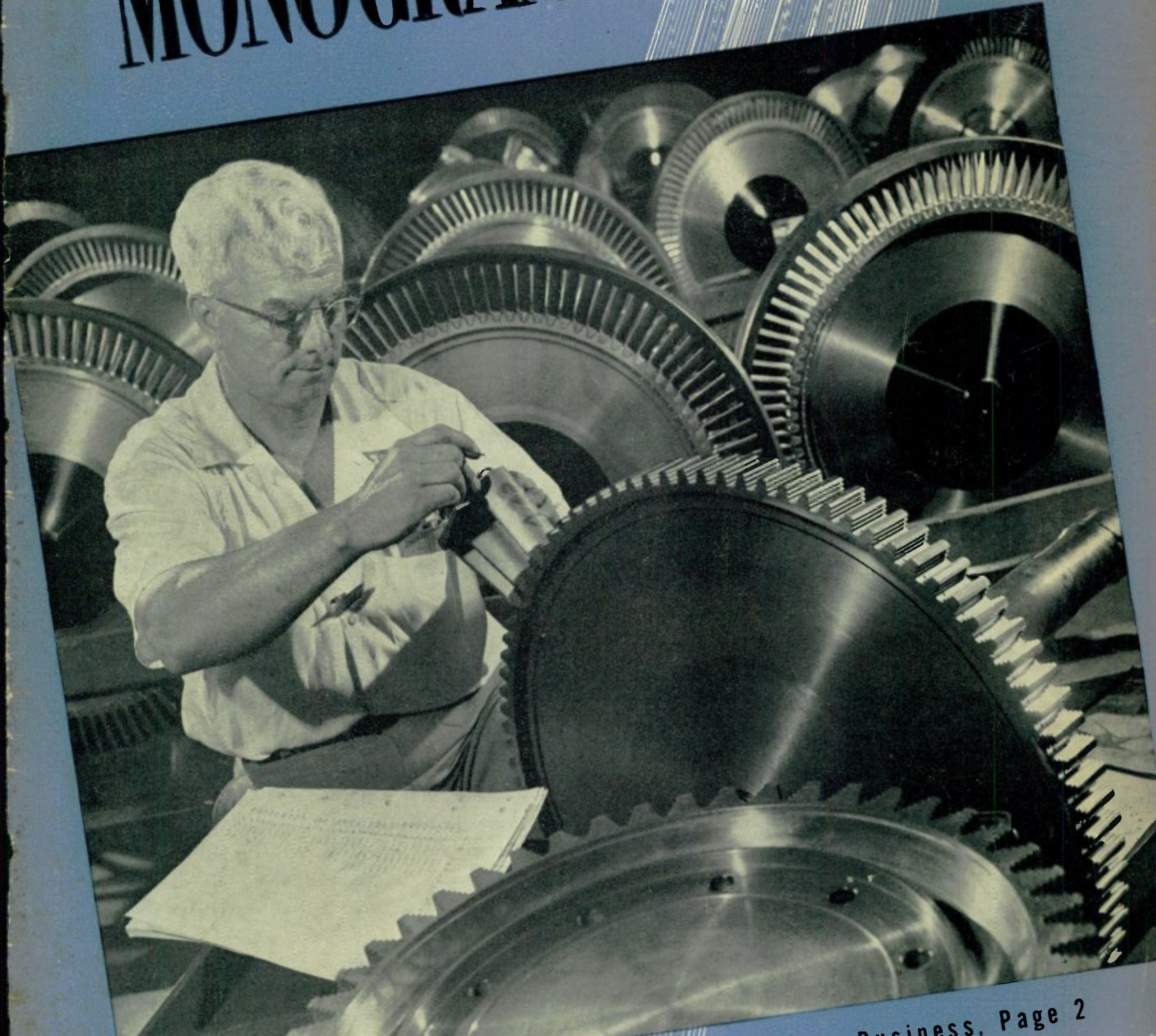
MONOGRAM



NOVEMBER–DECEMBER, 1950

Jets are Big Business, Page 2

IT'S GRAND TO BE TANNED!

GENERAL ELECTRIC SUNLAMP TANS LIKE THE SUN!

Accepted by the Council on Physical Medicine and Rehabilitation of the American Medical Association.

WANT TO GET those admiring looks that greet a glorious tan? Just a few minutes a day under a General Electric sunlamp will tan anyone who tans in the summer sun. Also provides vitamin D to help build strong young bodies. Fits ordinary AC sockets. Only $8.50. Follow directions on carton. Get your G-E sunlamp now and wear a radiant tan all year 'round!

You can put your confidence in—

GENERAL ELECTRIC

MONOGRAM

VOL. 27 No. 6

BARRINGTON S. HAVENS, Editor

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Monologue

LINCOLN VARIATIONS: That feature on Lincoln's Gettysburg Address which we ran in our last issue provoked some comment from readers. The text as we printed it, they complained, didn't agree with the text as they had learned it.

That's not surprising. For there are seven "authentic" versions of Lincoln's famous speech at Gettysburg, each differing from the others slightly. Five of them are in Lincoln's own handwriting.

The first version is the rough copy Lincoln made before delivery. The second, probably written in Gettysburg after correction of the first draft, is the copy he held in his hand when he spoke. That's the version we printed.

After Lincoln made his speech he made three copies for friends and others who requested them. And finally, there are two versions as taken down on the spot by press representatives.

GWUNREE OYUCKTRUCK: Sometimes, in order to insure privacy, it becomes necessary to "scramble" or otherwise make unintelligible the words of an oral message or conversation transmitted by radio. The Company's single-sideband transmitter can be used handily for this purpose, says George Floyd, who wrote the article about Lighthouse Larry in this issue.

By means of this transmitter, says Floyd, high tones can be made into low ones and vice versa. Thus the words "General Electric Company" can be transmuted into "Gwunree Oyucktruck Krinkino."

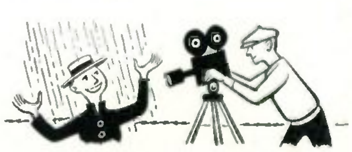
People like Floyd who occasionally have to demonstrate the single-sideband equipment enjoy speaking the topsy-turvy language into a microphone so listeners can hear it come out of the loudspeaker as everyday English. A favorite demonstration piece is the nursery jingle about Mary and her little lamb. The first line, in inverted speech, is: "Naarow hod e yutty yarng."

FLORIDA ADDRESS: Since we ran that article about General Electric pensioners in Florida a while back (July-August issue), a number of pensioners have asked how they could get in touch with the group. Better late than never, we always say, so here are some facts about the organization:

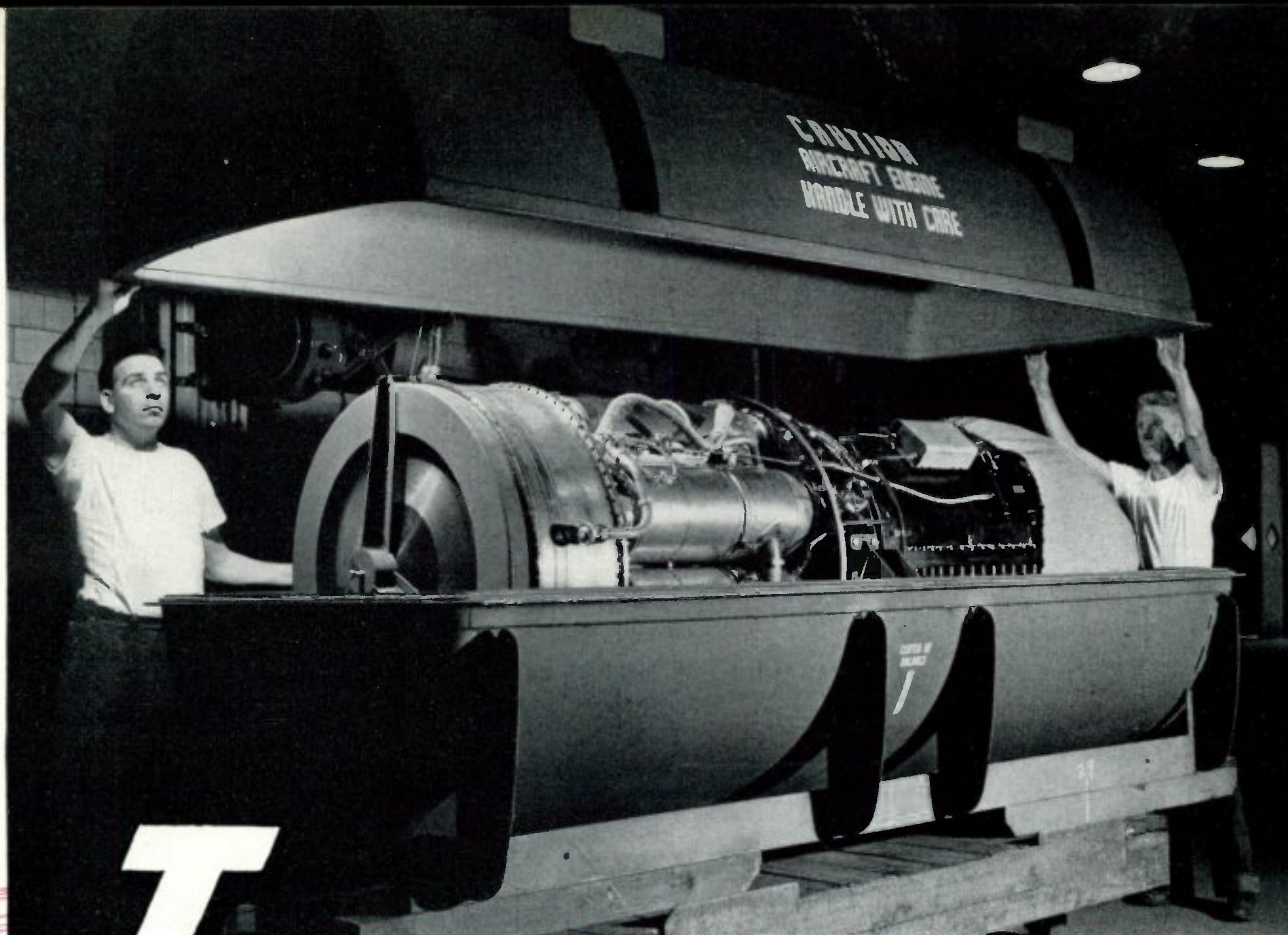
It's the General Electric Retired Employees Association, and the secretary is W. E. Schilling, 491 31st Avenue, North, St. Petersburg, Florida. Mr. Schilling will be glad to hear from retired or about-to-be-retired employees in—or going to—Florida.

RAIN TO ORDER: In view of the great public interest in the work of General Electric scientists toward the control of rain and snow, we feel we owe it to our readers to reveal that the engineers in Hollywood haven't been sitting idly by while all this was going on. Paramount technicians have developed an equipment that will provide anything from a cloudburst to a sprinkle over an area from 10 to 36 feet in diameter. Eleven of these equipments (more are contemplated) are hung either permanently or portably, by means of a boom, for spotting over any area where the script calls for rain. All the rain man needs to know is where and how much, and he'll do the rest.

Oh, yes; we forgot to mention that the heart of each equipment is a General Electric motor.



FIDDLES AND CRICKETS: Only recently have engineers begun to measure other important qualities of sounds than loudness and frequency. General Engineering & Consulting lab experts say they're just beginning to get the lowdown on the stridency of cricket chirps or the tonal differences between a Stradivarius and a mountaineer's fiddle.



JETS ARE BIG BUSINESS!

And General Electric has new research facilities for developing their incalculable power

IT WAS a September day in 1941. In England, RAF Spitfires were fighting a desperate battle against Nazi bombers in the flaming skies over London. Jet planes were then only a hope, and a fear. A hope, because the British had just sent an experimental jet plane into the air. A fear, because the Nazis might be developing one, too. (They were, as later intelligence reports proved.)

In Washington, D.C., the late General Arnold, chief of the Army Air Forces, was holding a secret meeting in the Pentagon. Gathered around his desk were five General Electric engineers. One of them had just returned from London, where he had been shown, under Government orders, the blueprints of the British jet engine.

The meeting was brief. "Gentlemen," said the general, "will your company take the responsibility of building the first American jet engine?"

There was no time for weighing pros and cons, no time for conferences back in Schenectady.

"Yes," was the answer.

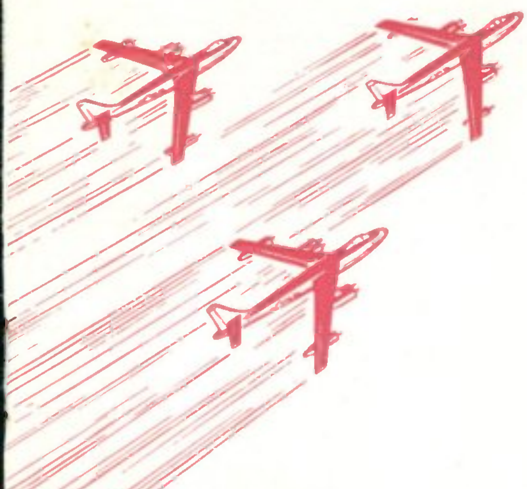
Thus began, in secrecy and urgent haste, the history of jet propulsion in America. In the nine intervening years—a brief span in the life of an industry—General Electric's jet engine business, now known as the Apparatus Department's Aircraft Gas Turbine Divisions, has grown from nothing into a mammoth operation. At a cost of 22 million dollars the Company has built up a jet center at Lynn River Works that is one of the leading facilities of its kind in the world.* Existing buildings and equipment were modernized and expanded. And a new laboratory for research and development was built from scratch.

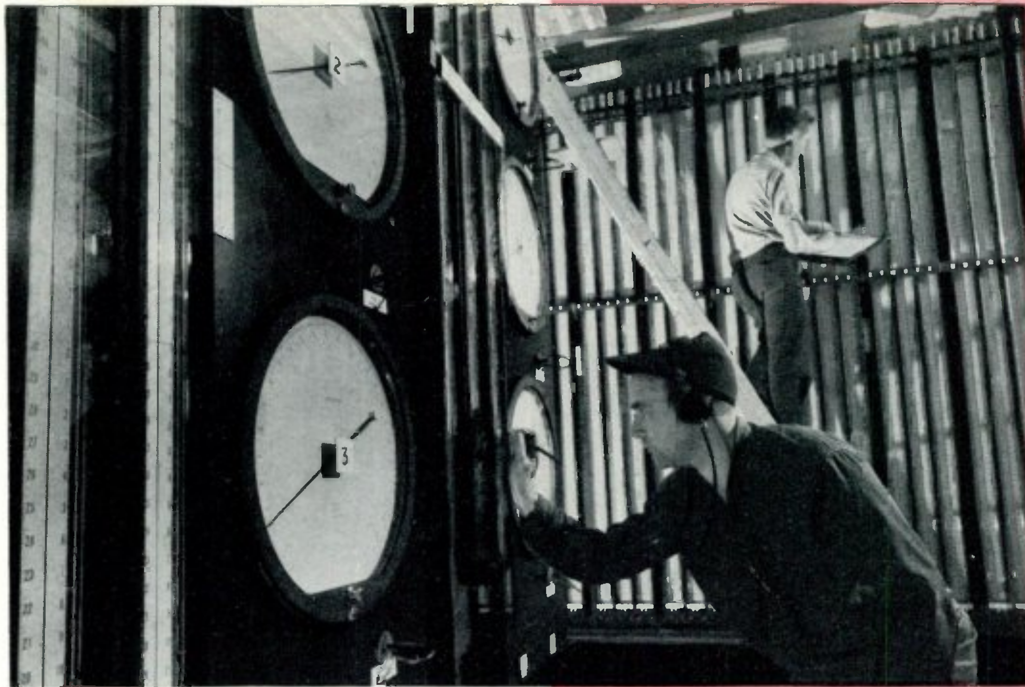
At Muroc Air Force Base, Manager LaPierre is ready to get first-hand experience in jet propulsion.

How many engines are being built, how many people it takes to build them, are facts which cannot be revealed for security reasons. But it can be said that the AGT divisions is now the biggest of the Apparatus Department's separate businesses—bigger even than the 60-year-old turbine business.

The story of jet propulsion has been an exciting one from the start. History

* *AGT also utilizes substantial government-owned facilities at River Works and an assembly plant at Lockland, Ohio.*





Hundreds of instruments like these record the progress of research tests on engine parts in the new lab. From a main control room an engineer directs operations by means of an intercommunication system.

was repeating itself, in a way, when the Air Force asked General Electric to accept the job of jet engine development. During World War I the Army Air Corps turned to G.E. to build the first turbosupercharger, the device which enables piston-engine planes to fly higher, farther, and faster.

First Choice

General Electric was the logical choice to develop this country's first jet engine, mainly because of the work initiated by the late Dr. Sanford A. Moss. As early as 1903 he had operated the first turbine wheel ever run in America on products of combustion. By the summer of 1918 the first turbosupercharger had been built and successfully tested on the summit of Pike's Peak.

General Electric, co-operating with Army Air Corps engineers, continued developing the turbosupercharger during the 30's. By the time World War II was on, our turbosupercharged planes were flying farther and faster than those of other countries.

Work on the turbosupercharger, now being handled by the Aircraft Gas Turbine Divisions, is still advancing. Announcement was recently made of a new turbosupercharger which will enable commercial airliners to make longer nonstop flights, and carry heavier loads. For instance, a piston-engine airliner equipped with these turbos could fly nonstop from Chicago to London, with a heavy payload aboard.

It was because of the Company's prestige in the turbosupercharger field that it was asked to develop the jet engine, since the two are related in principle.

Things moved quickly after the meeting in General Arnold's office. Key engineers like S. R. Puffer and D. F. Warner were pulled off turbosupercharger work at Lynn River Works, and shop was hurriedly set up in the old enameling building there.

Six months after the work began, the first U.S. jet engine was put on the test block. It was a jubilant success.

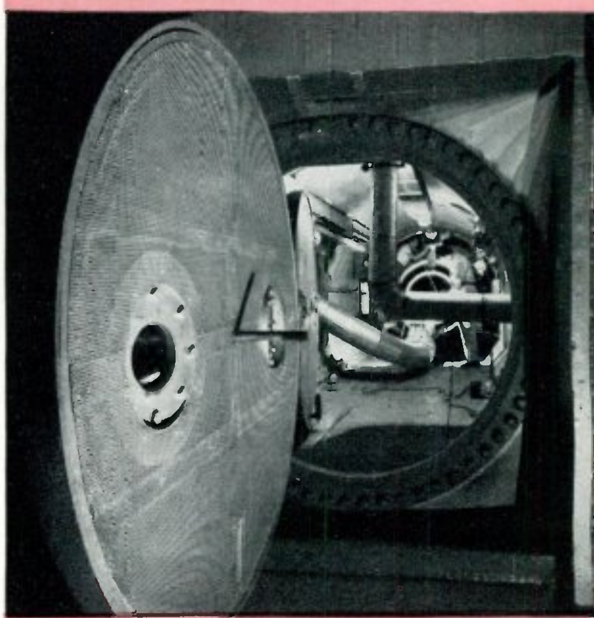
Another six months, and a momentous day arrived—October 2, 1942. From the desert sands of Muroc a strange, naked-looking plane rose and filled the skies with a new sound—the hollow roar of a jet engine. Inside the cockpit the pilot saw an amazing thing: the quivering needles of the instruments stood still as the plane sliced the air with absolute smoothness. The plane was Bell's P-59 Airacomet, powered by two General Electric turbojets—type I-A.

That first jet-powered flight was so successful the Air Force decided jet engines should be built in volume.

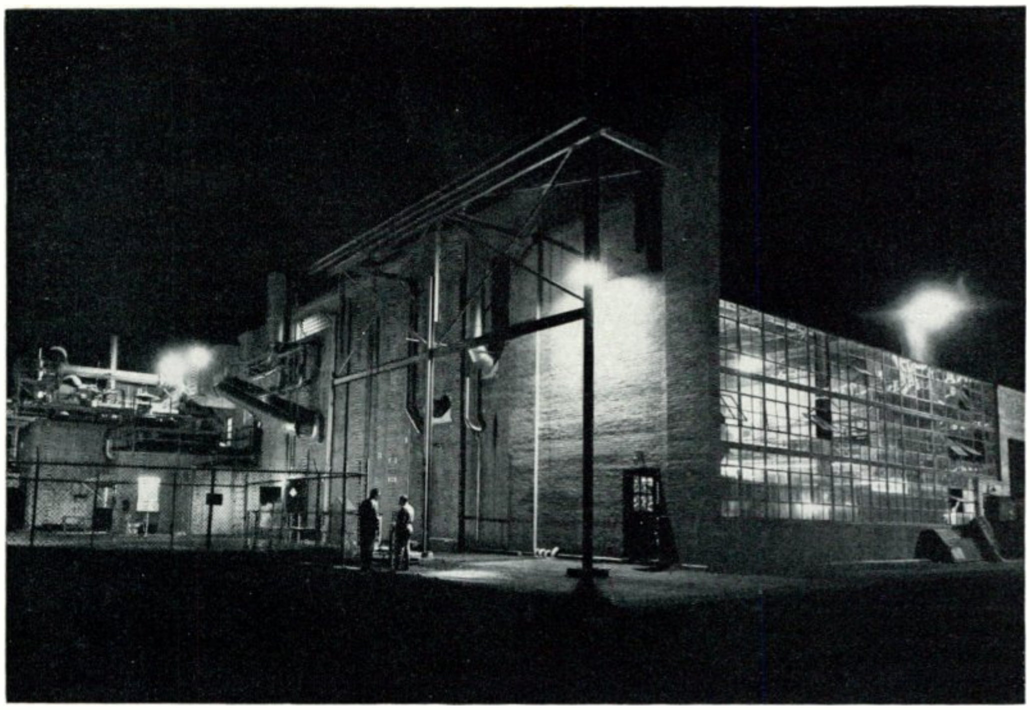
Record-makers

Powered by General Electric's mighty engines, one jet plane after another has written new records in the skies: the North American B-45 Tornado, first operational jet bomber; the Boeing B-47 Stratojet, fastest bomber, with a coast-to-coast record of three hours, 46 minutes; the Republic XF-91, high-speed, high-altitude interceptor; the North American F-86 Sabre, holder of the official world's speed record of 670.981 miles per hour; the North American F-86D, swept-wing interceptor; the Martin XB-51, superfast ground-support bomber. Convair's B-36D, largest and

A finished engine is ready to go. For protection en route, it travels in a specially designed, re-usable container (see photo, page 2).

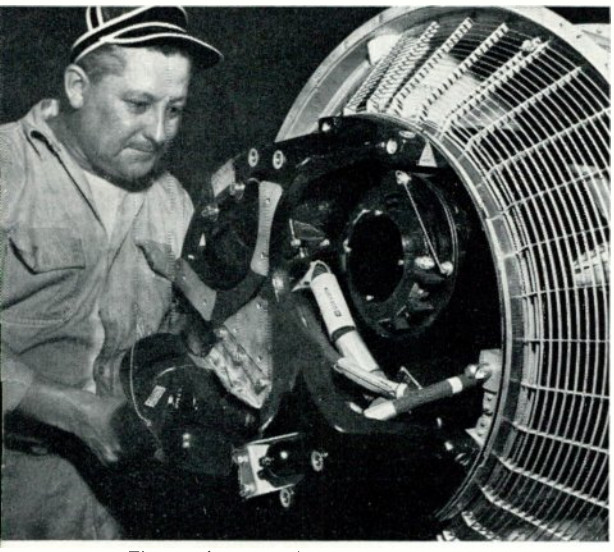


The lab's most spectacular equipment is the full-scale test stand, designed to test engine compressors under extreme flight conditions.



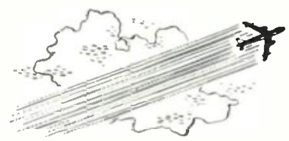
The laboratory is built on the banks of the Saugus River, a tidal inlet. At the rate of 80,000 gallons per minute, water is channeled into the building for cooling purposes. Channel is at left behind fence.

Gerhard Neumann, left, shows a new design of an engine part to E. E. Stoeckly, head of advanced design.



The finishing touches are put on the front end of a J-47. An improvement has recently been made in the screen through which air enters the engine.

A guard stands watch at the entrance to the jet engine plant, where work goes on 24 hours a day.



longest-range bomber, carries four G-E jets in addition to six G-E turbosupercharged piston engines.

As in every industry, research is the key to progress. The decision to build a laboratory solely for research testing of engine parts—not the engine as a whole—was reached only after a lot of thought. It would cost several million dollars, and require a large staff. But since the engine is only as good as its weakest part, it seemed that in the long run a lab of this kind would more than pay for itself.

It has. In its first year of operation, enough knowledge was obtained on the behavior of full-scale jet engine components to justify the lab's construction.

Plans for the laboratory began in 1945, under the direction of E. E. Stoeckly, then in charge of test facilities.

Construction began in 1946 and the lab was put in partial operation two years later. Probably its most spectacular feature is the full-scale compressor test. It's a tunnel-like arrangement designed to produce the most uncomfortable conditions a jet engine compressor is ever likely to have to put up with: the heat of an African desert or the cold of an Alaskan mountain; altitudes ranging from sea level to many miles above the earth.

The equipment requires a wiring system that is something to marvel at. Asked how many miles of wire were required, an engineer answered: "Give us a charge number and we'll take a week and figure it out."

In one part of the lab, the visitor might be puzzled by two identical sets of dials. One of the engineers explained it: "During test runs the engine components performed so well people thought the instruments weren't accurate. So we put in a second set of instruments to check the first set. But they're always the same."

Technical facts, however, aren't so impressive to the layman as the physical sight of the lab—the myriads of valves, the array of dials and gages, the giant piping system that looks like a plumber's fantasy.

Synchronized Research

But in spite of its complexity, the laboratory operation is run with clock-like precision. There's a central control room from which an engineer can direct operations at all times. An intercommunication system allows him to give instructions to the men stationed throughout the building. Every valve and every gage—and there are thousands of them—is numbered, and schematic diagrams are posted showing the number and location of each one. So the man in the control room has only to say, "Open valve 4102" into his microphone, and somewhere else in the building a man will locate valve 4102 and open it.

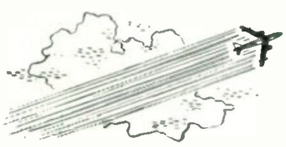
The taking of test data is well synchronized, because of the loudspeaker system and signal lights which flash a "Read!" sign at the proper moment. Hundreds of research readings are taken about every ten minutes during a test run. Half-hourly readings of vital instruments necessary for operation of the test equipment are taken simultaneously, and relayed to a central recording station.

If anything goes wrong—like pressures or temperatures getting out of range—an alarm system automatically goes into action. Horns blow and lights blink—and the uproar continues until the trouble has been fixed.

The AGT men are a young group (the average age of the section heads is 32), full of the enthusiasm that goes with a young and booming business. The exciting part of it is the element of the unknown, for no one knows what the future development of jet engines will bring in the realm of space and speed.

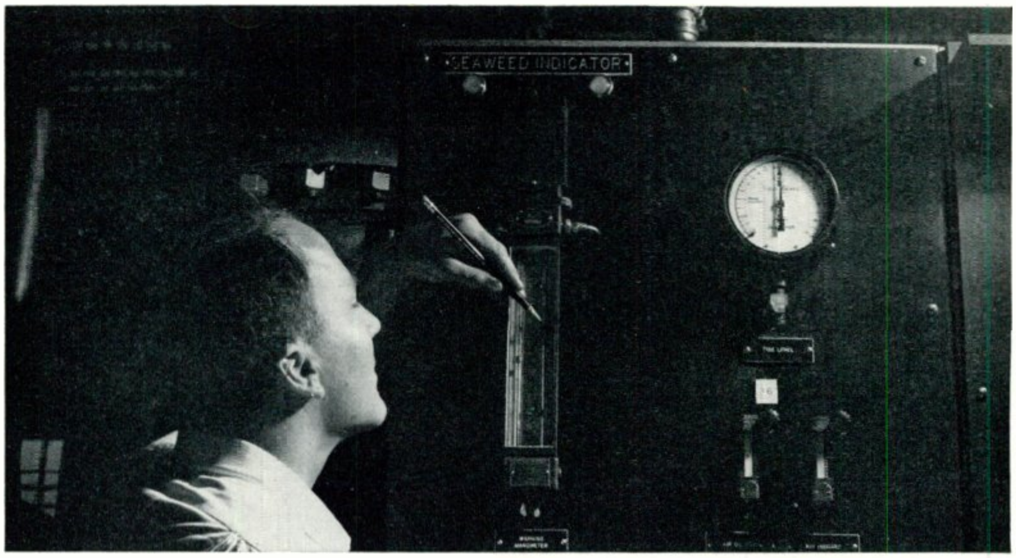
C. W. LaPierre has been divisions manager since November, 1949, but his experience with the subject of jet propulsion goes back many years. Formerly with the General Engineering & Consulting Laboratory in Schenectady, he was one of the first men cleared for research work connected with superchargers and jet engines. Today he's in a position to know just about as much about jet engines and jet planes as anybody. Air-minded people have been making guesses at the top speed (it's secret information) that jet planes have now reached; some say it's around 800 miles per hour. LaPierre wouldn't offer a guess—he's one of the few people who know.

Right now all jet engine production is for military planes, but LaPierre has bright predictions for the future of commercial jet flying. His outlook is shared by E. S. Thompson, manager of sales. Thompson believes that in about five years there will be coast-to-coast and transatlantic jet flights. The job of designing the engines to fulfill these predictions falls to the AGT engineering divisions, under the management of R. E. Burroughs.



Fred Brown is the engineer in charge of laboratory test. He's an ex-Marine fighter pilot who flew Corsairs in the South Pacific in World War II. Now he has a wife and child, and he hopes to stay where he is. Otherwise—"I certainly hope I'll be flying a jet plane."

Development work is headed by another young war vet, Hal Jordan. He was in Army Ordnance attached to the Air Force during the last war. While the lab was under construction he helped design facilities for it, mainly the full-scale compressor test. In this he takes a well-earned pride. He remembers the days of its complicated creation, when people were inclined to refer to it as the "million-dollar monster."

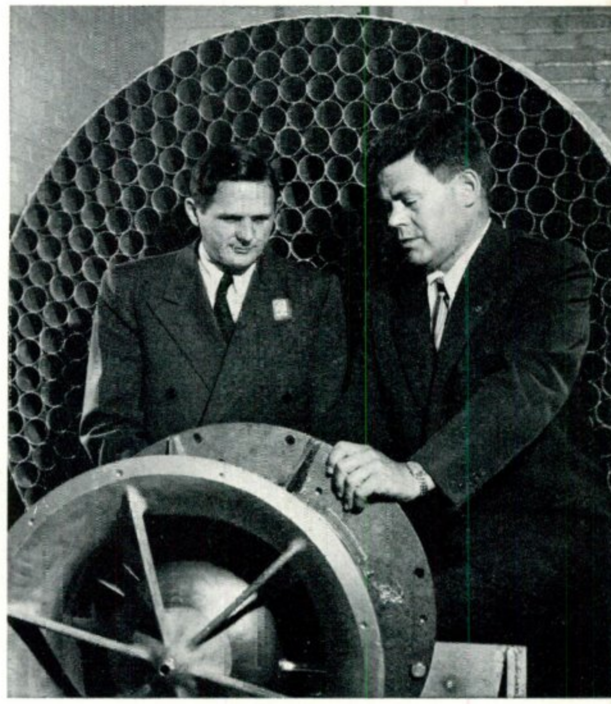


Screens through which seawater enters the laboratory tend to become clogged with seaweed. This instrument, devised by test engineer Dick Bradshaw (above), tells when it's time to have the screens cleaned.

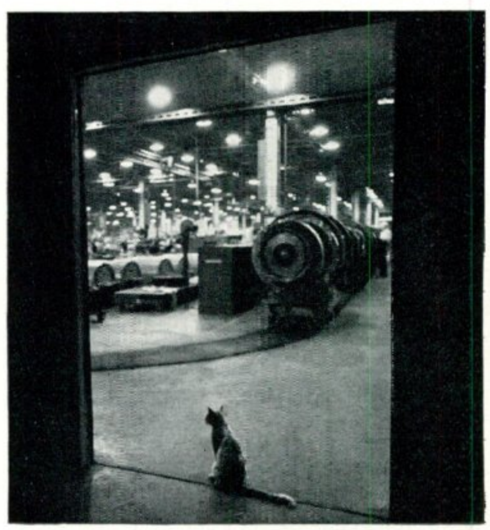
Adventurous Business

Gerhard Neumann, who is now head of AGT's preliminary design section, was project engineer in charge of the laboratory's construction during its final stages of completion. Thirty-three-year-old Neumann has the unusual distinction of being an American citizen by Act of Congress. In 1939, rebelling against Nazism, he left his native Germany and joined a Chinese Air Force unit that was to become General Chennault's Flying Tigers. Later he soldiered with the OSS (Office of Strategic Services), but although he was in American Army uniform he was theoretically an enemy alien. So President Truman signed the document that made Neumann one of the few persons in the history of the U.S. to become a citizen without ever having resided in this country. Today, his adventurous spirit seems to be finding satisfaction in the challenge of jet propulsion.

Men like these are the men behind the pilots who fly the jet planes. They're the men who spend their time in painstaking, everlasting research, who test and test again, and turn out jet engines that pilots have confidence in—even at speeds never before known to man. They seldom, if ever, get the chance to experience the thrill of a jet flight. Would they like to? "Sure," said one, looking up from a pageful of test data, "but we haven't got time."



C. W. LaPierre and E. S. Thompson, manager of sales, examine the scale model of a research compressor that may some day add to the jet's power.



Without benefit of official pass, a night-time visitor to the jet engine factory inspects the assembly line.

One-armed Robot

GOES TO WORK AT HANFORD

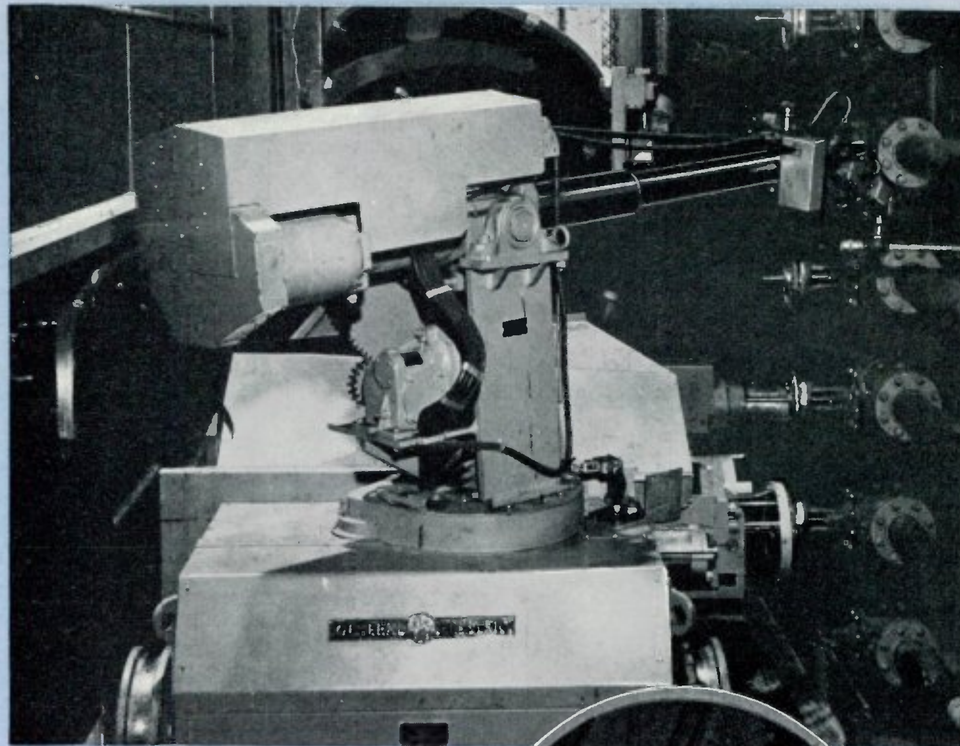
A RADIOACTIVE area isn't quite the place for a human being. So, as scientists continue to work with atomic energy, they must find more adept ways of doing it by remote control.

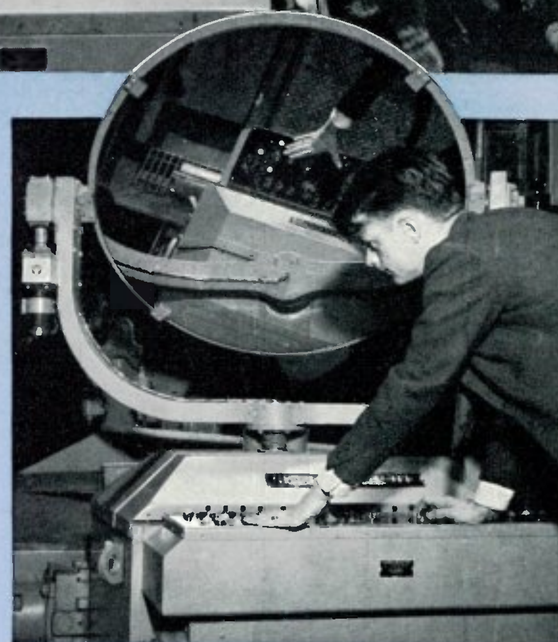
Our Company's research men faced this necessity early in the game and developed a pair of mechanical hands for atomic energy work at the Research Laboratory. These hands are similar to the hooks used by amputees (*Monogram, July-August, 1948*).

A more elaborate tool—a hand with a body attached—has now been developed for use at Hanford Works, where plutonium is produced. It's a five-ton "tool dolly" on tracks, and it looks like a railroad handcar with a gun mounted on it. The gun-like part is a telescoping arm, with double clamps at the end for a hand. The arm can be lengthened or shortened, raised or lowered. Like a human's, the hand can turn, grip, and bend at the wrist.

The one-armed robot owes its dexterity to six small electric motors in the arm and hand. (There are 24 in the entire machine.) It can take apart and reassemble complex machinery, open and close doors, even pick up objects as small as dimes.

Safe in a protected booth, an operator puts the robot through its paces by remote control. The controls are mounted in two boxes about the size of small suitcases. Lights on the control panels indicate the position of certain of the tools with respect to the apparatus being worked on. Six cables link the dolly with the remote controls in the shielded room.





One of the robot's jobs is to turn valves. The valve-turning attachments have electric feelers, indicating whether the valve handle is properly centered in the grasp of the turner.

•

The instrument panel on top is for contact operation. The mirror can be adjusted by remote control to allow the operator to see what the robot is doing when its work is out of his view.

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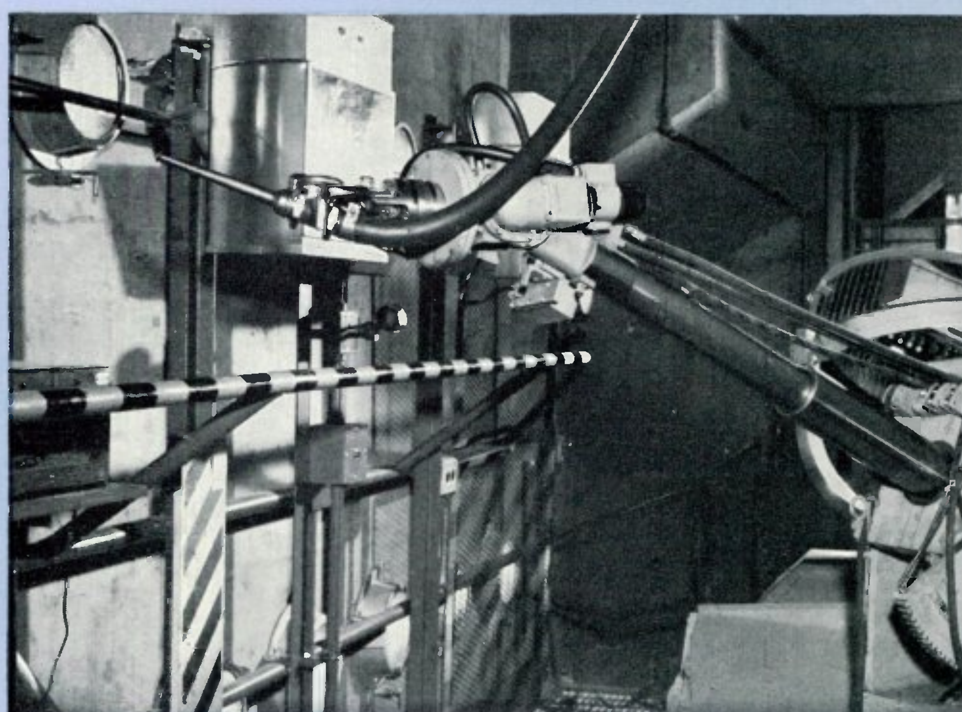
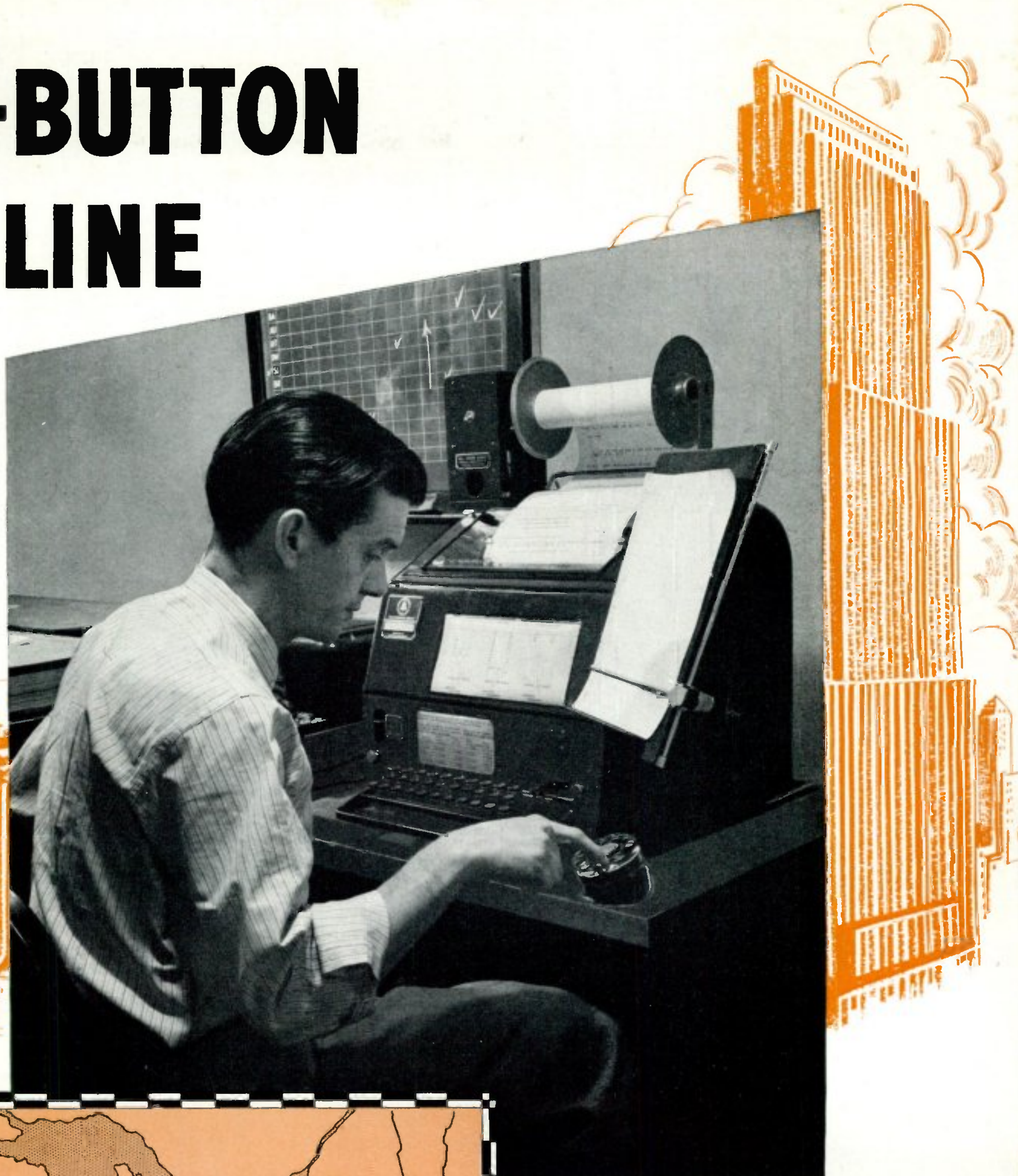
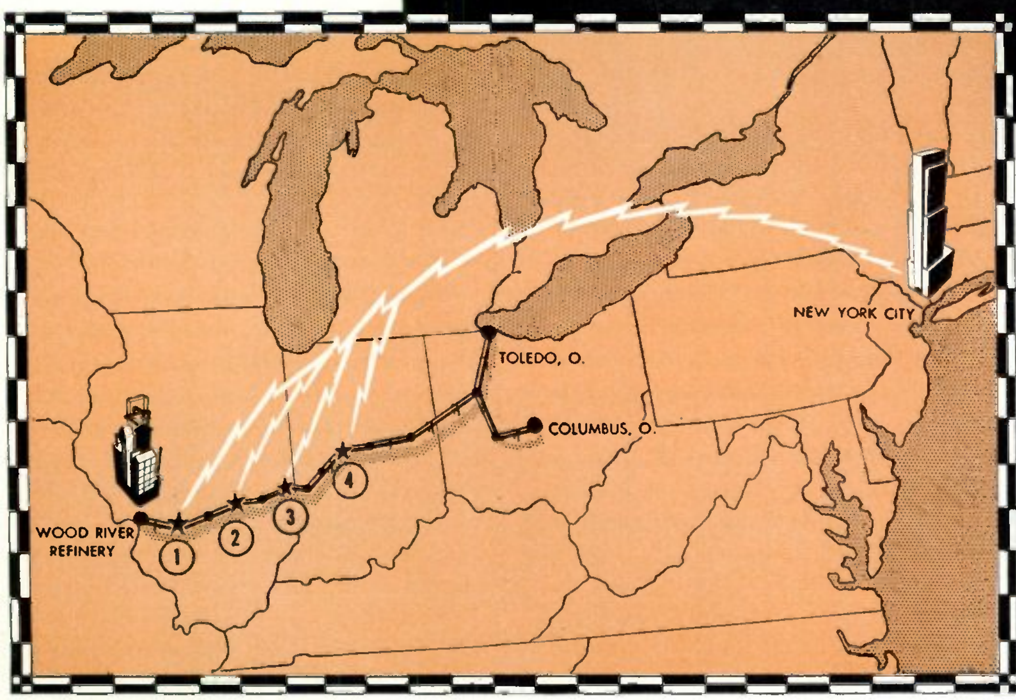
In case of fire in a radioactive area which would be dangerous to human fire fighters, the robot can man the hose. All it needs is someone to turn on the water back in a safe spot.



PUSH-BUTTON PIPE LINE

Oil pumps in the Midwest are operated by the spin of a dial in Manhattan





UP ON the 35th floor of a skyscraper in New York a man dials numbers on an ordinary telephone dial, and pipe-line pumping stations go into action out in Illinois and Indiana. Then, at another turn of the dial, he makes the stations report information back to him. Even in our automatic age, it's one of the neatest tricks of the week.

This new remote-control system for the Shell Oil Co. is believed to be the first of its kind in the world. It is being used on Shell's East Products pipe line, which extends eastward to Toledo and Columbus, Ohio from the Wood River refinery near St. Louis.

Four new pumping stations have been built along the line, all of them com-

A new pipe is lowered into its trench. It will carry crude oil from Jal, N. M., to Wood River, Ill.

Turning crude oil into finished products is a complex operation, as indicated by this view of Shell's refinery at Wood River, Ill. From here the products travel via push-button pipe line to Midwest consumers.

pletely automatic. Now that they're in operation, Shell is better able to handle the growing demand for gasoline, fuel oil, and other petroleum products—a demand which has increased steadily since rationing ended after World War II.

It was then that the Shell Oil Co. realized it would have to find a way to get more oil through its East Products pipe line. However, it had to be done without boosting expenses so high as to make the operation unprofitable. What was needed was more pumping stations along the line. But the cost of increased personnel to man the stations made the plan unfeasible.

If the pumps could only be made to run themselves! It wasn't impossible, figured the engineers, to turn them on and off from a distance, but the man at headquarters also had to know what was going on at the stations—things like pressure and electrical load, for example. The usual method was for station personnel to send back this information by teletype.

Shell officials talked over their difficulties with General Electric engineers, and an idea glimmered. They called in American Telephone & Telegraph, and the three companies teamed up to bring the idea to reality. The result is something novel in the history of the petroleum industry—a pipe-line pumping system remotely supervised and operated by dial.

Traffic Control

Moving at five miles an hour, more than a million gallons of oil a day churn through the 450-mile East Products line. The pipe line from the Texas and New Mexico oil fields to the refinery at Wood River, Illinois carries only one liquid, crude oil. But the East Products line must carry a variety of finished products away from the refinery. As many as 22 different types flow through the line, one after another.

At intervals along the way a portion of the products must be taken off and put in tanks for distribution to local customers. Without careful scheduling

things would be in a fine mess. But the man at the dial in New York sees that this doesn't happen.

He could hardly be blamed for developing a good case of megalomania. All he has to do is lift his finger and a wealth of oil moves across the land. Actually, as one operator put it, "We're too darn scared we'll dial the wrong number to get any feeling of power. We're in awe of the whole business."

While the automatic operation seems a bit miraculous, in practice—like many other modern wonders—it's incredibly simple. At Shell's New York headquarters a telephone dial in the control room is attached to teletype equipment which contacts the pumping stations. The dispatcher has a card in front of him listing the numbers to dial in order to start or stop various operations at each end of the four stations.

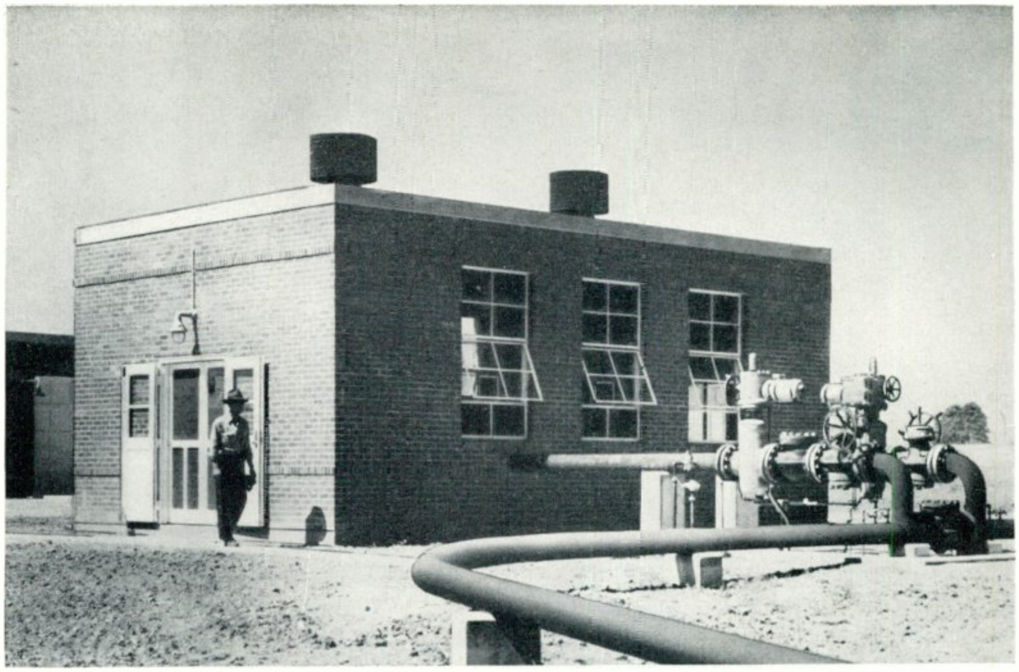
Report to Headquarters

The most uncanny part of the system is the way the station, without human aid, reports back to the dispatcher. By dialing a certain code letter he can ask about conditions at each pumping station and get the answer on the teletype within seconds.

This information is transferred to a chart which is moved along a board as the oil moves through the pipe line. (Three-eighths of an inch on the chart equals a mile of pipe line.)

Corrections for pressure and temperature (which affect the rate of flow) are made on the chart, for pressure varies in different locations, and the temperature of the oil as it leaves the refinery soon assumes ground temperature, which of course varies with location and weather. Markers are set on the chart to show exactly where each product is, 24 hours a day.

The dispatcher's guide is the "daily pumping order," covering the volume of each type of product to be pumped into the line. He can predict the time a batch will reach its destination by a little simple arithmetic: divide the volume by the pumping rate.



Orders dialed from New York are carried out automatically in this pumping station and three others like it along the pipe line. A man is on duty at each station for general upkeep and maintenance.

If anything should go amiss at the stations, the operator can dial another number and a siren at the station will scream for the attendant to come and see what's the matter. For the automatic stations aren't wholly without the human touch. There's a man at each one to take care of routine upkeep and maintenance and to operate any of the controls by hand, if necessary.

Actually, there is nothing new about any of the equipment that goes into this revolutionary system. The General Electric switchgear, controls, and accessory devices used at the pumping stations are all standard equipment. Teletype facilities were already in use on the pipe line, as a means of communication; all that was required was a special code. Standard telemetering devices of the Bailey Meter Co., built into the equipment at the stations, do the trick of reporting pressure and load across the teletype system.

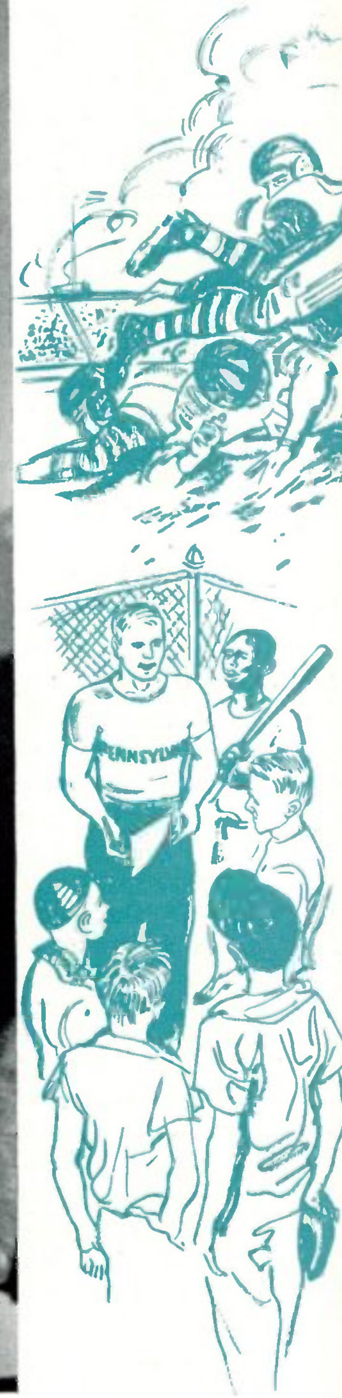
More Oil

What *is* new—and highly significant to the petroleum industry—is the way the different components have been combined to form a unique system, and one that works economically, continuously, and reliably.

The new dial operation has meant an increased capacity of 168,000 gallons a day (about five million gallons a month) in the flow of oil through the pipe line.

Here is the result of efficient engineering teamwork, a graphic example of what American industry is able to do. It's just one of those things that help explain why the United States, with only seven per cent of the world's population and six per cent of its land area, is able to produce 40 percent of the world's goods and services.

This control board in New York traces the progress of every gallon of oil in the Midwest pipe line.



OFFICIALS OF THE GENERAL ELECTRIC FAMILY

J.H. Smith

X-ray's Top Man

JOHN HEYWOOD SMITH president of the General Electric X-ray Corporation, is a Mormon from Salt Lake City, who came east in 1925 on a sheep train. Four years later, he had worked his way through the University of Pennsylvania, led his class scholastically, and been picked by Grantland Rice as All-American tackle.

He doesn't observe all of the Mormon faith's prohibitions against tobacco, coffee, tea, and alcohol, and explains that he is, hence, what is known as a "jack" Mormon. If the prohibition were only against tobacco, Smith wouldn't need to qualify his Mormonism with the word "jack," since his father found an effective means of discouraging him from smoking for a lifetime. When Smith was a youngster, his father caught him smoking, and bought him three cigars—as Smith remembers them, big, black cigars. Smith the elder made Smith the younger smoke all three in what may have been a new record for the course. Since then, Smith the younger has filled his T-zone with nothing but fresh, wholesome air.

His father, who perhaps violated the Constitution's provisions against cruel and unusual punishment in order to make his point, was John S. Smith, a prosperous flour mill operator in Springville, Utah, the son of pioneers who had fought Indians on their way west. Smith's mother was English, born in the town of Heywood, which was also her family name. John S. Smith took his English bride to the near-frontier of Utah. There, a week before Christmas, 1904, their eldest son, John Heywood Smith, was born into a world of moun-

tains and deserts, cattle ranges, and farms irrigated by water from the Rockies.

The Smiths had a farm and herd as well as a mill. When young John was seven, he had already had his share of contusions and abrasions from helping with cattle branding. His job was to hold the calves down, an operation he approached hand-over-hand up the victim's tail. Though his father was well-off by the town's standards, he chose to earn his own money, working summers on his family's farm and those of nearby relatives.

"Pretty Ornery"

There was also time for scaling the mountains—some of them 12,000-feet high—horseback riding, and hunting and fishing. Smith characterizes himself as a child who was "pretty ornery." Several of the townspeople seem to have agreed. When the youngster was pushed through a plate-glass window while roller skating late at night, the window's owner, with no evidence at all, appeared at the Smith home the next day with a bill for the damage.

Smith was big for his age, and tough, and a jewel in the eyes of Salt Lake City's football-minded East Side High School. He played football all through high school, was twice named all-state tackle, and was elected captain in his senior year. In what must have been one of the most bewildering displays of power in football annals, East Side, under Smith's captaincy, mustered three varsities to play and win three state championships (Utah, Idaho, Colorado) in a single day.

After one year at the University of Utah, he decided to go to the University of Pennsylvania. This was against his father's wishes, so he set about financing the venture himself. He worked as a grave digger during the summer. Then, when the time to go east came, he got a job taking a carload of sheep to Chicago, unloading, feeding and watering, and loading them up again every 18 hours.

Looking and smelling like a man who had bunked with sheep all the way from Ogden, he checked into the Morrison Hotel, one of Chicago's finest. He arrived just as the other guests were coming down to dinner in tuxedos and evening gowns. His trunk had not arrived, so he spent the next three days in his hotel room, waiting for decent clothes in which to face polite society. The complication of the delayed trunk completely dislocated his tight financial planning, so that he arrived at the University of Pennsylvania late, and with only six dollars left over after paying his tuition.

Smith once listed the various industries in which he had worked in order to finance his education. The list included macaroni manufacturing, brick making, road construction, grave digging—and then, after he arrived broke in Philadelphia, taxi driving, selling advertising, selling insurance, table waiting and supervising public playgrounds. The playground job he landed in his freshman year was in a tough neighborhood, and none of Smith's predecessors had lasted more than six months. He hung on for three years—until he graduated from the University of Pennsylvania.

Rugged Schedule

His schedule went like this: classes in the morning; playground from 2 until 10 p.m.; study from 10:30 until 3 a.m. During football season, the afternoon was taken up by practice. In spite of the schedule, he graduated with an average of 93, winning several scholastic prizes. In his first year, he was selected as the outstanding freshman of the University's Wharton School of Finance; in his last, he received a gold medal for his senior research thesis.

In his sophomore year, he won the position of tackle on the varsity, and played every minute of every game until graduation. In an end-of-the-season game with Cornell, always a grudge game, Smith threw a flying block at a Cornell fullback on the second play, and remembered nothing that followed until he came to in the showers, finding himself being congratulated on a brilliant game.

His choice as All-American came unexpectedly. Grantland Rice had made up his mind to name another Penn tackle for the honor. Rice came to Penn to watch his candidate play in the Cornell game, and left with the first name crossed out and that of John Heywood Smith in its place.

Many Faculty Friends

Smith made a large number of friends on the faculty, and among them was Richard Lansburg, who was one of the leaders in the industrial management field. Lansburg took an interest in his career, and got him several offers of good jobs.

Smith first went to work as a salesman for B. F. Goodrich. Unable to get into the field he wanted, industrial management, he left the firm, and, with Lansburg's help, landed a job with the Schlage Locke Company, a building hardware manufacturer in San Francisco. Smith and his new bride, Carolyn, bought a second-hand Essex and made the long trek west. It was a series of frustrating breakdowns. The Essex's last and most spectacular failure was in a blizzard in Sherman Pass, Wyoming, where snow plows had to dig them out.

At Schlage Locke Company, Smith began as assistant to the general manager. He was put in charge of all budgetary work and co-ordination of manufacturing with sales. He says that he has always seemed to accumulate jobs wherever he has been. His three years with Schlage Locke were no different from what had gone before in this respect. He took over responsibility for production control in addition to his other jobs, and, in his last year, he annexed purchasing activities. He also found time to improve the plant layout in the assembly department, and his layout is still in use.

When the depression struck, the bottom fell out of the building industry, and Schlage Locke's business dropped to nothing. Smith left to work for Lever Brothers as a travelling soap salesman, a type of work he disliked intensely. He was given about one-sixth of the United States as a territory—Utah, eastern Nevada, Idaho, Wyoming and Montana.

But he was anxious to get out of the soap business and accepted with pleasure when Brigham Young University in Provo, Utah, invited him to teach accounting economics and industrial management. Typically, he soon had two more jobs: coaching the line and managing the athletic department. While there, an old notion from his student days came to the fore again; he wanted a Ph.D. When a friend at the University of Pennsylvania wrote that there was an opening on the faculty, Smith jumped at the chance.

Graduate Student

Back in Philadelphia, he taught money and banking, corporation finance, and industrial management, taking courses toward a Ph.D. at the same time. Again, he took on additional responsibilities, coaching the Penn line, teaching in the extension school one night a week, and in the evening school another. Once more he was getting only three or four hours sleep a night. He maintained this pace from 1936 until 1941, by which time he had completed all of the courses required for the Ph.D., and was preparing for the final examinations.

In 1941, with the nation gearing up for defense, James Reed, who had been Smith's boss at Schlage Locke Company, called on him. Reed had become president of the Cramp Shipbuilding Company, and he wanted Smith for procurement manager.

But Smith didn't want to give up the chance for a degree, even though Reed offered him an excellent salary. He finally agreed to spend the summer studying the procurement department at Cramp, and to make recommendations for its improvement. He soon became involved in the Cramp operation, and, at the urging of Reed and Navy representatives, he found himself a full-time employee, carrying out his own recommendations.

He had intended to carry on his work toward the Ph.D. simultaneously, but this time one job was big enough to take all of his time. He never finished up the final examination for the degree.

At Cramp, he set up new procedures and methods, reorganized the procurement department from top to bottom, and oversaw the buying of materials and equipment for every type of warship from battleships to submarines. The sudden upsurge of shipbuilding in this country required a lot of subcontracting, and it was also part of his job to keep track of this program. The largest single contract let by the company was, incidentally, to General Electric—$21,000,000 worth of equipment for six cruisers.

After the war, he spent three years with the General Cable Corporation as assistant general sales manager. He organized a marketing research department there, and got it under way. He also instituted a method of controlling and co-ordinating marketing and production, and managed the company's laboratory in Bayonne, N. J.

One of his best friends is Edward McGinley, vice president of the Chemical Bank and Trust Company of New York, who introduced him to L. R. Boulware, who was then in charge of the Company's Affiliated Manufacturing Companies Department.

As a result of the interview with Boulware, Smith went to work as assistant to the president of the General Electric X-ray Corporation in April, 1947. In August of the same year he became vice president in charge of marketing. He was made executive vice president in March, 1948, and finally, last February, he was elected president.

The corporation he heads has gone through a reorganization and a move from Chicago to Milwaukee. The x-ray business is more competitive than ever before, and is faced by higher costs and a do-or-die demand for greater economy and efficiency. The industry has been growing at the rate of about seven per cent per year, and Smith sees promise of that rate's being increased considerably in the years just ahead.

Growing Industry

He believes that the x-ray field has tremendous possibilities, what with more and more hospitals being planned, and with resources being made available to provide the tools for keeping the nation's health at a high level. The fight against cancer is, of course, a striking case in point, and x-ray equipment is one of the most telling weapons in that fight.

In 1948, a year after Smith joined the corporation, G-E x-ray was given a military contract to develop special x-ray equipment for use in the field. After rugged tests in Alaska and Canada, the equipment was recommended by the American, British, and Canadian armed medical services as standard x-ray equipment for the forces of the Atlantic Pact Nations.

The field of industrial x-ray is at least as promising as that of medical x-ray, according to Smith. G-E X-ray has been placing special emphasis in the past two years on a program aimed at providing better x-ray inspection equipment. Also under way are projects for Army Ordnance, looking toward control over the loading of shells, bombs, and the like.

Bright Future

Smith feels that the organization of the G-E X-ray Corporation is solid, in excellent shape to meet the demands of the new period of defense expansion and to pace the industry in medical x-ray equipment. His job, he says, is to get good men, give them authority and responsibility, and let them operate.

He and his wife, the former Carolyn Wight, live with their three daughters at 6719 Revere Ave., Wauwatosa, Wisconsin, near Milwaukee. His oldest daughter, 20, is now attending the University of Wisconsin. The other two are twins, recently turned 15.

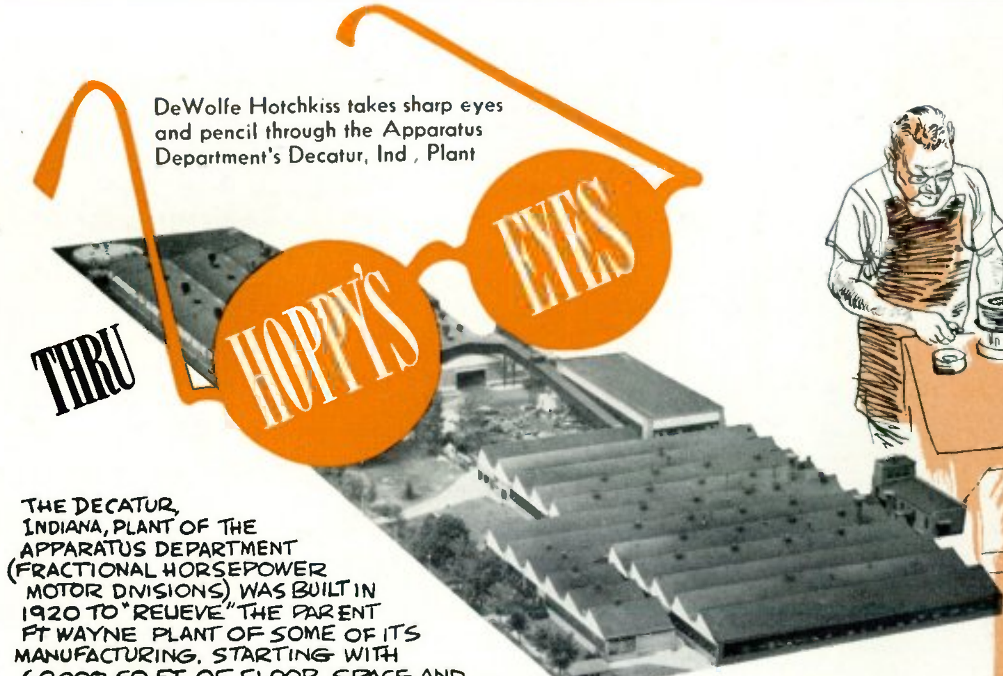
His present hobby is color photography, and, on his vacations in the West, he has shot thousands of feet of colored movies. The scenes are of the spectacular mountain and desert landscapes he knew as a child. He is still a mountain climber, still a naturalist, and still in love with the game of football. He is a great reader, particularly in the fields of economics, financial theory, and philosophy.

Ott Romney, now a dean at the University of West Virginia, coached Smith in his high school football days, and was head coach of Brigham Young University when Smith taught economics and coached the line there. Upon learning of Smith's appointment as president of G-E X-ray, he commented, "He is still following his battle-scarred nose—straight ahead. I am delighted and not surprised to find him as president of the General Electric X-ray Corporation. He ought to get along with the x-ray. Both of them see through a lot and get to the bottom of things."

DECATUR PLANT

THRU HOPPY'S EYES

DeWolfe Hotchkiss takes sharp eyes and pencil through the Apparatus Department's Decatur, Ind., Plant



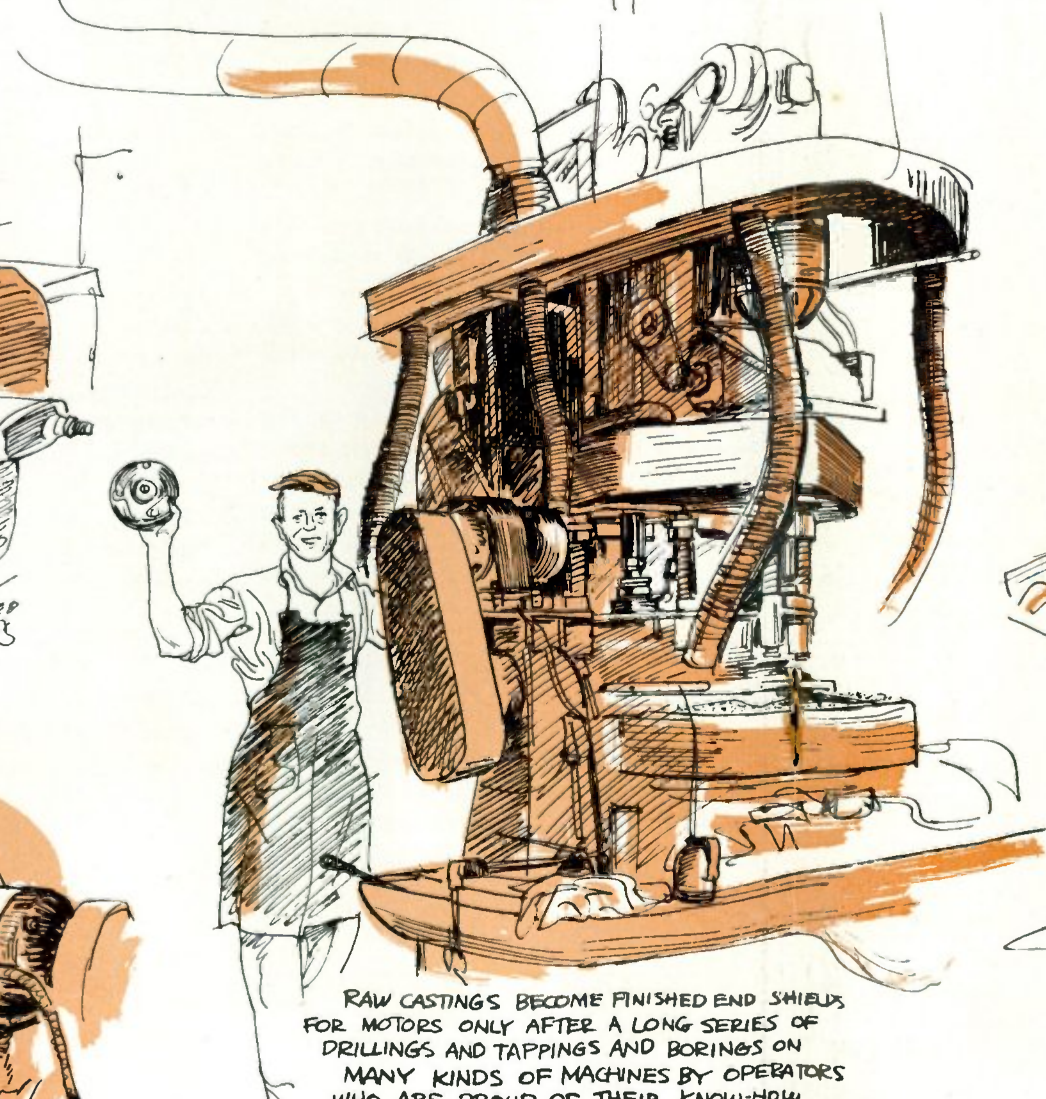
THE DECATUR, INDIANA, PLANT OF THE APPARATUS DEPARTMENT (FRACTIONAL HORSEPOWER MOTOR DIVISIONS) WAS BUILT IN 1920 TO "RELIEVE" THE PARENT FT WAYNE PLANT OF SOME OF ITS MANUFACTURING. STARTING WITH 60,000 SQ FT OF FLOOR SPACE AND THE DESIGN FOR ONE WASHING MACHINE MOTOR, DECATUR HAS SURVIVED FOUR GROWING PAINS AND NOW USES 180,000 SQ. FT TO BUILD 584 DIFFERENT MOTOR MODELS UP TO ½ H.P. — NOT ADDING THE UNCOUNTED THOUSANDS OF SPECIAL MOTORS MANUFACTURED DURING THE WAR, DECATUR IS NOW WELL INTO THE BUILDING OF IT'S FOURTEEN MILLIONTH MOTOR FOR FANS, OILBURNERS, GARBAGE DISPOSALS, ELECTRIC DISHWASHERS, AND THE FAMOUS UTILITY "OVER THE COUNTER" MOTOR.

HERE YOU SEE A "NEST" WHERE STATORS AND ROTORS START THEIR TREK TO BECOMING A MOTOR

HERE ALL STATOR WINDING CONNECTIONS ARE WELDED AND EXCESS WIRE ENDS ARE "TORCHED OFF"

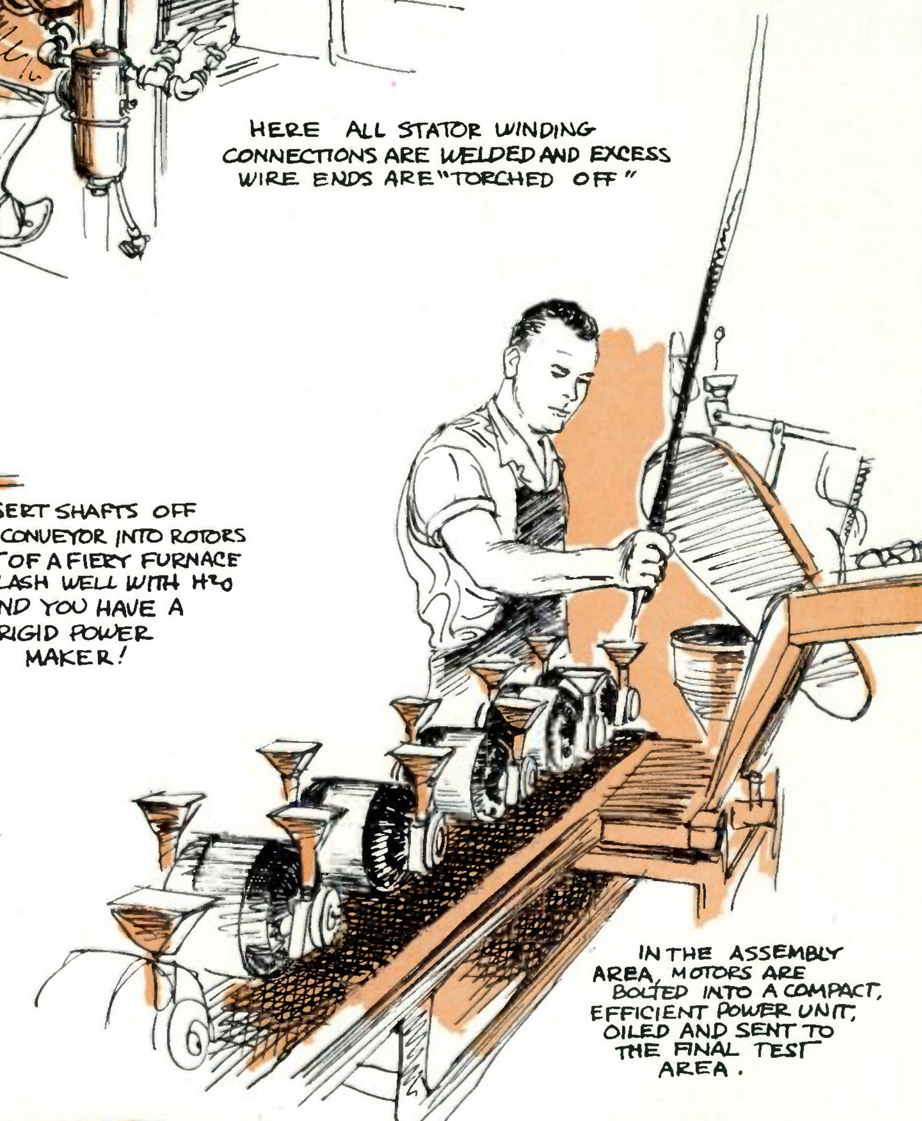
CLOSE LIMITS MUST BE MAINTAINED THROUGHOUT THE SOME 150 MACHINING OPERATIONS NECESSARY TO MAKE THE SOME 374 PARTS THAT MAKE THE AVERAGE F.H.P. MOTOR

FINISHED SHAFT GRINDING IS ONE OF SEVERAL JOBS THAT CALL FOR PRECISION WORKMANSHIP AND THE SKILL OF EXPERIENCED HANDS



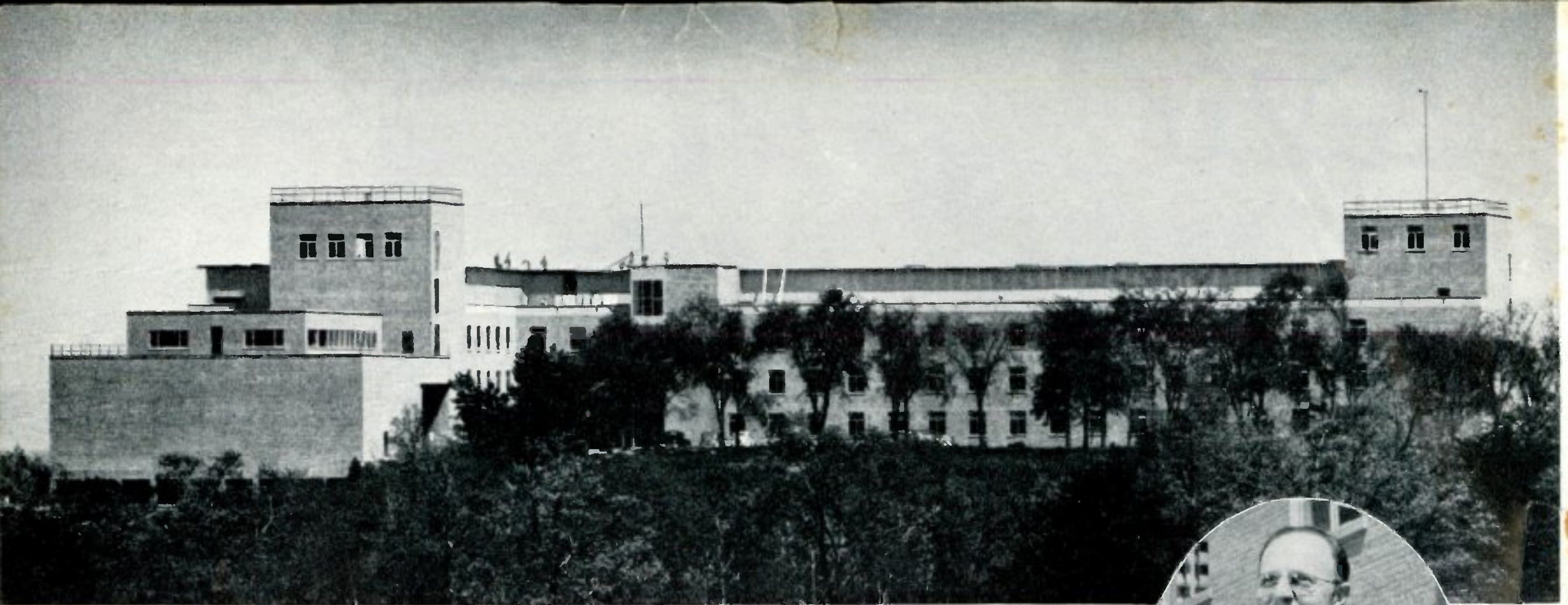
RAW CASTINGS BECOME FINISHED END SHIELDS FOR MOTORS ONLY AFTER A LONG SERIES OF DRILLINGS AND TAPPINGS AND BORINGS ON MANY KINDS OF MACHINES BY OPERATORS WHO ARE PROUD OF THEIR KNOW-HOW

INSERT SHAFTS OFF THE CONVEYOR INTO ROTORS OUT OF A FIERY FURNACE SPLASH WELL WITH H_2O AND YOU HAVE A RIGID POWER MAKER!



IN THE ASSEMBLY AREA, MOTORS ARE BOLTED INTO A COMPACT, EFFICIENT POWER UNIT, OILED AND SENT TO THE FINAL TEST AREA.

THE PACKING AREA WHERE MOTORS ARE PACKED FOR SHIPMENT TO EVERY STATE IN THE UNION AND FOREIGN CUSTOMERS ALL OVER THE WORLD.



Dr. C. G. Suits called the new generation of G-E scientists incomparably equipped, "second to none."

The Research Laboratory Celebrates its Golden Anniversary

At four p.m., on October 9, 1950, the new home of the Research Laboratory at The Knolls, near Schenectady, was dedicated. The dedication was made official by the simple gesture of Charles E. Wilson's handing to Dr. C. G. Suits, vice president and director of research, a ring of gold keys to fit the laboratory's outer locks. Watching were five hundred guests—among them, more than one hundred members of the National Academy of Sciences, America's most distinguished body of scientists.

The moment also marked the Laboratory's fiftieth anniversary, the Golden Anniversary of the country's first industrial laboratory to be devoted to pure research.

THIS YEAR, the half-way mark in the twentieth century, has been seized upon by all manner of human enterprises as a time for taking stock. For the Research Laboratory, whose lifetime coincides with that of the century, it serves as a convenient point for appraising the results of an experiment—the experiment that the Laboratory itself represents.

Conditions for that experiment were and still are these: *the best scientific talent available shall be superbly equipped and encouraged to investigate wherever curiosity leads.*

The experiment, never before tried by industry, was with human nature rather than Mother Nature. The results, as far as the men and women of the Laboratory are concerned, are in terms of personal satisfaction and a love for the work. For the Company, and for the world at large, the results are seen in terms of priceless new knowledge and mastery over Nature.

Lists of the Laboratory's accomplishments have been compiled a thousand times for speeches, articles, and publications. Such lists are always a scratching of the surface for time's sake. They generally begin with the spectacular and familiar developments . . . the Coolidge x-ray tube . . . the use of inert gases for lamp atmospheres . . . power tubes . . . ductile tungsten . . . hydrogen cooling for generators . . . atom smashers . . . cloud physics . . . phosphors . . . silicones . . . radar components. Developments like these are the headline stuff. There are a hundred more almost as well known—and countless more, no less technical triumphs, seeming completely out of the ken of the average man.

Jawbreaker

A random example of the last kind of thing is a recent Laboratory paper entitled "Crystallography and Interfacial Free Energy of Non-coherent Twin Boundaries in Copper." Jawbreaker that this title is, the ideas behind it can be depended upon, sooner or later, to have a bearing on the material well-being of the average man.

Such a paper represents one more bit

KEEP UP with General Electric

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

General Company

✓ Do large companies harm the American economy? A recent survey conducted by the magazine *Mill & Factory* asked five significant questions of 1000 manufacturers of all types and sizes. The questions were designed to learn whether the executives of such companies consider the so-called large companies an asset or a liability to the American economy. The questions and their answers follow:

1. Do you believe that the so-called large companies are harmful to the American economy? No, said 96 per cent of those replying.

2. Do you find the competition from large companies to be unfair to your business? No, said 93 per cent of those replying.

3. Do you sell some of your products to large companies? Yes, said 91 per cent of those replying.

4. Do you believe that, in general, large companies are beneficial to small companies? Yes, said 92 per cent.

5. Are you in agreement with the present government policy which, seemingly at least, is to break up large companies just because they are big? No, said 99 per cent.

✓ New records for first six months' sales and earnings were established by the Company during the first half of 1950, when General Electric and its consolidated affiliates earned a net profit of $77,445,000. This was an increase of 66 per cent over the $46,553,000 earned in the corresponding period a year before.

✓ General Electric employees are buying more than $26,500,000 worth of U.S. Savings Bonds a year under Company savings plans. Approximately 41 per cent of the Company's more than 175,000 employees are participating in the plans. Most of the bonds are being purchased under the Company's Employee Savings and Stock Bonus Plan, which gives the employee a bonus in Company stock.

For Improved Living

✓ A person who buys a pair of shoes in the future may have his feet measured by a device which lights up his proper shoe size electrically on a panel. At least that's the hope of A. Maurice Smith, men's shoe buyer for Maurice L. Rothschild & Co. of Chicago, who invented and has patented the foot-measuring device. It was engineered by members of the Lamp Department at Nela Park.

✓ Many U.S. cities are modernizing their street-lighting equipment using improved General Electric installations. Typical is Denver, which has launched a sweeping modernization of its entire downtown network of traffic signals and controllers. Manual adjustments and human guesswork in timing signals to handle irregular traffic fluctuations will be eliminated. Initially the installation will include 104 G-E traffic controllers supervised electronically by a master cycle selector.

Home Products

✓ For the second consecutive year 100 General Electric push-button ranges will be used by the finalists in Pillsbury Mills' national recipe and baking contest to be held at the Waldorf-Astoria, New York, December 11. Contestants will be given the ranges assigned them during the competition, as well as 100 G-E mixers and other cash and merchandise prizes.

✓ A new system of color television having important technical and economic advantages over previously proposed systems was announced recently by the Electronics Department. The new system, which has been submitted to the FCC, provides a method of transmitting color picture information within a frequency band no wider than that used in present-day black-and-white transmission, and it could be used with either the three-tube or the single-picture tube systems advocated by other companies at recent FCC color hearings.

✓ A new de luxe upright vacuum cleaner of entirely new streamlined design (Appliance & Merchandise Dept., AVF-807) features a new nozzle adjustment called the Napulator, for top cleaning efficiency on all types of rugs.

✓ A new automatic electric dishwasher (Appliance & Merchandise Dept.) will wash and dry up to 100 pieces of china, glassware, and cutlery in less than 30 minutes.

✓ Two new clocks announced by the Appliance & Merchandise Dept.: the Wink, a low-priced ($3.95, fair trade) alarm, and the Warbler, a double-duty occasional and alarm model.

In the Field of Science

✓ Sixty-two copper pennies, representative of the 62 counties in New York State, were bombarded before the 100,000,000-volt General Electric betatron in Schenectady, making them radioactive, and then flown to Syracuse and used for the official opening of the New York State Fair September 2.

✓ One million electron volts will be loosed in the battle against cancer in the Chicago area soon when an x-ray machine of this voltage, first of its kind in the city, is installed by the G.E. X-Ray Corp. at the Mercy Hospital Institute of Radiation Therapy.

Serving Industry

✓ Large-scale production of gas turbines, the new power plant adaptable to land, rail, or marine use, has begun in Schenectady in General Electric facilities to cost more than $4,000,000 when complete. This is the first time that turbines of this type have gone into full-scale production. More than 20 of the new power plants, now on order, will be used for power generation and for gas-pipe-line pumping stations. Three G-E units are already in use—two in power plants, the other on a locomotive (July-August MONOGRAM).

concerns an extraordinary group of people called radio amateurs, or hams, as they call themselves. Take an average person, imbue him with an interest in radio so that he can pass the Federal Communications Commission radio theory tests, give him the ability to read International Morse Code at 13 words per minute, and you have a ham.

Once this ordinary person has received his ham license, he is permitted to go on the air with his own transmitter and talk with other hams all over the world. He has no definite frequency assignment, but he can operate in any one of the several dozen amateur bands: that is, portions of the radio spectrum where hams congregate. He will use either a key, to send code, or he will use a microphone, to transmit his voice.

Practically anyone can become a ham, be he an eleven-year-old or an octogenarian.* Some are engineers on a busman's holiday, others are teen-age boys and girls dabbling in a new and exciting field.

Hams are amateurs only in the strictest sense of the word; that is, they are in the game without any thought of pecuniary gain. In any other sense they are far from amateurs. Some of the most spectacular advances in the field of radio communication have been made by hams.

In fact, in 1912 the amateurs of the country were given exclusive use of all the short-wave bands, because the professional radio engineers of that day felt that the short-wave bands were useless for dependable communication use. The hams went right ahead and used this space and in a relatively short time proved that the space was valuable indeed—so valuable, in fact, that it wasn't long before commercial interests were clamoring for use of the space themselves.

By getting on the air and operating under all sorts of conditions, the amateurs provided the radio art with a wealth of information, and in so doing proved the engineers wrong. Needless to say, the hams lost most of this short-wave space, but they do have small portions of it yet, assigned to their exclusive use.

Amateur Contributions

Many technical advances in the radio field have come from amateurs. One ham developed a theory on the way radio waves bend when traveling through the air. Another developed an extremely selective receiver. Still another, D. E. Norgaard of the Company's Research Laboratory, designed and developed a simplified transmitter which sends out only half a radio signal.

A high percentage of the electronics engineers and technically trained people in this country are radio hams. Some take up ham radio as a hobby after they become engineers, while others go into engineering or technical work because of their prior interest in amateur radio. (In my own particular case I switched from a journalism course in college to an engineering course because I had become interested in electronics with my ham station.)

Now that you know what a ham is, you'll be better able to understand what *Ham News* is and why the Company publishes it. Of course, *Ham News* may result in a ham buying a few General Electric tubes, because the "how-to-build" articles describe gadgets which use tubes in most cases, but even if every ham in this country bought all his ham tubes from General Electric, the total volume would be small compared to the over-all tube sales made by our Company.

Of course we are glad to get their business in this manner—that goes without saying—but more important we are anxious to prove to these amateurs, a great many of whom are in the electronics profession, that General Electric is one of the top-notch electronic concerns in the world. The prestige which our Company can gain in this way is invaluable, because the ham who admires *Ham News* may be the engineer who decides that his company should buy a General Electric television transmitter.

My job is acting not only as *Ham News* editor but also as General Electric's personal ham advisor. This gives me the opportunity to answer some 3000 letters a year from the Company's amateur customers.

Most of the questions can be answered in a straightforward manner, but others —well, for example: "Dear Lighthouse Larry, please design me a television receiver. I don't want it to have more than five or six tubes." That letter was answered, but not, I regret, to the satisfaction of the writer. Even the finest brains in the Company haven't been able to design a television receiver yet with only five or six, or even ten tubes.

Another lad had trouble making his crystal set work, so he packed it in a

** I know at least one—Edward P. Kingsland of Herkimer, New York.*

"Ham News" is an 8-page bimonthly publication with a circulation of 65,000, published for amateur radio operators all over the world.

A ham may transmit messages by microphone or telegraph key. E. H. Fritschel of the Electronics Dept., who posed for this picture, uses both.

shoebox and sent it to me. Fortunately there was little wrong with it, so I repaired it and sent it back to him.*

Neither of these two correspondents were hams; that is, they did not yet have their amateur license, but I imagine in several years they too will attain the required proficiency and become hams.

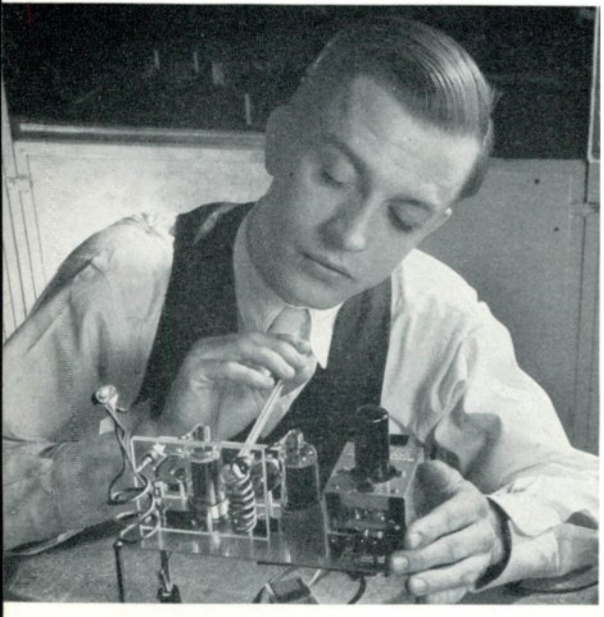
Not all of the questions received pertain directly to amateur radio. Take the case of the ham who wrote me for information on how to fix his electric blanket. After this was furnished, he again wrote me, and I quote:

"It is really fine to be able to call on someone for assistance occasionally, especially when the neighbors have the idea that a ham is a combination of Steinmetz, DeForest, and Armstrong.

"I don't know what experience you folks may have had in trying to keep unsullied the name of ham radio, but as for me, I have had to take on such bizarre jobs as converting 1931 farm radios to a-c, replacing the innards of maltreated jewelry-store superhets, advising on chicken-coop wiring, and checking the spark of a reluctant Model A Ford—just a few of the reasons I appreciate a hand now and then."

A great deal of my correspondence concerns television, but not quite in the way you might think. In fact, since the advent of television, quite a few radio editors have gotten gray-haired. You see, the average sensitive television receiver, because of the very nature of television itself, frequently picks up a lot of other radio and electrical signals in addition to the television signal it is supposed to receive.†

* *A practice that was concluded with that one instance, so please don't send me anything to fix; 60,000 MONOGRAM readers is too many, even for Lighthouse Larry.*



The author at work on a short-wave transmitting equipment, a hobby of which he never seems to tire.

All this has put a lot of letters in my mail basket and has provided material for several issues of *Ham News*. One gadget, designed to prevent amateur interference in television receivers and described in *Ham News* last December, is now so well known that it was mentioned in a recent article in *Reader's Digest*.

Humorous and tragic incidents occur almost daily on the ham bands. Many amateurs court their wives-to-be over the air—in some cases across the whole United States. While this was not true in my own case, it might have been.

I was an active amateur in Arizona in prewar days and had been in the habit of talking quite often to a young lady amateur in Alabama. We had even reached the point of exchanging photographs.

We stopped our over-the-air conversations when summer came, each looking forward (so I thought) to resuming our talks when fall rolled around. When this time arrived, I did manage to communicate with her amateur station, but the only person there was her dad, also a ham. It took a little time to get the story out of him, but he finally explained that another ham in California had beaten my time. He had a transmitter which permitted him to talk to the girl during the summer. He was evidently quite a fast worker, for she had married him before the summer was over.

Another time a ham's transmitter was heard on the air, but no one was talking; all that could be heard were the sounds of heavy breathing. Because the operator of this station had just been ill, his amateur friends several hundred miles away became worried, so they telephoned the police in his home town. The police, realizing that the ham lived outside town, called on the state police, and they, in turn, hurried to the amateur's home. Fortunately he had just fallen, literally, asleep—and snoring—at the switch.

† *Electric razors, automobiles, trolley cars, electric heating pads, medical equipment, electric trains, oil furnaces, electric mixers, faulty light bulbs—all are capable of creating interference in a television receiver, particularly if it's outside the normal range of a TV station.*

Another rescue proved to be the real McCoy. An amateur in Alaska was talking to another ham in California when, for no apparent reason, the Alaskan amateur became silent. The California ham, realizing that something might be amiss, contacted his local coast guard. This unit alerted the coast guard in Alaska by radio, who rushed to the amateur's home. He had been overcome by gas from a faulty heater, and they were in time to save his life.

Amateurs being rescued by the police or the coast guard are in the minority; it's usually the other way around. That is, the hams have an enviable record of providing emergency communication in times of national or local disaster.

Texas Disaster

All of us remember the Texas City explosion in April of 1947, when the freighter *Grandcamp* disintegrated at her dock. This disaster killed 600 and injured 2000. Three hours after the first explosion amateur operators began moving in from other cities with their portable transmitters and receivers to handle urgent messages regarding requests for ambulances, plasma, oxygen, and gas masks.

Every conceivable means of communication must be employed in a disaster of this sort, because phone lines and telegraph lines, even if still intact, cannot handle thousands of messages in the time required. Suppose that the mayor of the town is told that a new group of injured has been discovered. Ambulances are required. These must come from Houston. Get them there. A runner takes the message to the nearest ham station. The amateur contacts another in Houston, quickly gives the message and the authority. Soon a Houston ambulance is screaming toward Texas City.

The Red Cross requires plasma. Fly it in from Dallas. Gas masks are needed for fire fighters; contact an army depot. Bandages, oxygen, medical supplies of all sorts must be ordered, delivered, and used, all in the briefest span of time.

In the midst of their work, late in the afternoon of the same day of the *Grandcamp* explosion, all civilians were warned to evacuate the city—but all of the hams stayed at their posts. Sure enough, that night the S.S. *High Flyer* crumbled in an explosion equally as destructive as that of the *Grandcamp*. This new disaster added many more dead and wounded to the total, but no hams were seriously injured. (An amateur in Houston heard this second explosion instantly over the

Wide World Photo

Aerial view of the Texas City disaster, made shortly after the initial explosion took place aboard the "Grandcamp." 600 were killed and 2000 injured.

When a tornado swept across western Texas and Oklahoma, killing 134 persons and injuring 1300 early in 1947, ham operators sprang into action.

Photo Courtesy QST

microphone of one of the Texas City amateur transmitters, and then, when the direct sound waves, traveling more slowly, arrived at Houston 21 seconds later, he heard the explosion a second time.)

Because in many cases the hams in Texas City were only the first link of a radio network, some rather unusual radio paths came about to speed these emergency messages on their way. One route was from Texas City to Puerto Rico to Dallas to Honolulu to Fort Worth. Messages were getting into Fort Worth via this path 30 minutes after they left Texas City. It might seem strange that a circuitous route like this would be necessary, but the very volume of traffic required that amateurs use every possible means, no matter how roundabout, to get the messages delivered.

Photo Courtesy QST

Amateur radio played an important part in fighting flood waters when the Columbia River broke through the dike at Vanport, Washington, in the early summer of 1948. Here a ham uses a mobile transmitter.

Distant Places

But that was only one of the routes used. Amateurs as far away as Canada, Bermuda, and even Iwo Jima and Japan were on the air handling distress traffic from the Texas City disaster scene.

In a national disaster of the sort just described the amateurs usually get appropriate recognition of their services through newspaper articles. However, hardly a week passes but that hams in some section of the country are doing the same sort of job on a smaller scale, usually without publicity. Every hurricane, tornado, heavy snowstorm, or flood brings suffering and loss of normal communication paths. And where normal communication breaks down, you will invariably find radio amateurs glued to their rigs getting the message through until the emergency has passed.

I myself have managed to handle emergency traffic on two separate occasions. The first time the city of Tucson, where I was then living, had a flash flood that tore down the Southern Pacific Railroad telegraph wires. With other amateurs in Tucson I relayed train orders around Tucson from both the East and the West.

The Long Beach earthquake in the late 30's provided my other opportunity to help. In this case messages were sent from Long Beach over all imaginable paths, and I was receiving messages sent from Long Beach via New Zealand. These messages were addressed to all parts of the United States, and I had the job of speeding them in the proper direction.

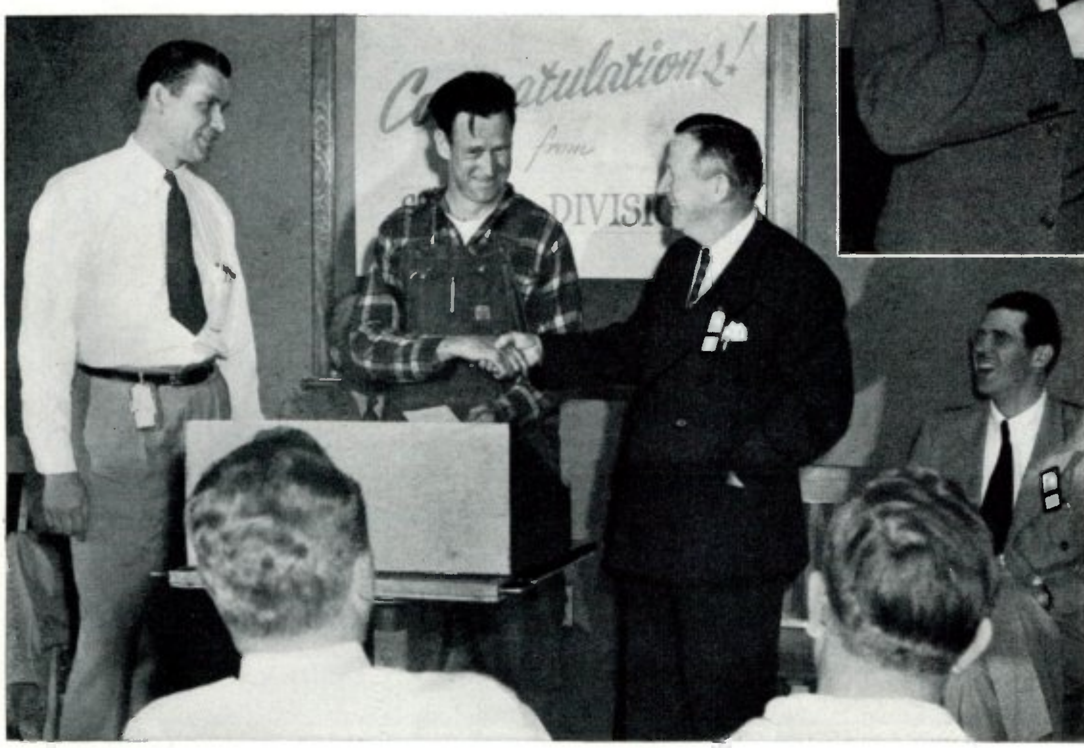
But that was some time ago. Today I'm settled down in Schenectady, working for the Company's Electronics Department. And, after a day at work talking with hams, writing to hams, designing units for hams, and writing articles for *Ham News*, I dash home to indulge in my own hobby—I did mention that, didn't I?—ham radio.

From left to right

Some members of the General Electric family whose names recently made news

When President Charles E. Wilson visited Oklahoma City recently to deliver the commencement address at Oklahoma Baptist University there, the Kiowa Indians took advantage of the occasion to adopt him into their tribe. Here Chief Jasper Saunkeah and other Indians of the tribe present him with his credentials. The certificate confers on him the title of Boiy-Bah-Hate-Kah-Keah, signifying Man Who Makes Lightning.

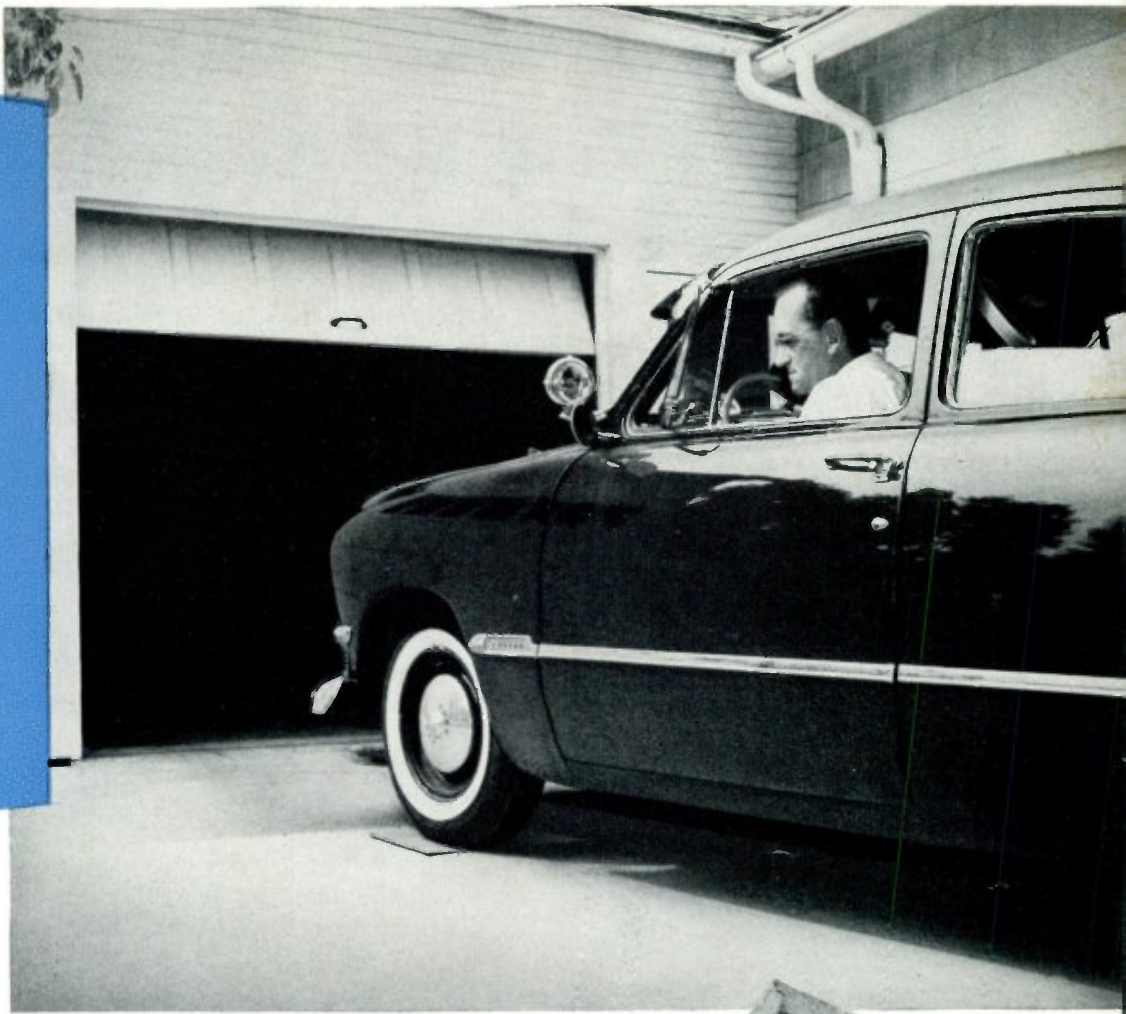
Alfred T. Shaw, night supervisor of the East Plant Ordnance Division, Transformer & Allied Products Divisions, Apparatus Department, receives a 50-year diamond pin from Manager W. C. Heckman of the Aircraft & Ordnance Systems Divisions, at a recent party honoring his completion of 50 years of continuous G-E service.



Richer by $1000, George M. Brown (center) has the distinction of receiving the largest suggestion award ever made at Hanford Works. Here he is being congratulated by Vice President G. R. Prout, with Foreman Rudy DeJong at the left. Brown said he'd use his prize money for bonds and for a sewing machine.

A Fort Wayne Works employee uses Alnico magnets to make an automatic

Garage Door Opener



Wolfe uses cardboard block to demonstrate positioning of box containing magnets. Actually the box (shown at right with cover removed) is buried in driveway 30 feet from garage.

THERE are various ways of opening garage doors electronically, but E. K. Wolfe, of the Apparatus Department's Fort Wayne Works, prefers to do it with magnets. The magnetic switch arrangement he devised uses current only when it is in actual operation, thereby eliminating standby power used in other systems.

Wolfe is foreman of the telephone and control section at Fort Wayne. He has a knack for contriving labor-saving gadgets for his home in Leo, Indiana, and has found many ways of using the small motors his plant makes.

His door-opening device uses a motor, too, but its main gimmick is magnets.

Buried in the left-hand lane of the driveway is a stainless steel box containing two magnetic switches. Underground wires connect the box with the equipment in the garage that pulls the doors up and down. This equipment consists of a small motor, a gear reduction unit from an old washing machine, three relays, a three-way switch, a start button (for manual operation), and 17 feet of bicycle chain.

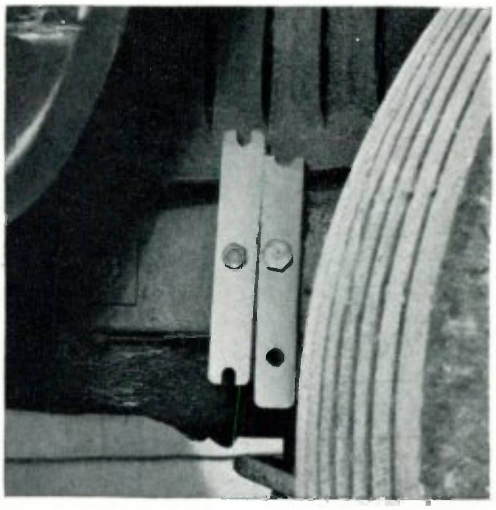
His car has a permanent Alnico magnet mounted on the frame just back of the left front wheel. When the car passes over the box, the magnet operates the switch. The action is powerful enough to be unaffected by snow, or even the cement that covers the box.

The steel box itself is nonmagnetic. So are the little mercury cups which bounce the magnets back—otherwise the doors might keep going up and down.

There used to be two cars in the Wolfe family, and each had a magnet on it. However, Wolfe arranged things so that each car opened only the door on the side of the garage where it was parked. He explains that this was done by having the magnet on one car with its north pole down; on the other car the magnet had the south pole down. Thus, the magnetic switch turned one way when approached by one car, and the opposite way when approached by the other.

The light in the garage is tied in with the system, too. It turns on as the door opens, and off as it closes.

This is the seventh 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.*



Magnets are mounted on car behind left front wheel.

BULLETIN BOARD

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E. S. McKay: staff of Vice President R. S. Peare, Advertising & Publicity Dept.

Robert Paxton: vice president in charge of manufacturing policy.

Research Laboratory—R. M. Drake: auditor. Electron Physics Divs.—J. L. Lawson: manager; C. G. Fick: assistant manager. E. D. McArthur: head of Electron Tube Div. E. E. Charlton: head of X-Ray Div. C. G. Fick: head of Communications Research Div. J. L. Lawson: head of Nuclear Physics Div.

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G. W. Hart: manager of advertising, sales promotion and sales training.

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J. R. Casey: manager, Gas Turbine Sales Div., Turbine Divs.

G. J. Clark: manager, Transportation Div., East Central District.

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Ab Martin: assistant manager, Fort Wayne Works.

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W. B. Snyder: assistant manager, Steel Mill Div., Industrial Eng'g Divs.

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Schenectady Large Motor and Generator Eng'g Div.—A. H. Lauder: manager of engineering. B. H. Caldwell: assistant manager of engineering. D. E. Brainard: engineer, Salient Pole Generating & Converting Div. H. D. Snively: engineer, Direct-Current Motors & Generators. R. V. Shepherd: engineer, Synchronous Motor & Generator Div. R. W. Wieseman: engineer, insulations, high frequency sets. J. C. Johnston: supervisor, mechanical design.

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C. E. Ring: manager of product quality.

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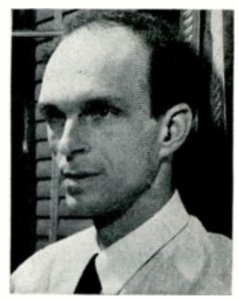
Product Service Div.—W. J. Kern: supervisor. J. R. Davis: assistant supervisor, field service section.

Robert Paxton
General



J. L. Lawson
General

J. M. Crawford
Apparatus

P. R. Hartig
Apparatus

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W. R. BARRETT: sales manager, Plastics Div.

W. W. WHITE: sales manager, Textolite plastics surfacing materials.

ELECTRONICS

L. S. HARTLEY: staff assistant, Equipment Development Works.

Commercial Equipment Div.—W. J. MORLOCK: assistant manager. H. K. SMITH: manager, marketing services.

Receiver Div.—J. D. WALTER: purchasing section.

Tube Divs.—C. J. BIVER: commercial engineer, central region. G. E. BURNS: field sales manager, replacement tubes. G. F. CALLAHAN: staff assistant. L. E. RECORD: engineer, Cathode Ray Tube Div. F. W. TIETSWORTH: commercial engineer, eastern sales region. W. C. WALSH: western regional sales manager.

LAMP

L. G. COVER: manager, H. L. WEISS: assistant manager, Cleveland Wire Works.

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Carboloy Co. Inc.—K. R. BEARDSLEE: president. E. F. WAMBOLD: executive vice president. J. E. WELDY: marketing manager. J. S. GILLESPIE: product sales manager. J. M. BERTOTTI: field sales manager.

G.E. Credit Corp.—H. J. BOWN: manager, Pittsburgh Office. J. F. LAWTON: special assignment, Cleveland area. J. M. WILSON: manager, Cleveland Office.

G.E. X-Ray Corp.—A. J. KIZAUR: vice president and chief design engineer. J. S. THELEN: vice president and factory manager.

Hotpoint Inc.—W. R. GRANT: vice president and secretary. R. M. SPANG: comptroller and assistant secretary. MOORHEAD WRIGHT, JR.: assistant to the president.

Trumbull Electric Mfg. Co.—L. E. BEES: vice president, manufacturing. CHARLES BANGERT, JR.: product planning manager. Y. T. CHANEY: sales engineering manager, eastern region. R. G. PAGE: designing engineer. R. C. WILSON: sales engineering manager, central region.

RETIREMENTS

GEORGE BARR: consultant, Federal & Marine Div., Apparatus Dept.; 43 years.

B. L. BENBOW: manager, Cleveland Wire Works, Lamp Dept.; 41 years.

H. S. EDGERLY: application engineer, Panel & Equipment Div., Apparatus Dept.; 50 years.

F. M. HASTINGS: sales representative, Chemical Dept.; 39 years.

W. S. LEGGETT: manager, Transportation Div., East Central Apparatus District; 45 years.

J. H. LOHRFINK: transportation engineer, Baltimore Apparatus Office; 48 years.

D. F. SMALLEY: design engineer, Lynn Motor Eng'g Div., Apparatus Dept.; 41 years.

R. D. VANNORDSTRAND: designing engineer, Industrial Heating Divs., Apparatus Dept.; 37 years.

DEATHS

E. S. HENNINGSEN: manager of engineering, Schenectady Large Motor & Generator Eng'g Divs., Apparatus Dept.; September 23.

J. M. JENSEN: retired from Power Circuit Breaker Div., Apparatus Dept.; July 30.

SVENTE ORLING: retired supervisor, Service Eng'g Div., Switchgear Divs., Apparatus Dept.; June 9.

G. C. SOLMES: purchasing agent, Peterborough Works, Canadian G.E. Co.; August 18.

A. P. WOOD: retired Apparatus Dept. engineer; August 22.

HONORS

A new professorship honoring President Charles E. Wilson has been established at the Graduate School of Business Administration—George F. Baker Foundation of Harvard University. The professorship, known as the Charles Edward Wilson professorship of Business Policy, was established by action of the Board of Directors of General Electric, in recognition of Mr. Wilson's 50 years of continuous service to the Company.

Dr. Katherine B. Blodgett of the Research Laboratory has been awarded the Garvan medal for 1951, an award made annually for an outstanding achievement by a woman chemist.


F. M. Roberts
Apparatus


J. R. Casey
Apparatus


W. J. Kern
A. & M.


C. E. Ring
A. & M.


W. R. Barrett
Chemical


L. S. Hartley
Electronics


H. K. Smith
Electronics


J. D. Walter
Electronics


F. W. Tietsworth
Electronics


L. E. Record
Electronics


K. R. Beardslee
Affiliates

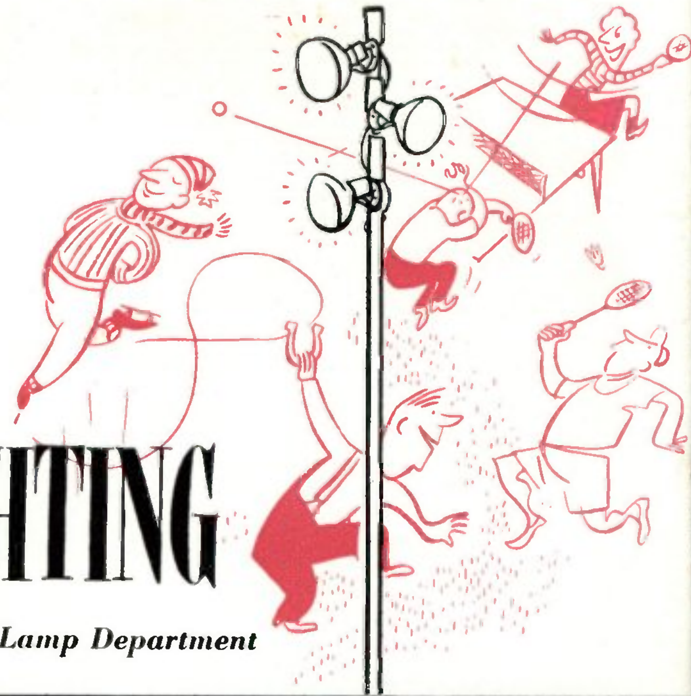

E. F. Wambold
Affiliates

OUTDOORS

CAN BE FUN AT NIGHT

WITH

BACKYARD SPORTSLIGHTING



By KIRK REID and JIM JENSEN, *Lamp Department*

IF YOU'RE a typical, recreation-loving American citizen, you've been putting up with an unsatisfactory set of conditions when it comes to outdoor recreation at home. Of course you take great pride in your yard—you spend the weekends getting it in shape and keeping it that way.

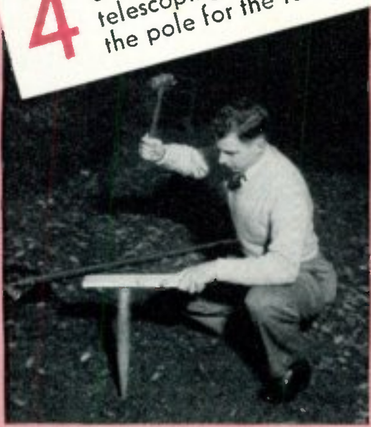
But during the week you miss out on the wonderful possibilities your yard offers, for it gets dark just about when you're ready to enjoy them. There aren't enough daylight hours in your day. That's especially true, with the days so much shorter as winter draws on.

Probably you've often thought it would be great if you could light up your yard practically and inexpensively. Perhaps you remembered the elaborate systems required for baseball or football, and you've dismissed the idea of outdoor lighting as being for millionaires only.

Well, here's good news: you can have portable, inexpensive backyard lighting that will operate on ordinary household wiring circuits.

How do you do it? By using weather-resistant lamps mounted on easily constructed poles and connected to your house wiring. You can use either floodlights or spotlights, and you can get either of them in two ratings: 150 and 300 watts. The use of such lamps on metal poles to light gas stations sug-

4 STEPS in setting up a telescoping version of the pole for the lamps.



FIRST STEP: Drive metal sleeve into the ground at desired location. Use a flat board (or a metal cap over the sleeve) to protect sleeve opening during pounding. Sleeve should be driven deep enough to support the pole adequately yet leave upper part of sleeve protruding far enough to allow for easy loosening when it's time to take the equipment down after use. SECOND STEP: Place lamps in adjustable sockets and aim them in the approximate direction desired. THIRD STEP: Insert bottom of pole carefully into the supporting sleeve and plug in the wire. Check the aiming of the lamps in the general direction desired and tighten the screws. FOURTH STEP: Extend pole to full 12-foot height and aim the lamps accurately either by twisting or by lowering and readjusting.

gested a similar technique, with lighter poles, for backyard sportslighting.

The success of the system lies in getting one or two three-lamp assemblies up in the air far enough to reduce glare, give satisfactory light distribution, and keep night-flying insects at a reasonable distance during the insect season.

Twelve-foot Poles

Twelve-foot poles are the answer. They may be made of metal or wood, and they may be as inexpensive as a handyman's ingenuity dictates—or as convenient as the lightweight telescoping poles now being manufactured for this purpose.

If the handyman tackles the problem of building 12-foot poles, he should provide some method for collapsing them for portability and storing, not to mention greater ease of adjustment. Various types of pole, both metal and wooden, are shown in the accompanying illustrations. If they're not inserted into a metal sleeve in the ground, they should be supported by guy wires.

If you don't make your poles of wood, you can always make them from pipe purchased at any hardware store. Such pipe should be no smaller than a half inch in diameter, and preferably an inch. If you're going to have a length of pipe in the ground as a holder or sleeve, that will determine the size of the pipe to use for the pole. There shouldn't be too much play between sleeve and pole.

One end of the sleeve should be flattened so it can be driven into the ground more easily. In locations where the poles will be used frequently, it may be wise to drive the outer sleeve entirely into the ground, covering it with a cap to keep out dirt when not in use.

A large selection of weatherproof sockets and other accessories is now on the market. Several of them are shown in the accompanying illustrations.

Types of Sockets

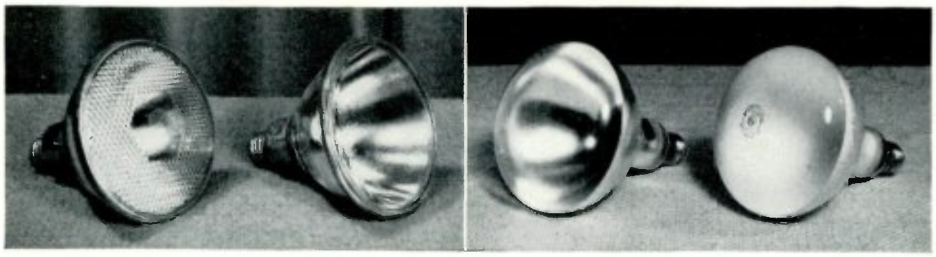
Some sockets come equipped with pipe-clamp mountings. Others can be fastened to wooden or metal poles by means of bolts and wing nuts. Some manufacturers provide a very convenient cluster of three sockets which may be attached to the threaded end of a pipe. Our own Company's Apparatus Department manufactures a flood- and spotlighting fixture.

General Electric lamps recommended for typical backyard sportslighting are also shown in the illustrations. The 150-

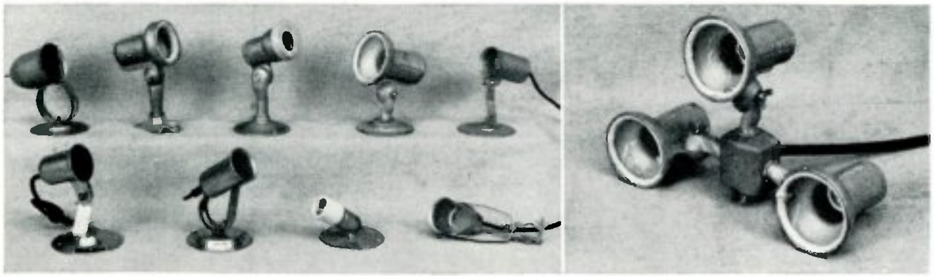
For table tennis, three 300-watt reflector floodlamps on the standard 12-foot pole give 40–70 footcandles on table.

In badminton, two of the three-lamp, 12-foot poles are used, located on the net line 15 to 20 feet from the net. Equipped with 300-watt floods, these provide ample light for following birds.

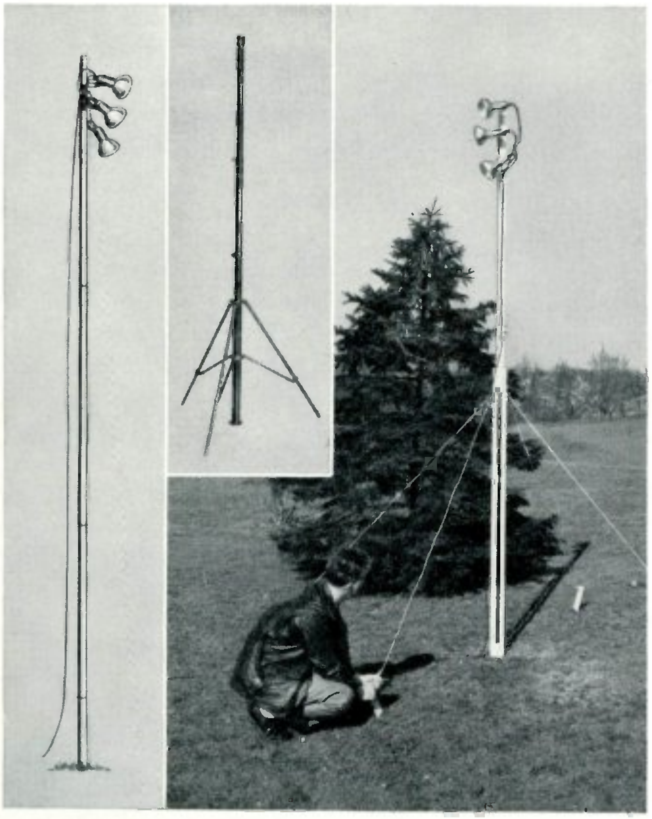
LAMPS AND SOCKETS FOR PORTABLE BACKYARD LIGHTING



150-watt PAR flood lamp | 150-watt PAR spot lamp | 300-watt R-40 reflector spot | 300-watt R-40 reflector flood

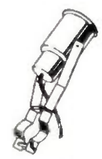


Here is a representative assortment of weatherproof adjustable sockets now available on the market. Any of these could be adapted readily for use on poles.



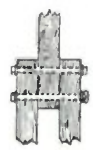
THREE POLE TYPES: Left, a telescoping aluminum pole; center, metal pole with tripod base; right, one of wood two-by-twos.

One way (chain and pipe) of joining pipe sections.



This type socket can be clamped to a metal pole.

Wood sections joined by metal sleeve and pin.



Detail of wood pole made from pieces of 2 x 2.

30-yard archery range has four 300-watt lamps: two reflector spots aimed at target, one flood each for shooting spot and lost-arrow area.

For pitching horseshoes, one-pole lighting is used with three 300-watt floods, one aimed at middle and others aimed at ends of the area.

Lawn bowling area is large, has no standard dimensions. It's desirable to use at least six 300-watt flood lamps mounted on two 12-foot poles.

For darts, one 300-watt flood lamp is adequate for a throwing distance of 15 feet. Another could be used to light up the area behind target.

watt spot- and floodlights (type PAR) will very likely be carried in your employee store. The heat-resistant 300-watt reflector spot- and floodlights (type R-40) may not be carried in stock at your store, but they'll probably be glad to order them for you. And while you're in the store looking around, they may be able to show you one type of socket (L-65-P) for the 150-watt lamps and also the G-E "Handy" floodlight (L-65).

Don't forget: the benefits of portable outdoor lighting aren't limited to backyard sportslighting. There are hundreds of additional uses, some of which are bound to be of interest to you.

Gardening and lawn mowing, for example, can be more pleasant after dark when it's cool. And it will be better for the vegetation, too.

Other Fields

Churches and fraternal organizations can find many uses for several portable 12-foot poles with lamps. If you belong to a PTA, remember that many school athletic departments hold light practice sessions in late evening hours on unlighted fields. Limbering-up exercises and the teaching of training fundamentals can be conducted with the aid of portable outdoor lighting.

If you're a suburban or rural dweller, you'll find that many gardening or farm tasks can be accomplished more efficiently and at more convenient times with the aid of light. And if you have a roadside stand, lighting of this kind is one way to boost the sale of surplus perishables: the traffic is often heavy after dark.

Carnivals, bazaars, lawn parties, whether private or public or commercial, can be made much more inviting with light.

At Christmas, too, you'll find your new lighting equipment will come in very handy to enhance other lighting and decoration.

For ice skating, either at small resorts or small neighborhood ponds, portable outdoor lighting equipment can be used to advantage. And that goes for other winter sports, too.

There are, of course, many applications where the portable type of equipment is inadequate, and a permanent job is in order. Such installations are beyond the scope of this article, but your nearest distributor of these G-E products (such as the G.E. Supply Corporation) or your own electrical contractor will be glad to advise you in such cases or refer you to someone who knows the answer.

25% to 50% more food space

No food wasted in the home that has a dependable General Electric Space Maker Refrigerator!

G-E Refrigerators give you much more storage space than most refrigerators now in use . . . yet they occupy no larger floor area!

YOU'LL BE mighty glad you invested in a refrigerator that gives you space for *all* your foods . . . a refrigerator that gives you the *finest* convenience features . . . a refrigerator that has proved, over the years, to be the *most dependable.*

Remember that the new General Electric Space Maker Refrigerator gives you more of all three:

1. SPACE. 25% to 50% more space for foods than most old-style refrigerators now in use. Yet, no larger floor area is required. Model shown has 18 square feet of shelf space.

2. CONVENIENCES. General Electric Refrigerators have so many special convenience features that you won't find in any other refrigerator.

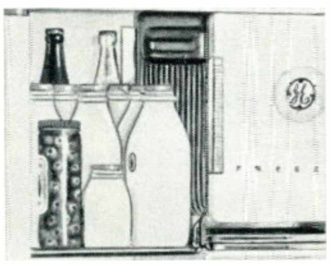
3. DEPENDABILITY. No other refrigerator can match General Electric's enviable record for dependability. *Of the many millions of G-E Refrigerators made, more than 2,200,000 are still in service after 10 years. Many as long as 15 and 20 years.*

Why not see your G-E dealer? He's listed in your classified telephone directory under G-E Refrigerators. General Electric Company, Bridgeport 2, Conn.

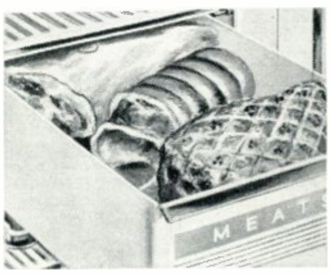
DEPENDABILITY
MORE THAN 2,200,000 G-E REFRIGERATORS IN SERVICE 10 YEARS OR LONGER!

Model NB 8 G illustrated.

Stores 24 pounds of frozen foods! Now you can have more of those delicious frozen foods on tap . . . and keep them for as long as two or three weeks.



Holds 12 square, quart-size bottles! No more fumbling and fussing about where you're going to set those bottles! Space for those *extra-tall* ones, too!



Large roasts are no problem in this new General Electric meat drawer. It's deep enough for fowl and standing roasts! Keeps meat in best condition.

Wide, deep vegetable drawer! Designed for fresh fruits and vegetables that require moisture to keep them fresh day after day! *Plenty* of room, too!

You can put your confidence in—

GENERAL ELECTRIC

Now you can afford *Luxury Living*

with low-cost
G-E REMOTE-CONTROL WIRING

What luxury just to drop off to sleep without a worry about forgotten lights . . . to know that in an emergency you can flood the house and grounds with reassuring light . . . to wake up in the morning and start the coffee without even getting out of bed!

Pipe dreams? Not at all! These and other comforts of all-electric living can easily be yours with General Electric's exciting remote-control wiring system. This new system costs less than a conventional system with the same complete flexibility of control.

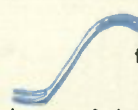
Master selector switches let you control those easy-to-forget basement and attic lights, operate garage and yard lights from your bedroom or other convenient spot.

Smartly-styled single switches can be used to control lights from any number of different points—let you walk through your home and grounds in a pathway of light.

If you're planning to build a new home or remodel your old one, contact your architect or electrical contractor. Discover how many jobs G-E remote control can do . . . how many steps it can save every day . . . how it can provide better living, easier living, safer more convenient living for everyone in your family.

For husbands only —

You probably want to know more of the details of General Electric's amazing new remote-control wiring system—how it works . . . what it is . . . how easily it can be made a part of your building plans.

This is the master selector switch  —lets you control up to nine different lights and appliances. Attractive individual switches like this  can be placed wherever you want them for convenient multi-point switching. Switches are connected by  thin, thermoplastic-insulated wire to a relay  —the heart of the G-E remote-control system. This specially designed G-E transformer  provides low-voltage current to the relay and switch circuit.

Simply touch any switch, the relay does the rest—turns lights or appliances ON or OFF, let's you "double-check" on forgotten lights.

G-E remote control is completely practical, extremely flexible and economical. There are no complicated techniques . . . no specialized installation practices. Consult your architect or electrical contractor—let him help you plan a layout to suit your needs. For a free booklet on G-E remote control, write to Section D24-1136, Construction Materials Department, General Electric Company, Bridgeport 2, Connecticut.

WIRING DEVICES

You can put your confidence in —

GENERAL ELECTRIC