in our family."*

Engineering career suggestions are being made on radio as well. Two major black radio networks over which the recording and sports celebrities carry the 60-second GE message have a total of 173 affiliates. Advertising research shows that 73% of black teens age 12 to 17 who listen to radio tune in on black stations. Radio is also an effective medium to reach the audience of parents, particularly those in lower socio-economic levels who may not be reached effectively by print.

To stretch its broadcast coverage, the Company sent special PIMEG kits to radio deejays. Complementing the spots, program hosts fill free air time from fact sheets in the kits while broadening minority listeners' awareness of engineering as a sensible career objective. 

# 'On the air'

GE people on TV and radio are speaking out for varied causes—

A special honor—the first of its kind—hangs in the Fairfield office of Frank V. Donovan, General Electric Connecticut Public Affairs Manager (right). The “Distinguished Service Award” is a tribute to Donovan’s 15 years of enthusiastic volunteer support of Connecticut Public Television (CPTV).

As a catalyst for CPTV’s growth and development, Frank pioneered live coverage of Connecticut General Assembly sessions, a move which led other states and now the federal government

to follow suit. He also initiated CPTV’s continuous reporting of election-night voting returns. And he served as CPTV’s first public affairs commentator. Frank produces, writes and hosts special political programs and documentaries on vital public issues. And he’s a stalwart when it comes to public TV fund-raising activities.

Active in CPTV’s evolution from a single channel in 1962 to a current network of five, Frank has devoted countless evenings and weekends to make the venture a success. “Broadcast-



**Jim Bennett:**  
international business advocate

“This country’s business interests overseas are vital to economic growth here and abroad,” states James H. Bennett, Associate Counsel for the Latin America Business Division. “The TV programs I’ve hosted or been interviewed on express, I hope, my strong personal conviction in U.S. internationalism.”

An experienced practitioner on that subject, Jim has appeared three times on CBS-TV’s college-accredited “Sunrise Semester” programs. Over a closed-circuit TV series for elected officials, he has shared his knowledge on multinational corporations and American capitalism. New York Mayor Beame applauded one of Jim’s telecasts in a special note of thanks to the show’s producers.



**Jackie Terrell:**  
personalizing a product

Many people switch television channels. Gainesville’s Jacqueline B. Terrell (l) switches TV studios.

As a spokesperson for the Battery Business Department, Jackie has spent the past year in “the broadcast biz.” To educate consumers about rechargeable batteries, she has appeared on 24 major daytime TV talk shows in Miami, Jacksonville, Atlanta, Detroit, Chicago, Cleveland and Minneapolis.

“My talk features the ‘three Es’ of rechargeable batteries: economy, ecology and energy,” Jackie explains. “There’s a lot of travel in the job, but I seldom get to see more of a city than its airport, TV stations and newspapers.” Next year? Jackie plans appearances in eight more American cities.



**Joe Podolsky’s support of**  
free enterprise

GE was hiring in Erie, and Transportation Systems Business Division wanted to build community understanding of free enterprise. Communication manager Joseph E. Podolsky had an idea.

In short commercial messages between segments of “High Q”—a popular Erie high-school TV quiz show sponsored by GE—Joe began talking about various business subjects. He wrote and delivered the messages in a conversational style, which reached area students and a huge audience of quiz contestants’ parents and family friends.

That was three years ago. Picked up now by another sponsor, “High Q” is still on the air, and Joe remains its free-enterprise spokesman.



including some on GE's behalf.

ing," he observes, "is a powerful tool. It needs the active involvement of good men and women to ensure accuracy, fairness and balance."

Besides Frank Donovan, many other GE people (see below) are finding that television and radio airwaves provide the most personal way to get a message across. Dedicating long hours apart from General Electric—or in the Company's behalf—these individuals communicate during any given week to audiences numbering in the thousands.



Around the nuclear circuit with Lynn Wallis

Nuclear power critics' charges are being forcefully addressed through the spokespersonship of Lynn R. Wallis, health physics consultant with San Jose's Communications and Nuclear Information.

To put nuclear safety into perspective, Lynn has made hundreds of visits to TV and radio stations and talked before numerous legislative groups. In every state where anti-nuclear initiatives last year threatened to shut down nuclear power plants, his work helped defeat those propositions.

Lynn's pro-nuclear arguments display his strong personal opinions as well. "To be effective, one has to believe in nuclear power wholeheartedly. I feel the pluses of commercial nuclear energy far outweigh any minuses."



'Barney' Barnes: belief in her work

In 1968, during the Vietnam War, Cleveland's Salathiel "Barney" Barnes heard a recorded radio prayer for American soldiers.

"The five-minute taped messages lacked sincerity and spontaneity," Barney recalls, "so I volunteered to go down to the station each Sunday morning and deliver them live."

Barney is now retired from Lamp Business Division's Ravenna plant—but her involvement in religious broadcasting goes on. Each Sunday morning, the 66-year-old grandmother hosts a one-hour program of Bible lessons, church news, prayer requests and interdenominational music. She pays for the air time herself with part of her GE pension and small contributions from listeners.



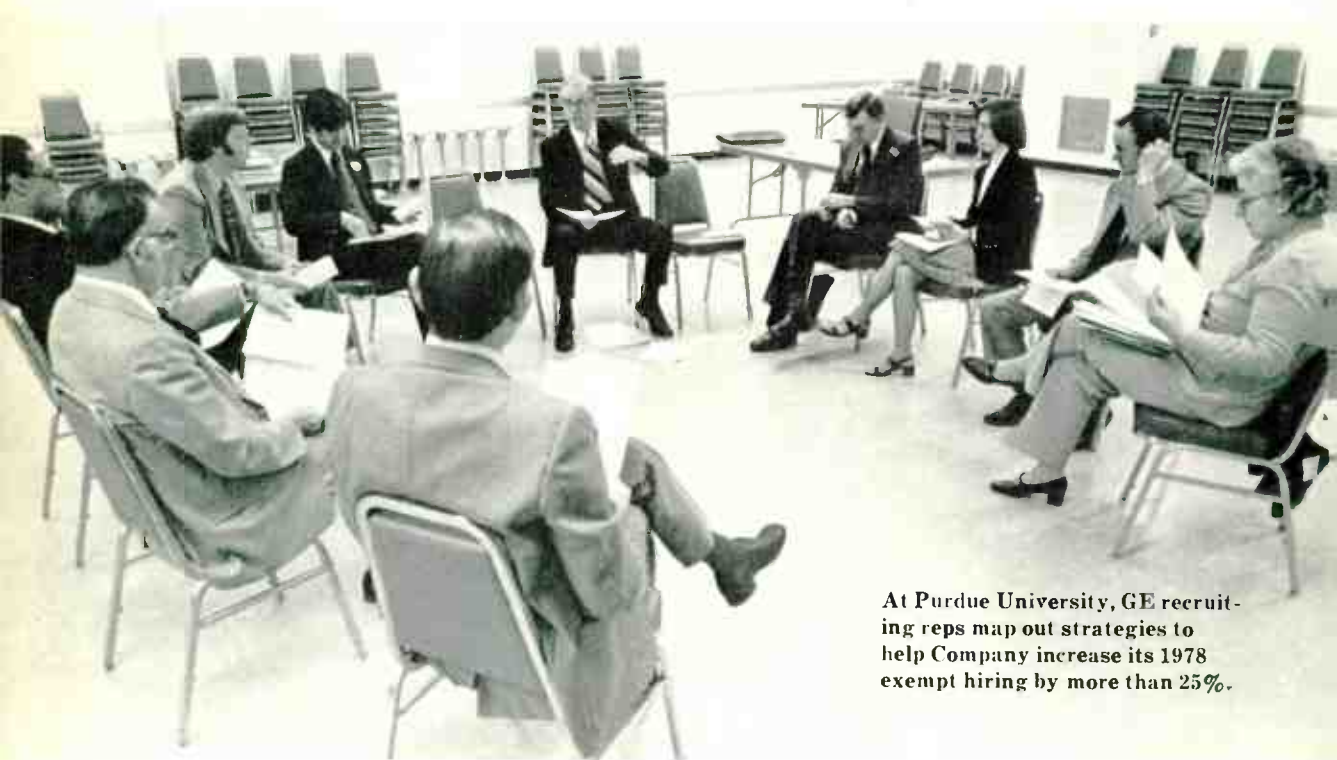
Sal DeFelice: helping others to adapt

When Lynn's Salvatore DeFelice asks fellow Italian-Americans to lend him their ears, 300,000 do just that—by turning on their radios.

Immigrating to this country 12 years ago, the Medium Steam Turbine Department designer perceived a need among people such as himself for learning to adapt to American life. The result: "L'Eco Italiano" (The Italian Echo), a half-hour Italian-language broadcast that airs each Sunday morning in Boston.

Sal worked three years on another radio program before his debut on his own show in 1976. His material covers immigration laws, health, child-raising, the need to learn English—anything which makes the adjustment for the Italian community easier.

# Campus recruiters—a special breed



At Purdue University, GE recruiting reps map out strategies to help Company increase its 1978 exempt hiring by more than 25%.

It's been going on since 1905. Interviewing seniors for its "Test" engineering program, General Electric was one of the first to send representatives to college campuses in search of new-employee talent.

Since then, of course, the GE recruitment effort has grown and diversified. During this 1977-78 academic year some 750 Company interviewers voluntarily will visit more than 235 schools and talk on an average of 25 minutes

each with 10,000 to 15,000 graduating bachelor's, master's and doctoral degree candidates.

On a crisp October morning the focus for a GE contingent of eight recruiters, a recruiting team leader and a regional recruitment representative was the expansive campus of Purdue University in north central Indiana. Along with 38 recruiters from other "Fortune 500" companies, the GE team was intent on finding the most



Students share a mutual interest with GE recruiters Gil Langford (l) and Lloyd Stubbins (r)—the future.



promising students from an influx of eager hopefuls. Sign-up lists showed 160 names of those who had expressed interest in interviewing with GE during the recruiters' two-day stay at Purdue.


Spurring the GE interviewers was the fact that the Company's operations are calling for an increase of more than 25% over last year in combined technical and non-technical hiring.

As it faced the day, the band of recruiters was aware of the significance of its task. GE Chairman Reg Jones expressed it in a message to all Company interviewers: "As you identify people to be considered for employment, you are really making decisions about the future of the Company. The task of managing General Electric will some day fall to the people you select today."

Illustrating this statement's relevance are two individuals in whom a recruiter once envisioned GE career potential. On the campus of the University of Nebraska in 1933, former board chairman Gerald L. Phillippe was first introduced to the Company. Six years later at the University of Pennsylvania's Wharton School of Finance and Commerce, General Electric employment opportunities were recommended to Reginald H. Jones. In both these instances, the recruiting was done by the same employee: Marvin L. Frederick, now retired.

With a weighty stack of resumés neatly separated into small piles across the bed, on the desk and atop the TV in a room at the Purdue Memorial Union, recruiting team leader Arthur H. Seddon and recruiter Lloyd S. Stubbins worked the afternoon before interviewing began to match students' interests with team members' fields of career expertise. By dusk, they had produced a busy agenda of the next day's activities.

Notes team leader Seddon: "Anyone who voluntarily leaves a family and his regular job to travel like this a few times a year has to believe in what he's doing. Every student who comes to us is unique. The difference among people and the human resource potential they offer are great testaments to the human race. It's up to us to find those who will make the greatest contributions to GE."

Paralleling this appraisal, Purdue University Placement Service Director Richard A. Stewart adds: "I believe corporations have personalities just as people do. The differences may be subtle, but they're there. Often, that personality difference the students look for comes across in the attitudes of the recruiters they meet." 

## Organization Changes

Announcement of the Company's new Management System came just as the *Monogram* was going to press. Hence, some managers' new titles, as well as their specific components, may have changed because of the reorganization.

### CONSUMER PRODUCTS AND SERVICES SECTOR

C. Frank Hix, Jr., General Manager—Housewares Manufacturing Department  
James A. Baker elected a vice president  
Ralph D. Ketchum elected a vice president

### AIRCRAFT ENGINE BUSINESS GROUP

Louis V. Tomasetti elected a vice president

### INTERNATIONAL AND CANADIAN GROUP

Richard W. Foxen, VP—Special International Projects  
Alastair C. Gowan, General Manager—Europe Business Division

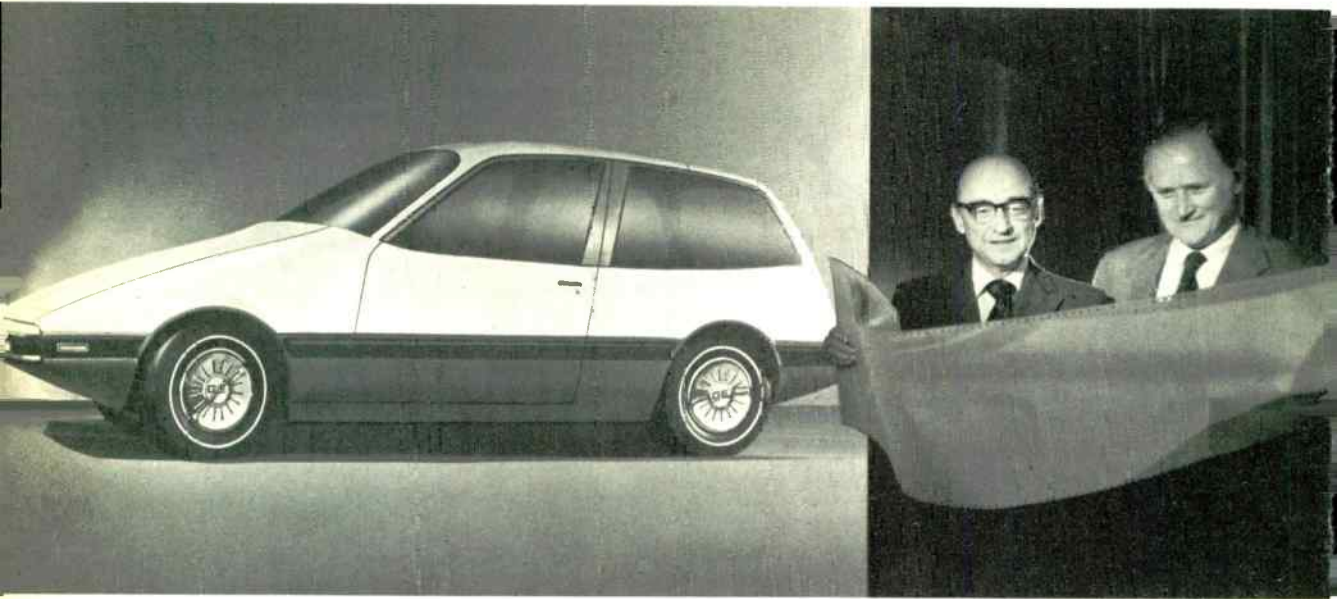
### POWER GENERATION BUSINESS GROUP

Roy H. Beaton, VP—General Manager, Nuclear Energy Operations  
George J. Stathakis, VP—Power Generation International Programs  
William A. Anders, General Manager—Nuclear Energy Products Division  
A. Philip Bray, General Manager—Nuclear Energy Projects Division  
Albert E. Kakretz, General Manager—Knolls Atomic Power Laboratory  
Henry E. Stone, General Manager—Nuclear Energy Engineering Division  
Bertram Wolfe, General Manager—Nuclear Energy Programs Operations

### SPECIAL SYSTEMS AND PRODUCTS GROUP

Daniel Lovinger, General Manager—Ballast and Specialty Transformer Business Department  
Donald J. Meyers, General Manager—Mobile Radio Products Department





Plans for a test electric car are reviewed by VP Art Bueche (1) and the R&D Center's James M. Lafferty.

## Electric cars: switching on new research

It is perfectly natural to assume General Electric's continuing fascination with electric cars. After all, founding father Thomas Edison not only drove one, but courageously ordered production of the first battery-powered vehicle back in 1889.

So one should not be surprised to learn that the R&D Center—to help meet the long-term challenges inherent in producing such vehicles economically—recently signed a \$5.98 million contract with the U.S. Department of Energy to develop and build a pair of four-passenger experimental electric automobiles over the next two years. Hopefully, such research will contribute to ideas which already have proved workable (see story at right).

The test vehicles will be subcompact-size and will be designed jointly by GE and Chrysler Corporation. A team of GE people will concentrate on various electrical and mechanical innovations plus the electrical drive system and controls. Working with the R&D Center will be the Direct Current Motor and Generator Department (DCM&G), Erie; Industrial Control

Department, Salem; Ordnance Systems Products Department, Pittsfield; and Semiconductor Products Department, Syracuse. Lead-acid batteries will be supplied by Globe-Union Inc., Milwaukee.

According to Eugene A. Rowland, Manager-Electric Vehicle Program at the R&D Center, the car will be similar to a subcompact station wagon, although the contract doesn't specify how it should look. "It will be designed along aerodynamic lines with no chrome strips or other extraneous ornaments," he explains. Chrysler will construct the body and chassis using conventional materials, but emphasizing aluminum and fiberglass for possible weight reduction. GE's Plastics Business Division will be called upon to recommend innovations in this area.

As for performance specifications, the four-passenger experimental electric has a challenging list, as ticked off by Rowland:

"The car must have a range of 75 miles, a minimum cruising speed of 55 mph, go from 0-30 mph in nine seconds, be able to climb a 5% grade at 50 mph for one mile, sell for \$5,000

in 1975 dollars, cost 15 cents per mile to run and re-charge in six hours.”

GE isn't starting from zero in its development work. The Company has been selling motors and controls for use in electric lift trucks and golf carts for several years, and even designed an experimental car called the "Delta" in 1967 and the "Q-T Van" (for quiet truck) in 1970-72. An experimental electric car called the "Lead Wedge" set a speed record in 1968 of 138.86 mph using a special motor purchased from GE that was built from the parts of a torpedo motor.

"Our car will include a DC motor from DCM&G that will be a modified, low-weight, 20-horsepower type," says Rowland. "The flow of battery current will be regulated by a new, lighter, more efficient solid-state controller using power transistors from GE-Auburn, and an on-board battery charger will be integrated with the drive system electronics. The R&D Center is designing all of the electronic systems for the car, and these will be packaged with the help of Ordnance in Pittsfield."

A new wrinkle being introduced in this model is the use of a microprocessor in a "regenerative braking" system. The technique allows the car's motor to become a generator during braking to recharge its batteries and thus recover some energy. The net result, according to Rowland, is to extend the range of the vehicle.


Those who struggle to make the electric car a reality agree that the biggest challenge is improving batteries. "Presently, the only reasonably-priced battery is the lead-acid type, but it's limited in energy density, is heavy and limited



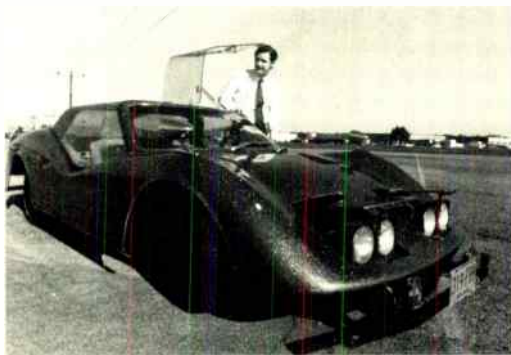
Left: Erie electric vehicle motor is checked by DCM&G's Mendel W. Kitzmiller and Frank T. DeWolf. Right: Salem's Charles E. "Bud" Konrad holds an electric car control.



to short-cycle urban driving," Rowland says. "In fact, the main weight of our car will come from 18 six-volt batteries weighing 1100 pounds." While GE currently sells rechargeable nickel-cadmium batteries for use in cordless tools or calculators, none is designed for use in electric cars. Research at the R&D Center on sodium-sulfur batteries is designed to meet utility load leveling demands at the substation.

Another challenge is improving the motors to be used in electric cars. Mendel Kitzmiller, Manager of the Small Motor Product Engineering sub-section of DCM&G, emphasizes the need to boost their efficiency. "We know how to do this, but it's costly," he points out. "Designers have to consider the type of driving that will be done—start-stop frequency, city vs. suburban trips—to predict what the motor will be called upon to do and what will improve the overall efficiency." 

## Bob's battery-powered auto



Syracuse's Robert D. King, an advanced development engineer at Heavy Military Equipment Department, built his own electric car on a 1969 Volkswagen chassis with a Bradley GT fiberglass body. The car averages three-fourths of a mile on a penny's worth of electricity. Notes Bob: "Translated into the cost efficiency of gasoline, that's like getting 45 miles per gallon. The car cruises at 45-50 mph with a range of 50 miles between charges. With dwindling gas supplies, I think electric cars will eventually become an around-town family vehicle."





Based in Denver, Ladd Petroleum conducts drilling and producing operations in 16 states and two Canadian provinces, and last year acquired its first significant off-shore drilling interest. In 1976, Ladd delivered nearly 2.3 million barrels of crude oil and 26 billion cubic feet of natural gas. The company's current production comes from 4,413 wells, in which Ladd owns an average 30.5% interest.



# Ladd Petroleum

As a Utah International subsidiary, it brings into the GE family one of the hardiest of this country's 10,000-plus independent oil producers.

Joining General Electric at the end of 1976, Utah International Inc. brought with it a subsidiary that specializes in oil and gas exploration and production. That's Ladd Petroleum Corporation, headquartered in Denver. It conducts drilling and producing operations in 16 states and two Canadian provinces.

Last year, Ladd delivered nearly 2.3 million barrels of crude oil and 26 billion cubic feet of natural gas to an energy-hungry U.S.

In 1976, Ladd enjoyed a phenomenally high 40% success ratio as a participant in 46 exploratory test wells, commonly called "wildcats." As reported in *Oil and Gas Journal*, this represented the best average of all oil companies, including the majors.

Last year also, 64 of Ladd's 78 development wells were successful, and these activities have made important additions to Ladd's reserves and enhanced its earnings and future potential.



Shown here: three examples of Ladd Petroleum's business activities. Top left, an oil pumping well; bottom left, a gas well head, called a "Christmas tree"; top right, a gas refinery. Thus far in 1977, 123 of Ladd's 147 development wells—in which the company holds, on average, a 28% interest—have been successful. Independents such as Ladd drilled 89% of all U.S. new-field discoveries from 1970 through 1976.

(continued next page)

Ladd Petroleum Corporation takes its name not from the firm's president and founder, J. B. "Bert" Ladd, but from his father—a Kansas wildcatter who "never made the strike he was always seeking" and who died in a Wyoming oil derrick fall in 1950.

Bert Ladd himself worked in the oil fields and on drilling rigs from age 13. In 1949, he received his petroleum engineering degree from the University of Kansas.

On March 1, 1968, he formed Ladd Petroleum Corporation, "with no assets, no liabilities and no stock outstanding."

The confidence investors had in the new firm was evident in its first major move. The company approached 220 participants in McCulloch Oil's drilling programs and asked them to make a tax-free exchange of their oil and gas interests for Ladd stock. When the offering was complete—90% of the persons offered accepted—Ladd had 2.8 million barrels of reserves.

The next step? "Going public" and gaining acceptance in the over-the-counter market. To that end, in 1969 Ladd acquired Alco Oil & Gas Corporation, which had interests in the highly rated Gomez Gas Field in Pecos County, Texas.

Recalls Ladd: "In 1971, our first Gomez well came in and put us in the limelight. For a few weeks, we had the world's deepest producer—about 23,000 feet. It wasn't the end of the rainbow, but it gave us wide recognition."

By the end of 1971, Ladd had 4 to 5 times the proven reserves of just three years before.

By 1973, the company was doing well—but Bert Ladd was worried: "American capital markets were tight. I was beginning to wonder whether there would be room at the money

table for small companies."

Ladd Petroleum's 1973 merger with Utah "was envisioned in July, negotiated in August and consummated on November 30," Ladd observes with obvious satisfaction.

A spread-the-risk philosophy is followed, today, by Ladd Petroleum. Explains Ladd: "We feel it's better to have 20% of 10 wells than all of two. That way we convert from a Las Vegas-style game of chance to more businesslike money management."

So far this year, 123 of Ladd Petroleum's 147 development wells—in which the company holds, on average, a 28% interest—have been successful. The company's current production comes from 4,413 wells, in which Ladd owns an average 30.5% working interest.

"Our business demands that we be highly entrepreneurial," says Ladd. "We have to run to stay even—sink enough test wells based on sound geology and engineering to replace our currently depleting oil and gas reserves."

The company's sense of urgency also derives from the technology of underground petroleum reservoirs. Explains Ladd: "When the company makes a discovery, underground pressure and productive potential immediately start to decline. To maximize recovery, we must react fast."

At present, Ladd is drilling 21 oil and gas wells, and completing nine others.

In an effort to outpace the dictum of "running to stay even," Ladd continues to acquire more properties. For example, in 1974 Ladd doubled its size by acquiring the LVO Corporation, a Tulsa-based oil company with diversified hold-



Helping meet U.S. energy demands, Ladd seeks to increase its ever depleting oil and gas reserves. The company is presently drilling 21 oil and gas wells, and completing nine others.





ings. Last year, Ladd acquired its first significant offshore drilling interest, along the Texas Gulf Coast.

**Bert Ladd speaks out** articulately about the present U.S. energy problems and the Administration's efforts to solve them. He takes issue with present charges of oil industry profiteering: "Oil industry profits are well within the U.S. industry average. According to *Business Week*, the biggest oil, gas and coal companies had a return of equity of 14.2% for the year ending this past June 30. By contrast, radio and TV broadcasters had a return of 23.3%, office equipment manufacturers 17.9%, and savings and loan associations 15%."

He continues: "The 'easy oil' has already been found. What remains is from two to four miles deep and in tough areas." He points out that the public "only hears about the discoveries. There are nine dry holes to one producer for exploratory wells, and only one profitable well in every 49."

Rising labor and production costs, a shortage of drilling rigs and new environmental regulations are also impacting on companies' profits.

He deplores the cry of some that Congress should break up the oil companies because they represent a tightly-controlled monopoly. Notes Ladd: "The fact is, it's a diverse industry. Besides the 16 so-called majors, there are more than 10,000 U.S. independents who stay in business simply through their persistent effort to find ever new sources of oil and gas."

Independents such as Ladd Petroleum drilled 89% of all U.S. new-field discoveries from 1970 through 1976, and made 77% of the significant new-field discoveries (defined as more than 1 million barrels of recoverable oil or more than 6 billion cu. ft. of gas).

Present price levels don't, in Ladd's view, help with another serious problem—recovery of more of the oil that is tapped by today's drilling methods. "Much of the discovered oil is left in the ground. Average oil-reservoir recoveries are only about 35%, while gas-reservoir recoveries are about 70%. Naturally-existing underground pressure can remove only a relatively small part of the oil, and current market

prices don't encourage secondary recovery by water and gas injection and other more exotic recovery means."

Natural gas pricing and deregulation are also being closely watched by Ladd Petroleum officials. "The option on natural gas is *not* between a plentiful supply at the proposed federally fixed price of \$1.75 per 1,000 cu. ft. [the present price is \$1.47] and runaway prices under deregulation," states Ladd. "Rather, the choice is between adequate supplies under deregulation and a shortage under continued regulation."

Ladd believes that a \$1.75 price "may bring forth some new natural gas, but the huge supplies needed to cure the gas shortage are estimated to cost \$2 and up—*still less than the cost of heating oil or any other alternate fuel.*"

National economic and political frustrations notwithstanding, Ladd's president predicts a bright future for the company. "One big reason is the quality of our people," Ladd states proudly. "We've had zero attrition in our key personnel since the company was founded in 1968, and our present 190 employees are hand-picked, capable personnel who are second to none. Ladd Petroleum is strongly positioned in the oil and gas industry, our exploration and development activities continue to increase, and we're already involved in some promising technology exchanges with other GE components.

"Independents such as Ladd Petroleum Corporation are here to stay," concludes Bert Ladd. "We're a hardy breed—realistic about today and optimistic about tomorrow." ■



Ladd Petroleum's top executives are (l to r): president J. B. "Bert" Ladd, senior VP John H. Moore and executive VP Kenneth R. Whiting. Bert Ladd holds a core sample from an oil-bearing formation.

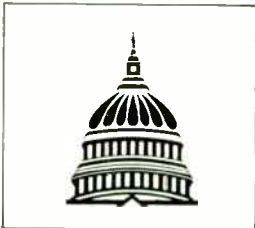


## Legislators: 'Give us the business facts.'



Prominent Congressional members addressed GE Washington meeting: Sen. Howard Baker (R-Tenn.), Rep. Al Ullman (D-Ore.)—shown talking with GE VP Phil Peter (I); and Sen. Daniel Moynihan (D-NY).

### The GE Constituent Relationship Program encourages component managers to keep their Congressmen up-to-date on vital business matters.



"It is irresponsible for business *not* to state its side of the story in Washington." So says VP Phil Peter, in charge of GE's Washington Corporate Office.

"Bills reaching the President's desk are a mixture of countless inputs from a wide range of public and private interest groups. As a good corporate citizen, business *must* make its viewpoint known."

Peter, interviewed by the *Monogram* at the third annual GE Constituent Relationship Managers' Meeting held Oct. 17-18 at Washington's Capital Hilton Hotel, emphasizes the need for GE to make its views heard. "The composition of Congress is changing dramatically. Since 1972 more than one-half of the House and 42% of the Senate have been elected for the first time. The last election alone resulted in 70 new Representatives and 18 new Senators."

Many of these newcomers, Peter points out, have only limited business experience and are not acquainted with business needs. "The best way to bridge this communication gap is through dissemination of sound factual information."

The Constituent Relationship Program's aim is a basic one: to seek meaningful two-way exchanges between the Company's managers and their Representatives and Senators from Congressional districts and states where GE has—a significant number of employees. It has met with great success. This year, 11 Senators and 25 Representatives were added to the program for a total of 187 members of Congress who are regularly contacted by GE constituent relationship managers. The program is dynamic, since Peter indicates an additional 40 members of Congress should be added to the program in 1978.

The GE vice president notes that the constituent program has been successful for the five following reasons:

- The relationship between the GE managers and their Congressional contacts has been a real, and not a paper one. The managers contact their assigned members of Congress an average of four times a year.
- The communication is two-way. GE people listen to the Congressmen's and Senators' views and, in turn, the legislators receive information on the Company's activities in their districts or states. The impact locally of prospective legislation on investment and jobs is aired between two individuals who share common interests.
- GE develops constructive, realistic positions which it believes are consistent with the public interest on key subjects, and presents them to the assigned members of Congress. Clear layman's language is used, backed up by detailed staff work.
- GE's constituent relationship managers are asked to become involved with a limited number of major issues each year affecting the Company as a whole. Thus, a rifle-shot rather than a shotgun approach is used.
- The program has top-level endorsement in the Company and is strongly supported at all levels of management. And, above all, the program is legal, moral and ethical.

**Emphasizing the importance that the Company places on meaningful contacts with Congress, GE Board Chairman Reg Jones addressed the constituent managers' dinner meeting in Washington on Oct. 17. "You are the 'forward edge' of General Electric management today—the new frontier for management action."**

Continued Jones: "Constituent relations work is central to the survival of our system of free enterprise, and to the continued good health of General Electric. I encourage you to continue your activism on behalf of the Company's interests."

The GE Chairman praised the high credibility and close rapport that many GE employees have established with their Congressmen, citing as an example the 10-year acquaintanceship that Lamp Business Group's Gus W. Quattrochi, Specialist—Public Affairs and Community Relations, has with Representative Charles Vanik (D-Ohio), as part of the program.

"As the Chief Executive Officer of General Electric, I may have a certain impact on Capitol


Hill," Jones told his listeners, "but you are the people who can open the doors and give our messages highest credibility." He added: "Politics is no longer a spectator sport for business. It's a game of winners and losers. And we in business can be losers if we aren't in there fighting. I'm convinced that political sophistication—political effectiveness—is one of the important qualifications by which the business leaders of the future will be selected."

Some 25,000 legislative bills are introduced in each session of Congress, and of this number some 40 to 50 may significantly affect GE. VP Peter's Washington Corporate Office counsels with individual GE components on bills affecting their businesses, and coordinates with Fairfield's Corporate Staff components and with the Corporate Policy Committee, which determines Company positions on key issues. On those key issues designated by the CPC, the Washington Corporate Office communicates to GE constituent managers who in turn communicate with their members of Congress.

This year, Peter notes that Congress has considered a number of complex business measures including energy, tax reform, social security financing and many others. Responding to the need for increased capital formation and tax reform, GE's constituent relationship managers were able to provide timely specifics.

"Business and government are finally learning how to sit down and talk to each other," VP Peter concludes. "Congressmen and Senators are being alerted to provisions in bills that are not in the best interests of their constituents or the public at large. Businessmen are learning to do the anticipatory work that avoids 'last-ditch' lobbying efforts on Capitol Hill, which are almost always ineffective."

Declares Chairman Jones: "The age of the Neanderthals—of primitive warfare between business and government—is quickly passing into history. The style of political action is rapidly changing, and the opinions of business, labor and various public and private interest groups are increasingly being sought and studied by Congress."

He adds, "General Electric's constituent relationship managers are on the 'cutting edge,' helping the Company and the business community urge constructive changes in national policy." 

# 'Getting there'

by Joan A'Hearn



Our occasional correspondent from the Ms. front takes a look at how the businesswoman can ease the travail of travel.

There I was at two o'clock in the morning, contemplating suicide because the sleepy motel clerk could not find my "guaranteed for late arrival" reservation. In retrospect, suicide seems a little drastic, but I had been traveling . . . via one car, two planes, one airport bus and two taxi cabs . . . since noon the day before. My feet had long since exceeded the dimensions of my shoes; I'd had a deodorant breakdown hours earlier; my right arm would forever be four inches longer than the left one from carrying what felt like a cast-iron suitcase; and the last thing I remembered eating was the filter tip from my last cigarette.

Eventually a room was found (between the ice machine and the elevator shaft) and I quickly unpacked, showered and set my alarm to go off in four hours. Thirty wide-awake minutes later I made a startling discovery about women. Even though we have been liberated, equally opportuned, acted upon affirmatively, and had our collective consciousness raised, there is still one area where we have yet to take that giant step for womankind: we do not travel well.

That may be okay for some otherwise fine wines, but women have to realize that while getting there may not be half the fun, it is a necessary evil in today's business world. So let's take the challenges one at a time and see how we can learn to travel like the fellows.

First there's the suitcase packing problem. My experience has been that it's only a problem if you follow those helpful hinters who tell you to travel light and only bring things that can be worn interchangeably, rinsed out in a minute and dried overnight. Better you should bring all you think you might need and then some. You may look like Quasimodo schlepping through airports but you'll always have something to wear for whatever unexpected occasion and you'll never experience the supreme discomfort of wearing damp pantyhose.

Then there's what I call the agony of de feet. Travel is broadening in two areas—the second one being the arches which really take a beating after you've been running for trains and planes with all that luggage. Even if you're only going to be away for two or three days, bring lots of shoes and change them as often as you can. It's amazing what that does for tired, aching feet and legs. It also helps if they match.

Next there's the question of personal comfort and how to guarantee it when riding on trains, planes or buses. Ideally, you want the seat next to you to be unoccupied—unless, of course, some extremely attractive, witty and intelligent member of the opposite sex insists on joining you. The closest I ever got to that was when Paul Newman's garbage man's brother sat across the aisle from me and smoked something funny



from Chicago to San Francisco. Anyway, there are several ways in which you can almost be assured of sitting alone. One is to eat a clove of garlic and get very close to whoever asks if the seat next to you is taken. But this tactic could backfire if you run into another garlic eater who has numbed olfactory senses.

Another ploy is to travel with a briefcase and lots of loose papers which you immediately plunk down on the seat next to you and then keep your eyes riveted to some fascinating literature as passengers get on at other stops. Or you can pretend to be asleep, but don't try that on buses—where the crime rate for purse-snatching is understandably higher than on planes.

With those hassles out of the way, let's assume we're at our destination and it's time to check into a hotel or motel. Ignore desk clerks who ask you to pay in advance . . . even if you don't have any luggage. They are throwbacks to another culture that assumes any single woman checking into a motel is engaged in a much older profession. Instead, smile sweetly and tell them to put it on your Diners Club or Carte Blanche card. And during the stunned silence that ensues, ask for extra towels in your room. Hotels invariably never give you enough towels and by the time you wash your hair and shower you've used up your 24-hour supply.

Other helpful hints for hotel living: Always leave two wake-up calls about five minutes apart. That way you have a fifty-fifty chance of getting one. Also, find out what local transportation the hotel provides. Very often, in towns where there's a large company facility, a car or bus makes morning and evening trips back and forth—but this is information that usually only gets passed on to the men. And by all means, check out the hotel in advance if you can. I've been booked into places where Jack the Ripper wouldn't venture after dark; where as yet unidentified species of insects inhabit the dressers; and where a notice was posted on the bathroom mirror that you could flush the toilet only during low tide. If you encounter similar situations, remember reservations can be cancelled . . . even in person.

The last item I want to mention is one that poses the largest problem for the woman who travels alone—that is, dining alone. For some reason known only to maitre d's, a woman can get breakfast or lunch in any restaurant without the slightest hitch . . . but at dinner time the atmosphere changes with the menu. Usually

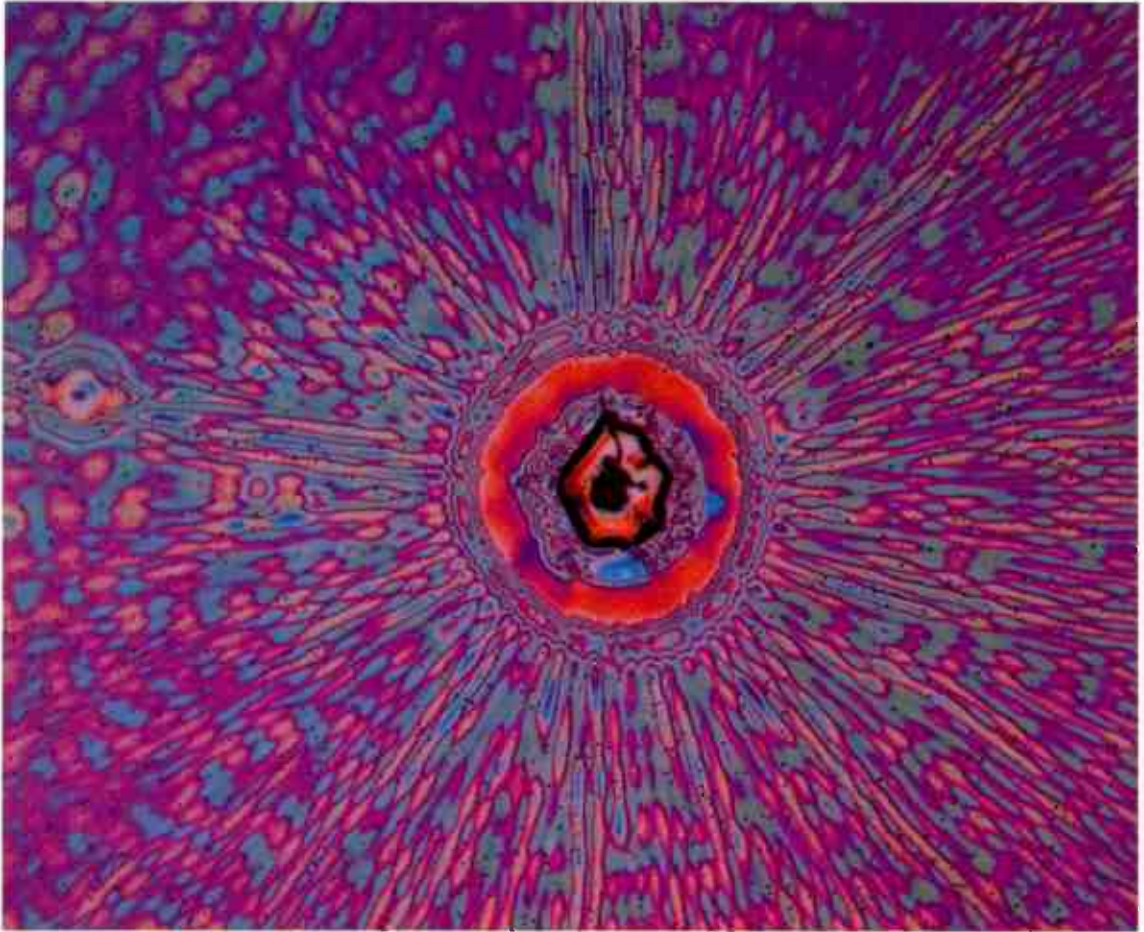
you'll be greeted with, "Would you like to wait in the lounge for the rest of your party?" You can say that you'd be happy to have a drink in the lounge but you're dining alone and would like to be seated for dinner whenever a table is available. In most good restaurants the attitude is that the only thing worse than a woman sitting alone in the dining room is a woman sitting alone in the bar . . . and you'll get a table pretty fast. Then you can almost see the waiters trying to decide whether to give you the worst service possible so you'll never return . . . or to give you the bum's rush out of there so maybe too many people won't notice you. Either way it makes for a thoroughly unenjoyable meal.

But there are a few steps you can take to erase the stigma of dining alone. First of all, make a reservation. That way, when you enter a restaurant which is practically empty and the maitre d' nervously greets you with his reservation list in hand ready to plead potential full capacity, you can assure him that yes, indeed, you have a reservation. It's worth it just to see the man in full consternation. Second, bring a book with you. You don't have to read it if you don't want to but it is a handy attention-getter, especially when dropped on a waiter's foot. Third, don't be intimidated. I've had waiters say, after I've ordered a drink, appetizer and entree, "Of course, you'd like that as soon as possible, wouldn't you?" Be polite, but firm, and tell them you'd like them one at time, preferably in the socially acceptable order, with enough time to finish one before starting the next.

Waitresses are even less tolerant of women alone in restaurants, and I'm sure there's some deep, psychological reason for this that greater minds will have to deal with. My main concern is that I can't stand being called "Honey," "Sweetie," or "Dearie" by a woman who as yet doesn't know that I prefer bleu cheese dressing to oil and vinegar. Then, too, a woman alone just can't compete with a neighboring table of four big spenders.

I think that slowly but surely the restaurant industry will become accustomed to the fact that women, like men, sometimes dine out alone. But, in the meantime, if you're not ready to blaze a trail . . . there's always room service or the local McDonald's.

As more women climb corporate ladders they are discovering that upward mobility may very well depend on "mobility ability" . . . and if we share our experiences, problems and solutions we can help each other to "get there." **AM**



**A FIRST PRIZE.** This photomicrograph recently won a first prize at the American Ceramic Society exhibit in Chicago, and a third place at Houston's International Metallographic Exhibit.

Using one of the R&D Center's reflected-light microscopes, Janice Methé, a technician-metallographer at the Light and Electron Microscopy Lab, captured the "exploded" flow pattern of liquid

boron trioxide ( $B_2O_3$ ) passing through a pinhole defect in a covering layer of silicon dioxide—a substance used in GE semiconductor devices.

Photomicrographs, as permanent records of natural observations, help scientists understand the composition and activity of substances with which they work, and enable them to illustrate their findings.