

FILE NAME: General Electric (GE)

DATE: 1989

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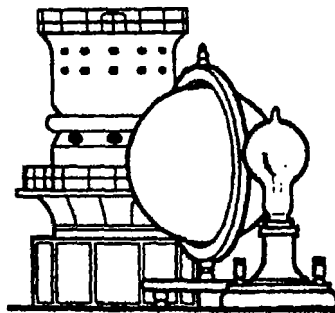
DOCUMENT DESCRIPTION: Book Excerpt - The General Electric Story



The General Electric Story

1876 — 1986

A Photohistory

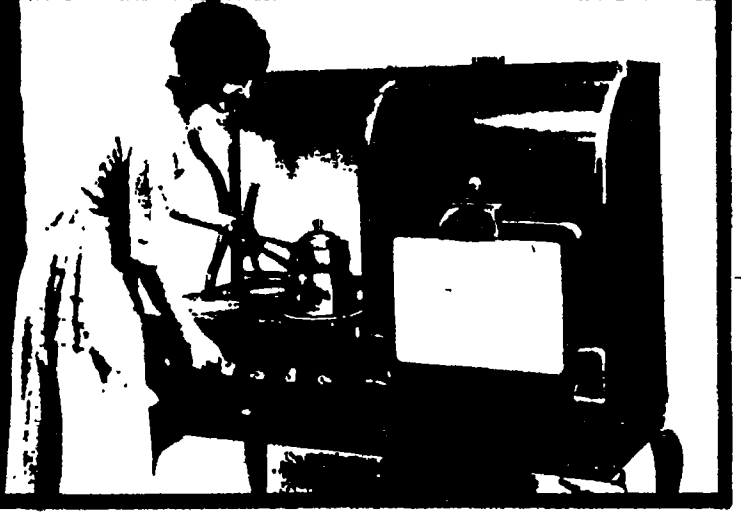
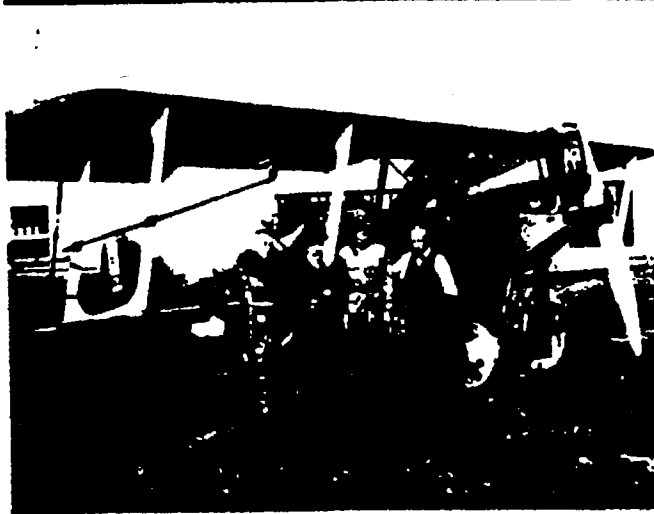
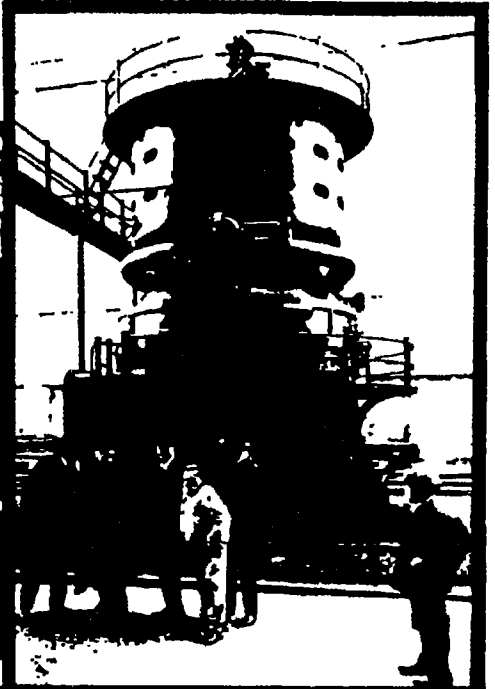


Hall of History
Schenectady, New York
October, 1989
Third Printing — Second Edition

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H437750 1989

THE STEINMETZ ERA

1892-1923



**The General Electric Story
Volume 2**

1915

Lighting

The San Francisco Panama Pacific Exposition is illuminated at night by 48 searchlights having a total capacity of 2.6-billion candlepower. The display is considered the greatest spectacle of illumination in the world.

Transportation

As part of the most extensive steam railway electrification in the world, GE installs the country's first 3000 V. DC line for the Chicago, Milwaukee, and St. Paul Railroad. Forty-two locomotives of 280 tons each are delivered to the railroad. The use of regenerative braking reduces braking problems on the steep grades and improves safety and operating costs.

GE installs its first geared turbines for ship propulsion on the "Pacific".

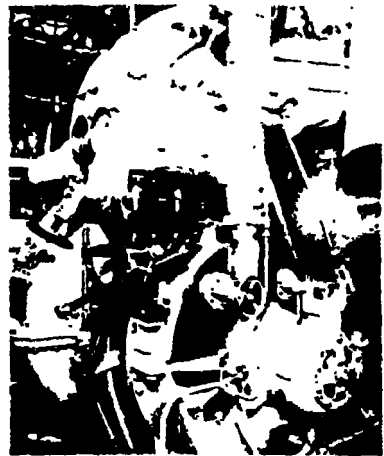
The first "all electric" ship, the 32,000-ton battleship "New Mexico" is launched by the U.S. Navy. Its two turbine driven generators weigh 600 tons each and are rated at 15,000 hp. All vital ship's services are powered by electricity.

Communications

Gasoline-electric generator sets rated at 5-kw are installed on large steamships to provide power for auxiliary wireless service.

Steinmetz Contributions

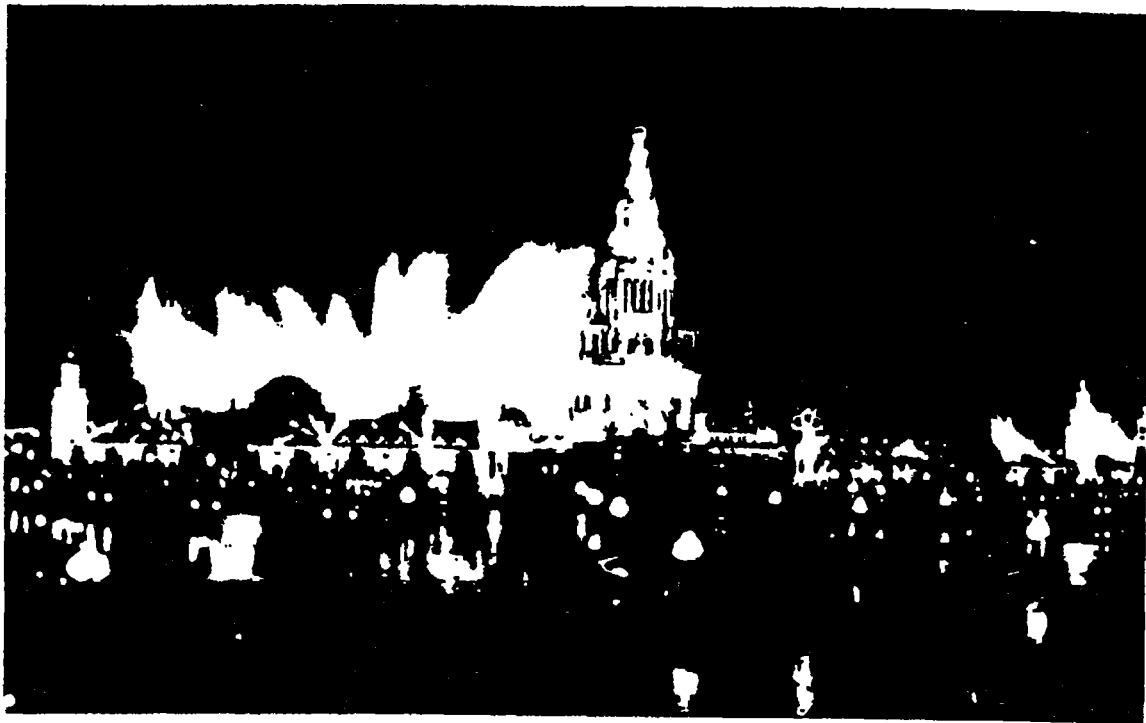
"A New Electric Vehicle: The Dey Electric" New York Times Magazine, 1915. Steinmetz was excited by the prospects of the electric car and consulted with Harry Dey. Unfortunately, the novel design did not survive in the marketplace.



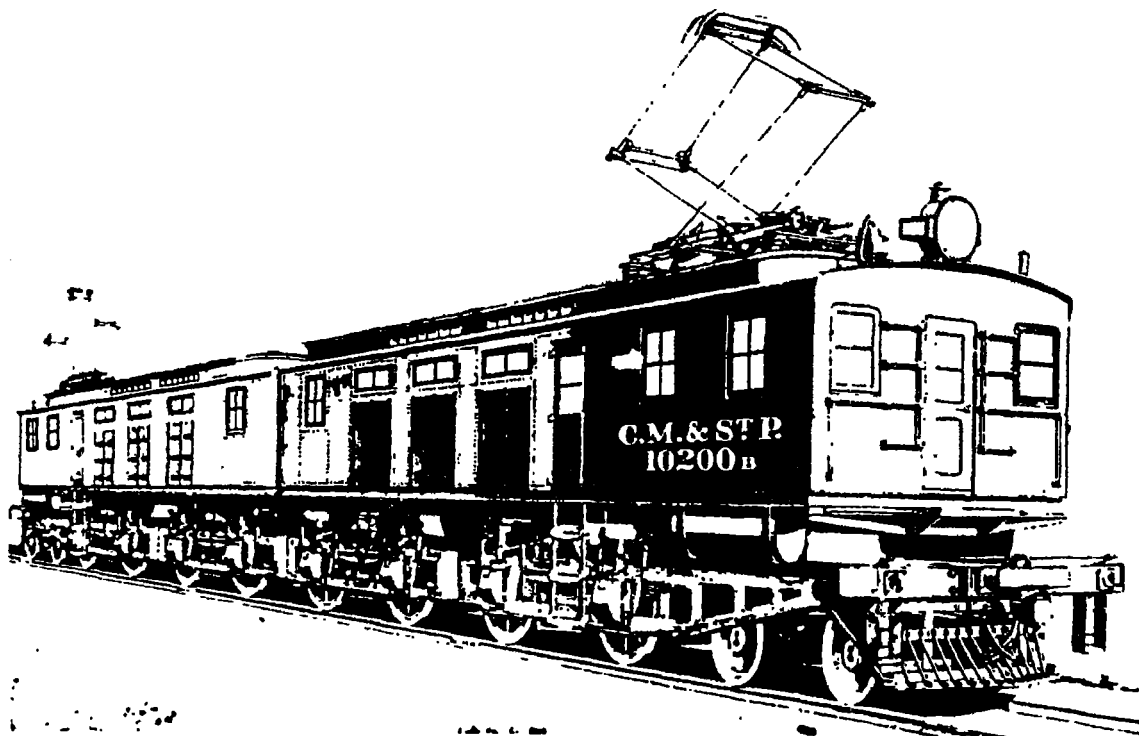
Geared turbine installed on board merchant vessel.



The "all electric" battleship U.S.S. "New Mexico".



The "greatest spectacle of illumination in the world" — at the San Francisco - Panama Exposition.

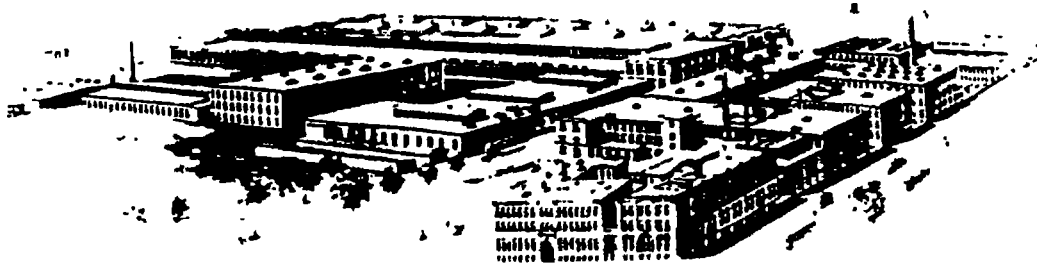


Drawing of GE 260-ton, 3,000-volt electric locomotive for Chicago, Milwaukee and St. Paul electrification.

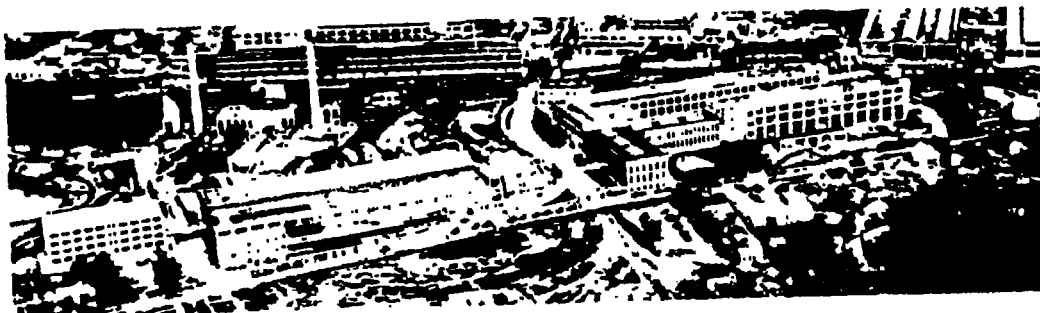
GENERAL ELECTRIC PEOPLE AND PLACES DURING THE STEINMETZ ERA

*A small sampling of the people of the Steinmetz Era and
of the General Electric plants in which they worked.*

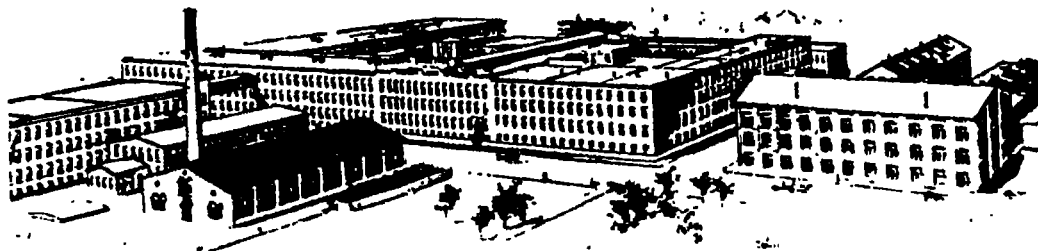




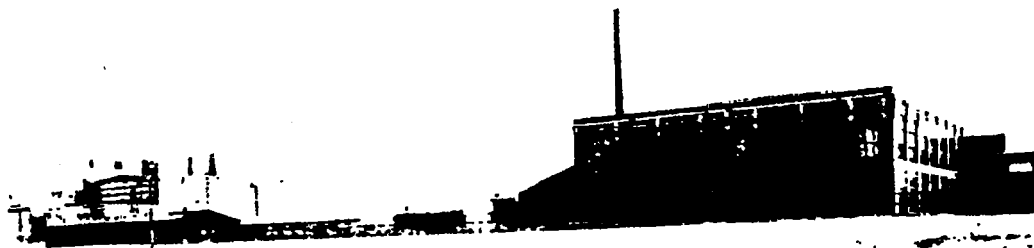
West Lynn Works,
Lynn, Mass.



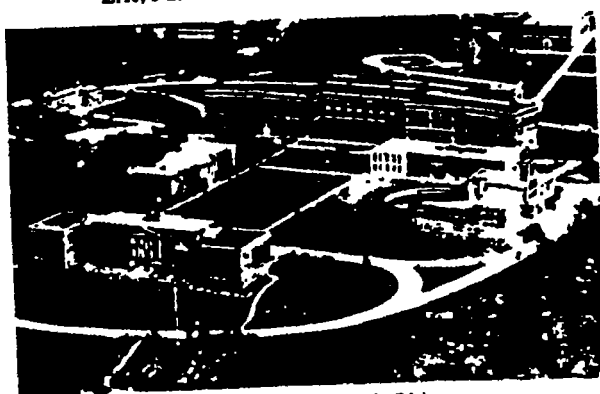
Pittsfield Works
Pittsfield, Mass.



Lamp Works,
Harrison, N.J.



Gray Iron
Foundry,
Erie, Pa.

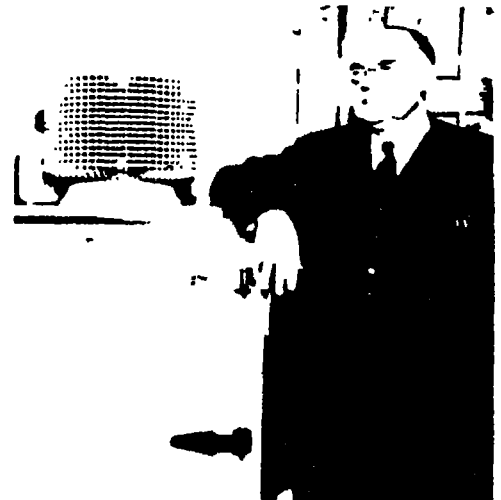


Nela Park, Cleveland, Ohio.



Fort Wayne Works, Fort Wayne, Indiana.

ON THE SHOULDERS OF GIANTS 1924-1946



The General Electric Story
Volume 3

1925



Marvin Pipkin with inside-frost lamp.

LIGHTING

Inside frosting is adopted as a means of reducing glare and improving light distribution in standard light bulbs. An improved method of etching the bulb interiors, invented by Marvin Pipkin of the Nela Park Lamp Development Laboratory, produces lamps which are stronger and easier to keep clean than exterior frosted types.



Early thyatron tube developed by A.W. Hull.

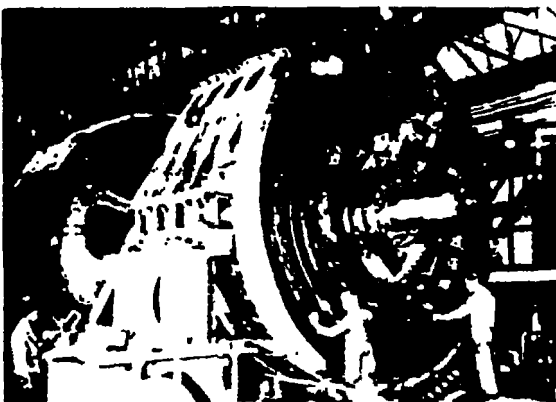
COMMUNICATIONS AND ELECTRONICS

Albert W. Hull dramatically improves the stability of vacuum tubes by the introduction of a screen grid tube, the tetrode. A similar tube was independently invented by Walter Schottky.

The Thyatron, a grid controlled mercury vapor rectifier, is developed by Hull and Irving Langmuir. The tube shows great promise of finding application in electronic control of medium power devices.

INDUSTRIAL EQUIPMENT

The world's largest steel mill motor is built. It is an 8000-hp, 240-rpm unit with higher continuous rating and operating voltage than any other induction motor in steel mill service.



World's largest motor, 22,500 hp, 220,000 lbs, for the "Saratoga"; World's smallest (Arrow), 1/4,000,000 hp, 4 oz.



Aircraft carrier U.S.S. "Saratoga."

TRANSPORTATION

Aircraft carriers U.S.S. "Saratoga" and U.S.S. "Lexington" are launched, each to be propelled by four 35,200-kw steam engine generators supplying power to eight 22,500-hp motor-driven propeller shafts. These 180,000-horsepower carriers are the largest naval vessels afloat.

A Canadian National Railway diesel-electric locomotive makes the longest non-stop run ever made by any engine — 2967 miles from Montreal to Vancouver in slightly under 67 hours, with a top speed of 60 mph. The controls and motors are supplied by Canadian General Electric, Ltd.

The Indianapolis 500 race is won by Peter DePaolo driving a Duesenberg Special with GE supercharger designed by Sanford A. Moss of Lynn's Thomson Laboratory.

MATERIALS

Thoriated tungsten filaments are developed for use in electron tubes. Work by Irving Langmuir at the Research Laboratory resulted in filaments from 8 to 50 times more efficient as producers of electrons than pure tungsten filaments.

"Glyptal" alkyd resins are introduced for paints, bonding laminates, lacquers, sealants and electrical insulation. Expanding on work started in 1912, Roy H. Kienle, J.G.E. Wright and others originated a number of reactions that could be used to produce Glyptals having properties specially tailored to the desired applications.

The first large-scale use of plastics for appliances is introduced when molded phenolic is used for the handle and thumb rest of flatirons. Pittsfield's John DeBell pioneers the large-scale application of phenolic for vacuum-tube bases.

APPLIANCES

GE announces the first hermetically sealed domestic refrigerator. The development of this compact, quiet, low maintenance unit is the result of the combination of many technologies.



Indianapolis 500 winner with GE supercharger. (from left) Sanford Moss, August Duesenberg, R.W. Mercer, F.S. Duesenberg, James Kemp, and Peter DePaolo at the wheel.

AROUND THE WORLD WITH GENERAL ELECTRIC

Japan

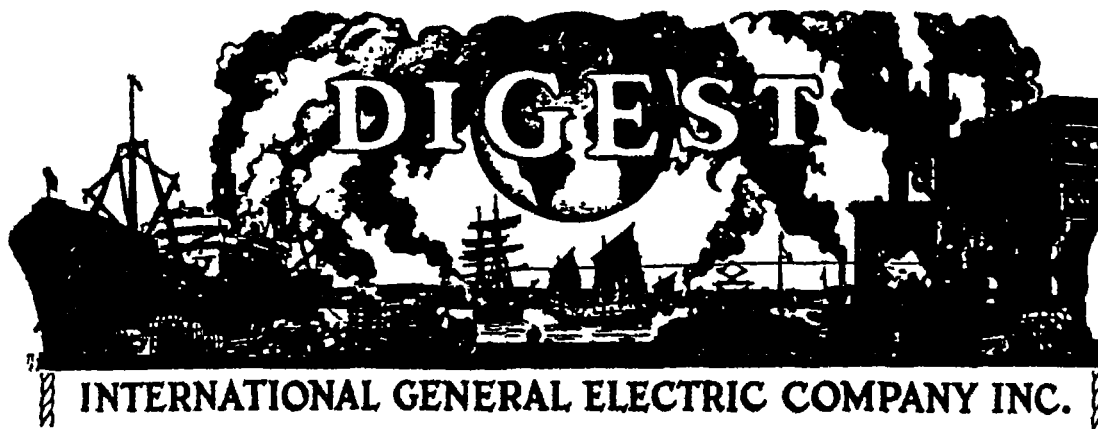
When Tokyo recently opened its new subway, the very first subway in the Orient, the gates were crowded from 6 o'clock in the morning until 12:30 the next morning, when they were closed. Many people stayed around just for the thrill of riding underground for the first time. The turnstiles were furnished through the Tokyo office of the I.G.E. and the cars were run by G-E motors.

Bolivia

Above the clouds in the mountains of South America, at an elevation of 14,000 feet, the Ratio Mines and Enterprises Co. of Bolivia will install 23 switchboard panels. This board which is being built at the Philadelphia Works, will control 10,000-volt incoming line and transformer banks, 3000-volt synchronous motors and 220-volt lighting, small motor, and generator circuits.

India

The selling field of wire and cable is highly competitive. Many firms manufacture it. It is difficult to create an outstanding product. However, the Mysore Government has ordered G-E cable for ten miles of underground service. This is probably a reflection of its confidence in the material and workmanship of G-E products, as similar cable has been furnished by us to this native government before.



1928

Electricity has a mission—to bring more comforts into the daily lives of more people

Russia

The International General Electric Company and the Amtorg Trading Corporation, of New York, announced recently that they had signed, under date of October 9th, a contract covering the supply of electric apparatus for export to the Union of Soviet Socialist Republics (Russia).

The contract provides for the purchase on the part of the Amtorg Corporation of not less than \$3,000,000 or more than \$10,000,000 worth of apparatus and material during the first two years.

England

Following the successful application of turbine-electric drive to approximately 40 American ships, the British have taken up the cue. A 19,000-ton passenger liner, using this means of propulsion, is being built in England for the Peninsula and Oriental Navigation Company, one of the oldest ship-operating companies in the world. This ship, 600 feet long, will be the first large electrically-driven vessel built in Europe. It will operate between ports in England, India and Australia.

Brazil

An order for \$100,000 worth of light was received from Brazil recently. This includes 774 General Electric novalux lighting units, and about 500 standards on which they will be mounted. In addition, the necessary cable, insulators, and other G-E material needed for this installation will be supplied. This is one of the largest orders ever received by the International General Electric. This order not only brings us more work, but shows that G-E products, because of their high quality and the excellent service they give, are gaining steadily in popularity.

Chile

The Chile Exploration Company bought six 70-ton G-E electric locomotives about a year ago, and recently turned in a repeat order for three more. This has made necessary an extension of substation capacity. So the order includes a G-E mercury arc rectifier together with the necessary transformers, switching equipment and an ample supply of spare parts. This apparatus will be installed at an elevation of 9500 feet above sea level.

Canada

In order to transmit power from the new Gaineau Power Company's generating station at Pagan Falls to Toronto, a distance of 250 miles, it has been necessary to use the highest transmission voltage ever used in Canada, 110,000 volts. Twelve transformers for operation at 220,000 volts were supplied by the Canadian General Electric Co., Ltd. Nine of these will step the generator voltage up from 6600 to 220,000 volts, and the remaining three will be used to supply power to the 110,000-volt transmission system.

France

In spite of high import duties and shipping costs, G-E equipped products are being shipped in ever greater quantities abroad. This alone is a high compliment to the quality of our products and would seem to indicate that they are more highly efficient and economical than those of our European competitors. A whole carload of washing machines and ironers, all fitted with G-E equipment, was recently shipped from Chicago to the French Thomson-Houston Co.

EXTRACTS FROM FT. WAYNE WORKS NEWS — 1928

Keep thy Shop and
[The Sayings of



thy Shop will keep thee
Poor Ric' . . .]

Just Published
for 1931
AN
Almanack

containing wise, thought-
provoking suggestions
for modernizing industrial
plants and published in
the firm belief that a penny
spent on modernization
to-day will be worth
ten pennies spent to-
morrow.



Instead of saying, "I can't use a synchronous motor here because I don't want it to stop at every voltage disturbance," call in the G-E sales engineer and ask him to show you the G-E time-delay devices which keep not only these motors, but all induction motors, on the line for all temporary voltage dips.



If power conditions in your plant will stand full-voltage starting, there are a number of G-E motors now available for this service that will greatly simplify your control equipment.



Continued bearing trouble was traced to an un instructed night man who stopped off the belts by mishandling the starter and kept tightening them up to make them stay on. A G-E magnetic starter would have saved six months of trouble.



A certain group drive required 164 large bearings and 3600 feet of heavy belting. It was replaced by G-E individual direct-motor drive with 20 small bearings. Maintenance dropped from 65 cents to 12 cents per ton of product.



High power-factor is as beneficial to the plant as to the vendor of electricity. In many cases, the G-E sales engineer can show you how to pay for "leading-power-factor" synchronous motors out of the economies that follow their installation.



A New England manufacturing plant modernized its heat-treating department, at the suggestion of a visiting G-E bearing specialist, by replacing four old fuel-fired, batch-type furnaces with a G-E automatic electric conveyor furnace. Handling costs dropped 60 per cent, production was tripled, the products were much improved, and the former high maintenance costs dropped out of the picture.



Hundreds of plants are going "out of the red" and scores of little plants are growing big because they called in the G-E arc-welding specialists to help them modernize their products with arc welding—the greatest of modernization tools. It's almost impossible to strike an arc without improving design or cheating the scrap heap with a next repair.



No better time to replace those old, inefficient blowers in the forge shop with modern G-E blowers that speed up production by maintaining uniform pressure on each furnace and reduce power costs because they are so efficient. Also, the operation of your cupolas can be greatly improved, and a substantial saving in coke effected, by installing a G-E cupola blower with automatic blast-gate control.



Give your plant engineer some G-E Thyatron or photoelectric tube equipments to play with and you'll be surprised at the number of places where he can use them to speed production, simplify control, and cut costs.



After you've replaced a stripped pinion on a motor shaft a few times, ask the G-E sales engineer to send you a Fabrol or a Tensolite pinion. They outlive most other pinions by wide, wide margins. They practically eliminate noise, too.

Modernization Reduces Costs — Increases Profit

There are any number of ways in which the G-E sales engineer can help you to modernize. Ask him about them when he calls; or write the nearest G-E office.

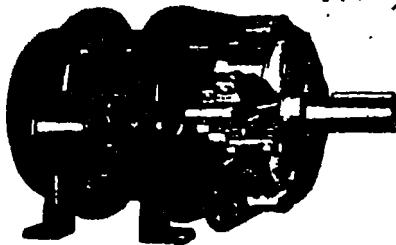
GENERAL  ELECTRIC

This advertisement, which appears this month in twenty industrial magazines reaching more than 243,000 men throughout the nation's industries, is part of the "Promote Modernization" campaign being conducted by the Industrial Department

1932



World's largest lamp, 50,000 watts, and smallest, "grain of wheat" lamp used in surgical instruments.



Cutaway view of typical GE gear-motor.

LIGHTING

The mogul "bi-post base" lamp is devised by Daniel K. Wright of the Lamp Development Lab. By using two heavy metal prongs as the lamp's base and as its electrical connections, stronger units can be constructed for high power lighting applications in the 10,000, 20,000 and 30,000-watt range.

Photoflood lamps are developed by Gwilym Prideaux and others at Nela Park. The low-cost bulbs produce high light intensities for 3-10 hours and are designed for photography and other short duration uses.

INDUSTRIAL EQUIPMENT

Gear motors for slow-speed drives from 600 to 13 rpm are introduced in 3/4 hp to 75 hp sizes to provide industry with compact, easily installed drives.

APPLIANCES

The GE oil burning furnace is placed in production. Burner units are manufactured in Schenectady, boilers in Pittsfield, and the complete heating package is assembled in the customer's home.

The Air Conditioning Department is established to handle electric devices for home heating, humidifying and temperature control.



New year-round room air conditioner.

GE oil-burning furnace.

The first GE dishwashers are marketed. Consumer financing by the General Electric Contracts Corporation is made available to meet the widespread demand for the great variety of new electric appliances.

T. S. Fuller, Roy Moore and Louis Navias of the Research Laboratory develop a motor-driven razor sharpener.

MATERIALS

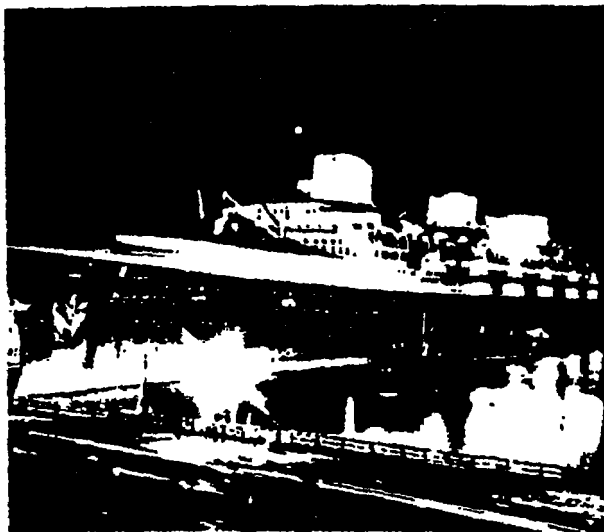
The Pittsfield Works announces the use of "Pyranol," a family of organic liquids having superior dielectric insulating properties, which make them particularly suitable for capacitors of large size. Frank M. Clark of the Works laboratory was principally responsible for their development.

TRANSPORTATION

The French superliner "Normandie" is launched, propelled by four of the most powerful motors ever built — 40,000 hp each, manufactured by GE Associate, Als-Thom, in France. This 1029-foot ship is the largest commercial vessel in the world and is destined to usher in a new era of superliners.

ORGANIZATION

Willis R. Whitney retires from his position as Director of the Research Laboratory and is replaced by William D. Coolidge.



The liner "Normandie" — propelled by four of the most powerful electric motors ever built.

Dr. Whitney Retires? Pooh!

Under the above heading, the *New York Sun* of November 1, 1932 said, editorially:

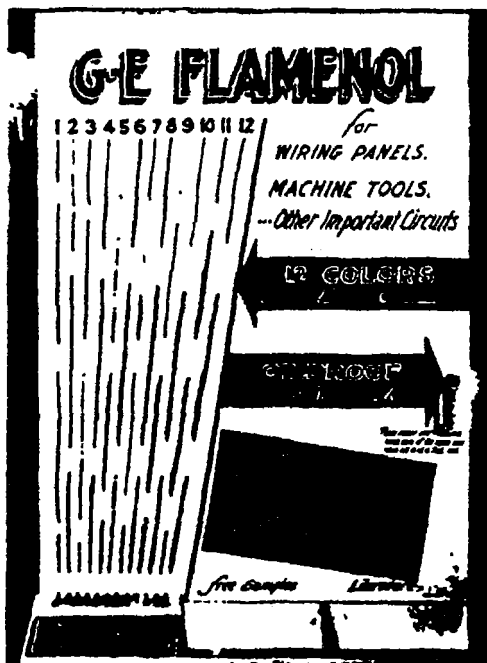
"The General Electric Company announces that Dr. Willis R. Whitney has retired." It means that he has been relieved of the obligations that devolve on the head of its research laboratory. In one of his numerous enlightening asides Dr. Whitney, speaking for humanity at large, has said that 'we are lamentably bound by words.' The corporation bulletin illustrates the truth of his incidental declaration.

"Dr. Whitney in seclusion, Dr. Whitney in retreat, Dr. Whitney withdrawn from circulation — these are unthinkable. The Whitney intellect has served knowledge too long to be suspended in its operations by a mere rearrangement of opportunities. The Whitney curiosity has so persistently projected into the abyss of man's ignorance that no shifting of titles can restrain it from future excursions into that fascinating, unplumbed gulf. The Whitney utilitarianism is too robust to be manacled by assignment to non-routine duties. The Whitney spirituality is too pervading to be definitely engrossed on a scroll and filed away in a cabinet, no matter how artistically the engrossing be done or how elegantly the cabinet be fashioned.

"And, ultimately, Dr. Whitney possesses a sense of humor and a quality of wit which veto the notion that a useful man should or can retire."



1936



LIGHTING

The coiled-coil filament lamp is introduced in standard lamps. First patented in 1917 by B.L. Benbow, the double coiling of the tungsten filament increases the efficiency of a 60-watt lamp by more than ten percent.

The San Francisco-Oakland Bay Bridge is opened in California, lighted by more than 1000 GE sodium luminaires.

MATERIALS

Flamenol®, a non-combustible, oil- and moisture-resistant insulation is developed for copper conductors used in home and industrial wiring. The new polymer, made by plasticizing polyvinyl chloride, was perfected by J.G.E. Wright, Moyer M. Safford and others under the direction of A. Lincoln Marshall, head of the Chemistry Section at the Research Laboratory.

Molding of wiring devices is begun at its Providence, R.I., plant by GE affiliate Monowatt Electric Co. The corporation was formed primarily to meet the rapidly growing chain store market for consumer wiring materials.

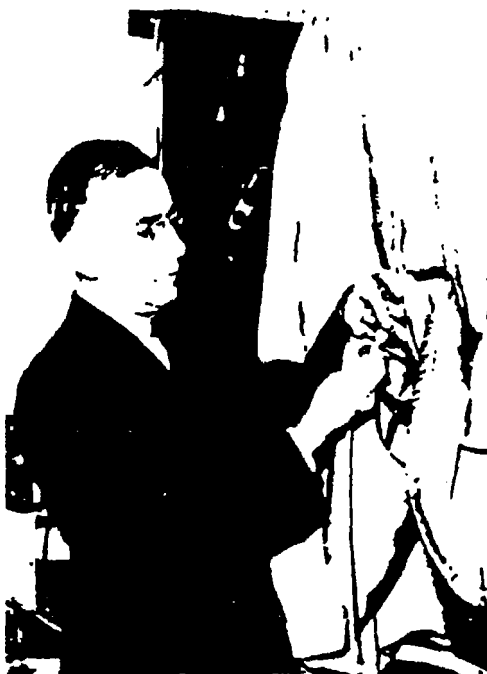
John H. Payne invents the "silent" mercury switch for home use. The mercury makes contact between metal caps through an opening in a ceramic barrier invented by Louis Navias.

APPLIANCES

W.K. Kearsley of the Research Laboratory invents the electric blanket. The first model consists of two sheets sewed together with flexible insulated copper wire between them. Kearsley had also invented a vascular exercise machine designed to help improve blood circulation in the legs of arteriosclerosis patients.

TRANSPORTATION

The Erie Works is building another "world's first" for the Union Pacific Railroad. It is a locomotive with a closed high pressure steam boiler-condenser-steam turbine system, whose steam is condensed to water for re-circulation, eliminating the need to stop en route to replenish water.



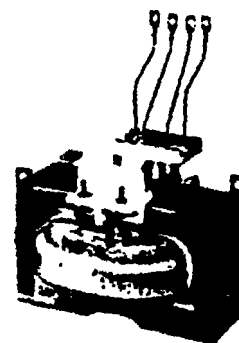
W.K. Kearsley and electric blanket.

1937

POWER GENERATION AND DISTRIBUTION

The first hydrogen-cooled turbogenerator built for commercial service is constructed for the Dayton Power and Light Company. This 3600-rpm generator is rated at 31,250 kva.

New "Spirakore" distribution transformers are designed with machine-wound steel ribbon replacing hand assembled laminations.



"Spirakore" distribution transformer, internal structure.

APPLIANCES

A new assembly line for the large scale production of electric washing machines is placed in operation at Bridgeport, Connecticut.

A high-sensitivity photo exposure meter is marketed by GE. Combined with photoflash bulbs introduced a few years earlier, it makes possible significant improvements in home and professional photography.

TRANSPORTATION

Over a mile of continuous rail track is formed by flash welding the ends of rails. This joint development of the Delaware and Hudson Railway, Sperry Products, Inc. and GE portends smoother, safer riding and fewer maintenance problems.

Howard Hughes sets a transcontinental air record of 7 hours, 28 minutes, 25 seconds. The GE supercharger helps make this historic flight possible.

ELECTRONICS

The first AC network analyzer is built to simulate electric utility power systems and will provide a speedy measurement method of power flow analysis in place of the old longhand calculations.



The GG-1 for the record-breaking Pennsylvania Railroad electrification.

MATERIALS

A.W. Hull and others at the Research Laboratory develop Fernichrome and Fernico alloys for glass to metal seals used in vacuum tube constructions. Because the coefficients of expansions of the alloys are close to those of the glasses used, strains at the points of sealing are eliminated, and the dangers of seal failure are greatly reduced.

INDUSTRIAL EQUIPMENT

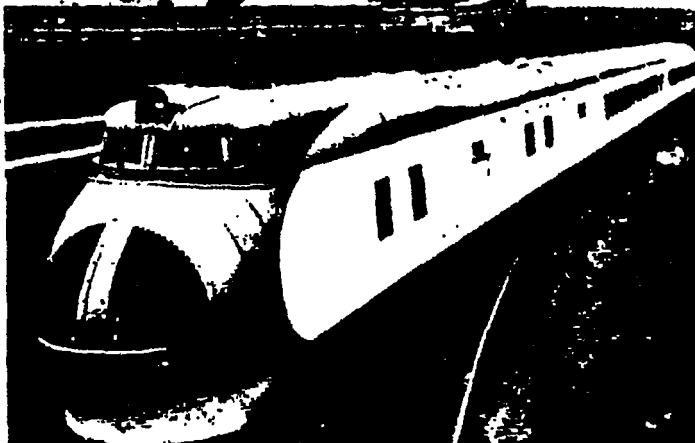
A GE-powered "lift and turnover" car dumper placed in service on Lake Superior can pick up a 95-ton car and empty its contents into the hold of an ore carrier in a minute.



95-ton electric car dumper on the Great Lakes.



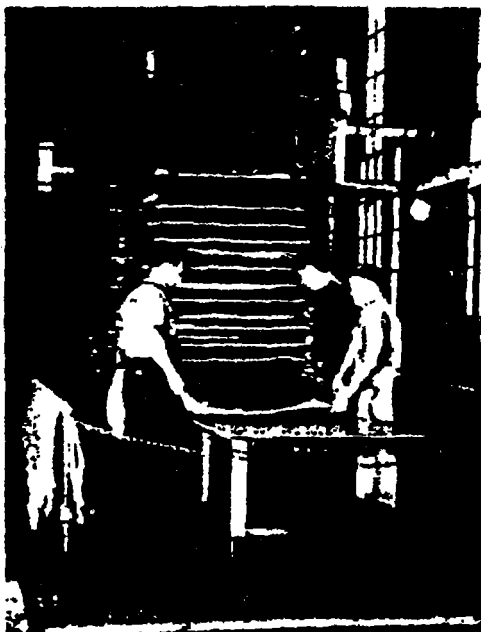
Chicago, Burlington and Quincy "Zephyr" diesel-electric locomotive.



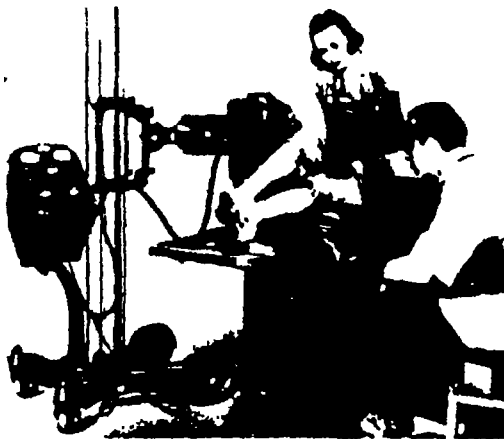
The Union Pacific "City of Los Angeles" diesel-electric locomotive.

THE STREAMLINERS ARE HERE!

1941



Producing Textolite sheet for a variety of industrial uses.



Mobile X-ray unit for medical use.

LIGHTING

"Black light" lamps are placed in production. The ultraviolet radiation produced by these low luminosity lamps can activate fluorescent materials, causing them to glow brightly.

George Inman is granted a U.S. patent for the basic principles of fluorescent lamp design. (see 1936)

MATERIALS

It is announced that General Electric is the largest producer of finished plastics in the United States.

TRANSPORTATION

GE-designed turbosuperchargers for aircraft engines are manufactured at its plants at Ft. Wayne, Indiana, and Everett and Lynn, Massachusetts. From 1925 through this wartime period, GE has been practically the sole supplier of impellers for all of the Wright and Pratt and Whitney engines.

The new battleship "North Carolina," the largest U.S. warship, is launched; equipped with GE propulsion, she is expected to develop 115,000 hp and have a speed of more than 27 knots.

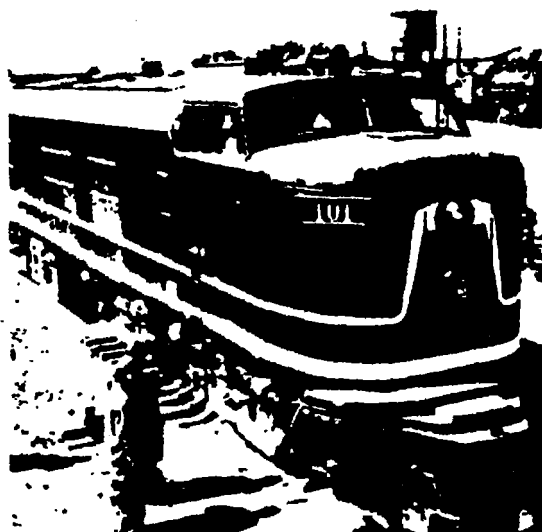
INDUSTRIAL EQUIPMENT

GE installs a 1,400,000-volt industrial inspection X-ray machine for the U.S. Bureau of Standards. By using a gaseous insulating medium in place of oil, a sizable reduction in the physical size and weight of the unit is accomplished. Similar high-voltage X-ray machines are used for treatment of deep-seated cancers.



Million-volt X-ray unit for inspecting castings.

1948



Alco-GE 4500-hp gas-turbine locomotive.

TRANSPORTATION

The first American gas-turbine electric locomotive, an Alco-GE 4500-hp unit, begins track tests at the Erie plant prior to shipment to the Union Pacific Railroad.

A new "supertanker" is launched. This ocean-going giant is powered by a GE turbine operating at the highest combined steam temperature and pressure ever used in a merchant ship and capable of delivering 12,500 horsepower.

LIGHTING

A new fluorescent lamp is developed to provide the same light for only 85 watts that the former lamp gave for 100 watts. Responsible for the increased output is the use of the rare gas, krypton, in place of argon which had previously been used.

MEDICAL EQUIPMENT

Largest of its kind in the world, the William D. Coolidge Laboratory of the General Electric X-Ray Corporation is dedicated to commemorate and perpetuate the tradition of x-ray development symbolized by its namesake.



William D. Coolidge (c.) inventor of the modern type of x-ray tube, and his wife Dorothy (r.) at dedication of new Coolidge X-Ray Laboratory with Dr. A.C. Christie (l.), nationally known radiologist.



I-50 watt-hour meter, with disk and shaft suspended magnetically.

INDUSTRIAL EQUIPMENT

A new 66-inch reversing hot strip mill produces steel strip at the record speed of 3900 feet per minute using GE motors and a new magnetic side register control which automatically guides the strip along its predetermined path.

The first completely new watt-hour meter in 50 years, the type I-50, is introduced. Its magnetic suspension virtually eliminates the wear problems associated with conventional bearings and results in an estimated life of over 60 years, eight times the service expected of conventional meters.

POWER GENERATION

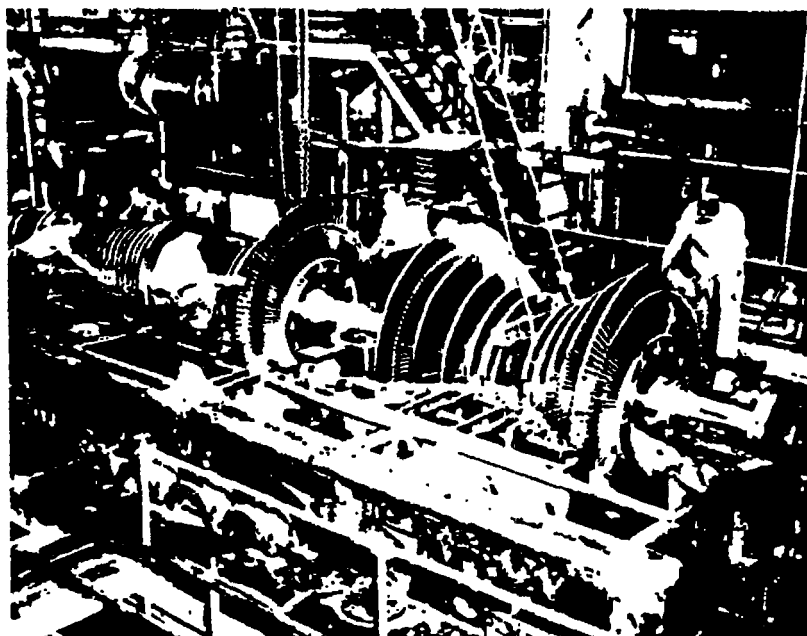
A 100,000-kilowatt turbine generator is put into service at the Sewaren, New Jersey, station of the Public Service Electric and Gas Company. Operating at 1050 °F, it is the largest of its type in the world.

The Knolls Atomic Power Laboratory (KAPL) initiates the use of digital computers for the design of naval propulsion reactors. KAPL was organized at Schenectady, New York, two years earlier for the purpose of developing nuclear reactors for the U.S. Atomic Energy Commission. (See Volume 3)



ISAAC F. KINNARD

As manager of engineering for the Meter and Instrument Dept. from 1930-1946, Kinnard had a profound influence on the growth of watt-hour meters and electrical indicating instruments. The analysis and reduction of watt-hour meter errors resulted in many of the most accurate meters in use today.



Rotor for 100,000-kw turbine-generator being lowered into position.

1949



Experimental model of "heat pump" unit for year-round air conditioning.

APPLIANCES

Ten experimental models of the "heat pump" are installed around the country as GE engineers test the system's capability for year-round air conditioning. The heat pump works like a refrigerator, reversible to pump either warmed or cooled air into the house at the turn of a switch.

MATERIALS

Man-made mica paper insulating tapes are introduced by the Insulating Materials Department. The precise control of thickness and porosity in the paper-making process produces an insulation with superior high voltage and high temperature capabilities.

INDUSTRIAL EQUIPMENT

The first successful molded instrument transformer, Type JKM-3, 5 kv, is introduced. A new formulation of butyl rubber molding compound and new molding techniques make possible exceptional indoor and outdoor stability.



Molded instrument transformer proves its durability in steam-chamber test.



Marvin Pipkin of Nela Park compares the even diffusion of "Soft White" lamp, on left, with standard frosted lamp on same wattage, on right.

LIGHTING

The Q-coat process, developed by Marvin Pipkin of Nela Park, results in an improved household lamp known as the "Soft White." By coating the inside of incandescent lamp bulbs with tiny particles of silica, the process provides an excellent light diffuser and reduces glare with almost no loss of light.

TRANSPORTATION

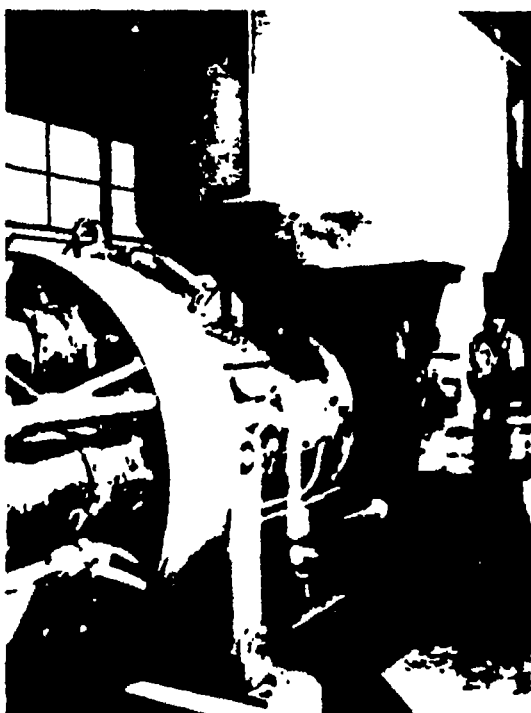
Driven by six J35 jet engines, a Boeing XB-47 Stratojet bomber averages 607 miles per hour and sets a new coast-to-coast speed record of three hours and 46 minutes. The new J47 turbojet will boost the Stratojet's total power by 25 %.

JULIUS H.E. HAGENGUTH

An international authority on lightning and high voltage phenomena, Julius Hagenguth developed basic information on methods for lightning protection of rotating equipment connected to power transformers. He played a major role in the development of plans for Pittsfield's new High-Voltage Laboratory, built in 1949.



Lightning strikes the Empire State Building during high voltage tests by Pittsfield's High Voltage Laboratory.



First gas turbine for power generation in the U.S.

POWER GENERATION AND TRANSMISSION

The first gas turbine for power generation, the GE MS3001, rated at 3500 kw, is shipped to the Oklahoma Gas & Electric Company's Belle Isle Station. One innovation is the use of the exhaust to preheat the boiler feed water for a 52,000-kw steam station.

Completion of the new High Voltage Laboratory in Pittsfield gives GE the world's most modern facility to understand the effects of lightning and switching voltage on power equipment.

The largest industrial building constructed after World War II is occupied by the Steam Turbine Department in Schenectady. Floor space of the new facility extends over more than twenty acres.

1950-1951

NATIONAL DEFENSE

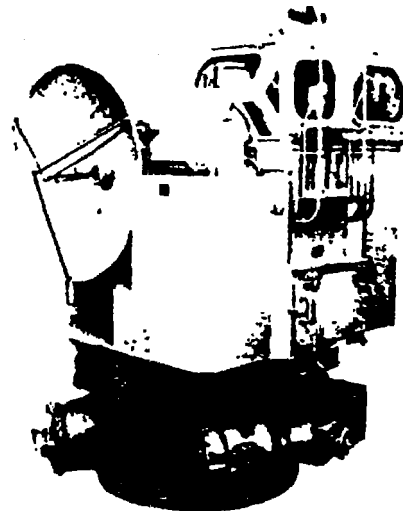
The Korean War starts and the Ordnance Systems Department begins production of the MK 56 gunfire control, the first fully automatic system to become a vital part of the Navy's anti-aircraft strength.

INDUSTRIAL EQUIPMENT

The successful development of a commercial xerographic unit by Haloid (forerunner of the Xerox Corporation) results in the first production of copy machine power supplies by the Specialty Transformer Department.

Design and material improvements result in $\frac{1}{2}$ -hp motors that are smaller and weigh almost 50% less than similarly rated units manufactured twenty years earlier.

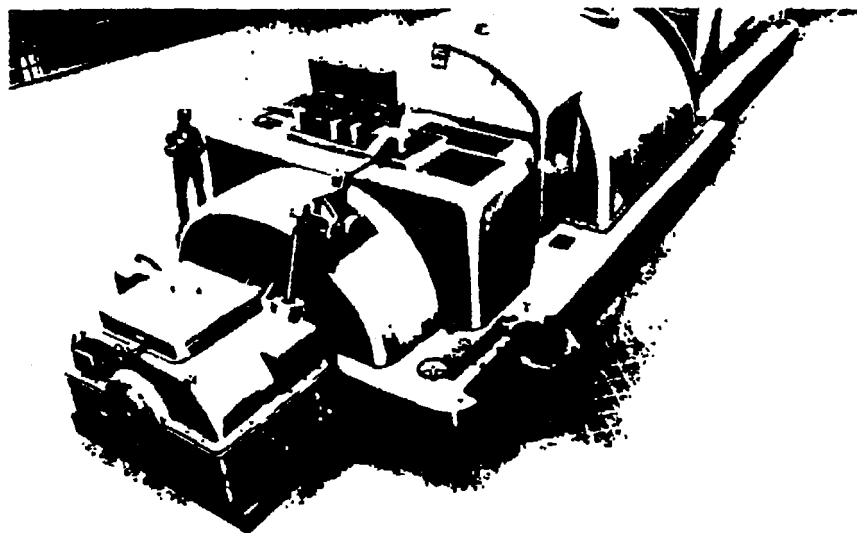
Two 65,000-hp synchronous motors, the world's largest, are installed at the pumping plant of the Grand Coulee Dam.



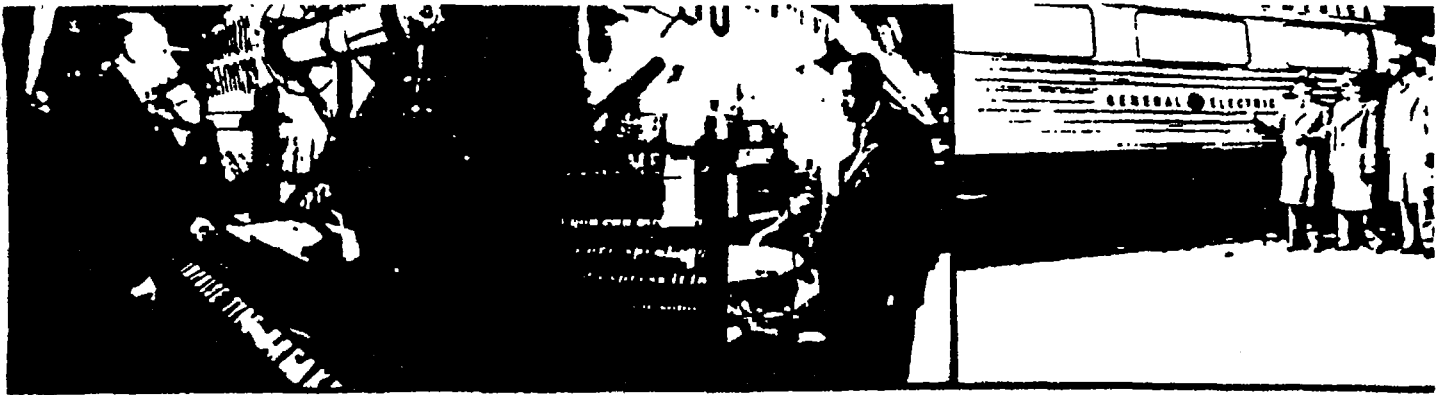
Pittsfield-built MK 56 gun director.

POWER GENERATION

The Steam Turbine Department delivers the first single shaft 3600-rpm, double-flow, reheat steam turbine-generator to the Dunkirk, New York, station of the Niagara Mohawk Power Company. The 80,000-kw unit introduces a unique construction which is especially compact and efficient.



80,000-kw, single shaft, double-flow, steam turbine-generator for Niagara Mohawk Power Company.



THE MORE POWER TO AMERICA SPECIAL

General Electric's "More Power to America Special," a ten-car exhibit train, begins a nationwide tour which will continue through 1950 into 1951. Visiting principal industrial centers, it displays opportunities which the electrical industry offers for increasing the nation's productivity. The quarter-mile long travelling showcase, of which the 4500-hp diesel-electric engine itself is a part, contains more than 2000 products and ideas for commerce and industry, for civic improvement, and for national defense.

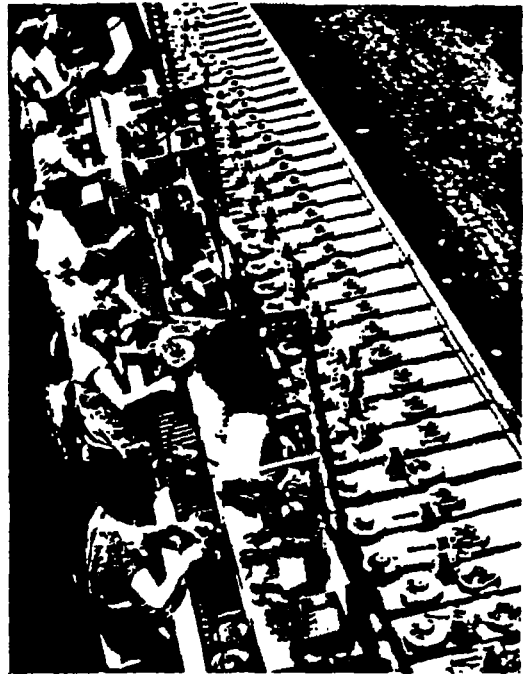


1952-1953

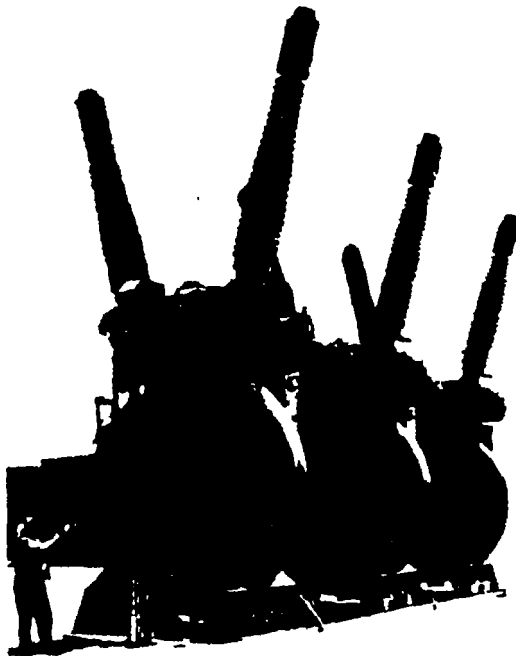
INDUSTRIAL EQUIPMENT

Canadian General Electric develops electrical equipment for the world's largest hydraulic dredge.

The new Form "G" line of fractional horsepower motors is 25 to 50% lighter and up to 40% smaller than previous motors of similar power ratings.



Matching motor parts at Taylor Street plant, Ft. Wayne, Indiana.



World's largest circuit breakers for 300,000-volt transmission line.

POWER GENERATION AND TRANSMISSION

KAPL, under the direction of the Division of Naval Reactors, AEC, develops the major containment concept for nuclear reactors, including the philosophy and equipment for design safety. This concept is used to design the West Milton Hortensphere which houses the prototype plant for the submarine Seawolf.

The Switchgear Department builds the world's largest circuit breakers for a 300,000-volt transmission line, highest in the United States.

Research and development leading to the reduction of power losses in steels for transformers results in a power transformer weighing 35 tons less than similar units of half the capacity shipped only three years earlier.

The first regenerative cycle heavy-duty gas turbine, the MS3002, rated at 6200 hp, is delivered to the El Paso Natural Gas Company's Pecos River Station in New Mexico. It will be used to provide power for natural gas pipeline pumping.

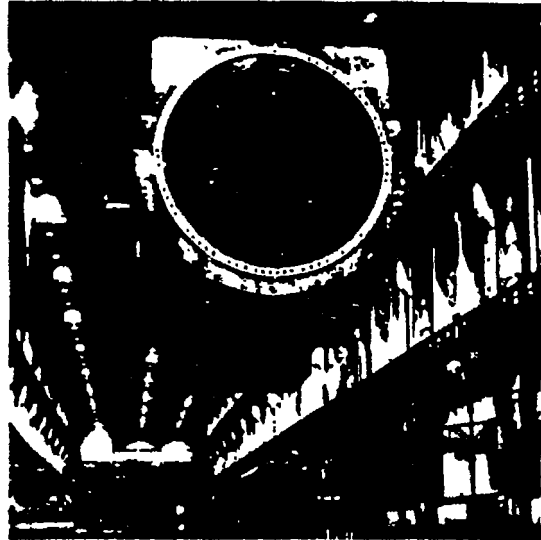
1955

POWER GENERATION

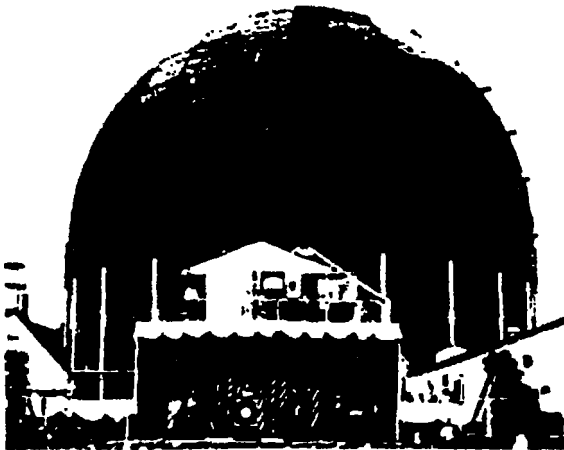
America's first commercial nuclear power is distributed over the Niagara Mohawk Power Company system. A GE turbine-generator and the Seawolf submarine nuclear reactor prototype are used to produce electric power from a plant at West Milton, New York.

A new air-blast circuit breaker for 138,000-volt transmission lines is the first of its rating in the U.S. It uses high-pressure compressed air to "blow out" a hot electric arc and, for a split second, interrupt flow of electricity when lightning strikes or a fault occurs on a transmission line.

The first large generator with liquid cooled stator is completed by the Turbine Division. Rated at 260,000 kva, the unit is capable of supplying the household electrical needs of 700,000 people.



Portion of 260,000-kva generator with liquid-cooled stator.



Ceremonies marking first commercially distributed nuclear power at West Milton, New York.

KENNETH A. KESSELRING

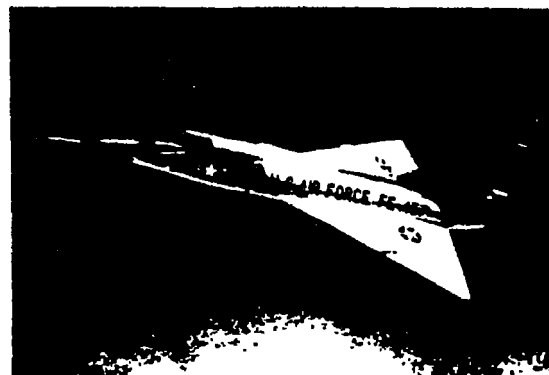
At the Knolls Atomic Power Laboratory, "Kess", was a man whose organizing abilities and technical contributions played a major role in many early successes in atomic power development. His involvement in the development of nuclear propulsion plants for the submarine Seawolf and the destroyer Bainbridge contributed to the foundations for GE's participation in the growth of the nuclear Navy.



NATIONAL DEFENSE

The free world's largest, most powerful radar is installed in central Turkey for the U.S. Air Force. The GE FPS-17 radar is part of the Air Force's SPACETRACK global surveillance system.

As part of Project SABRE, a major effort in upgrading the radar of the U.S. fighter aircraft, Aerospace Electronic Systems Department equips the F-106 all-weather interceptor with its advanced electronic counter-countermeasures equipment.

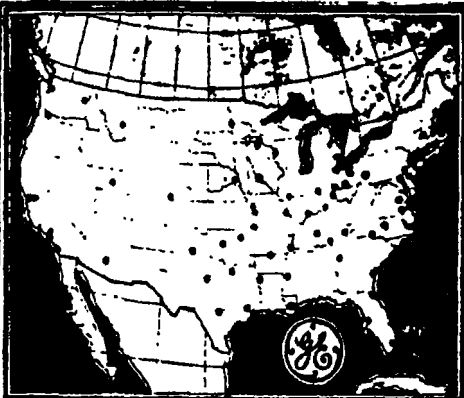


F-106 all-weather interceptor carries Project Sabre with electronic counter-countermeasures equipment.

DISTRIBUTING THE PRODUCTS OF TECHNOLOGY

THE SATURDAY EVENING POST

143



POINTS INDICATE LOCATION
of GENERAL ELECTRIC SUPPLY CORPORATION
HOUSES

*EVERY COMMUNITY which has
electric service is within easy reach
of a supply instance of one of these points*

Helping to fulfill Edison's Dream

WHEN THOMAS ALVA EDISON developed the first practical incandescent lamp, he made possible the many economic, social and industrial benefits which we now enjoy because of increased hours of light.

It is for this outstanding achievement that we today pay homage to the great inventor.

However, Mr. Edison's original contributions to lighting did not stop with the invention of the lamp. In common with many other pioneers, he found his first contribution of limited use until other problems had been solved. One of the most important was the development of a comprehensive system of distributing electric current, which would make possible the widespread use of the lamp he had created.

These great fundamental accomplishments

largely furnished the foundation for electric service as we know it today.

Fifty years ago this problem of electrical distribution was one of the greatest confronting the infant industry. Today that industry, grown to great proportions, is again faced with a problem of distribution, but of a different kind—the problem of prompt and economical distribution of electrical supplies and appliances.

The General Electric Supply Corporation, a national wholesale distributing organization, extends sincere congratulations to Mr. Edison, and pledges its best efforts, and those of the General Electric Company which stands back of it, to the performance of its part in the great task of bringing the blessings of electricity to the American people.

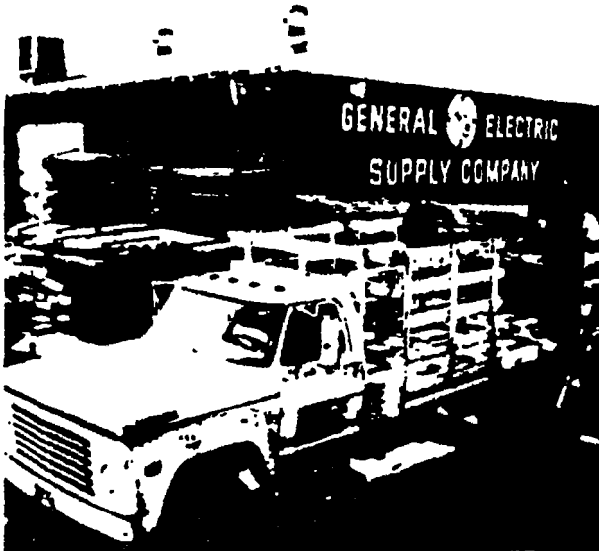


GENERAL ELECTRIC SUPPLY CORPORATION
Main Office: Bridgeport, Conn.

101 429
Saturday Evening Post, October 19, 1929

Electrification in the United States saw one of its most rapid periods of expansion during the decade after World War I. In 1919, 24% of America's homes were served by electric lines. By 1929, the number had grown to 63% and the increased need for electrical supplies in the newly equipped households presented General Electric with an opportunity to create a nationwide distribution network. In October, 1929, fourteen company-owned distributors and their 76 outlets were merged to form the General Electric Supply Company (GESCO). Headquarters were established at Bridgeport, Connecticut, with Gerard Swope chairman of the Board and C.E. Patterson president and director. Another director was Charles E. Wilson.

GENERAL ELECTRIC SUPPLY COMPANY



GESCO's network of supply houses, such as this one in Phoenix, Arizona stock over 85,000 different items.

In 1956, GESCO became a division of the Company, and two years later a young GE executive named Reginald H. Jones was appointed general manager. During the six years that he led GESCO, it experienced record growth and became firmly established as a full-functioning wholesale distributor of lamps, lighting equipment, electrical apparatus and supplies manufactured by GE and over 3000 other companies.

In 1976, GESCO's business took on an international flavor when the Saudi Electric Supply Company in Alkhobar, Saudi Arabia became an authorized distributor. Distribution centers were also opened in Riyadh and Jeddah.

In 1978, GESCO entered the Caribbean market in Puerto Rico by assuming responsibility for General Electric del Caribe, Inc.

The General Electric Supply Company ranks high as one of the lesser known segments of General Electric. But it occupies a unique position in which it purchases products from some 46 GE manufacturing departments and seeks opportunities to sell its merchandise to all of GE's plants as well as to outside companies. Its 3300 people in 183 distribution centers in the United States and in growing international markets have built an unchallenged reputation for service to the customer and have made significant contributions to the Company's growth.



GESCO sales representative reviews customer's needs outside the world's largest underground mine in San Manuel, Arizona.



GESCO in Saudi Arabia.

1956

ORGANIZATION

The General Electric Management Development Institute is opened at Crotonville, New York. It resulted from a three-year investigation initiated at the request of Ralph Cordiner who saw the need to develop an expanded number of managers trained in additional skills to satisfy the requirements of the new decentralization program and to meet the predicted growth of the Company. From 1956 until 1961 over 1500 managerial and professional employees participated in the Advanced Management Course. It was unique in the industry for its scope and length, and its approach to managerial work. During the same period, the Institute trained over 500 course leaders for the Professional Business Management Course conducted at many of the Company's locations.

Over the years, activities at Crotonville have reflected changing concepts in education and in management techniques and philosophy. Executive education programs have been complemented by learning opportunities specifically appropriate to the individual's level of responsibility in a wide variety of disciplines.

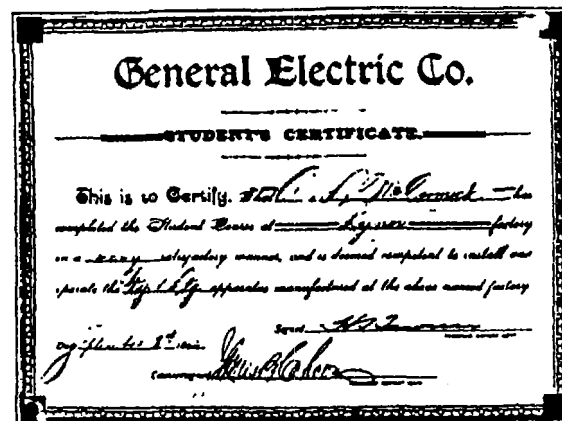
A TRADITION OF EDUCATION

The recognition of the need for continuing, post-school education goes back to the earliest days of General Electric, when the Experts Course was organized to develop engineers who could deal with the new technologies that produced the Company's products. This was followed by the Apprentice Course, the Test Course, organized by Albert Rohrer; and the Business Training Program. "Test" as it is fondly and proudly referred to by its alumni, offered technically trained college graduates opportunities for a series of assignments at a variety of Company locations, augmented by formal classroom education, before a decision would be made on career concentration. Later, the Advanced Engineering Program was formulated to develop problem solving and analytical capabilities at levels equivalent to graduate engineering school educations. In the 1970's a number of programs were established which combine the best features of "Test", for example, with those of other courses of study in technological areas. The Edison Engineering Program is the most recent of such programs. The same has been true of non-technical areas - as exemplified by the Financial Management Program, which has provided individuals with a broad base of familiarity with the Company's diversified operations, and has been a training ground for many of its business leaders.

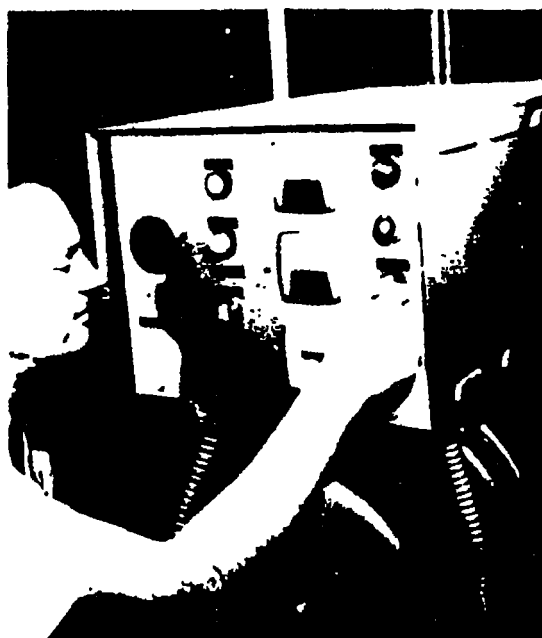


GE President Ralph Cordiner addresses the first class of the Advanced Management Course at the newly opened Crotonville Management Development Institute.

The philosophy of career-long opportunities for development is centered not only in the formal training programs but in a great variety of technical and non-technical courses to meet the needs and interests of virtually every type of employee - and where the pertinent educational opportunities do not exist internally, they are provided by financial support of external programs. In looking to the individual self-betterment of its employees General Electric is continually building the resources for its own progress.



Student Certificate issued the same year that the General Electric Company was formed—1892.

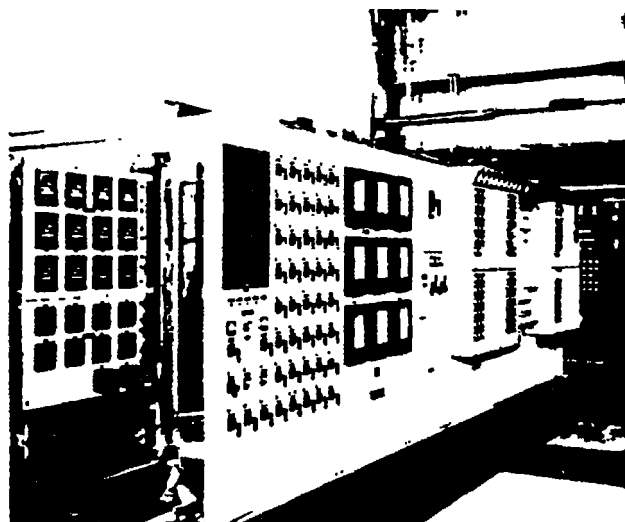


Tri-Clad brushless generator for computer power supply, under test by engineer E. H. (Ed) Perkins.



LOUIS T. RADER

A key contributor in the development and design of numerical control, computer and automation equipment throughout his industrial career, Rader was formerly Vice President and General Manager of the Communication and Control Division. His technological achievements were recognized by his nomination to the National Academy of Engineering.



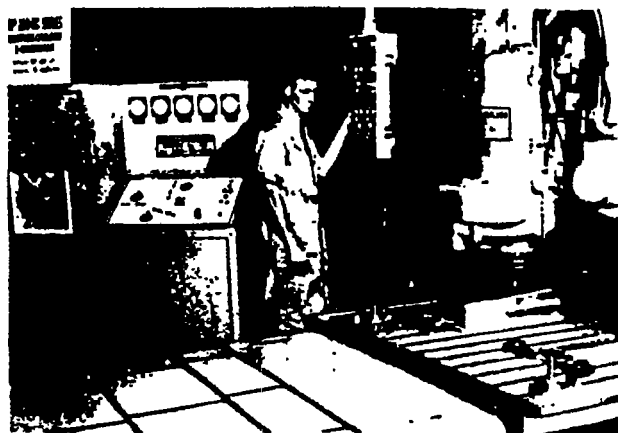
Static logic switching control panel for Inland Steel Company.

INDUSTRIAL EQUIPMENT

Silicon-controlled rectifiers are incorporated in a new class of small synchronous generators that eliminate brushes and add reliability and cost advantages.

Punched paper tape input for numerical control of machine tools is announced by the Industrial Control Department. This new industry standard is known as the GE "Mark Series" line.

Static magnetic digital switching and solid-state analog electronic amplifiers are introduced to the metal industry in the automation of an Inland Steel slabbing mill. Mill operation is controlled by a punched card program control system.



Continuous path tape control contouring and milling machine.

1957

MATERIALS

GE announces the full commercial availability of manufactured industrial diamonds for use in metal-cutting and other difficult materials processing operations ranging from glass-grinding to commercial drilling and dentistry.

Robert H. Wentorf, Jr. synthesizes Borazon® cubic boron nitride, a material not found in nature and second in hardness only to a diamond. Its potential use in materials processing is enhanced by the ability to remain hard at temperatures where diamond will burn.

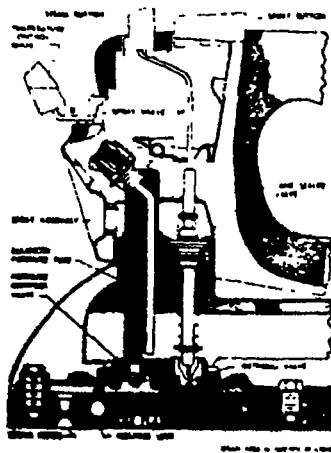
The first successful hydrostatic pressing of massive molybdenum billets is made by Howard Green, George Kaiser and Walter Brinn. Refractory Metal Products Department is the first commercial producer of large hydropressed tungsten and molybdenum billets used for forging rocket nozzle and other high temperature, high performance parts.



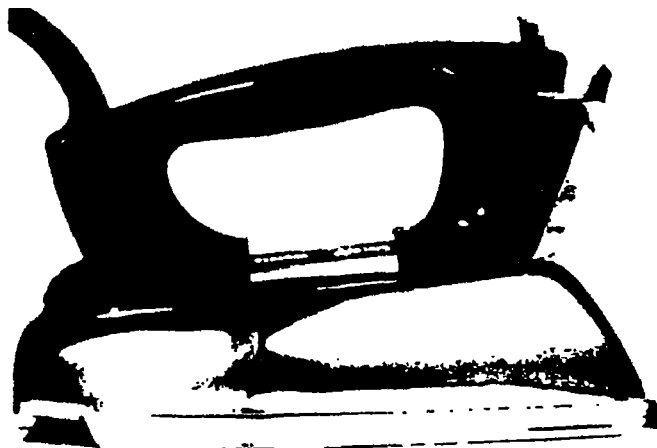
Robert H. Wentorf demonstrates that Borazon is hard enough to scratch diamond.

APPLIANCES

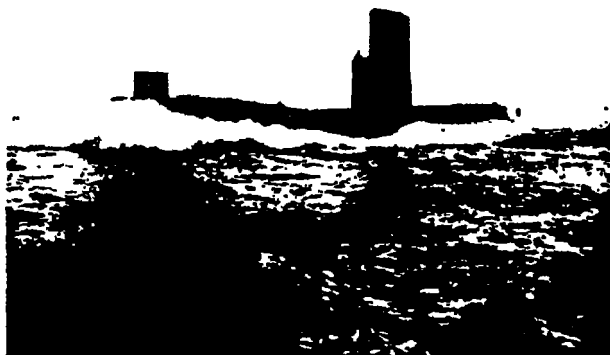
Housewares Division introduces the first commercially feasible combination spray, steam and dry iron, increasing the range of fabrics that can be conveniently handled with a single, household iron.



Cross-section of spray, steam and dry iron.



1957



USS Seawolf, the U.S. Navy's second nuclear-powered submarine. (General Dynamics Photo)

POWER GENERATION

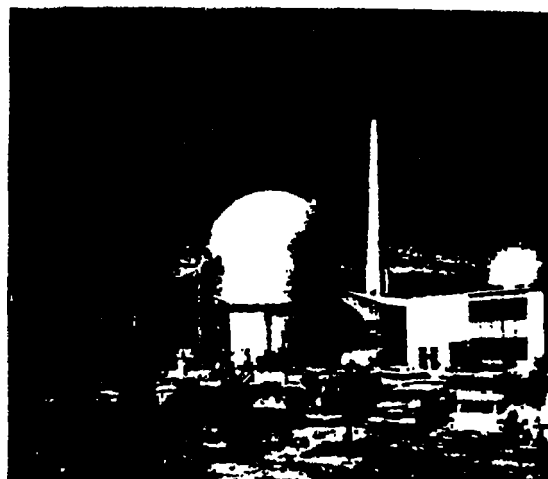
GE receives the U.S. Government's first nuclear reactor license for its five megawatt Vallecitos Boiling Water Reactor near Pleasanton, California. The unit goes into operation as a generator of electricity for the Pacific Gas and Electric Company and also serves as an operator training center and reactor component test complex.

Enriched uranium-oxide fuel pellets for nuclear reactors are first developed and produced by Carboly (now the Metallurgical Products Department).

The Navy's second nuclear powered submarine, the USS Seawolf, contains a reactor plant designed by KAPL, under the direction of the Division of Naval Reactors, AEC; and uses the liquid sodium cooling concept. It is commissioned at the Electric Boat Division of the General Dynamics Corporation in Groton, Connecticut.

TRANSPORTATION

The Erie Works makes its first shipment of a standard export universal locomotive to Chile. It is a 900-hp, six-axle U9C diesel-electric.



Vallecitos Boiling Water Reactor, recipient of first nuclear reactor license.



KARL PALEY COHEN

An early advocate of reactor concepts which the U.S. ultimately adopted for commercial power generation, Cohen made major contributions to the development of the gaseous diffusion and centrifuge processes for enriching uranium.

1958

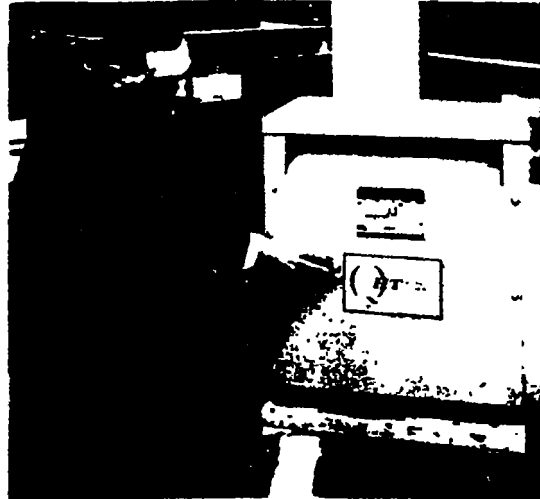
POWER GENERATION AND TRANSMISSION

The Advanced Reactor Systems Department pioneers a fast breeder reactor theory indicating that such reactors can be economically viable. It also develops a ceramic oxide fuel for use in fast breeder reactors.

The Specialty Transformer Department introduces industry's first guaranteed noise level, high temperature transformer, the "QHT" (Quiet, High Temperature).

PAUL GREEBLER

Starting in the late 1950's, when he joined GE's nuclear breeder reactor team, Greebler contributed many of the discoveries that made breeder reactors possible. He first described the Doppler effect in a fast, mixed-oxide-fueled breeder and the key role this phenomenon plays as an inherent safety mechanism.



QHT dry type transformer, with old type D in background.

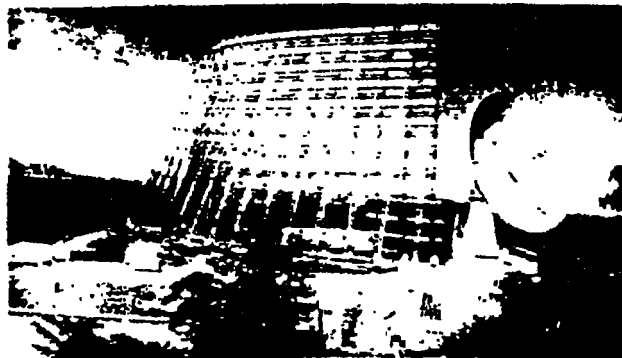


Testing the Vulcan gatling gun at Burlington, Vermont, firing range.

NATIONAL DEFENSE

The largest operational radar laboratory in the free world is developed and operated for the U.S. Air Force on the island of Trinidad, down range from Cape Canaveral.

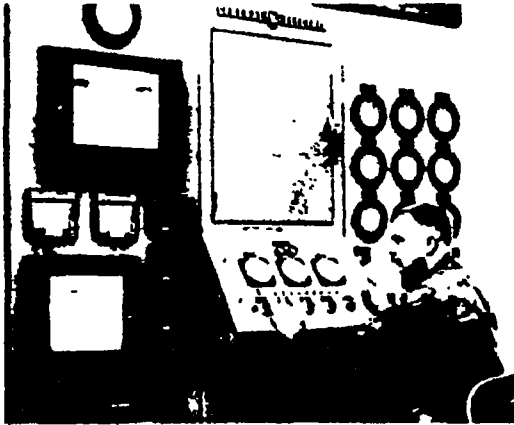
Armament Systems at Burlington, Vermont, produces the first linkless ammunition feed system, reliable at rates up to 7200 rounds per minute. It is used for the M-61 Vulcan gun installed on the Air Force F-105 fighter plane.



Trinidad radar laboratory, largest in the free world.

MATERIALS

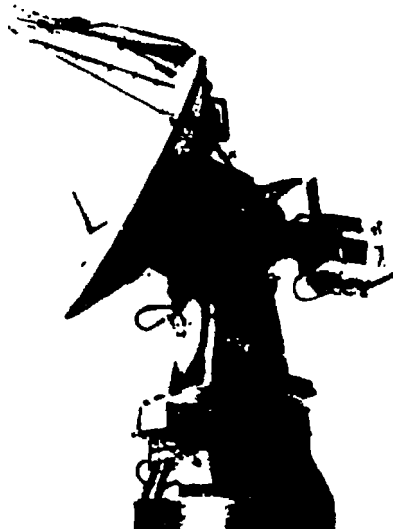
The Wire and Cable Department announces Vulkene, an insulation utilizing cross-linked polyethylene technology. Vulkene's high temperature properties will revolutionize the cable industry and usher in a new generation of solid dielectrics for cable insulation.



World's first electro-hydraulic control system for steam turbines installed at Dow Chemical plant by Medium Steam Turbine Department.



USS Triton (GENERAL DYNAMICS PHOTO).



MK 73 guided missile director.

INDUSTRIAL EQUIPMENT

The world's first electro-hydraulic control system for steam turbines is introduced at Dow Chemical by the Medium Steam Turbine Department. The replacement of mechanical hydraulic controls provides greater accuracy and lower maintenance making the new system the forerunner of all GE turbine control systems.

GE supplies the first integrated power control room (PCR) for a Jones & Laughlin Steel continuous annealing line. The self-contained, enclosed units include interconnecting wiring and ventilation and offer faster and less costly field installation.

NATIONAL DEFENSE

USS Triton makes the first round-the-world voyage without surfacing. During the 83-day, 36,000-mile trip, the nuclear dual reactor plant, designed by KAPL under the direction of the Division of Naval Reactors, AEC, demonstrates ample power to move the ship at cruiser task force speeds.

Pittsfield's Ordnance Systems produces fire control and guidance equipment for the Navy's Polaris Missile System, one of the nation's leading deterrent weapon systems.

The MK 73 director for guided missiles of the Navy's Tartar System goes into production at Ordnance Systems, which has been a continuous supplier of gun mounts and directors for 38 years.



Polaris missile launch.

POWER GENERATION



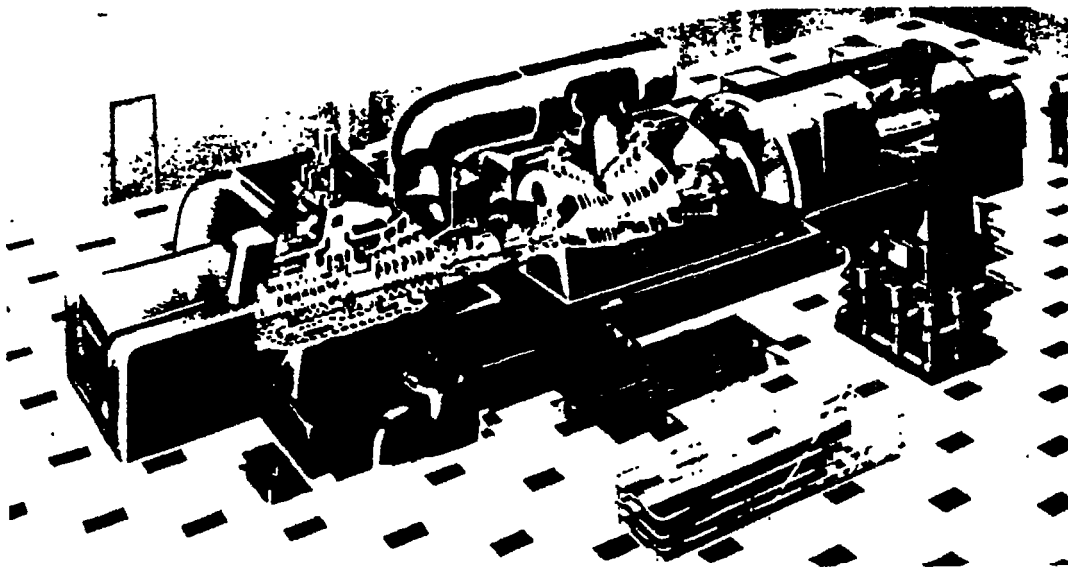
Pioneers in the development of utility boiler feed pumps (l. to r.): Harry Mayor, Stanley Styrna, John Cunningham, and Edwin Pace.

The first large-scale, privately financed nuclear power plant goes into service. It is the 210-MW Dresden 1 unit of the Commonwealth Edison Company near Chicago, Illinois. The Large Steam Turbine Generator Department supplies the first turbine built to operate on steam from a nuclear reactor. The 192,000-kw unit operates at 1800 rpm and uses 950 psi saturated steam.

A new type of turbine is designed to drive boiler feed pumps supplying water to the boilers that produce steam for main-turbine generator units. The boiler feed pumps integrate into the total power plant cycle, resulting in greater efficiency of power output and water usage.



Turbine Department's Applied Research and Development Laboratory develops processes for producing turbine castings.

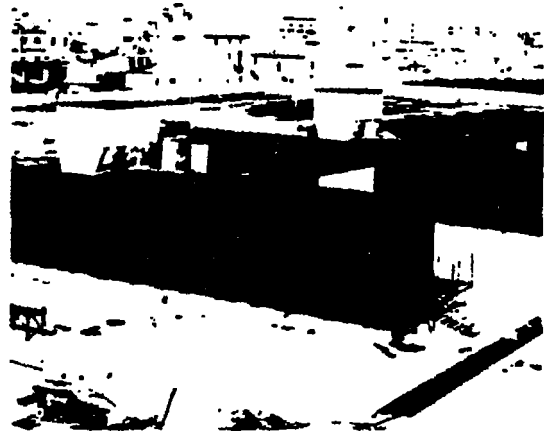


Anatomy of tandem-compound, double-flow reheat steam turbine-generator.

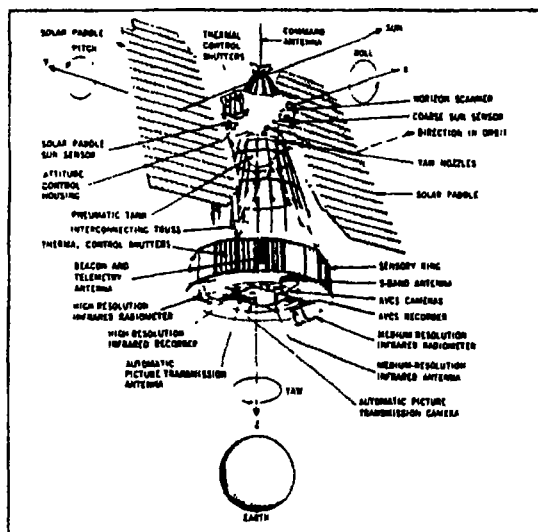
POWER GENERATION AND TRANSMISSION

The first "Package Power Plant" is supplied to the electric utility industry with a shipment to South Carolina Electric and Gas Company. The unit is a completely self-contained gas turbine-generator, almost entirely factory assembled and tested, and ready for installation as a peaking station to provide extra system capacity, or as a standby power source for emergencies.

The introduction of the high capacity vacuum interrupter for protection and control of medium voltage power systems enables the development of smaller, lighter, power breakers requiring less maintenance.



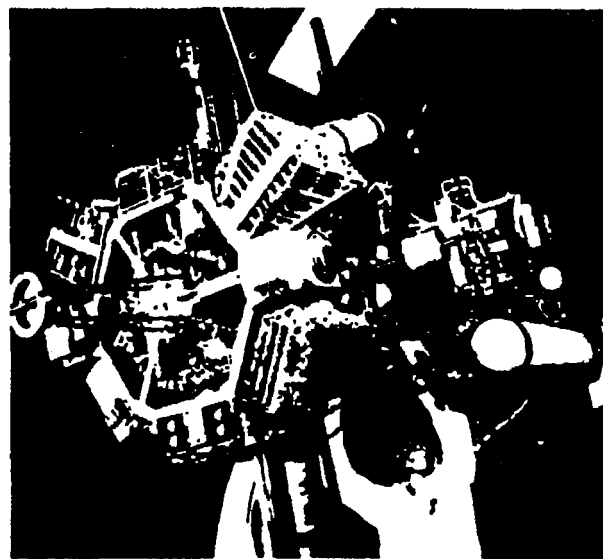
Two "Package Power Plants," each rated at 14,000 k.w., operated by Gas y Electricidad, Mallorca, Spain.



The NIMBUS meteorological satellite.

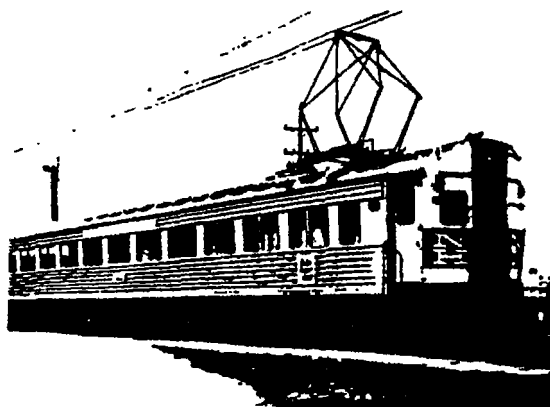
SPACE EXPLORATION

The Space Division develops NIMBUS, an earth-oriented meteorological satellite, the first of a series of seven that supply scientific data on atmospheric and environmental conditions.



Preparing NIMBUS prototype for test in Valley Forge space simulation chamber, one of the largest in the world.

1961



New York, New Haven & Hartford commuter car, first railroad application of solid state silicon rectifiers.

TRANSPORTATION

The Erie Works builds the country's largest diesel-electric locomotive. The U25B is a 2500-hp four-axle unit designed for high speed freight service on domestic railroads.

The first railroad application of solid state silicon rectifiers is on New York, New Haven & Hartford Railroad commuter cars.

GUY W. WILSON

At the Erie Works, Wilson pioneered the dieselization of America's railroads and played a prominent role in the development and marketing of some of the world's most powerful locomotives — gas turbine electric and diesel electric types.



The U25B diesel-electric locomotive.

ELECTRONICS AND COMMUNICATIONS

The Compactron, an electron tube allowing multi-functional receiving capability within one glass tube, is introduced by the Tube Products Department.

The Federal Communications Commission approves GE's proposed standards for FM stereophonic broadcasting and GE's Schenectady station, WGFM, starts broadcasting in stereo.

ANTAL CSICSATKA

After fleeing his native Hungary in 1956, Csicsatka joined the Radio Receiver Dept. in Utica where his pioneering contributions in radio engineering included the invention of the stereophonic broadcast system that was adapted as the U.S. standard and is used in 90% of the countries of the world.



Stereophonic table model radio with detachable speakers.

1962

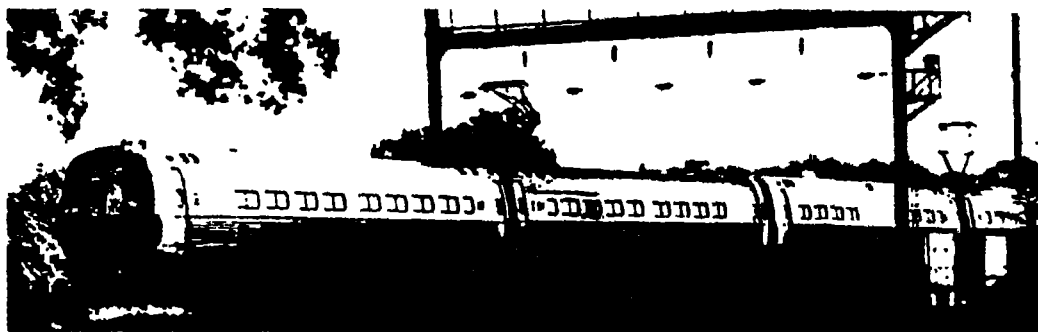
MATERIALS

The Silicone Products Department introduces the use of RTV sealants to industry and subsequently to construction and consumer markets. In 1958, room temperature-curing RTV silicone rubber was developed.

High power, solid state silicon rectifiers (SCRs) are made possible through the development of a tungsten substrate that matches the expansion characteristics of silicon yet serves as an excellent conductor of both heat and electricity. Produced by the Refractory Metals Department, these pressed and sintered tungsten discs serve as the basis for many new forms of power conversion.



RTV silicone rubber is demonstrated by Silicone Products' Charles A. Berridge.



Metroliner service between New York and Washington, D.C.

TRANSPORTATION

Ernest F. Weiser invents a staged phase control rectifier propulsion system that provides smooth, stepless control for rail cars and reduces wayside equipment costs. It is first introduced in "Silverliner" cars for commuter service in the Philadelphia area.

The USS Bainbridge with its power plant designed by KAPL under the direction of the Division of Naval Reactors, AEC, is commissioned as the Navy's first nuclear powered missile frigate.



FREDERICK T. SCOTT

When Fred Scott joined the Industrial Control Department shortly after World War II, he brought with him a solid background of field sales experience. He provided the marketing leadership that increased the Department's business more than sixfold during a period of 20 years.

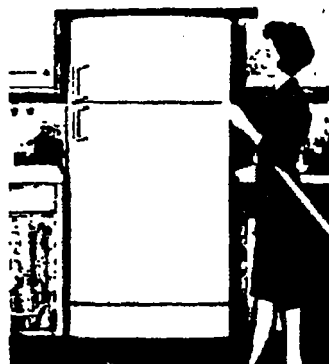
INDUSTRIAL EQUIPMENT

The Drive Systems Department pioneers the first successful application of digital computers to control hot strip steel mills at McLouth Steel Company. Use of the GE 312 computer provides the means for more accurate control operations, more uniform product quality and higher productivity.

Industrial Control Department builds industry's first solid state control and applies it to a battery-powered fork lift truck.



GE's new 18.8-cu. ft. Spacemaker Refrigerator-Freezer fits in same space as old 10-cu. ft. model.



APPLIANCES

The Mini-Basket washing system is added to the automatic washer to improve small load washing efficiency and to permit the handling of delicate handwashables. It uses 25 percent less energy than the small load setting on the same washer.

The first Package Terminal Air Conditioner is the ZONELINE which can be installed through the wall in apartments, motels, schools and other institutions to allow individually controlled heating or cooling at the touch of a button.

The first foamed-in-place urethane insulated refrigerator is built at Appliance Park. The new 18.8-cu. ft. capacity Spacemaker fits in the same space as the 1947 version of a 10-cu. ft. model.

LIGHTING

The Cool Beam dichroic reflector PAR lamp is developed for use in places needing increased light and reduced heat, such as food storage facilities. Its operation is based on a filtering process which permits all visible light to be reflected and more than two-thirds of the infrared (heat) radiation to be reabsorbed by the parabolic aluminized reflector.

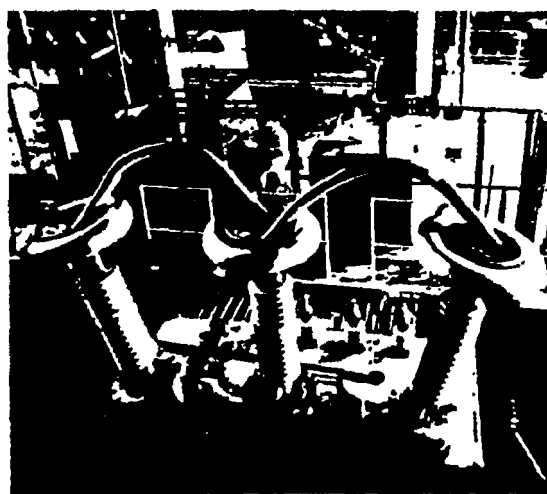
POWER GENERATION AND DISTRIBUTION

The development of a patented system for detecting and locating corona sources (partial discharges) in power transformers significantly improves their reliability and life expectancy.

A standardized line of geared turbine-generator sets is developed for marine applications. These units drive electric generators to supply all electrical power aboard vessels ranging from LNG container ships to nuclear attack submarines.

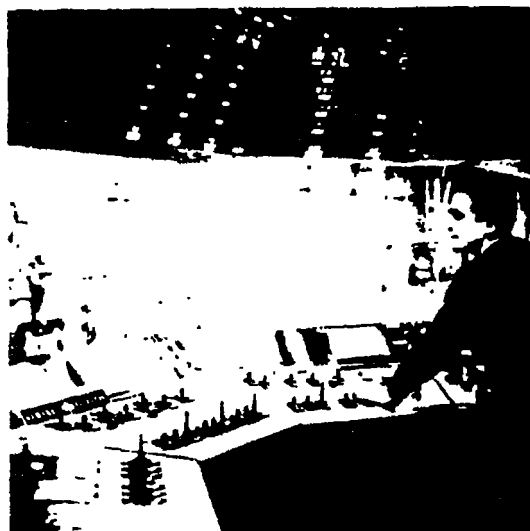
JOHN C. DUTTON

At the Medium Transformer Dept., Dutton pioneered the programming of the first computer designs of GE production transformers in 1952. His early exploratory approaches to vaporization cooling would later culminate in the development of the revolutionary VaporTran® transformer.



Corona testing power transformers at Medium Transformer Department, Rome, Georgia.

1963



Hot strip mill control room, with computer-directed position regulators, at Taranto, Italy.

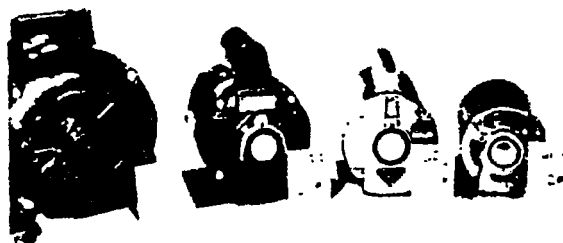
INDUSTRIAL EQUIPMENT

The popular 1/2-hp motor reaches a stage in its evolution where it is about one sixth the weight of the same rating at the turn of the century.

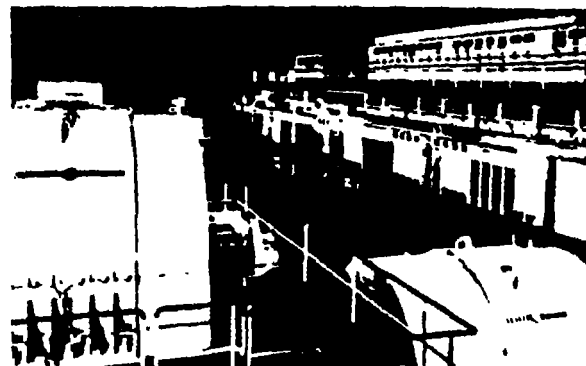
The capabilities of the static exciter system (1960) are extended to the utility industry with the installation of a unit on a new 224,000-kva generator at Southwestern Public Service.

The first completely thyristor-powered rolling mill drive system is installed at Bethlehem Steel's Burns Harbor facility with 28,000 kw of thyristor power supplies. Reductions in equipment size and weight are accompanied by increased reliability and efficiency.

Worldwide use of GE electronic controls with computer-directed, time-shared digital position regulators is initiated with installations in new hot strip mills in Taranto, Italy; Newport, England; and Abbey Vale, Wales.



Evolution of 1/2-hp motor.

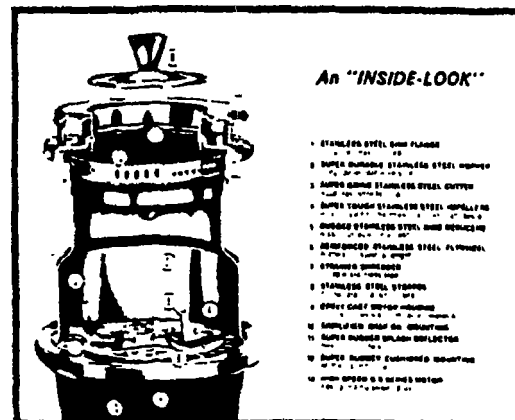


Thyristor-powered rolling mill drive on Bethlehem Steel plate mill.

APPLIANCES

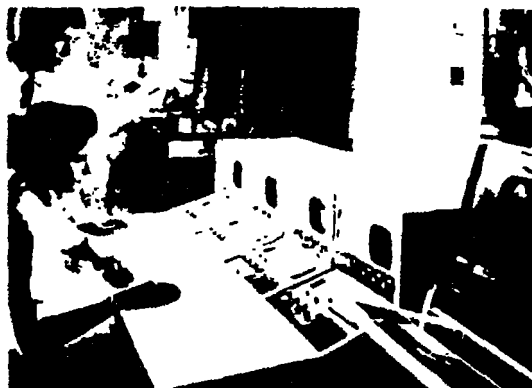
Mark P. Hogue of Appliance Park develops a unique, food waste disposer design incorporating an encapsulated series motor and the use of stainless steel throughout the water bearing components. The results set new standards for high reliability and long life, at a moderate price.

The P-7® self-cleaning oven is introduced. In developing the oven, which uses a pyrolytic system to remove food soil, GE engineers were granted some 100 patents.



Anatomy of the Disposall®.

1964



Electronic Patient Monitoring System.



Automatic Dial Paging System for doctors.



Vulcan Air Defense System (VADS).

MEDICAL EQUIPMENT

An electronic patient monitoring system for critical care applications is introduced by the Medical Systems Business Department.

A new automatic Dial Paging System is available for hospital and industrial use.

POWER GENERATION

Plans are formulated for SEFOR, the nation's first fast reactor fueled with plutonium-uranium cycle. This 20-MWe demonstration plant near Fayetteville, Arkansas, verified the theoretical work of GE scientists and demonstrated the feasibility of Liquid Metal Fast Breeder Reactors.

The first POWER BLOCK arrangement of gas turbines is built for Oklahoma Gas and Electric Company's Enid Station. These units, operating under a single control, consist of four General Electric MS 5000 units, rated at 14,000 kw each.

NATIONAL DEFENSE

GE receives U.S. Army authorization to develop the ground-based Vulcan Air Defense System. This rapid-fire system is a vital part of NATO and other U.S. ally anti-aircraft defense equipment.

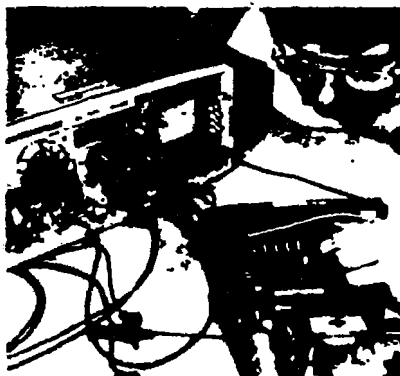
C. HERBERT RIDGLEY

Until his retirement in 1967, Ridgley guided the Missile and Armament Department in its vital armament system role in support of the nation's defense efforts.



INSTALLING AND SERVICING THE PRODUCTS OF TECHNOLOGY

The concept of equipment installation and service and specialized engineering support for its products dates back to the early years of General Electric. The Thomson-Houston Company opened a field service shop in Philadelphia in 1882. A year later, in order to assure satisfactory on-site installation, adjustment and maintenance of its arc lamps, the Company trained and established an organization of "experts", ancestors of today's Installation and Service Engineering field engineers. The first "expert" was Edwin Rice who later became the Company's president.



Testing circuit board during electronic instrument repair.



PETER C. VAN DYCK

Starting in 1954 as Finance Manager of the Service Shops Department, the Schenectady native became its General Manager in 1961 and in 1971, Vice President and General Manager of the newly-formed Apparatus Service Division. He held that position until his retirement in 1979. Under Van Dyck's leadership, the Division grew rapidly to its present worldwide network, introducing service innovations such as GEGARD, instrument rentals, measurements and diagnostic services, nondestructive testing, mechanical repairs and locomotive rebuilding.

APPARATUS SERVICE BUSINESS DIVISION

The Apparatus Service Business Division encompasses a network of more than 190 Service Shops in 19 countries worldwide - with the International Service Department headquartered in London. It employs more than 12,500 skilled technicians and craftsmen.

KEY EVENTS (1947-1978)

- 1949 The first International Service Shop is opened in Rio de Janeiro.
- 1955 One hundred Service Shop employees are flown into six Northeastern states to help repair electrical equipment at industrial plants and utilities damaged by record flooding after two hurricanes.
- 1959 Schenectady Instrumentation Service, begun in 1896, opens its first shop dedicated exclusively to instrument service.
- 1966 The introduction of the GEGARD® motor rewinding and insulation process sets a new standard in motor maintenance and repair.
- 1973 A mobile transformer test van, with portable generator rated at two million volts, is placed in service. It provides factory-quality dielectric testing on-site, saving down-time and costs involved in transporting the transformer to a test facility.
- 1975 A new Measurement Service helps locate invisible mechanical faults and potential equipment failures faster and more efficiently using state-of-the-art analytical tools such as thermographic surveys and acoustic emission tests.



Minneapolis Service Shop applies new wire to heavy apparatus.

INSTALLATION AND SERVICE ENGINEERING DIVISION

The Installation and Service Engineering Division has evolved to a worldwide organization of 170 offices, with 20 located outside of the United States. Its staff consists of some 4,200 people, the majority of whom are engineers whose skills and talents match the profile of customer needs in the geographic areas in which they are stationed.

KEY EVENTS (1947-1978)

- 1951 An Aircraft Gas Turbine Section, predecessor of I&SE's Aviation Section, is established to install and flight-test General Electric jet engines.
- 1955 Twelve Field District Engineering components and a foreign Installation-Turbine Section are incorporated into the newly established Installation and Service Engineering Department. William M. Denny becomes its first manager.
- 1964 Transfer of the Power Plant Engineering Operation to I&SE adds utility and industrial plant capabilities and system design expertise.
- 1966 To help supply the growing need for field engineers, the Field Engineering Program for graduate engineers is established.
- 1970 The Pacific HVDC Intertie Project, the country's first high-voltage dc transmission line, is installed by I&SE.
- 1974 The Field Engineering Program moves to a new Field Engineering Development Center on Balltown Road in Schenectady.



CHARLES C. THOMAS

Early in his career, Charles (Tip) Thomas was involved in a number of international projects that gained him a worldwide reputation as an outstanding systems engineer. From 1953-1984, he held key managerial assignments in Advanced Technology Systems, Construction Engineering and Power Plant Engineering. Among the pioneering projects that he managed was the design and turnkey installation of the first large steam-gas cycle power plant for the Oklahoma Gas and Electric Company and the first large computer-controlled steam plant for the Southern California Edison Company. In 1976, Thomas was elected Vice President of the I&SE Division.



W. G. ELY
1901 - 1927



F. P. WILSON
1927 - 1942



W. M. DENNY
1942 - 1984



I&SE Field Engineering Center houses classrooms and laboratories containing mechanical, electronic and electrical equipment that field service engineers are likely to encounter.

POWER GENERATION AND TRANSMISSION

Ten J79 type aircraft gas turbine engines are combined to provide hot gas to drive a single stage 1200-rpm gas turbine capable of producing 100,000 k w. The plant, built for the Cincinnati Gas and Electric Company's Dick Creek Unit #1, can burn either natural gas or liquid fuel by changing fuel nozzles and is designed for fully automatic, unattended operation.

The nation's first 500-kv power transmission system is protected by GE 500-kv Air Blast Breakers, the first power breakers of this rating. The breaker features the largest non-porcelain insulator column ever applied — a GEPOL unit, 4 ft. in diameter and over 15 ft. in length.

Canadian General Electric supplies EHV equipment for Quebec's 735,000-v transmission line, operating at the highest voltage of any commercial line in the Western World.

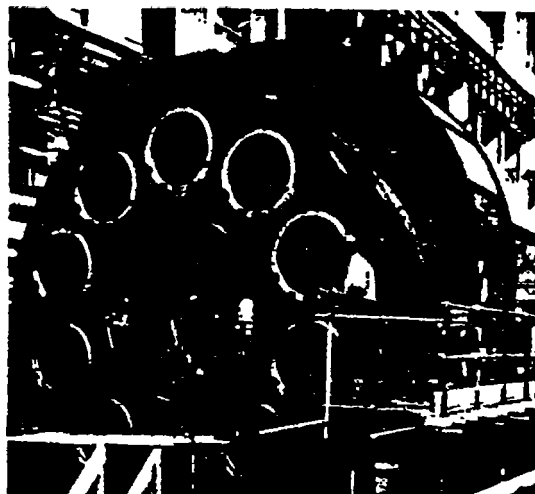
Introduction of the Load-Vac tap changer increases transformer operating levels and the time between required maintenance.

Fuel cells developed by the Direct Energy Conversion Operation are the first used in space flight as they power the Gemini 5 and Gemini 7 missions. An ion-exchange membrane, invented by Research Laboratory scientists Leonard W. Niedrach and W. Thomas Grubb, is a vital link in the construction of these highly efficient devices for converting fuel directly to electricity.

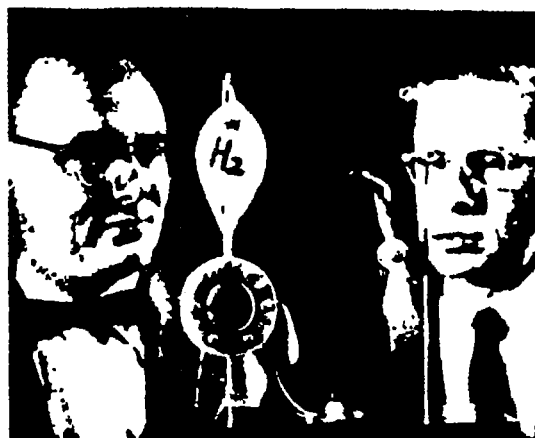


PIER A. ABETTI

Design of the first electromagnetic model of a transformer won Pier Abetti the Charles A. Coffin Award in 1953. He later pioneered a computer method for automatically translating customer specifications into power transformer design data, and when Pittsfield's EHV experimental transmission line was energized at a record-breaking 720,000 volts, Abetti was manager of the project.

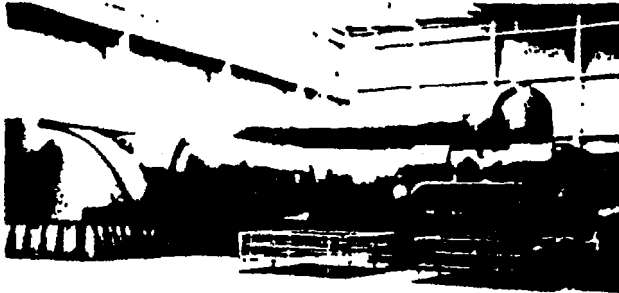


Power of 10 aircraft jet engines will drive new turbine-generator.



Leonard W. Niedrach (l.) and W. Thomas Grubb demonstrate fuel cell membrane.

1969



TVA turbine-generator, rated at 1,104,000 kw.

POWER GENERATION AND TRANSMISSION

The largest GE turbine for a plant using fossil fuel is built for the Paradise Unit No. 3 of the Tennessee Valley Authority. Rated at 1,104,000 kw, it has a 3600-rpm shaft driving one generator and an 1800-rpm shaft driving another generator.

The Big Sandy Unit No. 2 of the Kentucky Power Company, rated at 737,000 kw, is the Steam Turbine Division's largest double reheat turbine.

The first large scale production of nuclear fuel bundles and other components for boiling water reactors takes place at a newly opened manufacturing facility in Wilmington, North Carolina. Previously, such components were fabricated in laboratories and other prototype operations.



Nuclear fuel bundle production at Wilmington, North Carolina.



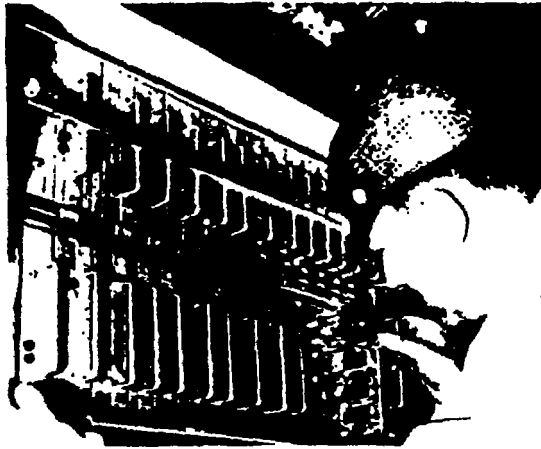
Big Sandy Station No. 2 of Kentucky Power Company, housing a 737,000-kw double reheat turbine.



STUART G. MILLER

As Manager of the Wilmington Manufacturing Department of the Nuclear Energy Products Division from 1972 until 1977, Miller developed and implemented unique computer applications for manufacturing, process control, and quality testing of nuclear fuel systems.

1969



TRANSPORTATION

A special gear transmission system, based on design principles developed for both aircraft and marine gearing, is provided by the Medium Steam Turbine Department to meet the confined hull requirements of hydrofoil ships.

The first "Super Rapid Transit" propulsion system is introduced on the PATCO transit line from Philadelphia, Pennsylvania, to Lindenwold, New Jersey. High performance motors and controls and on-board automation equipment provide smooth acceleration, speed regulation and positioned station stops.



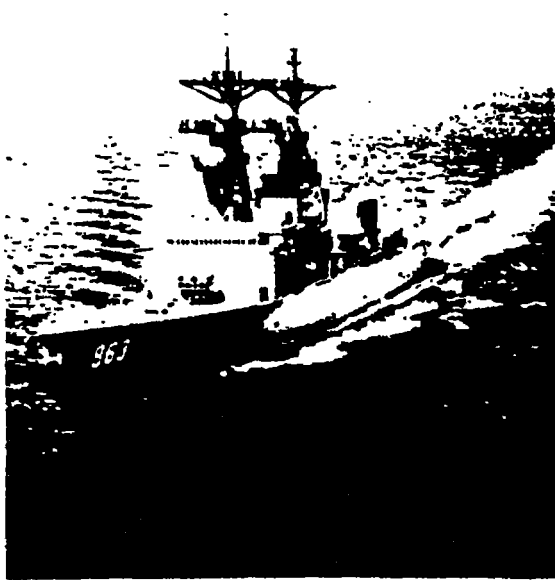
New "Super Rapid Transit" system with on-board automation equipment (above) sets new standards in commuter transportation.

APPLIANCES

Appliance Park announces the first side-by-side refrigerator-freezer with an automatic dispenser for ice cubes and chilled water through the door.



Side-by-side refrigerator-freezer with automatic ice cube and chilled water dispenser.



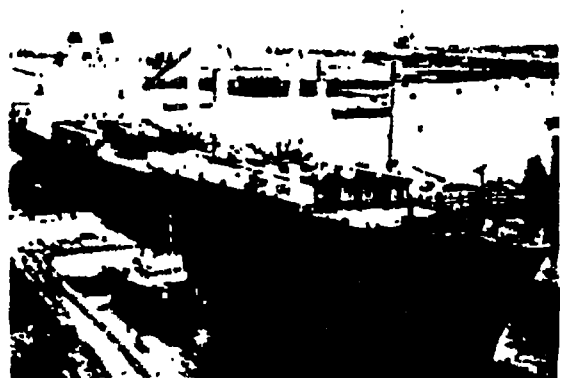
Four LM2500 turbines power Spruance-class destroyer.



Geared marine steam turbines drive U.S. Navy aircraft carrier, USS John F. Kennedy.

SHIPS AT SEA

General Electric jet engine, steam turbine, nuclear, and mechanical gear technologies help power and propel sea-going vessels for national defense (above), commerce (right), oceanographic research (bottom, left) and high-speed transportation (bottom, right).



LM2500 marine turbines first applied to roll on/roll off high-speed cargo ship, GTS Admiral William M. Callaghan.



Nuclear powered NR-1 deep submergence research vessel.
(General Dynamics Photo)



Hydrofoil ship uses special gear transmission system.



Tektite II undersea habitat for long-term oceanographic research.

UNDERSEA EXPLORATION

The Tektite II Program, an undersea habitat for prolonged underwater investigations, is the most ambitious of its kind ever attempted. Under the leadership of the Department of the Interior, GE makes contributions which include design, installation and maintenance of this habitat where over 50 scientists and engineer-aquanuts engage in scientific studies

INDUSTRIAL EQUIPMENT

The first adjustable-speed ac drive is introduced, using solid state inverter technology.

NATIONAL DEFENSE

For the Air Force Minuteman ICBM program, the Re-entry Systems Department develops and produces the Mark 12 re-entry system. Modified versions of the Mark 12 will be used on the U.S. Navy's Trident ballistic missiles. In 1963, the Mark 6 vehicle became operational as part of the Air Force's Titan II deterrent missile system.

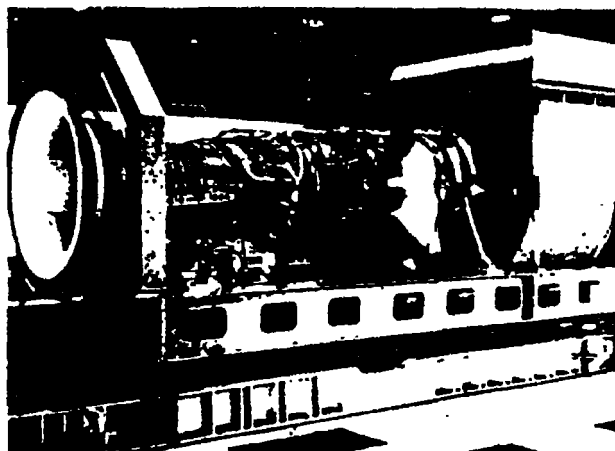


GERHARD NEUMANN

Neumann's innovative work in lightweight and high performance engine designs led to the record-breaking J79 engine and its successors. As Vice President and Group Executive, he established the jet engine in new areas of military, marine, commercial and industrial applications.



Synthesized gem diamonds created in the laboratory by subjecting graphite (dark powder) to extreme pressures and temperatures.



LM2500 gas turbine for ship propulsion.

TRANSPORTATION

Gas turbines based on the CF6 jet engine technology are chosen to power the newest Spruance-class Navy destroyers. A year earlier the LM 2500 heavy duty gas turbine demonstrated its capabilities on a merchant vessel. Other versions of the power plant are used for 25,000-hp drives for gas pipeline pumping.

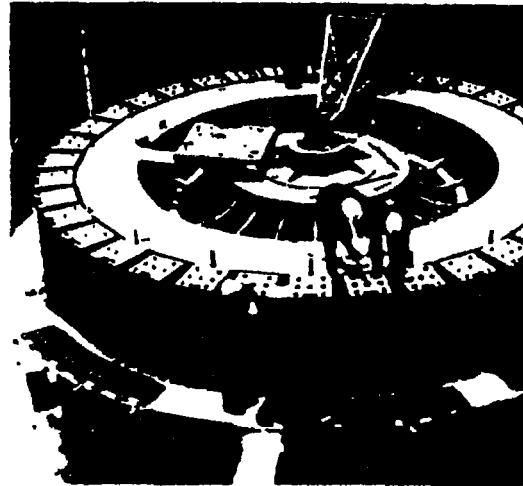
1971-1972

POWER GENERATION AND TRANSMISSION

The new GECO method for the production of nuclear reactor fuel is placed in operation at Wilmington, North Carolina. Conversion of uranium hexafluoride to high quality uranium dioxide is accomplished pyrolytically without the complex wet chemical process required earlier.

The first prototype of a zinc-oxide arrester is installed as part of the development of systems for the improved protection of transmission lines and equipment.

Canadian GE and turbines help make Labrador's Churchill Falls hydroelectric generating station one of the largest single-site producers of electricity in the world. The station feeds ac power to the Eel River, New Brunswick, station, which converts it to dc and reconverts it to ac for transmission to eastern Canada's population centers. The conversion system, built in cooperation with Philadelphia's Power Delivery Group, overcomes synchronization problems between the adjacent ac transmission systems.



Canadian GE generator being installed at Labrador's Churchill Falls.



The Carry-Cool portable room air conditioner, low in weight and in cost

APPLIANCES

The Carry-Cool® portable room air conditioner is introduced. Its light weight and rugged construction bring cool air in a package with convenience and cost previously unattainable. The extensive use of reinforced plastic produces, in one piece, an internal structure which would have required 27 formed and painted sheet metal parts.

NATIONAL DEFENSE

A new 1500-hp helicopter engine, the T700, developed for the U.S. Army, establishes a model for aircraft maintenance. It can be disassembled and maintained using only the ten standard tools included in the G.I. tool kit.

Ordnance Systems develops hydro-mechanical power trains which provide for rapid maneuvering and simplified operation at the high speeds required of the Army's infantry fighting vehicle. An electric stabilization system is also designed for the new combat vehicle.

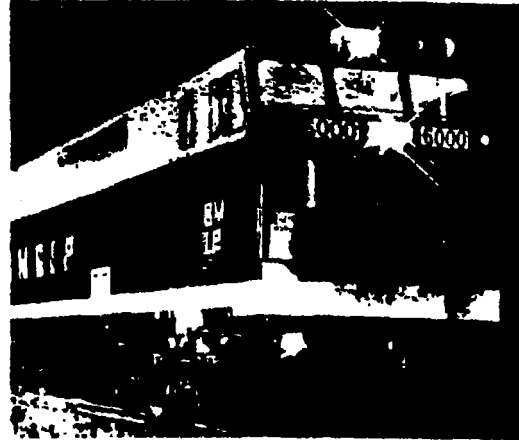
1973

TRANSPORTATION

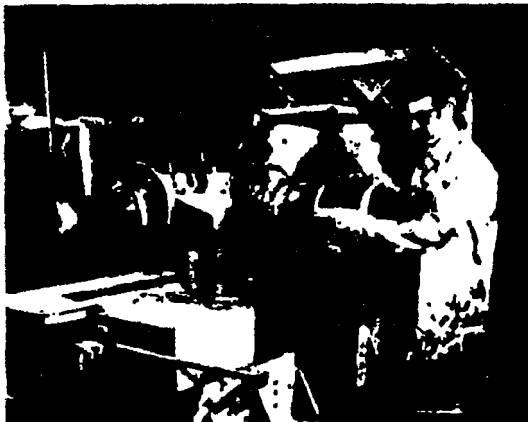
The Locomotive Department delivers the world's first 50,000-v, 6000-hp thyristor-controlled locomotives for the Black Mesa and Lake Powell Railroad.

FREDERICK W. BAUMANN

A Steinmetz award winner in 1975, Baumann is credited with conceiving and developing eleven major Small AC Motor Dept. product lines. These included an aluminum frame redesign that resulted in significant improvement in the construction of lightweight efficient motors.



World's first 50,000-v, 6000-hp thyristor-controlled locomotive.



Engineer Bill Smith at SAC plant in Hendersonville, Tennessee, removes motor frame from fully automatic casting machine. It can produce a 10-hp frame, weighing 13 pounds, every two minutes.

INDUSTRIAL EQUIPMENT

The development of centrifugally cast aluminum alloy stator frames and end shields results in performance improvements and reductions in the weight of small ac motors produced at the recently completed plant at Hendersonville, Tennessee.

The Drive Systems Department makes the first application of large cycloconverter technology in a 16,800-hp wound-rotor induction motor, opening the way for the development of even larger ac drives.



Gerald J. Michon (l.) and Hubert K. Burke (r.) display solid state imager held by Michon. An experimental TV camera, built around the invention, is aimed at the imager and displays it on the television screen.

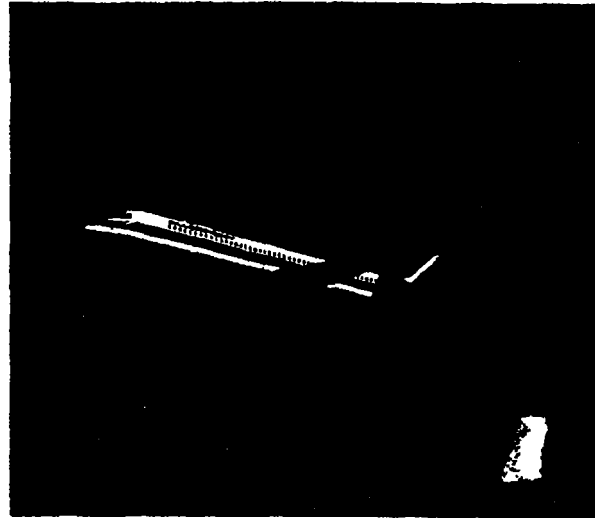
ELECTRONICS

The first solid state imager based on charge injected device technology is invented at the Research and Development Center by Gerald J. Michon and Hubert K. Burke. The stamp-sized device, which converts an optical image into an electrical video signal, replaces bulky video vacuum tubes used in conventional TV cameras.

HELPING TO FINANCE CONSUMER AND INDUSTRY NEEDS

The General Electric Credit Corporation has been part of the General Electric family since 1932. First known as General Electric Contracts Corporation, it was organized for the purpose of financing the purchase of consumer appliances. In that capacity it stimulated demand for appliances during a critical period of economic recovery from the nation's most severe depression.

Today, GECC is still a leading lender in the home products field, providing a broad spectrum of services to retailers and consumers, including casualty and life insurance through its Puritan Insurance Companies. In addition, it has become the largest non-manufacturing company in commercial and industrial equipment financing and leasing.



GECC is not a commercial airline. . .but in 1978 it had the ninth largest fleet of commercial airliners in the U.S., with 77 commercial aircraft on lease.

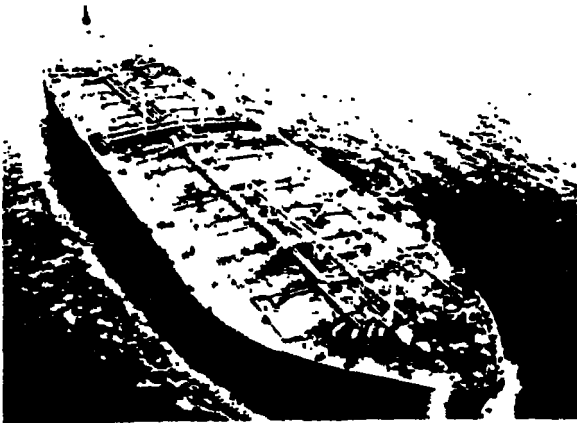
In 1967 GECC leased three DC-9 aircraft to Allegheny Airlines in the first such transaction in the aviation industry. In 1969, it signed a lease that provided United Airlines with 29 aircraft over a four-year period.



GECC is not a railroad. . .but it has accumulated more than 22,000 pieces of rolling stock—enough to make up a train 250 miles long.

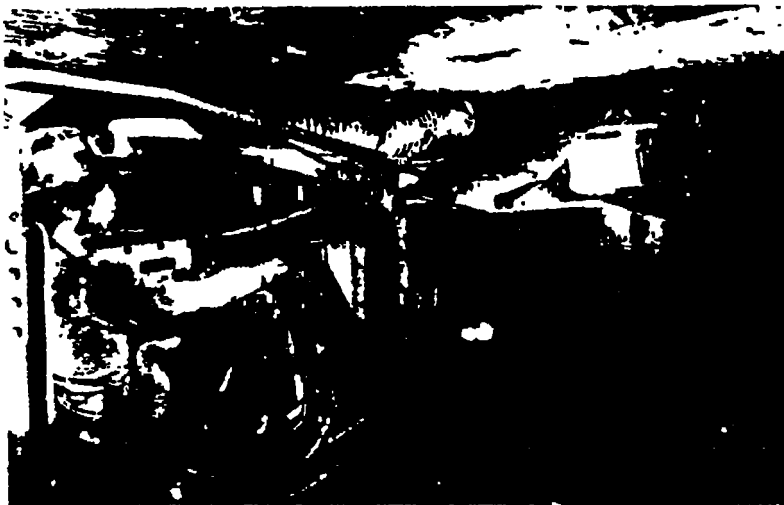
In 1975, GECC participated in the largest leveraged lease in railroad history and provided some 9,500 boxcars for American commerce.

GENERAL ELECTRIC CREDIT CORPORATION



GECC is not a maritime shipping company...but its fleet, leased to oil carriers, includes seventeen tankers that have an aggregate of 2,527,000 deadweight tons, the most of any fleet in the U.S. Merchant Marine.

The 368,000-deadweight-ton UST Atlantic, the largest tanker ever built in the Western Hemisphere, was acquired by General Electric and leased to the Shell Oil Company.



A Continuous Miner, shown here, is typical of equipment acquired by Quarto Mining, a subsidiary of North American Coal Company, through a lease by GECC. The lease arrangement allowed Quarto to acquire the equipment with no out-of-pocket investment and with much lower interest expenses than if Quarto had financed the venture conventionally.

Over the years, the General Electric Credit Corporation has provided similar services to a wide variety of industries requiring large capital investments to remain viable. Through these activities it has also played a key role in the continuing development and application of the products of technology.

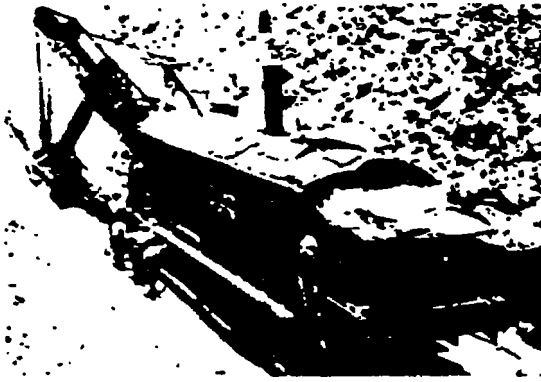


**General
Electric
Credit**
CORPORATION

Administrative Offices
260 Long Ridge Rd • Stamford, CT 06902

**One of the biggest names
in almost everything.**

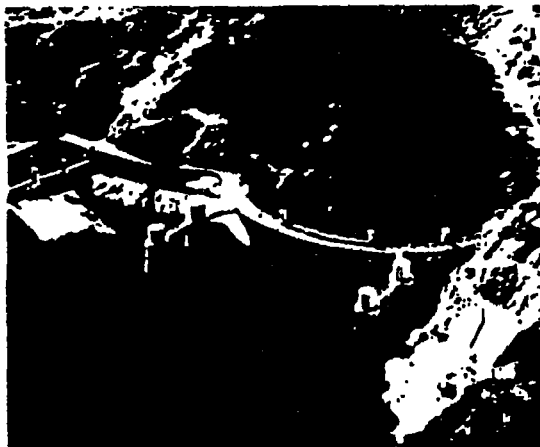
GE'S NEW DIMENSION IN NATURAL RESOURCES



Steam-powered shovels, mechanical marvels of the early 1900's, replaced the pickaxe and hand shovel.



Utah's railroad construction included trestles, tunnels, bridges, grading and track-laying.



Hoover Dam on the Colorado River required 5000 workers for its construction.

Utah International joined the GE family in December 1976 when a merger was approved by the share owners of both companies. This merger gave General Electric a new business dimension in natural resources and an acceleration of growth in international markets.

BEGINNINGS

Founded in 1900 as The Utah Construction Company, the enterprise spent the better part of the first 50 years of its existence as a heavy construction and engineering company. Most of the work in its first 20 years was the building of railroads, and the Company was the leading railroad contractor in the far West.

By 1920, the railroads were largely built, and the company turned its efforts toward heavy engineering construction efforts, such as dams, tunnels and earth moving. It was one of the leaders in the joint ventures that built such great structures as Hoover (1936), Bonneville (1940), and Grand Coulee (1942) Dams.

In the period shortly before and immediately after World War II, Utah's construction activities extended outside of the United States to Australia, Canada, Mexico, Peru, Brazil, Colombia, Indonesia, Guam, Korea and the Philippines. The Company utilized its earth-moving skills to enter into mining ventures in the U.S. and in many of these countries.

By 1971, Utah had removed itself from the heavy construction business and was committed mainly to natural resources -- on an international scale.



After World War II, Utah's earth-moving skills were applied in this Cedar City, Utah, iron ore mine.