



LIFE ON A GE-POWERED CONTAINERSHIP



WHAT ABOUT  
GE-TV TODAY?



A LOOK AT  
FINANCIAL ANALYSTS



VOLUME 50, NUMBER 3

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, Public Relations Programs, and J. Hervie Haufler, Manager, Corporate Editorial Communications. Permission for reprinting articles should be obtained from the Monogram Editor, 570 Lexington Avenue, New York, N.Y. 10022. Copyright, 1973, General Electric Company.

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# THE COMPANY

## DEBUT IN DENVER:

### Reg Jones chairs his first share owner meeting

ONE of the tests, not to mention trials, of a corporate chief executive in these contentious times is to face a share owners meeting and hold this legally necessary corporate forum to some measure of order. To the traditional spokesmen who make a profession of probing managers on their business performance have been added new critics questioning corporations on their alleged social failings. The combination can reduce a meeting to hours-long chaos.

On the morning of April 25 in Denver, this particular moment of truth came for the first time to GE's Chairman Reginald H. Jones.

The agenda for the Company's 1973 Share Owners Statutory Meeting included the election of Directors, the appointment of public accountants, a management proposal for a new five-year stock option plan, two proposals brought to a vote by traditional share owner spokesmen and three by church groups and others concerned with corporate social performance. In addition, a long-time GE meeting-attender could be expected to speak at length about his ten proposals that were again excluded from the proxy statement. Then there were the unscheduled speakers—the unknown quantities that, at Denver, turned out to include an environmentalist, a women's libber and an opponent of multinational operations. They were the ingredients for what could have been a very long and arduous day.



**Scenes at Denver:  
the Inspectors  
needed more time**

**A vote to buoy confidence**

However, the Denver meeting consumed just two hours and 42 crisp minutes from the 9:30 a.m. starting hour to adjournment.

Two factors accounted for the meeting's fast pace.

One was that the GE share owners at Denver cooperated by keeping their remarks brief and generally pertinent to the discussion.

The other factor was Chairman Jones' skill in applying firmness ("Could we come to the point, if there is one?") and insistence on accuracy and

relevance ("That is just not true; you are misinformed").

As a result, the meeting swept through its agenda so smoothly that, at the end, the Chairman had to ad lib for several moments to give the Inspectors of Election time to complete their count of the balloting.

The meeting was also marked by a strong vote of confidence from General Electric's half-a-million share owners. Despite the complexities of voting on seven proposals plus the

*(continued on next page)*

election of Directors, share owners voted a whopping 85% of all of GE's 182 million outstanding shares. Further, of the five proposals that Directors had asked share owners to vote against, none got more than a 2.3% favorable vote—short of the 3% that allows the same proposal to be resubmitted at next year's meeting.

In terms of subject matter, Chairman Jones handled a range of topics extending from a query as to GE opportunities for Vietnam veterans ("We have been extremely active"—see the story in this issue) to a "deep water" discussion of international currency (The main point of his response: "We do not seek in any way to speculate in currencies; we seek solely to protect ourselves against fluctuations"). Other specifics:

- On a proposal that GE should refuse to produce military weaponry: "I am a deeply religious man and I am deeply concerned with many of the issues that are raised by the Clergy and Laity concerned and other groups. And yet I am also, I hope, a patriotic man. I don't think that a minority should impose its will on the vast majority of American people by tactics such as those you are employing. Certainly I do feel you are entitled to your day in court and the opportunity to make your statements, because I know of your complete sincerity and your utter dedication to your objectives... Now the vast majority of the American people, through their elected representatives, determine the defense policy of this country, and the General Electric Company, because of its enormous technological capabilities, is asked to supply defense materials in support of the policy determined by these duly elected representatives. I think that you should recognize that we feel it is incumbent upon us that we should perform when we are so requested."

#### **No to a nuclear power moratorium**

- Regarding support for a nuclear power moratorium: "We would be opposed... We are in a period now where the United States is fast going to be running short on energy, and the answer is not to throttle growth. We can't solve the many social problems in the U.S. unless we have growth, economic growth, and we need energy for that. With the problems that we have in the areas of fossil fuels, we are going to need more and more generation of electric power through nuclear plants. We are convinced, based on the work that our scientists



have done, that these plants are fully safe... The possibility of nuclear accidents we just consider to be so remote that with all of the safeguards, the backups, the redundancies that are put in place in one of these nuclear plants, realistically we do not believe that a nuclear moratorium is the answer."

- On greater opportunities for women: "We've got a real problem in the United States, and particularly in industry, and in technologically oriented industry such as General Electric. Sixty percent of the management positions in our kind of industry are held by people who have a four-year technical degree. Now only 1% of the graduating classes in engineering in the U.S. today are women, and only 1% are blacks. We have got to increase that supply if we are ever going to get the upward integration of women and minorities into management ranks... We have been spending a great deal of corporate funds recently to encourage minorities and women to go in for a technical education... Last year, of all the additions to payroll that were made for managerial positions, 5% were women, and that's quite an increase from the less than 2% we averaged previously. And of all of the professionals that were added to the payroll last year, 10% were women, and that's a far cry from the 4% that we'd been running. This has only come about because of a very determined affirmative action program that we have undertaken." ❧

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# AT DEADLINE

## Union negotiations continue

Shunning publicity but reporting constructive sessions, negotiators for the Company and unions representing over 100,000 GE employees kept working as the *Monogram* went to press May 30. The atmosphere at New York City's Essex House, where the International Union of Electrical Workers (AFL-CIO) and the United Electrical Workers (Independent) are meeting with Company negotiator John R. Baldwin and staff, continued to be one of calm, reflecting progress toward the "peaceful and balanced settlement" that has been the goal throughout.

Although agreement had been reached on several issues by the original contract expiration date of May 26, there were others still to be resolved. The negotiators have been considering

each issue separately, building toward a comprehensive package that will be mutually satisfactory to the unions and the Company. Union spokesmen told the press there was no threat of a strike at this time.

Talks are also continuing at several plant locations around the country with other unions representing about 35,000 other employees.



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## Emmys to GE productions

Tomorrow Entertainment, Inc., GE's entertainment affiliate (March-April *Monogram*), has walked away with two important television programming Emmy awards, including the best single drama or comedy program of the year.

"A War of Children," a fictional documentary focusing on the problems of a family living amid the violence of Northern Ireland, was awarded an Emmy for best single program. Producers Roger Gimbel and George Schaefer received the awards for TEI and the Company.

Cloris Leachman was honored as best actress of the year for her role in "A Brand New Life," a TEI produced movie for television about the emotions surrounding the unexpected pregnancy of a 40-year-old woman.

Television Emmys are selected each year in May by the Television Academy of Arts and Sciences.

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## France selects GE's BWR

Electricite de France (EDF), the French national electric utility, has selected the General Electric-designed boiling water reactor (BWR) for two nuclear power stations.

EDF announced plans to award a contract for two 995-megawatt reactors to Compagnie General D'Electricite (CGE) and its nuclear subsidiary, Sogerca, which will supply the nuclear steam supply system.

The EDF decision brings to seven the number of GE-designed boiling water reactors selected by electric utilities around the world to date in 1973. They are the third and fourth awards in Europe in the past six months.



## HIRE THE VET: GE RESPONDS

In the fourth quarter of 1972 the percentage of Vietnam veterans unemployed dropped below total U.S. average levels for the first time in years.

In the first quarter of 1973, the jobless rate for vets was 5.8% compared to 8.1% for the same period a year ago.

The figures were no accident, no trend that just happened. They are the result of an intensive cooperation involving industry, the National Committee on Jobs for Veterans and the National Alliance of Businessmen—in response to a call for action by President Richard Nixon.

General Electric is moving to be one of the major allies in the campaign against vet unemployment. The Company hired more than 1150 veterans in the first quarter of 1973, 13% of all new hires. A few of the many specific stories are on these pages.

In one of the more unusual programs, GE is among 16 companies asked by the Department of Defense to participate in a job counseling and placement effort for returned prisoners of war. In a February letter, GE Chairman Reginald H. Jones alerted all general managers in the Company to the possibility that they might

*(continued on next page)*



Major Appliance Group's successful seven-week Project Transition classes graduate 180 qualified service technicians every year at McGuire Air Force Base, as shown here, and Ft. Bragg, North Carolina. Almost 50% of graduates join GE or franchised Customer Care dealers.

◀ Project transition graduate Harry Johnston says of his GE technician's job, "There's a comradeship here, just like I found in my 20 Army years." He describes his alternatives without the GE Project Transition opportunity as "joining the Foreign Legion or scrapping with the chickens over the unskilled jobs."

A former munitions instructor at Fort Dix, Harry now drives his Customer Care truck in southern New Jersey to an average of eight service calls a day, giving expert consumer advice and repairing everything from ranges to air conditioners.

be called to help. GE and the other companies involved have split up responsibility for the 31 different service hospitals in the U.S. to which the POWs have been returned. GE has primary responsibility for POWs at Maxwell Air Force Base Hospital, Alabama, the Naval Hospital at Philadelphia and the Army Hospital located at Fort Monmouth, New Jersey. Harvey Hellman, Headquarters Consultant for Personnel Practices, has been to see several former POWs. He says their present needs are largely informational, catching up on industry conditions in their specialty. Completely united behind the single purpose of helping these men, all sixteen companies have been trading references and appointments and keeping a low profile about it. If a POW has an interest in a company not included among the 16 main participants, his request is relayed.

Hellman reports that many of the POWs are now on 90-day leave. Many are career service people who will probably elect to stay in the Armed Forces. "We're ready, though," he says, "to provide information, counseling or an interview anywhere in the country anytime."

**Jonas Johnson (below)** grew up near Philadelphia, enlisted in the Navy in 1968 and spent four years as a crewman on aircraft carrier rescue helicopters.

During his last assignment, shore duty at Lakehurst Naval Air Station in New Jersey, John was accepted for the GE major appliance repair course administered by Zone Training Manager Frank Gosik at nearby McGuire Air Force Base.

Now at work for GE in the Philadelphia zone of Major Appliance Product Service, John says of his decision: "I couldn't have done better with my choices. Besides doing something constructive you're actually your own boss. They trust you to represent the Company."



**Dick Corcoran**, a Production Control Supervisor for the Aircraft Engine Group's Everett, Massachusetts plant, enlisted in the Marines in 1964 after one year in college. Returning from night patrol south of Da Nang, Vietnam in 1966, he stepped on a VietCong land mine. Quick action saved his life and his legs, though he spent a year and a half in the hospital. Not really expecting anything, he applied to GE and was hired in three days in December 1968 as an engineering technician. What he describes as "just plain doing the job well each day" has earned him five promotions since then and a key job responsible for material flow through the Everett plant. ☐







## FINANCIAL ANALYSTS

Who are they? What do they seek? How do we serve them?

**N**OT so long ago they were the statisticians in the back room of a brokerage house, the guys with green eyeshades and adding machines who tried to verify a few hard facts out of the generalized investor information then available.

Today they're front office, figures of power, their analyses often backed by rows of computers, their decisions and recommendations affecting the turnover of millions of shares of corporate stocks. They're professionals, organized in the U.S. and Canada into the Financial Analysts Federation, with over 13,000 members, and internationally, via kindred organizations around the globe.

They fit no single pattern. Attempts to cat-

egorize them tend to come no closer than this: "Every good analyst has two overriding characteristics. First, he's plagued with an insatiable curiosity. Equally important, he is a cynic. He accepts virtually nothing at face value until he gets to know management very well."

### Power in a handful

Essentially, financial analysts have come to the fore among the most powerful forces shaping investment decisions. Buy a specific stock? Sell? Hold? Is the price right? Does the price/earnings ratio represent good value? How sharp is the management? Can this company cope with world competition? These and countless

*(continued on next page)*



**GE's Investor Relations team: Manager Gregory M. Sheehan with Consultant Deedee deRoode, who manages correspondence with individual share owners and answers their telephone inquiries. Completing the team are, standing, left to right, Consultants Lynn Thomann, Frank Eckert and Norm Hinton.**

similar questions form the analysts' everyday work load, with their answers awaited by banks, brokers, investment advisory services and individual clients.

From the perspective of an individual company, the analysts' power is seen to be concentrated in a relative handful of people. When it comes down to General Electric, as an example, only some 400 analysts are directly interested. That's the estimate of the man who runs GE's Investor Relations Operation, Gregory M. Sheehan. These 400 include the key financial analysts—those who follow GE and the electrical industry closely and regularly.

Sheehan, a 36-year GE veteran, heads a four member team whose primary responsibility is

to serve the needs of financial analysts. He says of his job:

"The most important thing with analysts is always the performance of the company and its prospects for earnings. General Electric gives us the great advantage of having a blue-chip reputation. It's rated high not only as a progressively managed business but as one that meets the test of 'quality' in earnings. It's a reputation comprised of many things—including accounting methods that adhere to consistent principles and avoid the tricks of 'cosmetic accounting. Financial strengths, customer-orientation, competitive spirit, strategic planning, solid R&D—these are all elements in the substantial base on which we work with analysts."

## GE rated number one

Beyond these basics, Sheehan thinks that Investor Relations serves "by doing a professional job of helping the analysts do their professional job" He feels that the objective set when GE Investor Relations was first established as a separate component still applies:

"To provide better, more accurate information to security analysts so that over a period of time they will tend to base their appraisals of the Company's securities more upon the available factual and real information about the Company and less upon rumor, speculation and hunch..."

How well does today's Investor Relations team meet this objective? When Opinion Research Corporation conducted its most recent survey among analysts, the 80 individuals interviewed—who call on top U.S. companies in the electronics and electrical equipment sector—rated GE's Investor Relations Operation number one.

Explaining how he thinks the GE operation scores so well, Sheehan says: "Analysts want you to level with them. They want you to speak with the confidence that you're right and that you've done your homework. If you don't you're dead. There's no shooting from the hip in this business. I think the high estimation GE receives from analysts reflects the fact that we do take care, we are dependable in meeting the analysts' needs."

### Treading a careful path

GE's Investor Relations specialists are careful to provide as much information as they can consistent with disclosure requirements. Sheehan: "We have to tread a careful path. The information we provide to analysts has to be publicly available—to all share owners large and small. We coordinate closely with the editors of the *GE Investor* series of share owner communications to insure distribution of topical information to all share owners."

And of course no disclosure of "inside" information is made to analysts at any time. To do so would make them "insiders" prohibited from trading GE stock by SEC rules. So Sheehan and his staff must walk the tightrope of honesty with discretion, resisting the occasional probe into the undisclosed.

To keep analysts informed, Investor Relations has developed a number of methods that have proved effective:

- **Contact with top management**—Personal contacts between top management and the financial community are a necessary ingredient to

build analysts' confidence. Aware of this, GE's top officers cooperate closely with Investor Relations programs. On November 7 of this year, for example, Chairman Reg Jones will take the Hotel Pierre podium in New York before a group of up to 400 analysts to report on Company operations and answer their questions. Members of the press will also be invited to attend.

- **Group-level meetings and plant tours**—These are another vehicle to introduce management to analysts. The Industrial Group hosted 107 analysts in Erie last June. Upcoming on June 20-21 in Chicago will be a combined Power Generation and Power Delivery Group presentation to analysts.

- **Luncheons with Regional VPs**—GE's Regional Vice Presidents and Sheehan co-hosted analysts' luncheons in nine cities during 1972 and will sponsor 12 more in 1973. GE management also participates regularly in other analyst society meetings and in panels on specialized subjects.

- **Investor relations research**—To staff member Norm Hinton falls the task of conducting detailed research as a common resource for his associates, general management and individual share owners. His analyses add to the confidence and depth conveyed to analysts during personal interviews.

- **Sessions with individual analysts**—Individual briefing sessions—involving an analyst and Sheehan or one of his staffers, Frank Eckert or Lynn Thomann—continue to be the basic method for meeting analysts' professional needs. During 1972 Investor Relations conducted some 150 such in-depth sessions—supplemented by more than 2000 briefer sessions by telephone. It is in these sessions with individual analysts that everything Investor Relations does for analysts "comes together" and gets put into perspective.

One of the satisfactions of working with analysts, Sheehan notes, comes when they plunge into a depth study of General Electric and emerge with a report that earns commendation throughout the investment community for its professional excellence and helpfulness. One such report issued late last year, some 30 pages long, concluded with these words: "We believe that the stock is attractively priced for above-average appreciation. We recommend purchase." Reflecting General Electric's improved earnings performance and prospects, analysts' reports have been reaching this conclusion with a good deal of regularity. ☐

## CORPORATE BRIEFS



'Up with People' at Expo '74: General Electric will sponsor "Up with People" entertainment at Expo '74, a world-wide exposition to be held in Spokane, Washington, May through October, 1974. The musical group, familiar to GE employees from their recent 'Best Buy' tour, will feature an original repertoire of rock, jazz, country and folk music tied to the Expo '74 theme: "How Man Can Live, Work and Play in Harmony with His Environment."



Paine

Gifford

Brown

**Honors for GE'ers:** Dr. Thomas O. Paine, Vice President and Group Executive—Power Generation Business Group, Richard P. Gifford, Vice President and general manager—Communication Systems Business Division, and Burton P. Brown, Systems Consultant—Electronic Systems Operational Planning, have been elected to the National Academy of Engineering. Election to the Academy is considered the highest professional distinction that can be conferred on an American engineer and honors those who have made important contributions to engineering theory and practice, or who have demonstrated unusual accomplishments in the pioneering of new and developing fields of technology. . . . Willis E. Forsyth, Vice President and Comptroller, has been elected Director of the Eastern Area of Financial Executives Institute, the voice of corporate financial officers in the U.S. and Canada. . . . Dr. William D. Coolidge, 99, Director Emeritus of the GE Re-

search Laboratory, was presented a special Wedgwood medallion by officials of Climax Molybdenum Company in honor of his pioneering work that led to the invention of ductile tungsten and molybdenum.

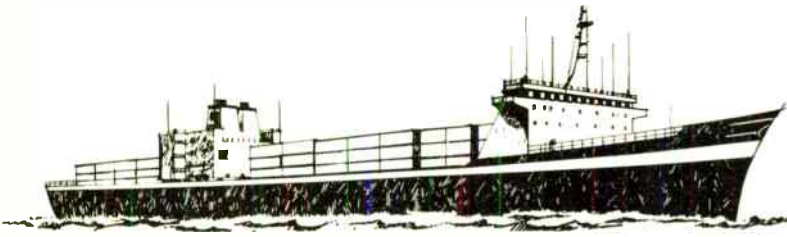


**Environment Protection Award to GE:** James J. O'Conner, Editor-in-Chief of McGraw Hill's *Power Magazine*, presents his publication's 1973 Environment Protection Citation to Donald E. Craig, Vice President and general manager of GE's Schenectady-headquartered Steam Turbine-Generator Products Division, right, and Robert F. Case, manager of GE's Schenectady Utilities Operation. The award went to GE for the multi-million dollar conversion of its Schenectady power station from coal to low-sulfur fuel oil firing.

**Father-son graduation:** L. Berkley Davis, GE's Vice President—Washington Corporate Office, donned a cap and gown along with his son L. Berkley Davis, Jr. during recent commencement exercises at the University of Kentucky. Davis was presented with an Honorary Doctor of Science degree from his alma mater as his son received his PhD in Electrical Engineering.

**50,000th pensioner announced:** Harold Gove, formerly an inspector for GE's Aerospace Instrument Programs, became the Company's 50,000th pensioner upon his recent retirement after 33 years of service. More than 100,000 have retired on pensions since GE's Pension Plan began in 1912, and the number is expected to double again within the decade.

**GE on TV:** Those who missed the "International Performance" series supported by GE on Public Broadcasting will receive another chance: all 12 shows will be repeated on PBS beginning June 5. (The other 11 programs will be aired each following Tuesday at 9 p.m.)



## Life on a GE-powered containership

Story and photographs by  
William Kermit Barclift

Once upon a time the scene at dockside was of large cranes lifting individual products or nets full of boxes up and into the ship's hold. Today the scene is changing. Trailer trucks roll alongside the cargo ship, and their entire truck-bed containers are lifted as units and deposited in the ship or onto the deck. The advantages of this containerized shipping are substantial. Not only is loading faster and more efficient, but the containers' contents can be sealed by the shipper and remain intact until delivered to the consignee.

This new look in shipping was pioneered by Sea-Land Service, Inc. in 1956. Today, Sea-Land boasts the world's largest containership fleet with 68 ships serving 106 port terminals in 43 countries. Augmenting this fleet, and already outrunning all commercial vessels at 33 knots, are the first five of eight new SL-7 containerships—the largest, fastest, most powerful merchant marine cargo ships in operation.

What's containerization mean to GE? Plenty, says Hughes W. Ogilvie, marketing manager for General Electric's Marine Turbine and Gear Products Department: "Sea-Land's commitments for sixteen 60,000 shp geared turbines from GE represent the largest order for ship propulsion equipment to date. In addition, two GE turbo-alternators supply on-board electrical power. Sea-Land's contract, combined with industry's trend toward containerization, are most encouraging indicators that our business will continue at a high level in the decade ahead."

At the recommendation of F. G. Folsom, Jr., manager—Advertising and Sales Promotion in Lynn, Massachusetts, this *Monogram* reporter recently boarded Sea-Land's fourth SL-7, the *Sea-Land Commerce*, on sea-trials in the North Sea.

It was four a.m. in Bremerhaven — Germany's oldest and second largest seaport. But despite the dim light and the presence of ships of every description dotting the waters of this wide entrance to the North Sea, my

taxi driver had no trouble spotting *Sea-Land's Commerce*. She simply loomed up too large and imposing to be overlooked.

In the dock's floodlights she seemed even more mammoth—eight stories high from waterline to the tip of her bridge—over three continuous football fields in length. I began to snap photographs but, even with a variety of lenses, it was difficult to encompass the vessel's whole span.

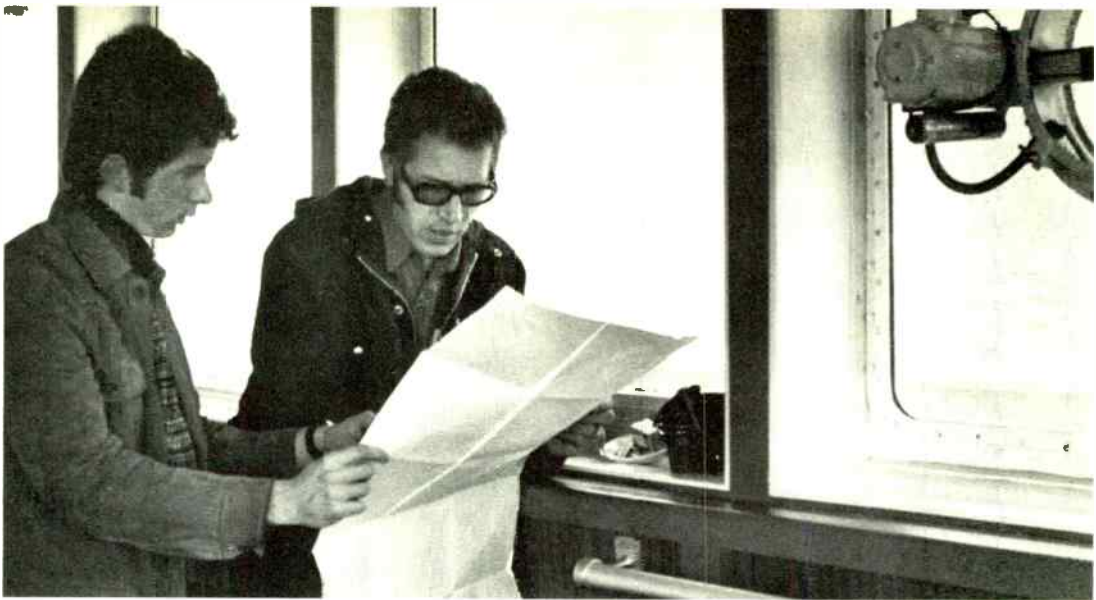
Accompanying me up the gangway was Sea-Land's Director of Ship Construction, Raymond G. Pyle, and Chief Naval Architect, John Boylston. Together with other Sea-Land personnel they designed the SL-7 fleet in conjunction with J. J. Henry Co., Inc. Ray was obviously pleased with the finished product: "She's the biggest—fastest—most beautiful ship afloat. Even the Queen Elizabeth II falls behind when she hits 33 knots."

Once on board, we strolled *Sea-Land Commerce's* vast deck—946½ feet from end to end. For this test run, only one container was loaded. When she enters service, though, the ship will have sufficient stowage capacity to carry 1096 35- and 40-foot containers. Of these, 402 will be carried on the main deck, stacked up to three tiers high, while 694 units will fill the holds. Placed end-to-end, a single load would extend seven-and-a-half miles.

After breakfast, Ray prescribed a course which would take us as far as Stavanger, Norway. "Don't expect a pleasure cruise," he warned. "During the next four days, all equipment aboard her will be checked under all types of circumstances and tested by the 200 contractors and subcontractors aboard—around the clock."

As four tugs eased our departure into the foggy North Sea, I tracked down my room inside the labyrinthine corridors of the superstructure. Then I went for the first of many engine-room tours. It was a tense scene, with people rustling about, warning buzzers sounding, lights flashing, tons of machinery throbbing. In the midst of this furious activity, I met Leo Venne, GE's I&SE field engineer. His assignment was to man the turbines till

(continued on next page)



GE'ers on board for shakedown cruise were **Monogram** editor Bill Barclift and I&SE's Leo Venne.

they were called on for their supreme test: to speed her up to full power.

Venne, a 10-year GE veteran and native of Hamburg, was quick to explain that "GE's steam propulsion machinery was the only choice for Sea-Land's new breed since no other form of propulsion could offer the same output and efficiency."

He led me through the maze of shimmering machinery embellished with GE monograms. We scaled two floors to get a better view of the ship's propulsion plant, comprised of separate cross-compound GE MST 19 steam turbines and gear sets—providing a total shaft horsepower of 120,000 hp. Everyday electrical requirements are met by two GE turbo-alternators rated at 3000 kw, with a diesel engine-driven alternator provided for standby power.

During the first 48 hours, while she was running on 60% power, Venne spent most of his waking hours monitoring the turbines.

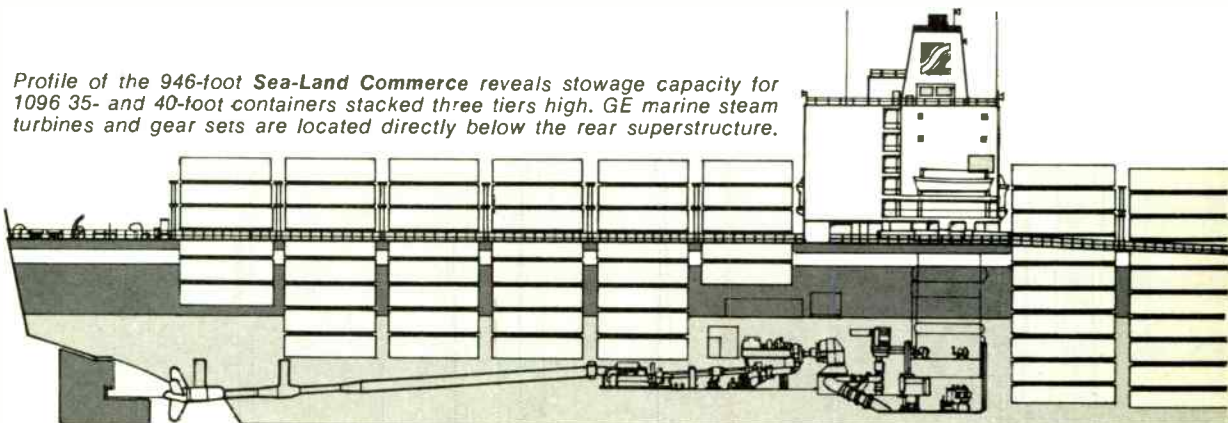
Occasionally he would fetch me to share a meal or explore the ship but it wasn't difficult to sense that his thoughts were on the hour when the turbines would be called to 100% capacity.

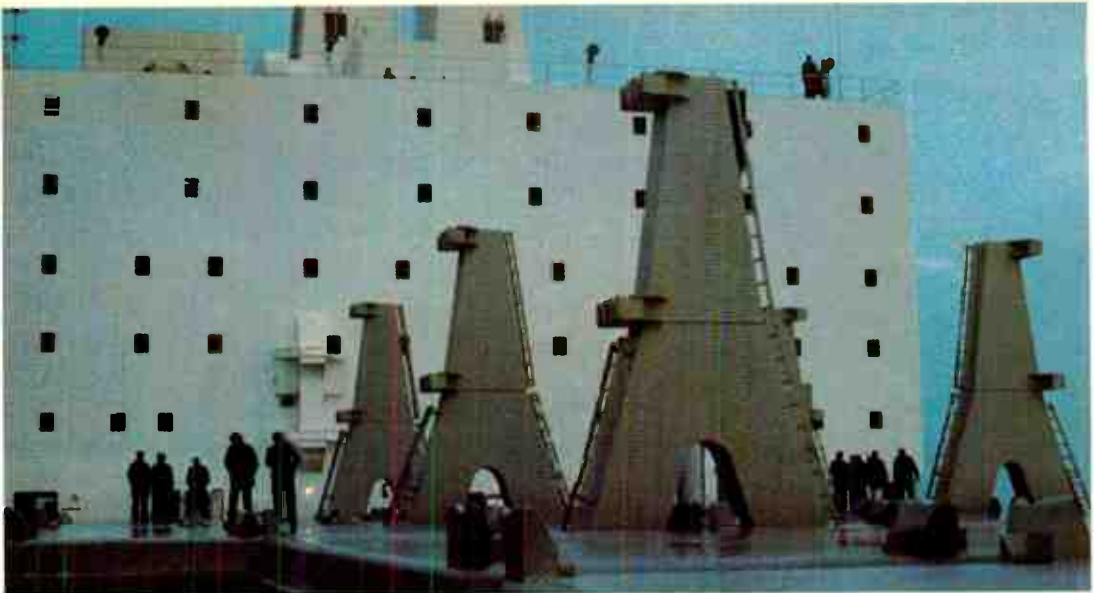
Three meals each day pacified the passengers, and the two mess halls provided a convenient gathering spot after dinner to evaluate the ship's performance and schedule the next day's testing. Afterwards, some took advantage of TVs, radios and stereos located in the officers' and crew's lounges. Others visited the bridge or walked the deck.

As we edged toward Stavanger, the crew conducted their many shutdown tests, turning maneuvers and rudder checks. Finally, at four a.m., the anxiously awaited signal came from the bridge to crank up both GE turbines to full capacity. There wasn't a hitch as *Sea-Land Commerce's* speed picked up to the full 33 knots.

Pleased with the successful crank-up,

Profile of the 946-foot *Sea-Land Commerce* reveals stowage capacity for 1096 35- and 40-foot containers stacked three tiers high. GE marine steam turbines and gear sets are located directly below the rear superstructure.





It's not an apartment building—it's the *Commerce's* above-decks superstructure.

Venne shouted: "There's no stopping her now—feel her go!" Back on deck, I joined a group of crew members assembled to watch the sunrise highlighted by scores of Norwegian fishing trawlers heading out for a day's catch. Wind gusts, indicative of our increased speed, forced most of the group inside, but I remained, almost immobilized by the magnificent scene. For me the vessel began to assert a different character. The sea de-emphasized her size and, as she forged through the wind-driven waves, her lines and movements became sleek, even graceful.

The final maneuver before we began our journey south was the "crash-stop"—a necessary test for avoiding any potential accidents. What a test for those GE turbines and gears! But again they passed the feat without a sign of trouble.

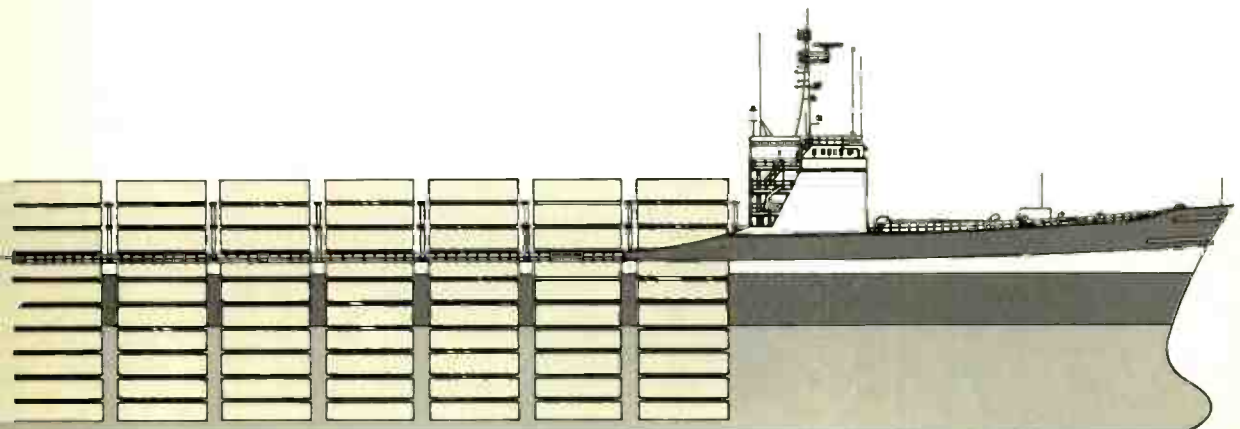
For the crew, the completion of the "crash-stop" test meant they were heading home. Another successful sea-trial was coming to

an end and life aboard *Sea-Land Commerce* settled down to a more normal routine. Multiple tasks still had to be performed, but people lingered a bit longer over meals discussing the cruise and swapping tall tales about previous sea adventures.

As we approached Bremerhaven, a small boat came alongside to deliver our channel navigator. Soon the crew dropped lines to the waiting tugs. It was growing dark and the horizon glimmered with lights from surrounding boats. I viewed our approach from the bridge and secretly wished something might delay our anchorage. I was growing attached to life aboard *Commerce* and wasn't quite ready to disembark.


But there was Ray Pyle again, ready to lead me down the gangway. I recalled Ray remarking "She's the fastest—biggest—most beautiful ship afloat." Looking back at the docked giant, I could only mumble in agreement: "Beautiful, beautiful."

*(Overleaf: photo coverage of the trial run)*





## Containership Odyssey:

GE's contributions to the world's largest containership are, as shown on this page, many and varied: Lynn's turbines and gears (left) propel the ship; GE controls, switchgear, instruments and auxiliary power equipment add to the profusion of GE monograms aboard. At right: scenes as the Sea-Land Commerce stood up to rough seas and endurance tests on its trial run in the North Sea. 









*Above, a welcome sight on a Monday morning: the first New Haven line Cosmopolitan run.*

*Right, the oldest and the newest New Haven line equipment: commuters, newsmen and VP Thomas A. Vanderslice clearly indicate a preference after ceremonies on the Stamford platform April 16.*

*Below, discussing urban transit on the maiden run are, left to right, Governor Nelson A. Rockefeller of New York, GE's Vanderslice, Frank C. Herring, Administrator—Urban Mass Transit Administration, U.S. Department of Transportation and New York Metropolitan Transportation Authority Chairman William J. Ronan.*

*Below, right, businessmen on the 8:20 a.m. to New York relax in the quiet of the Cosmopolitans. Each car can seat 118.*



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## “COSMOPOLITANS” ARRIVE FROM ERIE

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Several thousand Transportation Systems Business Division transit cars and propulsion systems are operating all over the world, from Stockholm's subways to Chicago's rapid transit. Almost 2500 are operating or on order in the New York metropolitan area alone.

But none are so welcome or likely to impress so many so quickly as 144 new General Electric commuter cars for the New Haven line of the Penn Central Railroad, the first of which began service April 16.

Commuters from southwestern Connecticut's Fairfield County have watched nearly every other commuter line in the New York area put on new equipment in recent years. It's finally their turn. For GE commuters, the pleasure of riding in the gleaming stainless steel cars is heightened by the knowledge that they are fresh off the Company's assembly lines in Erie.

New York Governor Nelson Rockefeller was at a trackside ribbon-cutting attended by Connecticut Governor Thomas J. Meskill, Special Systems and Products Group VP Thomas A. Vanderslice and Transportation Systems Business Division VP and general manager Louis V. Tomasetti. Rockefeller put it this way: "The New Haven line, long the unwanted bankrupt stepchild of railroad managements, is finally joining the twentieth century..."

*Senior Penn Central engineer William Quick, Jr. guides the Cosmopolitans down New Haven tracks for their first commercial run.*



Group VP Tom Vanderslice gave the Company perspective to assembled dignitaries: "From our viewpoint, the solution to this country's transportation problems does not require the development of exotic new schemes or technologies, but rather the application of today's proven technologies to transit, commuter and inter-city cars which are an integral part of a national balanced transportation system."

If the New Haven order is notable for its alleviation of the plight of New York City commuters, it is also notable around Erie for its complexity. The new "Cosmopolitan" cars are among the most complex electric rail vehicles ever built. The complications faced by GE designers included two entirely separate power sources. From New York as far east as the Bronx, a 600-volt DC third rail powers the trains. From there to New Haven, Connecticut, 11,000-volt AC overhead lines are used.

Extra effort has paid off. The maiden commercial trip, attended by the *Monogram*, set a new standard of comfort for delighted patrons of the 8:20 a.m. Stamford run, whose usual attitude can best be described as stoic. Quietness and the inherently smooth starts and stops of the traction motors with dynamic braking produced the most comments. Seventy miles an hour, the New Haven line speed limit because of track-bed conditions, was the top speed on this run, but the cars

*(continued on next page)*

*VP Vanderslice addresses inauguration ceremonies as Governor Rockefeller listens.*





*The 8:20 from Stamford prepares to leave, carrying commuters, dignitaries, GE executives, several television crews and 70 other members of the press.*

are designed for 100-mph speeds. Extra insulation and double-paned windows, the outer windows of GE Lexan® material helped produce the quiet.

The 144 new cars were purchased by the Connecticut Department of Transportation and the New York Metropolitan Transportation Authority as part of a bi-state modernization program. The first pair were delivered for testing last June and a total of 44 are now on New Haven tracks. The first cars went through an 8000-mile test program on New Haven tracks and all the subsequent cars will be tested for at least 4000 miles. To back up the delivery, GE is even conducting a training course covering all the major systems of the car for Penn Central employees. The Cosmopolitans, like sophisticated aircraft, were designed and built with the systems approach. The propulsion, control, braking, heating and air-conditioning are treated as systems. It is one of the innovations that is credited with making Erie's products industry leaders.

The Erie assembly plant where the Cosmopolitans were built contains many industry firsts. The electrified test track outside the plant is the only privately-owned one in the country and was used to test a prototype fore-runner of the Cosmopolitans under much more severe conditions than it would have encountered in customer service. The resulting knowledge is incorporated into the fleet of new Cosmopolitans.

One of the things that makes the 85-foot Cosmopolitans look different is the streamlined screened projection on the roof. That holds the braking resistors used to dissipate heat during dynamic braking. The heat dissipates harmlessly into the air on the roof instead of into nearby equipment as in the conventional undercar resistor placement. The roof also holds innovative clean air ducts to cool equipment under the car. The conventional undercar systems often scoop up debris-laden air.

The smooth start for the New Haven line Cosmopolitans is the latest in a series of recent successes for GE in electric rail vehicles. The Company supplied the electric propulsion and control equipment for the Western Hemisphere's first airport-to-downtown transit line in Cleveland; the highly successful Northeast Corridor Metroliners; the entire new fleet of 770 Long Island Rail Road commuter cars; and the nation's first automated rapid transit line—PATCO—which provides service between downtown Philadelphia and the southern New Jersey suburbs.

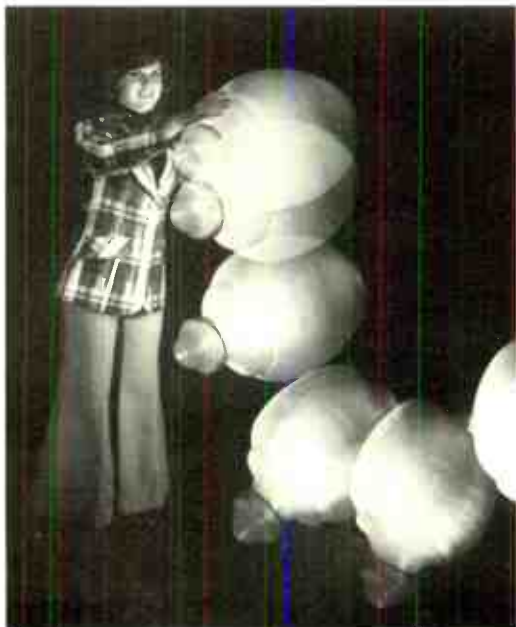
On a national scale, the Transit Systems Products Department cars are part of what the Company believes should be a national drive toward efficiency in urban and commuter transit. Electric rail vehicles are in the right place at the right time in this endeavor, for they promise to deliver efficiency in transit without adding to either the energy crisis or urban pollution problems. **AV**

## BUSINESS BRIEFS

**New nuclear orders:** Orders for big nuclear systems continue to roll in to GE's Nuclear Energy Division.

After more than three years, the Atomic Energy Commission has issued a construction permit for the Long Island Lighting Company's projected 820 megawatt nuclear plant at Shoreham, New York. Construction will begin immediately, to meet a 1977 target date. NED's Shoreham program manager, J. W. Blakely, said of the decision "... the receipt of the construction permit represents in many ways a milestone for the entire nuclear industry after such lengthy and exhaustive hearings."

Houston Lighting and Power Company has also signed a \$100 million letter of intent to purchase two GE 1200 megawatt Boiling Water Reactors to be placed in Austin County, Texas.



**New versatility for Lexan®:** Street light globes that bounce off concrete unharmed and resist vandals' rocks—these are some of the capabilities of Lexan 303 polycarbonate resin. The newest member of the Plastics Department's successful family was especially developed to cope with the ultraviolet radiation and high temperatures—on the order of 265°F—close to high-intensity-discharge lamps in such applications as streetlighting.

**Nela's 60th—still more innovations:** GE's Lamp Business Division recently celebrated the 60th anniversary of its Nela Park facility. East Cleveland presented GE with a resolution citing the leadership, good neighbor practices and campus-like beauty of Nela, the pioneer industrial park in America.

Meanwhile, inside the plant, the successful Lucalox® high pressure sodium vapor lamp became available in still another size, a small 150-watt version for safety and security light. Lucalox is already manufactured in 250-, 400- and 1,000-watt sizes.



**Electric vehicles gaining:** A fleet of 100 experimental van-size electric trucks, equipped with GE motors and controls, will soon be working full-time for several electric utilities across the country. Purchased through the Electric Vehicle Council of the national association of investor-owned electric light and power companies, the trucks will have 96-volt, 30-horsepower direct-current traction motors built at DC Motor and Generator Products Department in Erie, Pa. The controllers will be built by Industrial Control Products Department, Salem, Va.

**15-minute recharge:** Battery Products Section brought a major contribution in nickel-cadmium battery technology up from its Gainesville, Florida plant to meet the New York press recently. The POWER-UP 15™ battery can be recharged from almost zero to practically full charge in fifteen minutes flat. That's compared to a minimum of four or five hours before.

## PEOPLE

### GE welders spark an arc for creativity

General Electric prides itself on employing creative people. Every now and then that creativity finds new ways to express itself. One such way was recently provided employees in Erie when the Heavy Fabrication subsection of the Locomotive Products Department sponsored an art competition for its employees, who were challenged to create sculptures from usually discarded scrap metal.

The result: participation of 42 employees.

The competition was launched, explained Duane H. Shull, LPD manager of Manufacturing, "to impress customers and the general public with the creativity and fine quality workmanship of employees, and to familiarize those not connected with the subsection with the materials used by Heavy Fabrication employees. We were aware of the creative talent behind the rods and torches of the welders in Heavy Fab-

rication, but their response was far greater than we imagined—presenting a real challenge to determine the winners."

Chosen from the display were eight winners who received cash prizes. All participants worked on their own time—some jointly on a project—using welding rods and torches to mold the scrap metal.

Applauding the winning entries, Olaf F. Vea, LPD general manager, noted that "the variety of sculptures proved that the quality and creativity Heavy Fabrication employees put into building GE locomotives day in and day out is just as applicable to the field of fine arts." As a result, the winning sculptures will go on permanent display in the lobby of their new building addition.

Featured below and at right are the artists with their creations.



First place winner: Robert S. Kellogg and his AMERICAN EAGLE.



Michael A. Geer and John H. Wolfe and their **NATURAL RUST**.



Carl A. Skrekla with his **SPHERE**.



Charles E. Brown and Louis Dinocola and their **WELDER**.



Lowell A. Freeman and his **MAN OF STEEL**.



George L. Wendal with his **LOLLIPOP TREE**.

# ORGANIZATION CHANGES

## CORPORATE

James M. McDonald, *Manager—Marketing Consulting, Corporate Consulting Services.*

Raymond F. Pettit, *Manager—Financial Manpower Operation, Corporate Accounting Operation.*

## AIRCRAFT ENGINE BUSINESS GROUP

Raymond F. Letts, *General Manager—Group Manufacturing Operations.*

## CONSUMER PRODUCTS GROUP

Mark J. D'Arcangelo, *Manager—Lamp Strategic Planning Operation.*

Sigurd D. Medhus, *Vice President and General Manager—Consumer Financing Business Department, GECC.*

James A. Baker, *Acting General Manager—Large Lamp Department (Engineering and Manufacturing) in addition to serving as General Manager—Lamp Product Operations.*

## INDUSTRIAL GROUP

Louis E. Wengert, *Vice President—Group Business Development.*

Robert J. Rodwell, *Vice President and General Manager—Automation Business Division.*

James P. Curley, *General Manager—Contractor Equipment Business Division.*

## INTERNATIONAL AND CANADIAN GROUP

R. Howard Annin, Jr., *President and General Manager—General Electric Japan Ltd.*

Rodger E. Farrell, *President and General Manager—General Electric de Colombia, S.A.*

Chester A. Rose, *Vice President—Finance, Canadian General Electric Company Limited.*

## POWER GENERATION BUSINESS GROUP

George E. Grega, *Manager—Western States Region, Power Generation Sales.*

E. Roy North, Jr., *Manager—Atlantic Region, Power Generation Sales.*

## SPECIAL SYSTEMS AND PRODUCTS GROUP

Louis V. Tomasetti, *Vice President and General Manager—Transportation Systems Business Division.*

Bryce W. Wyman, *Vice President—Transportation Systems Projects.*

Erwin M. Koeritz, *General Manager—Construction Materials Division.*

Donald S. Bates, *Manager—Group Strategic Planning and Review Operation.*

# BASIC ANSWERS

## What About GE-TV Today?

**A** Any employee who may have had questions about the Company's television receivers in the past needs to take a fresh look.

General Electric today offers sets that are setting a fast pace in terms of quality.

This commitment to quality is reflected in a sharp drop in service calls. They're down 71% from previous years and customer complaints have plummeted by 64%. Independent services are helping GE engineers design what have been called the most serviceable sets ever built.

This high-quality performance has been a factor in helping GE-TV climb to a position as the third largest domestic manufacturer of TV receivers.

The facts behind GE-TV's success is the



*Alignment of critical circuits is a key element in GE-TV's total commitment to quality.*



## PRODUCTS

# TO SOME BASIC QUESTIONS

commitment to stringent quality control procedures and the industry's largest after-purchase service organization, reports GE-TV's general manager, Donald F. Johnstone. "We made the commitment to leadership in quality, reliability, performance and more recently to serviceability" he says. "We attribute our increased sales momentum to our commitment to total quality—the ultimate criterion for successful competition today and growth tomorrow."

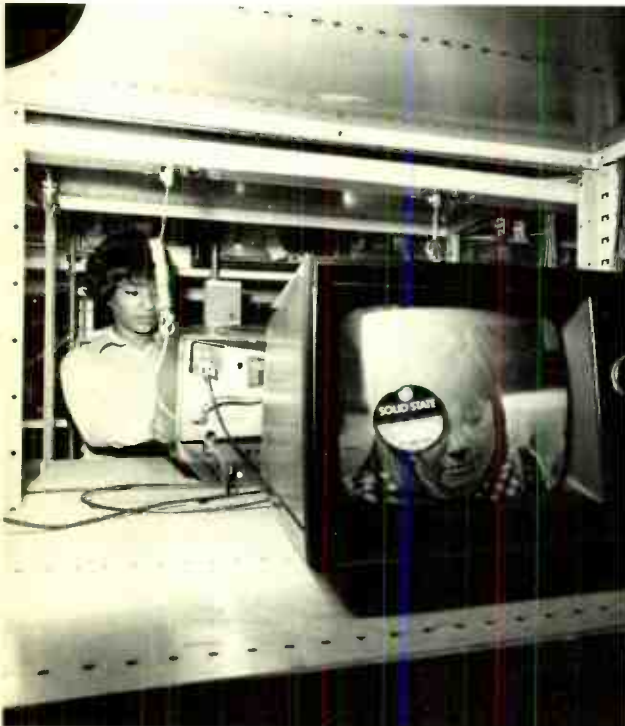
Quality control is a fact of daily life at GE-TV's bustling Portsmouth, Va. headquarters. One out of every five people building GE sets is a quality control specialist who double-checks the work preceding him. Johnstone likens GE-TV's quality checks to a thorough physical examination: "After we rattle, shake, drop and bounce test sets we take production samples and keep them on for over 2,000

hours to minimize, if not eliminate, major problems. Life testing permits us to simulate one year's actual operation and computers also test specific printed current boards and the alignment of all critical controls."

Field tests of GE-TV's product line are just as extreme. Engineers test sets both in the Rockies, at altitudes of 9,000 feet, and at the ocean's edge, where they must stand-up to high humidity and salt air.

The basis for GE's success at the marketplace is not only due to quality control, but a commitment to service that holds GE—not the dealer—responsible for after-service protection. "In order to test our confidence in GE-TV service, we were the first manufacturer to submit a solid-state monochrome set to the National Electronic Association for a review rating," explained Johnstone. "We received a 94.6% service rating—incredible

*(continued on next page)*



*A sampling of sets undergo rotational life tests and run for the equivalent of one year's home use.*



*In-home service is guaranteed through GE's "Customer Care—Everywhere" network.*

when 65% would be considered outstanding.”

Along with other major appliances, GE-TV supports the Company's "Customer Care—Everywhere" Program in another move to take direct responsibility for in-warranty customer satisfaction. This program, the largest factory service organization of any appliance manufacturer, was formulated to guarantee warranty service for mobile Americans whether they move across town or country. An added bonus GE-TV offers is in home

service on 18- and 19-inch color sets as well as 25-inch consoles.

Johnstone predicts that the industry's unit volume for 1973 will be about 9.0 million color and 8.2 million black-and-white TVs: "Success in this \$3½ billion technologically complex industry doesn't just happen—it's planned. GE-TV's commitment to leadership in quality, reliability and service have made us a strong number three, but we're not being complacent with that position."

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## **What about microwave oven safety?**

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**A** "Microwave cooking is not only a safe way to cook, but it has unique advantages and is more responsive to today's living," says Donald W. Lynch, Vice President and general manager—Range Products Division. "The phenomenal growth of this business is a testimony to the inherent benefits of the product."

Public concern over the safety of microwave ovens has arisen because of misinformation and misunderstanding of microwave radiation, Lynch explains. "Microwaves are not like x-rays, gamma rays or cosmic rays. They are a form of *radiant* energy, like heat and light from the sun or heat from a cooking range. Their effects do not accumulate through repeated low-level exposure and no residual radiation is left in food cooked by it."

Nevertheless, all energy has potential for harm: the sun can cause sunburn; current from a household electrical circuit can produce a shock; and high-level exposure to microwaves can be harmful to humans. Consequently, General Electric has set up safety standards, in conjunction with those set by the Bureau of Radiological Health (BRH), part of the Department of Health, Education and Welfare, to limit exposure levels and insure protection from accidental exposure. The industry standard limits levels of typical exposure in normal use to approximately 1/10,000th of the level known to cause harm to humans. Even under conditions of foreseeable misuse, safety margins of at least 10 to 1 are maintained under the standard. Since 1950, thousands of microwave ovens have been sold and yet there has been no known case of injury.



*Tests of GE microwave ovens insure that radiation leakage is far below stringent safety requirements set by the Federal Government.*

"The microwave oven has come out of its recent adverse publicity with its technical acceptability unchanged," adds Lynch. "If anything has changed, it is that the industry has been able to provide even greater assurance that microwave oven safety is an established fact in the governmental and scientific communities where the issue has been critically and knowledgeably reviewed for many years."

## **What ever happened to the Weathertron?**

A "That's not a bad question for a product that's been on the market over 20 years," answers Melvin H. Cole, Marketing Manager for GE's Central Air Conditioning Product Department. A long-time advocate of this intriguing product from Tyler, Texas—a single unit which heats and cools houses electrically—Cole has finally seen a gratifying jump in sales in the last several years: "The reason for the Weathertron® unit's popularity in recent months," Cole explains, "is that technical and economic factors have changed. Utility and public concern for conservation of energy and for protection of the

That makes it one of the best possible choices for commercial and industrial customers who are concerned about being good neighbors environmentally. GE makes both residential and commercial sized units.

The Weathertron is basically a heat pump whose components resemble a central air conditioning system that can be reversed. The evaporator coil becomes the condenser coil during heating and the unit actually plucks heat from the cold outside air during the winter and delivers it inside. A single compact Weathertron unit can heat and cool a house or commercial building automatically with only one year-round thermostat setting.

The single unit heat pump idea was once



*Increased production schedules roll GE's Weathertron heat pumps off the Tyler, Texas assembly line.*



*Both winter heating and summer cooling are provided by one all-electric unit.*

environment have increased. Scattered gas and heating oil shortages have appeared all around the country. Add these to the elimination of our early Weathertron unit heating-cycle problems in extreme Northern climates and it's easy to see why it is becoming the unit of choice in an increasing number of new applications."

GE's Weathertron uses no fuel directly, causes no pollution and uses electricity more efficiently than electrical resistance heating (electric furnaces, perimeter heating units).

thought of as an uneconomical luxury in homes outside the South. No more. For housing start-ups it lowers construction costs. And with changing economic factors, a careful analysis of total energy costs for living in a typical house will often show the Weathertron heat pump to have the edge.

Recently, Cole told an audience that "the heat pump promises an ideal and ready solution to some of the problems and concerns of our times." The sales curve is beginning to bear out that prediction.

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## Self-cleaning versus the “Clean-Look”?

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**A** Ten years ago, General Electric invented and marketed the first “pyrolytic” or P-7® self-cleaning oven. This innovative alternative to the standard grey porcelain oven quickly became an industry favorite.

In an effort to regain some of the market, other range manufacturers have recently presented an alternative to this concept—the “continuous-cleaning” oven. GE, too, will offer selected range models with the “continuous-cleaning” oven system in order to provide consumers with a choice. However, George P. Welch, general manager—Range Products Marketing Department, points out that “we want to make sure that every customer understands that there is a big difference between the two systems, so that he will know exactly what he is buying.”

What’s the difference? The “self-cleaning” system *automatically* cleans the entire oven interior including the oven door inner panel, oven door window, oven light covers and oven racks and panels. The finish is an attractive, glossy porcelain enamel, resistant to food-soil staining.

The “continuous cleaning” oven system, however, *cannot* be regarded as a complete soil removal process. Its advantage over a conventional oven is a porous ceramic interior which has a unique ability to hide levels of soil which would be unsightly on a standard oven and, consequently, does not have to be cleaned as often. This special porous coating is dark in color, rough in texture and somewhat low in abrasion resistance.

The coating is not used on racks, window or oven light covers, however. These parts must be cleaned by hand. In addition, stains appearing on the coating cannot be cleaned with conventional oven cleaners or abrasives which might scratch the coating.

Because of potential confusion between the two products, GE will call its porous ceramic coating the “Clean-Look” finish, and will print its limitations on GE range literature and on the removable oven bottom panel. Each quality GE oven will be sold on its merits: simply, the self-cleaning offers more and costs more; the continuous-cleaning oven provides a longer-lasting clean look on coated oven surfaces only and costs less.



Interior finish of GE’s “Clean-Look” oven (left) contrasts with that of “Self-Cleaning” (right).



GE's expanded Columbia, Tenn. plant employs two shifts to meet demand for Carry-Cool's.




## Can Carry-Cool do it again?

Introduced last year, GE's 43-pound Carry-Cool™ room air conditioner hit the market on the dead run and despite a cool summer and generally sluggish year for air conditioning was a nationwide sellout. Will this momentum last during 1973?

"Sales prospects look better than ever primarily due to our introduction of the new Custom Carry-Cool," reports W. O. Leftwich, general manager of GE's Room Air Conditioning Department. "Based on dealer orders which have been especially heavy for the Custom Carry-Cool, we expect another sell-out year. Dealers have a very good feel for what customers want and they have been very enthusiastic about the new features on the Custom Carry-Cool."

These new features include a simulated woodgrain louvered front design that blends with almost any room decor, and two cooling and fan speeds, including a low slumber speed for nighttime operation. The unit, which complements its predecessor, has a 4,000-BTUH capacity, built-in carrying handle for true portability and plugs into any adequately wired 115-volt outlet. Priced at about \$10 more than the basic unit, it still qualifies as an "impulse" item and, if summer even approaches "normal," Louisville predicts the impulse will be very strong.

"A pleasant spin-off from Carry-Cool's success at the market place" Leftwich added, "has been its boost to other GE and Hotpoint cooling units." "Its unique size, design and price virtually scream 'technological breakthrough' to market observers, and many who are attracted to personal portables, but find that their cooling requirements are beyond this capacity, buy other GE or Hotpoint units more suitable for their needs."

To meet the expected demand, production capabilities of Carry-Cool as well as the Hotpoint counterpart, "Porta-Cool," have been substantially increased. The Columbia, Tenn., plant, where the units are made, has just been expanded this year and now runs two full shifts in order to meet demand. 



GE's big '72 seller, Carry-Cool, is now available in standard (left) and custom models.

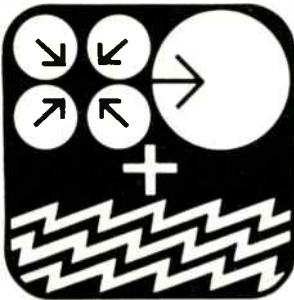
## Realism on those far-out power sources

ONE result of the public's concern over energy and the environment has been an interest in power sources other than today's most reliable providers of energy. Are there, perhaps, technologies that don't involve the problems and trade-offs that go with existing technologies? In a discussion with McGraw-Hill editors, GE's Research Director Arthur M. Bueche took the question head-on.

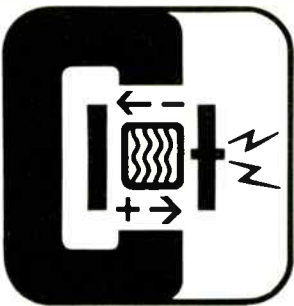
He made it plain that at least for the next

decade there is no realistic alternative to existing technologies and that energy needs will be met by the creative extension and combination of these technologies.

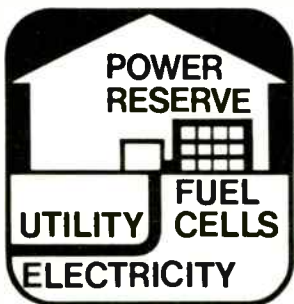
He went on to examine the dozen or so future hopes "that have received enough public attention to convince many people that they are nearer—and easier—and cheaper—and cleaner—and safer than the facts may warrant." Examples of Dr. Bueche's analysis:



**Controlled thermonuclear fusion** is essentially the progress of getting energy from the same source as the sun—from the joining of light-weight atoms. GE invested in fusion research for nearly a decade and concluded—a half dozen years ago—that practical fusion power was just too far in the future to justify a continued commercial investment. In the past year a new idea has come along: laser fusion. GE is joining in sponsorship of a laser-ignited fusion program at the University of Rochester. The forecast: fusion will not be ready for a major role until at least the turn of the century. It should be approached now as an area of research, not large-scale development.



**Magnetohydrodynamics—MHD**—replaces with a very hot ionized gas the metal conductor that flows through a magnetic field to create current in a conventional generator. Our investment in MHD is being made in the hope that we can get generating efficiencies above 50%. This, of course, is also the aim of our work on combined cycles and other approaches to power generation. In the past years we invested heavily in this tempting idea, but the technical problems were formidable. GE Space Division specialists have made progress in a closed-cycle MHD system which shows enough scientific promise to justify continuing investigation.



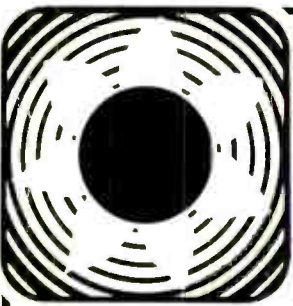
**The fuel cell**—General Electric's invention of the ion-exchange fuel cell led to the first actual "practical application" of a fuel cell—the Gemini spacecraft unit that provided reliable on-board electricity without exceeding extremely stringent weight limits. Currently, we are concentrating on fuel cells for the space shuttle and for some *specialty* marine applications. Our present belief is just *that*—that the fuel cell is destined for the foreseeable future to be a "specialty" power source, not a contender for economic general power production.



**Geothermal**, using the earth's internal heat to produce steam for turbine-generators, is one of a variety of energy sources, conversion and distribution schemes in which we are not—not now at least—investing much if any effort. Included in this category are such things as thermionic converters, thermoelectricity, solar energy and outer-space solar energy collectors with microwave transmission to earth. As for the geothermal itself, the most optimistic forecast that it could provide only a very small percentage of total power needs and only in limited geographical areas.



**The hydrogen cycle** is based on new and less expensive thermochemical methods of decomposing water into its gaseous elements—hydrogen and oxygen. The resulting hydrogen gas could provide a clean-burning fuel. Inexpensive hydrogen could change many basic ideas about energy, Dr. Bueche told the editors. "We are taking a very hard and close look at the whole idea, and we've come up with a variety of exciting new ideas and patentable inventions of our own." Realistically, though, it too remains a "long shot."



**Solar energy**—Supplementing Dr. Bueche's analysis, the R&D Center's Dr. James B. Comly gave the *Monogram* this capsule perspective:

Energy from the sun—it's abundant, widely distributed, resource-conserving, non-polluting, free. Why isn't it widely used as an energy source? What's its promise?

It is abundant: averaged over 24 hours, 17 watts per square foot per day reach the earth's surface. By converting only one seven-thousandth, the U.S. could meet its total electrical needs.

Of the many possible ways to use sunlight for useful energy, the National Science Foundation and NASA have singled out three for development: solar heating and air-conditioning for buildings; generation of electricity; and creation of clean-burning fuel using chemical and biological conversion methods.

On solar energy for buildings: an R&D assessment indicates promise for a cheap solar collector linked with a GE Weathertron® heat pump, as one neglected approach.

Electrical generation via sunlight can be achieved by photovoltaic solar cells or by steam turbine-generators using a "solar-fired" boiler. Solar cells are out of the question economically. Solar steam plants would use sophisticated sunlight collectors, feeding heat energy into a thermal storage system to smooth out energy input changes caused by clouds and the day-night cycle. The collector would require great land areas—30 square miles to supply the present needs of Washington, D.C. and environs.

Can solar power be competitive? The question is still open. It will probably take years to develop the technology to a commercially usable point. At the R&D Center we're working on building applications and new ideas on solar cells and thermal energy storage.

As to using solar energy to create cleaner-burning fuels, much research and process development need to be done.

Solar energy is thus abundant and free, but the investment in conversion equipment is not. It's unlikely that the total annualized cost will be a lot less than today's energy sources. Rising fuel prices will swing the balance more in solar's favor as time goes by.



**GE'ers under arctic ice:** Laboriously chipping through 34 inches of arctic ice, Re-entry and Environmental Systems Division divers joined other biologists and geologists on an expedition to study the effects of oil spills on the arctic ecology. RESD's Chuck Cantrell (below), who made the trip to supervise the dives made with the Division's Mark 10 closed-cycle breathing apparatus, checks a unique underwater habitat.