MONOGRAM

Wilson Nation's Production Chief
Cordiner takes over Company Helm
PAGE 10

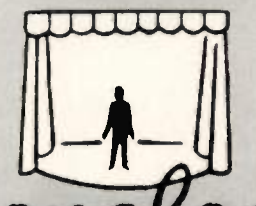
JANUARY–FEBRUARY, 1951

MONOGRAM

VOL. 28 No. 1

BARRINGTON S. HAVENS, Editor

The General Electric MONOGRAM is an intracompany magazine published for all office employees of the Company and its affiliates. Circulation is restricted to General Electric personnel. It is distributed without charge to those on its circulation list. The object of the MONOGRAM is to circulate news of the Company and its people. It does not state policies, preferences, opinions, or recommendations for the Company. It is published bimonthly at Schenectady, New York, by the General Electric Company and printed in the U.S.A. by The Maqua Company.



Monologue

MALTA ROBINS: Now that winter is upon us and the birds have all gone south, we are reminded that we never did tell the story of the pair of robins that nested at the rocket motor test station at Malta. We were told about it, in connection with that story we ran on the tests in our July-August issue last year, by T. B. Huestis.

Well, it seems that these robins built their nest in the steel framework above one of the test pits. When a missile was installed at the pit, the nest was less than ten feet from the business end of the motor. Pretty soon it would be necessary to make a "hot" test, and it was obvious that the young birds would not be old enough to leave the nest before the test. Yet, if they stayed where they were, they might be scared out by the terrific noise and flame, and they would then surely be drawn by suction into the roaring blast from the motor.

Top brass, middle brass, bottom brass, engineers, wiremen, steamfitters, and distinguished visitors from the army and navy all gave their opinions as to what should be done with the robins. Finally a sheet-metal cover was made to fit over the nest. In the test schedule was inserted a new item: "X minus 95 minutes, cover robins." And the test proceeded.

After the test a committee composed of two rear admirals, a major general, and three brigadiers (total: nine stars) inspected the nest and reported the young birds hungry but unharmed. Soon they were learning to fly—and not making near as much fuss about it as a rocket does.

FOOTNOTES AND BY-LINES: "One-armed Robot Goes to Work at Hanford" was the title of a little article in our last (November-December) issue, describing an interesting device for remote control of certain operations in a radioactive area. After the article was printed, we learned that the machine was developed by engineers of the General Engineering & Consulting Laboratory in Schenectady, a fact which we did not mention in the article. Believing that late is better than never, we hasten to rectify the omission now.

Coming now to the present issue, we call your attention to page 17, on which you'll find a photograph illustrating the Rorschach ink-blot test. Inasmuch as the ink-blots in question are copyrighted and it's against the rules to publish one of them, the picture on page 17 does not represent a real Rorschach ink-blot. We just thought you ought to know.

STRANGE AND WONDERFUL: A young Chinese student of business law, public relations, and similar matters, visited the San Francisco office of the Company recently in search of information for a term paper. He seemed very enthusiastic about General Electric, our informant says, his zeal evidently stemming from the fact that in China he used General Electric lamps. The Chinese word for these, he explained, sounds something like "chi-yee" and means "strange and wonderful." So next time you're in China and need some G-E lamps, just go in the store and ask for strange-and-wonderfuls.

HAIRCUT: Geoffrey Chapman, an Electronics Department distributor in Mobile, Alabama, is pretty loyal to General Electric, and evidently some of his enthusiasm has communicated itself to at least one of his two youngsters.

The parents recently took the two children to the barber shop for a haircut. The barber asked the youngsters what kind of haircuts they wanted—did they want a GI haircut? "No sir!" was the prompt response of the youngest, aged 5; "I want a G-E haircut."

A Message from

RALPH J. CORDINER

to the

EMPLOYEES OF THE GENERAL ELECTRIC COMPANY

ALONG with a sense of personal loss, I feel sure that every member of the General Electric organization must have a feeling of individual pride in the fact that Mr. Wilson was chosen as the "man of the hour" in this time of national emergency. The instantaneous public reaction left no doubt that the whole nation has been given a much-needed psychological lift in a time of crisis. I think we in General Electric can be pardoned if we boast that we feel an even greater lift for the very good reason that we know Mr. Wilson's qualities of leadership so intimately and know that the public confidence in his ability to handle such tremendous responsibilities is well placed.

This feeling of pleasure can be turned to a useful and patriotic purpose if it can serve as a reminder to us in the difficult period ahead that we must now address ourselves to our own jobs with new determination and enthusiasm. While Mr. Wilson has gone to Washington, he has left something very important with us. There is an organization which he built. There was never any doubt in his mind that this organization of men and women could do any job assigned to it and do it well. By leaving us to carry on as big a job as we have ever had without him, Mr. Wilson has implied a compliment which will require the best efforts of every one of us to deserve.

Ralph J. Cordiner

MANKIND'S DRUDGE

THE MOTOR

IT RELEASES US, AS IF BY MAGIC, FROM THE BODY- AND MIND-KILLING CHORES THAT SEEMED TO BE OUR DESTINY

SHORTLY after the first World War, a young publicity man asked the help of Charles Steinmetz in making the Company's huge electrical equipment appealing and vivid to the average newspaper reader. After a couple of thoughtful pulls on his famous cigar, the mathematical wizard offered this formula:

"One horsepower equals the muscle work of about 22 men—*big* men." He puffed again. "There are machines coming out of General Electric which can do more work than the entire slave population of this country at the time of the Civil War. Would that interest your average newspaper reader?" It would and did.

This formula (which some feel 22 Charles Atlas's would have trouble living up to), leads to an interesting series of computations—such as, the quarter-horsepower motor on a farmer's well pump does as much work as five men and a boy. Or, one of the big electric pump motors irrigating the Columbia Basin from Grand Coulee Dam does more physical work than the people of Detroit.

The point Steinmetz was making, of course, was that modern machines were making hard physical labor dirt cheap.

The trend had started, as every alert schoolboy knows, long before Steinmetz or General Electric—in eighteenth century England's Industrial Revolution. But when Steinmetz spoke, the Industrial Revolution was itself being revolutionized. Something was having as profound an effect on the economy and human way of life as James Watt's steam engine had had two centuries before. That was the electric motor.

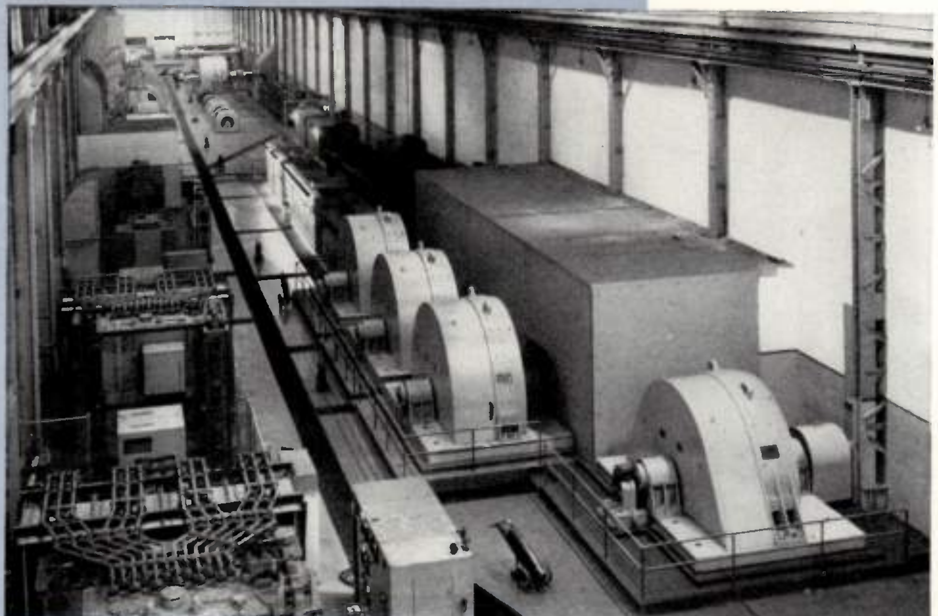
Housework Devalued

During the Twenties, General Electric ran its famous series of "Any Woman" ads based on this revolution. They had such provoking headlines as: "Any woman who turns a wringer is doing what a motor can do for two and one half cents an hour"; or, "Any woman who sweeps or beats a rug is tiring herself needlessly. A little motor can do it for one and three-quarter cents an hour." Understandably, the ads had a tremendous impact on a world of women who still beat their own rugs and turned their own wringers.

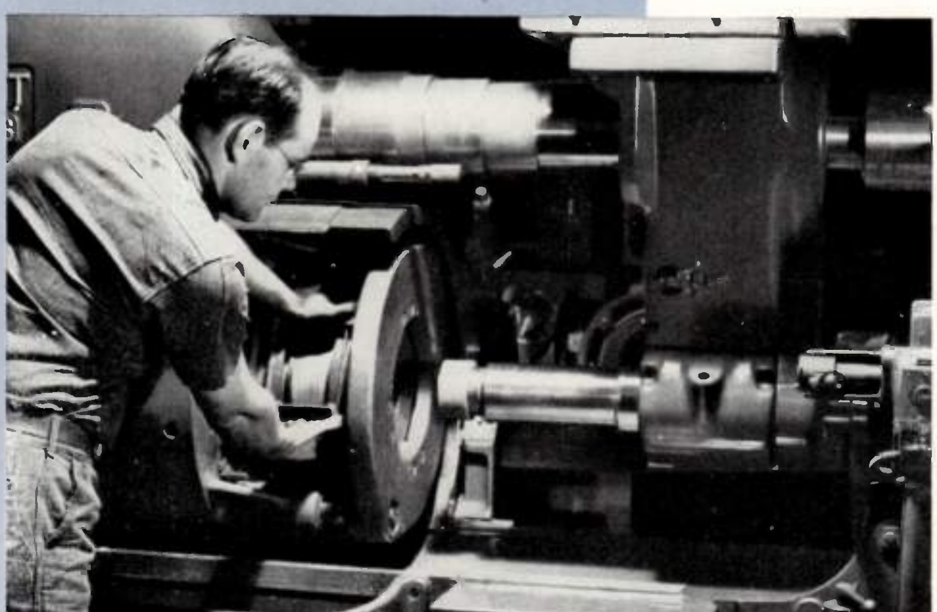
A few years before that, the Company's industrial application engineers had begun to hammer home the same theme, slanted at industry; namely: if industry wasn't doing most of its work with electric motors, it was doing its work the hard way, the expensive way.

There was no answer to their arguments. Electric motors were three times more efficient than internal combustion engines, five times more efficient than steam engines, and were more compact and more easily controlled than either.

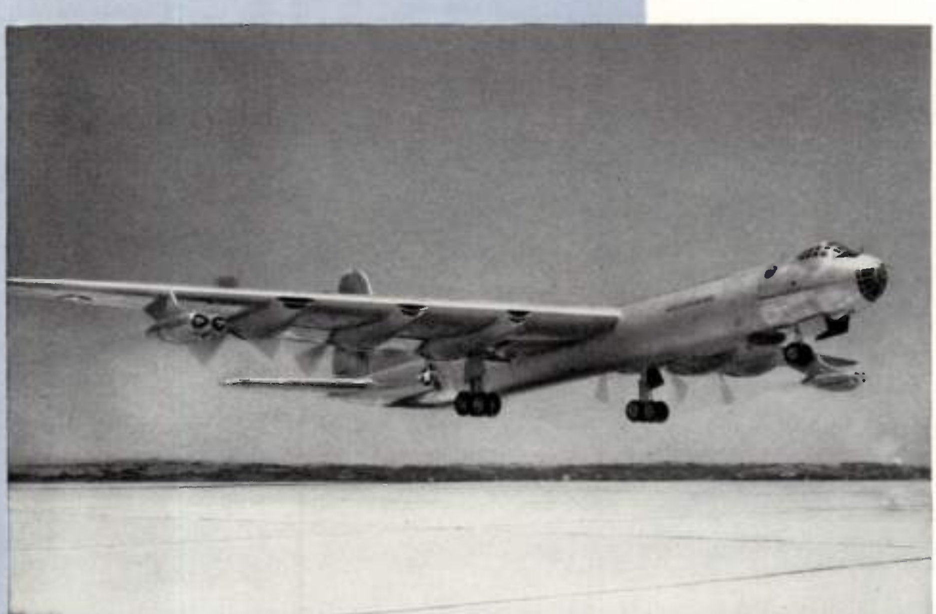
For want of an argument against electrification, industry went for the



If 22 manpower equal one horsepower, 38 Army divisions couldn't do as much work as these tremendous motors in a West Coast steel mill. The four in the foreground alone total 400,700 manpower.



Motor-driven machine tools do a much finer job than the most patient, experienced craftsman of a century ago. The average American worker is now helped by something like 165 manpower in motors.



The versatility of motors, particularly small ones, is nowhere better illustrated than aboard giant aircraft like the B-29 or this B-36D. Such planes use well over 300 small electric motors each.

electric motor with such enthusiasm that about 80 per cent of this country's industrial power is in the form of electric motors.

It all started with Michael Faraday, the English physicist, who worked out the basic principle in 1821. Had he exploited his discovery, developed it into a practical machine (he was certainly capable of it), he and his heirs might have become millionaires many times over. Instead, he took the classic attitude of the pure scientist, saying that he wasn't interested in applying his discovery.

Said he: "I have rather, however, been desirous of discovering new facts and new relations depending on magneto-electric induction than of exalting the force of those already obtained; being assured that the latter would find their full development hereafter." And he let it go at that.

What Faraday discovered was that a wire carrying a current experienced a push when placed in the field of a magnet. Essentially the basic electric motor is made of a movable element with current flowing through it and a stationary magnetic element. These are so arranged that the moving element is pushed around in a circle by the magnet's field, spinning a shaft. The shaft, of course, is where the work is taken off.

If Faraday wasn't interested in finding uses for his electro-magnetic machine, plenty of others were. Seventeen years after the initial discovery, a Russian went down the Neva River in an electrically powered boat at four miles an hour. A Scotchman equalled this record with an electrically powered car on the Edinburgh and Glasgow Railroad. In 1849, an American dashed down the tracks of the Baltimore and Washington Railroad at 19 miles per hour, in a vehicle propelled by an electric motor.

Electricity vs. Steam

None of these early motors was dependable enough to be taken seriously by industry. Industry continued to put its faith in the steam engine. Most of the American electrical pioneers were interested in the idea of a practical electric motor, but they were too involved with electric lighting and power generation to give much attention to the problem at first. *(Continued next page)*

The drive power of steam engines used to be carried about plants on shafts and belts. At first, electric motors were used simply to drive these same systems.

Separate electric motors on each machine eventually eliminated inefficient, ugly, and hazardous belt systems, and made way for a new era in factory design.

THE MOTOR—*continued*

When Edison was asked about the possibility of getting work as well as light out of power lines, he said he had done almost nothing about that use of electricity. The man to see, he said, was Frank J. Sprague. Sprague was just then putting the finishing touches on what Edison considered the first practical electric motor.

History Repeats

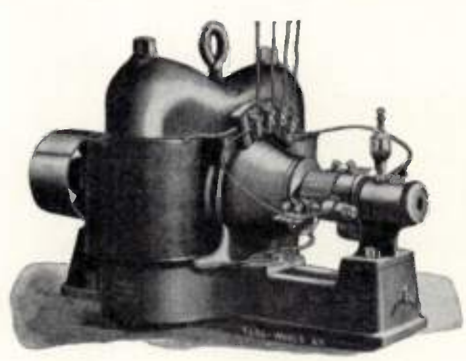
The textbook starting point for the Industrial Revolution was in the British textile mills—the flying shuttle, the spinning jenny, application of the Watt steam engine. As though history were repeating itself, Sprague sold his first motors to textile factories in Lawrence, Massachusetts.

The power in the mills had been supplied by steam engines turning long shafts. A tangle of belts ran from these shafts to the textile machinery. Sprague replaced the steam engines with cleaner, quieter, more efficient electric motors.

This installation was a simple replacement that didn't take full advantage of the electric motor's versatility. It took a while to discover just how sensational the benefits could be. To get those benefits, application engineers soon learned, the thing to do was to get away from a central power system and power each machine with its own separate motors.

When that was done, the revolution really got underway. Machines no longer had to be located along a power shaft; they could be placed wherever they were most needed. It meant new freedom in plant design. The jungle of overhead belts could be taken down, eliminating a hazard—and letting light in. Each machine could be operated at its own speed, it could be turned on and off without affecting the other machines, and energy was no longer lost in slippage and friction of belts. "Keep the power in the wire up to the last inch," was a General Electric slogan a few decades ago.

In a very short time after Sprague's textile mill installation, electric motors were running sewing machines, freight elevators, street cars, coffee grinders, emery wheels, lathes, printing presses, ventilators, ice-cream freezers, silverware polishers—in fact, just about every kind of machine the motor salesmen happened to see.



Frank J. Sprague's motor, ca. 1885. Edison called it the first practical machine for making electricity do work for industry.

Close to the turn of the century, Sprague's organization joined forces with Edison General Electric* to become the roots of the present motor business in the Company's Apparatus Department.

There was no real resistance to the idea of electrifying industry. The chief impediment was that the application engineers had to become experts in various types of industries before they could help those industries.

Industry Specialists

In order to make and install a loom motor, G-E engineers had to learn about looms. Before steel mills could be electrified, the engineers had to know as much about the steel-making techniques as the steel manufacturers. And so on, through mining and petroleum industries, chemical processing and rubber making—ad infinitum.

General Electric developed—it had to—a corps of industry specialists. These engineers understood the special problems of various industries and knew what could be done to help solve them. Heirs to the work done by these pioneers are the present-day Industrial Divisions of the Apparatus Department, which are broken down into such divisions as

* *A General Electric predecessor.*

the iron and steel industries section, the coal and non-ferrous industries section, and so on.

When the electric motor's progress got into full swing, it became clear that its effects would be a good bit more profound than merely stepping up efficiency, getting rid of overhead belts, and making control more precise. The electric motor, in effect, spread the Industrial Revolution over the countryside, whereas it had once been confined to packed factory towns close to coal fields or water power. Moreover, it did jobs no other kind of machine could do well—particularly little jobs, annoying jobs, which, when added up, accounted for far more work than was done in factories.

Work, like light, could be piped anywhere it was needed—enough work to run a steel mill or a locomotive, or as little work as it takes to run an electric clock.

Listing everything that electric motors now do is a job of almost the same magnitude as listing everything that needs to be done. The average home uses motors in several different ways. The average B-29 bomber carries 331 motors—aiming guns, hoisting ammunition, lowering landing gear, retracting landing lights, running instruments and radar gear. General Electric manufactures literally thousands of different types of motors to meet special needs.*

Each American worker now has about seven and one half horsepower in the form of electric motors to help him. That, by the Steinmetz formula, is about 165 manpower.

New Horizons

The electric motor is such a versatile performer, in fact, that *Fortune* was moved to declare four years ago that the only limits on its use were how much automatic help people could afford and how much they could endure. If people want their shoes tied, their windows raised, their glasses cleaned, or their teeth brushed, a motor can do it.

Since nothing is so permanent as change, it isn't surprising that electric motor's revolution of the Industrial Revolution is, in turn, being revolutionized. It's being done by electronics. Electric motors extended what the Industrial Revolution had begun—making brute physical labor all but obsolete. Now, motors coupled with electronic systems are showing promise of taking over many *routine mental* operations—sorting, parts inspection, and the like. Most operations that involve no creative thought, that call upon a person only to perceive something and then respond with a repetitive muscular motion, can probably be done better with motors and electronics.

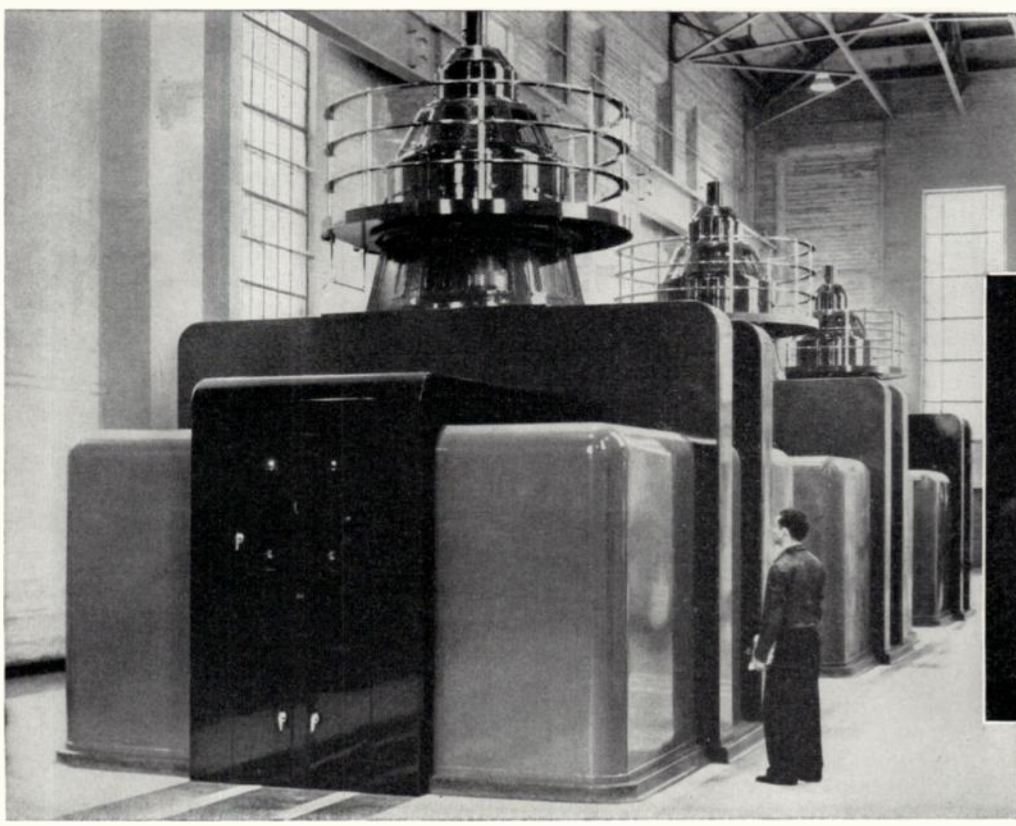
General Electric engineers recently coined a new word to describe the present trend of motor use—"Automation." It's a very general term, defined as "making industrial processes more completely automatic—eliminating human error and drudgery."

Automation, with Faraday's brain child at its heart, is in evidence almost everywhere: electric typewriters . . . card sorters . . . accounting machines . . . computers . . . flat-work-folders for laundries . . . floor sweepers . . . log carriages . . . multiple drills . . . power shovels . . . draglines . . . streetcar washers . . . beer can fillers and sealers.

Automation is dedicated, its coiners say, to a business man who wants lower costs; to workmen who want more dignified and productive jobs; to a nation seeking higher living standards and greater security.

The electric motor is by nature quiet, calling for remarkably little attention. Its unobtrusiveness may account for the fact that few laymen realize that it has had as impressive an impact on the human way of life and standard of living as James Watt's celebrated steam engine. Moreover, an intelligent guess is that its impact is greater than that of peacetime atomic energy promises to be.

** So many different kinds in fact that motor engineers are constantly trying to reduce the number in the interests of manufacturing efficiency, availability, and interchangeability.*

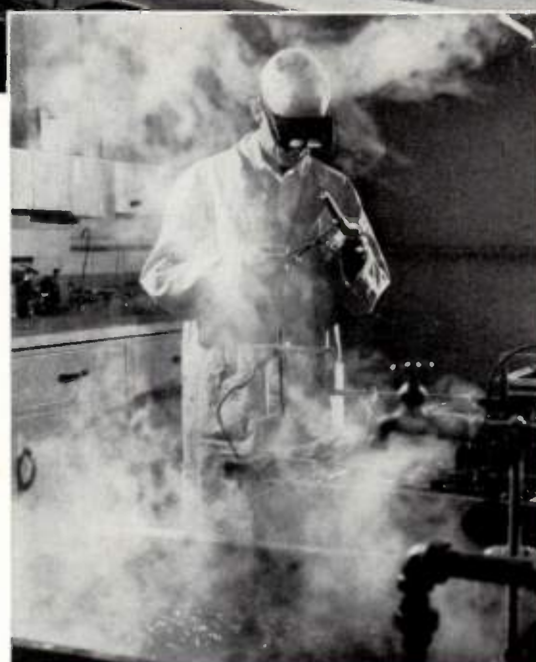


Some of the largest motors have been for pumping water, such as this 9000 horsepower pump motor in the West. The biggest G-E motor ever built is a 65,000 horsepower giant for pumping water at Grand Coulee Dam.

This two-watt, five and a half ounce midget, complete with ball bearings, was built for small control and protective devices aboard aircraft.

MEASUREMENTS LAB

The Meter and Instrument Divisions has new facilities for research and development



Photos by Jim Burns

Chemical engineers and technicians study organic and inorganic materials in the constant search for better insulations, plastics, and finishes. Because of the fumes from the plating process, this area is equipped with a special ventilation system which completely changes the air 67 times an hour.

During the development of a new watthour meter component an engineer uses a Helmholtz coil to check the effects of magnetic fields on the part being tested. The five-story lab has complete facilities for applied research, product development, and design in the field of measurement.

LORD KELVIN, the physicist who believed that knowledge doesn't amount to much unless you can measure it, would be in his glory at the Meter and Instrument Divisions in West Lynn. For here he would find virtually every type of electric measuring device. Precision instruments of the first order, they measure all sorts of things—volts and watts, time and temperature, sound, light, and color.

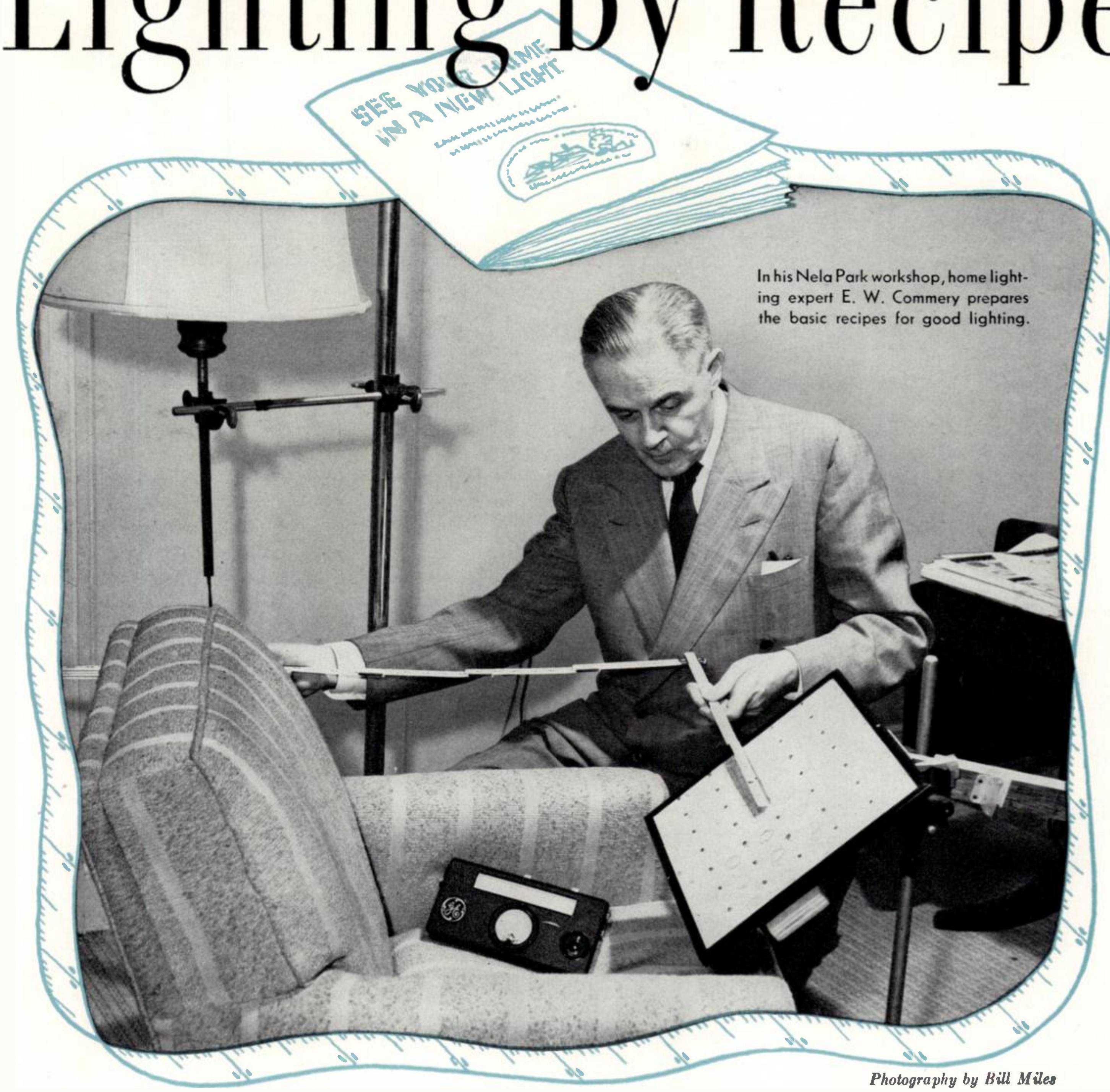
Measuring instruments like these are an inherent part of scientific progress. And because science always moves forward into the unknown, it is impossible to imagine what quantities will have to be measured next, or to forecast what instruments will have to be developed to measure them.

With this in mind, the Apparatus Department has built a new measurements laboratory, staffed it with 300 specialists, and provided them with the best possible equipment for developing new or improved measuring devices.

It's a five-story brick, steel and concrete building at the West Lynn Works, with all the latest laboratory conveniences such as special power services to every room and specially designed electronic power supplies.

Said Divisions Manager H. E. Strang at the recent dedication ceremonies: "Out of the research, analysis and development conducted in laboratories like this will be created the instruments of the future, contributing substantially to America's industrial productivity."

Lighting by Recipe



In his Nela Park workshop, home lighting expert E. W. Commery prepares the basic recipes for good lighting.

Photography by Bill Miles

What is good light? At last there's a sure way of knowing

THE voice on the phone was asking for help. Not that that was anything new to Gene Commery, Nela Park's home lighting expert. He was always getting calls from people wanting advice on lighting. But this one sounded like real distress. The young woman was on the verge of tears.

Her husband, she explained, was in danger of going blind. He worked in a factory and attended school. In spite of his failing eyesight he spent long hours studying at night, determined to finish his course. What was the best light she could give him, so that he could study with the least amount of eyestrain?

Commery told her what to do, slowly, so she could write it down—what lamp bulbs and fixtures to use, where to place them, how to avoid reflected glare from the desk top and other shiny surfaces.

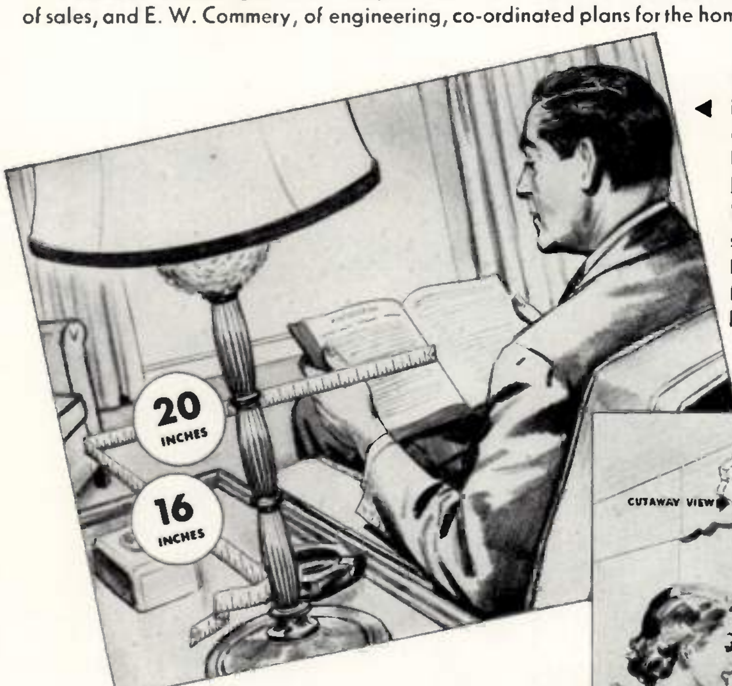
The call lasted 30 minutes. As Commery hung up he thought: wouldn't it be a great thing if there were a recipe book for good lighting, just as there is for cooking, so that a person could find out the right light to use by following simple, printed directions.

Today there is. Today Commery would tell that disturbed young wife to look up Recipe No. 6* in a booklet called "See Your Home in a New Light—22 Recipes for Better Living in a Better Lighted Home."

This little pamphlet is the most practical and sensible thing that has so far been done to educate the public in the fundamentals of good lighting.

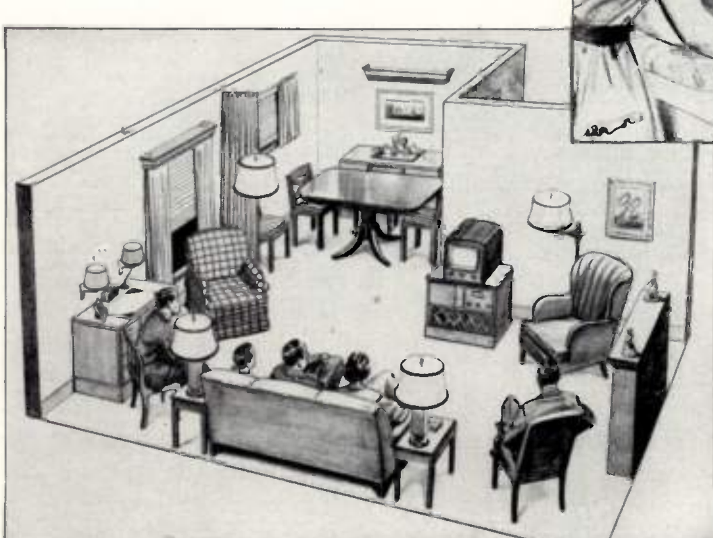
**See illustration at top of page 9 of this article.*

A committee consisting of (left to right) H. H. Green, of advertising, O. H. Young and E. D. Stryker, of sales, and E. W. Commery, of engineering, co-ordinated plans for the home light conditioning campaign.



◀ Lamps measuring from 25 to 30 inches to top of reflector are recommended. Top of diffusing bowl is 8 to 9 inches across. Diameter of shade bottom is at least 16 inches. Bottom of shade should be 15 inches above table for smaller lamp, and 17 inches for larger ones. The table height should be about 25 inches.

Use an unshielded surface fixture with two 25-watt fluorescent tubes. Shielding board protects eyes from direct glare. Alternates are a floodlight bulb or a standard lamp bulb in an enclosing globe. ▶



◀ For television viewing, maintain balanced lighting in the room by using floor and table lamps. Don't let direct light from the lamps fall on the tube. Avoid exceptionally bright spots of light on walls near the set. Arrange chairs so that the viewers may sit at a distance at least 10 times the width of the picture tube.

The lighting in the average American home is, strange as it seems, remarkably poor. Surveys, questionnaires, reports of lighting advisors—all these have revealed the same answer: the average home needs about four times as much light as it now has. Of the 40 million wired homes in America, not one out of 100 has proper lighting. The average home lighting, authorities say, is as far behind the times as a wood-burning cook stove is behind an electric range.

Not that good lighting equipment doesn't exist. Ever since Edison's invention of the incandescent lamp, lighting engineers have been striving to "bring the sun indoors," to create artificial lighting that simulates as closely as possible the ideal lighting provided by the sun.

The trouble seems to lie in the fact that people just don't know the kind of light they should have for the tasks they do in their homes. They don't know because they have never been told in language they could understand.

There have been attempts to show them, such as the "Better Light–Better Sight" program of several years ago. Trained lighting advisors carried their kits to homes and showed the housewife what good lighting was like. But in that program, as in every other crusade for improved lighting, the emphasis was on lighting a room as a whole, with thought being given not only to visual requirements but also to interior decoration and architectural types.

The issue was always confused with such secondary considerations. The basic question, however, is this: what kind of light enables you to do the job at hand—whether it's sewing, studying, shaving, or what not—with the least amount of strain on your eyes? It all boils down to placing the right light source at the right distance and in the right direction from the spot you're lighting. Simple as it sounds, there has been no easy way, until now, to find out what *was* right.

Many people are eager to know, if the telephone calls to Nela Park are any indication. But these are for the most part Cleveland citizens, people lucky enough to be able to make a local call to the world's foremost lighting center and talk personally with the experts.

Now homemakers all over the country can get the same authoritative advice. The recipe book is free, and easy to obtain.† Everyday situations are presented with illustrations and simple directions on how to light them properly. (Typical examples are shown on these pages.) You don't have to worry about things like footcandles, lumens, or light meters. Just get a tape measure.

In contrast to the simplicity of the recipes is the mass of knowledge and manhours of work they represent. A research group of the Illuminating Engineering Society made a survey of every conceivable way that people work in the home. Studies were made of the furniture—the height of tables and chairs and sinks and dressers. Reams of statistics were compiled to reach truly representative figures.

Then E. W. Commery, backed by 30 years' experience in home lighting, went to work with light sources, meters, yardsticks, and spent countless hours juggling them around.

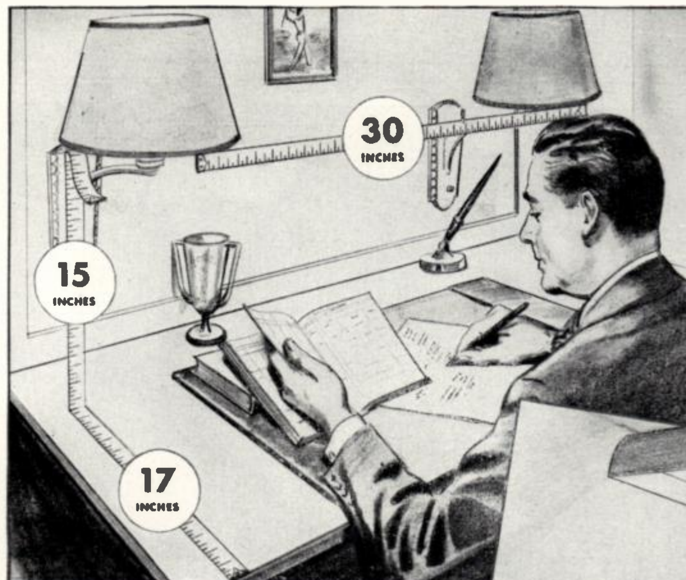
The result of all this is embodied in 22 recipes giving the minimum standards for light-conditioning any type of home, whether it's large or small, old or new.

The recipe book is the foundation of what the Lamp Department calls the "Home Light Conditioning Program." It's an ambitious plan, calling for the creation of 10,000 demonstration homes throughout the country by the end of the year.

The homes are "light-conditioned" according to the recipes, and open for inspection by the public. Visitors are given a copy of the recipe book, then they see the recipes in actual practice. Co-operating in the venture are electric service companies, operative home builders, retail stores, and manufacturers of lighting fixtures and portable lamps. General Electric is providing the lamp bulbs, the recipes, and over-all guidance.

Lighting experts foresee far-reaching effects of the new approach to home lighting. Manufacturers of portable lamps and fixtures are already designing equipment to fill the recipes. A new trend in furniture design may result from consumer demands for pieces that meet lighting specifications. For now the buyer knows exactly the lighting he should have and how to get it. He has the authority of the printed word—the word of experts—behind him.

†By writing to the Lamp Department at Nela Park. Electric service companies, lamp dealers, etc. also have a supply.

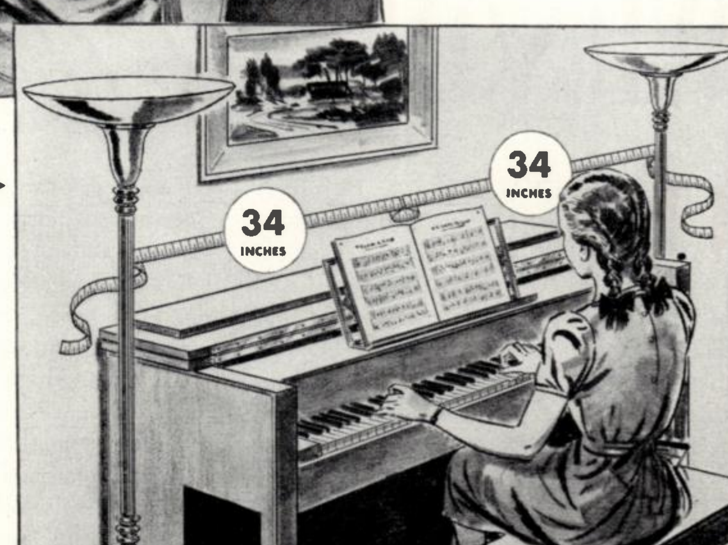


◀ Top diameter of diffusing bowl is 6 inches. Bottom of shade is 10 inches across and depth of shade is 6½ inches. Avoid dark-colored shades or shades that are bright when lighted. Use 100-watt frosted bulb. If desk is more than 2 feet from front to back, arrange supports so that each wall lamp centers 17 inches from the desk's front edge.

This fixture has a metal reflector with lengthwise shielding for a minimum of two 25-watt fluorescent tubes. Or the fixture may have a round metal reflector with a 12- to 14-inch diameter; use 150-watt silvered bowl lamp bulb. Attach to ceiling so that center of unit is over work bench and 10 inches back from front edge of bench. ▶

◀ With swing-arm floor lamp use 50-100-150-watt three-lite or 150-watt bulb in diffusing bowl, or white indirect bulb without bowl. A 32-watt circline fluorescent tube is also used in either case. For difficult sewing, clamp a 75-watt reflector lamp, flood or spot, to the shaft of the floor lamp. With it you'll get 80 footcandles of light.

Locate pair of torcheres 34 inches to left and right of center of keyboard and in line with lower edge of keyboard. Use 100-200-300-watt bulb. Shallow, white inside dense reflectors of 12 to 16 inches diameter are preferred. Height to reflector is 66 inches. Even distribution of light serves to prevent annoying lighting variations. ▶



CORDINER *becomes 5th G-E President*

WILSON *heads U.S. Defense Production*

ON DECEMBER 15, Ralph J. Cordiner became the fifth president of the General Electric Company. He was elected by the Board of Directors to succeed Charles E. Wilson, who resigned on that date to become director of the Office of Defense Mobilization—a job described in Washington as second in importance only to the presidency of the United States. Upon accepting this national responsibility, Mr. Wilson announced that he was severing all connections with corporate and banking institutions.

Mr. Wilson completed 51 years of continuous service with General Electric in September. Starting in 1899 as a messenger boy with the Sprague Electric Company, which was later to become a part of General Electric, he rose to the presidency in 1939. He served the nation as vice chairman and executive vice chairman of the War Production Board from 1942 to 1944, and has been widely credited with the success of the World War II production effort. His new call to Washington gives him even broader responsibility and authority.

The new president, Mr. Cordiner, executive vice president and a director of the Company since 1949, has been associated with General Electric for 24 years. During that period he has served as manager of what are now five of the Company's departments—Appliance and Merchandise Department, Affiliated

Manufacturing Companies Department, and divisions which later grew into Construction Materials, Chemical, and Electronics Departments.

Entering the Company first in the field of sales, his interests rapidly broadened to include organization, management, and administration, in which he has been directly engaged for more than a decade. He has worked closely with the two preceding presidents, Gerard Swope and Mr. Wilson. His association with Mr. Swope, president from 1922 to 1940 and from 1942 to 1944, began when Mr. Cordiner was manager of the Appliance and Merchandise Department. Again, after service on the War Production Board, Mr. Cordiner returned as assistant to Mr. Swope, who had come back to the Company presidency when Mr. Wilson went to his wartime post in Washington.

Mr. Cordiner and Mr. Wilson have been associated for many years, first in the Company's departments in Bridgeport, then in World War II government service in Washington, and finally in planning and bringing about the greatly expanded General Electric organization during the postwar period. In the expansion period, Mr. Cordiner was successively assistant to Mr. Swope, then, under Mr. Wilson, vice president, and executive vice president.

In recent years, Mr. Cordiner has extended even further his first-hand knowledge of the Company's broad operations through service as a director of several affiliates which have specialized responsibilities. These include the International General Electric Company, which handles foreign sales; the General Electric Supply Corporation, which is concerned with large-scale distribution; and, in the field of finance, the General Electric Credit Corporation.

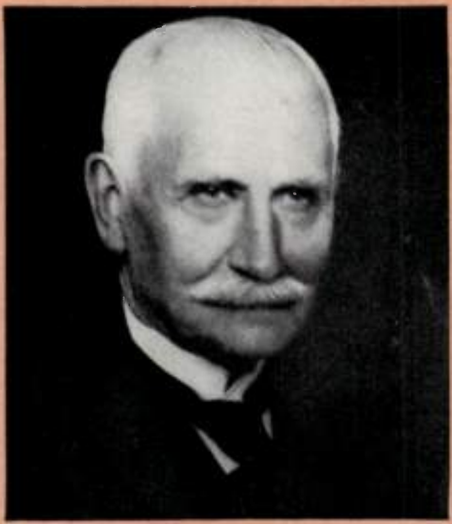
Mr. Cordiner is a veteran of the electrical industry, with a career which began even before his graduation from college. He was born in Walla Walla, Washington, on March 20, 1900, and attended Whitman College there, majoring in economics. His college career was interrupted by World War I, when, at the age of 18, he enlisted in the Navy as a seaman. He worked his way up through the ranks and was half way through officers training school when the war ended. Returning to college, he helped to finance his education by working part-time for the Pacific Power and Light Company, selling electric appliances. After graduating with high honors in 1922, he became commercial manager of a division of that company. Less than a year later he was offered a position with the Edison General Electric Appliance Company, a G-E affiliate, and five years later became its Northwest manager. In 1930 he moved to San Francisco to become Pacific Coast division manager.

Mr. Cordiner came to Bridgeport in 1932 to become manager and chairman of the management committee of a newly organized section which combined the heating device section of the Edison General Electric Appliance Company and similar activities of the General Electric Merchandise Department. During the 1930's he was closely identified with the Company's rapidly expanding appliance business under Mr. Wilson's direction as a vice president. Mr. Cordiner was successively assistant manager of appliance sales, manager of the radio division (forerunner of the Company's present Electronics Department), and assistant manager of the department. Following Mr. Wilson's move to New York as executive vice president, Mr. Cordiner became manager of the Appliance and Merchandise Department in 1938.

In December, 1942, Mr. Cordiner went to Washington as director general of war production scheduling for the War Production Board and three months later was appointed vice chairman to assist in lining up the Board's organization. In July, 1943, he returned to General Electric as assistant to the president and was elected a vice president and assistant to the president in February, 1945. It was during this period that he worked with Mr. Wilson in planning the postwar General Electric organization which resulted both in a greatly expanded plant and the decentralization of the Company's diversified lines into integrated departments.

Each of Mr. Cordiner's predecessors in the Company's presidency has had special talents to meet the demands of the times on General Electric. Mr. Swope's period, for instance, was one in which the tremendous gains of preceding decades were consolidated. Mr. Wilson took over at the start of unparalleled expansion. Now, Mr. Cordiner moves into the presidency at a time when the Company is facing another era of swift and far-reaching transition.

While a large part of the Company's engineering and production effort has been devoted to defense equipment since the last war, increasing demands for direct military production will now be made upon it. The experience and skills Mr. Cordiner brings to his new job are particularly suited to the stiff challenge of the coming years.



Charles A. Coffin

PRESIDENT, 1892-1913

Edwin W. Rice

PRESIDENT, 1913-1922

Gerard Swope

PRESIDENT, 1922-1940, 1942-1944

OUT OF THE WORKSHOP OF *Science*

Here are some of the new tools for research and industry recently developed in our laboratories

Winona Brown of the Electronics Department shows off a new tube developed by General Electric engineers for use in ultra-high-frequency television receivers. The tube is a tiny "magnetron," which is similar in principle to tubes used in radar and in quick-cooking electronic ovens. The television application marks the first consumer use of a magnetron, a tube type first devised by Research Laboratory scientists and used principally in industrial and military equipment.

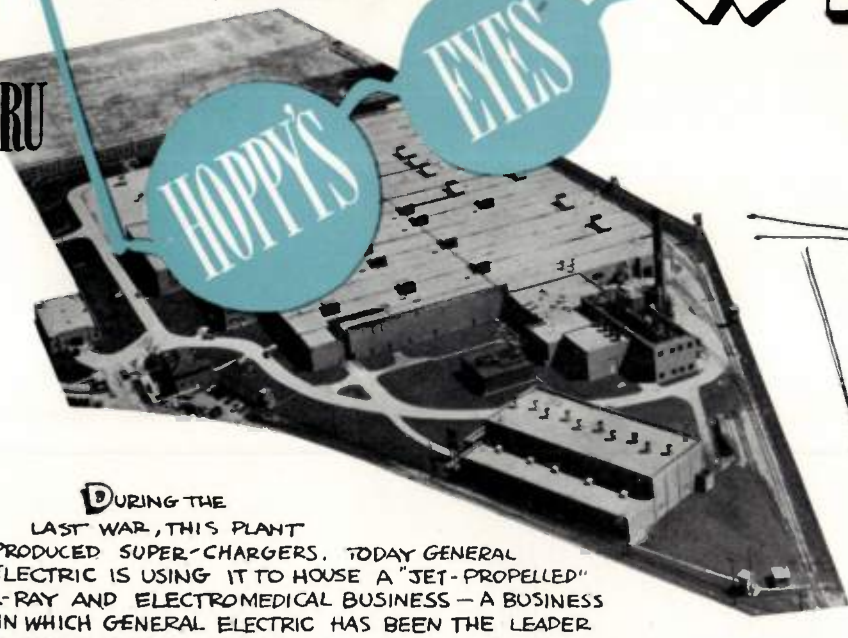
Dr. Vincent J. Schaefer of the Research Laboratory records the movements of clouds with this unusual camera system. A small hand movie camera is rigged to take a single movie frame every two seconds, so that 32 minutes of actual time turn up as one minute of movie screen time. The completed movies resemble an animated cartoon, as the clouds rise and fall, expand and contract at an increased tempo. Schaefer is one of the Laboratory's pioneers in the field of weather research.

A white square of paper, containing a smear from an object suspected of being contaminated with radiation, is analyzed by a new General Electric radiation detector known as the "universal scintillation counter." The instrument is able to check the smear for the presence of alpha, beta, or gamma rays, the "big three" of nuclear radiation. Operating the instrument is Mrs. Ethelyn Langdon, an assistant in the General Engineering and Consulting Laboratory in Schenectady.

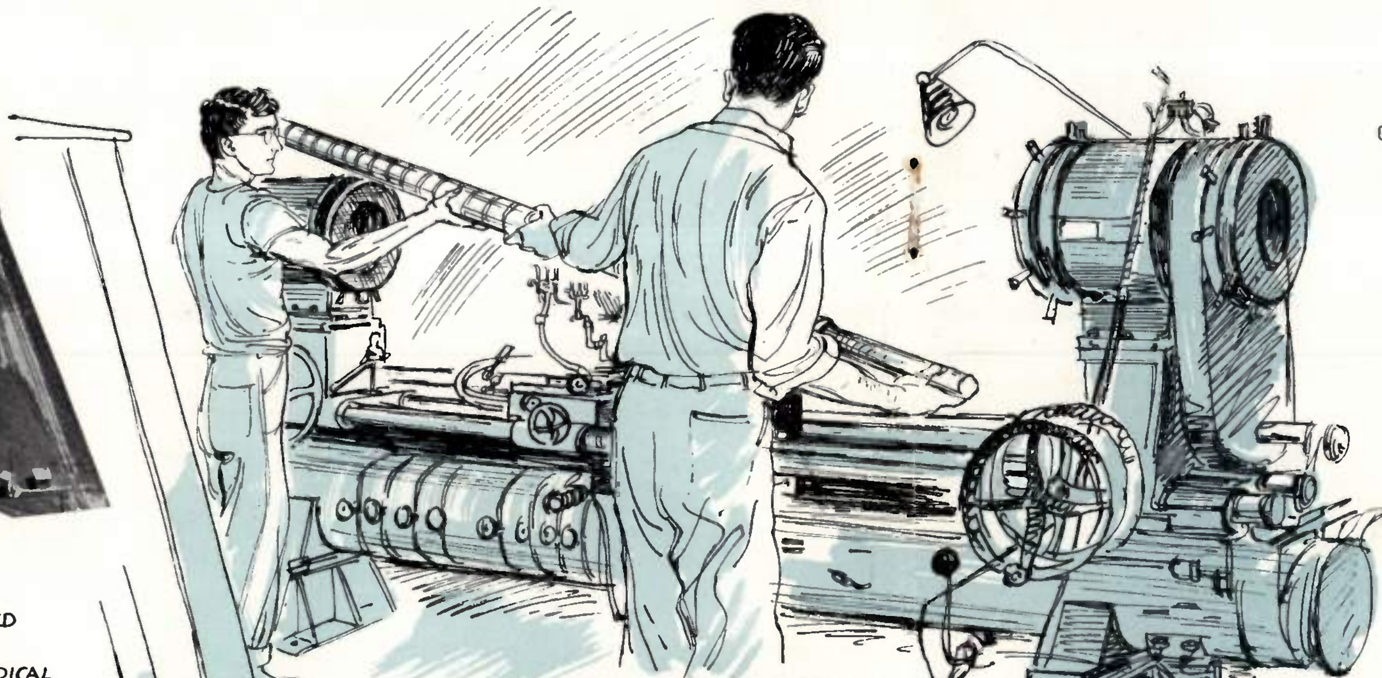
X-RAYS AT MILWAUKEE

THRU HOPPY'S EYES

Artist DeWolfe Hotchkiss takes a sketchy trip through the G-E X-ray Corporation's plant in Milwaukee.



DURING THE LAST WAR, THIS PLANT PRODUCED SUPER-CHARGERS. TODAY GENERAL ELECTRIC IS USING IT TO HOUSE A "JET-PROPELLED" X-RAY AND ELECTROMEDICAL BUSINESS—A BUSINESS IN WHICH GENERAL ELECTRIC HAS BEEN THE LEADER FOR OVER HALF A CENTURY. — THE LABORATORY AND FACTORY HERE DEVELOP AND PRODUCE THE EQUIPMENT WHICH IS SOLD THROUGH THE 35 DIRECT FACTORY BRANCHES OF THE DOMESTIC SALES ORGANIZATION STRATEGICALLY LOCATED IN THE PRINCIPAL CITIES OF THE U.S. AND CANADA. ALSO BUILT HERE IS EQUIPMENT TO BE SOLD BY GENERAL ELECTRIC MEDICAL PRODUCTS CO. A SUBSIDIARY ORGANIZATION WHICH HAS DIRECT BRANCHES AND OTHER SALES OUTLETS IN MORE THAN 30 FOREIGN COUNTRIES



TWO MEN IN THE TUBE MACHINING DEPARTMENT REMOVE A FINISHED 2,000,000 VOLT X-RAY TUBE FROM A HUGE GLASS LATHE. THESE TUBES ARE USED IN X-RAY MACHINES THAT ARE EMPLOYED IN BOTH MEDICAL THERAPY OF DEEP-SEATED CANCER AND IN THE EXAMINATION OF LARGE CASTINGS. THE LATHE, BUILT BY G-E X-RAY EMPLOYEES, IS BELIEVED TO BE THE LARGEST OF ITS KIND IN THE WORLD

ASSEMBLING THE LEADS ON #140 AUTO-TRANSFORMERS TO BE USED IN THE GENERATING SYSTEM OF X-RAY EQUIPMENT. THESE AUTO-TRANSFORMERS ARE ASSEMBLED INTO THE KX-8 CONTROL, DONCHA' KNOW.

PART OF THE G-E X-RAY FACILITIES IS THE FAMED COOLIDGE LABORATORY, LARGEST X-RAY DEVELOPMENT LAB IN THE WORLD. SHOWN IS THE FINAL ASSEMBLY AND CHECK-UP ON A 2,000,000 VOLT INDUSTRIAL X-RAY UNIT

THIS YOUNG AND MIGHT I SAY ATTRACTIVE GIRL IS CHECKING AN X-RAY TUBE WITH A POLARISCOPE TO DETERMINE WHETHER ANY STRAIN IS LEFT IN THE GLASS

G-E X-RAY IS OFTEN CALLED UPON BY VARIOUS INDUSTRIES TO DETERMINE WHETHER X-RAY CAN BE USED TO INSPECT THE QUALITY OF ITS PRODUCTS. HERE IS A 140,000 VOLT UNIT BEING TESTED ON A MYSTERY CHEMICAL PRODUCT (THE CONES)

STRICTLY A WHITE GLOVE AFFAIR — THIS IS SUCH A DELICATE JOB THAT THE OPERATOR MUST WEAR CLEAN, LINTLESS WHITE GLOVES AT ALL TIMES. THIS GIRL IS SETTING THE FILAMENTS IN THE CATHODE CUPS WHICH ARE PART OF THE INTERNAL ASSEMBLY OF AN X-RAY TUBE. THE GLOVES PROTECT AGAINST CORROSION FROM PERSPIRATION AND DIRT.

IN THE SHIPPING DEPARTMENT, A RED CORNER IS PAINTED ON APPARATUS GOING TO EXPORT. THIS BOX CONTAINS X-RAY PARTS DESTINED FOR PANAMA

IN THE STRICTLY MASCULINE JET ENGINE BUSINESS

Marion Kellogg ADDS A Feminine Touch

Jim Burns Photo

TO MANY of the young men who come to her office looking for a job, Marion Kellogg is a distinct surprise. They had rather expected a personnel supervisor to be a sober-faced male. Instead, they're confronted by a girl with laughing brown eyes and friendly charm.

The newcomer promptly feels at ease in her presence. Without effort, Marion injects into the situation the essence of her personality—a lively and honest concern for the other fellow. This rare quality is probably the real reason for her success.

Her job is to handle placement and training of technical and supervisory personnel for the Aircraft Gas Turbine Divisions of the Apparatus Department at River Works. This is no small achievement for a girl in what is generally considered to be a man's company.

Naturally, it hasn't been kindliness alone that has pushed her up the ladder; Marion has more than an average share of brains. In college she was elected to Sigma Xi, an honorary society in science—physics was her major. Training in physics and mathematics gave her a basic understanding of engineering and science. Although not an engineer herself, she has to know how to recognize a good one in recruiting engineers.

Student and Teacher

After graduating from the College of the Sacred Heart (New York City) in 1942, she went on to Brown University to get her master's degree in physics. Because of her high scholastic rank in college, she was given an opportunity to do a little teaching while she was working for her degree.

Fresh from a woman's school, she suddenly found herself facing a roomful of men, most of them older than she. But the situation was no less novel to her than to the University itself—she was the first woman faculty member the physics department at Brown had ever had.

This fact made quite an impression on the General Electric representative who came to interview her for a job in 1944. The next thing Marion knew, she was an engineering assistant in the Company's General Engineering and Consulting Laboratory in Schenectady.

But she discovered she wasn't cut out for engineering, and it wasn't long before

An Erie Works engineer has

Electrified Curtains

to keep out the cold

Jack Brightman checks watts and volts in the wire before Mrs. Brightman (above) sews it on the back of the curtains.

Photos by Curt Lamphier

NOWHERE else, probably, will you find curtains quite like the ones in Jack Brightman's home in Erie, Pa. To all appearances they're perfectly normal curtains, draping the living room's big casement windows in soft, pale green folds. But if you touch them you'll find them surprisingly warm, even though it's zero weather on the other side of the single pane of window glass.

The curtains, you'll discover by looking at their inner side, are electrically wired for warmth.

Brightman, who is head of the refrigerator development laboratory at Erie Works, came up with this adaptation of the electric blanket idea to lick the problem of casement windows. While attractive in appearance, they were a source of chills and sneezes on cold, windy days. They couldn't be fitted with storm windows, and even with the draperies pulled together the cold pushed through.

Wiring curtains for heat is such a simple matter he wondered why he hadn't thought of it before. Using General Electric heater wire, he arranged it in loops on the inside of the lower part of the curtains. He checked it with scientific instruments to make sure he was using the proper wattage and voltage (a low wattage, properly distributed, prevents any danger of fire). Then he handed the job over to Mrs. Brightman to do the sewing. All that remained was to attach a cord and switch, and plug it in.

Daughter Barbara practices her music in comfort.

Now it's just a case of "turn on the curtains" and the air near those once-drafty windows is pleasantly warm, even when icy winds blowing off Lake Erie are whipping around outside.

This is the eighth in a series of articles telling how G-E employees hit upon unusual ways of their own to use the products of their Company. The MONOGRAM *wants to hear of other cases; if you know of any, please advise the editor, at Schenectady.*

she was bored to death with the job. Routine work and studious concentration aren't Marion's strong points. She found it hard to confine her enthusiasm and initiative to the quiet juggling of a slide rule—especially when she could see all around her a job that needed doing, and one that would fit her like a glove.

The division in which she worked had mushroomed in size during the war, with much confusion on the part of many of the newcomers. She could see a wonderful chance for some really constructive work. Much could be done, she felt, in getting the right person in the right job, in probing his abilities, and in giving him the guidance he needed in order to make progress.

Somewhat cautiously she brought her ideas to C. W. LaPierre, who was then the division head, explaining what she thought could be done about improving the personnel situation.

"Go ahead and do it," said LaPierre.

So Marion created for herself the job of personnel manager for the lab's Electro-Mechanical Division.

The Right Niche

This was work she could put her heart in. Carefully she collected information from the interested supervisor and others on exactly the type of person needed for each job, interviewed people until she and the supervisor were sure the right one had been selected. Then she kept a close watch on his progress, making sure that things were going well with him.

"I wanted him to feel he wasn't being forgotten," she explains.

At the end of two years Marion moved up to the job of personnel placements manager for the entire laboratory, a position formerly held by a man.

She began introducing so-called objective methods into personnel work. These methods involved the use of psychological tests—like the ink-blot test (you explain what ink blots of various shapes remind you of) and the thematic apperception test (you look at a group of pictures and write a theme around each one). In each case, what you say is supposed to indicate what's going on in your subconscious.

She finds psychological tests helpful in evaluating each new employee after he has been in a job a few months. Then, if he doesn't seem to be doing the kind of work he is capable of, the tests help to throw light on what's wrong. But the tests merely serve as a supplement to Marion's own intuitive understanding of what makes people tick.

She landed her present job after her old boss, LaPierre, was made manager of Aircraft Gas Turbine Divisions. Remembering the capable job she had done for him in the lab, he asked that she be transferred to Lynn.

In official terms her job is "general supervision of placement and training of technical engineers and supervisors." It involves, among other things, traveling to the several General Electric plants and interviewing men taking the various training courses.

Guiding Hand

The Aircraft Gas Turbine Divisions have more than 100 test men on assignment at all times. Twice a month Marion flies to Lockland, Ohio, and spends two days at the AGT plant there doing the same kind of thing she does at headquarters in Lynn.

Busy as she is, she's still enlarging the scope of her work. Now she has set up weekly luncheon meetings—she calls them workshops—for commercial and engineering groups.

She knows that dealing with people can be a touchy business, demanding elaborate tact and understanding. AGT is a young division, and the men in technical and supervisory positions are young, too. Marion offers these men guidance in understanding the people with whom they work, and in helping them with their problems.

When she went to Lynn in January, 1950, she had to do a little recruiting of her own to build up her staff of eight people. The office is in a constant hubbub of activity. In the midst of it Marion sits at her desk with all the unruffled charm of a hostess at a tea table.

In Marion's office the welcome mat is always out for newcomers to AGT. After a few months on the job new employees are given psychological tests such as the ink blot test below.

Marion organized luncheon meetings at which supervisors discuss personnel problems, learn the diplomatic way to handle situations like reprimands and rating sheet discussions.

KEEP UP with General Electric

A brief review of what's new in the G-E family

General Company

The Company's consolidated sales and net earnings for the first nine months of 1950 were at record high levels for that period. Net sales billed totaled $1,354,483,215, or 14 per cent more than in the same period of 1949, and net earnings amounted to $112,919,454, an increase of 67 per cent over the $67,612,-879 for the corresponding period of 1949.

✓ The Electronics Department will open a former radio tube plant in Utica, New York, and convert it for the manufacture of emergency radio communications equipment, Vice President, W.R.G. Baker recently announced.

✓ Meanwhile the Apparatus Department announced it is expanding its jet engine manufacture facilities at Lockland, Ohio. Additional factory space will be obtained there, and executive and engineering staffs will move from Lynn to Lockland.

For Improved Living

The 19 elevators providing service to the 20 floors of the new 20-million-dollar Statler Center now being built in Los Angeles will be powered by General Electric gearless traction motors. The elevators will be equipped with the latest innovations, including a telephone and a loudspeaker system in each car.

✓ Dishes and cooking utensils, even after they're washed, may still be dirty, says the Lighting Research Laboratory at Nela Park. By using ultraviolet radiation to inspect such equipment, it was found uncleanliness might still exist even though inspection under normal lighting indicated a good washing job had been done. Probable solution: better washing methods, hotter water, and special detergents.

✓ The nation's first fluorescent street-lighting system was recently placed in operation in Detroit, using, instead of the conventional globes, giant tubular fixtures, eight feet long, developed for the purpose by General Electric lighting engineers.

Home Products

A new clothes dryer (Appliance & Merchandise Dept.) has time and temperature controls which permit the drying of all fabrics except knitted woolens that must be stretched and blocked. Other features: a new ventilating system and a fresh-odor ozone lamp.

✓ Visual control of cooking operations in an electric roaster has been improved in a new automatic model (Appliance & Merchandise), which has a heat-resistant window in the lid so foods can be watched while they cook.

✓ A new medium-price tank-type vacuum cleaner (Appliance & Merchandise) has many of the features of deluxe models—a throw-away bag, a demothing system, complete set of attachments.

✓ An economical fan kit (Apparatus Dept.), complete with motor, blade, cord, plug, and mounting accessories, may be built into kitchens to remove cooking odors; into attics to dissipate heat; or into poultry houses, dairy barns, and milk houses to get rid of moisture.

✓ A completely redesigned garbage disposer (Appliance & Merchandise) is more economical to operate and at least 50 per cent quieter than previous models. It also has a new shredding mechanism with extra cutting action.

✓ The Calrod Engine Heater is a new device (Apparatus Dept.) designed to help start automobile engines in cold weather. By prewarming the coolant which surrounds the engine block, it reduces engine wear and starting load on the battery and speeds warmup of the car heater. It plugs into a convenient outlet.

In the Field of Science

An atomic-powered submarine, costing about four times as much as present fleet-type submarines, might be capable of extending greatly the operational range while completely submerged and at speeds greater than those of surface operation. So declared K. A. Kesselring, Knolls Atomic Power Laboratory, before a recent meeting of the A.S.M.E. The Knolls Laboratory, which the Company operates at Schenectady for the A.E.C., is now devoting its major effort to the design (and later the construction) of a shipboard atomic power plant for the U.S. Navy. One application is expected to be in submarines.

Serving Industry

Equipment electrified with Apparatus Department products is helping to bore 25 miles through the Catskill Mountains to add 300 million gallons of water to New York City's water supply. For the first time in tunnel construction history tube rectifiers are being used for locomotive power.

✓ The recently opened $7,000,000 Washburn Tunnel under the Houston Ship Canal in Texas is equipped with the latest tunnel control devices and switchgear by the Apparatus Department.

✓ A new application of infrared heat lamps has been made by the Apparatus Dept., to the brooding of chicks on the Townsend, Inc., poultry farm near Millsboro, Delaware. Co-operating with General Electric in the installation were the Delaware Power & Light Co. and the University of Delaware.

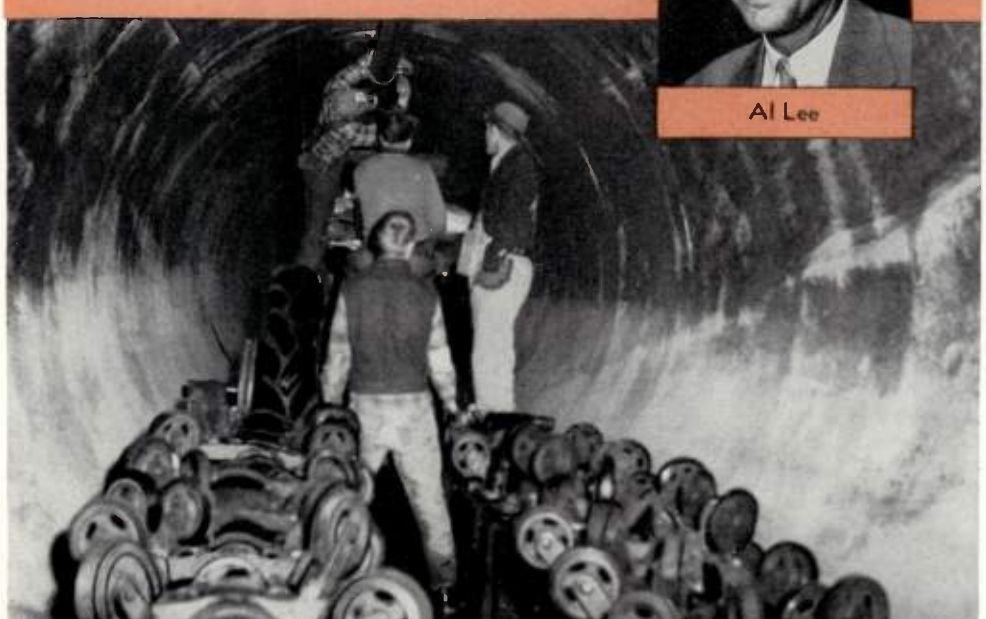
✓ The first of two electronic let-off controls, newly developed by the Apparatus Dept. for tricot knitting machines, is enabling the Van Raalte Co., Inc., Saratoga Springs, N. Y. to produce a better grade of knitted goods than was possible with mechanical control devices used previously.

CABLE *under the Great Divide*

How a 69,000-volt transmission line was installed in the Alva B. Adams Tunnel

Half-mile lengths of cable sheathed in steel pipe wait in the shadow of the Rockies to be drawn into the tunnel mouth. The sections travelled on the dollies lying on the tunnel's floor (below), and were joined and hung from the ceiling.

Al Lee

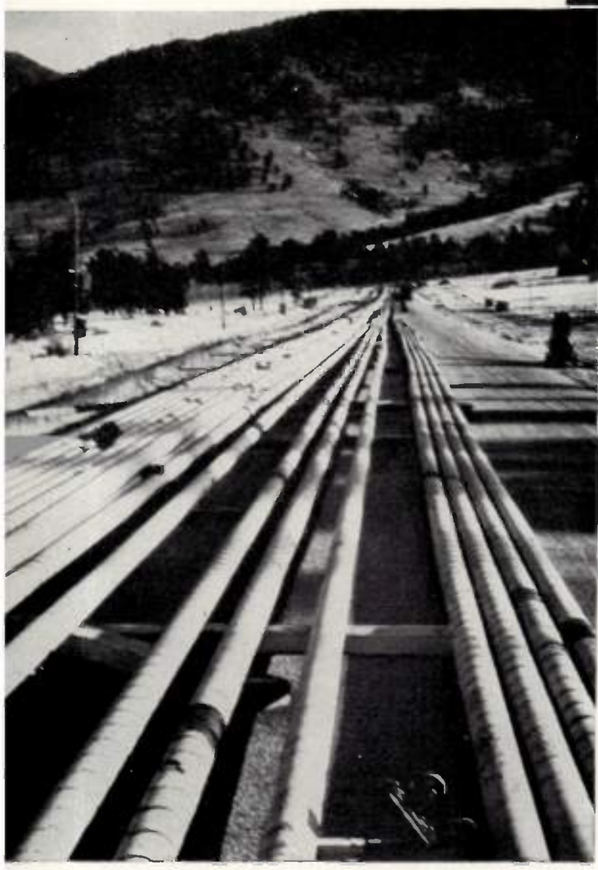


THERE'S never a dull moment in the life of Al Lee. His job with the Construction Materials Department sends him all over the United States. Sometimes he finds the work easy, but sometimes—well, take the Alva B. Adams Irrigation Tunnel.

Al recently returned from a five months' assignment on this project that took him to Estes Park in the north central part of Colorado—one of the most remote and windswept sections of the United States. Headquarters for the project were on the eastern slope of the Great Divide, where the altitude is approximately 8500 feet. Large snowfalls and tremendous changes in temperature are the rule for winter, while summer brings high winds and violent electric storms.

Amidst all this confusion of nature, Lee and his associates installed a 69,000-volt General Electric transmission line through the 13-mile-long Adams tunnel.* This tunnel burrows beneath a 12,500-foot mountain that separates the eastern and western slopes of the Divide. Its purpose is to carry irrigation water from the western slope, where it is overabundant, to the parched lands on the eastern slope.

** General Electric is represented in this project in other ways. The construction companies who drove the tunnel used G-E locomotives, transformers, motors, and control for ventilating and signalling systems.*



Before snow covered the eastern slope, the cables were stockpiled a half mile from the Adams tunnel. There, winches pulled them into lengths of pipe.

When the steel casings were welded together, the joints between them had to be not only watertight but airtight, in order to contain a protective atmosphere of nitrogen.

This is the business end of the 13-mile-long cable, which now carries power under the Great Divide. Protecting the thick conductors are layers of tape, rubber, metal bands, nitrogen, and coated steel.

This seemingly glamorous job proved to have more than its share of construction and installation problems. Weather was only a small factor in the gigantic ordeal against terrain, altitude, working conditions, and limited construction room. Plans had to be revised time and again because of unforeseen occurrences.

Long Study

There's nothing new in running a cable underground, but running an electric power line under a snow-covered mountain in a tunnel intended to carry millions of gallons of water is quite another story.

For 15 years the headwaters of the Colorado River have been under surveillance as a possible source of electricity and irrigation. In 1939 a bill for such a project was passed by Congress. Plans were drawn by the United States Bureau of Reclamation and the work was put out for bids.

At that time it was realized that electric power could be made available on both sides of the Divide—power on the west to run a pumping station, and power on the east to bring electricity to the farmers in this area. Under consideration were two methods. The first was the normal one of running bare conductors, suspended from giant steel towers, 45 miles over the top of the mountain. But the topography of the land and the necessity of having power flow at all times made such a project virtually unsuitable. If a conductor broke at the top of the mountain, it might take a month before a repair crew could get to it.

The alternative was running a cable through the tunnel itself. The use of a cable line through the 13-mile-long tunnel to interconnect the power source was held feasible by engineers as early as 1938, but because this type of work had never before been attempted under such conditions, many quarters considered the task impossible. Therefore final decision was delayed.

Drilling on the tunnel began in 1940. Despite Pearl Harbor and World War II, work continued until it was finished in 1946. It was then that the problem of power transfer again came to the fore.

The deciding factor was economic. Bids submitted on both methods indicated it would cost much less to run the cable through the tunnel.

Planning Conferences

Before any actual work on the installation of the cable could begin, conferences lasting many hours had to be spent in planning. Al Lee and Carl Mix, representing the General Electric Company, got together with T. W. Eisenman, representing the contractor,* to discuss all possible ways of doing the job as fast and as economically as possible. Numerous foreseeable difficulties, never before faced, were hashed over and solutions devised from the knowledge and skill gained in years of cable construction and installation.

Lee, Mix, and their associates decided that only the eastern end of the tunnel could be used to take construction materials in and out of the tunnel. The western end was unsuitable because of the tremendous gates which held back the waters of Grand Lake, water supply for the entire project.

Working Outside

The limited size of the tunnel made it necessary to do major construction jobs on the outside. Although the tunnel has a diameter of approximately 9¾ feet, most of the equipment used was even larger.

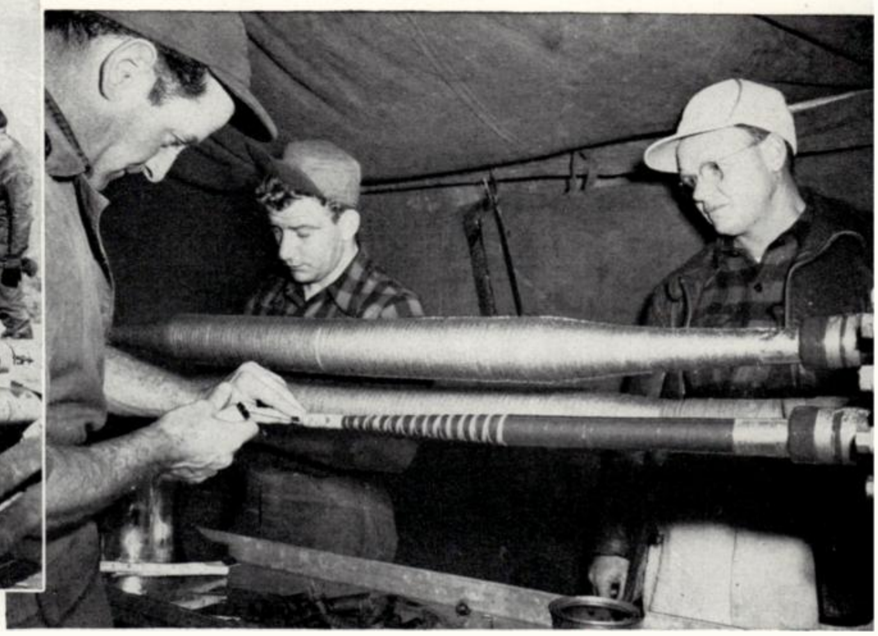
In October 1949, tools and materials were stockpiled a half mile from the tunnel entrance. Individual lengths of insulated cable, each a half mile long, arrived on giant reels from Schenectady. The power line was to consist of three of these cables put inside a steel pipe.

Although the cable was built with a water-resistant covering, it was necessary to put it inside a steel pipe, not only to offer further protection, but also to provide a container for nitrogen gas at 200 pounds pressure. This procedure is necessary to protect the insulation against deterioration which might take place in a normal atmosphere.

Sections of the pipe in 40-foot lengths were given a special protective coating in Denver and then hauled in to the project by truck. Crews of men, working several hundred feet apart, went to work to weld these short sections into longer, half-mile sections. Although it

* *Electrical Contractors, Inc. and C. M. Elliot.*

Getting the cables into a half mile of pipe was tricky. A plunger hooked to a light wire was blown through with air. The wire was used to pull a winch line through, and the line, in turn, dragged the cables into place.



When the cables were moved into the tunnel, the sections had to be joined to form a continuous line. Here, three men splice two of the long sections.

made the pipe cumbersome, the contractor felt that the longer lengths could be more easily installed in the tunnel.

In order to complete the weld around the circumference of the pipe, it had to be rolled over—and rolling over a half-mile length of pipe isn't easy. It was done by stationing men with pipe wrenches at intervals along the half-mile length; at a given signal, the men all rolled the pipe at the same time.

After the pipe had been welded and tested at 400 pounds air pressure, the next job was to pull the cables inside. This had been carefully planned beforehand. As a protection to the cable, so it wouldn't be cut or damaged in any way during installation, it had been wrapped with two large bands of copper on the outside before leaving the factory.

First, a plunger attached to a light, strong wire was pushed by compressed air down the entire length of pipe. Then a large steel winchline was pulled back through the pipe. And finally, using a tractor engine, the steel winchline was reeled in, bringing the cables with it.

Real Difficulties

By January 1950, part of the power line was ready to be installed. This was the time when the real difficulties arose.

How were the sections of cable-filled pipe to be moved up the slope to the tunnel mouth and through 13 miles of tunnel? Each section weighed 43,000 pounds. It had to be jockeyed up a ten-per-cent grade over a winding course involving depressions and other bad terrain. It had to bend around corners.

So a railroad was built. There was only one major difference between this railroad and an ordinary one: the wheels of the carriers, or "dollies," ran in a trough instead of on tracks.

Once the pipe reached the entrance of the tunnel, new problems arose. As the tunnel was round, no tracks were needed on the inside; gravity would keep the dollies in place at the bottom. But *because* the tunnel was round, the jeep and tractor (which were used not only to pull the dollies through the tunnel but also for general transportation) kept wearing their tires badly on the outer edges. The contractor took care of this by a special recapping job; large blocks of rubber were placed at the points of excessive wear.

The tunnel was too small to allow the jeep to turn around inside. Therefore it had to back up—sometimes for long distances. Because the normal reverse gear in automobiles is low speed, a special set of reverse gearing was obtained which enabled the jeep to go backward as fast as it would go forward.

It had previously been decided that it would not do to let the pipe lie on the bottom of the tunnel, because the flow of water would eventually deteriorate it. So the pipe was hung from the ceiling. This would normally keep it dry, as the water would not quite fill the tunnel.

Stainless-steel hangers were installed every 20 feet to hold the pipe in place. The job of placing the pipe sections in these hangers proved to be one of the most difficult phases of the project. But it was done—after several trial methods had shown the easiest way.

Splicing the Ends

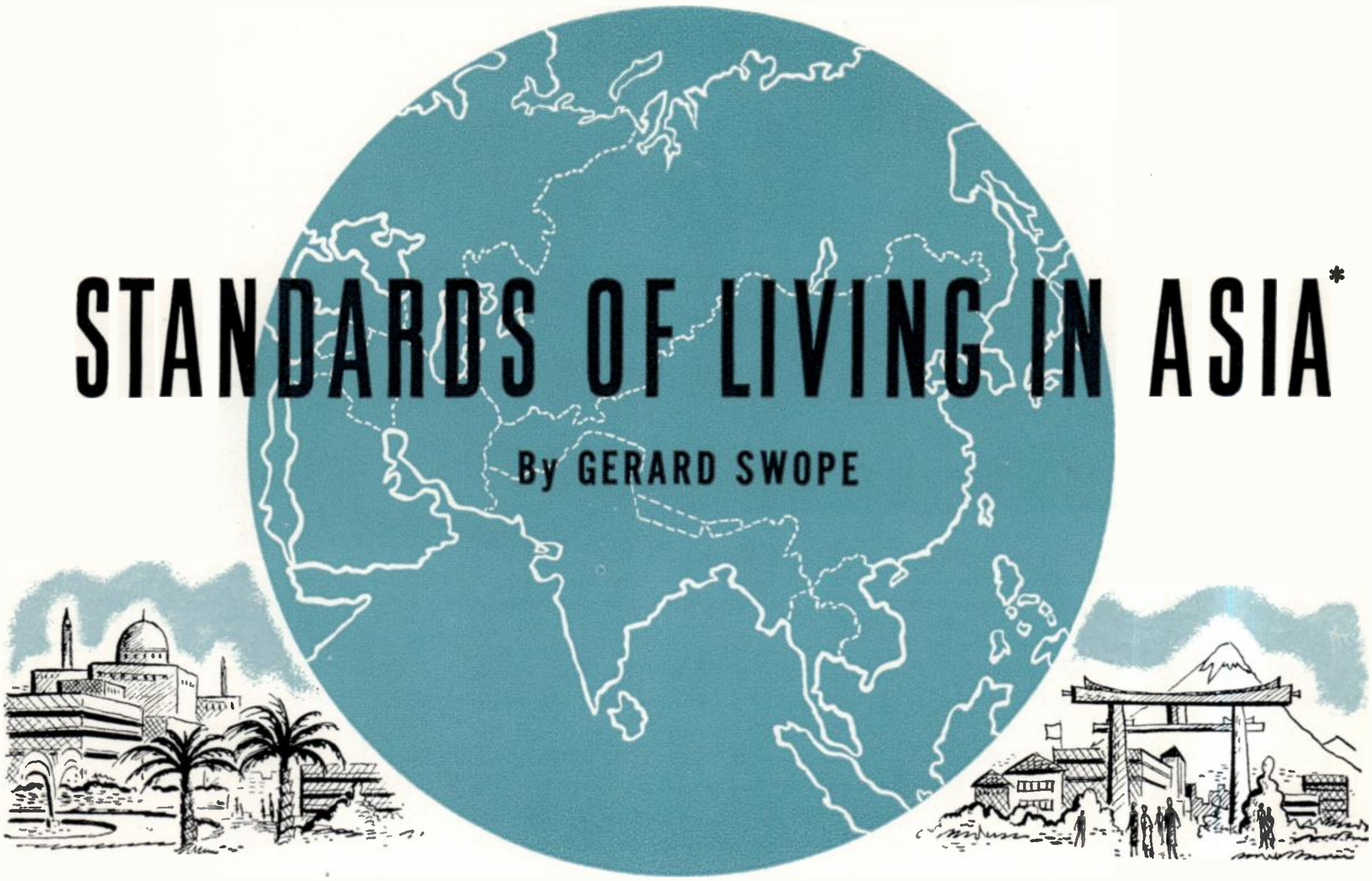
The only work that now remained to be done in the tunnel was to splice the ends of the cable together and weld the half-mile lengths of pipe into one continuous, gas-tight piece. The splicing had to be done with extreme care.

The power line was finally brought through and out of the tunnel and attached to 100-foot towers located on each side of the Divide. The cables had to be brought out of the pipe through an insulating seal to keep the inside of the pipe gas-tight, because the pipe had to be filled with nitrogen to a pressure of 200 pounds. The nitrogen was trucked to the site of the project in a liquid form, converted into a gaseous state, and forced into the pipe.

The Alva B. Adams Tunnel has been conducting water from the western to the eastern slope for some time now. The power line was scheduled to go into operation last Fall.

The completion of this project will make a 15-year-old dream a reality. From the water will come fertile grazing lands and good growing conditions. From the electricity will come heat, light, and power for many people.

Meanwhile, Al Lee is back in his office working on another assignment—one which will take him to another distant part of the country.



STANDARDS OF LIVING IN ASIA*

By GERARD SWOPE

GERARD SWOPE, *who was President of the General Electric Company from 1922 to 1940, and again from 1942 to the end of 1944, is one of the most beloved elder statesmen in American industry. In 1938 we published in the* Atlantic *his authoritative findings about the cost of living in Europe, and in June, 1940, his second analysis, "The Cost of Living in South America"; in 1950 he visited one country in the Near East and seven in the Far East, and here is his revealing comparison of their cost of living with ours.*

**Reprinted by special permission from the Atlantic Monthly.*

IN THE YEAR 1937 in the course of visits to European countries, and again early in 1940 in visits to several South American countries, I made some comparisons of standards of living which were published in the *Atlantic Monthly*. The articles aroused much interest and discussion, and thousands of reprints were made. This year I visited one Near Eastern and seven Far Eastern countries, not only to compare their standards of living with ours—a subject which has always been of absorbing interest to me—but also to see at first hand the various groups in countries bordering on the Pacific Ocean, and associated with the American Institute of Pacific Relations, of which I have been the chairman since December, 1949. In Table 1 I have compared the cost in workers' time in the United States of some of the commodities discussed in my earlier articles with their cost in the United States in 1950.

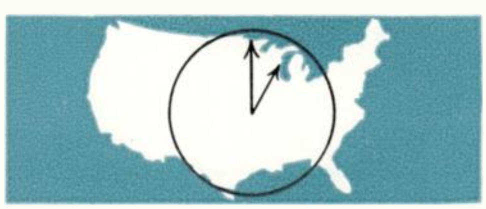


TABLE 1

Number of minutes' work required to buy certain commodities in the United States.

5 Food Items	*1937*	*1940*	*1950*
1 qt. of milk, 1 doz. eggs, 1 lb. bread, 1 lb. butter, 1 lb. meat	102 (1 hr. 42 min.)	135 (2 hrs. 15 min.)	88 (1 hr. 22 min.)
1 60-watt incandescent lamp	12	15	6.2
1 k.w.h. electricity	3.6	4.5	1.75
1 copy of a newspaper	3.5	3	1.5

It will be seen that the various items all take less of the workers' time to procure. This is partly because of reductions in prices of most items, partly because workers' wages have gone up.

The basis taken was the low-income group, the common or unskilled worker, using the day or hourly rate in the national's money unit of value and how much that unit of value would purchase in the community where the worker lives. Wage rates or cost of living in different countries cannot be compared by reference to exchange rates of the money unit. In some countries exchange is limited and restricted; in others there is a great difference between the official rate of exchange and the actual rate. In one country (Indonesia) the unit of money had been literally cut in half: all bills of five gilders and over were cut in half, the left-hand half used in stores or at the bank for one half the number of gilders printed on the note, the other half turned in to the government, with the understanding that the bearer would receive a forty-year 3 per cent bond for one half the amount printed on the note. It would be entirely misleading to compare wage rates of these countries on a money basis, because of the difference in purchasing power or real value.

Before leaving the United States from New York in January, 1950, I took the generally admitted wage rate of common labor and the retail prices in corner stores of four articles of food—milk, eggs, bread, and butter, and three other items in general use—a kilowatt-hour of electric energy, a gallon of gasoline, and a newspaper.

Food of course varies in the different countries, especially because of the difference in latitude from the North Temperate Zone of the United States to below the equator in Indonesia, and varies too in character, kind, and quantity; but all of the items in Table 2 are used to some extent in all the countries I visited; therefore the same four articles of food have been taken—one quart of milk, one dozen eggs, and one pound each of bread and butter.

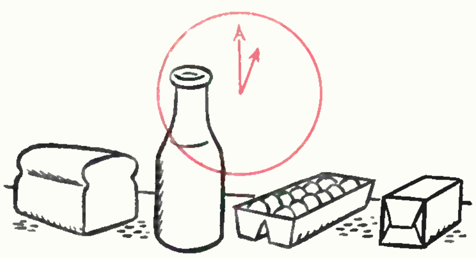


TABLE 2

Number of minutes' work required to buy four food items.

	1 qt. milk	*1 doz. eggs*	*1 lb. bread*	*1 lb. butter*
Israel	24	87	21.5	32.7
Pakistan	600	720	210	1380
India	168	204	40	444
Ceylon	90	450	45	450
Malaya	150	345	37.5	300
Indonesia	480	1260	168	360
Philippines	96	234	40	270
Japan	120	270	45	720
United States	10	37.4	6.7	34.3

The length of time an unskilled worker in the United States must work to procure one quart of milk, as shown in Table 2, is ten minutes; in Israel twenty-four minutes, over twice as long; in Pakistan six hundred minutes, or sixty times as long.

A glance at Table 3 will show that to procure the stated quantity of all four food items, a worker in the United States must work one hour and twenty-eight minutes, while in Israel he must work two hours and forty-five minutes, or twice as long. In Pakistan he must work forty-eight hours and thirty minutes, or over thirty times as long.

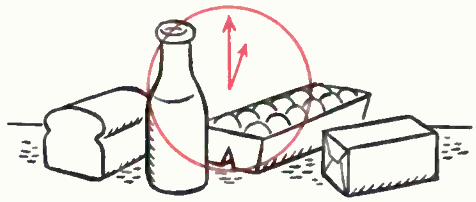


TABLE 3

Total time required to buy all four food items.

Israel	2 hrs. 45 min.
Pakistan	48 hrs. 30 min.
India	14 hrs. 16 min.
Ceylon	17 hrs. 15 min.
Malaya	13 hrs. 52 min.
Indonesia	37 hrs. 48 min.
Philippines	10 hrs. 40 min.
Japan	19 hrs. 15 min.
United States	1 hr. 28.4 min.

It will be noted that Table 2 shows great variety in some items between even neighboring countries. It follows that the longer a man must work for these four food items, the lower his standard of living; therefore the highest standard of living is in the United States. In second place, notwithstanding all its difficulties and large monthly immigration, is Israel; and in third place the Philippines. Far down on the list are Indonesia and Pakistan. While Japan is low because of the war, it is rapidly improving.

Also reflecting the standard of living are the two items in Table 4: one hour of electricity and one gallon of gasoline. The three countries, the United States, Israel, and the Philippines, also show the least amount of work to procure these items. The countries with the lowest standard of living, Indonesia and Pakistan, also take the longest working time to procure these items.

TABLE 4

Number of minutes' work required to buy two commodities.

	1 k.w.h. electricity	*1 U.S. gal. gasoline*
Israel	7	45
Pakistan	120	780
India	28	288
Ceylon	12	285
Malaya	33	285
Indonesia		480
Philippines	20	105
Japan	8	120
United States	1.75	12

The last item is the daily newspaper, the cost of which is shown in Table 5. It is also a reflection of the standard of living and the literacy of the country with the United States, Israel, and the Philippines in the first group and Indonesia and Pakistan last.

TABLE 5

Number of minutes' work required to buy one newspaper.

Israel	4
Pakistan	60
India	8.4
Ceylon	1.5
Malaya	20
Indonesia	60
Philippines	10
Japan	4
United States	1.5

The total kilowatt-hour use of electricity per capita per year is a reflection of the degree of industrial development in a country and of the use of electricity in the home for lighting and household appliances. In the U.S. the kilowatt-hour use per capita per year is 2000, in Israel and Japan 400, in the Philippines 23, in Indonesia 5.2, and in India 1. I have no reliable figures for Pakistan, Ceylon, or Malaya, but the figures are very low, probably less than 1.

The use of gasoline and petroleum products tells approximately the same story. The annual consumption in gallons per capita in the U.S. is 600, in India 6, in Indonesia 8, in the Philippines 24, and in Japan 9. From this study and comparison of the standards of living in these countries and the use of electrical energy and of petroleum products, two conclusions may be drawn:—

1. That the central impetus in the Near and Middle East in improving education and standards of living is and will be Israel.

2. All the rest of Asia (exclusive of U.S.S.R.), Indonesia, and the Philippines will look to Japan for progress and development of education and standards of living.

BULLETIN BOARD

ORGANIZATION CHANGES

GENERAL

G. W. Marsh: assistant comptroller.

Knolls Atomic Power Laboratory—M. J. Gross: administrative assistant to technical manager. E. B. Haines: head of Manufacturing Div. H. E. Scott: manager, Contracts Div. Dr. Lewi Tonks: head of Physics Div.

Research Laboratory, Chemistry & Mechanical Investigations Divs.—Dr. A. L. Marshall: manager; A. J. Nerad: assistant manager; Dr. A. E. Newkirk: assistant to the manager. Dr. W. E. Cass: head, Dr. J. R. Elliott: associate head, Organic Chemistry Div. Dr. H. A. Liebhafsky: head, Analytical Chemistry Div. Dr. A. E. Schubert: head, Chemical Process Engineering Div. A. J. Nerad: head, Mechanical Investigations Div. Metallurgy & Ceramics Divs.—W. E. Ruder: manager; J. H. Hollomon: assistant manager. D. Turnbull: head, Chemical Metallurgy & Structures Div. J. C. Fisher: head, Physical Metallurgy & Cryogenics Div. J. D. Nisbet: head, Materials & Process Div. L. Navias: head, Ceramics Div.

AIR CONDITIONING

S. A. Durbin: product planner, military products.

L. G. Huggins: product planner, central plant air conditioners and large refrigeration machines.

W. L. Sneltjes: supervisor, advertising & sales promotion.

Regional Managers—S. C. Bernhardt: central region. E. J. Guillory: southern region. L. M. Larkin: western region. H. N. McMenimen: eastern region.

APPARATUS

A. L. Davis: manager of service, Transportation Divs.

J. F. Eckel: manager, Large Motor & Generator Divs.

J. E. Harrell: manager, Nashville Office.

A. E. Hollas: manager, Alco G. E. Div., Service Engineering Divs.

N. M. Howard: staff assistant, Marketing General Div.

H. L. Ross: manager, Lynn River Works.

E. C. Schorr: assistant manager of sales, Specialty Transformer & Ballast Divs.

S. H. Thomas: assistant manager, Capacitor Sales Div., Transformer & Allied Product Divs.

B. R. Zimber: acting supervisor of training, manufacturing personnel, Large Apparatus Divs.

Aircraft Gas Turbine Divs.—Neil Burgess, Jr.: assistant manager of engineering. A. V. Feigenbaum: manager's staff. D. F. Warner: designing engineer.

Advertising & Sales Promotion Divs. C. K. Emery: manager, Technical Publications Div. W. D. O'Neal: manager, Production Div. G. M. Robertson: assistant to manager.

Control Divs.—L. L. Holmes: engineer, Aircraft Control Engineering Div. Sales Divs.—J. T. Bailey: manager, Control Equipment Div. B. A. Feldman: in charge, appliance section. F. H. Holt: manager, Control Devices Div. A. J. Lee: in charge, aircraft section. F. L. Miller: in charge, electronic & regulator section. W. B. Rodemann: in charge, Marketing & Promotional Service Div.

Lynn Motor Engineering Div.—F. W. Baumann: engineer, A-C section. L. J. Hayes: supervisor of planning, Tool & Die Div. I. Kalikow: engineer, aircraft section. D. F. Stevens: assistant to supervisor, wage rate & planning.

Small & Medium Motor Divs.—J. T. Farrell: assistant to manager of sales. H. W. Bennett: manager, Gear-motor & Packaged Drive Sales Div. P. D. Ross: Erie D-C Armored Motor Sales Div.

APPLIANCE & MERCHANDISE

H. L. Disco, E. R. Koester: assistant managers of manufacturing.

D. E. MacKenzie: Pacific District sales representative, ranges & water heaters.

G. C. Mapelsden: in charge of engineering, Scranton Works.

R. D. Moore: assistant manager of purchasing.

Howard Oliphant: manager, appliance sales, Seattle, Wash.

E. F. Vickery: assistant manager, appliance sales, Northeastern District.

Household Refrigerator Div.—G. F. Kelley: manager, mfg. engineering. C. A. Rystogi: manager, manufacturing.

CHEMICAL

F. R. Cronmiller: supervisor of budgets & planning.

R. A. Hoffer: engineering manager, Plastics Div.

Chemicals Div.—R. J. Blackinton: resin application engineer of the west coast. A. W. Boyd: in charge, chemical process development, Waterford plant. J. T. Castles: manager, Waterford plant. C. L. Chase: sales development supervisor, phenolic products section. Dr. Alphonse Pechukas: engineering manager.

CONSTRUCTION MATERIALS

R. P. Allison, Jr.: assistant manager, Conduit Products Div.

George Carlson: manager, New Kensington Works.

W. J. Delehanty: manager, Oakland Wire & Cable plant.

C. A. Moore: manager, traffic & warehousing, customer service operations.

L. G. Huggins
Air Conditioning

J. F. Eckel
Apparatus

H. L. Ross
Apparatus

E. C. Schorr
Apparatus

ELECTRONICS

T. E. JAMRO: manager, Clyde Works (recently reopened for production of germanium products).

G. W. NUTTER: manager, Utica Communication Equipment Works.

Commercial Equipment Div.—O. K. LINDLEY, J. H. SWEENEY: sales managers.

Government Div.—H. R. OLDFIELD, JR.: sales manager, naval aviation equipment. T. B. JACOCKS: district sales manager for marine and ground equipment, Washington, D.C. J. J. LOSEY: district sales manager for aviation equipment, Los Angeles. F. C. MATHISON: district sales manager for aviation equipment, Washington, D.C.

LAMP

I. S. MECKLY: in charge, convention & exhibit section.

J. A. ST. LOUIS: manager, Cuyahoga Lamp Works.

AFFILIATES

Canadian G.E. Co.—C. A. MORRISON: assistant to the president.

Carboloy Co., Inc.—S. B. STROM: comptroller. F. C. RITNER: vice president in charge of research. I. L. WALLACE: manager of engineering. J. A. MULDOON: manager of manufacturing. R. L. BROWNLEE: manager of production. A. J. DECARLO: manager of purchasing and materials.

G.E. Credit Corp.—K. B. ABERNATHY: manager, New Orleans Office. G. T. SAVAGE: manager, Charleston, W. Va. Office.

G.E. Supply Corp.—C. T. SHROPSHIRE: vice president. R. J. BROWN: manager of marketing. L. B. PERKINS, JR.: manager, Philadelphia District. L. H. TAYLOR: assistant manager of operations.

G.E. X-Ray Corp.—W. J. FLEMING: vice president, engineering & manufacturing.

International G.E. Co.—H. P. DOYLE: manager, commercial contracts section, Sales & Engineering Dept. F. H. MILLER: director and vice president, manufacturing, G.E.S.A., Brazil. ALLEN MULFORD: manager, Marketing Div., Sales & Engineering Dept. C. R. ROIG: in charge of manufacturing, G.E.S.A., Argentina.

Locke Inc.—R. G. BELLEZZA: chairman of the board. G. E. BURENS: president and general manager. W. F. YOUNG: assistant to the president.

Telechron Inc.—E. C. PEASE: advertising manager. D. E. PERRY: commercial engineer.

Trumbull Electric Mfg. Co.—CHARLES BANGERT: manager of engineering.

RETIREMENTS

J. F. BAHM: director and vice president, G.E.S.A., Brazil; 40 years.

J. H. BARKSDALE: manager, Nashville Office, Apparatus Dept.; 43 years.

J. F. DOWD: Order Service Div., I.G.E.; 38 years.

W. F. FRISCH: staff assistant, Transformer & Allied Products Div., Apparatus Dept.; 38 years.

T. E. GIBLIN: Plastics Div., Chemical Dept., Pittsfield; 25 years.

H. H. REEVES: Advertising & Publicity Div., I.G.E.; 40 years.

J. E. SAVAGE: Advertising & Sales Promotion Divs., Apparatus Dept.; 44 years.

G. M. STONE: Plastics Div., Chemical Dept., Pittsfield; 34 years.

H. E. WINDER: Sales Div., Switchgear Divs., Apparatus Dept.; 38 years.

DEATHS

N. H. BOYNTON: retired sales consultant, Lamp Dept.; Oct. 12.

M. W. DAY: retired head of the former Marine Engineering Dept.; Sept. 26.

N. T. KELSO: Fractional HP Motor Divs., Apparatus Dept.; Sept. 7.

O. W. PIKE: manager of engineering, Tube Divs., Electronics Dept.; Oct. 7.

P. J. JOHNSON: manager, Cuyahoga Lamp Works; Nov. 1.

A. D. WAGONER: retired purchasing agent; Sept. 28.

HONORS

DR. IRVING LANGMUIR has been awarded the John J. Carty medal by the National Academy of Sciences.

E. W. COMMERY and J. M. KETCH, executive engineers, Engineering Division, Nela Park, have been made Fellows of the Illuminating Engineering Society.


H. W. Bennett
Apparatus

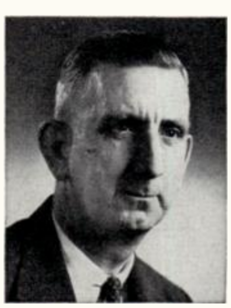

P. D. Ross
Apparatus


R. A. Hoffer
Chemical


Dr. A. Pechukas
Chemical


R. J. Blackinton
Chemical

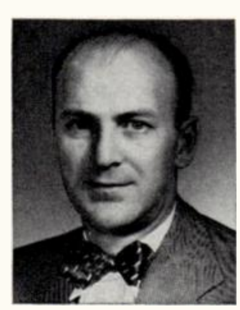

R. P. Allison
Construction Materials


George Carlson
Construction Materials


O. K. Lindley
Electronics


T. E. Jamro
Electronics


J. H. Sweeney
Electronics


I. S. Meckly
Lamp


S. B. Strom
Affiliates

New Voices on the Air Waves

Two-way radio is finding wide use in everyday communication

THAT blue sky you see out your window is filled with new voices. Not the kind you hear on your radio or television set, but doctors calling their offices for instructions, a taxi driver talking to his wife at home to learn where to pick up his next fare, a ranch foreman giving orders to pick carrots and cabbage because the market is right, a construction superintendent calling for a bulldozer to fill a low spot so the river won't reach the top of a cofferdam, or a photographer en route to Albany getting instructions from a magazine editor in Philadelphia.

It's all being done with the radiotelephone. For this form of communication, once used only for trans-oceanic and ship-to-shore conversations, has changed so rapidly from a curiosity to a useful tool that already some people are wondering how they ever got along without it.

America, a land of quick communications, is fast taking advantage of new radio frequencies now allocated by the Federal Communications Commission for a variety of business and personal applications. We are all more or less familiar with the radios installed in police cars. The equipment used by them is similar to that designed by General Electric, among others, for this latest and fast-growing market.

With one eye on the winding road, the country doctor takes a microphone out of a cradle on the dashboard. He presses a thumb control switch.

"Calling KIB 449! Calling KIB 449! Come in, please."

In a matter of seconds the doctor's wife is on the phone.

"Can you hear me, dear—and is there anything doing?"

She replies that he is coming through clearly—"and there certainly is something you can do. Just after you left the house Mrs. Brown called. She's the one who lives beyond that little white church on the road outside Concord. Her baby isn't feeling well—running a temperature. Did you hear me?"

The doctor replies, chats a while, hangs up the microphone, and proceeds to the Brown house.

If you were to talk to Superintendent George Stiers about his construction work at the Medicine Creek Dam in Nebraska he'd tell you: "I don't know how we ever got along before on these jobs without radio communication."

"Why, one day an operator jumped off a machine and lit on his head. It looked bad. We thought his neck was broken. A quick radio call to the office had our ambulance on its way immediately, and we fed the details to the office where they were transmitted by telephone line to the hospital. When the man got to the hospital they were all ready to take care of a broken neck. Fortunately his neck wasn't broken at all, which doesn't cut any of the credit for our radio sets."

Western Mine

Here's a rather humorous report from a district representative of the Electronics Department:

"I talked to a mine company today. A vital motor had conked out at their mine 200 miles away a week before my visit. The foreman put the motor in his jeep to go for repairs. He got 50 miles out and a wheel started off on a different cow trail from the other three. Two days later a Navaho came along on his mustang and rode the foreman double 40 miles to the nearest trading post. A day later the mine office got word that the mine was shut down. Two days later the foreman got back to the mine with the motor. A week later a wandering Navaho rode in and passed the word that the mine was back in operation.

"Total cost to the company was 50 miners out of work for six days, no production for ten days. We figured them a two-way radio job."

A ranch used the radio-telephone in a variety of ways. Here's one car report:

"Lee, I'm calling from Arrowhead Ranch. A picker just beat it with a load of stolen goods. I think he's heading your way."

A moment's silence, and then Lee Hanks, secretary-treasurer of the Isabell-Hartner Ranches of Glendale orders: "Take after him. I'll contact the Glendale police and have Car One head him off from here."

It sounds like a chapter out of Sam Spade. But in reality it was the smooth, efficient working of the General Electric radio communications setup as employed by one of the biggest growers and shippers of produce in Arizona. In true tradition of cops and robbers stories, the thief was caught by Car Two and paid for his indiscretion.

This, however, was just an extracurricular phase of a system which, though in use only since October 1949, has already cut labor costs appreciably, has been responsible for completely accurate picking with little or no holdover, has proved to be a time saver in replacing parts and replenishing fuel supplies, and has even facilitated the rush transportation of an injured laborer to the local hospital.

Remember the great forest fires in 1947 in the Bar Harbor and Mt. Desert Island areas of Maine? Radio-equipped jeeps now tour that area, making routine checks on fire reports.

Minnesota Paper

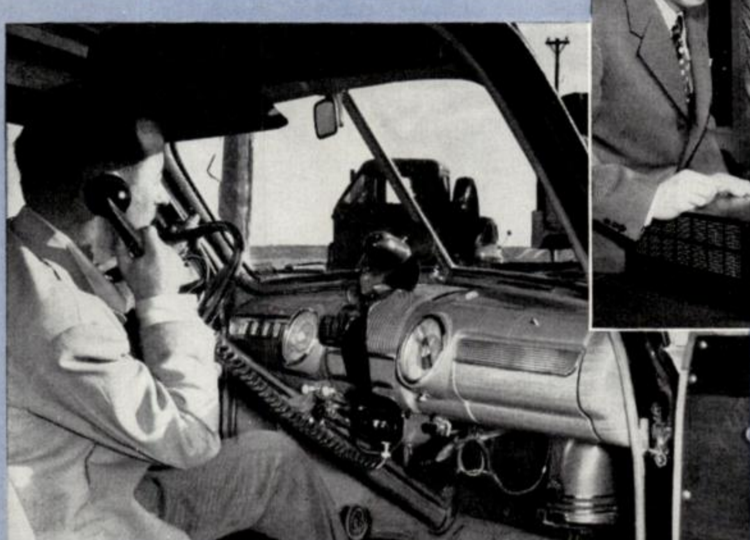
Along another phase of the forestry picture is the use of the radio-telephone by The Minnesota & Ontario Paper Company to co-ordinate and expedite log drives. Five portable stations built into trunks, at strategic points near the Minnesota border, aid in the yearly battle against the vagaries of nature. Thousands of cords of pulpwood must be rounded up from many lakes and herded through a labyrinth of rivers, lakes, and dams to arrive eventually at the mills. The harvest of pulpwood begins with the spring thaw and ends with the winter freeze-up. It's a battle against time which radio helps immeasurably.

One small Virginia city, Lynchburg, after suffering a series of three grave tragedies some 16 years ago, organized a volunteer life-saving crew. For a number of years the crew's emergency car had been equipped with short-wave radio, which was a help. But it was handicapped by its "one-way" capacity; the car could not talk back.

Last year the city installed a complete new General Electric radio system, which included facilities for the life-saving crew. Emergency calls during 1949 included 66 cases of bone fracture, 65 burn cases, 2 gas poison cases, 16 internal poison cases, 5 drownings, 19

Designed to improve performance in the crowded radio-frequency spectrum at the lowest possible price is this new 10-watt unit consisting of a transmitter, receiver, and power supply, all in one cabinet. It should be popular with police and fire departments, public service vehicles, taxi fleets, and other organizations that have similar problems.

Repair foreman for Colorado Interstate Gas Co. uses two-way radio to communicate with distant headquarters.



The superintendent in charge of construction of a dam sends out a call for reinforcements using his auto radio.

Glistening and shimmering in the sun and water, two Chesapeake Bay ferry-boats pass in mid-bay. Each has a General Electric ship-to-shore radio set.

Two-way radio helps co-ordinate the efforts of three major operations in Pueblo, Colorado—the police department, the fire department, and the county sheriff.

Above, floating repair caisson at Grand Coulee Dam, equipped with two-way radio. Below, Minnesota & Ontario Paper Co. uses two-way radio to communicate between its scattered loggers.

dog bites, 280 persons injured by falls, and 11 vehicle accidents. The new radio system has already saved many man-hours in time and an unknown total in pain and hardship. The ability of the crew members to remain in touch with each other and with headquarters has proved invaluable.

At Lake Geneva, a popular Wisconsin resort not far north of Chicago, a General Electric two-way radio system has been installed to more effectively protect the lives of swimmers and boaters on the 10-mile expanse of water. Patrol boats are radio-equipped, as are several of the land patrol bases. This enables them to be in constant touch with each other as well as with the headquarters near the lake's main wharf. The installation is so new that detailed results are not yet available. However, a previous, less complete radio system proved sufficiently valuable to warrant the complete new G-E system.

Police Teamwork

The sort of teamwork which is possible with two-way radio is illustrated by an installation currently in use by the city and county of Pueblo, Colorado. The city police and fire departments and the county sheriff co-operate with a single General Electric radio system, which provides immediate communication between any or all of the departments and their deputies who have radio-equipped cars. In this way, the police and fire departments and the sheriff can be jointly informed of emergencies.

An added advantage is that of keeping in constant touch with headquarters while on the road, eliminating the necessity for returning to headquarters many times daily. Such co-ordination, hitherto impossible, is paying big dividends not only in Pueblo but also in other cities similarly equipped.

With users of the two-way radio-telephone singing such high praises of the job it is doing for them, the supplying of equipment has become a large and fast-growing business.

Last year two-way radio communications was a $25,000,000 business, and indications are that 1950 will see it grow to $28,000,000. It is interesting to note the rates of growth in a few of the fields authorized by the Federal Communications Commission to operate radio-telephone systems.

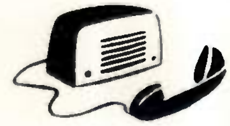
Increasing Use

As of June 15, 1949, there were 41,000 mobile units in police use, a 15-per-cent growth over 1948, indicating there will be about 6100 units added during 1950. In fire use as of June 15, 1949 some 3100 licenses had been granted for mobile units, a 77-per-cent increase over 1948, indicating a total of about 5500 by the end of this year.

And so it goes. The use of radio in forest conservation is growing at an annual rate of 21 per cent, for utilities by a rate of 43 per cent.

One of the fastest-growing users of radio-telephones is the taxicab industry. At the end of 1948 there were about 32,000 mobile units licensed by FCC, and at the end of 1949 there were nearly 54,000 mobile units licensed. It is predicted that there will be a whopping 67,000 taxicabs licensed to use radio at the end of 1950.

The surface has hardly been scratched in many fields, such as industrial materials handling and automotive emergency. And future applications seem limitless.



Your Mid-winter Check List

Check These Values!

G-E Apparatus Products at Attractive Prices

UTILITY MOTORS for those "long winter evening" jobs in your home workshop. Use them for saws, drills, sanders, etc. *Be sure to specify model number when ordering.*

Model	Hp	List price	Price to you
split-phase			
1E152	¼	$15.70	$10.45
1E163	⅓	$16.85	$11.25
1E164*†	⅓	$23.05	$15.35
capacitor			
1E175	⅓	$25.70	$17.15
1E165A*†	⅓	$31.15	$20.80
1E166A*†	½	$34.60	$23.10
1E167*†	½	$40.34	$26.90
1E160A‡	½	$46.15	$30.80
1E161A†	¾	$49.60	$33.10
1E162A‡	¾	$61.25	$40.85

*Ball bearing. †Double shaft. ‡115/230 volts

CALROD* ENGINE HEATER keeps car engine warm in these cold months. Gives faster starts and rapid warm-up of car heater. Easily installed in lower radiator hose of any car.

List price: $8.95 — **SPECIAL EMPLOYEE PRICE** $4.50

*Reg. U.S. Pat. Off.

HANDY FLOODLIGHT

gives light wherever you need it, whenever you need it. Use it for indoor repair work, after-dark work on long winter evenings.

List price: $4.45 — **SPECIAL EMPLOYEE PRICE** $2.90

FOR SEALED-BEAM spotlights, use L-65P Lampholder.

List price: $3.25 — **SPECIAL EMPLOYEE PRICE** $2.10

BATTERY VITALIZER

keeps battery fully energized in cold weather. One plug goes into 115-volt a-c outlet, another goes into dashboard cigar lighter. *Be sure to indicate make and year of car.*

List price: $9.95 — **SPECIAL EMPLOYEE PRICE** $6.30

HEATING CABLE

protects your roofs, eaves, gutters from damage caused by ice and snow. Complete installation instructions. Plug into any 115-volt outlet.

List price:	SPECIAL EMPLOYEE PRICE
30-ft. set $6.55	30-ft. set $4.25
60-ft. set $10.95	60-ft. set $7.10

You can buy these, and other G-E products at your Employee Store, from your Employee Sales Agent, or by mailing coupon with check or money order.

BATTERY CHARGER charges run-down battery in 24 hours. Small, portable, easy to use. Plugs into any 115-volt, 60-cycle, a-c outlet.

List price: $19.50 — **SPECIAL EMPLOYEE PRICE** $12.65

674-40

GENERAL ELECTRIC

If the above products are not available locally mail this coupon to:

Employee Sales, General Electric Company, Building 23, Schenectady 5, New York.

Please ship me the following items. I am employed by G.E. or by an affiliate. I will pay express charge upon receipt. Enclosed is my check or money order for $..........................

Make check or money order payable to General Electric Company.

Utility Motors (check model)

☐ 1E152 ☐ 1E163 ☐ 1E164 ☐ 1E175 ☐ 1E165A ☐ 1E166A ☐ 1E167 ☐ 1E160A ☐ 1E161A ☐ 1E162A

Heating Cable (check one) ☐ 30-ft. set. ☐ 60-ft. set.

☐ Battery charger.
☐ Handy Floodlight.
☐ L-65P Lampholder.
☐ Calrod Engine Heater

☐ Battery Vitalizer. Specify make and year of car.
Make.............. Year.........

Prices subject to change without notice. In states where Use Taxes are in effect, purchaser should remit tax with check. THIS MAIL ORDER SERVICE EXPIRES MARCH 31, 1951.

Name ____________________

Home Address ____________________

City ____________________ **State** ____________________

Her choice for Beauty

- Thank General Electric's amazing Textolite* Plastics Tops for bringing a smart decorator look to your kitchen! G-E Textolite tops come in a multitude of patterns and colors to dress up all kitchen work surfaces. And G-E Textolite's beauty is more than skin deep. General Electric Textolite tops are tough, long-wearing, and easy to clean. A swish of a damp cloth leaves them looking new and sparkling.

His choice for Strength!

- G-E Textolite's performance is as good as its looks! General Electric makes Textolite tops scratch-resistant—*better than low-carbon steel.* G. E. makes Textolite tops heat-resistant. This amazing material resists cigarette burns, boiling water, and even scalding greases. G. E. makes Textolite tops stain-resistant. They shed fruit juices, alcohol, household chemicals, all without a trace!

You can put your confidence in

GENERAL GE ELECTRIC

CD49-W2