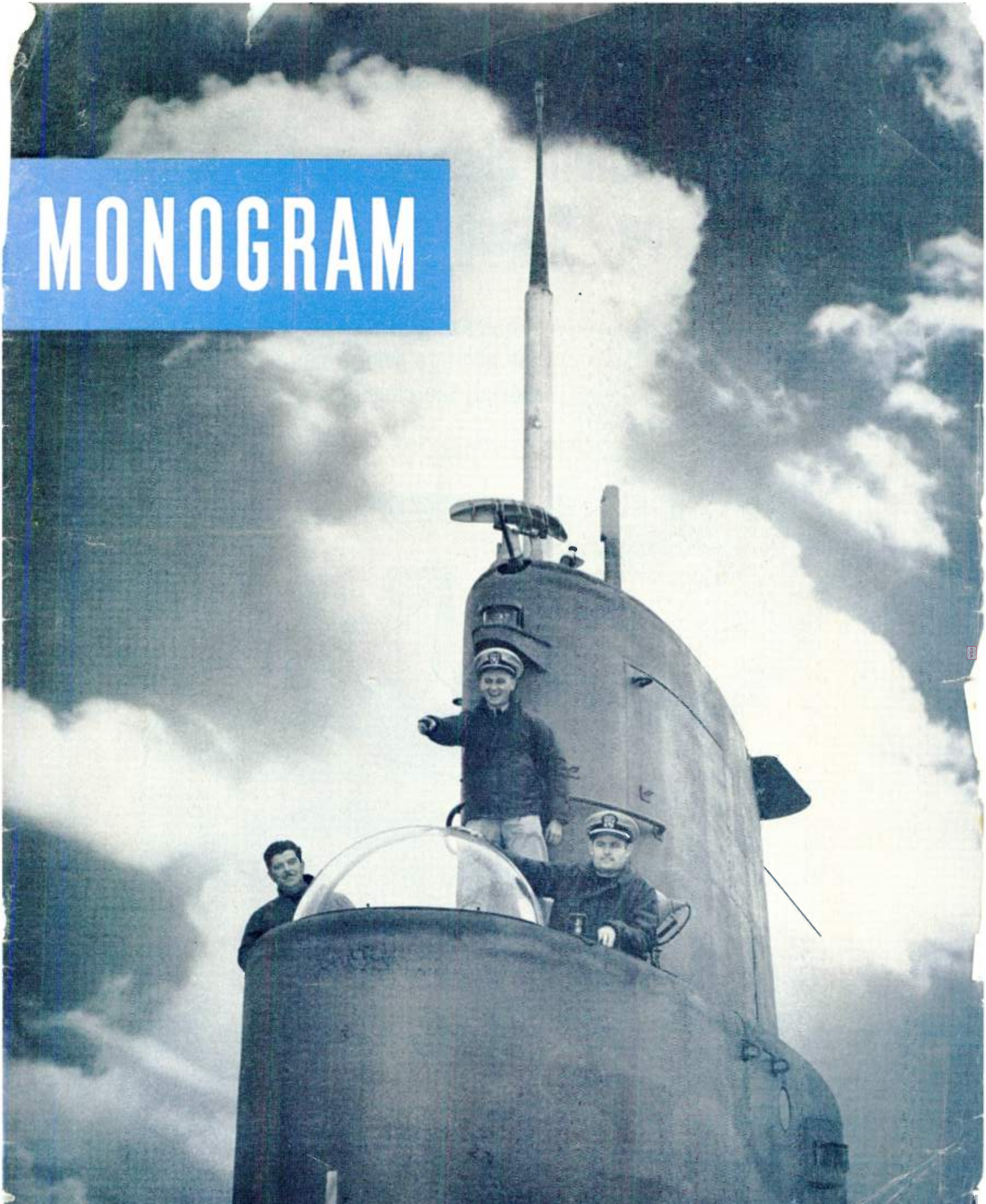
MONOGRAM

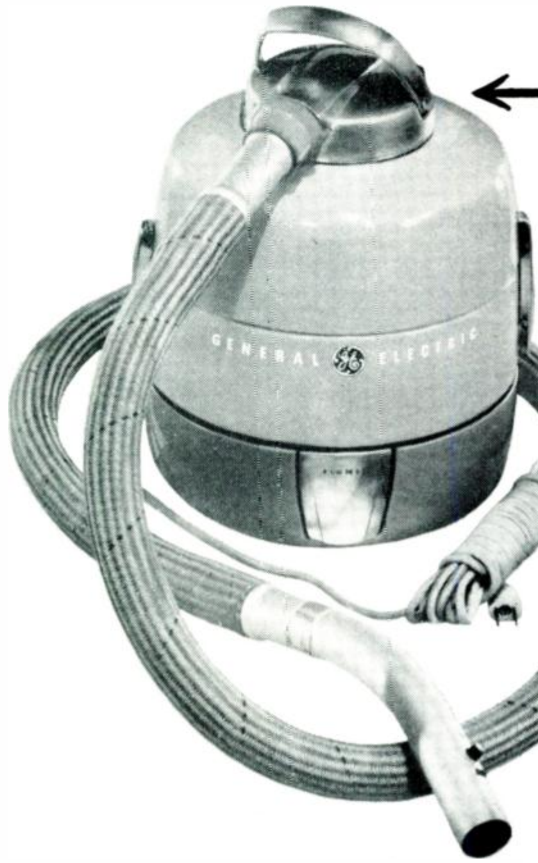


JANUARY—FEBRUARY, 1952

Killer Sub, Page 2

General Electric announces:

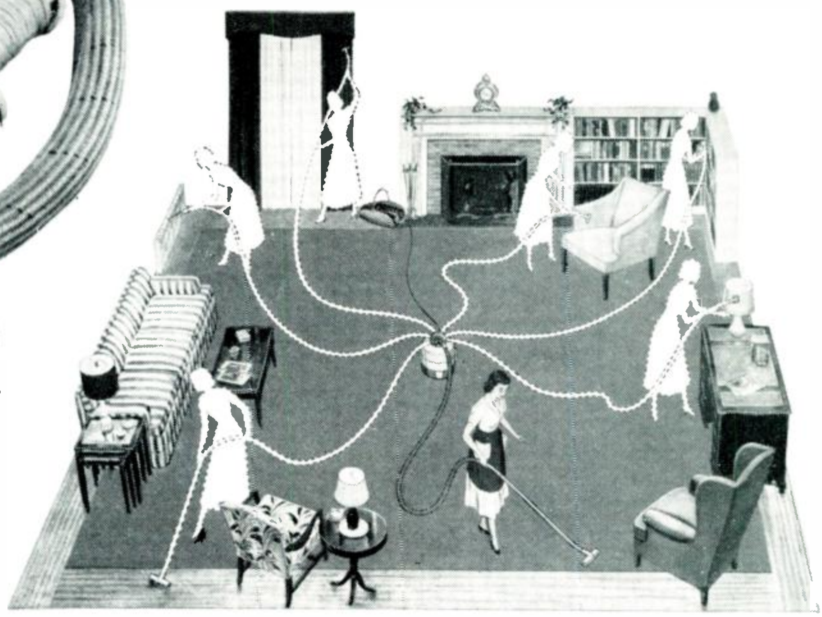
The only vacuum cleaner in the world to bring you "Reach-easy" Cleaning!



Its amazing swivel-top lets you clean the average living room without once moving the cleaner!

(Model AVC-815 complete with caddy and 10 attachments)

YOU'LL BE PROUD to own this great new General Electric Cleaner. And you'll agree that with its complete set of versatile "non-scratch" attachments (some of which are shown in use below) . . . it is one of the *handsomest* appliances ever to wear the G-E monogram!



Happy day! Here is a completely new kind of vacuum cleaner that gets everything double-clean . . . double-quick! Look:

1. Clean a whole room without moving the cleaner! You simply place the cleaner in the center of the room, then—since the unique swivel-top rotates—you reach every corner without the usual tug-of-war! *That's* "Reach-easy" Cleaning!

2. Most effective home cleaner ever made! It gets all the dirt in a way no other cleaner does . . . thanks to G-E engineering. And because of a new principle in surface filtering . . . the dirt-getting ability is maintained as the bag fills!

3. Larger disposable bag than any other cleaner! Just throw the dirt away, bag and all. And because the G-E "Throw-Away" bag is *extra-large*—it has to be replaced only a few times a *year!*

4. At last here's a cleaner with a soft, gentle, air exhaust. Its air-cooled motor is mounted in live rubber and cushioned with everlasting spun glass. And there's no radio or television interference!

What a difference! With this revolutionary new General Electric Cleaner in the middle of the average living room, you can clean every corner *without once moving the cleaner!* And it is easily moved from room to room . . . glides smoothly over the doorsills. So convenient to carry upstairs or downstairs, too!

● What more could you want? Nothing . . . except a demonstration and question-answer session in your own home or at your local General Electric dealer's. Get in touch with him . . . quick! General Electric Company, Bridgeport 2, Connecticut.

Trim and specifications subject to change without notice.

GENERAL ELECTRIC

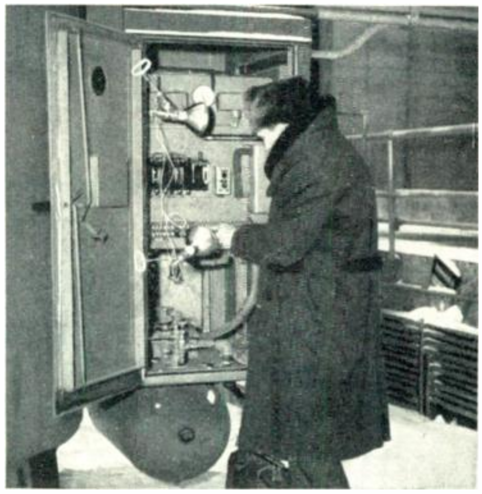
MONOGRAM

VOL. 29 No. 1

R. E. DWYER, Acting Editor

The General Electric MONOGRAM is an intracompany magazine published for all office employees of the Company and its affiliates. Circulation is restricted to General Electric personnel. It is distributed without charge to those on its circulation list. The object of the MONOGRAM is to circulate news of the Company and its people. It does not state policies, preferences, opinions, or recommendations for the Company. It is published bimonthly at Schenectady, New York, by the General Electric Company and printed in the U.S.A. by The Maqua Company. The MONOGRAM is copyrighted and permission for reprinting articles therefrom should be obtained from the publisher. No outside material is purchased. Articles, news items, pictures, etc. may be sent direct to the editorial office.

First-Class Mail



Engineer Petersen at work

WARM HANDS IN THE DAKOTAS

Dear Editor:

I have read with interest the article on infrared heat lamps entitled "Moving the Sun to the Product" which appeared in your July-August, 1951 MONOGRAM. The article mentioned that the list of applications of infrared heat lamps seems endless . . . It appears to me that my useful application is worth adding to your list.

During the winter months I add an extra suitcase to my paraphernalia which I take with me on outdoor field engineering assignments. The case contains a set of heat lamps. The past two winters I have given much time to the study of outdoor power circuit breakers operating in extreme cold temperature conditions . . . This assignment has taken me into the wind- and snow-swept flats of North and South Dakota during the worst storms. While others avoided the Dakotas and the natives huddled around their circulating heaters, I worked . . .

My attire is complete and satisfactory to combat the elements. It consists of an oversized sheep-lined overcoat, wool shirt, wool slacks and wool underwear, felt boots and buckskin mittens. I hadn't found anything to protect my nose until I thought of the heat lamps. When my work is centered in one spot such as in the case of the circuit breakers, the lamps are mounted in sockets, equipped with rubber-covered clamps, clamped to a convenient object and directed on my poor nose.

A fellow cannot do much with boxing-glove-like mittens; therefore, the lamps are directed a few inches away from the object to be worked on and the job is accomplished comfortably in the rays of the lamp without gloves. Furthermore, the clear white lamp provides excellent illumination. Of course, the cold metal parts are also warmed for comfortable handling. On one occasion involving a test on copper oxide rectifiers used to obtain the direct current for closing the solenoid-type operating mechanisms for the circuit breakers, the lamps were a ready source of heat to warm the rectifiers to study their temperature characteristics . . .

Sincerely yours,

Minneapolis, Minn. E. L. Petersen

PINK LETTER BLUES

Tom Bost, of the Electronics Division's Atlanta office, received the following letter from his distributor, Jeff Chapman, of the Chapman Electric Co. in Mobile, Ala.:

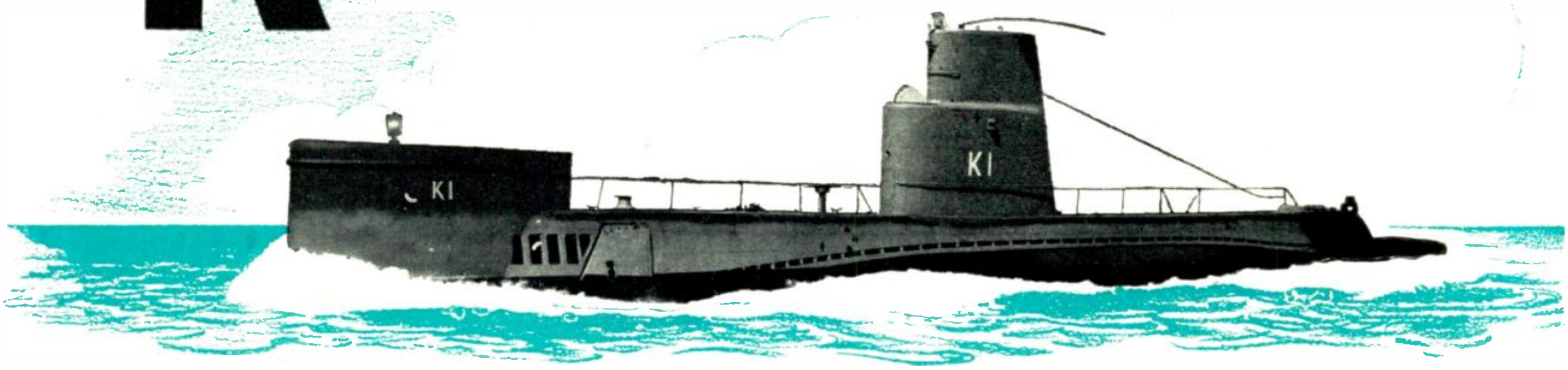
Dear Tom:

. . . Mrs. ...., one of our customers in the fishing village of Bayou La Batre, recently received a notice from the FCC stating that her trawler was radiating an interfering harmonic on 5576 Kcs and demanded a reply within three days. Mrs. .... had never heard of a harmonic and consulted her dictionary; when she found the word she had only gotten as far as "harmonica." She replied to the FCC stating that she was answering their pink letter about her boat and wished to advise them that she had three boats, operated by her husband and two sons. Furthermore, she knew that neither of them could play a harmonica and that her husband said there wasn't even a harmonica aboard any of her boats. She added that if the FCC ever heard of anyone playing a harmonica from one of her boats while they were supposed to be working she would fire them without notice . . .

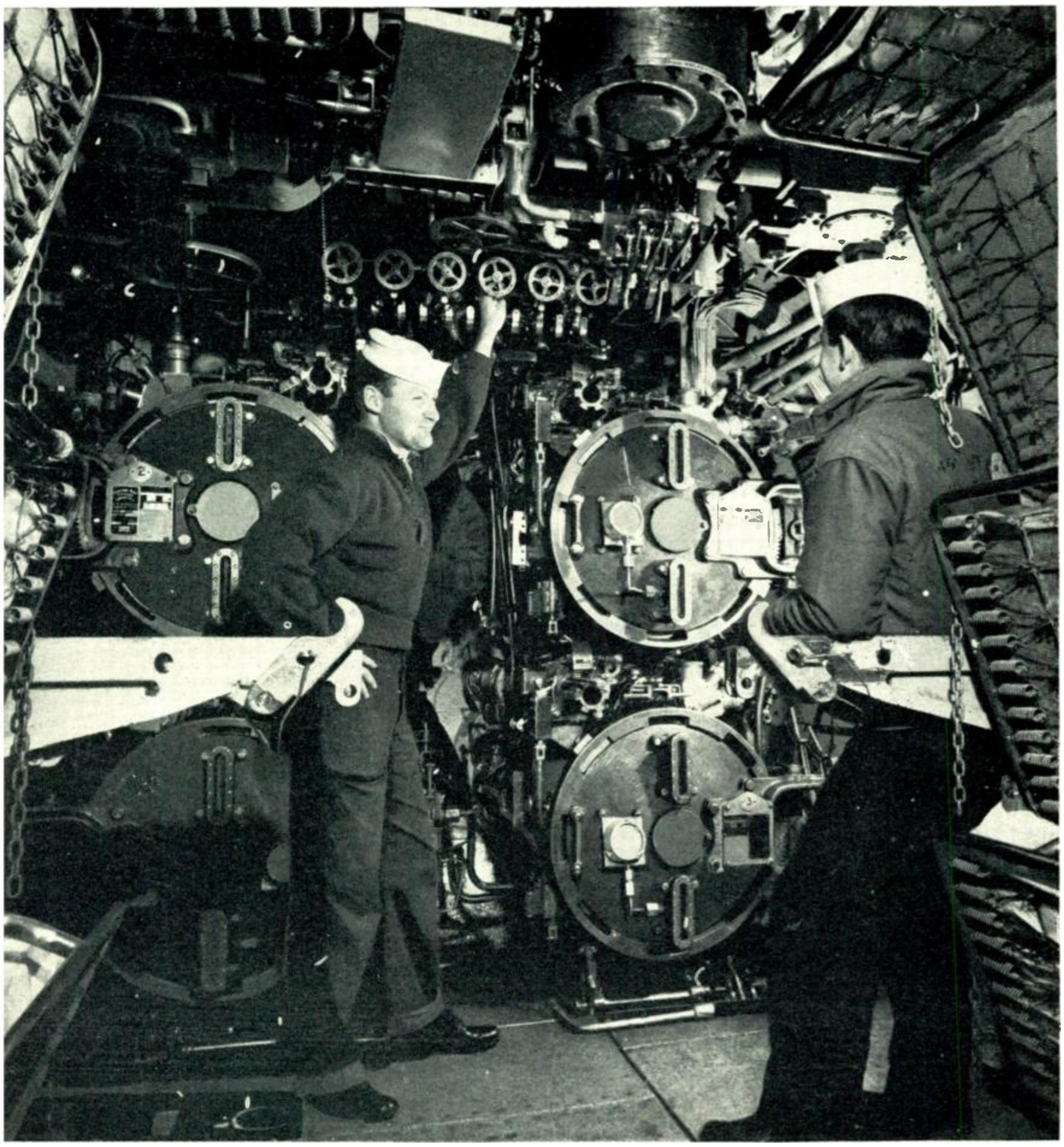
Regards,

Chapman

K stands for KILLER



Just off the ways, the K-1 answers enemy submarine threat



Typical submariner Leo Feeney, Engineman First Class, passes on a little scuttlebutt in the torpedo room of the K-1. He was a crewman on the famous "Dace" when it torpedoed and sank Japanese light cruiser "Maya."

Special photography by Jim Burns

LAST November, under a gray, rain-heavy Connecticut sky, the new submarine, SSK-1, backed her engines and turned out into the Thames River. She left her birthplace at the Electric Boat Co. in Groton and moved up-river to the U.S. Navy Submarine Base at New London where she would receive her commission pennant and become an official man-of-war. She was the latest of the more than 100 General Electric powered submarines built at Electric Boat since 1933.

The K-1 is a boat new in design and new in mission. Small, with less than half the length and tonnage of the successful World War II fleet submarines, she has been made into a compact, muscular platform for electronic search and detection gear. The letter "K" in her name means "Killer" . . . killer of enemy submarines.

Her normal crew is forty picked men—many selected veterans of the submarine war against Japan. They were chosen for their professional ability to make effective the long and dangerous underwater stalk of enemy undersea raiders in our home waters. Equipped with a snorkel breathing device, the K-1 can and will remain on a submerged patrol for as long as two months. Because of these extended hunts, the underwater propulsion for the K-1 must be of the best design that marine engineering can create. A submarine runs on electric-battery powered motors when fully submerged. To furnish the maximum speed for this submarine,

Lt. Francis Callahan, shown talking to crewmen Bob Linskey, Ray Paul, and Dick Jacobs, is an Annapolis grad. Berths are in torpedo room.

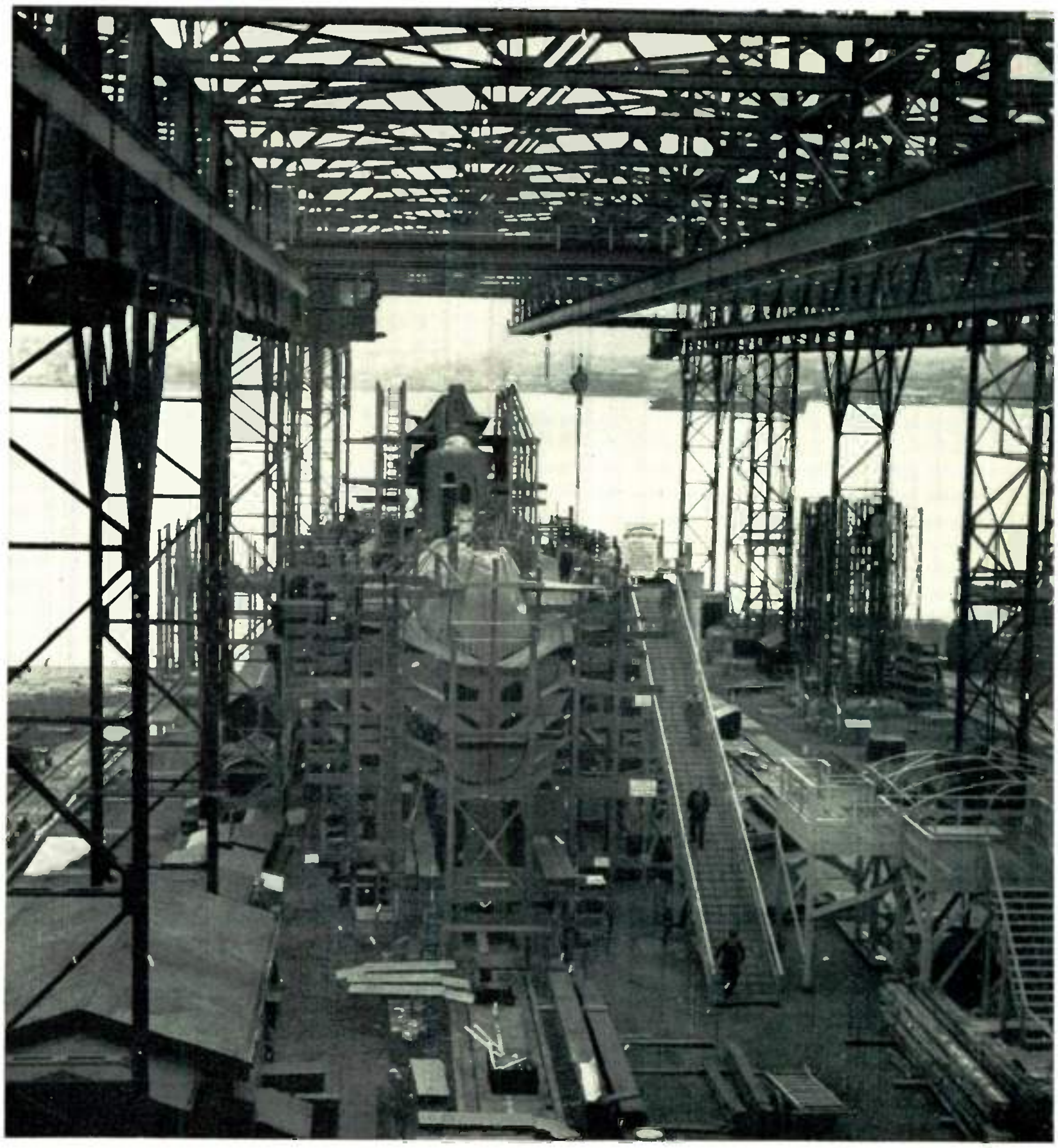
G-E motors and generators, here being readied for sea trials, develop maximum horsepower in minimum space. Lt. Cmdr. F. Andrews, right, will be K-1 captain.

General Electric built powerful special motors and rebuilt accompanying generators, working to overcome the greatest submarine motor problem—speed versus size.

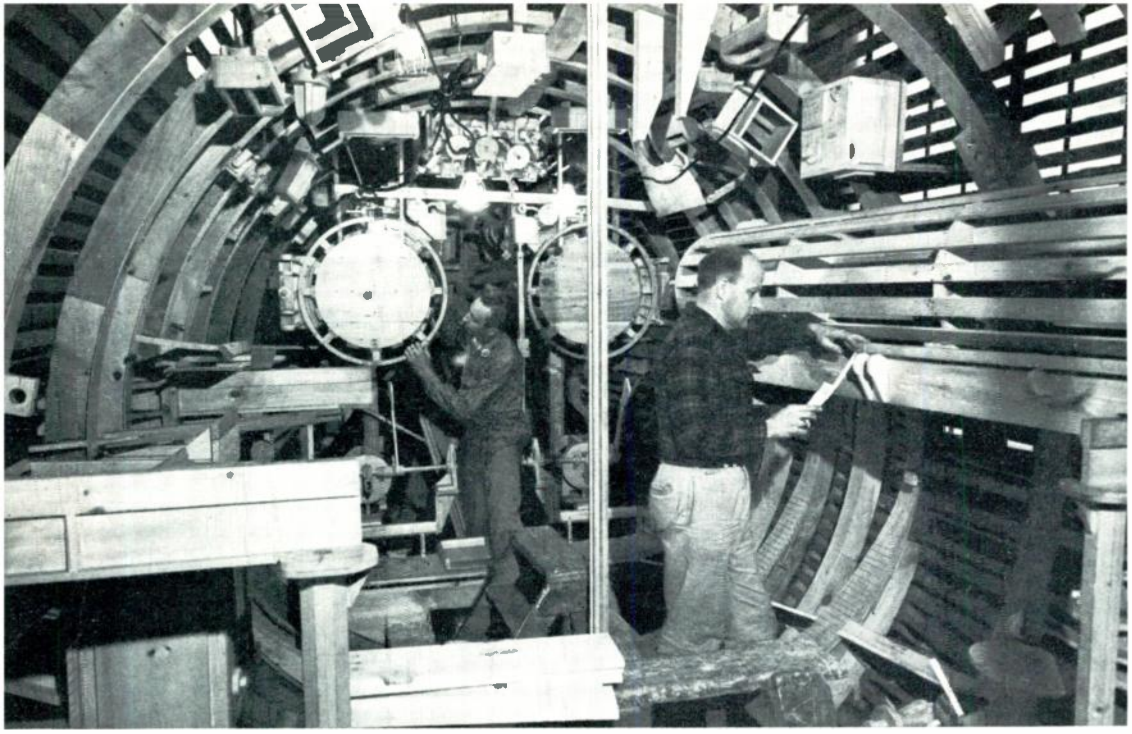
From the first entry of General Electric into submarine engineering during the naval construction holiday of the twenties and thirties, the best minds from the design, application, and installation departments have co-operated with the engineering genius of the Navy and the Electric Boat Co. The latter is the only private peacetime builder of submarines in the country.

The original design for a submarine comes from the Navy, however. In planning a submarine, Navy designers have most firmly in mind the primary duty that the boat will have to perform during hostilities—to deliver a torpedo to a target as effectively as possible. And it must be able to travel long distances before attack, remain submerged for long periods, be so constructed that it will escape electronic detection until it has delivered its attack, and, once having fired its torpedoes, escape.

When naval theorists find that the need for a new development is great they institute a fundamental design. Electric Boat specialists working with Navy engineers solve the problem of specifications and requirements that this sub must possess to perform its primary mission. Part of the first consideration is the vital propulsion problem. It must be kept in mind that a submarine needs two propulsion systems, one for surface and near



Surrounded by construction and scaffolding, another prototype submarine nears the launching stage. This boat will be stern-launched, but during war subs built at Manitowoc, Great Lakes, were side-launched.

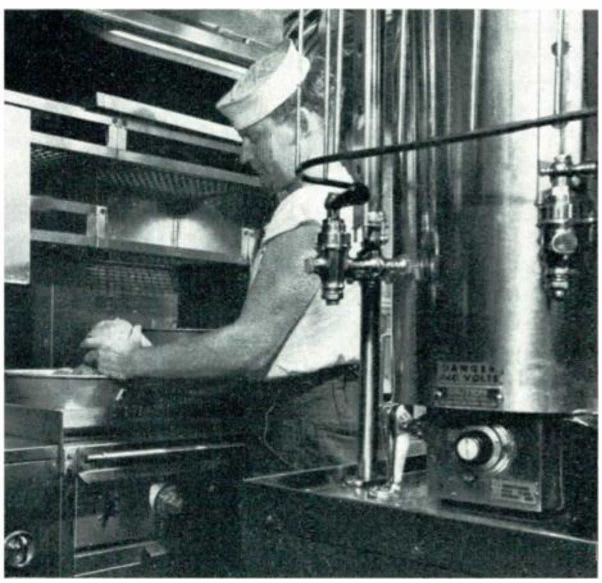


Before work on the sub is started, Electric Boat makes a full-scale wooden model. Thus, all parts may be fitted as in the actual boat and all pipes and fittings may be preformed at reduced cost. This construction short-cut has been pioneered by Electric Boat. It is found to be especially helpful in mass construction.

Karsch

John Jay Hopkins has been president of the Electric Boat Company since 1947. He also heads Canadair, Ltd., an associated airplane manufacturer.

J. J. Rudesheim, G.E., Capt. W. T. Jones, and O. P. Robinson, vice president and construction manager at Electric Boat Co., talk over new designs.



Submariners have good food. Although compact, this new Hotpoint galley for the K-1 crew's mess has every cooking facility found in bigger ships.

KILLER SUB *(continued)*

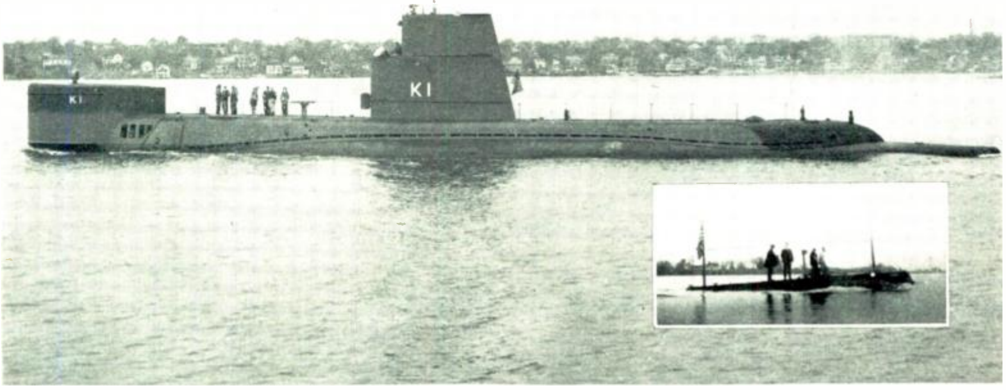
surface running, which may be diesel, and another for submerged running which, due to the shortage of air for greedy combustion engines to gobble, must be a battery-powered electric motor.

In the normal course of construction, an engine builder takes the prime contract for the entire propulsion system. The prime engine builder will subcontract his electrical components (motors, generators, and necessary controls) to qualified electrical manufacturers—for example, General Electric. Practically speaking, General Electric will help the Navy draw up the electrical requirements even before it proposes a bid for the order.

When General Electric's proposal has been accepted, however, the design and application engineers of the Aircraft, Federal & Marine Department, co-operating with the Navy, with the engine builder, and with the hull builder, work out the details of the duties that the electrical equipment must perform. It is then designed, manufactured, and delivered to the Electric Boat Company. At the Groton boat yard General Electric service engineers take control of the installation, their field experts advising on the fitting of the equipment into the hull and getting it running properly. As technical representatives to the trial crew they assist in the dock and initial deep-water tests of the equipment before the hull is declared complete and ready for acceptance by the Navy.

The history of Electric Boat is integral with the history of submarines themselves, for the company grew out of an organization formed to finance the first workable underwater boat. This submarine, the *Holland*, was a third attempt to design a submersible attack boat by John Phillip Holland, an Irish immigrant and patriot, then teaching in the New Jersey schools. His original attempts were unsuccessful, and only the formation of interested and convinced financiers into the Electric Boat Company brought his third and probably final attempt to fruition in 1900.

On April 11, 1900 the *Holland* was accepted by the Navy. Its commission was awarded just a year after the formation of the Electric Boat Co. This boat, the first submarine to become part of the striking potential of our Navy, demonstrated a surprising number of features still found in our modern craft. Yet, in size she is a toy beside our present fleet submarines. From the *Holland's* 54 feet, submarines have grown to lengths of 300 feet. The *Holland* displaced 74 tons when submerged, and had a cruising range of 200 miles; the current "Shark" boats cruise 20,000 miles and displace 1500 tons. The *Holland* took $236,000 to build (its purchase price was $150,000). During World War II, a submarine cost six millions to deliver to the fleet. With the increased cost of construction and of the complex new gear developed since the end of the Japanese war, a submarine of the fleet type delivers today for 30 million dollars!



In comparison with the K-1 the size of the Holland (inset) is indicated by the relative heights of the men standing on the decks. In doing away with a deck gun on the K-1 the Navy returned to the armament of the Holland, whose dynamite projector, a crude explosive projector that never worked, was soon abandoned.

In emergencies, qualified submariners can fill in at any station on the boat. In action, however, this engine room is filled with trained specialists.

The *Holland* was, of course, the Navy's first submarine; in fact, it was the first workable undersea craft in the world's navies. With a gasoline engine of 45 horsepower it made 5.7 knots on the surface and 2 knots when running submerged on its electric motor. It had three torpedoes which were fired through a single tube. It had a crew of one officer and five men. It was little bigger than the Japanese midget submarines that made the early attack on Pearl Harbor.

Submarines of Vice Admiral C. A. Lockwood's Pacific Command, most of them General Electric powered, sank five and a quarter million tons of Japanese shipping during the war. Two hundred and fourteen men-of-war and 1178 merchant ships went down before SubPac torpedoes. Fifty-five per cent of the Japanese tonnage afloat was destroyed by less than two per cent of the personnel of the Navy. This score was double that of carrier aviation, the next most efficient weapon with which we fought. The Japanese merchant fleet was driven off the seas, crippled by the loss of 69,000 irreplaceable seamen and officers. After the war Japanese and German admirals admitted that the stoppage of imported raw materials, coupled with the loss of supply vessels, reduced the Japanese war potential to limited defense.

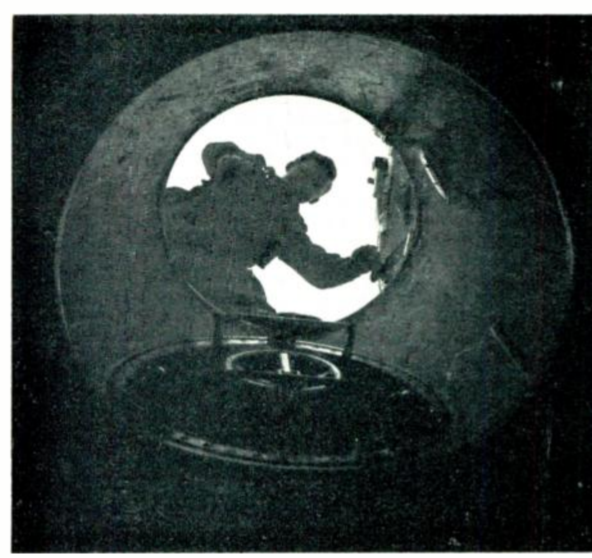
The cost of this attrition can most clearly be measured in the losses of single ship parts. Conservatively, an anchor costs $1200. Multiplying this cost by the number of Japanese merchant vessels definitely sunk (1178), the loss in this component alone amounts to $1,413,600. And most ships have two anchors!

The leaders in the sinkings were *Tautog* with 26 Japanese flags on her conning tower, and *Flasher*, which sank 100,231 tons of Japanese cargo, transport, and war vessels, both built at Electric Boat. From the records that we recovered after the war we have compiled an accurate picture of the collapse of the Japanese economy that leaned so heavily on imports. Metallic ores, rubber, and basic foodstuffs were reduced to a trickle. In achieving this strangle-hold we lost 52 submarines to enemy action. In the same time the Japanese Navy lost 130 of their subs, while during the entire war the German Navy lost the incredible total of 781.

During their 20 years of association in the construction of submarines, General Electric and Electric Boat have developed a remarkable feeling of mutual understanding and co-operation. General Electric maintained as many as 12 field representatives at Groton during the height of the war effort. The present installation supervisor, J. J. Rudesheim, started installing General Electric equipment in Electric Boat hulls during the war, and he has been there continuously except for a short period when he was with the More Power to America train.

Nearing completion at Groton is the new submarine *Trout* which is of the powerful "563" class of long-range fleet submarine. Motors, generators, controls,

A submarine makes its first public appearance when it is christened and launched. At launching time the submarine is three-quarters complete.



In groups of three the crew can escape through this hatch. They seal themselves in, partially flood the chamber, open the outer door and escape.

H. L. Johnstone, Electric Boat fitting-out supervisor, right, traditionally throws a hat over the side of all new subs for luck. Here he reviews G-E equipment data with technical representative J. J. Rudesheim.

KILLER SUB ***(continued)***

motor ventilating system, lighting equipment, and all the standard rheostats and wire to maintain these and other gear about which little can be said—all are G.E.-built. The propulsion gear was designed specially for this high-speed, snorkel submarine.

The primary mission is radically different from that of the K-boats. *Trout* is being readied for any emergency that would call for the extremes of long-range attack. It has powerful torpedo firepower, electronic sound and detection equipment, and a top speed that is known to be much faster, both on the surface and submerged, than World War II prototypes.

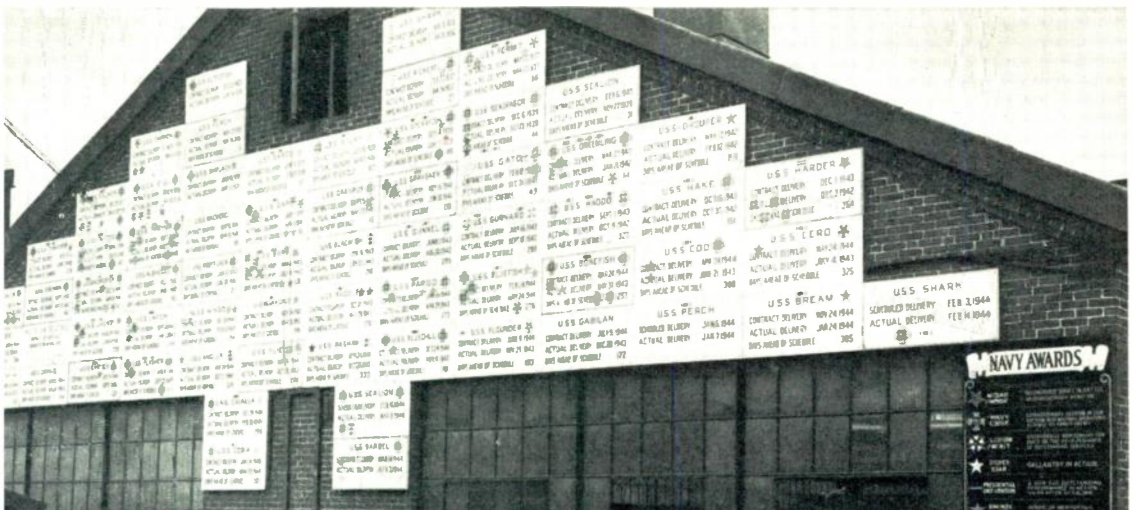
In the tripartite division of Germany after its conquest many of the German submarine experts fell into the Russian Zone. With them we also lost finished submarines and component parts of the new German "Type XXI." We have access to enough data on this very advanced boat to realize that, allowing for postwar improvements, we still have the world lead in submarines.

If an emergency calling for full production ever comes again, General Electric is ready to provide the expert technical manpower for installation of electrical submarine components as it did in the last war. Under the direction of Walter Butler, General Electric's supervisor of Marine Installation, men have been selected for emergency assignment to any port in the world. The men already in the field, like J. J. "Jake" Rudesheim and W. I. Heer, have their working experience on the newest designs at their immediate command. In General Electric's Washington Office marine experts make daily contact with the Bureau of Ships. They are ready to give immediate replies to any design or delivery questions that top-level naval designers may have. R. L. Schmidt of this office represents G.E. to the Bureau of Ships on submarine and any other naval work in which the Company is engaged.

General Electric can institute an expanded marine installation program rapidly as it did in the last war. Marine installation specialists would be given refresher courses at Schenectady, Lynn, and Fort Wayne Works. If needed, these men will make actual dock and sea trials with the crew and will take the qualification escape and survival training that the Navy prescribes for its submariners. One of the escape courses requires the men to go upwards through a 100-foot tank of water without any special breathing apparatus.

The working of an anti-submarine submarine takes great nerve control and unusual mental and physical stamina, even for the jet age. Killers will patrol waters known to have active enemy submarines. Running always under the surface, sometimes at snorkel depth, and other times at deep water levels, they constantly search the suspected waters with their electronic finders. When the search gear reports a suspicious "ping" the boat begins its stalk. All equipment is rigged for silent running. The torpedoes are readied for discharge and the target data is fed into the computer that solves the mathematical problems of range, target speed, and target position. Creeping through the water slowly and silently to escape detection, with the men motionless at their stations, the Killer closes on its enemy. When in range she drives home her torpedoes. One salvo is all the Killer gets, and one is all she needs.

With new models, of which the K-1 is but one, our submarine force is keeping prototypes of the most advanced submarines in existence constantly in commission. When and if the emergency arises, these submarines will become the parents of whole new fleets of boats. They are proving that intelligent American marine engineers can give this country the necessary edge in undersea weapons.



Eric Barr, Electric Boat security officer, points out delivery record of "Bluegill" to works manager Walter Harvey. During war, Barr skippered "Bluegill", sank Japanese light cruiser "Yubari", captured an island.

TOPS IN TOPS

General Electric's Textolite plastics surfacing wears like iron, washes like glass

Checking his tool box, Ard finds everything he will use in resurfacing his kitchen counter. He has chosen decorative pattern Red Pearl. The sheets have come from the distributor cut to approximate counter size

HOW'S your kitchen counter? Getting a little blotched and discolored, dirty and rough? Are the pieces around the faucets coming loose and letting splash seep down along the wall surface behind the sink? With a minimum of expense and no more tools and time than the average home handyman has on hand, a new heat-, stain-, and wear-resistant surface of colorful new Textolite can be fitted to any home-sized counter or table top in a Saturday afternoon.

In the "how-to-do-it" story on these pages Ard Foster and Bess Galt, of the Chemical Division in Pittsfield, Mass., show how a kitchen work area can be resurfaced easily and with a minimum of carpentership. The Textolite sheeting manufactured for this and similar installations comes in a whole spectrum of colors—solid or variegated. Patterns range from natural wood designs through opalescent to regular and modern medley patterns. One of the nice touches available in Textolite is the cigarette-proof

Photography by Jim Burns

Completely resurfaced, new sink and splashboard in place, work space has bright, tough, Textolite top.

Starting at one o'clock Ard and Bess make their measurements for the first cuts. They allow ¼ inch so the sheeting can be filed to exact size. The clocks below tell the time sequence of all important operations.

grade that makes a fine table top for extra hard wear.

Textolite, which is made in the Coshocton, Ohio Plant of General Electric's Chemical Division, is a laminated plastics sheet of layers of resin-impregnated paper, stacked to various thicknesses and pressed under heat into iron-tough plastics board. In addition to home use, Textolite sheeting makes an excellent surfacing material for schools, hospitals, industrial work benches and restaurants. It is a sturdy and decorative facing for doors.

Textolite sheeting has the plastics characteristics of lightness, low cost, good cleaning properties, and brilliant color possibilities.

By writing to room 100M, Chemical Division, General Electric Company, 1 Plastics Ave., Pittsfield, Mass., you can obtain booklet CDL-18, titled "General Electric Textolite Plastics Surfacing." This bulletin shows colors and texture patterns available and gives some interesting facts about the use of this plastics for surfacing in the home and elsewhere. The pamphlet lists Textolite retail distributors throughout the United States.

After removing edge trim, old linoleum is stripped off. The wooden top of the counter should be cleaned carefully of old adhesive and then washed with alcohol or acetone. Textolite comes with its "down" side prepared for gluing.

Getting down under, Ard scribes sinkhole cut while Bess steadies the Textolite. The sheet has been trimmed approximately to width but later will be filed down to exact size. The dimensions of a new sink may be used as the guide.

With a metal-cutting keyhole saw the rounded corners of the sinkhole are most accurately cut. For edges any metal cutting saw is satisfactory. Circular and band saws are preferred power tools. Textolite is cut with pattern-side up.

The metal sink ring is a good final gage for the interior cut-out. With the Textolite sheeting cut and fitted, the counter may be prepared for gluing with a light sanding and cleaning. Cleaned, slightly roughened surfaces give best bond.

In dungarees for the dirty work, Bess stirs the easily mixed, cold-water casein glue to take out all the lumps. Where fully waterproofed bonding is needed, any of the resorcinal adhesives that will dry at room temperature are excellent.

Spreading glue smoothly and fully on both surfaces gives the strongest bond. A brush, roller, or, as in this photograph, a metal spreader will spread the adhesive and insure an equal depth of the glue on the Textolite and on the counter.

While still tacky the surfaces are pressed together. The C-clamps fasten over a protective batten board and under the counter edge. They are then tightened until a small bead of adhesive is squeezed outward from between the surfaces.

After edge clamping, heavy weights (here ordinary bricks), are distributed over the entire surface. An even pressure must be maintained until the adhesive sets. Phonograph records and heavy-bound volumes are equally adaptable.

Those Loyal PTMers

All over the world the alumni of General Electric Test gather to recall the good old days

By C. F. TERWILLIGER
Technical Personnel Services Department

I'VE been promising myself for several years to put down a few sentences about one of the intangibles—the loyalty of some 20,000 Test men. Even with the records before me it isn't the easiest thing in the world.

Why does a young fellow go through two or three years of Test, often with a chip on his shoulder, and then for the rest of his life spend hours looking up other graduates, getting his son on Test, writing three-page letters to us about the good old days, and exchanging three dollars for a PTM key to wear to business, lodge, and church.

And with his stock of enthusiasm for Test growing more than it is spent, he collars other graduates and with them forms a chapter of PTM (Past Test Men)—and in so doing manufactures an excuse for spending hours eating, singing, boasting, writing poetry, reminiscing, and creating casual philosophical bases for living to an old age.

College leaves us with a wealth of memories, some definite, others vague and unreal. We recall the yellow and red bricks of the buildings, curving sidewalks that cut through a green campus, pretty young women walking to classes, and the thrill of football season. Every season recalls a special part of the life we had to leave behind us. These and a thousand other things we remember—making us a little sad sometimes, because we never really succeed in our attempt to recreate the old days.

It's true that Test men have their college memories, but a more integrated memory is that of their days on Test—the days when, as young college graduates, they began their creative professional careers.

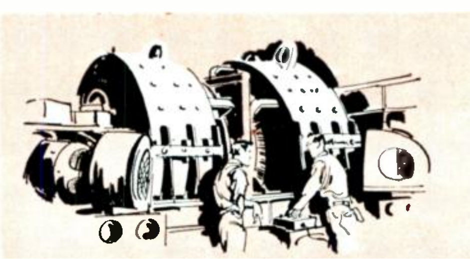
But more than the memory of work, the young men take with them the mental picture of wind sweeping down Erie Boulevard, rustling the skirts of office girls, flipping a black derby from a young man's head, revealing hair parted in the middle. One man wrote that he could remember "moustached young men from the south looking up at the hills where dark clouds rested quietly, full of snow, and the young men shivered in silent anticipation.

"Then it isn't winter anymore and the same young men take the same young ladies for evening canoeing trips down the Mohawk River. And the same stories that have been told for hundreds of years about young people are again fulfilled." It never changes.

"Test" is exactly what the title implies. Engineering graduates from colleges and universities all over the world come to General Electric to serve as Test men. Their work involves testing turbines, motors, refrigerators, lamps, and hundreds of other products in addition to attending classes.

Since 1885 General Electric has had Test graduates working in plants all over the nation. Test men have left the Company for other fields of engineering, teaching, sales, advertising, art, etc., but all of them recall with pride the work and good times they had as fledgling engineers on the Test program of G.E.

"Test" is a clinical course. From the flat plane of study emerges in bold relief the sobering sense of actuality. It is while on Test that men first experience the thrill of being in control of a piece of electrical apparatus. And the vast difference between a short circuit on paper and a short circuit in actuality is more often than not forcefully learned. But more important than anything, contacts are made with the men who are important leaders in the electrical industry. Such men as Rohrer, the mathematical genius Steinmetz, Alexanderson, and others, have been present to influence and teach Test men.



Numerous leaders of the electrical industry are PTMers. Alumni from the U.S., China, Japan, Germany, England, Brazil, and many other countries have taken knowledge gained on Test into homeland industries. But the thing that means the most to these men are the memories of friendships formed on the day and night shifts of Test, where they worked under the stern eye of such men as the Edinburgh Scotsman, Pete Mulvey.

Pete was a foreman's foreman. He was as tough as they come, and had the look of a stern schoolmaster when he peered through his black, steel-rimmed spectacles. Although tough, Pete had a heart as big as a turbine and he was as honest and fair as could be. One of the favorite stories about Pete Mulvey, told by hundreds of the men he worked with in his 30-odd years as a foreman, was how he invented the "Mulverized Brush."

Things weren't going too well one night, and commutation trouble got Pete down. Becoming vexed with the set of brushes on the machine, he took one of them out, wound up like Walter Johnson, and threw a perfect strike down the aisle of the shop, smack into a bucket of oil. Like the good foreman he was, Pete Mulvey decided he had better redeem the brush and try to use it again.

That night he baked it in the kitchen stove. When he tried it the next day it worked perfectly. After that, all brushes were treated in the same way. The "Mulverized Brush" became a subject for the conversations of posterity.

Many Test men stay in the Company until retirement. Others find opportunities elsewhere. One man left G.E. because of a strange set of circumstances. He was assigned to make high-speed sending tests, and was sent south to establish radio communication with the Schenectady Works. On and on he stayed—Schenectady became as remote as the yam gardens of an African savage. A company was formed around the southern test operation, and before the man knew what had happened he was no longer a General Electric employee, but a member of RCA's radio staff. That was a long time ago, but his testing experience has kept him a loyal and active member of the Test Alumni.

More than twenty thousand men have gone through Test—and in that number have been many colorful people—"Fat" Jalonack, "Leather" Harris, the "Castle Gang"—names which reveal something of the color of many PTMers. These men are remembered for the things they did, both sensible and otherwise.

Times have changed a bit but not the heart and spirit. Pete Mulvey is gone, along with a lot of the men he worked with. But there are other Pete Mulveys and many green hands that need guidance.

Two Test men, both Londoners, had a keen sense of competition. That fact gave birth to one of the most famous boat races ever held on the waters of the Mohawk: the Murphy-Proud paper boat race.

It was a grand Saturday afternoon. The sun was hot and the water warm on the feet of Proud and Murphy. It was the climax of a week of preparation, when both men had quit working to devote their energies to the small paper craft. Test men from nations all over the world were gathered at the water's edge. Odds were given and bets placed. The paper boats were carefully placed in the water, their sheets filling with the afternoon breeze. Someone yelled jibe ho! and in a moment it was all over.

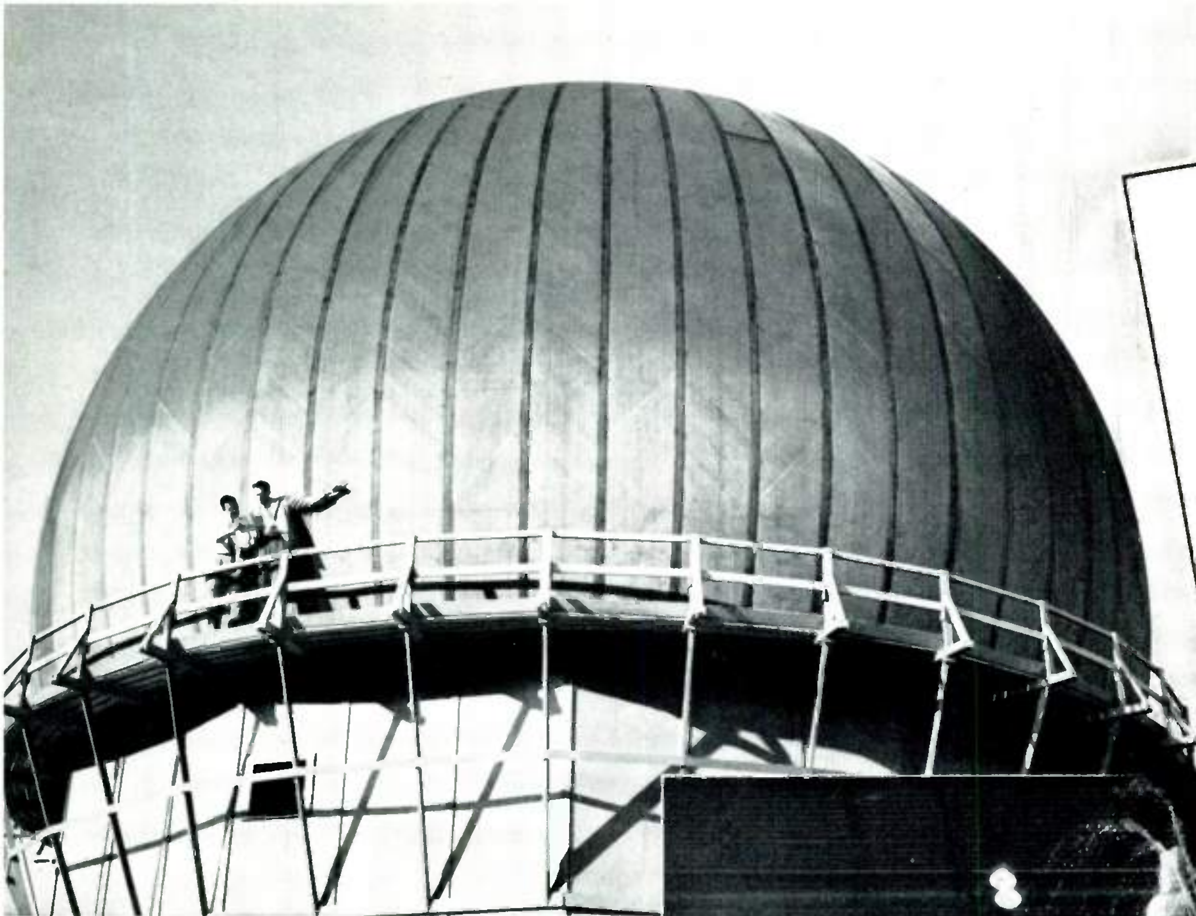
Who won? Well, Murphy won the race, the bets were paid off, and years hence people were to talk about the time a Murphy beat a Proud on the Mohawk. It's the little things that make life worth while.

It wasn't all laughter and gaiety. War came in 1918 and most of the Test men were called to the front. Four men from England, one from Scotland, and one from Australia marched into Test headquarters one day and announced their intention "to go home and fight." All six were killed in action.

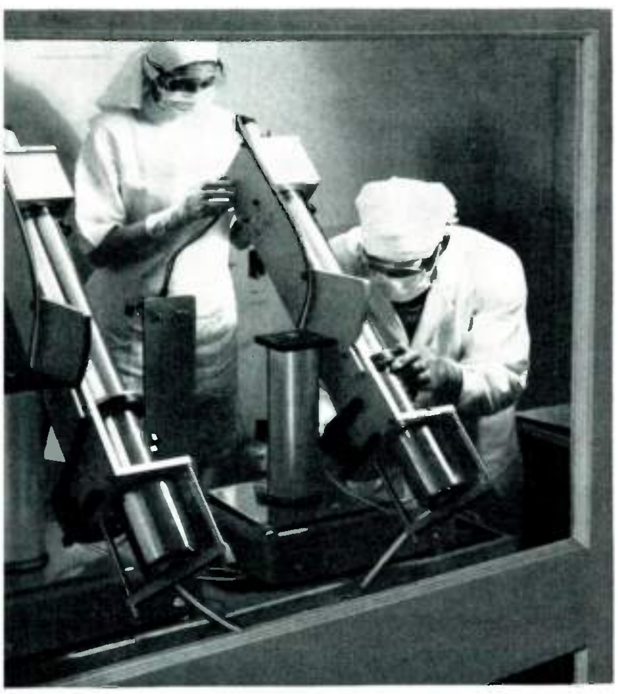
Many of the several hundred Test men who went to war remained at peace forever on Flanders Fields. And if it could be known, there are graves on islands in the Pacific, and in the sands of Africa, the earth of Italy and Germany, of Test men.

No one has ever been able to put his finger on the elusive quality which makes a group experience last in living, breathing memory. Even the men who take but a small part in the Test program find that the experience is one of the most valuable in their lives. Ask a Test Man about his General Electric experience and he'll give you 50,000 words about the glory of Test—the 67-year program in which G.E. has been testing machines and men. There is no particular need to mention General Electric's pride in the Test Alumni. The fact that Test men have distinguished themselves is of small consequence when consideration is made of the fact that a man's career is made to be a pleasant reality—far removed from the drudgery which work so often becomes.

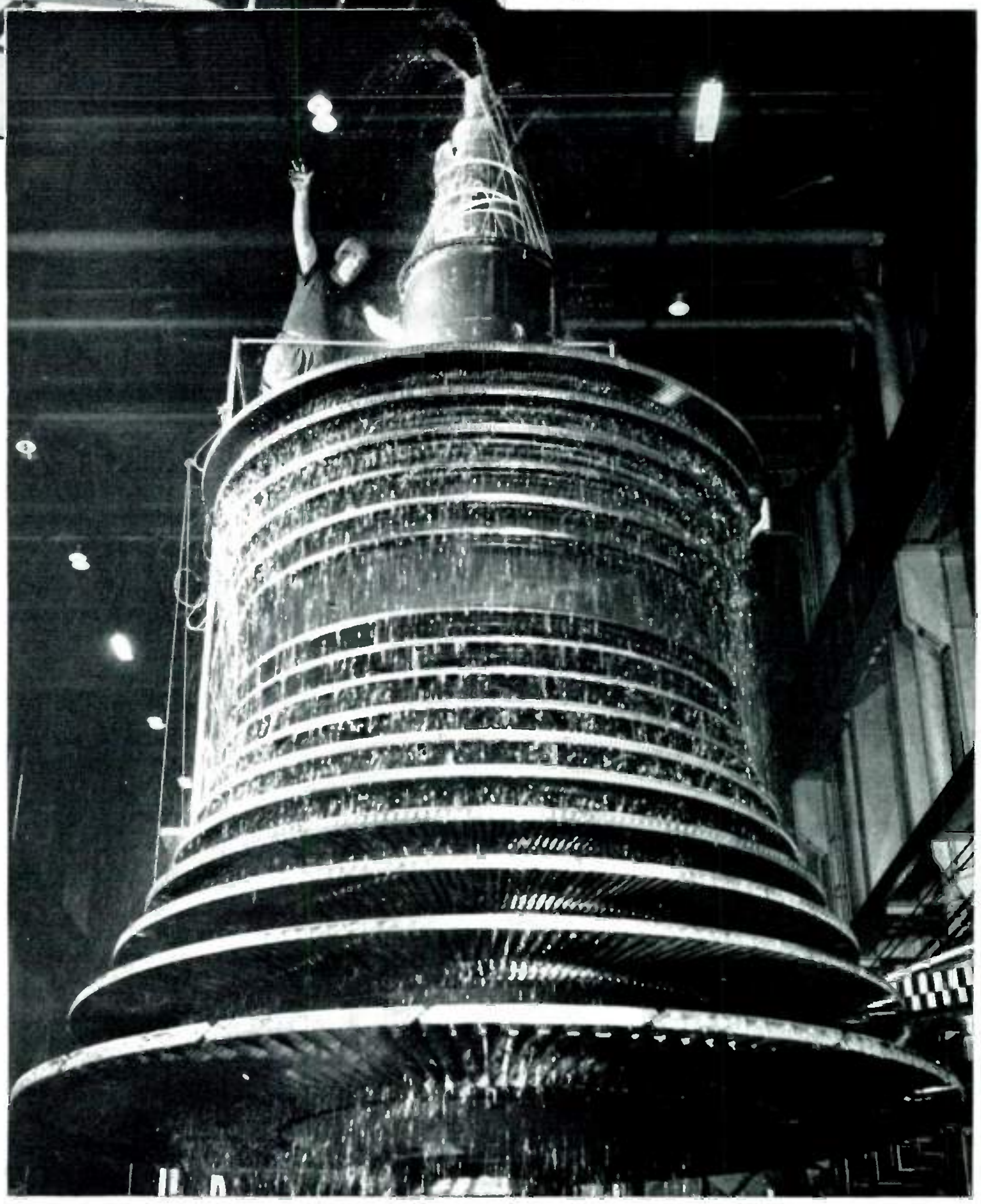
the Picture Page



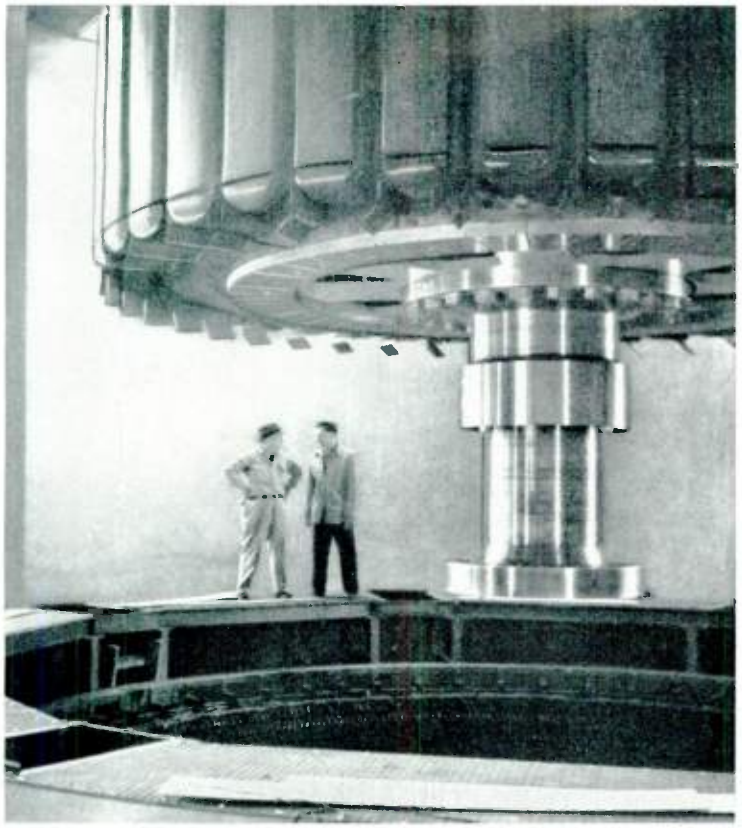
AN AIR FORCE order for the most complex radar systems ever produced has been completed at Electronics Park. Capable of detecting aircraft at long ranges, the systems are major "posts" in the radar fence protecting the U.S. and Canada against air attack. Because many posts are in the Arctic, a "radome" (above) was developed to shelter the antenna from the elements without distorting signals.



THE armed services and most civilian hospitals now require that blood plasma be irradiated by germicidal lamps before it is used. This treatment kills a harmful virus which may be transmitted through transfusions from "pooled" plasma, causing a type of jaundice. General Electric germicidal lamps are in use in the plasma irradiation process shown here, photographed at the Cutter Laboratories in Berkeley, California.



LOOKING like a huge tinselled bell, this steam turbine rotor under construction lent a festive touch to the turbine plant in Schenectady. Water cascading from the top is used for cooling purposes.



IN LEPPINIEMI, Finland, a 230-ton rotor is installed under the watchful eye of C. C. Watson, G-E service engineer, shown with a Leppiniemi power company representative. The rotor is for a 40,000-kw hydraulic generator.

GENERAL ELECTRIC and Cornell have announced a pioneer plan for educational and industrial research co-operation through the establishment of an advanced electronics center at Ithaca, N. Y. About 80 G-E people will work there. The radio telescope shown above is for the study of radio signals originating from points in outer space. Inspecting it are Brig. Gen. (ret.) T. C. Rives, manager of the center; Dr. S. C. Hollister, dean of Cornell College of Engineering; Vice President W. R. G. Baker, Electronics Division; and Dr. C. R. Burrows, director of Cornell School of Electrical Engineering.

WHEN the Danville, Illinois, plant produced its 25 millionth fluorescent lamp ballast, special ceremonies were held to celebrate the event. Miss Carolyn Rudy, former Junior Miss America titlist, was chosen to reign as "Silver Ballast Queen."

A NEW telegraph switching center is now operating in San Francisco to link 15 key western cities with General Electric's leased wire system. A total of 250 stations are now on the network, serving 110 cities. Right to left: E. I. Hibbard, head of the G-E communications system; Miss Agnes Ivy, chief operator for the new center; E. H. Nelson, aide to Mr. Hibbard.

CATASTROPHE SPECIALISTS

Jim Burns

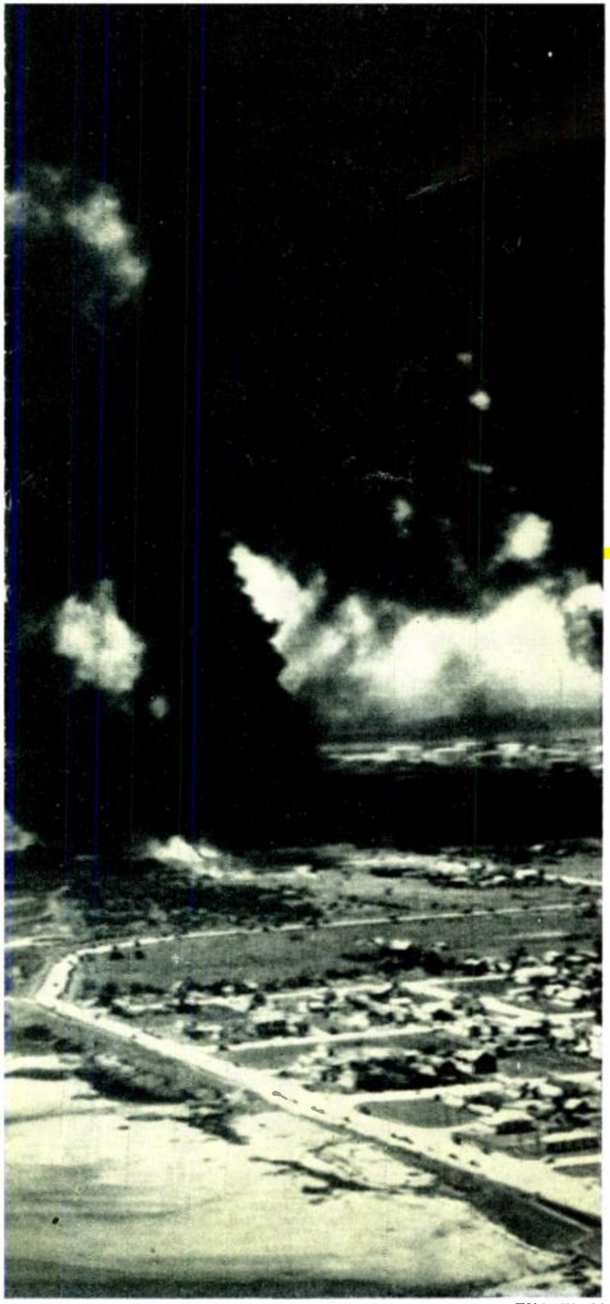
Here marine expediter Walter Butler (center) confers with aids Joe Whitaker (left) and Ernie Haig on a rush naval service job. Teletype machine brings in daily telegrams calling for rush services.

★ ★ *Whe*

IF YOU were to scan the New York *Times* or *Business Week* for full details of a major flood or national defense against enemy attack, one organization always in the news would be General Electric's service engineering group. This isn't an accident, nor are G.E.'s field engineers hungry for publicity. A basic fact in their history is their ability to cope with emergency situations.

Two interesting prongs of this effort are the marine repair unit and the service shops. Both indicate what field engineers can do to help restore damaged defense installations, public services and industrial equipment.

Should the U.S. Navy be subjected to sudden assault by a foreign power, from



Wide World

Jim Burns

Nerve center for General Electric's far-flung service shop network is Manager H. F. McCullough's office in Schenectady, where he is shown briefing two specialists for a field assignment.

By PAUL F. GAVAGHAN

ı national security or public safety is threatened, General Electric trouble shooters swing into action

100 to 138 marine repair specialists would be immediately dispatched to key ports and shipyards from Boston to Tokyo. One hundred and one of these experts in shipboard overhaul and repair are on constant call at all times, while 34 are additionally available in the event of actual military attack.

This master plan, designed to furnish repair services swiftly to ships of all classes, was devised by Walter G. Butler after a complete canvass of G-E marine personnel and an examination of naval needs. Butler, who is supervisor of marine installations for the Company, can supplement this frontline emergency force with factory specialists drawn from Lynn River, Schenectady, and Fort Wayne.

The remarkable feature of Butler's arrangement is that G.E. can duplicate the size and strategic location of its World War II marine field organization virtually overnight. Typical of service engineering's aggressive red-tape cutters, Butler is responsible for funneling specialized skills and materials from G.E. to the precise trouble point. He has an extremely broad knowledge of marine installations in port and afloat. He knows the shipbuilders, the designers and Navy officials—plus trouble of all kinds.

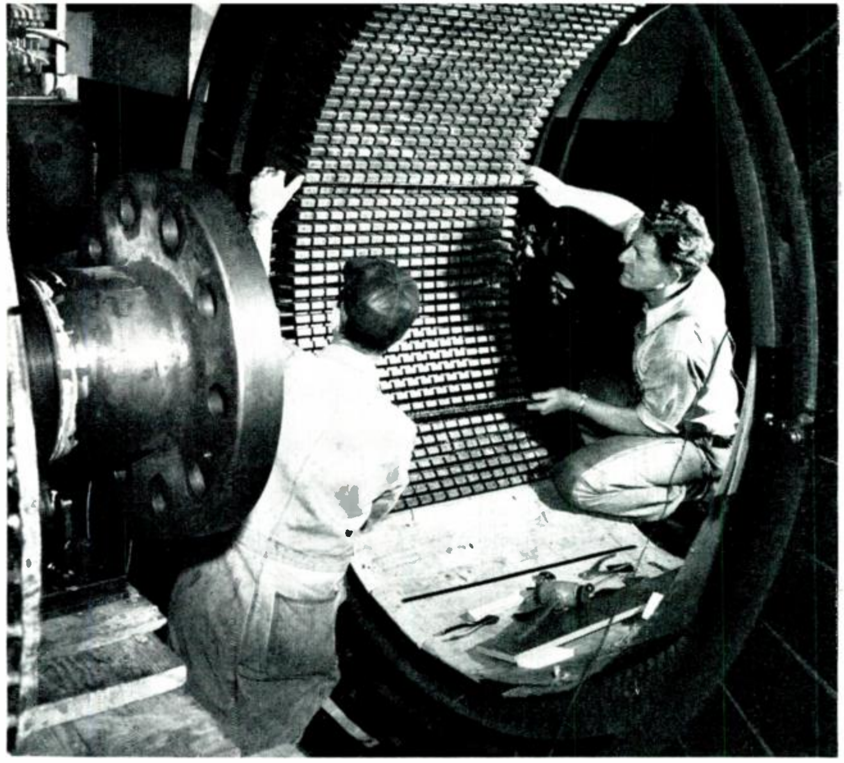
"I call it the Fire Department," Butler said, in reference to the force of field engineers at his disposal. "We're waiting for alarms every minute."

The teletype machine at his office in Schenectady brings in telegrams daily, most of them calls for rush services.

To focus a maximum amount of trained trouble shooters and equipment on endangered areas, field engineering chiefs like Butler have to wade through jungles of bureaucratic red tape—as well as distance, time and material shortages. "Expediting Navy blueprints in the last war turned my hair gray," he stated. To speed up the vital flow of paper work, Butler streamlined the approval system so that the time cycle was cut 60 per cent.

America's present state of national tension finds field engineers assigned to duty on submarines, cruisers, destroyers and the reactivated moth-ball fleet. One

After rush shipment by special truck with police escort from Indiana to Texas, this 900-hp motor is lowered to its base at a flooded Fort Worth pumping station.



A watchword for service shops is "repair." Here Bob Poole and Art Lindberg of the Denver shop carry on a 70-year-old tradition by repairing a frequency changer.

CATASTROPHE *Continued*

marine engineer is currently testing Brazilian destroyers, as part of the over-all hemisphere defense effort. These marine field engineers are required to help train key Navy personnel in operating and maintaining G-E marine machinery, in addition to their normal duties of installation and testing. The volume and urgency of their work will be more than quadrupled if our Navy is attacked.

However, even the most elaborate master plan and the most wide-ranging field force would be ineffective without accurate information to pinpoint needs as they arise.

To supply this factual basis, a central directory is currently being compiled by Joseph Whitaker at Butler's headquarters. This massive piece of documentation will list all naval and merchant vessels which have G-E equipment aboard. It will be available to all field engineers for ready identification of any mauled ship and its equipment. Since General Electric has major propulsion machinery on over 1000 merchant vessels and over half the warships in the U.S. Navy, such a master register will offer detailed information for helping craft in trouble.

Ernest Haig, also of Butler's section, has the responsibility of scanning all reports on repair and overhaul of naval vessels. After obtaining comments from engineers and manufacturing groups concerned, he compiles the information and sends it to marine superintendents at various ports.

In addition, G.E.'s marine repair specialists will have extra tasks ahead, since a major number of Uncle Sam's capital ships were built by other American suppliers according to G-E design specifications.

Time has been the ancient enemy of field engineers. In many cases advance planning can eliminate this factor. However, emergency situations rarely renew themselves in the same pattern, and the complementary risk of commercial loss or military danger adds to the urgency of their work. Both the lordly battleship and the workhorse tugboat have departure-and-arrival commitments to meet. Failure to meet such obligations means that crucially needed firepower or hauling strength will not be available at the proper time. Butler's staff is ceaselessly forced to devise new methods to conquer the unexpected.

There is a story connected with almost every marine field engineer, most of whom have had colorful experiences and amazingly active careers. Philip Flaig, for instance, well remembers the four-year period in his life when he spent one week out of every month underwater in a submarine.

Of course, military emergencies aren't the sole preoccupation of service engineering personnel. Nor does the marine repair unit have a monopoly on defense repair work. General Electric's nationwide group of service shops has been in business since 1882, serving the nation's civilian and military needs. Next year will mark the 70th year of service by these shops, with notable results in public health and safety to stud their record.

"G.E.'s service shops have handled almost every type of public disaster," said H. F. McCullough, manager of service shops. And they have—with fires, floods, tidal waves and other major causes of breakdown for public services as their collective enemy. Service shops strike directly to the core of widespread trouble as soon as an emergency develops, devoting particular attention to hospitals, water pumping plants, sewage stations and auxiliary facilities.

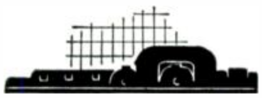
McCullough's men are veterans of the Pittsburgh, Cincinnati, Fort Worth and Kansas City flood disasters, to say nothing of the Texas City explosion, the Connecticut River rampage and the Rhode Island tidal wave. This kind of catastrophe experience stretches back into the Thirties; it explains how General Electric has so vastly improved and standardized salvaging techniques and time-cycles.

"As soon as possible, we try to set up auxiliary power facilities and keep them running day and night," McCullough said. "In the event hospitals are affected, we're responsible for seeing that the light, heat, x-ray and ventilation equipment are restored to service and we restore refrigeration power to milk and blood banks.

"Many cities are situated below sea level. When a flood occurs, service shops have to keep the sewage pumping stations working. Otherwise the sewage returns to its source, contamination results, and you've got an epidemic on your hands.

"Water pumping stations are obviously important—in terms of a city's or area's health. They're one of our primary responsibilities.

"To do any important job for public rehabilitation, I won't hesitate to draw on our regional personnel. When Texas City blew up, I called in specialists from all over the Southwest. On the other hand, the Kansas City flood required help from all over the country."



The Kansas City disaster affords a prime example of how service shops supplied fundamental needs: power, heat, ventilation, water, sewage disposal. G.E.'s flood disaster teams were the first on the job, with the permanently located Kansas City service shop already operating when the flood began. McCullough supplemented his on-the-scene group with field engineers, mechanics, armature winders, factory technicians and design personnel. He mobilized a major organization within a week, selecting key specialists from Philadelphia, Pittsburgh, Johnstown, Pa., San Francisco, Dallas, Houston, St. Louis, Denver and Baltimore.

Service engineering didn't rush haphazardly into the Kansas City situation. First, experts toured the stricken area and determined the scope of the damage to facilities. Secondly, these specialists set up a disaster timetable, whereby critically needed facilities could be restored according to schedule.

Thoroughness in planning and execution enabled General Electric to save 94 per cent of the flooded electrical equipment which passed through its shop facilities. The most important machinery was cleaned and dried out within three weeks after the flood's peak. During this time, more than 1000 pieces of flooded apparatus were returned to operation.

Also, to bolster the record-shattering performance of its pioneer service shop in Kansas City, the Company established an additional repair shop.

A telegraph tracer system provided step-by-step control of each trainload of apparatus shipped from G-E plants and warehouses to the flood area.

Asked for a ground rule estimate by the National Production Authority, G-E field engineers calculated that 90 per cent of the flooded equipment could be salvaged. This estimate was made within two days after the flood's peak, when pessimism as to the salvage possibilities reigned in rehabilitation councils. It was accepted by the NPA and served as the basis for allocations during the city's emergency materials program.

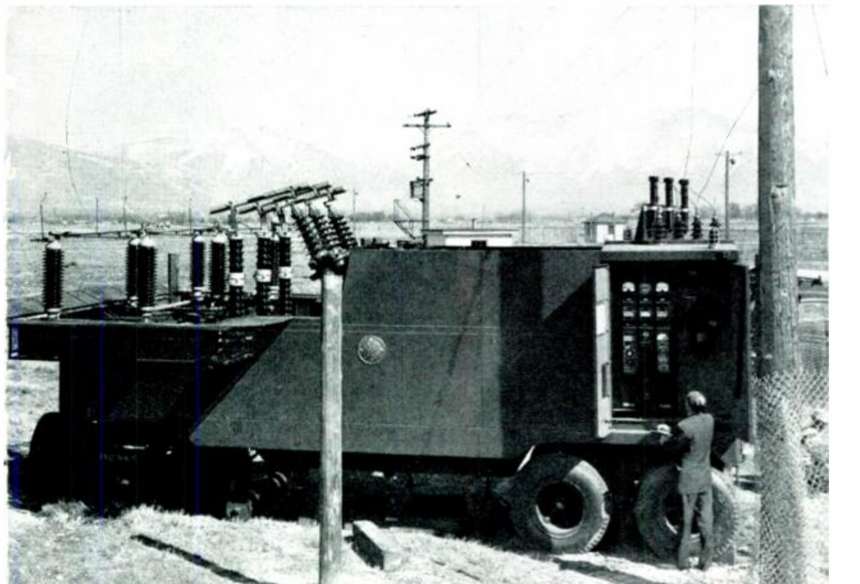
Key industries won't be the only prime targets of enemy A-bombers in any hypothetical future conflict. Subway systems and irrigation projects will also entice hostile bombardment, in view of the chaos that would result if either were knocked out. G.E.'s service shop personnel are and will be involved in projects as geographically remote as these.

At the present time, a sizable staff of service shop technicians is constantly doing maintenance work on New York's subways. Their first responsibility is to keep the underground cars moving. If their work never ceases in "peacetime," it could be hugely complicated by aerial attack, as might be imagined.

Irrigation projects are vitally important to the Southwest, both from the monetary viewpoint of drought-stricken farmers, and that of urban populations dependent on regular crops. McCullough regularly assigns engineers to keep irrigation water-pumping machinery in order, thereby serving a vast and unknowing public.

At the present time, there are two jet engine service shops maintained by General Electric in the United States. One is at Strother Field, Arkansas City, Kansas. The other shop is at Los Angeles. However, the entrance of G.E.'s group of national service shops into aviation engine repair will be more marked within the next few years. Despite this, overhaul and modification of turbosuperchargers go on regularly in Los Angeles and New York, and similar work is done on fire-control systems at Dallas, Los Angeles and Seattle.

Both Butler's and McCullough's organizations indicate the major role service engineering will play in any future catastrophe that might affect our national defense or public services.



This G-E mobile unit substation owned by the Utah Power & Light Company can bring electric power swiftly to areas isolated by distance or disaster.

Preliminary steam cleaning of a 500-kva transformer was done thoroughly and without delay during the peak of the flood in Kansas City last summer.

General Electric engineers W. E. Herrmann and J. S. Hickey (above) devised a unique test for the Type H leak detector. When Herrmann built a new home and installed radiant heating, he wanted no leaks. He filled the system with a mixture of Freon and air under pressure and used the leak detector to find defective joints. Another new application for the detector was made at the Zep Aero & Breathing Equipment Co., Los Angeles. It was used to find halogen vapors inside aircraft oxygen tanks which the company repairs and reconditions. The tanks, used by crews and pilots of jet aircraft, must be free of contaminating halogen.

Make 'em Feel at Home

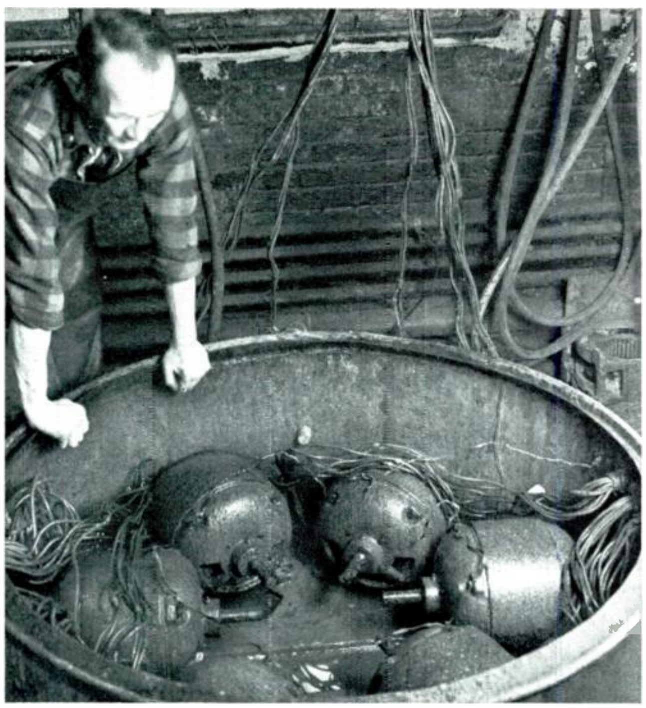
Hundreds of G-E products are tested under actual conditions before they reach the customer

PEOPLE in Erie, Pennsylvania have grown used to seeing locomotives, bearing names in strange languages, running back and forth on a narrow-gage track outside the city. For years General Electric's locomotives have been given tests under normal operating conditions on these test tracks outside the Erie Works. Today, it isn't uncommon to find all kinds of General Electric products, from irons to locomotives, being tested in actual use all over the world.

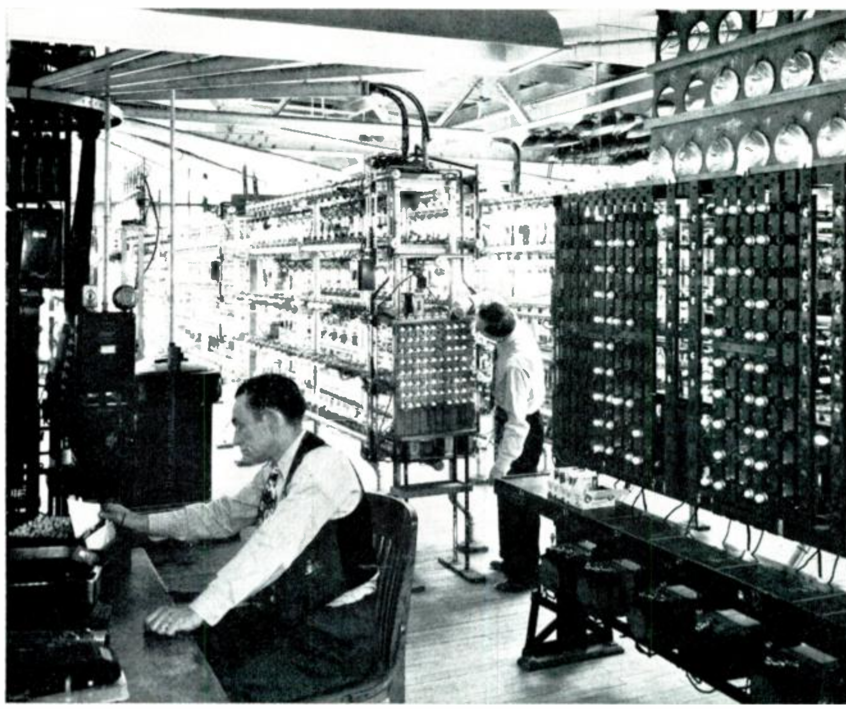
Last winter, for example, the Air Conditioning Division sent room air conditioners to Venezuela. There they were installed in homes to test their performance in extreme heat and humidity. Winter in Venezuela is the hottest, most humid time of the year.

These in-use tests are in addition to the regular laboratory tests to which each General Electric product is subjected before being put on the production line. Generally speaking, a product is lent to an individual or company. It is put in actual operation, often with two or three General Electric engineers also on the job. Careful checks are made on the machine's operation and reports are kept for designers' and engineers' reference back at the factory.

Some in-use tests are simulated because it would be impossible to conduct



At the Lynn River Works, induction motors are inspected after a simulated life test in a salt-spray tank, to determine the ultimate endurance of their insulation. The motors are chosen at random off the assembly lines. Then they are subjected to one of the worst possible combinations of conditions and operated until they fail. They are continually exposed to a two per cent salt-water spray while operating on a duty cycle of three minutes on and seven minutes off. These repeated voltage surges impose greater stress on the insulation than would continuous operation.



Incandescent lamps, chosen at random from production lines in General Electric lamp factories across the country, are tested in the Lamp Department's "Proving Grounds Laboratory" at Nela Park, Cleveland. This panel contains sockets for over 12,000 lamps of all types and sizes. Voltage is controlled by electronic devices to within 1/10 of a volt in 120-volt circuits (the voltage used in most homes). In this simulated in-use test, burning time is recorded by automatic time recorders. Life test racks burn day and night on a regular schedule and are constantly patrolled by veteran inspectors. Tiny differences mean a lot. Life tests show up the fact that microscopic variations in only one of the 20 to 30 parts in a lamp can greatly undermine performance.

them on an actual working basis. Paints, made by the Chemical Division, are tested on boards planted in the heart of the Schenectady Works where dirt and chemical fumes are at a maximum. Small fractional-horsepower motors are given a salt-spray bath approximating that which they might receive in actual use aboard a fishing vessel.

Small appliances are tested by a panel of 3000 housewives who use them in their homes and send weekly reports back to General Electric concerning their workability, as well as suggestions on design improvement. At Telechron Department various employees are lent electric alarm clocks to use at home. Through this in-use test Telechron engineers know the effects on clocks produced by open windows, hot radiators, and household dust and dirt. In all cases very complex questionnaires are filled out by the person using the clock and returned at the end of specified periods.

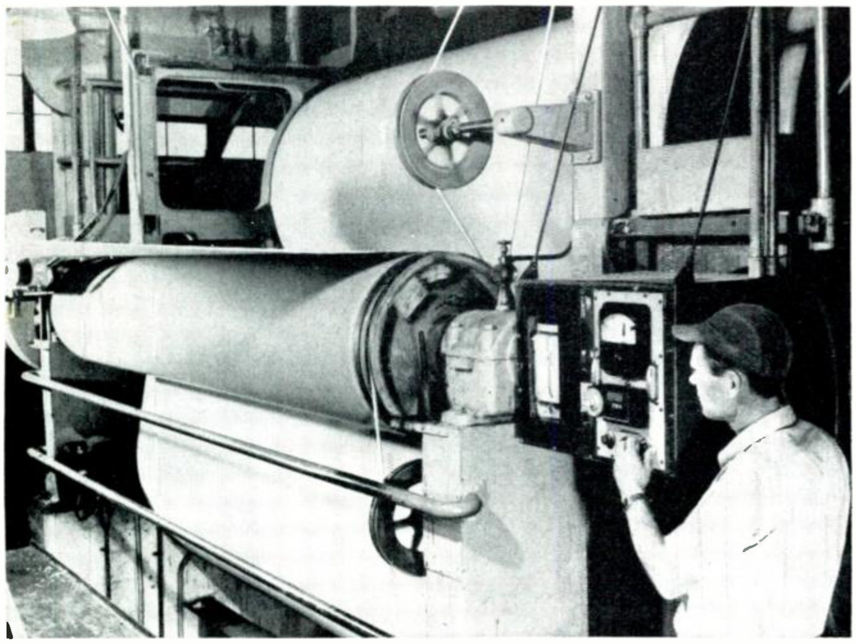
It would seem a fairly easy job to test small products in use, but even a gas-turbine locomotive wasn't too large to be tried out this way. For nearly three years the locomotive was "on test" on the Union Pacific Railroad, where it was used to haul freight over the Rockies and through the deserts of the far West.

In the last MONOGRAM, the story of the Flight Test Laboratory in

(*Continued next page*)

B. F. Roberts signals to W. K. McNutt from the top of the 85-foot tower at the Control Engineering Laboratory in Schenectady. The tower, built to test crane hoist equipment under actual working conditions, has a 70-foot free lift and a test load weight which can be handled in increments from a quarter ton to 22½ tons. All operating characteristics can be readily studied. The brake used on the hoist is of two-shoe, two-magnet construction designed three years ago and tested on the tower in a few days. Equivalent field tests would have required weeks. At full-speed lowering, a 15-ton load can be stopped in 1½ seconds. A 20-ton truck, traveling at 50 miles per hour, requires a distance of 110 feet to stop.

After more than a year of routine laboratory tests, the Carboloy Department's "Live-Spiral" masonry drills were put in the field. Chicago was selected for the tests because construction firms there use a coarse, washed stone as aggregate in mixed concrete, a condition which gave rise to early customer complaints. The material was tough and hard to drill and could either make or break the drills, which are an adaptation of coiled spring and cemented tungsten carbide tips on ordinary steel masonry drills. Difficult construction jobs were selected in the area and Carboloy supplied "Live-Spiral" drills to contractors on a no-charge basis. G-E engineers teamed with contractors' laborers to carry out the tests.



An operator checks a beta-ray gage developed by General Electric and installed here on a 136-inch paper mill at the Fibreboard Products Corporation in Antioch, California. The beta-ray gage was on display in an "Electrical Wonderland Exposition" on the West Coast when General Electric's sales engineers saw a possible place for it in the Fibreboard Corporation. They borrowed the demonstrator from the exposition and installed it on a test run basis. Results justified the ordering of a complete individual beta-ray gage for the corporation. High accuracy in weight of the paper board must be obtained because of critical tolerances of the folding machines used in the process of manufacturing containers for such foods as milk and other dairy products.

Frost covers the casing of the military x-ray unit made by the X-Ray Department as engineer Reimann Stroble lifts it from a refrigerator where it has withstood temperatures as low as —50° F. Following a thawing-out process the tube was operated to determine whether the extreme cold had had any effect on its operating efficiency. This climatic test is only one which the tube must undergo in order to be sure that it will withstand the rugged transportation and storage conditions of military service. It is also given a "heat test" during which it operates at temperatures up to 125° F.

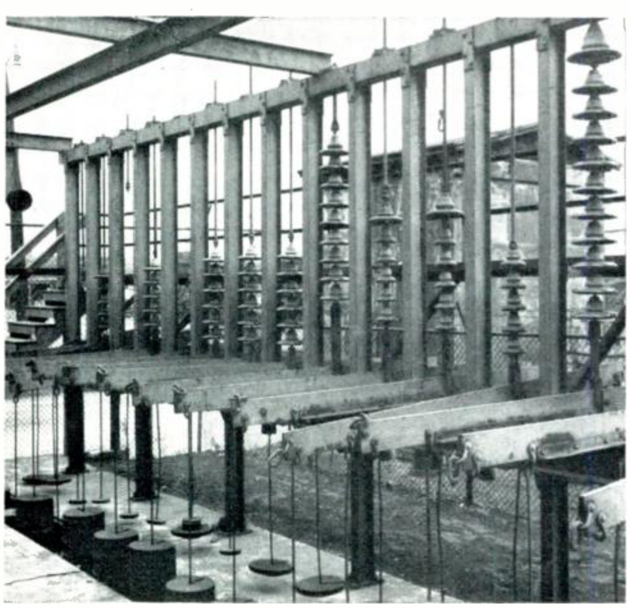
Make 'em Feel at Home *continued*

Schenectady described what is probably the Company's largest in-use test operation. Jet engines and aircraft equipment of all types are tested in actual operation at the Laboratory.

Why try out products in use when there are laboratories of all kinds where they are tested in the development stage?

As everyone knows, a mechanical device, no matter how small, proves its worth or shows its idiosyncrasies once it has been put in use. Management receives all kinds of reports on products during the development stage—reports on design, finance, how much each product ought to be able to stand under stress and strain. But only by these in-use tests can the Company be sure that a product does turn out maximum performance.

Because of these tests, when you buy a General Electric product, you can be sure that it has been thoroughly tested for a maximum of dependability under normal home or factory use.



The Locke Department in Baltimore, Maryland frequently runs an unusual type of test known as a "time-load" test on its suspension insulators. Locke recommends that the maximum load imposed on an insulator in service should not exceed half of its rating (an ultimate mechanical and electrical strength of 15,000 pounds). To make certain that the maximum recommended working load will be met with an adequate margin, a string of insulators is put in a test frame and a load of 6000 pounds is applied. This is increased at the rate of 1000 pounds a day until the total load is 10,000 pounds. This load is held for 10 days. Then the insulators are placed in testing machines and pulled to destruction to see if the test caused any lowering of the mechanical and electrical strength.

Wiring a barn, or any surface job, has been greatly simplified by Monowatt's "Surf-A-Line" plastics wiring devices. Tests were run under closely simulated farm conditions. Dust and moisture, which are ever-present in barns, were built up between two "hot" points and a normal 115 volts run through. Arcing occurred, lasted momentarily and stopped. Because the bases of these devices are made from urea compound, heat generated by the arcing dried out foreign matter and left no permanent track. After several days of this forced testing, the urea insulation still showed no signs of tracking and the device continued to operate perfectly.

It's one thing to pull into a gas station and order five gallons of gas—but it's another thing to refuel high in the clouds, where General Electric has hung

Traffic Lights in the Sky

A directional lighting system is installed on a Boeing B-29 tanker to help in the job of refueling bombers in mid-air (top photo). Special sealed beam lamps were developed by the Lamp Division for this purpose. Red and green lights are automatically triggered by microswitches connected with the boom.

IT IS a dark night and through the great tunnel of the Boeing B-29 can be heard the subdued drone of the engines. Outside in the blackness only a few stars shine bright overhead, and below there is nothing except earth, all quiet and dark.

The radio operator listens carefully for contact with a North American Jet Tornado.

"This is Air Force Such-and-Such. We're right behind you, closing in."

The jet moves forward and upward, closer and closer to the B-29.

In the rear of the tanker a tall man with a baseball cap shoved back on his head takes position in the boom-operator's pod in the tail of the airplane. He runs a checkout on the boom, "flying" it from side to side. Then he speaks.

"Boom operator to tanker pilot—boom station is ready for refueling operation. Are you ready to make contact?"

"Roger."

"Boom operator ready. Start moving in."

The slip-away doors atop the Jet Tornado fuselage amidship are already open, exposing the receptacle into which the fuel will be driven under pressure. The man with the baseball cap reaches for it with the telescoping boom.

"Come forward five feet. Forward four, three, two . . . Hold it. I'll make contact on the count of three."

The nozzle of the boom slides the final few inches along the slipway atop the Tornado and contact is made. In a moment the fuel is being pumped in and the G-E "traffic lights" take over.

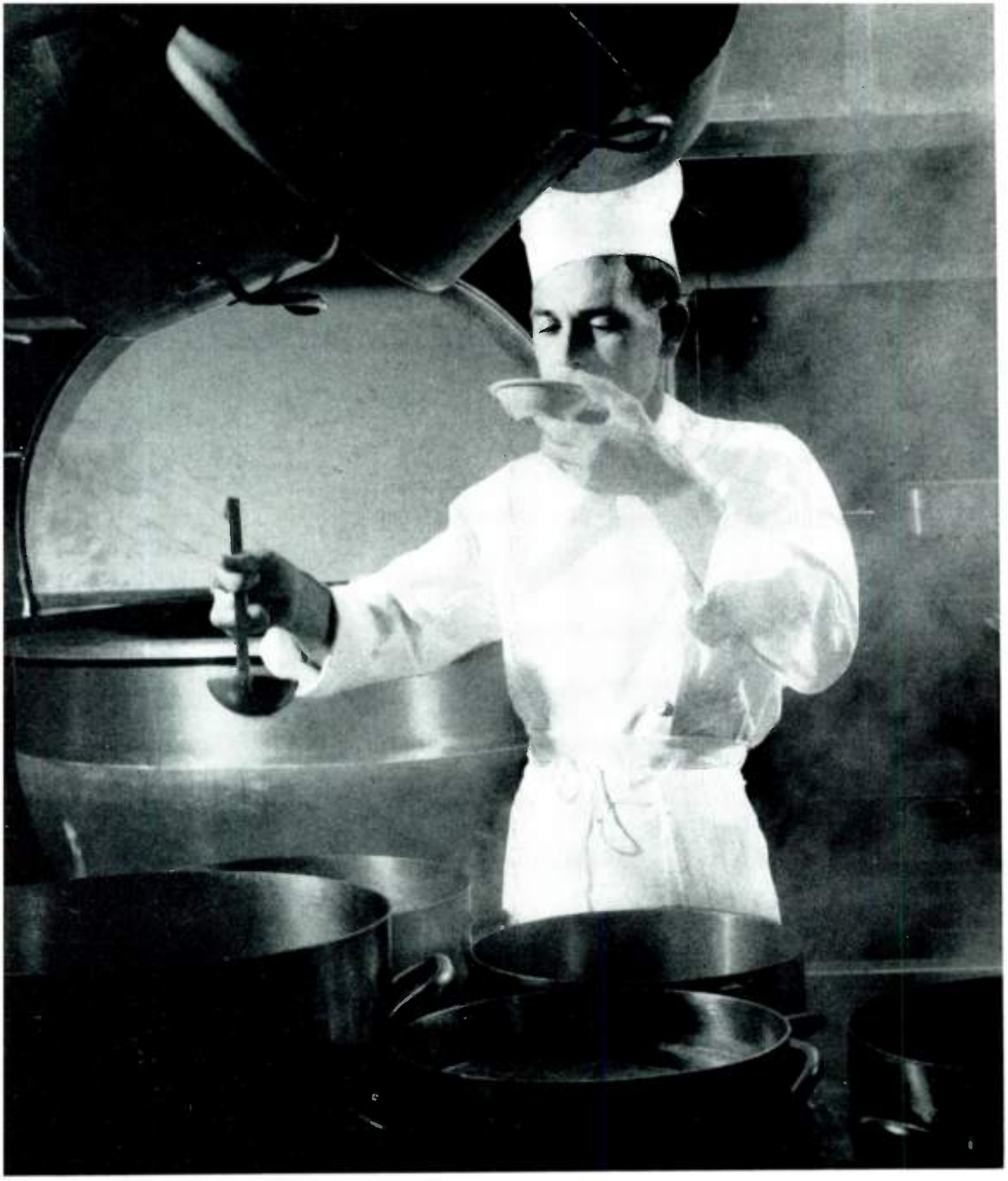
"Contact is made," the man tells the jet pilot. "Now follow instructions from the pilot director system."

The pilot of the Tornado looks through the glass over his head and then, suddenly, a light flashes on, and letters appear in the blackness: "UP."

Now the pilot moves his plane slowly. The "UP" light goes out and another comes on: "FWD." He moves his ship forward until the light goes out and a green light flashes on to tell him that he is in position.

Soon the jet is refueled and released. Its pilot places his hand on a small knob, and within seconds the planes are separated by miles of darkness.

On the tanker the telescoping tubes are secured and the plane, lighter now, turns in a slow arc and heads homeward.



Expert chefs prepare lunch for Electronics Park employees. Nearly 175 gallons of soup are made daily.

Where do we Eat?

When you set up business outside the city, your noon-hour habits may change

The glass-walled restaurant seats 130. Here, along with good food and fast service, diners enjoy a pleasant view of the Park's spacious grounds. A 15-cent charge for table service eliminates tipping.

K. A. McClenathan has the responsibility of seeing that the Park's 10,500 employees don't go hungry.

For most men and women in business the lunch hour has its own familiar routine: a quick walk or a short ride to a favorite restaurant, a hurried lunch, and a prompt return to the office. Or, if the meal is simple enough and the service fast enough, there may be time to squeeze in an errand or two before the hour is up.

But here and there across the country a change is appearing in the noon hour's well-established pattern. Industry is going rural. More and more, industrial plants are being built beyond the outskirts of city or town.

Today, many of General Electric's plants are located, or are being built, just outside town. The Lockland jet engine plant with 5000 employees, Appliance Park outside of Louisville where some 16,000 people will work, the Research Laboratory built a few years ago on a hilltop near Schenectady—these are a few examples of the new trend.

When business moves to the country, the time-honored custom of hurrying to town for lunch becomes a thing of the past. The noon hour assumes a more leisurely air. There's more time for the main business of eating, no rush to crowd in errands or hasty shopping. But how do they fare for lunch, these people who can't get to a public restaurant?

To find out what happens when mass hunger sets in at a big plant in the country, the MONOGRAM visited Electronics Park, eight miles from Syracuse, where every noon 10,500 employees get just as hungry as anybody else.

The pictures on these pages indicate that the food situation at Electronics Park is well taken care of. You have your choice of eating in the cafeteria, the restaurant, or a snack bar. For special parties there are two private dining rooms.

Each day, between the hours of 11:30 and 1:00, some 1100 people are fed in the cafeteria, 100 in the restaurant, 50 to 100 in the private dining rooms, and another 5000 at the seven snack bars throughout the plant. The remainder bring their lunch from home.

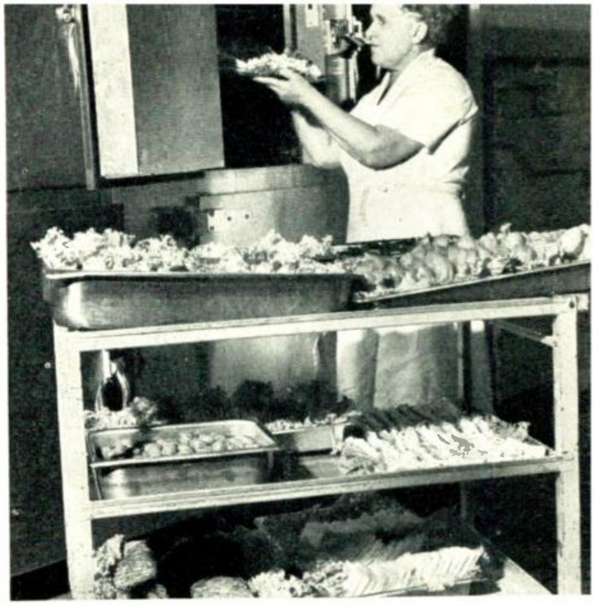
This big business in food is handled by Nationwide Food Service, Inc. of Chicago, a concessionaire for such famous eateries as the Senate restaurant in Washington and the Metro-Goldwyn-Mayer cafeteria in Hollywood. Nationwide has a total of 135 operations across the country—at shipyards, airports, and some of the nation's largest factories.

Running the Park concession is K. A. McClenathan, whose job it is to see that good food is bought economically, prepared tastefully, and served fast. To do this he has on his staff 44 full-time and 39 part-time employees.

Each Friday McClenathan makes out a staggering grocery list, to be delivered on Monday. The amounts of food ordered sound like a housewife's nightmare: a ton and half of meat . . . 150 pounds of butter . . . 140 pounds of coffee . . . 25 bushels of carrots . . . 90 pounds of frozen peaches—the list sometimes stretches to as many as 300 items. Certain things, like milk and ice cream, are ordered daily.

For 83¢ you can get a hot meal like this in the cafeteria: roast beef, oven-brown potatoes, spinach, rolls and butter, cherry jello with whipped cream.

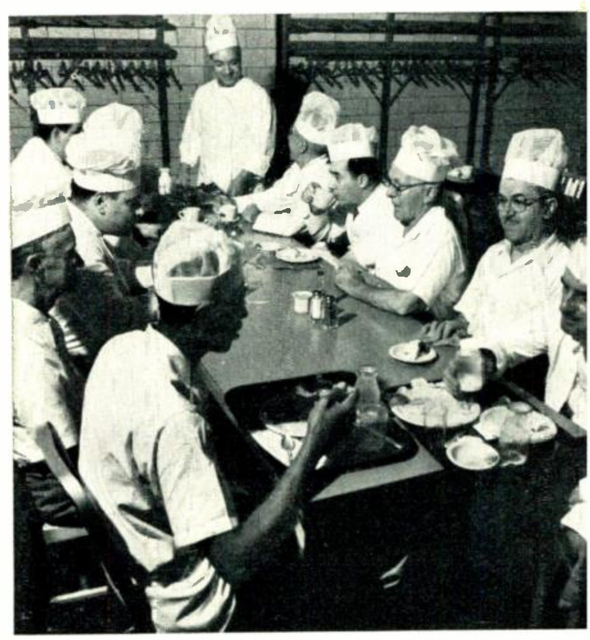
Photography by Jim Burns



An appetizing cartful of food is prepared for the smorgasbord, which is served every Tuesday in the dining room. For $1.25 you can eat all you want.

Head Chef Bill Pelligra stands beside enough roast beef to feed a family of four all winter. Park employees will consume it in one noon hour.

Elizabeth Bertalli is expert at baking fancy cakes. Employees may order them for special occasions.



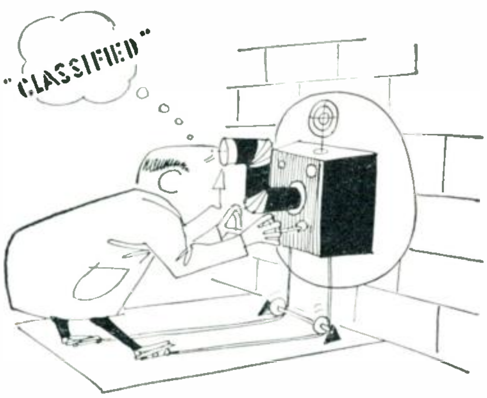
Proof of the pudding: when the last customer has left, chefs sit down to enjoy their own cooking.

KEEP UP with General Electric

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

Atomic scientists have added another tool to their kit. A new device now makes microscopic study of deadly radioactive materials—heretofore an impossible task—possible.

The new instrument is a combination of special microscope, camera, periscope, and an illuminating system, in such an arrangement that light can get in and out through the test chamber's thick walls, but dangerous radiations from the radioactive specimens are completely blocked.



Mechanical hands, similar to those developed by General Electric, permit atomic researchers to work in complete safety.

In using the microscope, which extends into the test chamber, an operator places the specimen on the microscope stage. Looking through a single eyepiece, he employs the remote controls to get the specimen adjusted and properly focused. Then the visual eyepiece is exchanged for a photographic one, and the camera is swung into position to make the specimen photograph for leisurely study.

* * *

In a nation which has in the past year seen the worst floods of its history, it is a little difficult to believe that the threat of water shortage can be anything but a wild dream. But it's no dream.

To do something about it, General Electric made "Pipeline to the Clouds"—a color movie dealing with the nation's water supply. It is another in the Company's More Power to America series.

The movie dramatizes the importance of water to the individual and his community, outlines the need for immediate action to combat potential water shortages and to assure safe, adequate supplies.

To emphasize the message of "Pipeline to the Clouds," camera crews of producer Raphael G. Wolff's Hollywood studio ranged from the sunbaked wastes of Death Valley to the mountain streams of Vermont. The film outlines the toll wrought on municipal and national water resources by a rising population, an expanding industrial front, and the world's highest standard of living.

For a remedy the film prescribes expanding water supplies, improved water quality, modernized water works equipment, expanded distribution systems, and construction of water works facilities in communities where none exist. It is available at reproduction cost to industrial and civic leaders who are interested in campaigns to improve local water conditions.

* * *

It taxes the imagination, but banks of infrared heat lamps are now being used to dry water-soaked athletic fields.

The first major use of heat lamps for this purpose was at the University of California's Memorial Stadium last year, before the Stanford–California football game. It had rained for 10 consecutive days. Mud was ankle-deep in many places. The field had never been in worse condition.

A giant helicopter blew off the surface water but the turf remained extremely soggy. Sawdust, tanbark, and burning gasoline were applied, but with little success.

Then, General Electric lighting experts suggested the use of infrared heat lamps. The proposal was adopted. Two banks of lamps, each consisting of 16 500-watt lamps in industrial-type units, were used. Drying areas of 30 square feet at a time, the units were moved every 40 minutes throughout the night before the game. By game time the field was in greatly improved playing condition.

There are many possibilities for expedient use of heat lamps in this line. The drying of tennis courts, race tracks, and other outdoor areas is possible. During cold weather, players on football benches might be kept warm and comfortable. But heat lamps should not be considered a substitute for tarpaulins, especially in rainy areas. They are, rather, useful auxiliary equipment in reducing both miserable playing conditions and postponements of games because of wet grounds.

* * *

The University of California's School of Medicine, in San Francisco, will soon have an atom-smasher that develops the most powerful x-ray beam ever generated specifically for the treatment of cancer.

The machine, a synchrotron, produces an x-ray beam of 70 million volts. With it, university scientists will conduct research in the treating of deep-seated cancer with ultra-high-energy x-rays.

The synchrotron, purchased with funds from the Atomic Energy Commission, was designed and constructed by G-E scientists and engineers. Total cost of the new cancer-fighting machine and the building in which it is being assembled, all financed by AEC funds, is about a half million dollars.

The new synchrotron will not be used in treatment of human patients for some time. Early work will be devoted to determining the effect of the ultra-high energy x rays on animals.

All possible precautionary measures have been taken to protect the machine's operators from radiation.

* * *

General Electric's television people got an unexpected testimonial not long ago. Needless to say, they were pleased.

It seems that Warren Bell, President of the Tidewater Power Company, reported that he was getting clear reception on his G-E television set, installed at his home in Wilmington, N. C. That, in itself, wasn't surprising—what was surprising was that the nearest TV transmitting station is 180 miles away! Grins of pleasure broadened still more when Mr. Bell added that he also gets Norfolk, Virginia, which is 210 miles away, and Jacksonville, Florida, a whopping 350 miles away.

Well, General Electric builds its TV sets with good fringe area reception in mind. It's proud of them, too. But we couldn't resist this story about good reception on the fringe of the fringe.

★ ★ ★

The world's most powerful wind-tunnel drive, capable of creating supersonic blasts of air, is being constructed by General Electric for the National Advisory Committee for Aeronautics. The 250,000-hp unit to be installed at the Lewis Flight Propulsion Laboratory, in Cleveland, Ohio will be used in the testing of aircraft power plants in the ramjet, gas turbine, and rocket categories.

The wind tunnel drive's individual motors will weigh about 120 tons and will be approximately 14 feet high, 14 feet wide, and 25 feet long. Control and switchgear will also be supplied by General Electric.

General Electric is also constructing a 180,000-hp wind-tunnel drive for NACA's Ames Aeronautical Laboratory at Moffett Field, California.

★ ★ ★

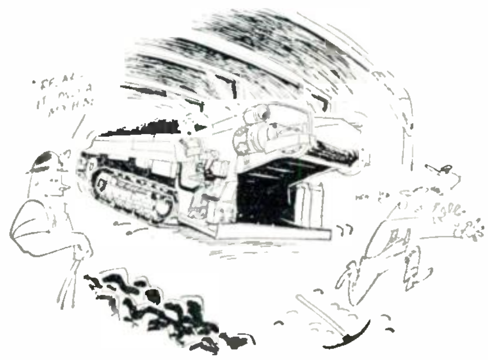
As winter's stormy blast brings drifts of snow to the sidewalks of America, husbands shout fiery invectives at the weatherman, but in the Bucyrus-Erie Company at Milwaukee, all will go on as usual.

General Electric lead-covered heating cable is being used on plant runways to keep snow from piling up and causing loss of time.

The installation, comprising 40,000 feet of the cable, covers four concrete runways, ranging from 100 to 275 feet in length and about ten feet wide. The heating cable is laid on wire mats about 2½ to 3 inches below the surface and on approximately 3-inch centers. Tile drains provide adequate run-off for the melted snow. After a week-end snow fall last winter, with the outside temperature at eleven degrees below zero, the cable cleared runways within a few hours.

★ ★ ★

A vehicle which operates like an Army tank and looks like a yawning hippopotamus has been developed by General Electric. It will be used in shuttling coal from veins to cars far beneath the earth's surface.



The shuttle car—as it is called—is powered electrically, its 600 feet of extension cable plugged into an outlet in much the same way as a household appliance. The cable is automatically reeled in or out as the car travels.

The tank-like car is loaded by miners or by automatic mining machines. It in turn transfers the load to conveyances which will bring the coal to the surface.

A distinctive feature of the car is its snout, which can be raised or lowered, enabling the machine to disgorge its load by means of a continuous conveyor belt. The vehicle can turn on a dime, carry larger loads than conventional type shuttle cars, unload faster, and is built for either left- or right-hand drive.

★ ★ ★

When, during a recent overhaul of the tanker S. S. *Mission San Carlos* at Jacksonville, Florida, engineers discovered that a vital generator part was missing, General Electric field engineers speedily phoned coastal ports all over the nation in an effort to find a replacement for the missing part. The *San Carlos* was scheduled to leave the port in three days. It was finally found in San Francisco on another ship which was due to be in port several weeks for repairs. The substitute part was flown to Jacksonville in time for the *San Carlos* to make her scheduled sailing.

A newly manufactured part was subsequently shipped from Schenectady for the benefactor vessel.

★ ★ ★

General Electric is starting a large-scale program to produce all-weather engines with "hot noses" for what is believed to be the world's fastest bomber, the Boeing B-47 Stratojet.

The icing problem encountered by jet planes has been overcome by giving the engine a "hot nose." Hot air is piped from the turbojet's compressor to hollow parts of the nose, where temperatures get high enough to melt any ice crystals forming. An additional feature is a retractable air inlet screen, designed to keep foreign objects from going through the engine while the plane is on the ground.

The all-weather engine—the first model of which is the J-47-GE-23—will give future models of the B-47 greater speed and range. Rated at more than 5800 pounds of thrust, the engine has a comparatively low rate of fuel consumption, is completely safeguarded against ice, has a special ignition system which makes possible high-altitude starts, and may be equipped with water injection for thrust augmentation.

Other Air Force planes powered by the J-47 include the North American F-86D interceptor, the four-jet North American B-45 bomber, the first jet bomber to see combat, the Republic XF-91, high-altitude interceptor, and the Martin XB-51, three-jet light bomber.

The "23" will be produced by General Electric, with the Packard Motor Car Company and the Studebaker Corporation as licensees.

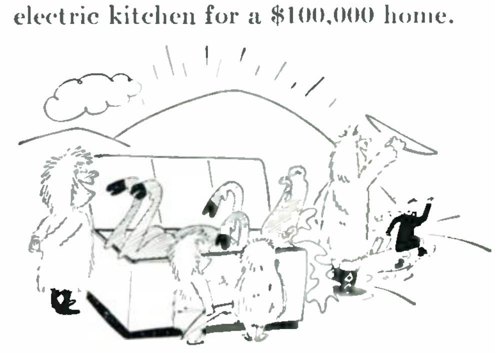
★ ★ ★

The salesman who sells lawnmowers in the Sahara doesn't hold a candle to H. A. Faroe, proprietor of the Northern Supply Company of Anchorage, Alaska. He sells food freezers, and lots of them, in a place where winter temperatures drop to 60 degrees below zero.

Mr. Faroe sold six General Electric 11-cubic-foot freezers a day or two before his recent departure for a visit to the United States. The freezers are in big demand for storing moose meat.

This super-salesman has lived in Alaska 28 years and has seen his adopted home town of Anchorage grow from a frontier village of 3000 to a city of 53,000.

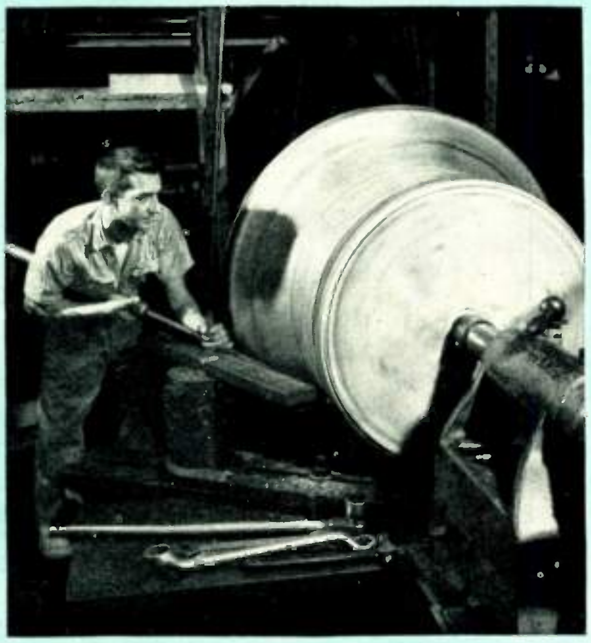
Business is good he says, although it is hampered somewhat by a shortage of trained service personnel in the northland and delivery delays caused by hard weather and long distances. In spite of these difficulties he has managed some notable sales, among them being an all-electric kitchen for a $100,000 home.



But then, maybe this is easy for a man who can sell freezers in Uncle Sam's chilliest possession.

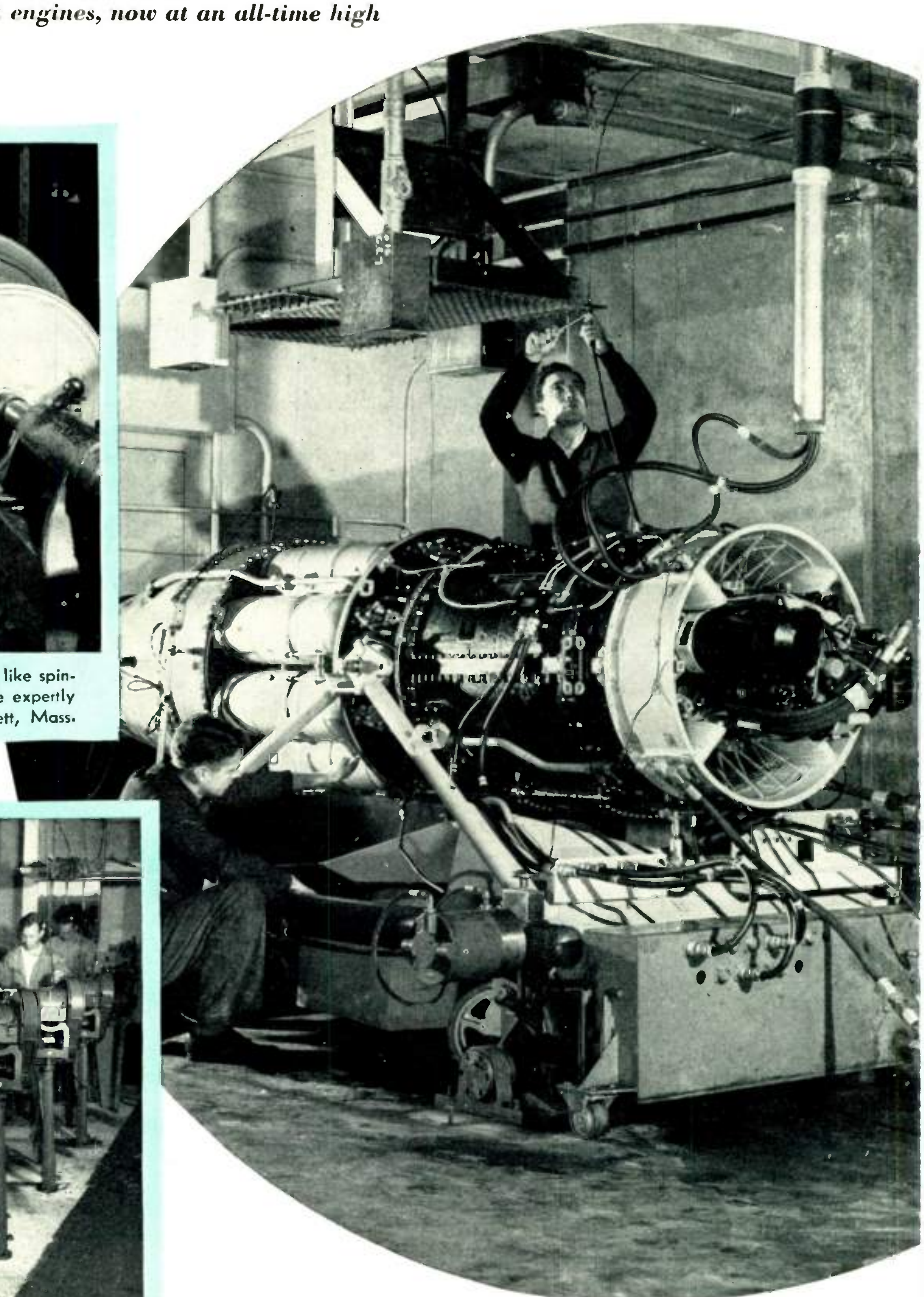
Dividing the Defense Dollar

Thousands of subcontractors help General Electric meet the demand for jet engines, now at an all-time high



Building jet engines requires special skills, like spinning stainless steel parts. Jobs like this are expertly done by the Roland Teiner Co., in Everett, Mass.

In Waterville, Maine, the machine shop of Mainair Service makes a variety of parts such as connectors, rings, bolts, etc. Mainair has a total of 25 employees.



At G.E.'s Lockland plant, jet engines are assembled entirely from component parts built to our design by subcontractors throughout the country. The "Lockland Plan" permits speedy expansion of production in case of all-out mobilization.

Subcontracting jet engine parts has boosted the number of employees of Associate Aircraft Tool & Manufacturing in Hamilton, Ohio, from 3 to 100 in the past 5 years. Here a G-E inspector visits the shop.

The know-how of the American Welding & Manufacturing Co. of Warren, Ohio, successfully solved a difficult problem in welding titanium to meet requirements of the jet program.

Very small firms such as the Norwood Pattern Works in Norwood, Ohio, contribute their important specialties. In the basement of a private home men make wooden mock-ups for development engines.

IF YOU have more work to do than you can conveniently handle, you find a capable person and pass some of the work along to him. That's subcontracting—industrial teamwork that benefits everyone concerned.

At present, General Electric is engaged in this kind of teamwork on a gigantic scale. The Company holds contracts for about five hundred million dollars' worth of defense work, involving products like radar, aircraft and shipboard armament systems, guided missiles, and jet engines. More than half of the total amount of these contracts will be shared with some 17,000 suppliers for component parts, materials, and services.

As a first-class example of how the defense dollar is spread around, take the case of the jet engine. . .

An aircraft jet engine will fit in a box no bigger than 12 feet long and four feet high. Yet this jet engine which powers America's largest and fastest military planes must house in its compact space more than 10,000 horsepower. To generate that power the engine must cope with temperatures up to 2000 F. Parts of the jet rotate 8000 times a minute; air rushes through the engine at nearly twice the speed of sound. So greedy is the jet for air that it could empty a six-room house in seven seconds.

These are astounding figures to an ordinary man, even in this age when temperatures, speeds and lives are complacently discussed in thousands. Yet, the very bigness of the figures suggests the scope of the technical and manufacturing organization necessary to design and produce a first-rate jet engine.

Who, then, builds this engine?

Ten years ago, General Electric alone was engaged in the jet engine business in America. Based on years of experience with steam and gas turbines, the Company was awarded the contract to develop and build America's first jet engine by the U. S. Army Air Corps. Now there are five companies building jets, and soon the auto makers will help, as licensees.

A handful of companies would have no difficulty turning out all the jet engines needed in peacetime. But when national security demands a big step-up in production, as it does at present, existing facilities become inadequate, and building new ones is impractical.

Then, hundreds of new people enter the picture. These are the subcontractors and suppliers, the specialists in nuts and

The first chapter in the jet story was written long before the first jet flight. Without years of research and development on rotors for steam turbines, these rotors for aircraft jet engines might never have been built.

bolts and gaskets and nozzles, the small businessmen, even the individual worker. The engine, broken down into 15 major sub-assemblies and more than 1000 minor parts and components, is subcontracted to these people.

Today, General Electric's Aircraft Gas Turbine Department uses some 4070 suppliers throughout 41 states. They run the gamut from America's largest corporations to the smallest of independent machine shops. Up in Waterville, Maine, the Machine Shop Division of Mainair Service (25 employees), which used to have the seasonal job of sharpening lawn mowers, now has the year-round job of making a variety of parts for the J-47. In Burbank, Cal., Bardwell & McAlister (415 employees) takes care of difficult machining work on stainless steel engine parts.

The main responsibility, of course, rests with the prime contractor. He must design the engine, assemble the parts, and test the completed unit. He's responsible for the delivery, performance, and servicing of the engine. He must maintain a huge staff of design draftsmen, a comprehensive testing program with extensive laboratory and test facilities, training programs for military and manufacturing personnel.

Above all, he must see that the search for new or better ways of building engines never halts. For, at the rate jet planes become obsolete, the nation could fall sadly behind if research and development slowed down for even a short time.

While jet engine production is geared directly to the need for national defense, it must be kept alive during more peaceful years, too. This duty falls to the lot of the prime contractor.

It's up to the prime contractor to supply the cadre for great expansion in an emergency. When the emergency has passed, the parent company must be able to retrench quickly without upsetting the economic situation.

All these things are considered by the government when letting a prime contract for a major defense project.

Subcontracting makes sense from everyone's point of view. Government agencies demand it to broaden the operation of experienced companies, to provide dispersion in case of attack, and to keep the small concern from being frozen out of business by material shortages. But the economic facts of life are such that even without government urging, the prime contractor would be eager to subcontract a large quantity of his business.

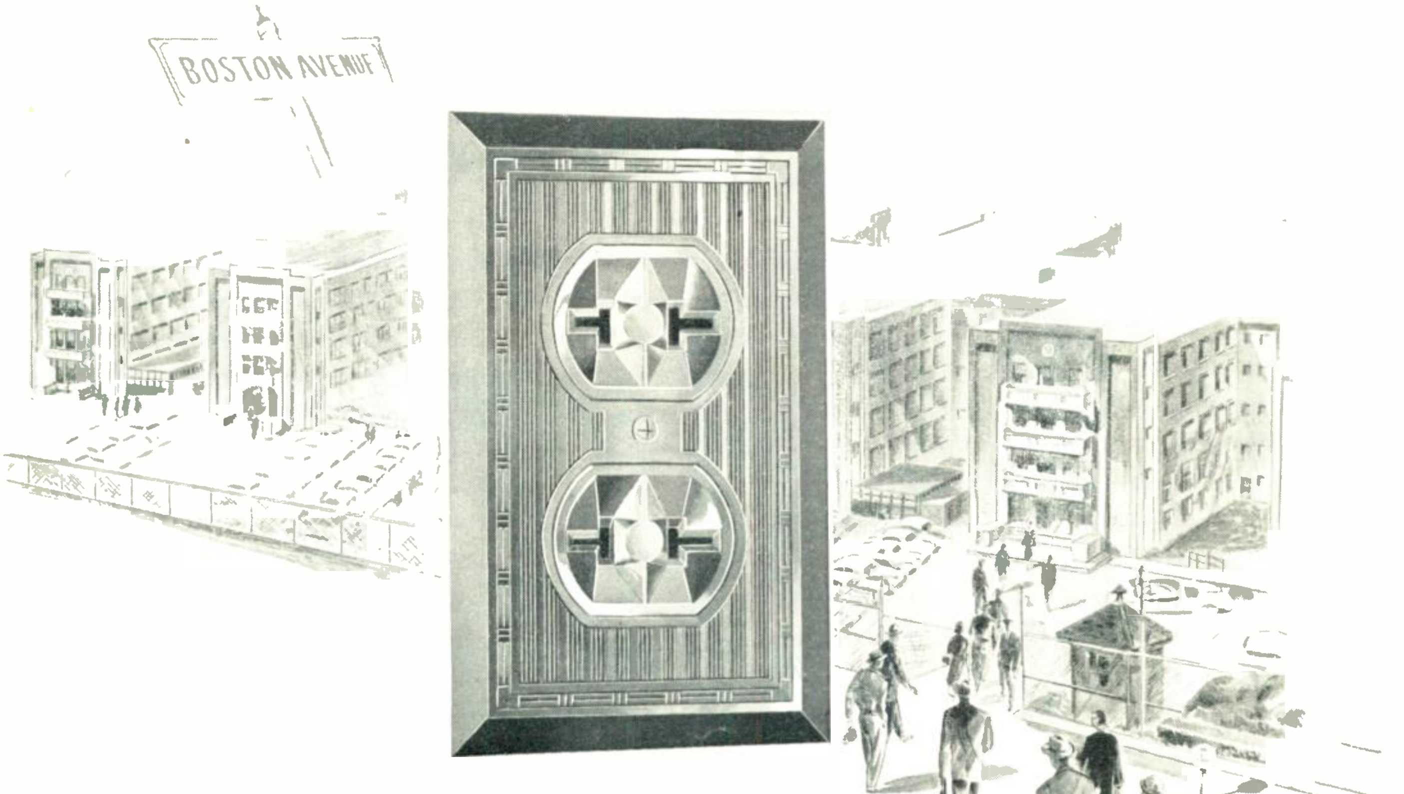
Why? Because he won't have to expand his facilities and then wonder what to do with the excess when the emergency is over. Because he won't have to spread his experienced management so thin that it's inefficient. Because he won't have to clutter up the home plant with small manufacturing operations; instead, he can use the floor space for final assembly, test or other critical jobs which call for the prime contractor's special skills or experience.

The government and the prime contractor, however, aren't the only ones who are happy about the situation. Eventually, a lot of ordinary individuals benefit from it, too. Economically, it works like this.

Out of every dollar the Aircraft Gas Turbine Department receives for defense work, 60 cents goes directly to its 4070 suppliers. The latter, in turn, have many suppliers of their own. One small supplier in Massachusetts, for instance, employs only 18 people, yet these 18 people supply business to six other concerns with a total employment of over 1000.

Thus, the defense dollar filters down until finally it reaches the smallest unit of business—the individual selling his services. And when it reaches this point it is right back where it started—in the pocket of the taxpayer.

The teamwork of thousands of large and small businesses produces the engines that keep our jets flying.



There's a bit of BRIDGEPORT behind every electrical outlet

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At the Bridgeport Works, the Construction Materials Division helps make today's — and tomorrow's — electrical power possible. For G-E construction materials are the foundation products that carry electric power into millions of homes, offices, and factories, and make it available at any time of day or night.

The Construction Materials Wire and Cable Department is responsible for the manufacture of more than 150 types of wires and cables in many different sizes for electrical and electronic uses—including much of the aerial and underground cable that carries power from electric utilities to residential and industrial users.

The Division's Conduit Products Department produces the materials that provide mechanical protection for wiring—conduit boxes and steel conduit and tubing to protect wires from damage and moisture—underfloor wiring systems that give industry new freedom of electrical availability.

The Wiring Device Department of the Construction Materials Division produces the wiring materials with which you are most familiar at home and at work. Switches, outlets, sockets, fuses, and the amazing new remote-control wiring system are produced in the Bridgeport Works to improve electrical service throughout the nation.

Behind every electrical outlet—in the long chain of electrical materials between the electric utility and the user of electricity—you'll find the products of the Construction Materials Division on the job.

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G-E CONSTRUCTION MATERIALS GO WHEREVER ELECTRICITY GOES

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