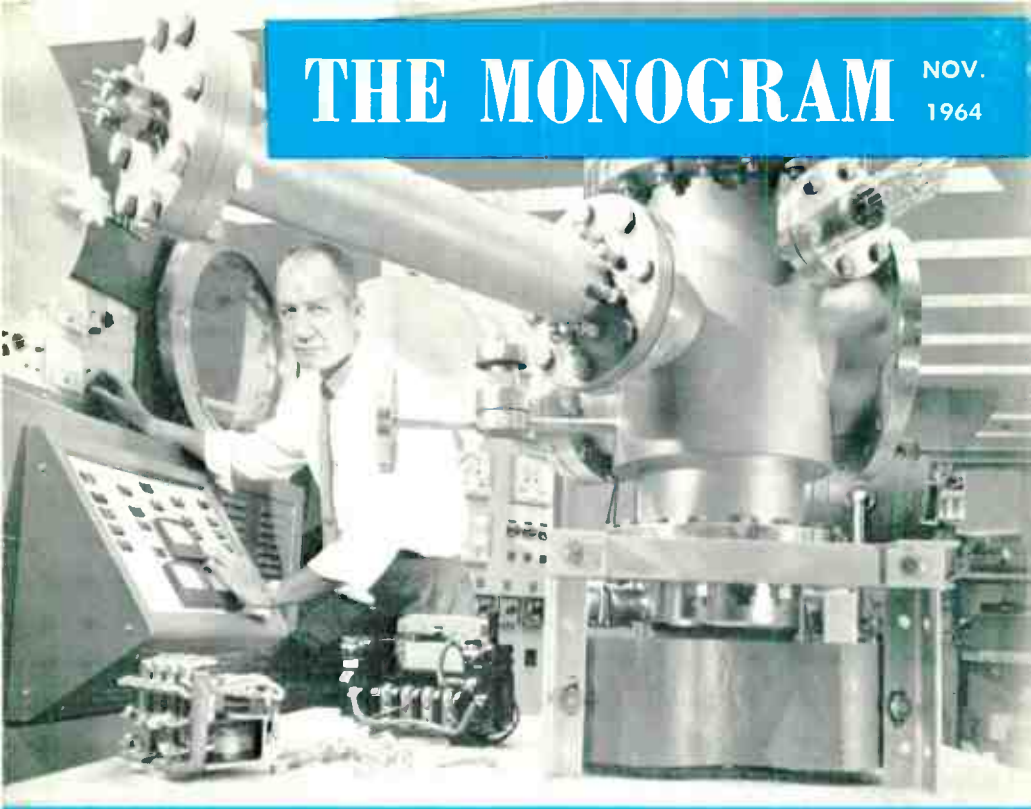
THE MONOGRAM

NOV. 1964



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DIRECTORS AT LYNN

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LETTERS

Yep! Gotta Have That, Too

EDITOR: Re: "The Big Bird Takes Off." Although I hate "me-tooers," in this case it's said with pride. We, too, took part in the first flight of the XB-70A and we, too, performed perfectly on the second successful test flight—and for that matter the first as well. We'uns are the electrical system — generators by DCM&G, and controls by Specialty Control.

R. H. GUEDET
D-C Motor & Generator Department
Erie

The Key Club

EDITOR: Please add to your ever-growing list of "G-E Secretaries Having Phi Beta Kappa Keys" Philadelphia's own Molly Haines. Her boss is Joe Hannifin, advertising and sales promotion manager here in Philadelphia office.

Molly is Class of '51 vintage, University of Rochester, with a BA in French.

ESTELLE BARTHOLOMEW
Marketing & Public Relations Services
Philadelphia

Self-satisfying

EDITOR: Here's customer service made to order. One recent Friday afternoon Jim Somers, Insulating Materials Department salesman in East Orange, N. J., received an urgent call from the Park Hill Painting Company. For the new General Electric Supply warehouse near the Brooklyn-Queens Expressway in New York City, the contractor needed 100 gallons of a light gray to paint structural steel beams not previously specified for painting. Because of a job deadline, painting had to start the first thing Monday morning.

The Industrial Paint Products Section of IMD, Chelsea, Mass., tinted the 100 gallons, shipped it out within six hours, and the paint was on the job to meet the deadline early Monday morning.

P. F. JUDICE
News Bureau
Schenectady

The object of *The Monogram* is to keep its readers informed on General Electric activities so they may contribute more effectively to General Electric progress on the job and better represent the Company in its relations with the public.

IN THIS ISSUE

EDITORS
Richard T. Tibbetts
George F. Way

The Monogram is an intra-Company magazine published for office employees of the General Electric Company and its affiliates. It is published monthly at New York by the Employee Communication Operation of Management Development and Employee Relations Services and printed in the U.S.A. by The Maquo Company.

GENERAL ELECTRIC

VOL. 13, NO. 10

THE GENERAL ELECTRIC
MONOGRAM

NOVEMBER, 1964

COMMUNITY RELATIONS

San Jose's Good Scouts

Scouting in the United States is more than 50 years old, but you can't accuse the young knot tiers and trail blazers of not keeping up with the times.

A case in point: the 30 Santa Clara County Boy Scouts who, this summer, became the first in the nation to earn scouting's new "Atomic Energy" merit badge.

Their instructors were first-class engineers from the Atomic Power Equipment Department in San Jose, Cal. (such as G. William Fitzsimmons, pictured below). The program consisted of lectures, films, demonstrations and tours of reactors and other facilities at San Jose and the Vallecitos Atomic Laboratory. The Scouts took a two-hour written examination at the conclusion of the course.

SCOUTING'S SIGN OF THE TIMES
Earning a nuclear merit badge.

Exclaimed Scout Executive Larry Enright: "They took the boys into tomorrow and showed them how they would be a vital part of it."

OPERATING RESULTS

Commercial Sales Gain

In the commercial, or non-defense side of the business, we are enjoying continued record sales.

So said President Fred J. Borch last month in announcing General Electric's operating results for the first nine months of 1964. But he added that a lagging defense business held total sales to about the level of a year ago.

Mr. Borch cited improvement in sales of consumer goods, industrial products and utility equipment over the corresponding period in 1963 as indicators of the across-the-board strength in commercial product lines.

Net sales billed during the first three quarters amounted to $3,582,976,000 before the effect of nonrecurring price adjustments applicable to products affected by the 1960 antitrust cases. The 1963 figure was $3,606,459,000. After inclusion of nonrecurring charges, the 1964 sales figure was $3,480,662,000.

Earnings for 1964's first nine months, before these nonrecurring charges, were $203,980,000 or $2.25 a share—up from $192,400,000 or $2.14 a share last year.

Inclusion of the nonrecurring charges reduced the 1964 figures to $153,199.000 or $1.69 a share.

ELECTRIC LIVING

It's Cheaper to Retire

One strong factor in the lively market for electrical products has been the steady rise in all-electric living, a trend reinforced by continuing evidence of its economy as well as its comfort.

Another solid endorsement came last month from the 10.000 residents of the Rossmoor Leisure World retirement community in Seal Beach, Cal. They're finding it's cheaper—by $22.750 a month—to retire in 1964 than it would have been in 1939.

They would have paid that much more 25 years ago to enjoy the same conveniences of all-electric living (if they had been available), according to Southern California Edison Company. After studying a sampling of 509 units over a period of 19 months, the utility announced an average monthly electric bill of just $10.50 per unit at Rossmoor Leisure World.

Each total-electric apartment at Seal Beach is equipped with General Electric kitchen appliances, including built-in oven and range, refrigerator and Disposall® and is heated with radiant ceiling cable.

Southern California Edison Company noted that the "electric service charge index" (cost per kilowatt hour) had dropped 27.7 percent since 1939 while the cost-of-living index has risen 110 percent.

Average electric costs for a Rossmoor Leisure World unit in 1939 would have been $14 per month, or $22.750 more than currently paid for the 6.500 apartment homes there.

The Seal Beach retirement community near Los Angeles is the nation's largest, but even larger Rossmoor Leisure World communities are under construction in Laguna Hills and Walnut Creek, Cal.; Olney, Md.; and Princeton, N. J. Builder-developer Ross W. Cortese plans other communities for the Midwest, Canada and Europe.

ATOMIC PRODUCTS

No Plant for Bodega Bay

Pacific Gas and Electric Company decided late last month to withdraw its application for the Bodega Bay atomic power plant in California. The Company's Atomic Power Equipment Department was to have supplied the boiling water reactor for the proposed 325.000-kw plant.

Department General Manager George White said the decision on Bodega Bay hinged on the question of the proximity of the plant to one of the world's best known zones of seismic activity, the San Andreas Fault.

Commented Mr. White: "General Electric, PG&E and their consultants, the Advisory Committee on Reactor Safeguards, and the Atomic Energy Commission all found the plant and its features would have provided for operation without undue hazard to the health and safety of the public."

He said the only doubt expressed by the AEC concerned the ability of the structure to withstand a hypothetical three-foot shear movement brought on by earthquake, and the inability to provide an experimental or experience proof-test of the novel design to keep the structure intact. PG&E found this minority view sufficient cause to withdraw the application.

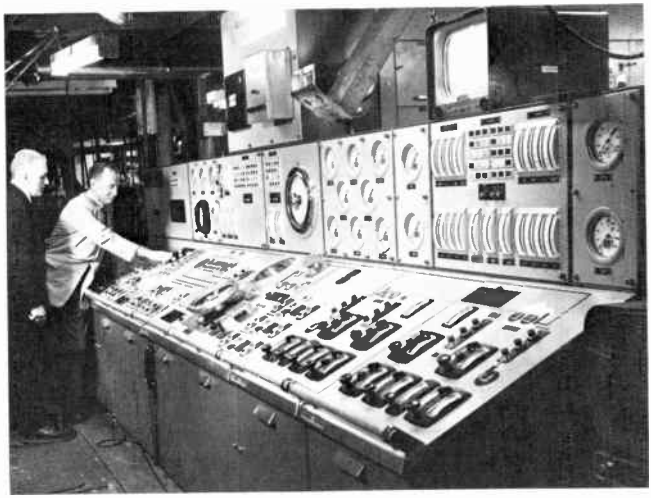
AT DEADLINE

New Licensee: General Electric has licensed the firm of Tokyo Shibaura Electric Company (Toshiba) to make and sell certain lines of the Company's computers. Under the ten-year agreement, Toshiba will make data processing machines of the GE-200 and GE-400 series and GE/PAC 4000 and model 412 industrial process control systems.

All In Favor: Two Company vice presidents, Electric Utility Group Executive Charles K. Rieger and Consumer Products Group Executive Herman L. Weiss, have been elected to the Board of Governors of the National Electrical Manufacturers Association, it was announced November 11. The trade association also announced the election of A. C. Monteith, senior vice president of Westinghouse Electric Corporation, as its president for the coming year.

Giant Step For Microwave: Southern Railway will more than double the size of its communications network through a multi-million-dollar contract just signed with Communication Products Department for a high-capacity, transistorized, microwave system. It will provide communications coverage over an additional 2,200 miles and more than 100 new locations on the Southern's lines. Communication Products said the equipment order represents the largest single industrial microwave contract ever awarded. The department supplied similar equipment for two previous phases of the road's $28-million communications modernization program. Southern Railway President D. W. Brosnan said "completion of these new links will be another giant step forward in Southern's continuing program to increase our usefulness to shippers," and pointed out that microwave stations provide greater reliability because they are not vulnerable to snow, ice or heavy wind storms.

Hands Off: Atomic Motor Product Section in Schenectady has developed a "solid-state" pump for liquid metals or other electrically-conductive fluids which has absolutely no moving parts, seals, or mechanical impellors. The section designed the pump to handle hot, corrosive, or radioactive coolants for atomic reactors, has built units to pump from .2 to 6,300 gallons per minute. Ultimately, such "pumps" may move polished metal in steel mills without touching it.



NEW ENGINE ROOM—The console at left in the engine room of U. S. Lines' S. S. American Racer permits bridge control of the throttle and automatically monitors 20 different pressure and flow points. It is part of a Control Operation System which can reduce engine room watch to one man and promises significant savings in fuel costs.

MARINE AUTOMATION

Launching a New Breed

To the traditional welcome of whistling harbor craft and water-spouting fireboats, the first of a new breed of U.S. cargo liners will steam into the Port of New York this month.

For the hard-pressed U.S. shipping industry, this one is really worth tooting about. She's the S.S. American Racer, the most automated ship afloat, and the United States Lines is counting on her and four sister ships about to be commissioned to help restore this nation to prominence in international shipping.

To endow its five "Challenger II"-class cargo liners with speed and economy, United States Lines turned to General Electric for new concepts in propulsion and automation systems. Four Company departments teamed up to supply these features:

• A Central Operation System from Industry Control Department automates the engine room, reduces crew size by 25 percent, and cuts fuel costs.

• A new turbine from the Medium Steam Turbine-Generator and Gear Department propels the S.S. American Racer through the ocean at a wake-churning cruising speed of 21 knots. Pre-assembly of the turbine at Lynn into just three engine packages slashed installation costs.

• Also pre-assembled and installed as a package at the Sun Shipbuilding and Dry Dock Company yards near Philadelphia was the ship's service turbine generator from the Small Steam Turbine Department in Fitchburg.

• Two Missile and Armament Department thin-film distillation units, the first ever installed on a cargo liner, convert sea water to fresh water for boiler feed.

These advances can't come too soon for the U.S. shipping industry which sees ever-broadening ocean-going freight business prospects in this era of world trade. Since World War II, however, the U.S. industry has been steadily losing tonnage to foreign shippers; the percentage of international trade shipped in U.S. bottoms

has dropped from 68 percent in 1945 to about eight percent at present.

Response: U.S. Lines believes the answer lies in faster, modern cargo liners with automated systems which minimize the foreign lines' advantage in labor costs. The American Racer and her four sister ships which will all be in service by next year bring to 16 the number of new, high-speed vessels that U.S. Lines will have added to its fleet since 1962. And five more automated ships are planned.

In the Racer's Central Operation System, a bridge control system gives the officer on watch the option of maneuvering through all propellor speeds, ahead to stern, by direct control of the throttle system. With the bridge in control of the throttle, the Racer can be operated with one man in the engine room. Initially, however, two men (as opposed to three to five in non-automated ships) will be on watch.

Engine room automation is also expected to cut fuel costs by two percent through a data logger that will enable the watch to maintain optimum thermal performance. The data logger printed sheet also aids management planning.

Steamed Up: The trend to faster ships is helping steam turbines in their competitive battle with diesel engines. As the horsepower mounts (Racer's propulsion unit develops 18,750 shaft horsepower), so does the marine turbine salesmen's chances. The new turbine design for the Racer is an MST-13 single-plane steam turbine, which is arranged in a straight line from stem to stern, instead of on staggered levels.

Burlington's two thin-film distillation units, which each produce 12,000 gallons of fresh water daily by spreading sea water in thin films on evaporating tubes, require less power and represent less volume and weight than other methods.

'Big Picture' for Iowa Power

Iowa Power and Light Company has given General Electric's Industrial Electronics Division a multi-million-dollar, five-year assignment: devise a system that will plan an electric utility's total growth, and a computer-based management control system to help run the business.

Dr. Louis T. Rader, vice president and general manager of the division, signed a contract with Iowa Power President A. Paul Thompson last month under which General Electric will provide the lead in organizing the project. Management of the project will be carried out by the Internal Automation Operation, Dr. Rader said.

In brief, the job consists of providing a "big picture" window through which Iowa Power can survey its present business operations and opportunities for future growth.

To do so, General Electric will use the most advanced automation and communications techniques to integrate the utility's business information system, its electrical and gas operations, and its marketing and customer service.

Iowa Power's objectives are to increase operating efficiency, its performance in serving customers and to accelerate its growth, all in the most economical manner. Tangible results are expected within the first year of the five-year program.

Dr. Rader added that many Company departments ultimately will become involved, including Computer, Communication Products, and Industry Control, as well as departments manufacturing electrical generation, transmission, and distribution equipment and even consumer goods.

VACUUM PRODUCTS OPERATION

'Nothing' Ventured — A Business Gained

LATE LAST MONTH, Dr. Thomas Aquinas Vanderslice received official confirmation that he is a profit-making businessman, as well as a highly-reputed research scientist. His Vacuum Products Operation is now making money out of the world's thinnest air.

Vacuum Products Operation, set up as an operating business component of the Tube Department, makes and sells equipment to produce and measure high and ultrahigh vacuums. Dr. Vanderslice, who contributed significant advances to the technology of "hard" vacuum as a scientist at the Research Laboratory in Schenectady, was engineering manager of the formative business group at its start in 1962 and has been the Operation's manager since it became a business entity in February of this year.

By moving General Electric's newest Schenectady-based business into the black in less than two years, Dr. Vanderslice has built a growing, 130-man operation of new jobs in Schenectady.

True, Vacuum Products was on the profit side of the October ledger by just the slender thread of a few thousand dollars. But this small tangible is more than a moral triumph: it confirms the promise of a new market and vindicates a number of courageous, risk-taking business judgments based on the belief that General Electric could put some of its oldest technology and youngest management together to build new products, jobs, and dollars for the Company.

The Legacy: A rich storehouse of basic vacuum technology was part of the legacy left General Electric by some of its most eminent research scientists, notably Drs. Irving Langmuir and William D. Coolidge. Much of it was discovered as an almost incidental by-product of their pursuit of other knowledge in lamps and x-ray. For many years, this know-how remained a laboratory tool, part of the scientific sophistication for which the General Electric Research Laboratory became justly famed.

But when man began reaching into space, it became imperative for him to know more about the behavior of materials and phenomena under vacuum conditions. To do so, man had to build a little bit of outer space in which to experiment — an ultrahigh vacuum — and space researchers began to beat a path to General Electric's door.

As a result, when the Advance Product Planning Operation of the Electronic Components Division surveyed growth opportunities a few years ago, the first recommendation of Dr. M. A. Edwards and his group was to spin off the rich legacy of vacuum technology as a new business.

It was an astute choice. So expert is Vacuum Products at the business of "making nothing" that its equipment can produce vacuums approaching the emptiness of deep outer space. This, the scientists have discovered, is a weird otherworld, where solids evaporate and cold metals can weld at a touch. But its sheer emptiness is perhaps the hardest thing for the average person to comprehend. When Dr. Vanderslice gets to describing it, you begin to understand why a Ph.D. is a good choice to run this business.

Cutting It Thin: The deepest vacuum man has produced is officially measured at

1×10^{-15} torr (for Torricelli units, or millimeters of mercury which a given gas pressure will support. Air at sea level has a pressure of 760 torr.) Got it? We didn't either. See if this helps. It's 10 billion times thinner air than that in a vacuum tube, 100 billion times less gas pressure than in a light bulb. Not much improvement? Well, try it this way: If you could spread your next breath evenly around the entire surface of the earth, its molecules would be closer together than the gas molecules in a vacuum at 1×10^{-15}.

Building the intricate and fantastically precise electronic equipment it takes to isolate and manipulate the elusive stray molecules in an ultrahigh vacuum is the key to both producing and measuring the "big nothing," and it's the stock in trade of Dr. Vanderslice's operation.

Among their most sophisticated products are an "ion pump" system that cleans out space by charging gas particles and electromagnetically "trapping" them, and a mass spectrometer measuring device called the "partial pressure analyzer." An improved monopolar PPA just announced by Vacuum Products can measure extremely high vacuums, but its main job is to identify the type of gas remaining in a vacuum, right down to the individual molecule. (On the cover, Engineering Manager Dr. J. Roger Young checks an experimental vacuum chamber designed to demonstrate the monopole PPA, housed in tube at left.)

Growing Market: Such products are obviously not for the many, but Vacuum Products is broadening its offerings to shoot at larger share of the $100-million-plus annual market for vacuum equipment. The market itself is growing fast as new devices make high vacuum processes more reasonable for industrial and commercial as well as scientific purposes. Dr.

DR. VANDERSLICE inspects special vacuum chamber equipped with monopole partial pressure analyzer, foreground. At left, heart of the ion pump.

Vanderslice points out: "General Electric alone buys more vacuum equipment in a year than anyone besides the government. Less and less of this is for defense uses. Of our own sales this year, about 30 percent are government-funded."

New Uses: Aside from the space market, vacuum systems are now being used in a host of intriguing applications, the most important of which are research and manufacture of thin-film microelectronic circuits. They are used in the manufacture of klystron and some higher cost ceramic tubes, to coat optics, and to apply a metallic finish to plastics and costume jewelry. High-vacuum furnaces are another new field for the operation. Potentially enormous business, although still over the horizon, is the freeze-drying process, which allows foods or medicine to be preserved for months without refrigera-

tion by removing the moisture from them under vacuum.

General Electric is not the only new suitor to the market, Dr. Vanderslice observes. Hughes, RCA, and Westinghouse all have recently entered the business, and there are 60 to 70 other makers of specialty equipment.

General Electric deliberately chose to enter the most difficult end of the field. Dr. Vanderslice explains, "because our technology gave us the greatest competitive advantage in ultrahigh vacuum. If we can be commercially successful in this end of the spectrum, we feel we will win customers faster for all kinds of systems."

At the moment, Vacuum Products Operation is well ahead of its budget for orders received and net sales billed. And Tube Department General Manager R. B. Ames was delighted last month when he was able to send a congratulatory wire notifying Dr. Vanderslice that Vacuum Products Operation was now making money.

Mr. Ames declares that Vacuum Products represents Tube Department's greatest single potential for future growth.

And he credits Dr. Vanderslice, Ph.D. turned business manager at age 32, for literally building a new business from "nothing." "Without question," he says, "there could be no man better technically qualified or management-oriented to run this business. His enthusiasm carries his men with him. Many nights he is up with them checking out equipment. They succeed because they have the tremendous enthusiasm of men selling their own idea."

Those who work with Dr. Vanderslice agree he's willing to get to the top the hard way. For exercise after lunch, he's been known to run up the four flights of stairs to the Operation's offices in Building 28, leaving winded associates behind.

EMPLOYMENT

Stories Worth Telling

General Electric's efforts to provide equal employment opportunity have been documented in a new publication—the personal stories of 50 Negro employees.

Just off the presses (and about to go back on by popular demand) is a booklet prepared by Management Development and Employee Relations Services to demonstrate the wide range of managerial, technical, clerical, and production jobs that are now held by Negroes in General Electric.

Entitled "At Work in Industry Today," the booklet tells how some of the Company's Negro employees got their jobs and how they are preparing themselves for advancement.

That's the main reason for the booklet. As its introduction explains, the Company has been told by educators that because of the Negroes' years of hopelessness about the future, "it isn't enough for us to tell them about good job opportunities; you have to show them."

"At Work in Industry Today" shows them with some remarkable stories of perseverance and dedication. There's an engineer who dropped out of both high school and college but came back both times to earn a degree and a General Electric job. There's a computer programmer who got his first job in industry at the age of 46 after a discouraging early post-graduate career that included stints as a waiter, janitor, and postman. Almost all of the 50 are currently engaged in some form of education and training to qualify for future advancement.

Copies of the booklet may be obtained by writing to *The Monogram*, 570 Lexington Ave., New York City.

New Team for Stargazing

The Company's Space Sciences Laboratory and the University of Pennsylvania have formed a unique industrial-educational team to explore the heavens.

Much of that exploration will be from a battery of telescopes at a new observatory in New Zealand with a clear view of the relatively uncharted skies of the southern hemisphere. Hopefully, the effort will put the Company in the forefront for charting future space flight.

The unprecedented coupling of the basic research skills of a university with the technical skills of industry endows the "Associates for Astronomical Research" (AFAR) with some high-powered tools to examine the nature of outer space.

Joint Interests: The University of Pennsylvania had a widely respected department of astronomy, an impressive inventory of basic astronomical instruments, and a desire to put them to work extending man's knowledge and training scientists. The university needed weather conditions conducive to extended telescope study (lacking in much of North America) and advanced sensing devices to broaden the range of its instruments.

General Electric's Space Sciences Laboratory at Valley Forge, outside Philadelphia, had a laboratory full of modern sensory equipment developed in the course of extensive missile and satellite work, advanced data processing techniques to evaluate information about outer space, and a desire to know more about the environment of planets where future space probes may be headed. The laboratory sought a university with the staff and equipment for astronomical research and an opportunity to develop industrial leadership in the areas of astronomy, astrophysics and space sciences.

SPACE SCIENTIST PETTY
Charting trails in space.

Neither had far to look. Alan F. Petty, manager of the laboratory's stellar and planetary research operation, met Dr. Frank B. Wood, chairman of Penn's astronomy department, while studying for his doctorate at the university. They worked out the AFAR relationship with the aid of Dr. Leo Steg, manager of Space Sciences Laboratory, and Provost David R. Goddard of the university.

Mount John: Dr. Wood had, by this time, concluded an agreement with the University of Canterbury in Christchurch, New Zealand, to jointly operate the new $1.5-million Mount John observatory. The University of Pennsylvania is loaning much of the astronomical equipment for Mount John. Dr. Wood is currently on a year's sabbatical leave in New Zealand, setting up the new observatory and planning research projects.

As part of its support for the program, the Space Sciences Laboratory spent

$35,000 to renovate an 18-inch astronomical refracting telescope from the University of Pennsylvania, which will be one of the prime instruments in Mount John's planetary polarization studies.

Better View: Modern sensor instrumentation, such as image orthicons and infrared photodetectors from the Space Sciences Laboratory, will be loaned to Mount John for placement on telescopes. Astronomers expect it to provide much more precise information than ever before on the atmosphere around planets like Mars, Venus and Jupiter. New knowledge is also expected about hazards to space flight (such as sun spots, solar flares and asteroids) and potential navigational aids (certain types of stars).

The Mount John studies will be supplemented by research at the Advanced Technology Laboratories' radio-optical observatory near Schenectady and the University of Pennsylvania's Flower and Cook observatory near Philadelphia. Some observations will eventually be conducted from orbiting space stations.

AIRCRAFT

Big Hello in Texas

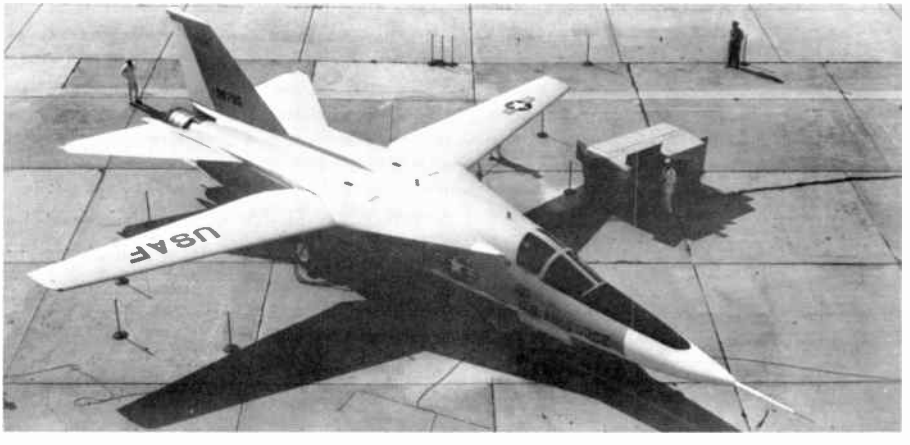
General Electric-equipped aircraft have been making almost monthly debuts this year, and last month the spotlight moved to Texas, where Company components had a hand in two top aviation stories.

Most spectacular was the roll-out of the sleek, eye-catching F-111 (below) at General Dynamics' Forth Worth plant. Light Military Electronics Department in Utica and Johnson City, N. Y., developed attack radar, flight control systems and weapon control equipment for it.

Defense Secretary Robert S. McNamara called it "the greatest single step forward in combat aircraft in several decades."

Earlier, the largest vertical and short takeoff and landing airplane, the XC-142A tri-service V/STOL transport, made its maiden flight at the Ling-Temco-Vought plant at Dallas. It's equipped with four, tilt-wing T-64 engines from the Small Aircraft Engine Department.

OUT OF THE HANGAR IN TEXAS: THE F-111
Utica and Johnson City helped equip it.



CHAIRMAN PHILLIPPE SEES

Seven Wonders in our Future

A World's Fair gets folks to thinking about change — both the advances from past to present and the progress to come — Board Chairman Gerald L. Phillippe observed in a talk to the Investment Bankers Association last month. And when you get to thinking about it, the pace of change is breathtaking. Consider, said Mr. Phillippe, our own "Seven Wonders of the World" — seven areas of phenomenal General Electric growth since the last fair 25 years ago when these products were only laboratory dreams. The "wonders": jet engines, computers, fluorescent lighting, microwave physics which gave us radar, polymer chemistry, solid state electronics as expressed in transistors, and television— not to mention atomic energy and space flight which did not even exist in 1939. Then, in these words, Mr. Phillippe visualized for us seven "wonders" of the next "World's Fair unit of time":

"BUT WHAT of the period ahead? The question is one of more than scientific curiosity. This country is now in its 44th month of uninterrupted economic expansion. How can we sustain this momentum and launch a new surge in economic development, with all that could mean for higher incomes, creation of new jobs, and keeping America competitive in world markets? Perhaps one key is to be found in scientific and technological breakthroughs — and in the creative application of those breakthroughs to the uses of man. This is not simply a desirable objective for the country: it is also the formula which an aggressive market-oriented business must use to achieve its own new burst of growth.

With some of these considerations in mind, Dr. Guy Suits, General Electric's director of research, and, as such, our resident fortune teller, has reviewed the whole field of industrial research and development, with

particular emphasis on those fields of direct business significance to our own Company, of course. Dr. Suits identified seven leading areas of promise for the growth of major business opportunities.

Fusion: The first is thermonuclear power. As you know, the present atomic power business is based on the process of atom splitting, or *fission*. This was the power unleashed in the atom bomb, power which man has learned how to control and now to use constructively.

Now further research is being directed toward a second nuclear process — atomic *fusion* — as a possible future source of electric power. Fusion is what produces the energy of the sun itself; it is vastly more explosive and correspondingly harder to control and turn to constructive human purposes.

However, I think it is interesting to note, again turning to our "World's Fair Unit of Time," that electric power from nuclear *fission* was not even *predictable* in 1939 — could *not* have been a '39 Fair exhibit — yet has become economically *competitive* before 1964. Though aware of the pitfalls between parallels, I cannot resist speculating on the significance of being able actually to demonstrate the fusion reaction at the '64 Fair, and the enormous promise, of a virtually unlimited energy source for mankind, which lies on down this road. How far ahead? How big a business? Does Macy tell Gimbel?

Fuel Cell: A second area of promise identified by our research director is the fuel cell, a dream which dates from about 1830. We now hope this dream may "come true," thanks to our research efforts. It's the dream of a battery that runs on gas. In the fuel cell proper, a gaseous fuel like hydrogen or ammonia — or a hydrocarbon gas or vapor — is continuously fed into the device, in the same way as gasoline is fed into your car's engine, and thus continuously generates electric energy just as your car's engine now generates mechanical energy.

Recent research progress in General Electric has produced fuel cells which can qualify for military, space, and other specialty use. If we learn enough about fuel cells from these strategic applications, we may develop fuel cells which can replace batteries for industrial use. Any industrial device which now uses storage batteries would be a prospective application for such fuel cells.

If we learn enough about the industrial application, we could then develop fuel cells for gas engine uses. If we are lucky, and nature

FUSION DEMONSTRATION AT THE FAIR

EARLY FUEL CELL

agrees, down at the end of this road is the possibility of fuel cells doing the kinds of jobs now done by some internal combustion engines. The fuel cell is presently, of course, far too expensive for most common applications. It is not hard to conjecture, however, what this could mean in the way of new uses for man — as well as new markets for the electrical industry.

Superconductivity: The phenomenon of *superconductivity*, though originally discovered more than 50 years ago, has been only a fascinating laboratory curiosity. Under superconduction conditions, which occur at very low temperatures, many common metals and alloys exhibit *perfect* electrical conduction — a rare phenomenon in nature. If a direct current is started in a superconducting coil, the current will flow forever without weakening.

The possibility of using superconduction practically in electrical equipment has been in the minds of scientists ever since the original discovery was made, but there have been insurmountable roadblocks in the way. For example, it has been expensive to attain and maintain the required low temperatures.

As a result of progressive improvements in cryogenic equipment, the attainment of extremely low temperatures is now commonplace.

Because of this and other developments, superconductivity is destined to find its way into practical equipment for the electric utilities — transformers, for example. And farther down the road, think of the value —

to the electrical industry and to its customers — of transmitting large amounts of electricity at long distances with no loss of power at all.

Information Science: The great developments in the field of computers, including the development of computer machinery and the programming to go with it, are now familiar to everyone. But there are vast additional developments clearly evident in the broad field of *information science.*

When we begin to understand more about how human beings receive, process, and transmit information, we may harness computers to more complex assignments in traffic control, in education, in retailing, in medical practice, and in managerial decision-making. It may soon be possible, for example, to provide the traveling executive with an input-output device on his briefcase which can communicate by telephone with a computer in the executive's office, sending back questions and obtaining answers on matters that arise during his trip.

In the financial field, we in business management may expect an information system which will show, on a television screen in our offices, a complete statement of the entire business as of one minute ago which, when we have drawn from it what we need to know, is then erased, the data being filed and updated electronically rather than on paper cluttering up our desks and file drawers.

Electronic Living: Under this somewhat inadequate title of *Electronic Living,* I intend to include an important area of progress: solid-state electronic phenomena.

One recent development of dramatic impact has been the electronic

CRYOGENIC TESTS

NEW USES FOR COMPUTERS

SOLID-STATE CIRCUITRY

heart pacer, so small that it can be implanted in the living body. Many cardiac patients are walking around today with the aid of this device, which was made possible by the development of miniature electronic devices that provide low power at low heat with an extremely high range of reliability.

The stage is now being set for further great progress in a bewildering array of solid state electronic functions, including solid state devices to control power. This progress seems certain to find application in the factory, in the home, and in personal service on a greatly expanded scale. "Electronic Living" in the future will surely mean broad use — by people as individuals — of electronic aids based on microminiature solid-state components — Dick Tracy-style wrist radios, for example, or perhaps ultimately personal telephones in your coat pocket. I remember that I scoffed at one of our division managers who wanted some funds to produce an electric toothbrush. Now *he's* laughing all the way to the bank.

Polymers: I also mentioned *polymers* as one of the earlier Seven Wonders, 1939-vintage. This field is still so pregnant with potential that it must make the list of promising areas again in 1964.

As an example of polymer progress, let me mention just one illustration: a recent announcement made by our Research Laboratory. It concerned some new permeable membranes which permit the flow-through of different gases on a selective basis. One of our scientists has invented a way to make films out of special silicone rubber which are only about one mil thick and yet so perfect that the chances of holes occurring are about one in a billion per square foot.

In a dramatic demonstration of the ability of these membranes to separate air from water — as sort of an artificial fish gill — the cage of a pet hamster was completely surrounded by water. Across three sides was the new permeable membrane. Our hamster stayed alive and healthy in his own little "submarine" by breathing air whose oxygen was replaced — by permeation through the membrane — from air contained in the water surrounding his cage.

All water, including the oceans to a depth of several hundred feet, contains substantial amounts of air, and hence oxygen. Some of our imaginative engineers have seized on this demonstration and are happily dreaming up simple systems for supplying submarines with air drawn

from the water around them, for the purification of air in space capsules or moon stations, and for providing cheap, reliable oxygen to patients in hospitals or at home.

Life Sciences: Perhaps the most significant fact about the *life sciences* is that many physical scientists are turning to this area as an outstanding opportunity and challenge.

We have already noted the impact on medicine, for example, of miniaturization, as in the heart pacer. Another promising opportunity beckons in the marriage of medicine and the computer; perhaps the diagnoses of many killer diseases may at last lie within our grasp, if we can put computers to work on them.

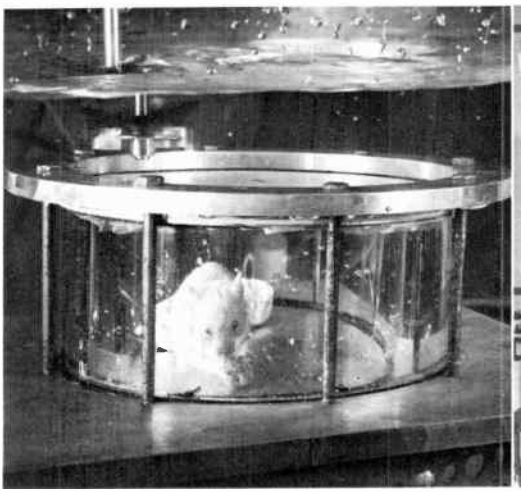
Many business opportunities present themselves in the life sciences. One example is photosynthesis, the clue to more efficient storage and use of energy. Another example: finding new food sources, perhaps out of the ocean. Is it too much to hope that we may someday discover the principle of the basic life mechanism itself?

• • •

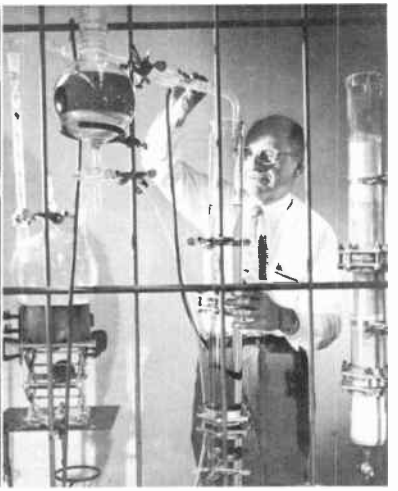
These seven areas of promise stand out, then, as rich in potential for significant business growth in the coming 25 years. I must, at this point, however, add two important qualifiers:

First, you will remember that many of the most significant new areas to develop since 1939 were not even predictable at that time. This was true of atomic energy and space exploration. An analogy must surely exist today. We should allow for some "X" factors in 1964 — developments which are not foreseen now but which will emerge out of the blue, as exciting business opportunities — or perhaps I should say, out of the red, R&D expenses being what they are. And, conversely, some of those that I have mentioned may not pan out.

A second important qualification is that this long-term look at the areas of scientific promise is by no means the whole picture of electrical progress. To the contrary, this is a highly competitive business that requires a high order of innovation continuously, in the bread-and-butter lines, to win today's customers. Those of you who have visited our Progressland exhibit at the World's Fair have noticed that, except for the fusion demonstration, all the products shown are available now. Yet people leave that exhibit with stars in their eyes because even today's products are, for many of them, a vision of that "Great Big Beautiful Tomorrow That's Just A Dream Away" (to quote our theme song.)



UNDERWATER CAGE OF PERMEABLE MEMBRANES



PHOTOSYNTHESIS EXPERIMENT

For this industry which is as old as Edison is also as new as tomorrow. It has been a great force in the growth of this nation, and it will continue to make an increasing contribution to the quality of life in America.

Then, too, look abroad to that three quarters of the globe that still waits to be electrified and industrialized, and think what this means to the electrical manufacturing industry for the rest of the twentieth century. Europe and Japan are just beginning to electrify their homes in the American style, and consumers in Asia, Africa, and Latin America are just starting to get the idea that this is possible for them, too. This is the glowing business prospect for electrical manufacturers willing to operate on a worldwide scale.

I hope you will pardon my enthusiasm for this industry with which I've been associated for so many years. I know others, in other industries, would offer you equally glowing reports, for they too have sensed the new surge of life in the American economy as we begin to reap the benefits of an unprecedented decade of research and development. None of this economic growth will be handed to us on a silver platter, for we face vigorous competition from other industrial nations.

Nevertheless, it would be hard to face the kind of future I have sketched with anything but eager anticipation of its challenges and its splendid opportunities."

An End to Starvation

Dr. George L. Haller, vice president in charge of Advanced Technology Services, was also looking ahead last month, and he saw some immensely pleasing prospects in his crystal ball of developing technology.

At the top of Dr. Haller's list of things to come by the year 2000: an end to starvation throughout the world, longer life, and the ability to change hereditary traits.

Dr. Haller told the Instrument Society of America's annual meeting that we shall be able to produce more food than we can consume by creating synthetic foods. He predicted the development and perfection of artificial organs to replace those worn out by disease. And he foresaw the unraveling of the genetic code which determines the characteristics that pass from parent to offspring.

Other features of the remarkable life Dr. Haller says we can expect by the turn of the century:

• "Virtually limitless" reserves of electric energy.

• New sources of scarce materials through mining the oceans and synthesizing all kinds of materials from air, water, and common elements of the earth's crust.

• New means of communication through relay satellites and laser beams which will enable us to communicate with anyone, anywhere, any time.

• The physical frontiers of the year 2000 will be deep within the earth and far out in space. Exploration of the moon and the nearer planets will be underway.

• New forms of transportation will be powered by nuclear energy and fuel cells, bringing every point on earth within three or four hours of any other.

VICE PRESIDENT HALLER
In technology's crystal ball.

• New problem-solving techniques will multiply a thousand-fold man's creative thinking capacity and give ordinary people access to computers, a service which will be as commonplace as telephones.

BOARD OF DIRECTORS

The New England Investment

At Lynn last month for their annual field visit to Company facilities, the Board of Directors got a firsthand look at the result of part of General Electric's $112-million capital investment in Massachusetts during the last decade.

They also received full exposure to New England's renewed spirit of competitiveness from Vice President Gerhard Neumann and other Flight Propulsion Division boosters of the "Zero Defects" program.

Board Chairman Gerald L. Phillippe told the directors that the investment in

Massachusetts facilities has turned "outmoded, top-heavy plants" into producers of some of the Company's most technically advanced products during a "decade of planned progress."

Among the products he cited: hydrofoil gearing, fuel cells, and helicopter engines at Lynn; instrumentation for automation at West Lynn; missile guidance systems at Pittsfield; and the electric toothbrush at Ashland.

Mr. Phillippe also pointed to the meter plant at Somersworth, N. H., as "one of the most advanced manufacturing facilities in the nation."

BUSINESS INFORMATION

Or, as we say in Computerese...

General Electric, as you may have heard, is the nation's largest commercial user of computers. For those who cared to take notice, two Company developments this month hinted at what this may mean to everybody's job in the future. Computers are rapidly becoming everyday tools for many General Electric employees.

"Structured accounting," a short cut to making every accountant feel closer to his computer, is now available from the financial folks at Atomic Power Equipment Department, who have found such fiscal togetherness saves time and money.

Write Your Own: Now in use both at San Jose and the Switchgear Department, the system permits any good accountant to write his own computer programs after a brief instruction period, without the help of a systems analyst or programmer.

It's an extension of a General Electric decision-making technique called "structure tables," invented several years ago to define the exact logic used to program computers for a specific business function — in this case, accounting.

According to R.V. Drake, manager of finance at San Jose, the concept improves the accountant's control over the automated accounting structure by avoiding misinterpretations and assuring desired accounting practices. The accountant's structure tables embody in one document the user's manual, the working accounting policy, and the computer program.

Compatible: Also, Mr. Drake says, the principles of structured accounting have wide application: the techniques are compatible with nearly all existing computer systems.

Sorry folks, there are no structure tables that will help you balance the family budget. Computers can do only so much. But the system is available to any bona fide Company finance manager for help in keeping the corporation's books.

Meanwhile, at about the time you read this, a workshop of Company engineers in Schenectady is learning how to use another computer language. Developed by the Engineering Administrative Consulting Service, it provides a simple, readable language with the right kind of tools to enable the engineers to do design engineering work on a computer. And, since it's a System Language, it seemed right to call it SLANG.

General Electric College Bowl

(NBC, Sundays, 5:30 p.m., EST)

Participants: Nov. 15—San Diego State College; Nov. 22—Mount St. Agnes College; Nov. 29—Virginia Military Institute; Dec. 6—General Electric Fantasy Hour ("Rudolph, the Red Nosed Reindeer," narrated by Burl Ives).

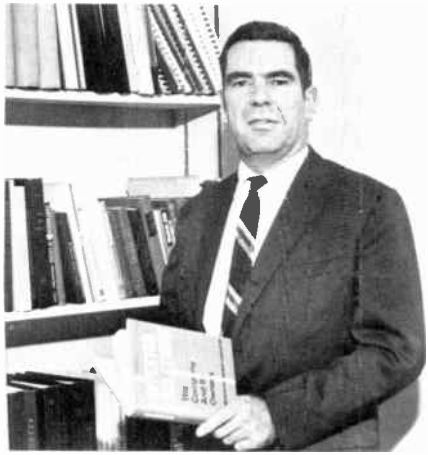
PEOPLE

Investors' Friend: The 100,000-member National Association of Investment Clubs presented a Distinguished Service Award in Investment Education last month to O. Glenn Saxon, Jr., General Electric consultant in professional investor relations.

Mr. Saxon has been a sparkplug in American Management Association seminars on corporate investor relations, and he was a major contributor to a recent AMA book (photo at right) designed to improve investor relations programs.

Said Mr. Saxon in that book: "If share ownership can be broadened . . . we may well see the day when, for millions of families, income from invested capital may rival in importance income from labor." Broader participation will not only be a source of strength for industry, but also a challenge to better investor education, he noted.

Also cited by the investment club association was Thomas B. McCabe, board chairman and director of Scott Paper Company, who is a General Electric director.



SAXON AND AMA BOOK
Toward better investor education.

Two-Generation Career: When John Abrahams, veteran Housewares Division salesman in the New York district, retired last month, the master of ceremonies at the farewell party was William Pfief, manager of the division's new Marketing

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At Crotonville: The second General Management Course got underway at Crotonville on September 9. The 58 participants include:

Accounting Services: *Clifford H. Springer.*
Advanced Technology Services: *Robert C. Osthoff.*
Antitrust Settlement and Litigation Operation: *William F. Surette.*
Area Division — Far East: *Horace Paynter.*
Area Division — Latin America: *Emile R. Jansak.*
Area Division—Mediterranean: *Paolo Fresco.*
Atomic Products Division: *Cleve R. Anderson; Lawrence L. German; Eugene W. O'Rorke.*
Canadian General Electric Co.: *Robert N. Allemang; Alfred M. Hurley.*
Chemical and Metallurgical Division: *Frank P. Florentine; Robert T. Daily; Joseph D. Webster, Jr.*
Command Systems Division: *Arthur A. Fickel; David C. Pinkerton.*
Component Products Division: *Daniel O. Anderson; John E. Larsen.*
Construction Industries Division: *James P. Curley; Frank M. Precopio.*
Defense Electronics Division: *George W. Frost; Donald E. Uren.*
Defense Programs Division: *Donald T. Atkinson; George D. Prestwich.*
Electric Utility Sales Division: *Wendell B. Freeman; R. Keith Jordan.*

and Distribution Operation. Forty-seven years ago, Mr. Abrahams was hired in Schenectady by George Pfief, Bill's father.

Cordially yours: Progressland's idea of the way VIP reservations should be made was the prompt, accurate manner in which Mrs. Sue Lindeman handled those details this summer for the Metallurgical Products Department. So when Progressland closed for the winter last month, the visitor relations staff gave Mrs. Lindeman a bit of VIP treatment; they sent her a bronze medallion of Progressland with their compliments.

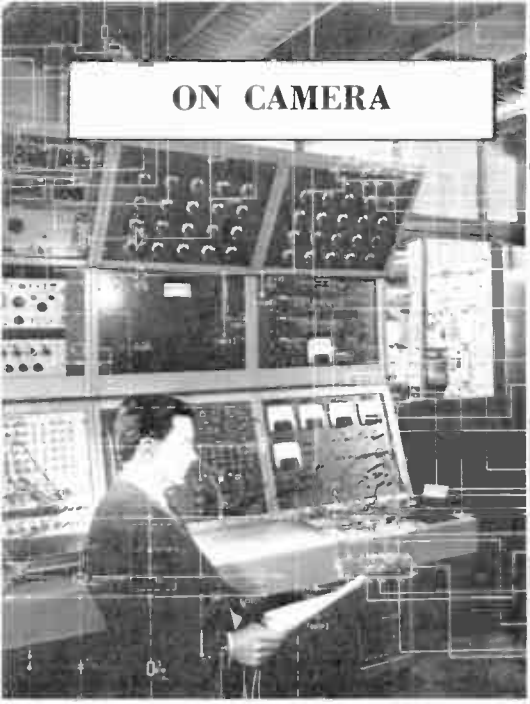
Full Speed Ahead: Silicone Products Department, which has already made a big splash in the marine industry with its sealant, has just dropped a name in Washington. The new sales representative there is John Paul Jones.

Cross-Country Running: After three fuses blew and shut down the Cannon Electric plant near Los Angeles one Saturday afternoon this fall, Richard H. Hansen of the Industrial Sales Division got a hurry-up call for replacements before Monday morning's first shift. He scoured the area without success. On Sunday afternoon, he called Philadelphia's Switchgear plant, talked to a guard who got in touch with another guard at the Pittsfield plant. Together they tracked down Jack Moynihan of the Distribution Protective Equipment Department, who drove to the plant, packed the fuses, and sent them by taxicab 80 miles to an airport. The fuses arrived in Los Angeles at 4 a.m. Monday and were installed before the 6 a.m. starting time. The score: one happy customer.

South African Advisor: James G. Douglas, manager of the Electrical Equipment Division of South African General Electric Co. (Pty.) Ltd., has been appointed as a representative to a subcommittee of Prime Minister Verwoerd's Economic Council. Mr. Douglas was selected by the Association of Chambers of Commerce of South Africa as its representative on a subcommittee for the electrical, machinery and apparatus sector. The Economic Council is patterned after a similar body which advises the U.S. President on economic matters.

Electronic Components Division: *Gordon N. Hall; Joseph S. Quill.*
Engineering Services: *William R. Kruesi.*
Flight Propulsion Division: *E. Van Stralen Claxton.*
General Electric Credit Corp.: *J. M. Elkins.*
General Electric Supply Company Division: *James J. Zipperer.*
IGE Export Division: *Edward A. Brown; Kristian H. Christiansen; Robert C. Davidge; Frank B. Gray; Edward L. Taylor.*
Industrial Sales Division: *Horace Bongarten.*
Lamp Division: *Robert L. Imboden; Daniel J. Vaughan.*
Major Appliance Division: *Mark J. D'Arcangelo; Gordon B. Smith.*
Management Development and Employee Relations Services: *E. Sidney Willis.*
Manufacturing Services: *Edgar S. Weaver.*
Marketing and Public Relations Services: *Theodore F. T. Crolius.*
Missile and Space Division: *Richard E. Roberts; Charles A. Wood.*
Motor and Generator Division: *Maurice C. Sublette.*
Power Distribution Division: *Harold D. Beck; James O. Sweeny.*
Power Generation Division: *Jacob B. Gatzemeyer; Stephen J. O'Brien.*
Power Transmission Division: *Christy W. Bell; Carl C. Hudson; Howard D. Kurt.*
Radio and TV Division: *Robert S. Cross.*
Research Services: *Leon St. Pierre.*
Treasury Services: *John J. O'Brien.*

ON CAMERA



SYSTEM SIMULATOR — Behind a lace of control system tracings stands an analog computer at the Industry Control Department in Salem, Va. Engineers use it to test and adjust complex industrial controls by duplicating the demands that steel and paper mills, petroleum blenders or other heavy industrial processes will put on them. Such factory preadjustment saves days or weeks in getting new controls on customers' lines.

WIDER, PLEASE — This huge General Electric Resotran® 2000 x-ray unit is looking for cavities in a 25-ton high pressure turbine casting for a hydroelectric plant in Italy. Riding on an overhead crane at the Societa Terni plant, it can peer through seven inches of solid steel to spot flaws, using 2 million volts of electricity. The radiographic device is made by the X-Ray Department in Milwaukee.

GE-225 PREDICTED WINNERS: Computer Department Application Engineer Robert Anderson and Salesman Joseph McDonnell struck an electioneering pose after they helped First Union National Bank of North Carolina project the state's election returns on its GE-225 computer. Programmed by Anderson, it foresaw the presidential return within 5 percent, the gubernatorial race within 1 percent.

LIGHT FOR LIVING — New showplace for residential lighting is this center of Nelo Pork's Lighting Institute in Clevelond. In oddition to the luminous dining ond kitchen oreos shown here, it feotures newest light sources ond techniques for living, bath, sewing, fomily room and patio areas. The center uses 250 lomps of 40 types, 200 switches, and 17 miles of wiring.

HE MAKES A LASTING IMPRESSION — Glen R. Brownbock, New York Metropoliton District manager of the Mojor Applionce Distribution Sales Operation, leoves his footprints in cement ot Dishwosher ond Disposall Department's Hall of Fome in Louisville. Mr. Brownbock won immortalization os o winner in o notionol sales contest for district managers and independent distributors. Costing directors: Department Generol Monager D. W. Lynch, Marketing Monager W. O. Leftwich.

AROUND THE COMPANY

Santa's Helper: For some reason, Radio and Television Division thinks this is a strategic season to publish a new, full-color catalog of its galaxy of electronic entertainment products. It will include the division's full line of products, including the recently-added Show 'N Tell* Phonoviewer for kids and the nine-inch transistorized portable TV for daddies. Want to get one? You, and every Company employee, will — about the first of next month.

Big 'Uns: Industry Control, DC Motor and Generator, and Small AC Motor and Generator Departments have combined to provide the motor and control drive systems for the world's highest capacity crane. The massive crane with a lifting capacity of 800 tons is now being erected at Combustion Engineering's expanded nuclear reactor plant in Chattanooga, Tenn. . . . Power Transformer Department has shipped the world's highest capacity generator step-up transformer to the Commonwealth Edison Company of Chicago. When installed, it will weigh 400 tons.

Our Man in Tokyo: Another example of the increasing internationalization in Company outlook is the Research Laboratory's announcement that an office will be opened in Tokyo, Japan, early next year. Dr. Peter J. Frank, who has served in a similar position in Europe for the last four years, will be the laboratory's scientific representative in Japan. His job: to keep abreast of research in Japan and the Far East.

Fuel Cell Record: The fuel cell battery, which the Direct Energy Conversion Operation announced last month had passed its Gemini mission requirements (*The Monogram*, Oct. '64), kept right on performing at specified output for more than six weeks. That's three times the duration of the projected 14-day Gemini missions. And just before the end, the battery had enough kick left to go through a heavy load cycle similar to the high power demand just before re-entry of a spacecraft.

On Campus: General Electric and Union College in Schenectady have created a study program leading to a master of science degree in engineering with a major in power systems. The program is open to participants in the Company-sponsored power systems engineering course, conducted annually for qualified engineers both within and outside the Company . . . The Industrial Research Development Center of the University of Virginia's school of engineering and applied science has agreed to offer an advanced technical education program to Specialty Control Department engineers in Waynesboro . . . General Electric radiation experts at Hanford, Wash., have developed the first radiation technology course in the country for non-technical people. Some 68 Hanford operators and radiation monitors are taking two-year evening course at Columbia Basin College.

Carrying the Freight: Two eastern railroads announced purchase last month of U25B mainline, diesel-electric locomotives from the Locomotive and Car Equipment Department. The New Haven Railroad ordered ten; the New York Central System bought 30, doubling its U25B fleet.

Here, Here: Of the many employee United Fund gifts, the Tyler, Tex., presentation was perhaps the most personal. Plant committeemen handcarried $10,500 in $1000 packets to report meeting.

*Trademark of General Electric.

VICE PRESIDENT SCARFF
Lamp Division.

ORGANIZATION

Executive Office

Paul A. Tilley has been retained as Consultant—Managerial Personnel, reporting to Board Chairman Gerald L. Phillippe. Mr. Tilley will study ways to supplement the present processes of identification and selection of managerial personnel.

Chemical and Metallurgical

Marshall Bartlett, Jr., has been appointed General Manager of the Laminated Products Department.

Lamp Division

General Manager Donald D. Scarff has been elected a Vice President.

Area Division—Mediterranean

Compagnia Generale di Elettricita, S.p.A. of Milano, Italy, has elected Douglas A. Hopper as its Executive Vice President, with specific responsibility for the Business Development Operation.

Defense Electronics

A Division Planning Operation has been established and Dr. John G. Hutton has been appointed Manager.

Charles W. George has been appointed General Manager of the Light Military Electronics Department.

Thomas I. Paganelli has been appointed Acting General Manager of the Radio Guidance Operation.

Defense Programs

A Defense Electronics Field Operation has been established, with Donald T. Atkinson appointed as Manager. An Engine Field Operation has been established, with George J. McTigue appointed as Manager. A Missile and Space Field Operation has been established, with David Cochran appointed as Manager.

The personnel, facilities and functions of other components have been transferred as follows:

The Equipment and Component Marketing Operation and the Market Information and Communication Operation of the Aerospace and Defense Marketing Operation, to the Finance and Defense Business Practices Operation, pending further study.

The remainder of the Aerospace and Defense Marketing Operation, to the Field Operations, as appropriate. Concurrently, the Aerospace and Defense Marketing Operation has been discontinued.

The portion of the Washington Region Operation concerned with Engine, Missile and Space, and Defense Electronics representation, to the Field Operations, as appropriate.

The Equipment and Component Sales Operation of the Washington Region Operation, to the Finance and Defense Business Practices Operation. The Washington Region Operation has been discontinued.

EDITORIAL

$ .75

We're Changing, Too

YOU COULD HARDLY read the newspapers fast enough to keep up with international developments last month. The world, it seems, just won't hold still.

Lest we think the process of change is so vast and global as to be remote from our workaday lives, Richard J. Anton, the Company's manager of Business Education Service, provided some interesting insights into our industrial evolution last month.

In a speech to the industrial relations committee of the National Association of Manufacturers, Mr. Anton questioned whether the old premises on which much of industry's employee relations is based really apply now.

In the first place, we aren't the same people we once were. Mr. Anton noted that the hourly-paid work force at General Electric is about the same, in absolute numbers, as it was 11 years ago, but it now represents only 51 instead of 62 percent of our employment.

Our competitors aren't the same, either. It isn't enough just to meet the wage and cost patterns of domestic industry. We must now be competitive on a world-wide basis. And it won't do to rely on labor costs overseas catching up with us. Mr. Anton pointed out that while it is true that foreign wage rates, percentagewise, are rising faster than ours, the gap in actual dollars is likely to widen. That's because our increases are figured on a much higher base.

These changes in the nature of our Company and in the nature of our competition are forcing more changes — in our work methods, in the skills we need, in the products we sell, in the markets we serve. These conditions create much greater demands for manpower planning at all levels, a subject now under study by Company task forces of employee relations managers.

To keep abreast of change and to turn it to our advantage, communications is a key link. Employees must know the facts of the business and what needs to be done about them.

That is why, suggests Mr. Anton, that so much importance attaches to the preliminary finding against General Electric last year by a National Labor Relations Board Trial Examiner. This "would seek to impose vague but real limitations on our freedom of speech," he said.

That finding would deprive employees of the facts without which no one can be expected to make rational judgments, according to Mr. Anton. In an era of constant change, that would be a terrible handicap.