The Wisconsin engineer. Volume 58, Number 1 October 1953

Madison, Wisconsin: Wisconsin Engineering Journal Association, [s.d.]

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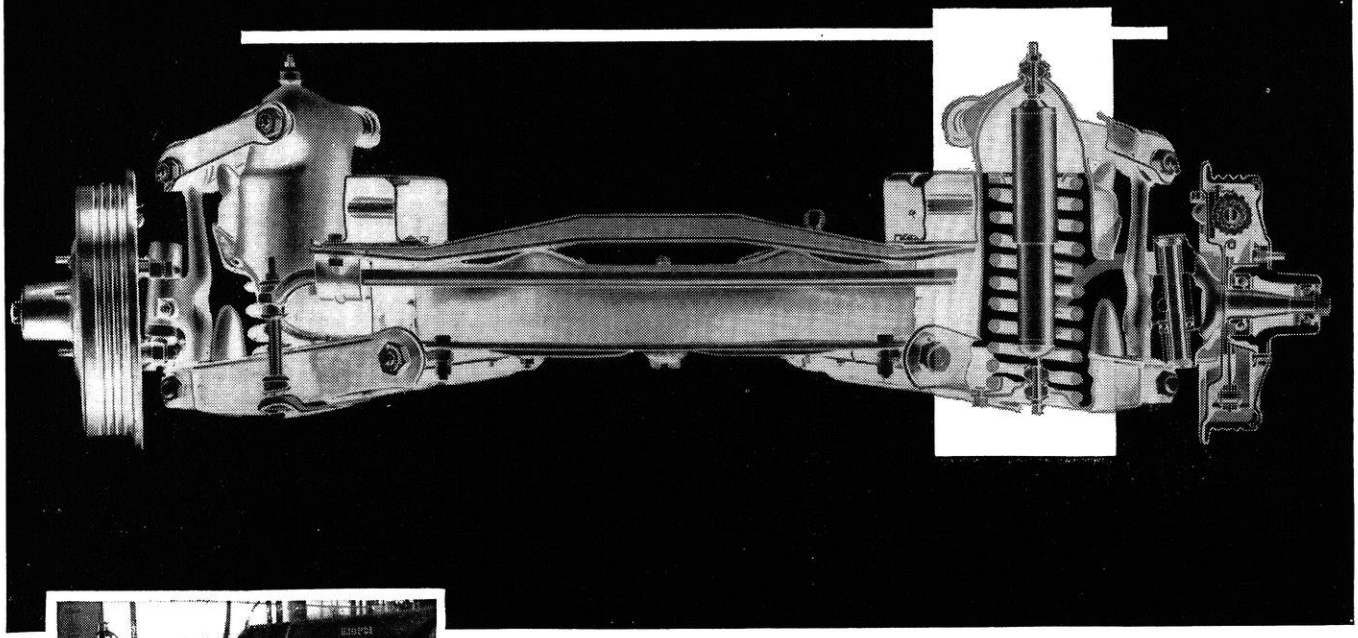
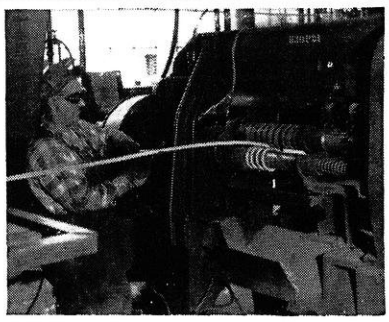
October, 195

25¢

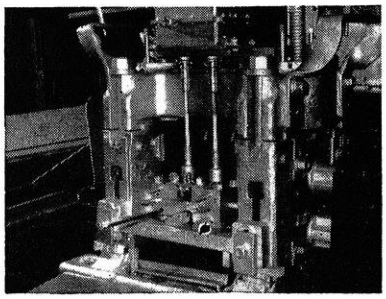
We gambled on the future

and the auto industry cashed in





● Here, at Muehlhausen Spring Division of Standard Steel Spring Co., precision-rolled U·S·S CARILLOY Spring Rounds are coiled without centerless grinding. CARILLOY Rounds have minimum decarburization, and they cost less to use.



● At the Gary Works of United States Steel, this precision mill rolls CARILLOY Coil Spring Rounds with extreme accuracy. Tolerances are half of standard: .004″ on the diameter, instead of the usual .008″, and only .006″ out of round, compared to .012″ on ordinary rolled bars.

IN the early days of the development of coil springs for front suspensions of automobiles, the only steel that was available was an ordinary hot-rolled bar from which as much as .035″ of metal per side had to be removed by grinding to insure freedom from harmful seams, pits, and decarburization. This cost money, was wasteful and time consuming.

We at United States Steel felt there was a better way of doing this, so we put our best engineers on the problem.

Using a mill especially equipped for the purpose, they devised an ingenious method of producing hot-rolled bars to eliminate harmful defects and most of the grinding expense. Rolled by this method to half the standard tolerances, with half or less the amount of decarburization, these CARILLOY Precision Rolled Coil Spring Rounds can be used "as furnished" or with only a small amount of centerless grinding.

This exclusive development has paid off in two ways. It has paid off for the automobile manufacturer in that his costs are reduced and spring performance is of the highest order. And it has paid off for us because these CARILLOY Precision Rolled Coil Spring Rounds are now used in over half of the coil springs in new automobiles.

Here's just one more example of the better steel products being developed by United States Steel's vast research program. To keep pace with the ever-increasing demand for special steel, United States Steel is always looking for young men with exceptional ability and training in metallurgy, engineering and related fields. For more information, write United States Steel Corporation, Room 2816-C, 525 William Penn Place, Pittsburgh 30, Pennsylvania.

USS

3-1817

UNITED STATES STEEL

You can't vote yourself security

THE GERMANS TRIED IT and lost their nation —the Russians pretended to try it and made themselves slaves.

You'll notice that security is always offered in return for your vote—"just a vote of confidence, so I can get for you what you want." So the worker votes for a union boss he never saw, the businessman votes for a subsidy or cost-plus government contract.

And for every inch they advance toward security, they retreat a mile toward regulation that is next to servitude.

But there *is* a way to enjoy security in America (and only in America, by the way). That is, to make yourself something the world must have—a skillful farmer, a productive worker, a sound businessman. In this country it is true that the more value you add to the world and the more you add to the world's goods, the more you will be paid in return. *That* is security with self-respect —the only kind of security Americans want.

What's on the horizon for a young engineer ?

THAT depends, of course, on where he sets his sights.

The horizon at General Motors is crowded with opportunities for the young engineering school graduate. They are opportunities that he might never discover elsewhere.

From General Motors flow an endless variety of products. Automobiles, trucks, refrigerators, Diesel engines are just a few. In addition, GM defense contracts include shells, bombsights, range finders, tanks and gas turbine engines.

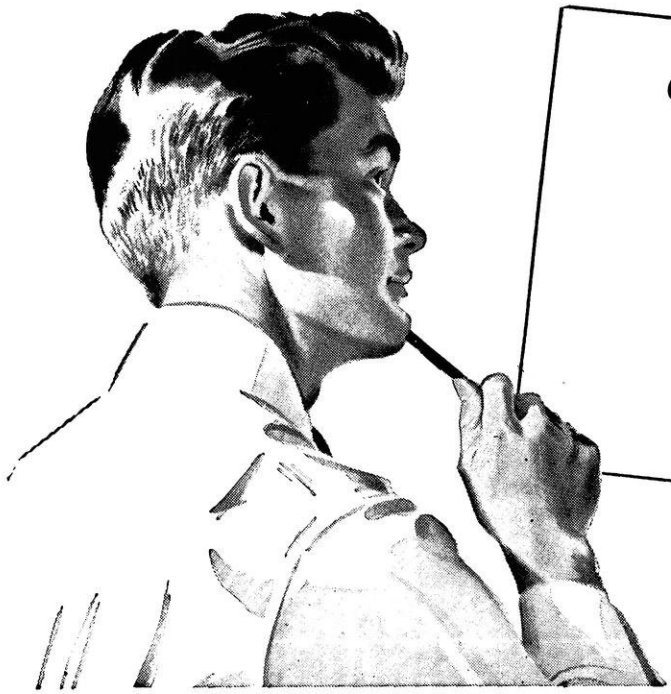
So you can see how a GM engineer has a real chance to follow his natural bent, and work in the field of his choice.

But there's another important advantage in launching your career at General Motors. All work is decentralized among GM's 33 manufacturing divisions, its 116 plants in 57 towns and cities throughout the United States. And though each division operates on its own, each can call upon the vast resources of GM's central research and engineering laboratories.

Thus General Motors, despite its size and scope, gives you the opportunity of working intimately with top engineers, of sharing their knowledge and experience.

Does the opportunity pay off? Many engineering school graduates, now in key jobs at GM, can testify that it does.

Why not check with your College Placement Office and arrange for an interview with our GM College Representative the next time he visits your campus. Or if you prefer, write direct to us.



GM positions now available in these fields

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CHEMICAL ENGINEERING
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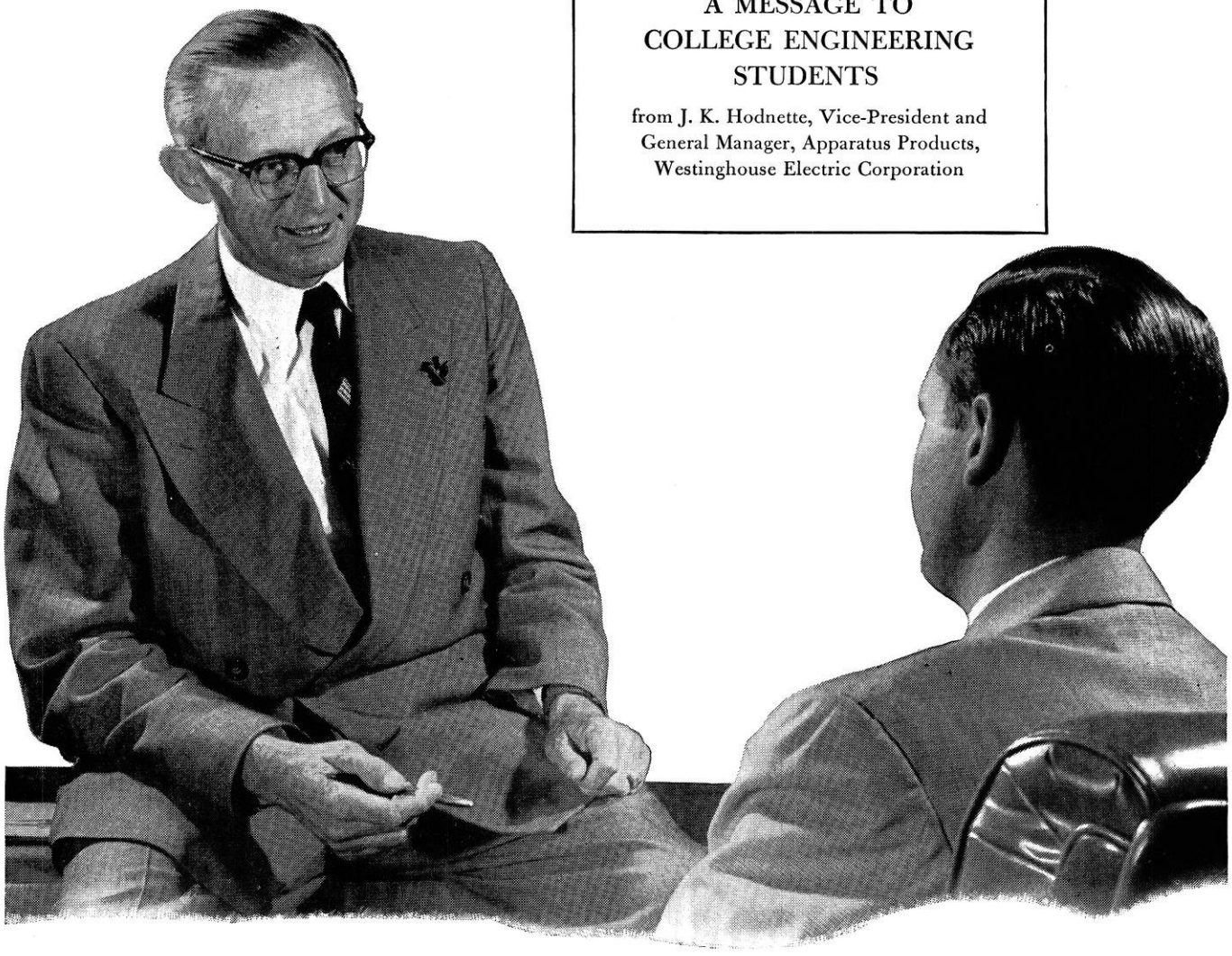
GENERAL MOTORS CORPORATION
Personnel Staff, Detroit 2, Michigan

A MESSAGE TO
COLLEGE ENGINEERING
STUDENTS

from J. K. Hodnette, Vice-President and
General Manager, Apparatus Products,
Westinghouse Electric Corporation



To the young man with a vision of success

Success means different things to different men. It can mean professional recognition, or great achievement, or exciting work, or many other things. Whatever its special meaning to you—keep its image in your mind, for you are already well on the way to achieving it!

If you are *determined* to become a research scientist, you *can* be. If you have a burning ambition to become a sales engineer, you can be. If you have your sights set on a top executive spot, you'll be there someday. One might think a large company like Westinghouse would have more pressing things to think of than the ambitions of its young engineers. On the contrary, nothing is more important . . . for our professional people are our biggest asset.

Here at Westinghouse, intensive efforts are made to help our professional men realize their individual goals —through extensive training programs, study programs leading to advanced degrees, leadership programs, and guidance in professional development. You are treated as an individual at Westinghouse.

If you have the will, and are prepared, we can show you the way. G-10271

YOU CAN BE SURE...IF IT'S
Westinghouse

For information on career opportunities with Westinghouse, consult Placement Officer of your University, or send for our 34-page book, *Finding Your Place in Industry.*

Write: Mr. C. W. Mills, Regional Educational Co-ordinator, Westinghouse Electric Corporation, Merchandise Mart Plaza, Chicago 54, Illinois.

The Student Engineer's Magazine

WISCONSIN ENGINEER
Founded 1896

In This Issue . . .

Cover

KURT F. WENDT
Dean, College of Engineering.
Photo courtesy University News Service

Frontispiece

120-ton compressor stator section for the world's largest wind tunnel being machined on a 40-foot vertical boring mill. The ring is for one of five compressors being built for the Air Force's new wind tunnel at Tullahoma, Tennessee. Holes in the ring are sockets for variable-pitch stationary blades. The compressors plus their 216,000-hp electric drive will comprise the world's largest rotating machine. *Cut courtesy Westinghouse*

Articles

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The Student Engineer's Magazine

WISCONSIN ENGINEER

Founded 1896

Volume 58 OCTOBER, 1953 *Number 1*

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This is but one example of the far-reaching chemical developments in which you could participate at Hercules—in research, production, sales, or staff operations. It suggests the ways Hercules' products serve an ever-broadening range of industries and end-uses.

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Sales Offices in Principal Cities

EC53-6

An Exciting Past Foretells A Promising Future

WE don't need a crystal ball to foretell the future of any young engineer who finds his place in the family at Goodyear Aircraft.

For Goodyear's forty-four-year history has been one of teamwork with the aviation industry in forging new frontiers—utilizing the widest scope of engineering talents.

Here is America's only producer of both heavier- and lighter-than-air craft—builder of a wide range of aviation equipment which includes guided missiles and the electronic equipment which controls them.

Here has taken place research, development and production of metals, plastics, devices and structural designs not only for aircraft—but for many far-flung fields as well.

From it came the first use of Duralumin in the construction of aircraft, and the development of many of the processes now used in shaping and forming metal structures.

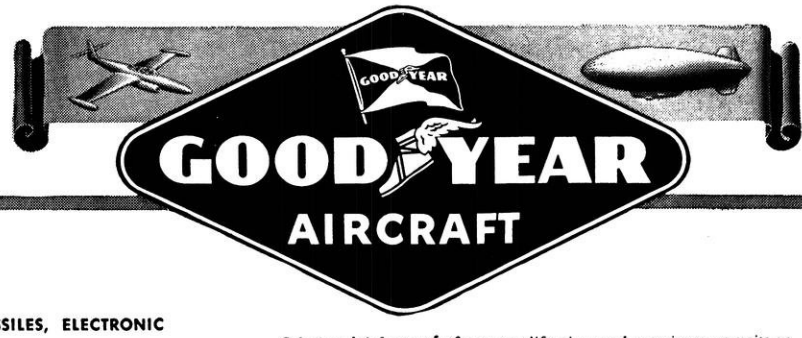
From it came honeycomb structures with the strength of solids, electrically transparent enclosures for jet radar—and the radar itself—enclosures that must withstand 600-mile-an-hour raindrops.

From it has come complete airships, airplanes, fuselage shells — and countless aircraft components for practically every member of the industry.

All this and more has been made possible by the talents of young engineers who have come to Goodyear Aircraft because they have found it a good place to work — *with future assured and opportunities unlimited.*

This is true because Goodyear is one of America's basic industries—a place that will always be doing business, come defense, war or peace.

Where will you find a broader, surer opportunity?

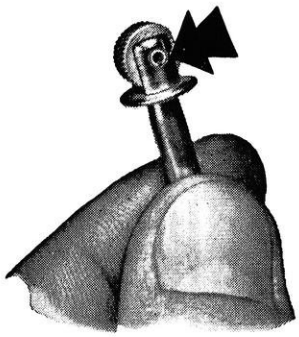


ENGINEERS WANTED *for research, design and development of:*

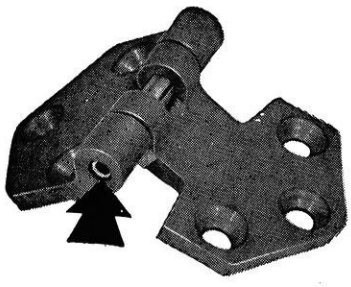
AIRPLANES, AIRSHIPS, HELICOPTERS, GUIDED MISSILES, ELECTRONIC COMPUTERS, AIRCRAFT COMPONENTS, RADOMES, WHEELS AND BRAKES, TRANSPARENT ENCLOSURES, REINFORCED PLASTICS, BONDED SANDWICH STRUCTURES, RADAR STRUCTURES and many other challenging opportunities.

Submit a brief resumé of your qualifications and experience, or write us today for an application blank and further information. Address: Dr. K. Arnstein, Vice President of Engineering, Goodyear Aircraft Corporation, Akron 15, Ohio.

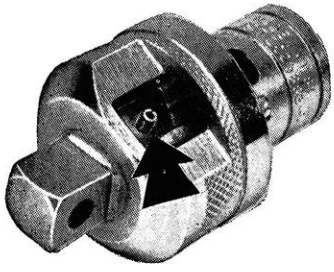
GOODYEAR—The Company with COMPLETE Coverage in the Aeronautical Field



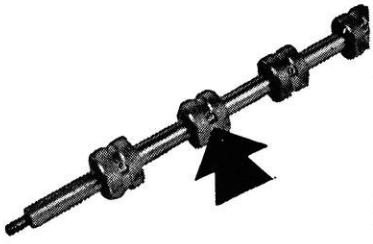
Replacing a rivet



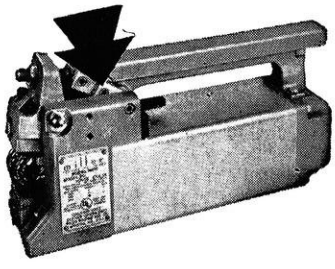
. . . a hinge pin



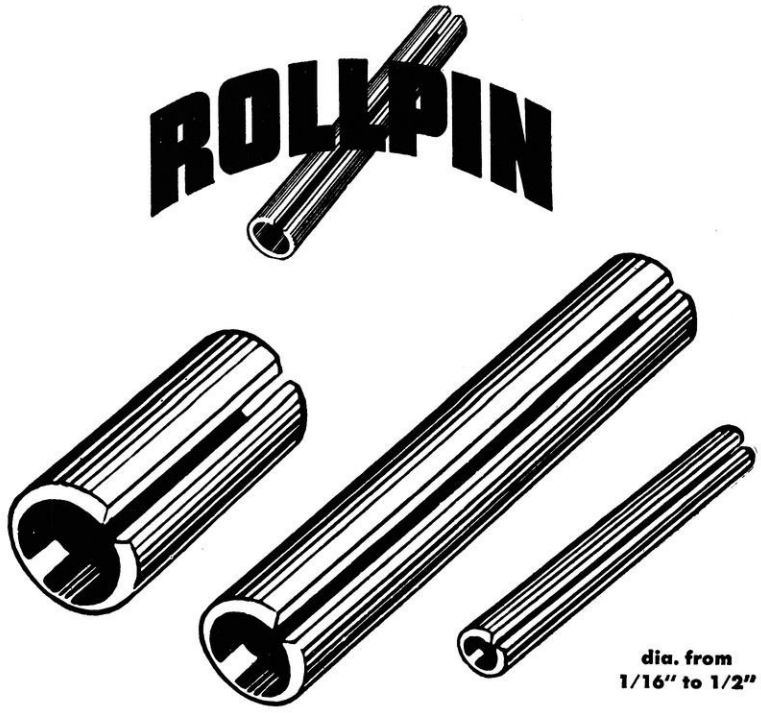
. . . a stop pin



. . . a set screw



. . . a bolt and nut



. . . a modern fastener that saves time and money on thousands of applications

Rollpin is a hollow, split, cylindrically formed pin with chamfered ends. It is simply driven into holes drilled to normal production tolerances. Because Rollpin is slightly larger than standard sized holes, it compresses as inserted. It is self-locking—and vibration-proof—because of the constant pressure it exerts against hole walls. Its shear strength exceeds that of a cold rolled pin of the same diameter. Rollpin is readily removed with a drift or pin punch—and can be reused.

Because of its versatility—and the production economies it makes possible—Rollpin is finding wide usage in almost every phase of manufacturing activity. Write for design information on the Rollpin. It will enable you to cut costs for many applications where use of rivets, set screws, dowels, and straight, serrated or cotter type pins create installation or performance problems.

ELASTIC STOP NUT CORPORATION OF AMERICA

2330 Vauxhall Road, Union, New Jersey

Elastic Stop Nuts with the famous red collar are another ESNA product

Dedication

To Dean Kurt F. Wendt, commencing his first semester as Dean of the College of Engineering, we offer our sincere welcome.

Although new in his capacity as dean, Kurt Wendt has long ago distinguished himself, nationally and locally, as an educator and a leader in many fields. After graduating from the University of Wisconsin with membership in Tau Beta Pi, Chi Epsilon, and Sigma Xi honorary fraternities, he joined the U.W. faculty in 1927. Since then, his accomplishments have included presidencies and committee chairmanships in the American Society for Engineering Education, the National Research Council, and the Wisconsin Society of Professional Engineers; committee work for the America Standards Association, the American Society for Testing Materials, and the Society for Experimental Stress Analysis. He is now the director of the Engineering Experiment Station; and he is the University of Wisconsin's Big Ten Faculty Representative. Last summer he spent thirty days in India studying technical colleges and universities for the United States Government.

To Dean Wendt, with wishes of continued success, we dedicate this magazine.

THE WISCONSIN ENGINEER STAFF

(Above) Prof. Hyland presents retiring Dean Withey (at right) with a special award for outstanding service to the Wisconsin Engineer.

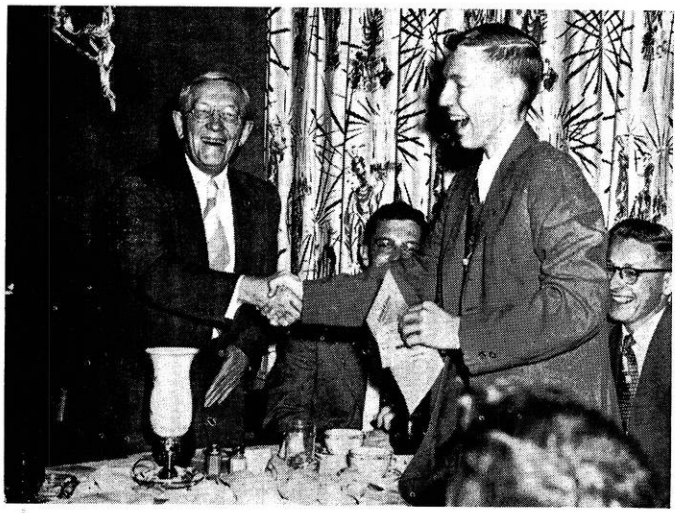
(Right) Retiring Dean Withey presents the Wisconsin Engineer Key to (from left to right) Preston Koentop, Jack Bokros, Jack Binning, Jim Chapel, and Edwin Humpal.

Each year the **Wisconsin Engineer** holds a banquet honoring the staff members. Awards are presented in each of three levels. The basic award constitutes an invitation to the banquet; the intermediate award is a **Wisconsin Engineer** certificate; and the highest award is a **Wisconsin Engineer** Key. Last year two special awards were given to faculty members for outstanding service to the **Engineer.** These pictures were taken at 1952-53 banquet last May.

Photos by Dave Dauterman

Wisconsin Engineer Banquet

(Above) Prof Kommers receives a special award from Prof. Hyland for outstanding service to the Wisconsin Engineer.



(Left) Prof. Kommers presents Edwin Humpal with the Jesse B. Kommers Award for writing the year's most outtsanding article.

Another example of opportunities for engineers at LINK-BELT

High speed "highway" for low costs

Millions of tons of bulk materials now ride on belt conveyors engineered and built by LINK-BELT

For bulk materials handling, belt conveyors provide remarkable initial economies. And in many cases operation and maintenance cost far less than any other method of transportation.

Belt conveyors handle huge tonnages, because the material runs at high speed in a continuous stream—24 hours a day, if desired.

Initial cost is low, because there is no need to carve out hills or fill in low spots —no need for heavy bridges over obstructions. Belt conveyors are light in weight and operate in narrow or low passages . . . up or down steep grades. They are inherently long-lived, requiring little maintenance.

The science of handling bulk materials is just one of many growing fields open to graduate engineers at Link-Belt. If you're near one of the many Link-Belt plants listed below, stop in for a talk. Or write today for fully illustrated booklet, "An Introduction to Link-Belt."

◀ *Link-Belt belt conveyor system at Hungry Horse Dam (Mont.) carries 900 tons per hour of blended sand and sized aggregates up a steep canyon wall to concrete mixing towers.*

12,748-D

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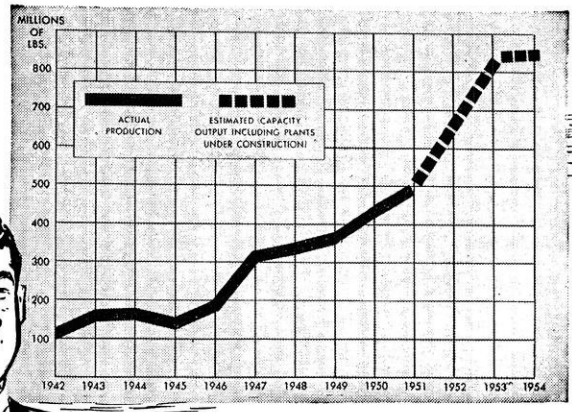
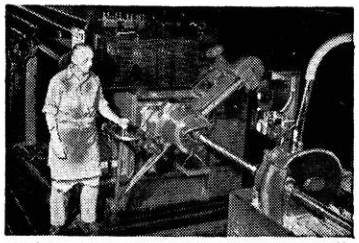


Reynolds expanding production —historic chapter in 33 years of continuing growth.

A Fertile Place for Careers to Grow...

Settling tanks, where impurities are separated from sodium aluminate



Tube drawing, one of many mill operations at Reynolds

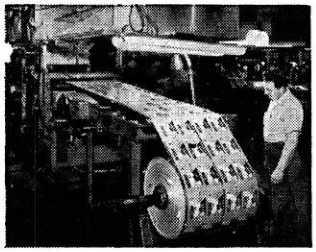
A broad vista of opportunity opens up for college graduates who come to work for Reynolds. The phenomenal rise of the Reynolds Metals Company, known throughout business and industry, is clearly depicted by the above chart. The five-fold expansion in total production of aluminum ingot alone spells broad opportunity. Add to this the vast and productive fabricating facilities of Reynolds —in themselves an enterprise of considerable proportions—and here indeed is a fertile field for any ambitious engineer.

From bauxite mining through metals refining and fabrication to application engineering, sales and marketing, Reynolds offers broad career opportunities. Operating 27 plants in 13 states, and still expanding, there is virtually no limit to what can be accomplished by a capable graduate engineer.

Preliminary orientation in production and sales... direct on-the-job training... liberal insurance, hospitalization and retirement programs... these are all parts of a sound personnel policy maintained at Reynolds.

For important information on "your future in Aluminum," *mail the coupon.* If you are definitely interested now, write direct to General Employment Manager, Reynolds Metals Company, 3rd and Grace Streets, Richmond 19, Va.

REYNOLDS ALUMINUM



Foil—for many uses, including colorful, protective packages and labels; also famous Reynolds Wrap.

Full color movies tell the fascinating story of Reynolds Aluminum. 16mm films available for group showings.

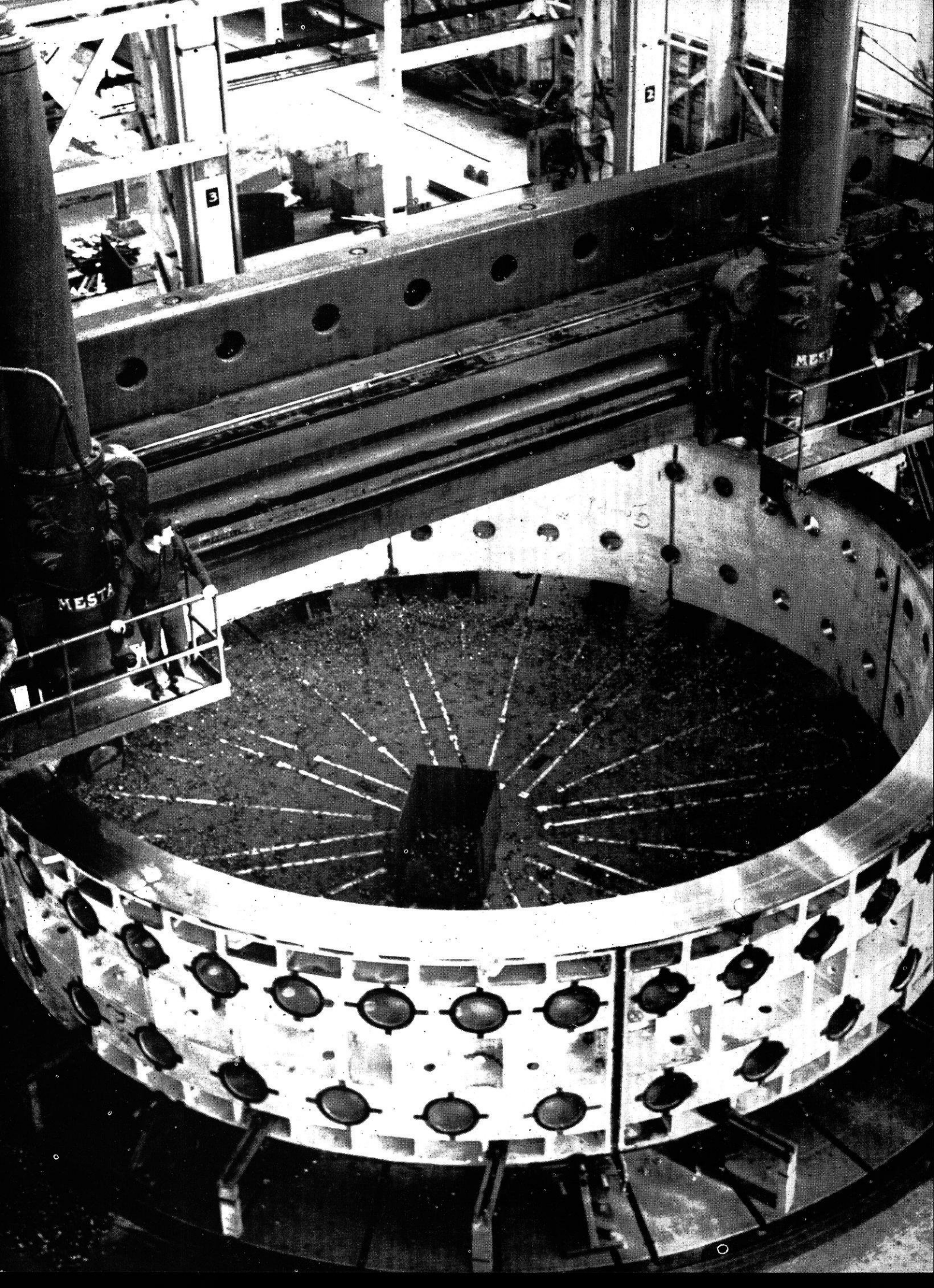
Reynolds Metals Company,
Employment Dept.
Richmond 19, Virginia

Please send me, **FREE,** your 96-page booklet "The ABC's of Aluminum"; also the 44-page book, "Reynolds Aluminum ... and the Company that makes it."

Name_____

Address_____

School_____ **Class**_____ **Course**_____


MESTA

editorial

The Decision Is Yours

With the permission of the upperclassmen, I should like to direct this editorial to the incoming freshmen.

In the past month you freshmen have been adjusting yourselves to this new experience of "college life". The stabilizing influence of home is gone—you are on your own. In this helter-skelter campus life, you feel as though you are being run over much as an insect on the steps of Bascom, not knowing which way to turn to avoid trampling feet. It is time for you to stop and ponder—"Why am I in college?—Where am I headed?—Where do I fit in?"

Will you become a part of the campus infestation of the brightly colored, gaudy, Social Butterfly? The typical specimen is a gay, carefree fellow with a bravado attitude and a distinct disdain for anything academic. He abhors professors and merely tolerates instructors. He avoids classes as a plague. He is usually a parasitic demon relying completely upon his fellow insect, the Bookworm, for his assignments. Like most insects, he is attracted by glittering lights, only to fall mortally wounded by the intense heat—realizing too late that the dean bases probation and dismissal from college on the grade report, not the date book.

At the other end of the line are those, commonly referred to as 'Bookworms." They are the sallow-complexioned, hollow-eyed physical specimens that leave their rooms only long enough to attend class or to replenish their supply of No-Doze. They dream of but two things—a three-point and a $600 per month job. These creatures are in as bad a state of delirium as their companion parasites, the Social Butterflies. These Bookworms have neglected to realize that personality development, too, is part of a college education.

Now would it be presumptuous to assume that neither of these species of college student represents the solution? Perhaps we can combine the two and produce a far superior cross—a good sound attitude toward academic pursuits, tempered with just the right amount of 'social diversion and the whole interspersed with a few extra-curricular activities.

The decision is yours.

Summer Survey Camp

By Richard White, c'55

The University of Wisconsin summer survey camp for civil engineers is located at Devil's Lake State Park near Baraboo, Wis., on the southwest shore of Devil's Lake. Nestled between two rocky bluffs, the camp is reputedly one of the finest of its type in the country. The park presents innumerable types of terrain, with its high bluffs and spring fed lake being the most significant features. Most of the work done is within walking distance of the camp.

Every CE at Wisconsin must attend this summer camp in order to receive his degree. Most of the fellows go to camp after their sophomore year, or as soon as they complete their surveying courses on the Madison campus. The camp usually starts the first Monday after final exams and runs for six weeks.

The camp is established and run much in the same manner as a regular surveying party operates, with the faculty serving the duties of foremen and chief engineers in addition to their regular roles as instructors. Every man in camp gets a chance at each of the various positions of the party in which he is working, which vary in size from two to ten men, depending on the type of problem. Instructors accompany the parties on every survey to make certain that everyone understands the procedures involved.

The purpose of the camp is twofold. First of all, the CE's are presented with the fundamentals of a wide range of surveying subjects, and then given a chance to apply these principles in the field. After the field data has been taken, every man must prepare a complete set of maps and drawings, and a written report on each project. In this manner the CE's gain a thorough conception of the problems encountered in each of the different projects, i.e., transit and plane table topography, which along with aerial photography serve as the three important methods of map-making; hydrography (mapping lakes); primary triangulation and base-line measurement using first order equipment; and a water power survey of the Baraboo River. Also included is a current meter discharge measurement of the Wisconsin River at Portage; land surveying and city platting; and railroad maintenance work, such as re-aligning the tracks on horizontal curves and raising or lowering the tracks on vertical curves. All of these surveys are covered in CE 116, a four-week, four credit course.

The other aspect of the camp is to present some practical experience in surveying. Although this is emphasized in every subject taught in CE 116, it is really brought out in CE 122, a two week course in highway location

(*continued on page* 40)

Summer Camp Diary

By Elizabeth Jackson c'54

(The following are excerpts taken from a diary kept at the 1953 session of the Civil Engineers Summer Survey Camp.)

June 3: All civil engineering students who had successfully completed surveying courses required by the U. of W., registered and paid the fees necessary for attending Summer Survey Camp. Registration was nearly like semester registration except that now each student's college address became: c/o U.W. Summer Survey Camp, Baraboo, Wisconsin.

June 4: All students to attend summer camp attended an initiation meeting. Prof. Wagner, Mr. Haas, and Mr. Kallsen gave inspiring talks about living conditions, working conditions, and regulations at camp.

Students were further informed that the dining hall and commissary were to be operated on a cooperative basis. Each student must deposit $95.00 for expenses; and funds left at the end of camp are refunded to the students.

Of interest to most civil engineers was the fact that beer was to be available at the commissary.

Other items of interest from the meeting were: living quarters are trailers formerly at the Monroe Park trailer camp; bathing facilities are Devil's Lake; each student must put in two days of supervised construction time directed toward the general upkeep of the camp; working hours are 7:00 a.m. to 4:30 p.m. Monday through Saturday, and reports are to be written at night as "home work."

Civil engineers left the initiation meeting anticipating their six weeks' vacation at Devil's Lake located in Wisconsin's beautiful vacation land.

June 13: Summer Survey Camp began showing signs of life. Surveying equipment, instructors and students arrived from Madison.

June 14: Cars laden with books, drawing instruments, bedding, and work clothes were a common sight around the camp on the southwest shore of Devil's Lake. By late afternoon all students had arrived.

After the evening meal a general assembly was held in the "barn." Students and faculty were introduced; faculty was: Prof. Wagner, Mr. Haas, Mr. Kallsen, Mr. Kolf, and Mr. Hunt, all of the University of Wisconsin, and Prof. Beebe of the University of South Dakota. Following a custom of former summer camps, the 1953 group elected a fire prevention crew whose duty it is to operate the "Azimuth City's" outmoded fire engine in case of fire. A fire chief and six "horses" (to pull the engine) were elected. The honorable crew was Nick George, Bob Reese, Tom Elbert, Bill Taylor, Jack Horn, Bob Luce, and Liz Jackson.

After the assembly adjourned, student returned to their trailers to arrange things for comfortable living. Mattresses were filled with straw and placed on metal cots. The trailers provided unusual conveniences to the engineers: rusted bread-boxes became excellent shoe storage space; refrigerators which could not be used as such, became cases for drawing implements; and former kitchen work space became desks.

Liz Jackson, after being informed that she was not to have her surveying partner for a roommate as the other

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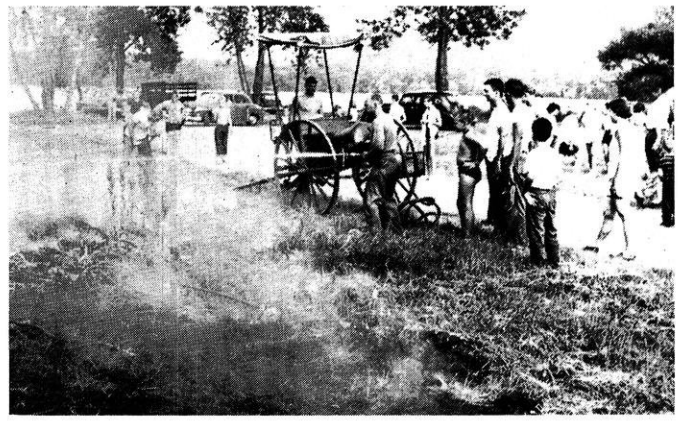
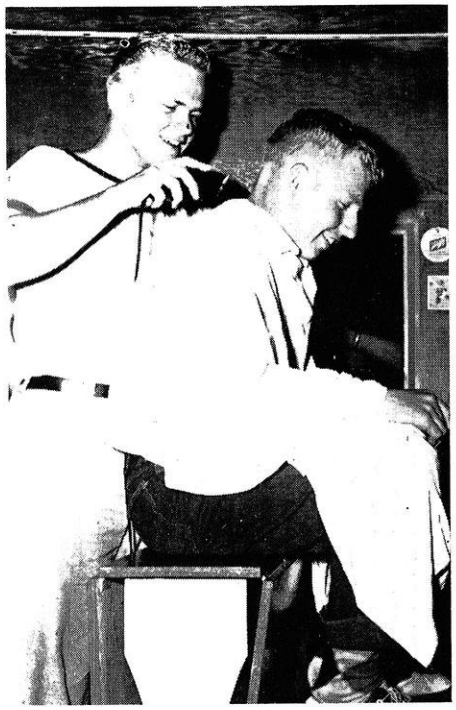


Shown here are some of the wet engineers who helped quench the blaze during the fire drill. Those in the foreground are (l. to r.) Jack Horn (behind the fire engine), Bill Hunt, Ned Godfrey, John Shackleford, and the author.



Bill Taylor, for some unknown reason, seems to be actually enjoying the experience of having his head shaved by Bud Arnold. He apparently hasn't seen himself in the mirror —or maybe he just caught a glimpse of the unhappy Fred Fox after his disastrous trip to the Baraboo Barber.

Seen here is Don Highway's car as it is being placed with one tree at its front bumper and another snugly against the back bumper. Those caught in the act are (l. to r.): Paul Erickson, Howie Brunmeier, Bob Reese, Nick George, Tom Elbert, Ron Fiedler, Eric Laine, Chauncey Reider, Bill Taylor, Don Ulrich, Norm Peterson, and Dick White.

engineers did, found her abode in the section of camp set aside for the girls who prepared and served meals to the summer campers.

June 15: At 6:00 a.m. students were awakened by the camp horn for first call to breakfast. The camp horn was to become a familiar sound to the campers since it was to sound 11 times a day for the next 41 days to call the surveyors for one reason or another.

June 17: Summer camp's two Bob Reese's decided that all their correspondence must include middle initials in letter addresses to avoid confusion.

June 20: All engineers who had survived the first week of surveying spent the Saturday night at various forms of entertainment: The Chateau on the north shore was popular; the Dude Ranch was tried by wealthier members; Baraboo provided two movies; the commissary was well stocked with beer; but some of the more eager students preferred to catch up on report writing.

June 22: Don Covall, more commonly known as Don "Highways"—the State Highway Commission's contribution to the summer camp faculty, arrived to teach the first session of the highway course.

June 23: Fred Fox visited the Baraboo barber. That the barber had used a bowl to style Fred's hair, was accepted without doubt; but it was decided, after some consideration, that the reason Fred's hair looked so funny was that the bowl wasn't the correct size. Ed Arnold and Will Taylor set up their own barber service. The selling point of their service was that they had bowls that fit.

June 24: All camp members dressed in their surveying best assembled for the taking of the camp picture.

June 28. Erick Laine discovered that swimming was much more fun on the North Shore than at the summer camp beach; and safer, too, because the North Shore has a pretty life guard.

June 29: Camp members who had already been assigned to topography had discovered many interesting things about the Devil's lake area: (1) the bluffs are steep; (2) trees are spaced so that each tree is not farther than one foot from another tree; and (3) every "topog" area contains many mosquitoes.

July 2: Highway instructors Hank Kallsen and Don "Highways" had their evening fishing trip disrupted when they were attacked by students enrolled in highways. Hank, after being routed from his hiding place, was "thrown" into the lake. Don "Highways," believing he was safe in his locked car, was lifted (car and all) and placed securely between two trees by the highway class.

July 3: Assignment for the highway class: replace Don "Highways'" car in the parking area.

July 4: A holiday and a day of rest for the surveyors, excepting those virtuous ones who worked on reports.

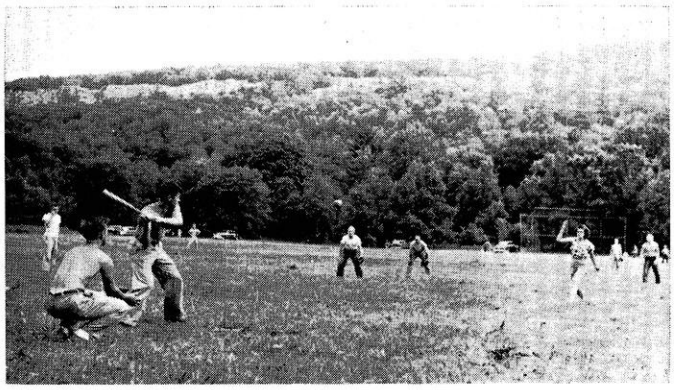
July 8: Members of the hydrography party who were chosen as oarsmen initially felt that they had been chosen because they had unusual muscles, but by the end of the day the oarsmen wondered what they had done to deserve the punishment.

July 9: Bill Taylor reported hydrog class with his arm in an improvised sling; he had calculated that it was his turn to be an oarsman.

July 10: Prof. Beebe's water power survey crew decided that a truck driving course for Prof. Beebe would be a wise addition to the summer camp curriculum.

July 11: The highlight of the summer camp social season was the camp dance. The dining hall was decorated, a band was hired, and girls were imported to make the party a success.

Howie Brunmeier seems to be getting out-charged by the hard-driving Hank Kallsen in this picture taken during the fire drill. Others are (l. to r.): Dick Robbins, Paul Erickson, Sylvester Hamshire, Bruce Dillman, and John Shackleford.



Prof. "Red" Wagner and Bill Hunt, of the powerful faculty club, are here seen employing a sort of "Williams shift" on Mel Sensenbrenner, who shortly after this picture was taken smashed the ball into the far reaches of the outfield. Others are (l. to r.): Don Otto, catching Shirley Dahle, the fast-balling pitcher, and Bill Taylor, a runner at second base.

July 12: The faculty-student baseball game was played complete with restrictions established by the faculty. The faculty was victorious, but at this time in the season the students were likely grade-conscious.

After the game the elected fire prevention crew presented a fire drill, victorious faculty members were dunked into the lake along with the fire crew and nearly everyone else at camp.

July 15: Gene Vasiliev gained membership in the Rattlesnake Club by killing a rattlesnake found in "Bularena," the city survey area.

July 16: Anyone with a typewriter that types engineering lettering could make a fortune when the engineers start lettering their city plats!

July 20: After Dick Kolf's plane table crews had tramped through swamps for several days, a common chant around camp was "Kolf in the lake!"

July 21: Hank Kallsen's rails crew discovered that laying railroad curves was not so tedious when there were girls camping on the south edge of the ball field.

After dinner the boys from the rails crew suggested baseball practice.

July 23: Only two remaining days to complete the summer's work! The "barn" remained well lighted far into the night and early morning, and family bibles (more commonly called gouges) were circulated between trailers as the surveyors prepared reports.

July 24: All students who had completed their work were dunked into the lake by the less fortunates.

July 25: By 8:00 p.m. all reports had been submitted and faculty members had begun the tedious job of grading the work and reading the suggestions and criticisms by the students.

July 26: By mid-morning camp was nearly deserted; the commissary and dining hall had been closed; and surveying equipment has been transported back to Madison. The tired students were off to summer jobs or vacations, and Summer Survey Camp on the southwest shore of Devil's Lake awaits the 1954 session.

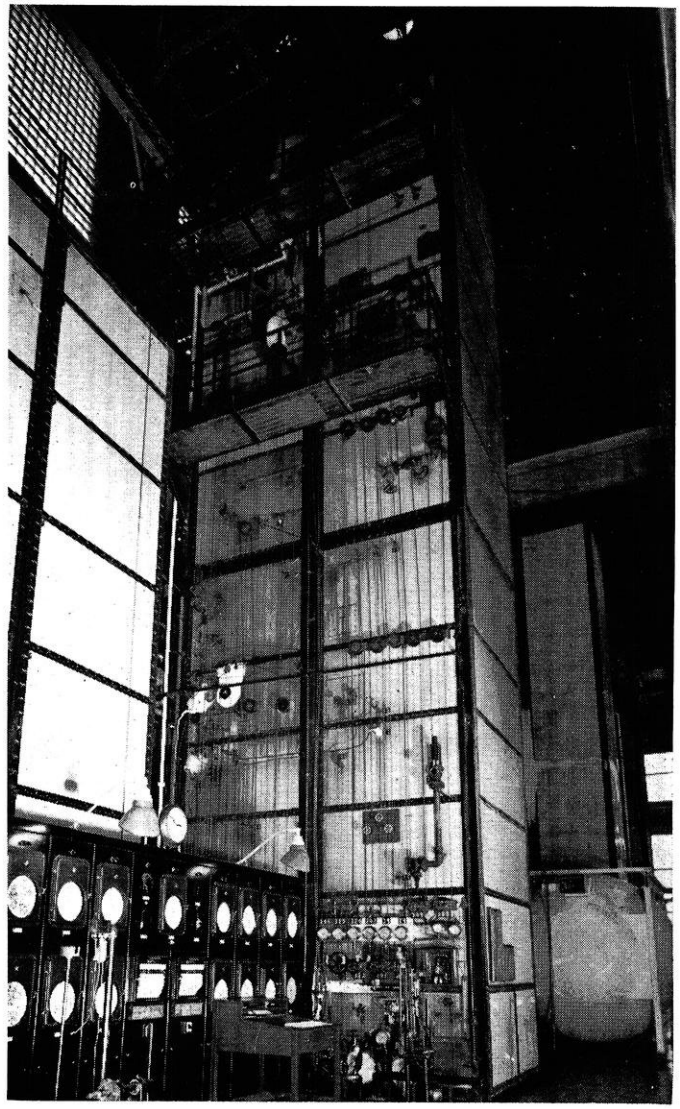
THE END

COMMERCIAL OXYGEN

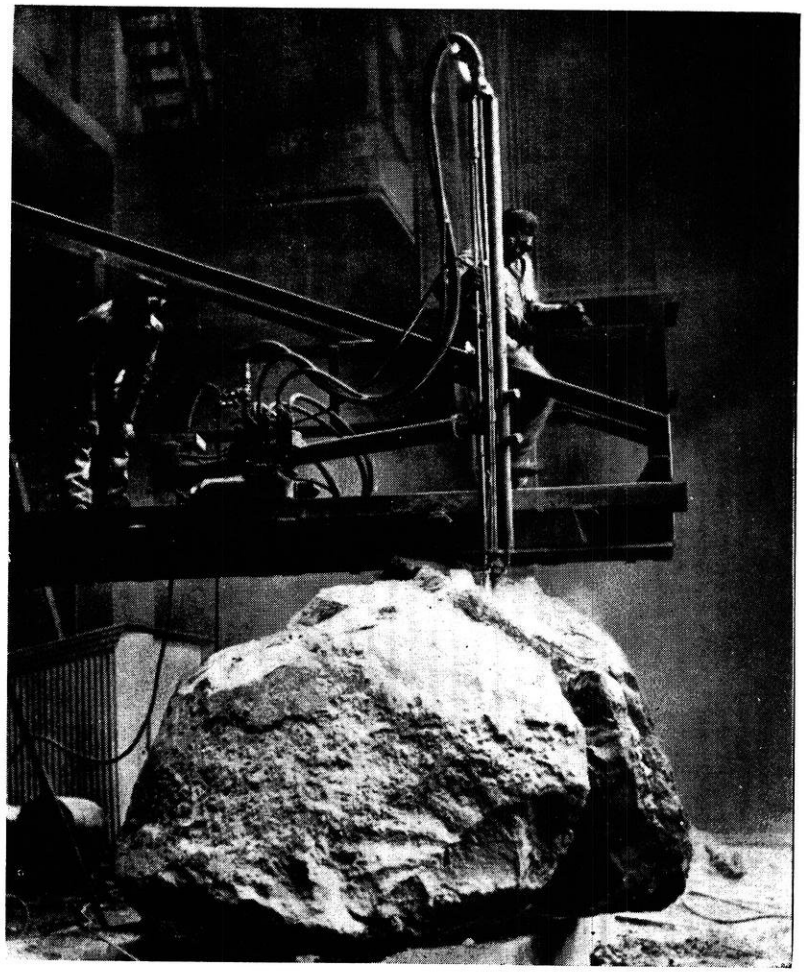
It's Production and Applications

Information and illustrations courtesy of Linde Air Products Co.

Edited by Robert Sommerfeld



Front side of a typical large, high-purity, liquid oxygen producing unit showing operating panel. This unit produces approximately 150,000 cu. ft. (gaseous equivalent) of 99.5 per cent pure liquid oxygen per hour.



Cutting through a 60-in. thick steel ladle button.

The production of oxygen and the number of commercial applications which have been made of it have experienced a phenomenal growth in the past 50 years. Prior to 1907, commercial oxygen was produced by the potassium chlorate laboratory process, the Brin barium oxide process, and after 1895, by the electrolysis of water. In 1895, Dr. Karl Linde had made the first continuous machine for liquefying air. This machine was the forerunner of today's oxygen, nitrogen, and rare gas industries.

In 1907, the first major liquid air installation in the United States was made for the Linde Air Products Company at Buffalo. By 1915 there were five such plants in operation, and today there are plants in every industrial section in the country, and in nearly every industrial area in the world.

The majority of the oxygen produced today is produced by the liquid air process. In this process, air is liquefied, and the main components, oxygen and nitrogen, are separated by fractional distillation. A relatively small amount of oxygen is still obtained from the electrolysis of water.

According to the Survey of Manufacturers, approximately 2,058,000,000 cubic feet of oxygen were produced in 1923. In 1929, it had increased to 3,140,000,000 cubic feet. By 1939, the production was about 4,562,000,000 cubic feet, and in 1947, about 14,429,000,000 cubic feet were produced. During the peak of the war effort, in 1944, an estimated 18,500,000,000 cubic feet were produced.

In the liquid air process, air is first cooled until it becomes partially liquefied. The liquir air is then rectified, boiling off the nitrogen and leaving the oxygen as a liquid. The oxygen may then be withdrawn as either a liquid or a gas.

A variety of cycles have been developed to accomplish the air liquefication. Some use the Joule-Thompson effect exclusively, and others combine this with the use of expansion engines or turbines. Some cycles also use external refrigeration.

In one cycle for the production of liquid oxygen, air is first compressed to about 2500 psi. This compressed air is cooled by countercurrent heat exchange with waste nitrogen gas coming from the fractionating column. After some cooling, the compressed air is divided into two portions. One portion is further cooled and partially liquefied by expansion through a throttling valve. This partially liquefied air is then fed into the high-pressure section of a double-column fractional distillation unit.

The second portion of the compressed air is expanded in an expansion engine and is also delivered, partially liquefied, to the high pressure section of the rectification column.

Any cycle for the production of liquid or gaseous oxygen from the air can be divided into three fundamental steps. These are (1) purification of air, (2) partial liquefaction of the air by refrigeration, and (3) separation of oxygen from nitrogen by fractional distillation of partially liquefied air.

Liquid oxygen is formed in the rectifying column of every plant, whether gaseous oxygen or liquid oxygen is withdrawn. The production cycles for both cases are approximately the same, though the equipment used is somewhat different.

Whether the product is withdrawn as a gas or liquid, it is fed into a storage container. This is a type of gas holder, or in the case of liquid, a special storage tank well enough insulated to hold a liquid which boils at nearly 300° below zero, Fahrenheit.

One of the largest plants in the United States for the production of high-purity (99.5 per cent) liquid oxygen has a capacity of about 400 tons per day (10,000,000 cubic feet of oxygen at standard conditions).

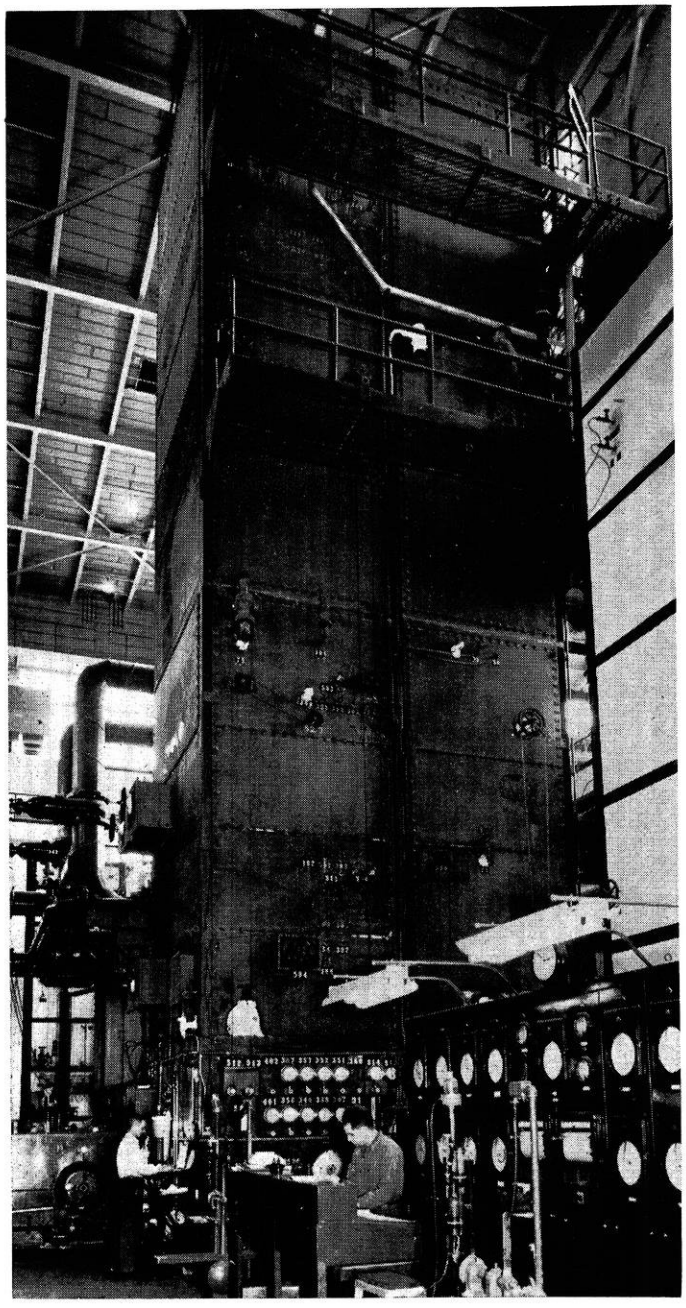
In recent years, there has been an increasing demand for oxygen of about 95 per cent purity for chemical and metallurgical uses. At the time of its construction in 1946, the largest known single unit for producing low purity gaseous oxygen could produce about 4,800,000 cubic feet of 90 per cent oxygen per day from a single fractional distillation unit.

A process which is used to a very minor extent for the production of commercial oxygen is the electrolytic separation of water to give off hydrogen and oxygen. However, since power consumption is excessively high, large-scale electrolytic installations are now obsolete.

One of the more pressing problems in the industry is the distribution of the oxygen after production. The most familiar method is in the form of compressed gaseous oxygen in standard steel cylinders holding the oxygen under pressure of about 2200 psi. The cylinder distribution is the most practical means of supplying oxygen at temporary or widely scattered points, or where the consumption is not large or consistent. With cylinder distribution, however, there is the problem of high container weight to product weight, in the case of a 244 cubic foot cylinder, about 130 pounds to 20 pounds.

When the demand is greater than can be conveniently handled by single cylinders, manifolds are used with pipe line distribution to consumption points. In industrial plants and hospitals, piping gaseous oxygen has been common practice since about 1925.

For large quantity distribution, a method of transporting and storing high-purity oxygen in liquid form was developed in 1932. The difference in volume between oxygen as a liquid at its boiling point and normal pressure, and as a gas at normal temperature and pressure is about 860 to 1. Liquid oxygen is delivered by railroad tank car or truck and stored as a liquid on the consumer's property. As needed, the liquid is converted to a gas and delivered to points of use through a pipeline system. This system is



economical only if the consumption is 1,000,000 cubic feet or more of oxygen per month.

Advantages of liquid distribution to consumers who require 50,000 to 1,000,000 cubic feet per month may be realized through a variation of the system. Liquid oxygen is brought to the storage point as a liquid in a tank truck. At that point it is converted to a gas by equipment on the truck and discharged into receiver tubes on the consumer's property.

As a comparison of the saving in transporting it as a liquid rather than a gas, it would require 11 railroad cars to transport an equivalent amount of gas in the standard 244 cubic foot cylinder than one railroad tank car can transport as a liquid.

One of the earliest uses of oxygen was mixing it with a combustible substance to produce an extremely hot flame. This led to the oxygen-acetylene welding process which produces the hotest flame temperature, about 6000° F., currently available to industry.

Metal production, fabrication, and repair as it is known today would be impossible without the oxy-acetylene processes. Oxy-acetylene welding permits the fabrication of many structures and parts that could not be built before welding was developed. Welding has also provided a means of repairing broken or damaged structures with large savings in time and money. With the oxy-acetylene blowpipe, practically any metals—similar or dissimilar—can be joined so that the weld is as strong as the base metal. There are many closely allied applications for the oxy-acetylene flame.

This unit produces about 4,800,000 cu. ft. (about 200 tons) per day of 90 percent oxygen.

1. Oxy-acetylene flame-hardening is used to impart a hard, wear-resistant case to quench-hardened steel and iron parts.
2. The oxy-acetylene flame can be used to anneal metal parts after welding or cutting.
3. Flame-priming utilizes the quick heat of oxy-acetylene flames to remove loose scale, rust, and surface moisture from steel prior to painting.
4. Oxy-acetylene blowpipes provide a convenient source of controllable heat for bending, straightening, or shaping operations on steel.
5. Flame-spinning uses the oxy-acetylene flame and a shaping tool to shape tubing. This process is especially effective for making end-closures.

If one thing can be singled out as being the most important factor in the growth of the oxygen industry, it is probably the many processes that the availability of low-cost, bulk oxygen has made practical. The uses of oxygen in the iron and steel industry, for instance, begin with the extraction of iron ore and end with the production of finished metal parts. By far the greatest proportion of industrial oxygen is used for conditioning steel and cutting iron and steel.

Prior to the late 1940's, it was not economically feasible to mine ore from the eastern end of the vast Mesabi iron range in Minnesota. The reason for this was the difficulty of drilling the very hard, tough ore deposit. In 1949, the jet-piercing process was developed for drilling blast-holes in the ore or rock. This flame process uses oxygen, fuel, and water to get such high temperatures and gas velocities that rock is disintegrated. In 1951 it was estimated that the jet-piercing process would make it possible to mine 30 to 40 million tons of iron ore a year from the hard, massive beds of magnetic taconite of the Mesabi.

When scrap iron and steel, pig iron, and hot iron from the blast furnaces are loaded into huge open hearth furnaces to be melted and refined, oxygen-enriched gases are often used instead of ordinary air. In this way, the melt-down and refining periods are shortened considerably.

When steel has been refined and is ready for rolling or forging, surface defects are removed by a process known as deseaming, scarfing, or conditioning. This process uses a nozzle that is designed to deliver a relatively large jet of oxygen at low velocity. In mechanized steel conditioning, the entire surface of the billet, bloom, or slab is removed by a scarfing machine set into the rolling mill line. The machine can remove a thin layer containing surface defects from one, two, or four sides simultaneously and the operation can be performed while the metal is still hot and without interrupting the rolling operation.

The principle of oxygen steel conditioning and other cutting applications is fundamentally simple. When heated to the kindling temperature, iron or steel can be cut (actually burned) by a jet of pure oxygen. With this process, iron or steel can be shaped under close control. Tolerances of 1/16 in. are easily maintained. By introducing an iron-rich powder into the cutting oxygen stream, oxy-acetylene cutting has been further expanded so that it can be used effectively for cutting stainless steel and cast iron. Heavy scrap metal sections that were too heavy for handling were formerly disposed of by burying in slag dumps. Now, hundreds of thousands of tons of steel and

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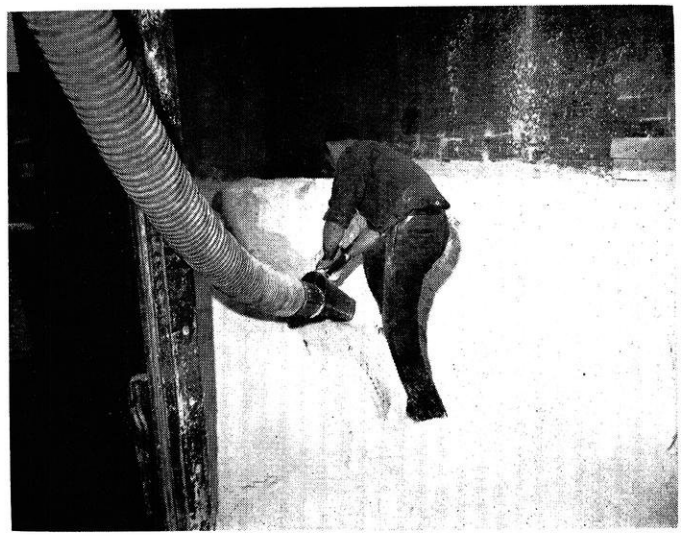
HIGH SCIENCE



Pneumatic Hose—Engineering knowledge is important to the work of the hygiene staff. This apparatus is used to suck up powdered ceramic materials from freight cars to large storage silos. The workman is thus protected from dust which would be unavoidable if the powdered material had to be shoveled.

Cut courtesy Westinghouse

NATURE'S EXTREMES NOW AVAILABLE TO SCIENCE

Testing equipment ten miles up in the sky without ever leaving the ground is now possible in this new turbo pump altitude test chamber at General Electric's Aircraft Gas Turbine Division facilities at Lynn, Mass.

This chamber is one of the many testing facilities used to test equipment under the severest conditions which could be encountered in actual flight. Simulated altitudes over 60,000 feet can be obtained as well as simulated aircraft climb rates in excess of 20,000 feet per minute and climb rate angles as high as 60 degrees.

Used primarily for testing reheat (afterburner) fuel pumps for jet engines under varied conditions and altitudes, this chamber has a volume of approximately 950 cubic feet and can accommodate a 470 gallon capacity fuel tank. Engineers can observe pump operations under all conditions of altitude by watching through the observation ports provided in the sides of the chamber.

The entire end of the chamber can be removed to permit the installation of larger equipment to be tested under altitude conditions.

LIGHTS

FREEDOM OF FORM ACHIEVED WITH STEEL

Freedom of form previously available only with concrete, has been achieved with steel materials in a bridge spanning the Rio Blanco River near Vera-Cruz, Mexico.

By applying welding techniques, Mexican engineer, Camilo Piccone, has projected a span with slender arch ribs, free of cumbersome bracing. The structure is based on a new design conception by Thomas C. Kavanagh, head of the department of civil engineering of New York University's college of engineering.

The ultra-modern "basket handle" effect is heightened by the use of color. Painters have daubed the curved ribs orange and made the horizontal tie-girders cherry red. The bridge was opened last May and motorists who invariably stop to admire the striking architecture on their first trip across the span have created a minor traffic problem.

The 250-foot long, all-welded steel splayed-arch highway bridge accommodates three lanes of traffic. The arch ribs are inclined and joined at the center of the span. The resulting space framework produces visually interesting effects from different angles.

Unconventional design in the Rio Blanco bridge extends also to the flooring, where a diagonal gridwork of floor beams has proved far more economical than usual bridge floor systems. Its strength and safety factors are as high as conventional constructions.

Dr. Kavanagh's original design conception won an award in the 1951 professional bridge design competition sponsored by The Lincoln Arc Welding Foundation of Cleveland, Ohio. Through the award, Mr. Piccone learned of Dr. Kavanagh's design.

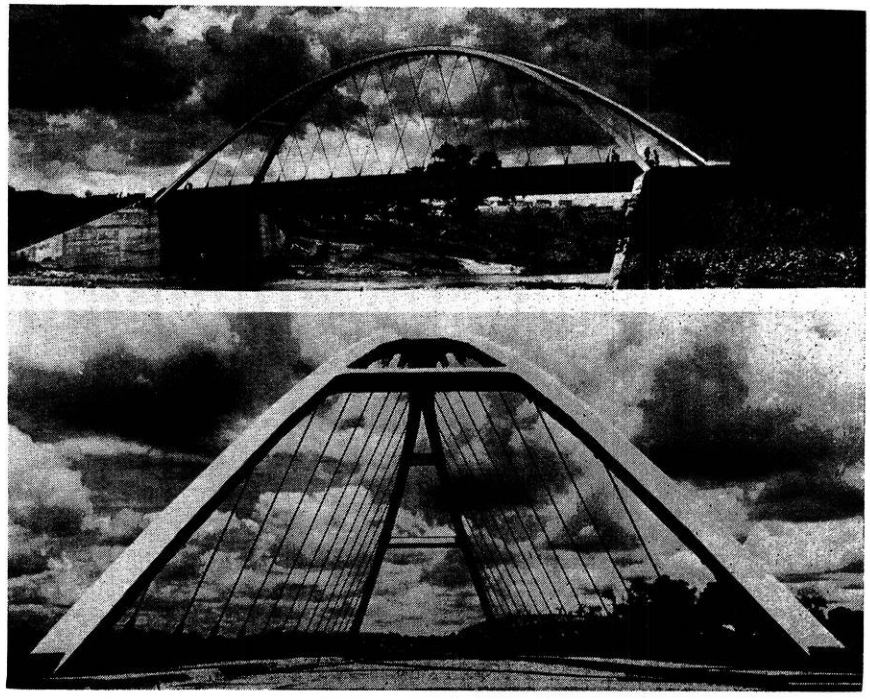


Photo courtesy Lincoln Arc Welding Foundation

W.S.P.E.

SUMMER CONFERENCE

SECRETARY'S OFFICE
2318 Rowley Avenue
Madison 5, Wisconsin
E. C. Wagner, Secretary

(Editor's Note: The W.S.P.E. section this year has been changed both in make-up and content from that of the past few years. A reorganization of the State Publication Committee indicates that there will be more and better coverage of W.S.P.E. activities this year. Each of the first seven issues will contain a biographical sketch of one of the seven chapter presidents. The eighth issue will feature a sketch of your state president.

You will greatly aid your chapter reporter if you will inform him of any news item which may be brought to your attention).

The Seventh Summer Conference of the WSPE was well attended and very successful. That is the consensus of opinion of all members who were present. The total registration of engineers was 100 with the attendance, including wives and guests, of 173.

Kohler Program

The part of the program at Kohler was one of the highlights and many thanks are due the Kohler organization for the fine job of taking care of the group. We met at the American Club on Friday noon and had an excellent luncheon as guests of the Kohler Co. Lyman C. Conger of the Kohler Co. staff welcomed the group at the luncheon and set up the program of afternoon visits through the Kohler plant or Kohler Village. The trip through the plant was excellently arranged and carried out by Mr. Ed Beaver, general manager of the Kohler Co. The group was split up into groups of 10 or 15 with competent guides and made the trip more interesting. The guides went out of their way to explain each part of the plant and were very patient in answering all questions. The trip through the shell plant was both interesting and informative. Having seen how bathtubs and other plumbing fixtures are made, each and everyone present has become more conscious of the quality of Kohler Co. products. The trip through the foundries was interesting from an engineering standpoint because of the unique innovations in the preparation of the moulds and in the pouring of the metal. The group also saw how the small engine-driven electric generators were produced. These generators are used for emergency purposes and fill a very definite need in the public building and communications fields.

The inspection trip through the Kohler Village and Walderhaus and the demonstration home was appreciated by the women. Most of the women chose the village tour because it was more interesting to them. It was the women's consensus of opinion that the Girl Scouts of Kohler are extremely fortunate in having a place like the Walderhaus as their headquarters. The demonstration house was also most interesting to the women and there is no question but what many present got ideas on some remodeling or changing they had in mind in their own homes.

Friday night get-together and dance.

Registration

The staff and employees of the Schwartz Hotel did an excellent job of seeing that everyone was taken care of. Of course such a job was not possible without the able assistance and information on the registration as collected by Mr. Tom McGuire of Plymouth. Everyone was permanently placed and enjoyed the excellent dinner at which a little birthday celebration occurred. It so happened that Pierce G. Ellis, our president had a birthday which was reported to be the 21st? At least the cake only had two candles with one burning We. might ask Pierce if the one burning candle was for the 21st year? Anyway it was a very interesting side light and everyone thoroughly enjoyed it.

Friday Evening Get-together

The program arranged by the Fox River Valley Chapter for the Get-together was superb. Mr. W. G. Bryan was an able master of ceremonies and added some interesting comments. The dancing was thoroughly enjoyed by all present. Music supplied by the Don Schuerer Trio from Manitowoc of the English Lake fame consisted of piano, accordion, bass viola and drums. The magic and tricks performed by Curt Walter, master of tomfoolery from Oshkosh was superb entertainment. He was capably assisted by Rose Evans (Mrs. Kenneth Evans, Mad-) ison). Maybe Mrs. Evans should look forward to a career in the entertainment field. The entertainment highlight of the evening was the Four Beaus, Barbershoppers from Sheboygan. This entertainment was so well received that after rendering many encores the boys just had to say, "Well, that's all folks." The quartette consisted of Donald (Mickey) Mueller, tenor; George Ernst, lead; Clairmont Nass, baritone; and manager Clayton Kiel, bass.

The refreshments provided were thoroughly enjoyed by everyone judging from the way the waiters and waitresses were kept busy in providing them. As usual, Tom McGuire came to the forefront here in plugging Plymouth as the world's cheese center with samples of cheese for everyone. This addition was one of the highlights of the evening's doings.

Business Meeting

On Saturday morning there were several committee meetings held during breakfast time after which the business meeting convened in the pavilion. This meeting was ably presided over by George Steinmetz, our first vice-president. The key note of the meeting was amply provided by President Pierce Ellis, outlining six major points of the problems and accomplishments as follows:

1. Membership.
2. Publications and publication policy.
3. Weaknesses and inequalities in the registration law.
4. Working relationship with architects.
5. Violation of registration law and compliance therewith.
6. Appointment of registration board vacancy of Delmer Nelson, professor of mechanical engineering at the University of Wisconsin.

Legislation Announcement

Willard Warzyn, chairman of the legislative committee, gave a very comprehensive report on legislation affecting professional engineers, ably outlining the problems, benefits and courses of action regarding this all-important problem.

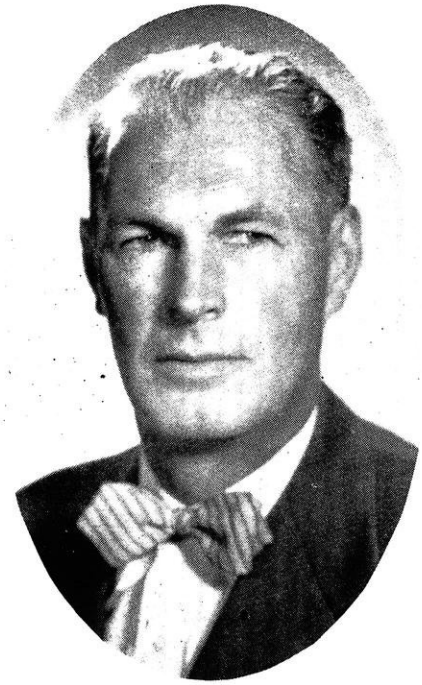
Unity Problems

Edwin Seeger, Vice-President, NSPE, gave an interesting address regarding the unity problem among professional engineers. He ably outlined the problems and action taken at a national level regarding a unity organization which would include all of the engineering societies. This unity organization to be a spokesman for all technical and professional organizations. This problem which has been with the engineering profession since its inception was attacked by the formation of the Engineers Joint Council (EJC).

(*please turn to page* 29)

1. President Pierce G. Ellis addressing the Saturday morning business meeting.
2. Mr. Willard Warzyn making legislation announcement at Saturday morning business meeting.
3. Mr. Edwin Seeger addressing Saturday morning business meeting on subject, "Unity Problem Among Professional Engineers."
4. Mr. Paul Robbins, National Director of NSPE, addressing Saturday morning business meeting on subject, "Vital Questions Concerning the Professional Engineer."
5. Dean George B. Walter presenting his banquet address, "No Man Is An Island", on Saturday evening.
6. Mr. Murl Deusing presenting his travelogue, "Florida Everglades", at the Saturday evening banquet.

Meet the Presidents



PAGE A. JOHNSON
Southwest Chapter President

Page A. Johnson, president of the Southwest Chapter of the Wisconsin Society of Professional Engineers, was born at Clay Center, Kansas, March 17, 1906. While he was still a boy, his parents moved to Fond du Lac, Wisconsin where Page attended public school. Page was president of his junior and senior class in high school, and was on the high school basketball team that won the state championship in 1924. He continued his athletic career the next two years at Lawrence College, where he was a two letter man, earning letters in basketball and tennis. It was while at Lawrence, he decided to become an engineer, and transferred to the University of Wisconsin, where he earned his bachelor degree in Civil Engineering three years later. He worked for the Robert Candlish Construction Company, of Harvey, Illinois part time while still in school, and remained with them a few years after graduation, leaving them to go with the Illinois Highway Department. Three years later he decided to go homeward and joined the Wisconsin Highway Department. He left the Wisconsin Highway Department to become city engineer and commissioner for the city of Fond du Lac, which position he held two years, serving as well on the library board and as a park commissioner.

In 1937, he became a field engineer for the Portland Cement Association. He has continued in that capacity for the past 16 years, in which his work has largely been keeping the field up to date on the latest concrete developments, and at the same time informing groups and individuals of concrete and its uses.

He has been instrumental in the development of engineering as a profession in Wisconsin, being a charter member of the WSPE, a staunch supporter of the registration act, active on several of the society's committees, was state chairman of the public relations committee and vice president of the Southwest Chapter prior to becoming its president last fall.

Page remains active in athletics, enjoying a good game of golf, tennis, fishing, swimming or a canoe trip whenever he can, and he chooses bowling as his winter sport. He also enjoys a good game of bridge (naturally—being a civil engineer).

While attending the University of Wisconsin, Page met Jean Lindsay, an Alpha Chi Omega transfer from Brenau, and they became married in 1934. They have two daughters, Judith, 16 and Trudy, 13.

Page, in addition to his WSPE activities, was a member of Sigma Chi fraternity, serving as its president in 1929. He is also active in Kiwanis, YMCA, Madison Club, Madison Technical Club, and a member of the Congregational church.

Summer Conference

(*continued from page 27*)

It was Mr. Seeger's opinion that the EJC as constituted was not flexible enough for unity organization. It could be considerably improved by expanding the organization to cover more societies and to find means for participation by younger members. The plan to expand EJC is progressing, and NSPE is trying to find some basis on which it can go along. Progress is being made in that a committee has been appointed with representatives from both EJC and NSPE to discuss the matter. NSPE could probably go along if agreement could be reached so that professional questions would be referred to it for action. Various other plans for unity organization have been proposed, and among them that NSPE be the unity organization. It was Mr. Seeger's opinion that any unity organization has to be started from grass roots to be successful. It has to be an original organization which is not dominated by electrical or any other group or profession. He also stated that such an organization must be based on registration or something as good as registration. If people are to recognize and respect the engineering profession, there must be high standards for membership. Mr. Seeger referred the group to an article in the Sept. issue of American Engineer and urged all to read same. Mr. Seeger closed his remarks on the thought that most of the people who are members are interested in having a professional level organization rather than a labor union type organization. He mentioned as an example the labor union type of organization as now exists particularly in the aircraft engineers.

Vital Questions Concerning Professional Engineers

Paul H. Robbins, executive director of NSPE gave a thought-provoking address regarding the vital questions concerning the profession. He gave it in such a manner and with his dynamic, pleasing personality put the thoughts across in a very effective way. His address was also very highly entertaining—each one present will remember the little episode entitled, "Then Phantom Strikes Again." Mr. Robbins was very complimentary to Edwin Seeger, giving everyone the feeling that the men heading our profession are very able individuals. In outlining the vital questions of the profession, Mr. Seeger pointed out that there was not time for discussion of all of them here, but that NSPE is vitally interested and much concerned about all of them. The questions outlined were as follows:

1. What can be done to improve unity among engineers? Mr. Robbins referred to Mr. Seeger's remarks and the article in the National Engineer magazine.
2. Is there a shortage of engineers?
3. Should we be concerned in using engineers in a purely technical field or should we be diverted to other interests.
4. To what degree should encouragement be given to young people to enter engineering?
5. How can we best help young members coming out of college?
6. What are the best ways to obtain proper recognition of our profession?
7. What can be done to improve registration?
8. How can we better train members to improve the profession?

Mr. Robbins stated the above problems and others are getting ample consideration by some 200 committees of top engineers. He pointed out this was one of the major benefits the society is giving to the profession and to the individual engineers. Mr. Robbins then turned his thoughts to the problem which

Friday dinner—recognize any of your friends?

PAUL H. ROBBINS
Executive Director

Paul H. Robbins, Executive Director of the National Society of Professional Engineers, was born in Syracuse, New York.

He is a registered professional engineer and holds degrees from Syracuse University and the Massachusetts Institute of Technology and has engaged in graduate work at Columbia University for his Ph. D. degree.

After field experience in highway design and layout, he became associated with the Pittsburgh Bridge and Iron Works leaving there in 1937 to join the engineering staff at Cooper Union.

He has also taught at New York University and the University of Maine.

In 1941 he went in the executive office of the mayor of the city of New York as full time consultant on engineering training.

He also served the city as expert examiner in engineering work.

With the activation by the Army of the New York Port of Embarkation, the principal east coast port through which men and material were funneled to the European and Mediterranean war theaters, he assumed the duties of director of training.

The chief of transportation of the Army, under whose command the New York Port operated, sent Mr. Robbins to all ports of embarkation in this country as his representative to consult with commanders of these installations on all phases of management, organization and the utilization of personnel.

Mr. Robbins is married, has two children and lives in Silver Springs, Maryland.

He is a member of Tau Beta Pi, Phi Kappa Phi, Delta Sigma Rho, Army Transportation Association, American Society for Engineering Education, Society of American Military Engineers, and American Society for Photogrammetry.

He is director of fellowships for Tau Beta Pi and a member of the advisory committee of "Who's Who in Engineering."

(*continued from page* 29)

he stated as, "What are we as members going to do about the collective bargaining thinking being generated in our profession?" He stated that so far our thinking had been on the professional level rather than a purely collective bargaining union level; in other words, we only consider technical background. Now we must consider the monetary or dollar angle along with all the others. This is difficult because our profession considers individual progress on a professional level to be better and more healthy for the profession than the so-called union collective bargaining theory. It resolves itself into two basic philosophies:

1. The so-called employment unit status level or
2. The professional technical status.

We, as members, like the latter because it is similar to the elite status of the profession of doctors or lawyers. The first philosophy sets up class distinction, which of course, is not consistent with our thinking as members. It puts short time gains ahead of and at the expense of long term development or advancement. The best interests of the public are sometimes abandoned. It is not compatible with the position of engineer of being the go-between of capital furnishing the money or funds and labor doing the physical work. It means the business of public trust of the engineer is sometimes violated or abandoned.

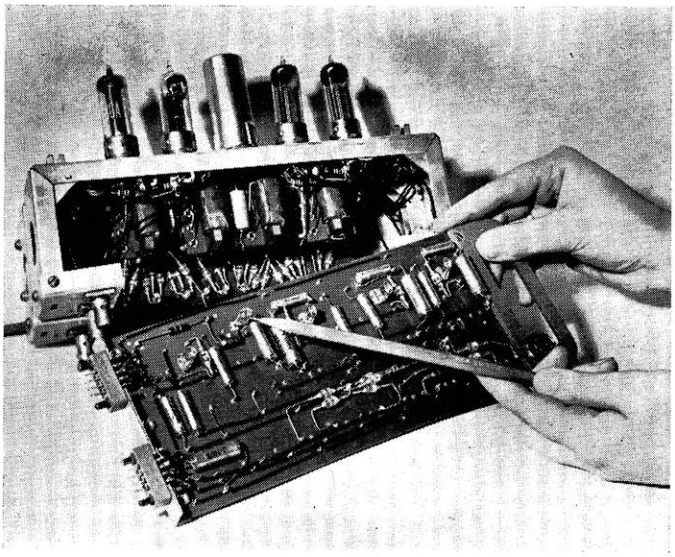
Mr. Robbins then outlined the advancement of the labor union organization type for professional technical people, specifically mentioning aircraft industry, RCA, TVA, So. Calif. Edison and some G.E. and Westinghouse plants. In addition to the labor organizations of technical employees which have been with us for some time, the Engineers and Scientists of America

(*please turn to page* 38)

TRANSISTORS

Condensed from a Report on
the RCA Transistor Press Demonstration

By Victor Muth



Employing only standard electronic parts, with no attempt at subminiaturization, this section of electronic adder in the foreground shows the drastic size reduction achieved by using transistors in such circuits. The pencil points to one of the five developmental point-contact transistors in the unit which do the job of four tubes and four transformers. At rear is same equipment employing tubes and transformers, which consumes four times as much power as the transistor unit.

Almost everyone has, by now, heard of the transistor. This tiny electrical device has been widely advertised as being a device which can do the same things as the present day vacuum tube and do them better. Because of the small size of the transistor it is reasonable to expect that electrical equipment built with transisters instead of vacuum tubes will be much smaller and more compact than it is now. The following is a digest of a report on the RCA 'Transistor Press Demonstration' held November 17, 1952 at Princeton, New Jersey, where some of this new equipment was revealed.

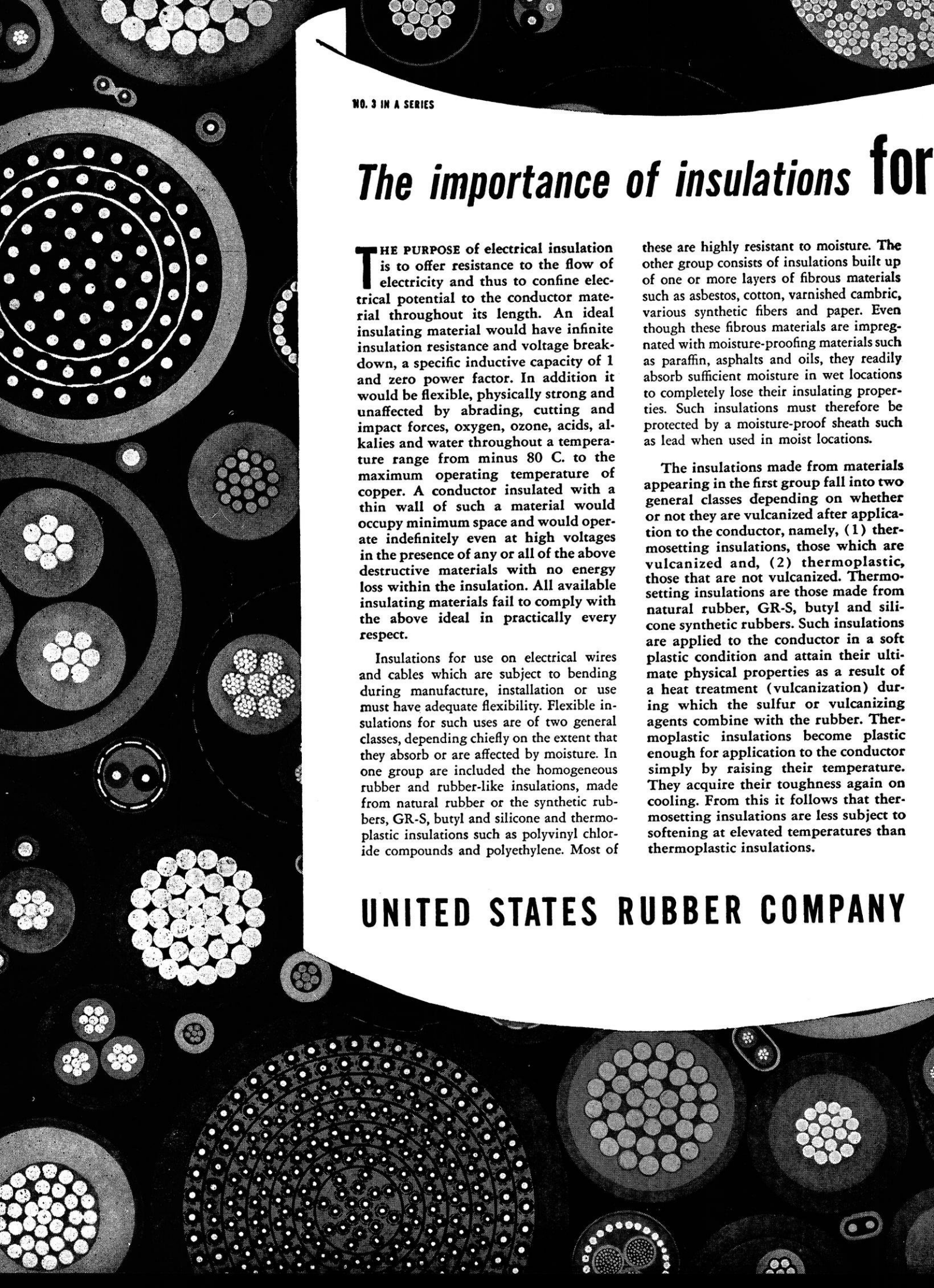
Perhaps the first thing one thinks of in the line of electrical equipment where weight and size are important is a portable radio. At the demonstration an all transistor personal radio was shown that gave the standard 100-hour battery life with five small batteries, each about the size of a checker plece. There is a great reduction in size and weight of this unit because of the batteries alone, not considering the difference in size between the transistor and tube.

Along this same line, an FM receiver was built using eleven transistors with both junction and point contact. This receiver is completely portable and weighs five pounds, approximately one-half the weight of an FM receiver using tubes.

A transistor automobile radio was also shown, using eleven transistors. The most important feature of this set is the elimination of the high-voltage power supply common to present day auto receivers. This power supply, comprising a vibrator, transformer and rectifier, which are substantial parts of the set, are unnecessary in a transistor receiver since transistors operate directly off the six-volt automobile battery. This set uses one-tenth of the current of present auto sets which is less than that required to operate the two dial lights.

Computer parts also have been developed using transistors. A transistor counter capable of a million individual counting actions per second was shown. This counter requires two watts of power while a counter doing the same job with tubes would consume 60 watts, weighs 1/8

(*please turn to page* 44)



NO. 3 IN A SERIES

The importance of insulations for

THE PURPOSE of electrical insulation is to offer resistance to the flow of electricity and thus to confine electrical potential to the conductor material throughout its length. An ideal insulating material would have infinite insulation resistance and voltage breakdown, a specific inductive capacity of 1 and zero power factor. In addition it would be flexible, physically strong and unaffected by abrading, cutting and impact forces, oxygen, ozone, acids, alkalies and water throughout a temperature range from minus 80 C. to the maximum operating temperature of copper. A conductor insulated with a thin wall of such a material would occupy minimum space and would operate indefinitely even at high voltages in the presence of any or all of the above destructive materials with no energy loss within the insulation. All available insulating materials fail to comply with the above ideal in practically every respect.

Insulations for use on electrical wires and cables which are subject to bending during manufacture, installation or use must have adequate flexibility. Flexible insulations for such uses are of two general classes, depending chiefly on the extent that they absorb or are affected by moisture. In one group are included the homogeneous rubber and rubber-like insulations, made from natural rubber or the synthetic rubbers, GR-S, butyl and silicone and thermoplastic insulations such as polyvinyl chloride compounds and polyethylene. Most of these are highly resistant to moisture. The other group consists of insulations built up of one or more layers of fibrous materials such as asbestos, cotton, varnished cambric, various synthetic fibers and paper. Even though these fibrous materials are impregnated with moisture-proofing materials such as paraffin, asphalts and oils, they readily absorb sufficient moisture in wet locations to completely lose their insulating properties. Such insulations must therefore be protected by a moisture-proof sheath such as lead when used in moist locations.

The insulations made from materials appearing in the first group fall into two general classes depending on whether or not they are vulcanized after application to the conductor, namely, (1) thermosetting insulations, those which are vulcanized and, (2) thermoplastic, those that are not vulcanized. Thermosetting insulations are those made from natural rubber, GR-S, butyl and silicone synthetic rubbers. Such insulations are applied to the conductor in a soft plastic condition and attain their ultimate physical properties as a result of a heat treatment (vulcanization) during which the sulfur or vulcanizing agents combine with the rubber. Thermoplastic insulations become plastic enough for application to the conductor simply by raising their temperature. They acquire their toughness again on cooling. From this it follows that thermosetting insulations are less subject to softening at elevated temperatures than thermoplastic insulations.

UNITED STATES RUBBER COMPANY

electrical wires and cables

Natural rubber, including Laytex®, GR-S synthetic rubber and thermoplastic insulations are available in two classes, depending on whether they are designed for use in dry or wet locations. Standard insulations, Type R and Laytex Type RU (made from rubber) and Type T (made from thermoplastic) are for use in dry locations while moisture-resistant insulations Types RW, RUW, and TW are for use in wet locations. There are many installations, particularly in buildings, where the less costly standard compounds give entirely satisfactory service.

Natural rubber and GR-S synthetic rubber insulations are also available in two classes depending on the operating temperature for which they are designed, namely, Type R and RW for 60 C. operation and Type RH and RUH for 75 C. operation. Conductors insulated with RH insulation carry more current, that is, use the conductor more efficiently than those insulated with Type R insulation. There is also available a combination insulation capable of operating at 60 C. in wet locations and 75 C. in dry locations. Butyl rubber insulation is suitable for operation at 80 C. and silicone rubber for even higher temperatures.

The thermoplastic insulations described above are limited to 600 volts for general power distribution. The rubber and rubber-like insulations are limited to a maximum operating voltage of 5000. For operation at higher voltages where ozone is produced in quantity, resistance to ozone in the insulation must be provided.

Acceptable ozone resistance in rubber and GR-S synthetic rubber insulations is provided by incorporating in them relatively high percentages of an inert or chemically saturated compound such as vulcanized vegetable oil. These are the so-called oil base compounds. Compounds made from butyl rubber are inherently ozone resistant. Oil base and butyl compounds are suitable for operation at a maximum voltage of about 28 KV, grounded neutral, when properly shielded.

Varnished cambric insulated cables are generally used in the same voltage range as ozone resistant rubber, that is, at a maximum of 28 KV, grounded neutral, and at a maximum conductor temperature of 85 C. For use in wet locations varnished cambric cables must be covered with a lead sheath.

Impregnated paper-insulated, lead-covered cables are suitable for operation at voltages up to 69 KV at a maximum temperature of 85 C. Gas or oil filled paper insulated cables are suitable for higher voltage services at somewhat reduced temperatures.

Insulation thicknesses for all insulations depend on the rated voltage, the conductor size and type of insulation. Minimum insulation resistance and test voltages have been established for all classifications.

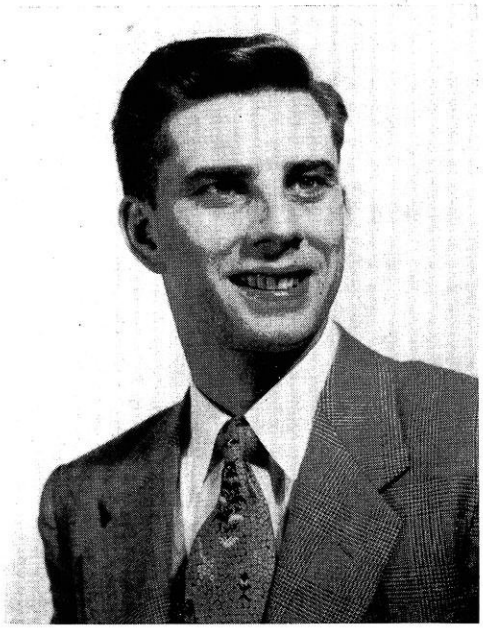
For reprints of these pages write to address below.

Electrical Wire and Cable Department
Rockefeller Center • New York 20, N.Y.

ALUMNI NOTES

By

Richard White, c'55



PAUL J. SCHUBERT

Schubert, Paul J., m'50, has recently been promoted to purchasing agent of the Printed Foil Plant, Harrison, New Jersey, a division of Reynolds Metals Company. Paul joined the Reynolds Metals Company June 20, 1950, as a purchasing trainee for the Louisville Parts operation, and has made rapid progress in the purchasing field. He is a native of Appleton, Wisconsin.

Kneevers, Victor A., c'35, has left the Donahue Engineering Company to form his own engineering firm in Sheboygan, Wisconsin.

Sandner, Frank X., Jr., c'42, Lt. Commander, U.S. Navy, returned to inactive status after duty as resident supervisor of ship building at Pascagoula, Mississippi. He has accepted a position as assistant production manager and coordinator of naval construction with the Ingalls Shipbuilding Corporation in Pascagoula.

Ahlgrimm, M. S., min'53, is working with the DuPont Company in Wilmington, Delaware.

Collins, William A., c'24, suffered a fatal heart attack, Sept. 30, 1953, at Beloit, Wisconsin. Mr. Collins had been a city employee in Beloit since 1924 and was street superintendent and public works superintendent before becoming city engineer, the position he held at the time of his death.

Shorey, Edwin R., Jr., c'35, is now supervisor of the Calgary area, Shell Oil Company, Calgary, Alberta, Canada.

Buckstaff, Sherwood, min'22, MS (Geology)'23, is chief geologist for the Houston, Texas branch of Shell Oil Company.

Dietz, Jess C., c'39, PhD'47, has been promoted to professor of civil engineering, University of Illinois, Division of Sanitary Engineering.

Slezak, John, m'23, president of Illinois Brass Works, Sycamore, Illinois, has been appointed Assistant Secretary of the Army in charge of material procurement.

Severson, Lloyd J., min'36, is now vice president of Oliver Iron Mining Division, U. S. Steel Corporation, in Duluth, Minnesota.

Bredeson, Duane, and **Finn, Fred T.,** both min'53, are now serving with the U.S. Air Force.

Schmidt, Milton O., c'38, MS'41, has been promoted to professor of civil engineering, University of Illinois, Division of Topographic Engineering.

Professors J. G. Woodburn and **A. T. Lenz,** c'28, PhD '40, attended the Minneapolis meeting of the international conference on Hydraulics from Aug. 31 to Sept. 24, and were pleased to visit with the following Wisconsin graduates:

Ree, W. O., c'35, Soil Conservation Service, Stillwater, Oklahoma.

Roberson, Prof. J. A., MS(c)'50, Washington State College, Pullman, Washington.

Minshall, N. E., c'24, Soil Conservation Service, Madison Wisconsin.

Lowe, Prof. T. M., MS(c)'31, Louisiana State University.

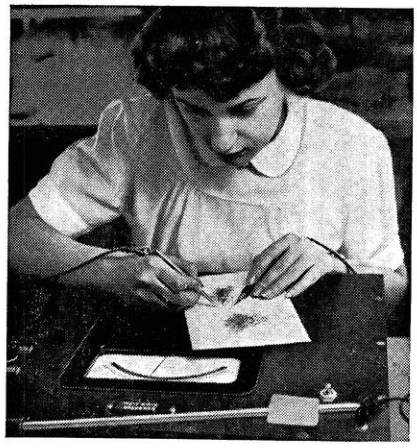
Francis, C. J., c'26, Soil Conservation Service, Omaha, Neb.

It took 100 years of engineering

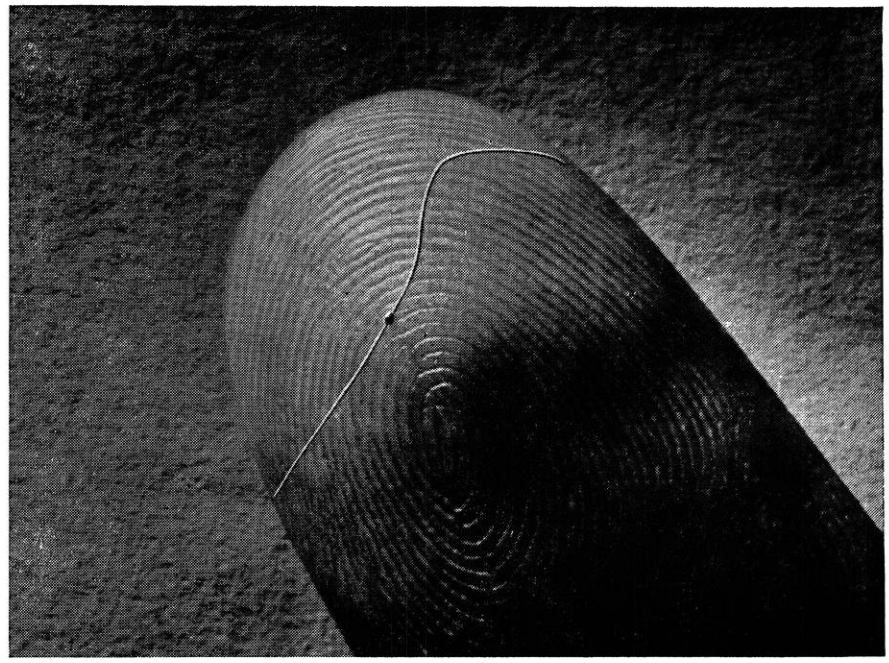
See that tiny speck of oxide on a hair-like wire? It's called a thermistor, and it's the first practical *thermally* sensitive resistor. It's so sensitive it will measure temperature variations within one-millionth of a degree. As a circuit element and control device, this small, stable and rugged unit has a place in a variety of electrical circuits.

Although the thermistor is the smallest and, in appearance, one of the simplest devices made by Western Electric—manufacturing unit of the Bell Telephone System—it was more than 100 years in the making.

Back in the 19th Century—some time before Western Electric was founded in 1869—Michael Faraday studied a curious thermally sensitive resistor material similar to that used in 20th Century thermistors. As Faraday and others after him discovered, the trouble with making effective use of this material was that different units made by what seemed to be the same process, showed large variations in their behavior. The problem of how to control the amount of impurities present in the material was finally solved a few years ago by our research team mates at Bell Telephone Laboratories.

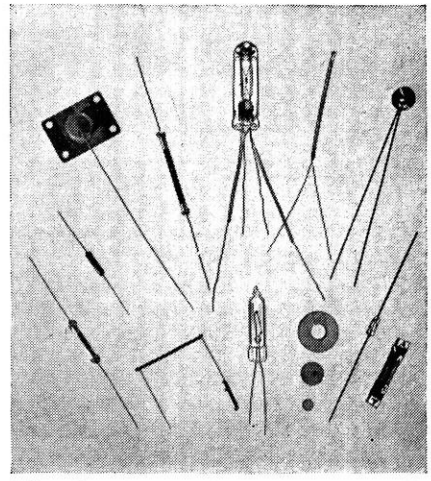


At Western Electric's Allentown (Pa.) Plant hundreds of minute thermistor components are electrically tested and sorted every day. The basic component, an oxide, has a large negative temperature coefficient of resistivity.



Once beyond the laboratory stage, Western Electric's engineers tackled the job of *mass-producing* the hard-to-handle oxides. After many trials they got a pilot line in operation—then a full scale production line through which compressed powders of thermistor material could be sintered into a strong, compact and homogenous mass. Today reliable thermistors are being made in many shapes and sizes—small beads, rods, discs, washers—to meet varying circuit and design problems. To make this possible, Western Electric engineers had to find new ways to apply a slurry of oxides on wire; new ways to extrude and mold oxide mixtures.

At every turn, the thermistor has presented fresh challenges to our engineers. Engineering is like that at Western Electric—where technical men of varied skills pool their knowledge in a constant search for new and better ways to do things.



The thermistor takes many forms depending on the resistance and power-handling capacity needed in a particular circuit.

WANT TO KNOW MORE?

Send the coupon below for a copy of the 16-page technical monograph entitled, "Thermistors as Components Open Product Design Horizons."

Western Electric

A UNIT OF THE BELL SYSTEM SINCE 1882

WESTERN ELECTRIC COMPANY
COLLEGE RELATIONS DEPARTMENT
195 BROADWAY, NEW YORK 7, N. Y.

I'd like more information about

☐ Thermistors and their application
☐ Engineering opportunities at Western Electric

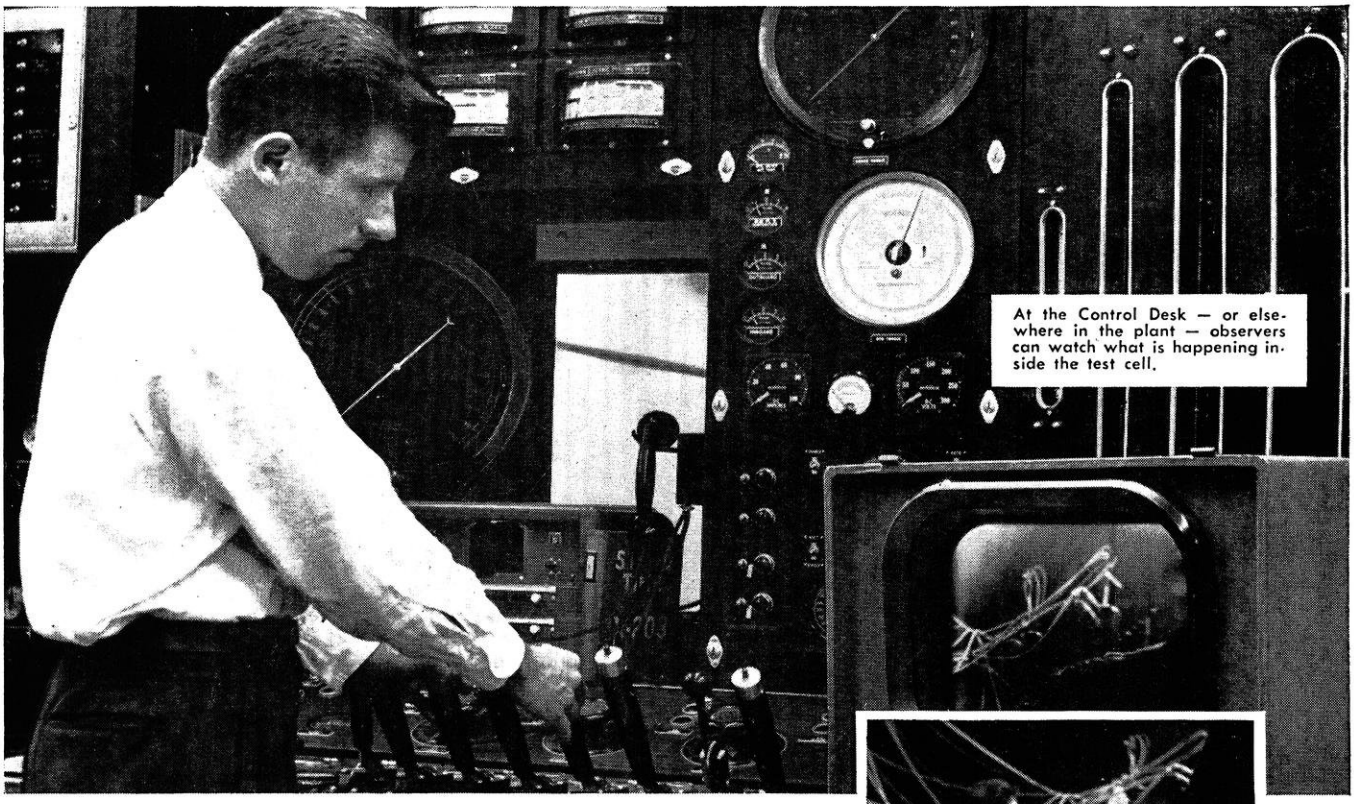
Name _____

Address _____

City _____ State _____

School _____ Class _____

NEW LOOK IN JET ENGINEERING



At the Control Desk — or elsewhere in the plant — observers can watch what is happening inside the test cell.

Television cameras are easily pre-focused on parts formerly impossible to see during a test run.

Through the use of industrial television, Pratt & Whitney Aircraft engineers can now watch what happens as big jet engines are run under abnormal conditions. Without personal hazard, they can see inside the test cell from any location in the plant.

On their television screens they can observe the action of linkages, controls and other parts. Even infra-red characteristics not visible to the human eye can be studied.

But to do this, many technical problems had to be solved. For instance, commercial equipment had to be modified in many ways to operate under abnormal temperatures and in hazardous atmospheres. Soon a further development will permit remote traversing of the camera and adjustment of lenses.

This typifies the way in which new engineering and research facilities are constantly made available to Pratt & Whitney Aircraft engineers. Here engineers are encouraged to experiment with new ideas — given an opportunity to do *real* engineering.

PRATT & WHITNEY AIRCRAFT
Division of United Aircraft Corporation
EAST HARTFORD 8, CONNECTICUT

If you are interested in our employment opportunities for engineers, contact your College Placement Officer or write directly to Mr. Frank W. Powers, Engineering Department, Pratt & Whitney Aircraft, East Hartford, Conn.

Out of the dark...

In a few swiftly moving years, television magic has brightened nearly 23,500,000 homes. **Leading all the way is RCA...**

Pioneering in electronics, building powerful transmitters, supplying vital equipment to studios and stations, programming the finest in entertainment, news and education, building radio and TV sets that most people want . . . So what do you see? You see the great new line of RCA Victor television with Rotomatic Tuning: The sharpest, clearest pictures on record at the click of a dial. You see through NBC—a service of RCA—today's top television programs, with a fabulous new line-up starting this Fall. That's why —from yesterday's darkness to the brilliance of today—**it's RCA all the way!**

CONTINUE YOUR EDUCATION WITH PAY—AT RCA

Graduate Electrical Engineers: RCA Victor—one of the world's foremost manufacturers of radio and electronic products—offers you opportunity to gain valuable, well-rounded training and experience at a good salary with opportunities for advancement. Here are only five of the many projects which offer unusual promise:

- Development and design of radio receivers (including broadcast, short-wave and FM circuits, television, and phonograph combinations).
- Advanced development and design of AM and FM broadcast transmitters, R-F induction heating, mobile communications equipment, relay systems.
- Design of component parts such as coils, loudspeakers, capacitors.
- Development and design of new recording and producing methods.
- Design of receiving, power, cathode ray, gas and photo tubes.

Write today to College Relations Division, RCA Victor, Camden, New Jersey. **Also many opportunities for Mechanical and Chemical Engineers and Physicists.**

RCA® *RADIO CORPORATION OF AMERICA*

World leader in radio — first in television

(*continued from page* 30)

(ESA) was recently organized as a National organization to collect all the locals. This organization claims a membership of 40,000 people (Mr. Robbins questioned this number.) At hearings before the Congressional Committee on labor matters, particularly the Taft-Hartley Act, ESA singles out NSPE as their prime target and tried to label them as management representatives. To combat this situation, Mr. Robbins outlined various surveys that were being made on the vital question of what generates a collective bargaining attitude. This survey is being made among management, industry, and members of the engineering field. Questionnaires are being sent to engineers in training and to professional engineers in an effort to determine and get the difference of attitude of all age groups. All in all, Mr. Robbins' address was an inspiration and gave much food for thought.

Saturday Afternoon and Evening

Saturday afternoon everyone at the WSPE convention was invited to participate in as many of the following activities as they desired; an auto trip through the Kettle Moraine Area, the Wade House, trout fishing at Silmer Moons Springs, golf, or hiking. Mr. Raymond Sivesind, Supervisor Historical Sites, State Historical Society of Wisconsin, gave a short lecture with colored slides on "Interesting Historical Facts of the Kettle Moraine Area."

Mr. Sivesind also presented slides of the Old Wade House State Park, Wisconsin's newest state park. Wade House is one of the earliest stage coach inns in Wisconsin. The restoration of the Old Wade House was made possible by The Kohler Foundation in memory of Marie Christine Kohler.

The informal cocktail party and banquet were well attended by both members and ladies followed by an enlightening and entertaining program.

Pierce G. Ellis, President of WSPE, our toastmaster, presented George B. Walter, dean of Lawrence College, who entertained us with a delightful and humorous address, "No Man Is an Island." This was followed by Murl Deusing's travelogue on "Life in Florida's Everglades" in color; Mr. Deusing is curator of Education, for the Milwaukee Public Museum.

Appointment

Delmar W. Nelson, professor of Mechanical Engineering at the University of Wisconsin, has been appointed by the State Industrial Commission to serve a three year term on the Wisconsin Registration Board of Architects and Professional Engineers. He succeeds the late Grover Keeth.

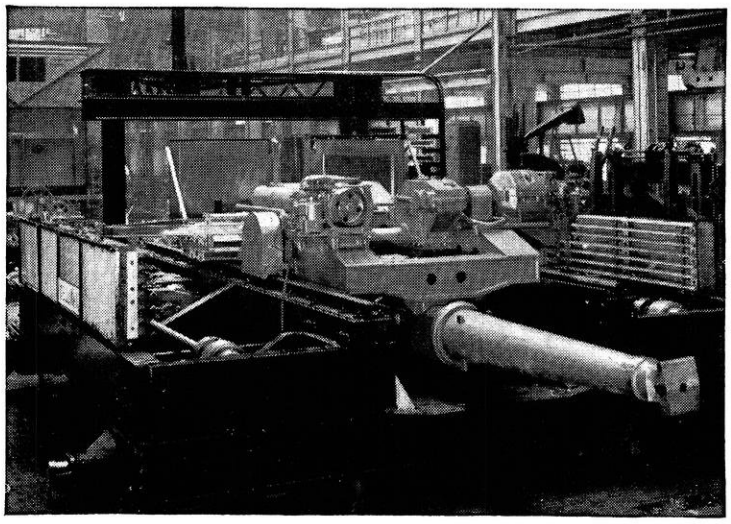
He is a past chairman of the Rock River Valley section of the American Society of Mechanical Engineers, of the Wisconsin Chapter of the American Society of Heating and Ventilating Engineers, and of the Madison Technical Club. He is, at present, also on the Advisory Committee for the revision of the State Heating, Ventilation, and Air Conditioning Code.

Active, too, in WSPE, he is a past chairman of the Fees and Classification Committee and of the Nomination Committee. He is a director of the Southwest Chapter for the ensuing year and is a member of the present Nomination Committee of WSPE.

Professor Nelson received both his BS and his MS from the University of Wisconsin.

(*please turn to page* 50)

Another page for **YOUR BEARING NOTEBOOK**

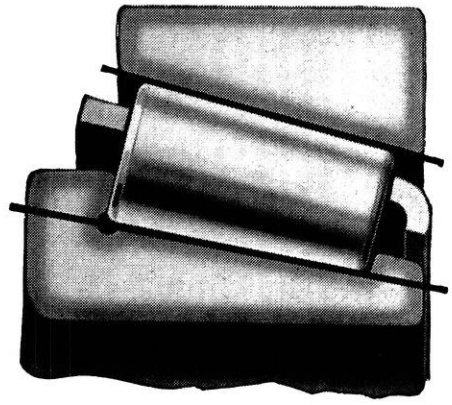


How to carry a floor charger's 12-ton overhung load

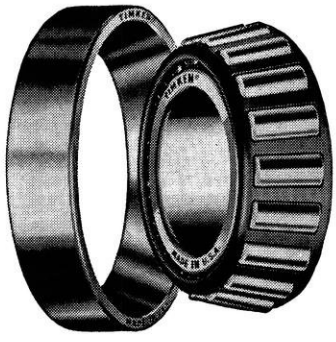
This floor charger charges and levels 12 tons at a crack in open hearth furnaces. The 12-ton overhung load and the terrific shock loads set up by the charging operation are carried by the peel shaft bearings. To take these loads and to keep the charger in top operating shape, design engineers specify Timken® tapered roller bearings.

Line contact gives TIMKEN® bearings extra load-carrying capacity

In Timken bearings, the load is carried on a line of contact between the rollers and races instead of being concentrated at a single point. Rollers and races are case-carburized to give a hard, wear-resistant surface over a tough, shock-resistant core. And to be sure of getting the highest quality bearing steel, the Timken Company makes its own.



TIMKEN
TRADE-MARK REG. U. S. PAT. OFF.
TAPERED ROLLER BEARINGS



Want to learn more about bearings or job opportunities?

Many of the engineering problems you'll face after graduation will involve bearing applications. For help in learning more about bearings, write for the 270-page General Information Manual on Timken bearings. And for information about the excellent job opportunities at the Timken Company, write for a copy of "This Is Timken". The Timken Roller Bearing Company, Canton 6, Ohio.

NOT JUST A BALL ○ NOT JUST A ROLLER ⬭ THE TIMKEN TAPERED ROLLER ⬭ BEARING TAKES RADIAL ⓪ AND THRUST →⓪← LOADS OR ANY COMBINATION ✳

Commercial Oxygen

(*continued from page 23*)

iron scrap are easily and economically cut and reclaimed as heavy melting scrap. Pieces as large as 6 ft. thick can be cut with accuracy at a rate of 2 to 3 inches per minute.

The oxygen supplied for welding and cutting has a purity of 99.5 per cent. This same oxygen is used by hospitals for oxygen therapy. Patients suffering from oxygen-want are supplied with any required concentration of oxygen, up to 99.5 per cent, by a nasal catheter, face mark, or oxygen tent. To provide proper concentrations for specific needs, special pressure reducing regulators control the flow of oxygen.

Patients suffering from asphyxia, asthma, pulmonary diseases, heart disease, and anemia are often treated with oxygen concentrations. Oxygen is often prescribed as part of standard post-operation treatment also. It has been found that patients who breathe extra oxygen for a short time following an operation are frequently more comfortable.

The aviator flying at high altitudes has difficulty getting enough oxygen from the "thin air" of the rarified atmosphere. In such instances, unless the cockpit or cabin of the airplane is pressurized, he requires extra oxygen. Oxygen from cylinders is also used in submarines to replace the oxygen consumed by the crew.

THE END

Summer Survey Camp

(*continued from page 16*)

which takes up the remainder of the camp period. Using the principles taught in an on-campus course in curves and location, the objective is to locate approximately one mile of highway in full accord with the Wisconsin Highway Commission practices. Every detail is carried out just as if it were an actual project of the commission, including a preliminary paper location made in the office, which is later transferred to the ground with minor adjustments being made in the field. Each student must submit a report containing a complete set of plans, profiles, cross-sections, and cost calculations. The Highway Commission furnishes an engineer who presents the standard operating procedures to the CE's and sees to it that they are carried out correctly. (Incidentally, this year's engineer was known to everyone at camp as "Don Highway." Wonder where that last name came from?)

All in all, the camp is quite an experience for everyone involved. The recreational facilities available, the informal air between students and faculty, and the co-operative setup of the camp create an atmosphere that will long be remembered by the CE's of Wisconsin. And even more important, the six weeks of surveying prepares the potential engineer for practically any surveying problem he may meet in later life.

THE END

"Allis-Chalmers Graduate Training Course Was Just What I Needed."

says LOWELL E. ACKMANN

University of Illinois—B.S., E.E.—1944
and now manager, Peoria, Ill., Branch Office

"My experience with machinery in the Navy during the war convinced me I needed a training course. There was so much equipment on board that was a complete mystery to me that I became very 'training-course minded'.

"After investigating many training courses, the one at Allis-Chalmers looked best to me then—and still does.

"In my opinion, the variety of equipment is what makes Allis-Chalmers such a good training spot.

"No matter what industry you may be interested in, Allis-Chalmers makes important, specialized equipment for that industry. Electric power, steel, cement, paper, rock products, and flour milling industries—to name a few, are big users of A-C equipment.

"Before starting on the Allis-Chalmers Graduate Training Course, I thought I would like selling, preferably technical selling but, as is often the case, I didn't know for sure. This course, together with some personal guidance, helped me make up my mind. That, too, is an important advantage of the GTC program.

"But whether you want to be a salesman or designer, production engineer, or research engineer, Allis-Chalmers, with its wide variety of equipment and jobs, is an ideal place to get off to a good start—without wasting time."

Facts You Should Know About the Allis-Chalmers Graduate Training Course

1. It's well established, having been started in 1904. A large percentage of the management group are graduates of the course.

2. The course offers a maximum of 24 months' training. Length and type of training is individually planned.

3. The graduate engineer may choose the kind of work he wants to do: design, engineering, research, production, sales, erection, service, etc.

4. He may choose the kind of power, processing, specialized equipment or industrial apparatus with which he will work, such as: steam or hydraulic, turbo-generators, circuit breakers, unit substations, transformers, motors, control, pumps, kilns, coolers, rod and ball mills, crushers, vibrating screens, rectifiers, induction and dielectric heaters, grain mills, sifters, etc.

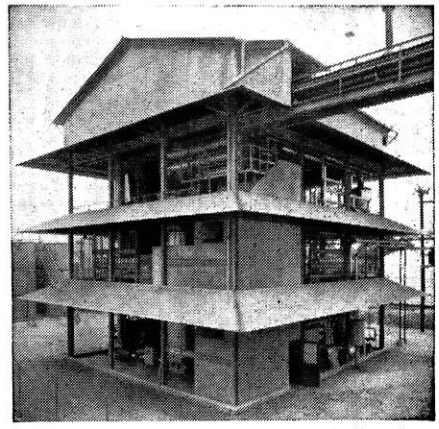
5. He will have individual attention and guidance in working out his training program.

6. The program has as its objective the right job for the right man. As he gets experience in different training locations he can alter his course of training to match changing interests.

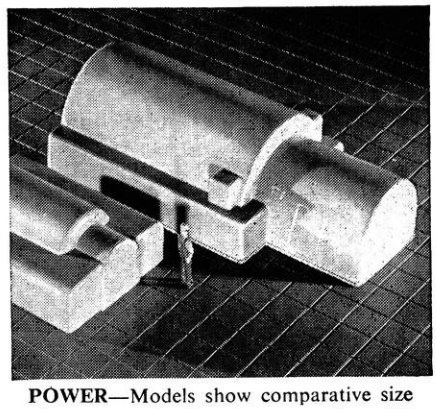
7. For information watch for the Allis-Chalmers representative visiting your campus, or call an Allis-Chalmers district office, or write Graduate Training Section, Allis-Chalmers, Milwaukee 1, Wisconsin.

ALLIS-CHALMERS

C-5676



PROCESSING—Allis-Chalmers built solvent extraction plant processes one hundred tons of rice bran per day at oil processing plant in Texas.



POWER—Models show comparative size of generators having the same rating with and without super-charged hydrogen cooling. Allis-Chalmers is first to supply super-charged hydrogen cooling.

● Claud M. Kellett, Jr. received his Bachelor of Electrical Engineering degree from Georgia Tech in 1950.

Claud's first year at Allison was spent in the company of other recent engineering graduates in a college graduate training program. This program helped him gain practical experience in the activities of selected departments throughout the Allison plants. On the completion of his training, a call to active duty with the Army delayed Claud's permanent assignment to an Allison department. However, the twenty-one months he was away did not diminish his opportunities in the least. When he returned early this year he was able to resume his career in engineering with the result that today he is an experimental engineer concerned with electronic instrumentation in the Research Group of the Transmission Test Department.

The torqmatic converter turbine that Claud is working with is a vital element in the operation of Allison heavy duty transmissions. Allison is the world's largest manufacturer of torqmatic drives for heavy duty Ordnance and commercial vehicles and equipment. The commercial converters and transmissions are used in scrapers, tractors, trucks, cranes, shovels and drilling rigs.

The problem presented to him in connection with the turbine was to find the level of residual stresses created in the turbine by repair welding performed on the hub. The feasibility of such welds might then be determined. Claud applied variable resistance type strain gages to the turbine vanes at their exits and read their strain levels with the strain indicator. Then he cut the vanes around each of the strain gages to relieve residual stress and re-read the strain levels. From the difference in strain between the stressed and relieved conditions he was able to calculate the residual stress induced by the welds.

Yesterday Claud was interested in torsional vibration and the electronic "know-how" required to present it for oscillographic recording. He knows that tomorrow the many tests of transmissions and component parts will each present unique problems. Pressure transducers, vibration pick-ups electronic flow meters and tachometers must be installed with a myriad of complicating factors ever present. Equipment not available must be designed and built, or existing equipment modified. A future at Allison holds a constant challenge of doing that which has not been done before.

Allison is looking for young men with degrees in **MECHANICAL ENGINEERING, ELECTRICAL ENGINEERING, AERONAUTICAL ENGINEERING** ***and*** **INDUSTRIAL ENGINEERING.** ***There are also a number of openings for majors in Metallurgy, Electronics, Mathematics and Physics.*** Write now for further information: R. G. Greenwood, Engineering College Contact, Allison Division, General Motors Corporation, Indianapolis 6, Indiana.

Allison

DIVISION GENERAL MOTORS CORPORATION • Indianapolis, Ind.

Design, development and production—high power TURBINE ENGINES for modern aircraft . . . heavy duty TRANSMISSIONS for Ordnance and Commercial vehicles . . . DIESEL LOCOMOTIVE PARTS . . . PRECISION BEARINGS for aircraft, Diesel locomotives and special application.

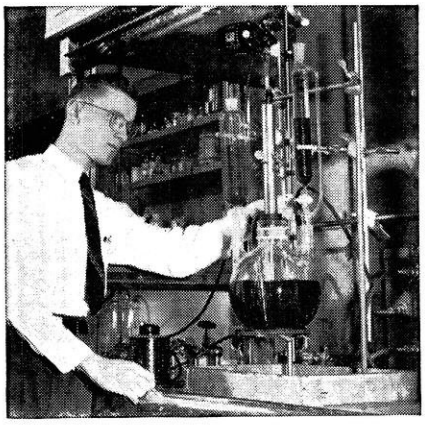
THE DU PONT DIGEST

Research

provides broad opportunities for chemists, physicists and engineers cooperating on many problems.

For one thing, much Du Pont research is fundamental, aimed at advancing scientific knowledge regardless of specific commercial objectives. However, such research often suggests new products . . . each with its own challenging technical problems which must be solved before commercial production can begin. Solving these problems offers another great field of work for teams of engineers and scientists.

"Teflon" tetrafluoroethylene resin is an example of this well integrated teamwork.



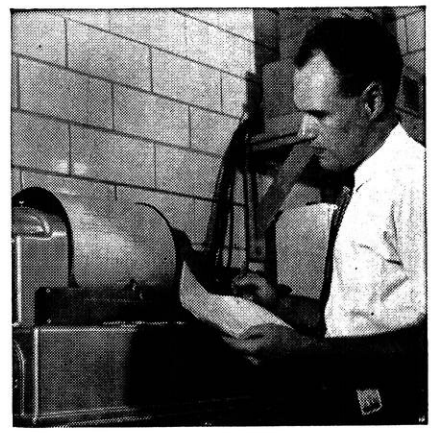
Howard E. Holmquist, *Ph.D. in Organic Chemistry, Univ. of Minn. '51, is shown at work on a problem in synthetic organic chemistry.*

Doing chemical *engineering research on a plate in a distillation tower are: C. M. Gamel, Jr., S.M.Ch.E., M.I.T. '48; and J. B. Jones, M.S.Ch.E., Univ. of Mich. '46.*

During research on refrigerants, the polymer was discovered and work was begun to make it useful. The new plastic had a remarkable combination of properties; temperature resistance beyond the range of any previous plastic, excellent electrical characteristics, and the highest degree of chemical inertness of any commercial plastic.

In fact, "Teflon" was almost too unusual. Although it melts, it is too viscous to flow like other plastics. It does not dissolve—even in aqua regia. There was no method for molding it or for making it into thin coatings.

The problem of molding was solved with the help of techniques used in powder metallurgy. "Teflon" is now molded by cold pressing, followed by sintering or "fusing" at about 360°C.



Research workers *have available modern apparatus, such as the infrared spectrometer being used here by Vaughan C. Chambers, Ph.D. Org. Chem., M.I.T. '50.*

For coatings, previous research suggested dispersions—minute particles suspended in a liquid. After much study, a team of technical men learned how to suspend particles of "Teflon" about 1/125,000 of an inch in diameter. Then a commercial scale process was devised. This development made possible thin coatings of "Teflon" and also a process for extruding the material.

Meanwhile, another group discovered how to successfully formulate the new plastic into "Teflon" tetrafluoroethylene resin finishes and wire enamels.

The development of "Teflon" illustrates the close teamwork that is the basis of research at Du Pont. But this teamwork doesn't end with research. Bringing the product to commercial reality requires development and design work by chemists and both chemical and mechanical engineers. Next month's Digest will feature information on the opportunities Du Pont offers men interested in this phase of making "better things for better living . . . through chemistry."

ASK FOR "Chemical Engineers at Du Pont." New illustrated booklet describes initial assignments, training and paths of promotion. Just send post card to E. I. du Pont de Nemours & Co. (Inc.), 2521 Nemours Building, Wilmington, Delaware. Also available: Du Pont and the College Graduate and Mechanical Engineers at Du Pont.

DU PONT
REG. U.S. PAT. OFF.

BETTER THINGS FOR BETTER LIVING
. . . THROUGH CHEMISTRY

Watch "Cavalcade of America," on Television

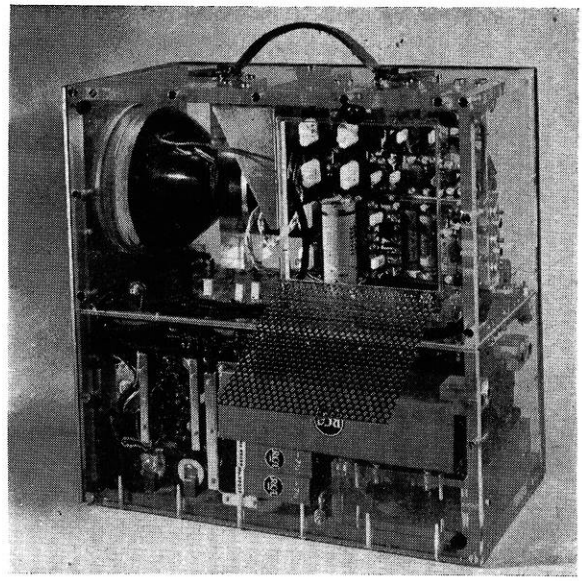
Transistors

(*continued from page* 31)

as much as a tube set, and would take up a space of 20 cubic inches whereas the tube counter would take up 200 cubic inches. Another computer element, the electronic adder was duplicated using transistors. (See Fig. 1.) Capable of 100,000 additions per second, this adder requires one-quarter the power and is one-seventh the size and one-fifth the weight of a comparable unit using tubes.

A completely portable television receiver (see Fig. 2) was demonstarted which used all transistors except for the picture tube. The unit was about the size of a portable typewriter case (7″ x 13″ x 12″,) weighed 27 pounds, and produced a satisfactory picture when operated off its self-contained loop antenna five miles from the transmitter and fifteen miles with the addition of a small "rabbit-ear" antenna.

Along with units mentioned above were shown such devices as a transistor portable phonograph, a wireless phonograph jack that permits the use of a record player with radios that have no phonograph connection, a wireless microphone, a toy piano, a transistor ukelele, and a transformerless power amplifier. These, and other electrical equipment are at present being designed, constructed, and tested using transistors. It may not be long before it becomes practical to begin production of equipment using transistors so that the public may benefit from this new wonder of electrical science.



Side view of portable battery-operated television receiver, which uses developmental and experimental transistors and no tubes except the 5-inch picture tube. The single-channel receiver weighs 27 pounds and is housed in a cabinet 12 by 13 by 7 inches, about the size of a portable typewriter case. When operated from its self-contained loop antenna, the set produced a satisfactory picture five miles from the Empire State TV tower. With a small "rabbit-ear" antenna, the range was increased to 15 miles with similar results.

THE END

SYNTHANE — making bigger payloads pay off

Synthane bushings, spacers, and bearings in the landing gear of this giant of the skies share the landing shock loads of twenty-five tons. But Synthane parts have many virtues in addition to their ability to withstand the jolts of heavy landings.

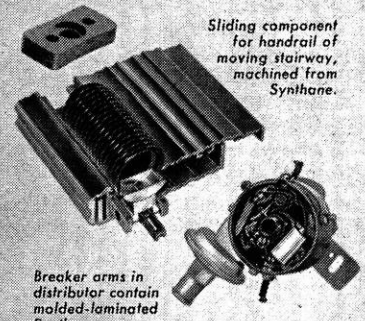
Parts made of this hard-working laminated plastic are unaffected by oils, and are dimensionally stable. They resist abrasion, and weigh half as much as aluminum.

Because Synthane is so easy to machine, it is appropriate for fair-leads and cable-sheaves in control systems. Because it is an excellent electrical insulator, you will find it at work in engine ignition systems, flight instruments, automatic controls, and radar sets. Because Synthane is light and corrosion-resistant, it's used for the flapper valves in fuel cell baffles.

Synthane has all these properties and many more. It might be a good material for you to try. Start by sending for the complete Synthane Catalog. Synthane Corporation, 42 River Road, Oaks, Penna.

IS YOUR ANSWER HERE?

If you are not in the aircraft industry, Synthane's combination of properties may still stir your interest. Besides the properties at the left, Synthane has good tensile, compressive, flexural, impact and shear strength, a low coefficient of expansion, is moisture- and wear-resistant, easy to machine.



Sliding component for handrail of moving stairway, machined from Synthane.

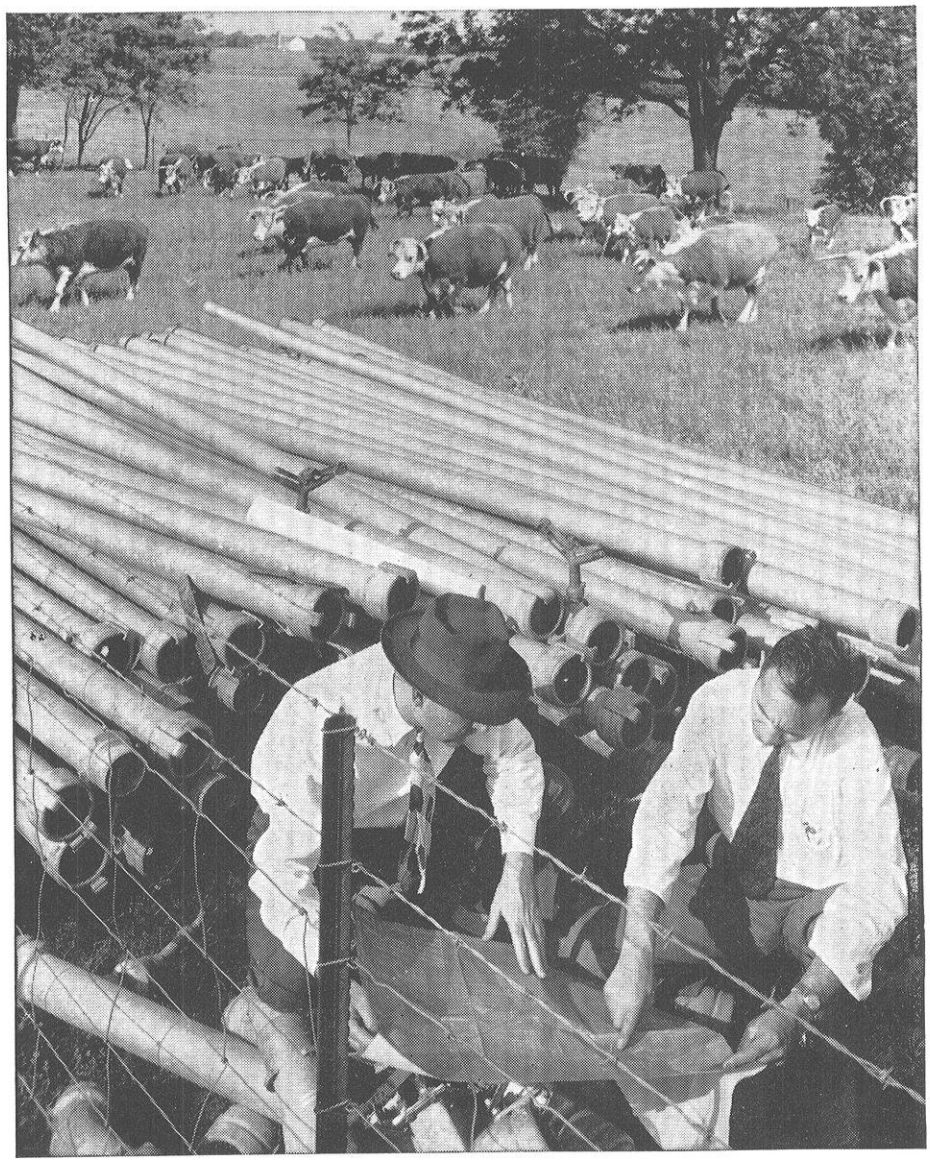
Breaker arms in distributor contain molded-laminated Synthane.

Synthane-one of industry's unseen essentials

SYNTHANE

LAMINATED PLASTICS

Two agricultural scientists, from a large state university, check the blue print for irrigation pipe on Republic's experimental farm.



HERE THE CATTLE ARE GUINEA PIGS

If you're going into industry, one of your most difficult tasks faces you in the next few months. You'll have to distinguish between progressive companies and stand-stills. One way is to consider the pioneering each is doing.

How much does this company you might join plan its future?

How much does it care about society in general?

The cattle in the picture, for instance, are at Republic's experimental farm. They are part of a study to determine how much extra grass, hence extra meat, can be produced by irrigation. The purpose of the experiment is to prove the benefit of converting worn-out crop land to profitable grazing area.

The economic reasons for Republic's experiment are that animals must be fenced and Republic makes steel farm fence; also that irrigation requires pipe and Republic makes steel irrigation pipe. But beyond this immediate commercial aspect, Republic's experimental farm has a goal reaching far into the future.

Republic Steel's policy is based on a deep realization that no economic or social section of a nation can long progress at the expense of others. Progress must be mutual and industry has a responsibility to *do for* its customers as well as to *sell to* them. This, we believe, is an enlightened approach to economics which will promote the continuing welfare of all.

We hope such research programs, of which our farm experiments are only one example, will catalog Republic in your mind as a progressive, forward-thinking company.

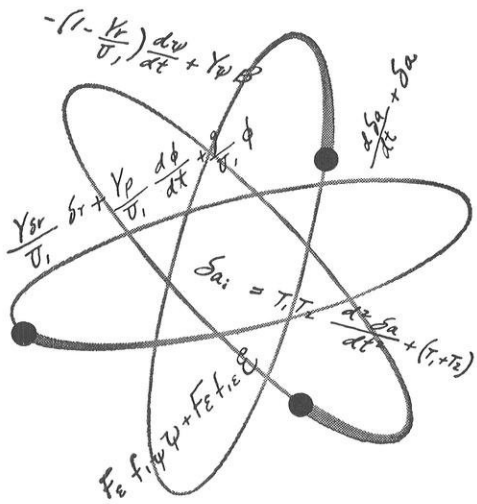
REPUBLIC STEEL

GENERAL OFFICES • CLEVELAND 1, OHIO

REPUBLIC STEEL

WORLD'S WIDEST RANGE OF STEELS AND STEEL PRODUCTS

Future of Automatic Controls brings new opportunities for engineers and scientists at Honeywell



As science advances, and as our country continues to develop its industrial might, the business of automatic control gets bigger and increasingly important.

For the prime force behind the 20th century revolution has been and will continue to be *automatic control.*

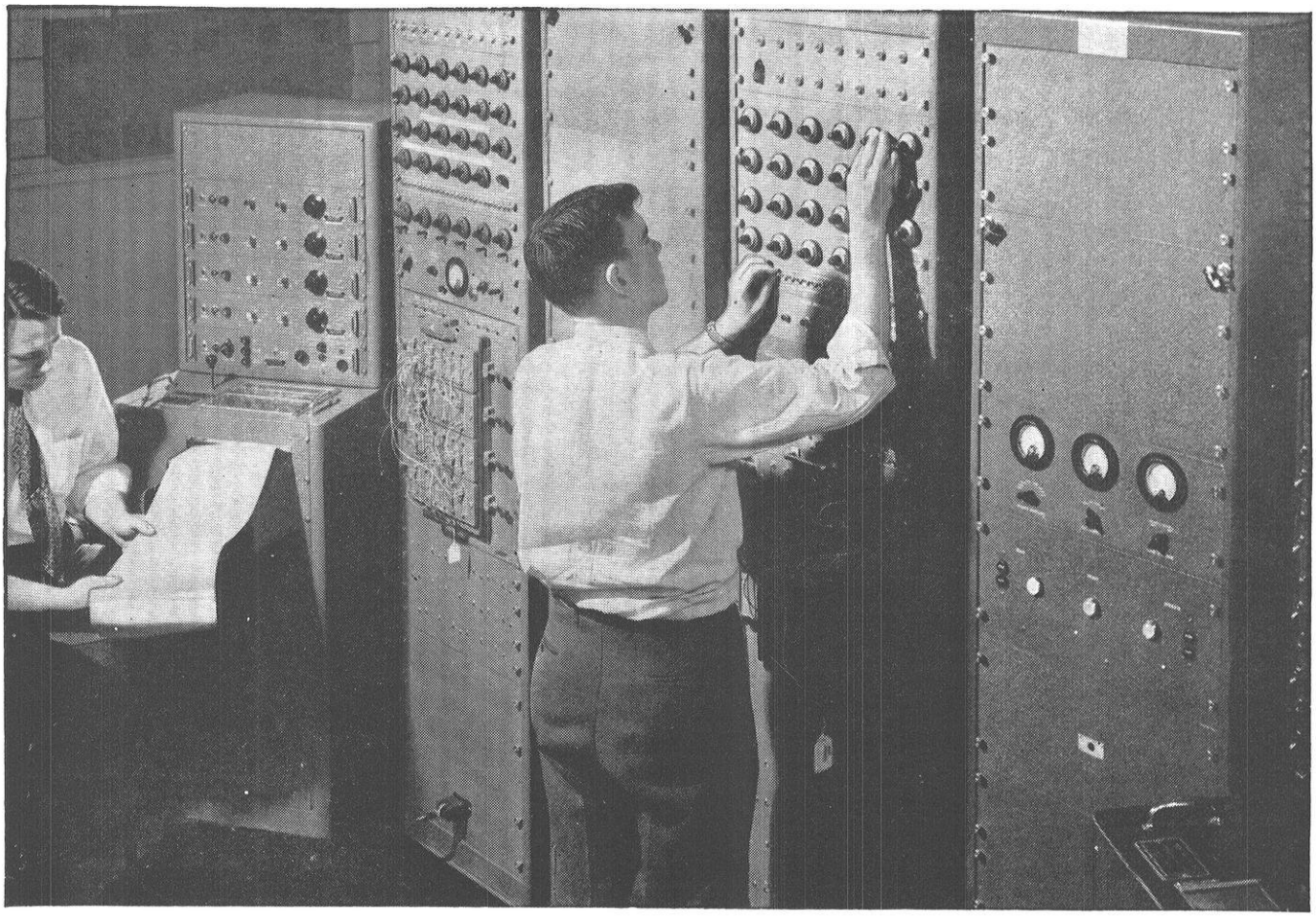
So at Honeywell, leader in this field for over 60 years, it of course means a bigger, more exciting, more challenging job ahead—all of which adds up to greater opportunities for engineers and scientists.

And that's why we're always looking for men with ideas and ambition to grow with us.

Here at Honeywell one out of ten employees is engaged in research and engineering activities.

Shown below is part of our Aeronautical Division's analog computing equipment, which helps our research engineers to develop and simulate flight tests on automatic controls for aircraft. It's typical of work being done by all of the company's eight divisions in plants across the country.

So if you're an engineer or scientist and like to use your imagination freely in such fields as electronics, hydraulics, mechanics, chemistry, physics, and a wide variety of others, be sure to send in the coupon below.



America lives better—works better—with Honeywell controls.

MINNEAPOLIS
Honeywell

First in Controls

MINNEAPOLIS-HONEYWELL REGULATOR CO.
Personnel Dept., Minneapolis 8, Minnesota

Gentlemen: Please send me your booklet, "Emphasis on Research" which tells more about engineering opportunities at Honeywell.

*Name*_____

*Address*_____

*City*_____ *Zone*____ *State*_____

McCormick's

Engine-Ears

By Larry McCormick, met'55

If you, kind sir, are looking for information about your favorite campus charity, you have turned to the right page.

This being the first issue of the year, and the article which you are reading, the first of my series, there is nothing of value herein. (The first paragraph was just a come-on.) The individuals who could enlighten me on the activities of the campus engine societies were nowhere to be found. This penpusher was forced to dig up his Fearless Fosdick badge and go out hunting stool-pigeons.

These informers paid off with a little knowledge: The boys in ASCE had an intellectual get-together in the plush lounge of the Hydraulics Lab. This event took place on the evening of Sept. 30, 1953. (I think it was 1953!) "Informative" talks were given by the CE staff, followed by a movie for those who could not understand the "Informative" talks. Tea was served and the meeting was brought to a grand conclusion. Everyone jumped to their feet and thundered out a chorus of "Mary had a 4% grade."

The first week of school saw a group of CE's standing in front of the ME building, seriously contemplating a group of holes. These holes were being hand excavated in an effort to find a lost gas or water main. The CE's were apparently thinking about what they could do if they flunked out of school. Nice prospect, hmm!

Jerry Bard whisperen to me the other day that AIChE held their first "kickoff" meeting October 7. He also hinted at the possibility that a few outstanding men may be admitted to this select group if they have the price of a membership in their acid-burned blue jeans. These are the gentlemen who will govern the fate of AIChE: Ron Hasse, president; Art Stroud, vice-president and treasurer; Jerry Bard, secretary.

? ? ? ?

"What about SAE?" . . . Quiet sir, I'll come to that in a minute. "I wanna hear about SAE." . . . go 'way, ya bother me! "WHAT'S SAE DOING?" . . . Okay, okay. They had a real shindig on September 29, in the Topflight room at the Union. "Wha' hoppen?" Well, they had a speaker (goes by the name of Mr. Jackson), who really gave 'em the word on Indianapolis cars, their design, and the way they're put together. It seems Mr. Jackson is a sales engineer for the Perfect Circle piston ring people. Mr. Jackson slipped the audience some colored slides and a movie. He also told of his experience working on the Maserati that Wilbur Shaw drove to victory in 1939 and 1940. Here are the new officers in the society: Paul Padrutt, president; Candon Nelson, vice-president; John Zahn, recording secretary; Bill Taylor, corresponding secretary; and Chuck Gunderson, treasurer.

There is a rumor that the resourceful pilot who camped over the Penn State-Wisconsin game is a ChE. The writer has been sneaking into games or trying since he was 5 years old. "It ain't like the old days."

Come-on-a-my-house

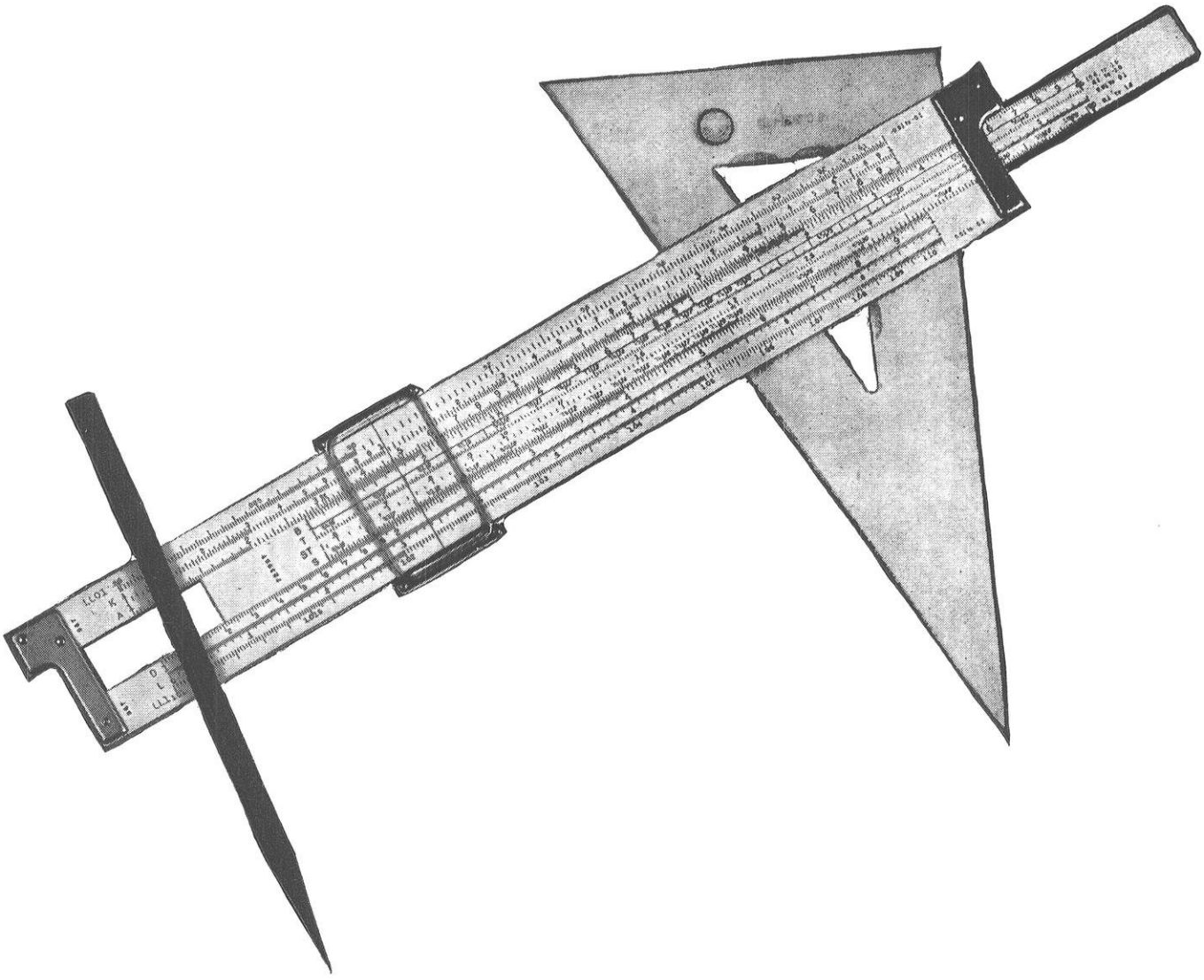
Clarence Reider, a Triangle man, sent down this advertisement:

Triangle, a fraternity of architects and engineers, was begun in 1907 to help men planning to enter the engineering and architectoral fields to get a greater reward from their years at school.

Since its installation in 1913, the Wisconsin Chapter has been trying to do just that. Along these lines numerous extracurricular activities are included in this semester's program.

On the athletic side we have volleyball, basketball, bowling, and tennis teams ready for their contests in interfraternity play. With regard to the social side of our school life, we just had a successful party after the Penn State game. Its theme was "Fashion Clash," and the first prize was awarded to Dale Sievert and Howard Chagneau for the craziest outfit. Then again, looking at the more serious aspect of college life, the fraternity now has six men on the staff of the Wisconsin Engineer, numerous more in the engineering societies, and a man on the Air Force Color Guard.

"Oscar," the iron man, of Triangle, now has some competition as the guardian of 438 N. Frances. Since he allowed our treasured "Blarney Stone" to be stolen, we thought a double guard would be in order. Toward this end we acquired a three month old Cocker Spaniel puppy named "Zip," which actually is quite a misnomer. We're expecting great things from our mascot.



You'll find classmates—and a future—at Boeing!

Men from more than 120 top engineering schools are building rewarding careers at Boeing. So chances are, you'd be working with some of your classmates here. And in addition you'd be a member of an Engineering Division renowned for its trail-blazing contributions to both military and civil aviation.

If that's the kind of engineering prestige you'd like to enjoy, look into Boeing opportunities. This company has been growing steadily for 37 years. It provides the finest research facilities in the industry. It offers you work on such exciting projects as guided missiles and the fastest known bomber in the world: the B-47 six-jet medium bomber, as well as the still-classified B-52 eight-jet heavy bomber.

You can work in Seattle, in the Pacific Northwest, or in Wichita, Kansas. Boeing provides a generous moving and travel allowance, gives you special training, and pays a good salary that grows with you.

Plan *now* to build your career as a member of Boeing's distinguished Engineering personnel after graduation. Boeing has present and future openings for experienced and junior engineers in aircraft

- **DESIGN**
- **RESEARCH**
- **DEVELOPMENT**
- **PRODUCTION**
- **TOOLING**

also for servo-mechanism and electronics designers and analysts, and for physicists and mathematicians with advanced degrees.

For further information, consult your Placement Office, or write:

JOHN C. SANDERS, Staff Engineer — Personnel
Boeing Airplane Company, Seattle 14, Washington

BOEING

W.S.P.E. Membership

(continued from page 38)

Chapter	Members & Affiliates 7/1/53	Quota	New Members	% Quota
FRV	117	41	5	12.2%
M	342	141	6	4.4%
NW	51	17	2	1.7%
SE	64	41	0	0 %
SW	199	53	1	1.9%
W	55	10	0	0 %
WV	41	15	0	0 %
Out of State	45	32	0	0 %
	914	350	14	4.0%

New Members Added Since July 1, 1953 Sponsored by

Fox River Valley

William H. MacDonald ..... L. H. Kingston

Walter F. Nelson ..... L. H. Kingston

George F. Hrubesky ..... L. H. Kingston

Timothy P. King ..... L. H. Kingston

Rudolph J. Heins ..... L. H. Kingston

Milwaukee

Kenneth H. Burner ..... John Gammell

Sebastian J. Killa ..... Harry Gute

Norbert V. Sim ..... John Blakey

Ralph H. Earle ..... Pierce G. Ellis

Daniel J. Reed ..... Orrin E. Andrus

George Koresh ..... Pierce G. Ellis

Northwest

John La Verne Curnow ..... W. F. Baumgartner

Arthur L. Kotz ..... W. F. Baumgartner

Southwest

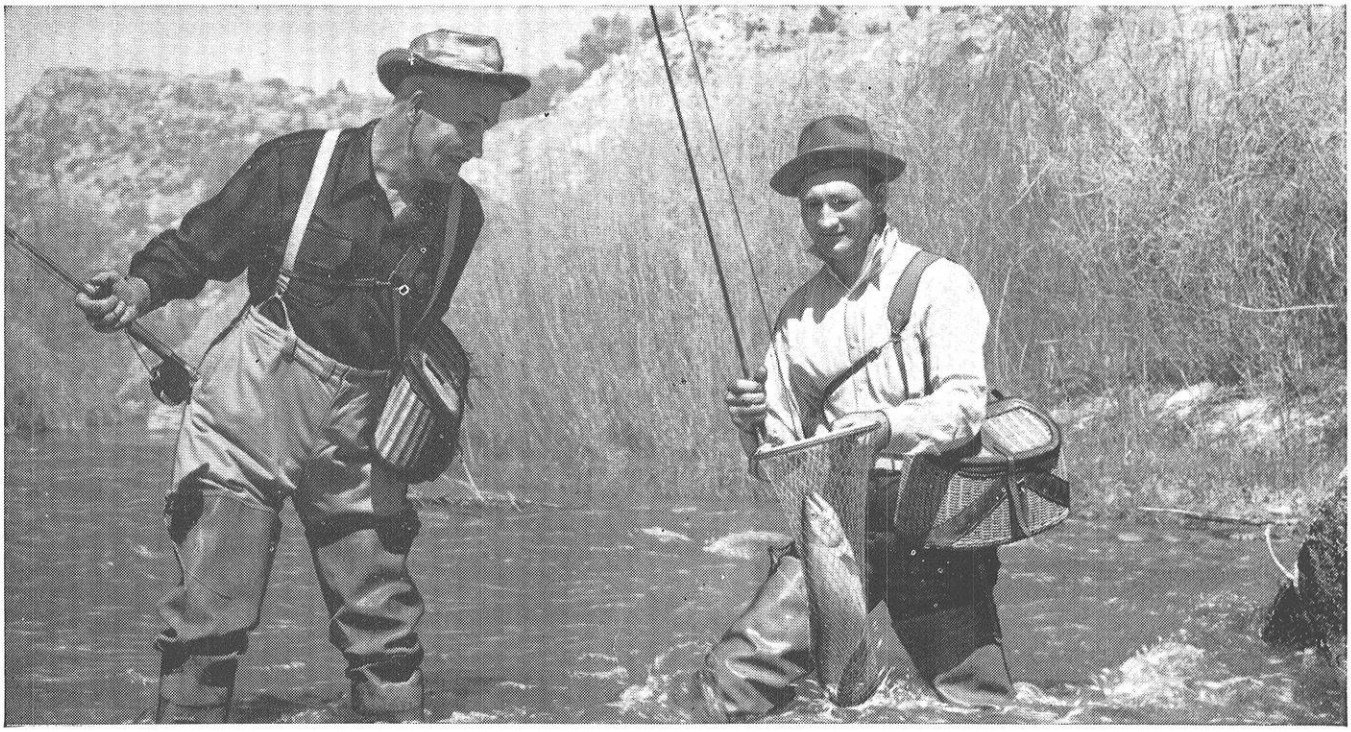
C. G. Extrom

WSPE Membership Engineer of the Month

LYLE KINGSTON, Green Bay, engineer on the staff of Wisconsin Public Service Corporation, accounted for 5 new members and puts Fox River Valley Chapter first in the race toward the membership goal.

Hat's off to Lyle Kingston!

(please turn to page 54)



THE BEST YEARS of his life are not all past for Tom Toman (left) of Casper, Wyoming. Tom retired over five years ago after 26 years with Standard Oil. He's here shown fishing on the North Platte River, with his son, Rudy, now one of our employees at Casper. Every month Tom receives retirement income provided through his and the company's contributions to Standard Oil's retirement plan while he was working.

TESTED WAYS TO BETTER LIVING

BETTER LIVING can begin with your job. The fact that 19,900 employees of Standard Oil and its subsidiary companies have been with us for more than 10 years is evidence of that.

What do all these people find in their jobs that keeps them happy?

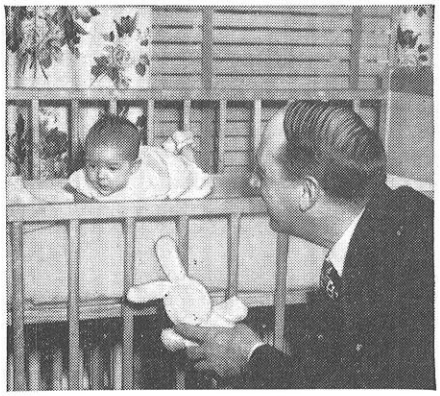
Steady work at good pay comes first to mind. But in addition to being assured of better-than-average earnings with a growing and progressive company, Standard Oilers can work with the company toward security for themselves and their families. Employee benefits have been steadily improved since the company's first retirement checks were mailed to Standard Oilers in 1903. Our present retirement plan, in which more than 90% of our eligible employees participate, is part of one of the broadest employee benefit programs in any industry.

These benefits help guard against financial stress in case of accident—on or off the job—or sickness, and bring such things as hospitalization, regular savings, and stock ownership more easily within reach.

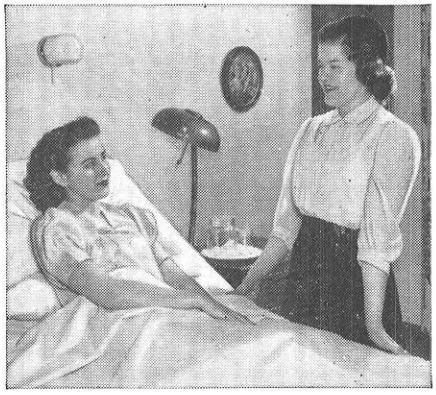
Every job here is important in some way to every other job, too—so that all our 51,000 employees, pulling together, help make Standard Oil an even better place to work.

Finally, when you know that your efforts are important to your community and to your country, you can feel you not only make a good living, but you're living well.

Standard Oil Company
910 South Michigan Avenue, Chicago 80, Illinois



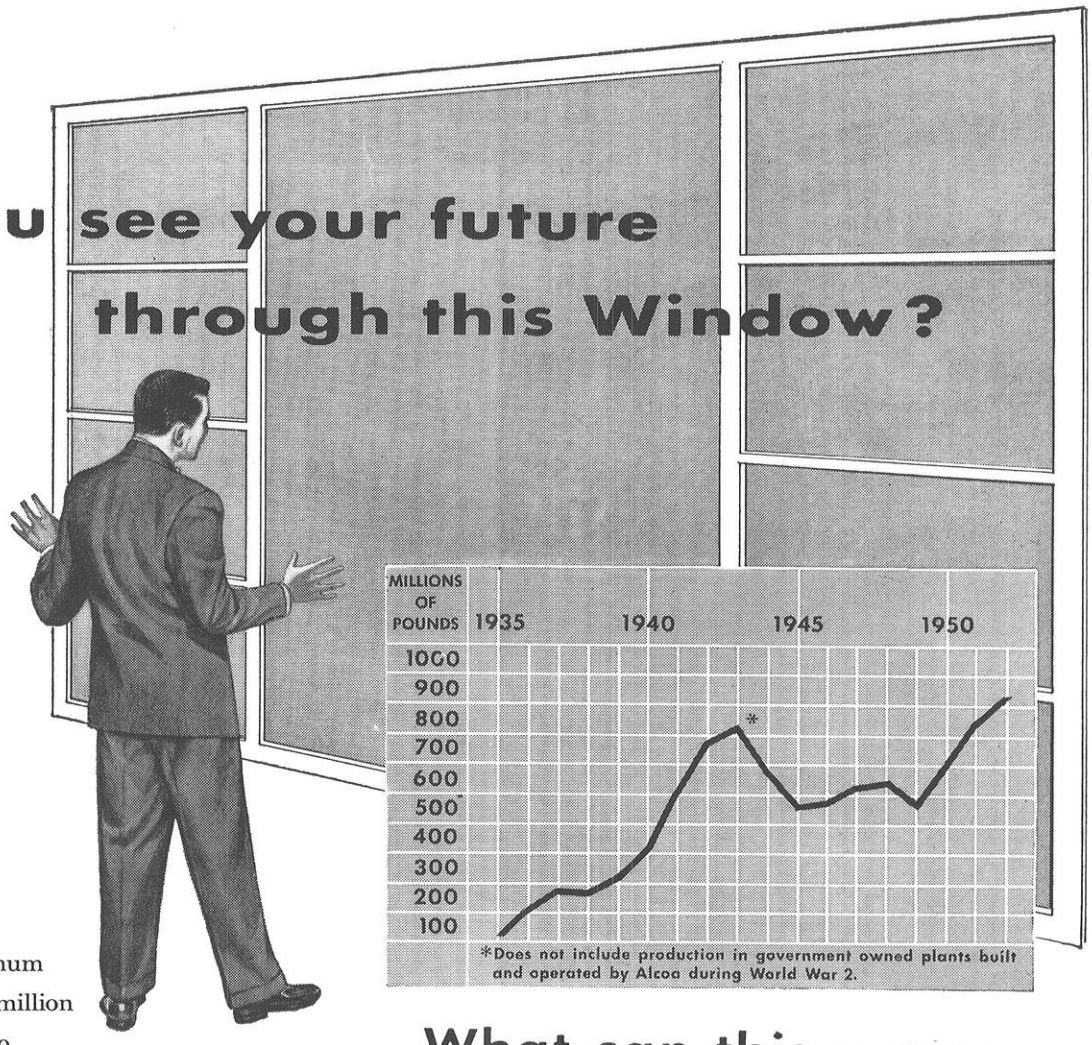
DADDY'S PROUD—and relieved. Melvin Long of our Champaign, Illinois, bulk plant paid a large part of the expenses of daughter Patricia Ann's arrival through Standard Oil's contributory Group Hospital Expense and Surgical Operation Insurance Plan, which covers employees and their immediate families.



IT'S NO FUN TO BE SICK—but Lydia Wagener and her visitor, Sophie Szkarlat, both of our Detroit office, know she is protected under Standard's Sickness and Disability Benefits Plan, and its Occupational Illness and Injury Plan. Employees receive substantial payments in emergencies caused by sickness or injury either on or off the job.

SAVINGS PAY OFF double at Standard Oil. Catherine Lynch and Elizabeth Faller help issue bonus stock certificates. Under our Savings and Stock Bonus Plan, 29,410 employees have bought U. S. Savings Bonds and received, in turn, shares of company stock at no cost to become stockholder-owners of Standard Oil.

Can you see your future through this Window?



This is an aluminum window, one of four million that will go into buildings in 1953. Twenty years ago, it was just an idea in the mind of an Alcoa development engineer. Ten years ago, only a few thousand were made annually. Now, production *is increasing* at the rate of over half a million a year. This is just one of a torrent of new uses for aluminum which means that Alcoa must continue to expand. Consider the opportunities for you if you choose to grow with us.

What can this mean as a career for you?

This is a production chart . . . shows the millions of pounds of aluminum produced by Alcoa each year between 1935 and 1952. Good men did good work to create this record. You can work with these same men, learn from them and qualify yourself for continually developing opportunities. And that production curve—is still rising, we're still expanding, and opportunities for young men joining us now are almost limitless.

Ever-expanding Alcoa needs engineers, metallurgists, and technically minded "laymen" for production, research and sales positions. If you graduate soon, if you want to be with a dynamic company that's "going places", get in touch with us. Benefits are many, stability is a matter of proud record, *opportunities are unlimited.*

For more facts, consult your Placement Director. ALUMINUM COMPANY OF AMERICA, Pittsburgh, Penna.

Alcoa Aluminum

ALUMINUM COMPANY OF AMERICA

W.S.P.E. Chapters

(continued from page 50)

FOX RIVER VALLEY CHAPTER

R. E. LEE

REPORTER

On October 1, a meeting was held at "The Valley Inn" in downtown Neenah. The speaker, a representative of the Cummins Engine Company, presented a film and talk on the development of the Cummins high speed diesel for the Indianapolis 500 mile race.

The chapter officers are:

President: Gordon R. Mercer, Algoma

Vice-President: Wayne G. Bryan, Neenah

Secretary-Treasurer: Robert W. Frazier, Oshkosh.

MILWAUKEE CHAPTER

CLYDE R. ETHIER

REPORTER

Correction: There was an error in the list of chairmen for the Milwaukee Chapter as published in the September Newsletter. The chairman of the Education and Registration Promotion Committee is not Mr. O. E. Andrus, but is Mr. John C. Andreas, 4425 South 84th Street.

SOUTHEAST CHAPTER

H. J. CARLIN

REPORTER

Past SE chapter president Thomas T. Hay, superintendent of the Racine sewage treatment plant, reported that he and Frank Vilen, superintendent of the Kenosha sewage treatment plant will be in attendance at the 26th annual meeting of the Federation of Sewage and Industrial Waste Associations to be held in Miami, Florida, October 13-16.

NORTHWEST CHAPTER

R. N. MORRIS

REPORTER

Wm. Steuber, WSPE member residing at 2210 Lakeland Avenue, Madison, was one of the 9 regional award winners in the recent General Motors essay contest entitled "How to Plan and Pay for Safe, Adequate Highways." Bill's entry of 3500 words briefly stated that our highways are generally in good condition but are being used beyond capacity. He said that 25-30 years ago the same necessity for highways existed when paved highways were needed to replace all-weather roads. At that time the federal government stepped in to help solve the problem, and we should again look to the federal government for an answer.

Bill's entry was one of 44,000. In addition to the 9 regional award winners, there was a 1st, 2nd and 3rd place winner and three honorable mentions. The length of the submissions varied from a sentence on the back of a post card to 70,000 words.

Bill is also the author of a best seller entitled, "US - Incorporated" which is an adventure story about the kind of boys that would probably grow up to be engineers.

Bill is assistant state highway engineer at the Madison office of the State Highway Commission.

The next meeting of the SW Chapter will be held October 27 at the Nakoma Country Club. Kurt F. Wendt, dean of the University of Wisconsin College of Engineering will be the main speaker. Professor H. A. Peterson, chairman of the electrical engineering department at the University of Wisconsin will also give a talk on his recent trip to India.

SOUTHWEST CHAPTER

C. H. GAUSEWITZ

REPORTER

WESTERN CHAPTER

D. W. GRUNDITZ

REPORTER

WISCONSIN VALLEY CHAPTER

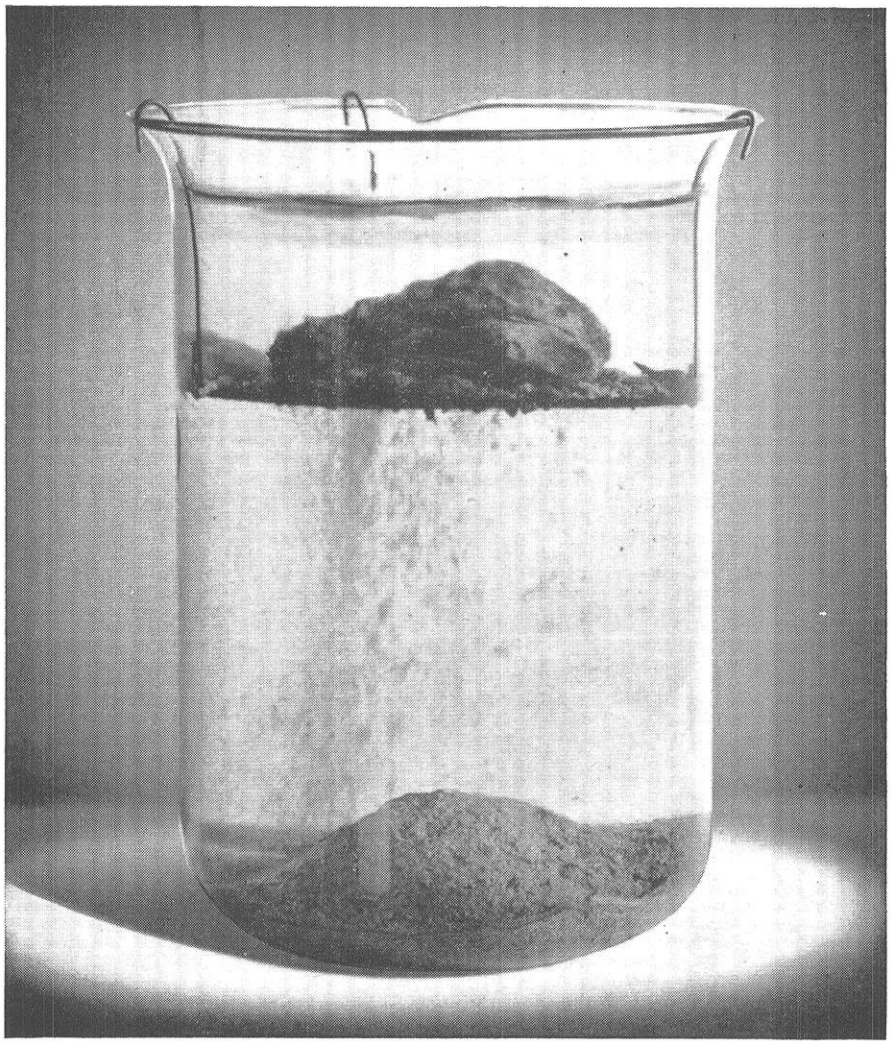
J. M. ABERNATHY

REPORTER

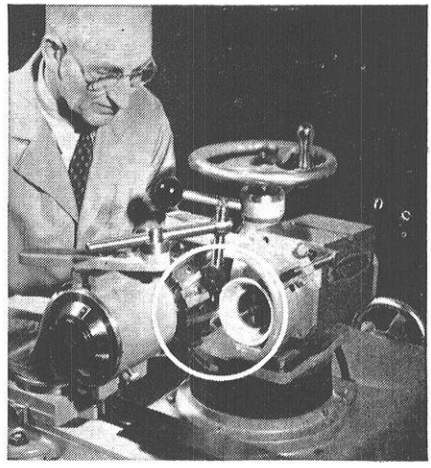
The Wisconsin Valley Chapter held their first fall meeting Saturday, September 12, at 3:30 at the Charles Hotel in Marshfield. Nine members and their wives were in attendance at this meeting.

The city attorney of Marshfield gave a very interesting talk on city zoning and platting laws after a very enjoyable dinner at the hotel. The next chapter meeting is to be held in Tomahawk in the latter part of October.

Mr. A. L. Genisot and Mr. P. L. Schroeder of the Wisconsin Valley Chapter attended the Seventh Summer Conference meeting at Elkhart Lake September 18th and 19th, and a report on said meeting is to be presented at the October chapter meeting.



DEMONSTRATION . . . By a Norton-developed process, "32" ALUNDUM abrasive grains form in an electric furnace in a fluid mass. Each grain "grows" into a single crystal. As the matrix dissolves, the crystals are released — each one complete in itself, strong, hard and with many sharp points. No crushing is necessary.



TOOL GRINDING with a Norton ALUNDUM wheel is rapid . . . gives operators the "Touch of Gold" by better and more economical tool sharpening.

Dramatic step in giving grinding operators the

"TOUCH OF GOLD"

"32" ALUNDUM, a Norton development in abrasives*

Today grinding is not just a "cost" item. Every time a Norton grinding wheel comes in contact with a product being made, the operator has the "Touch of Gold" . . . adds to product value and usefulness . . . increases the profit margin.

Among the most revolutionary forward steps in grinding history was the development by Norton of "32" ALUNDUM abrasive. It set new standards for faster, more productive work on many types of grinding such as tool grinding, surface, internal, cylindrical, centerless grinding.

This is one of the ways we at Norton carry out the tradition of "Making better products to make other products better." Another is in the field of Special Refractories where Norton catalyst supports, seamless porous mediums, kiln furniture and furnace linings are helping industrial progress.

A career at Norton where engineers and technicians work in 19 specialized areas, would be interesting and productive. But wherever you work, bear in mind that Norton is the world's largest source of abrasives and abrasive products. For information write NORTON COMPANY, Worcester 6, Mass.

NORTON

Making better products to make other products better

Abrasive • Grinding Wheels • Pulpstones • Oilstones
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NORTON COMPANY
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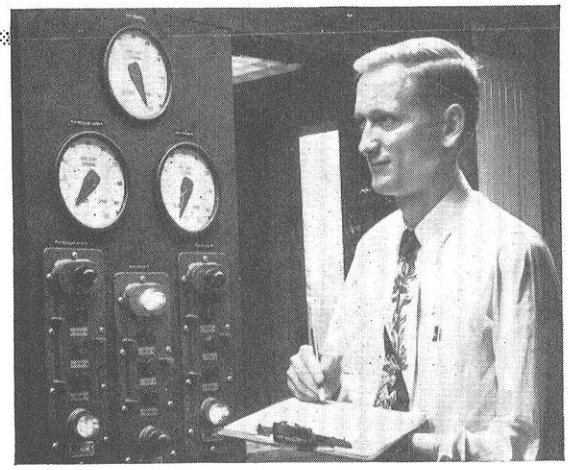
Behr-Manning, Troy, N. Y., Is A Division of Norton Company

*Trade-Mark Reg. U. S. Pat. Off. and Foreign Countries

NEEDED--- A NEW APPROACH!

HE HAD ONE



JACK R. SNYDER
Design Engineer—Helicopter Engineering Division
S. B. A. E. PURDUE UNIVERSITY '46

As a Group Leader in our Helicopter Design Department, Jack has made significant contributions toward M. A. C. helicopter development projects. Most noteworthy has been his work concerning the adoption of hydraulic power controls to helicopters and convertiplanes.

Jack joined the McDonnell engineering team soon after his graduation from Purdue in 1946. He is shown above inspecting one of the control panels in our recently completed Helicopter Laboratory. We need more young engineers like Jack Snyder—*engineers with a new approach.*

We're looking for young engineers—engineers with new ideas—engineers who can visualize the practicality of today's research and evolve from it the aircraft of tomorrow.

It is this type of thinking that has enabled the McDonnell engineering team to design and develop such hallmarks of aviation as the "Phantom", first twin-jet carrier based fighter plane, and the now famous "Banshee" series of Navy jet fighters.

Today, McDonnell engineers are engaged in a variety of projects concerning airplanes, helicopters and guided missiles. We are always interested in new talent—*young men with a new approach.*

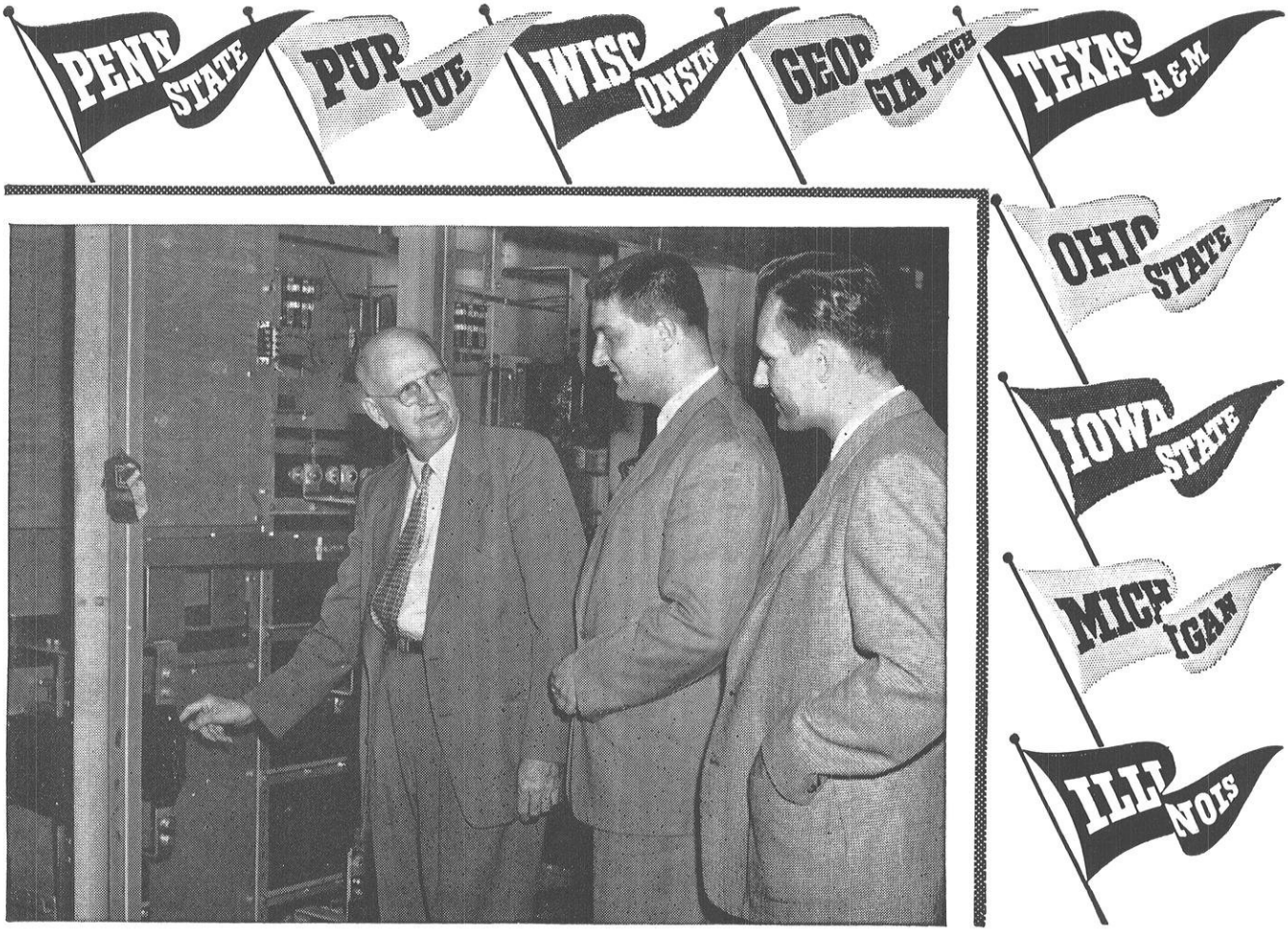
If you're looking for our type of engineering —we're looking for you. Check your Placement Office for dates when the McDonnell representative will visit your school— or write to:

TECHNICAL PLACEMENT SUPERVISOR
BOX 516, ST. LOUIS 3, MISSOURI

BUILD YOUR FUTURE WITH A COMPANY . . . . YOUNG IN YEARS, YOUNG IN SPIRIT AND IDEAS

McDONNELL Aircraft Corporation

Manufacturers of AIRPLANES AND HELICOPTERS • ST. LOUIS 3, MO.



You Learn from Men who Know!

• When you join ranks with Square D, you can be sure you'll get *complete, individualized training* from seasoned men who know electrical distribution and control like a book. Equally important, they know how to pass along that knowledge in a practical, down-to-earth way you'll like.

• Year after year, Square D looks to the nine schools shown above for electrical, mechanical, industrial and general engineering talent. We're proud of the calibre of men we employ, train and advance. They're the kind of men you'd like to work with. Why not let us tell you more about it?

MAIL THE COUPON ▶

We'd like to send you a 16-page "get-acquainted" brochure. It tells a lot about Square D, its products, services, markets and opportunities.

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6060 Rivard Street, Detroit 11, Michigan

I'd like a copy of
Square D's "Get-Acquainted" brochure.

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City_____ Zone_____ State_____

SQUARE D COMPANY

WELDING AWARDS

Wisconsin Engineer Wins Award

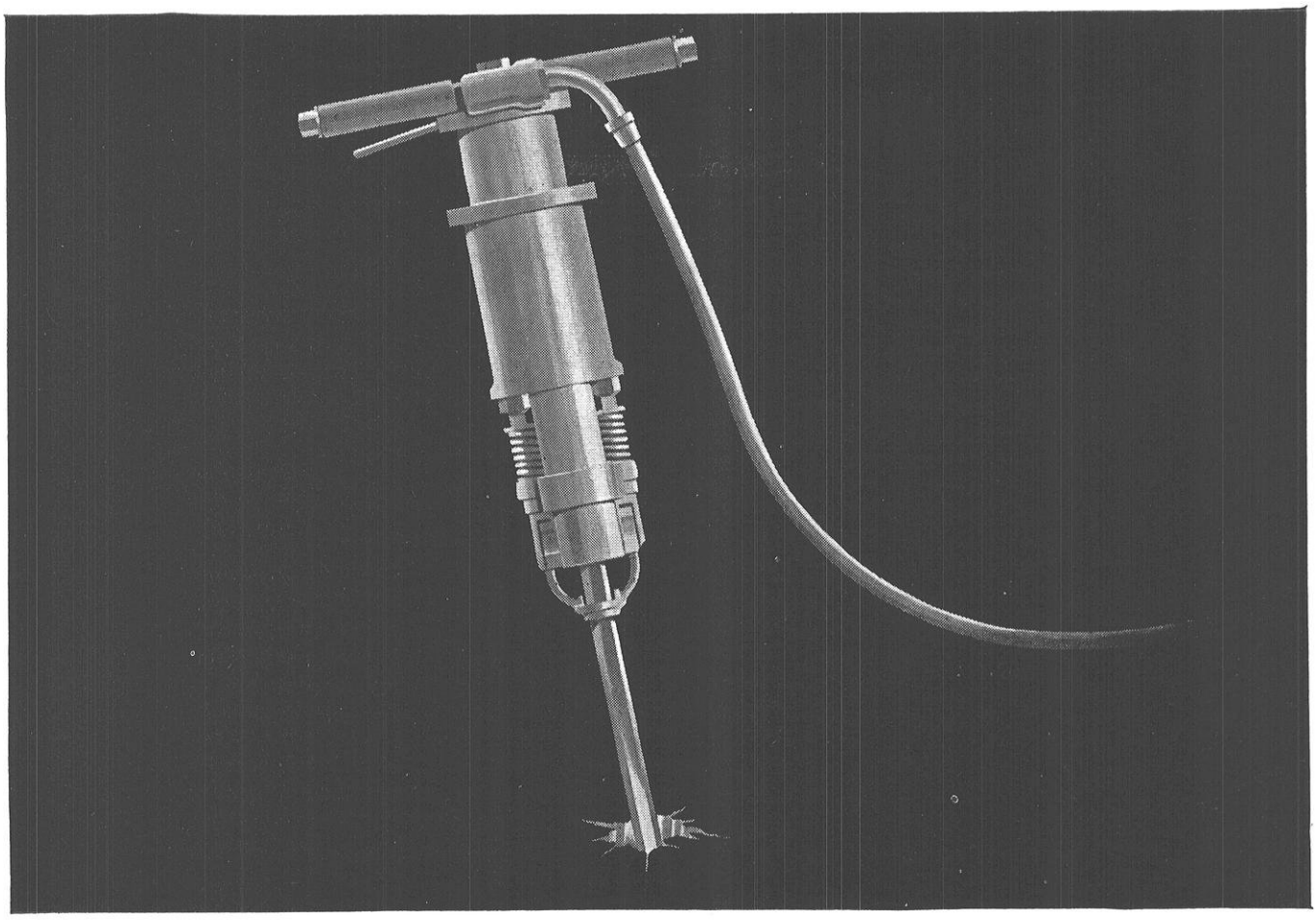
The American Welding Society has selected a paper published in the **Wisconsin Engineer** for second prize in the annual A. F. Davis Undergraduate Welding Award. Wayne Jacobs and Charles Marschall collaborated to win the second prize of $150 with a paper appearing in the November, 1952 Wisconsin Engineer entitled, "A Comparison of the Quality of Weldments Prepared by Different Welding Processes." Roger C. Waugh and Otto P. Eberlein won the $200 first prize with their paper entitled, "Penetration Factors in Metallic Arc Welding" published in the May, 1953 issue of the Cornell Engineer. The awards were presented at the Society's annual meeting at Cleveland, Ohio, on October 19, 1953.

The purpose of the awards as stated in the contest rules is "To encourage and stimulate interest in welding through the preparation of articles on the subject of welding by undergraduate students, and dissemination of such information through undergraduate publications."

YOU TOO MAY WIN

Any undergraduate of any college or university, in the United States, its possessions, or Canada, is eligible. The paper must be published in an undergraduate publication in the interval between April 1, 1953 and April 1, 1954. Subject matter of the paper may be on any phase of any type of welding or its application to design and construction. The judging group is selected by the Education Committee of the American Welding Society. The judging is based on the originality of subject, originality and clarity of presentation, and the thoroughness with which the subject is presented.

The James F. Lincoln Arc Welding Foundation has established a welding library in the Engineering Library in the ME building. If you are interested, contact the **Wisconsin Engineer** for more details.



AIR MUSCLE . . .

Properly compressed and coupled to this drilling tool, air packs a rock-busting wallop. How different from the days when men slung sledges, and even cracking pavement was a slow, tortuous task . . . as were many other manual jobs in industry.

MIND OVER MUSCLE . . .

When men of science learned how to put a cyclone in a cylinder, pneumatic tools and compressed air became salient servants in saving men's muscles and industry's time.

In its more than two hundred applications compressed air cleans, sprays, operates machines for hoisting, hauling, hammering, drilling, cutting, grinding, blowing, pumping. Applied in free or enclosed action this versatile, conveniently-conveyable power agent may be found at work in mines and mills, on highways and skyways, on and under the water, in production and processing.

AMERICA WORKS LIKE THAT . . .

Uniquely so. For here, every art, every science, every branch of engineering work together for the good of all. And the power behind their progress is America's all-seeing, all-hearing and reporting Inter-Communications System.

THE AMERICAN INTER-COM SYSTEM . . .

Complete communication is the function, the unique contribution of the American business press . . . a great group of specially edited magazines devoted to the specialized work areas of men who want to manage better, design better, manufacture better, research better, sell better, buy better.

COMMUNICATION IS OUR BUSINESS . . .

Many of the textbooks in which you are now studying the fundamentals of your specialty bear the McGraw-Hill imprint. For McGraw-Hill is the world's largest publisher of scientific and technical works.

After you leave school, you will want to keep abreast of developments in your chosen profession. Then one of McGraw-Hill's many business magazines will provide current information that will help you in your job.

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HEADQUARTERS FOR TECHNICAL AND BUSINESS INFORMATION

McGRAW-HILL FOR BUSINESS

Midget with the giant brain

The Problem

To design and build a computer for airborne automatic control systems—with severe restrictions imposed on size, weight and operation under extreme environmental conditions; in short, a computer that would be small, simple, reliable, rugged—and easy to build and maintain.

AT HUGHES RESEARCH and Development Laboratories this problem was examined exhaustively, and it was concluded that a digital computer offered the best means for satisfying the requirements because of its ability to solve complex problems accurately and quickly.

Because the requirements of this application could not be met by existing digital computers, owing to their large size, the following developments were undertaken:

1. Simplification of the logical structure of the computer through the use of a mathematical theory of computer design based on Boolean algebra—but with retention of the operational versatility of a general-purpose computer.

2. Development of ingenious circuitry to utilize the new logical designs.

3. Achievement of minimum size by the use of subminiature techniques, including germanium diodes, subminiature tubes, and etched circuits.

4. Employment of unitized construction: plug-in units of flip-flop circuits and diode networks.

Need for subminiaturization, then, was a governing factor. Consequently, entire new techniques for making things not only vastly smaller, but at the same time easier to build and service, were developed by Hughes. This is a continuing process and there is indication of even more significant advancement in miniaturization for the future.

A major effort at Hughes is also devoted to adapting electronic digital computer techniques to business data processing and related applications—destined for far-reaching peacetime uses.

One of the subminiature switching circuits from the Hughes airborne electronic digital computer is examined by Dr. Eugene M. Grabbe (right), Associate Head, Computer Systems Department, Advanced Electronics Laboratory, and Phil A. Adamson of the Technical Staff, Radar Laboratory.

ENGINEERS AND PHYSICISTS

Activities at Hughes in the computer field are creating some new positions in the Laboratories. Experience in the design and application of electronic digital computers is desirable, but not essential. Engineers and physicists with backgrounds of component development or system engineering are invited to apply.

ADDRESS: *Scientific and Engineering Staff*

Hughes

RESEARCH AND DEVELOPMENT LABORATORIES

Culver City, Los Angeles County, California

What's Happening at CRUCIBLE

about Alnico Permanent Magnets

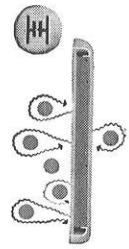
You will find Crucible Alnico Permanent Magnets in products ranging all the way from cuff links to magnatrons. Here are just a few unusual applications in which these magnets were used to simplify or improve a product.

This is Warren, age 4, a cerebral palsied youngster, using magnetic toys in therapy-play.

Magnetic Toys Cerebral palsied youngsters at the Children's Rehabilitation Institute, Cockeysville, Maryland, are unable to play with normal toys. Their lack of muscular coordination and control, causes ordinary blocks or toys to slip through their grasp and fall to the floor. Crucible helped overcome this problem by imbedding small permanent magnets in the toys. By using these magnet-equipped toys on metal topped tables, the children are able to control them much more easily.

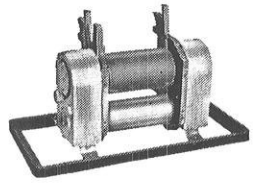
The Children's Rehabilitation Institute has pioneered techniques to help these handicapped children gain maximum muscular control and coordination. Experience at the Institute has shown that the use of magnetized toys helps develop coordination in hand and arm use, and in grasping and releasing.

Cuff Links One manufacturer of cuff links had a happy idea. He replaced the stem with a magnet assembly designed by Crucible magnet engineers. The tiny, powerful aspirin-sized magnets used, gave the finished product a holding force at the pole plate as high as 80 ounces troy.



Enlarged cross section view of one cuff link.

Telescriber-Recorder In one application, for this instrument that transmits written messages over wire, two permanent magnets were being used to match the electromagnetic fields. Assembly time and unit costs were high. Crucible magnet specialists designed one permanent Alnico magnet to replace the two. Magnet costs were cut 50% ... and efficiency of the unit was increased.



Top bar Crucible Alnico; lower bar (replacing former 2nd magnet) provides return path.

Engineering Service Available

Perhaps your magnet problems are entirely different from these. Whatever they may be, our staff of magnet and electronic engineers will be glad to tackle them, and to work with you in meeting your magnet requirements. Don't hesitate to call us when you have an application for permanent magnets.

CRUCIBLE first name in special purpose steels

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National Drawn Works, East Liverpool, Ohio • Sanderson-Halcomb Works, Syracuse, N. Y. • Trent Tube Company, East Troy, Wisconsin

STATIC

BY I. R. DROPS

A Scotchman and an Irishman were on board a ship bound for Scotland.

Scotchman (catching sight of his fatherland): "Hurrah for Scotland."

Irishman (riled): "Hurrah, hell."

Scotchman: "That's right, every man for his own country."

* * *

Senior: "You forgot to take off your pajamas this morning."

Freshman: "I didn't. This is my ROTC uniform."

* * *

Salesman: "Sir, I have something that's guaranteed to make you the life of the party, allow you to win friends and influence people, help you forge ahead in the business world, and in general make life a more pleasant place and invigorating experience."

Engineer: "I'll take a quart."

* * *

"Boy, oh boy! That was some blonde with you last night. Where did you get her?"

"Dunno. I just opened my billfold and there she was."

* * *

I serve a purpose in this school—
On which no man can frown—
I quietly sit alone in class
And keep the average down.

The two gentlemen from Harlem were deep in conversation.

"Ah wins," one declared.

"What you got?"

"Three aces."

"No, you doesn't. Ah wins."

"What you got, man?"

"Two eights an' a razor."

"You sho' do. How come you is so lucky, man?"

* * *

C.E.: "Did Fifi blush when the strap on her bathing suit broke?"

Chem.E.: "I didn't notice."

* * *

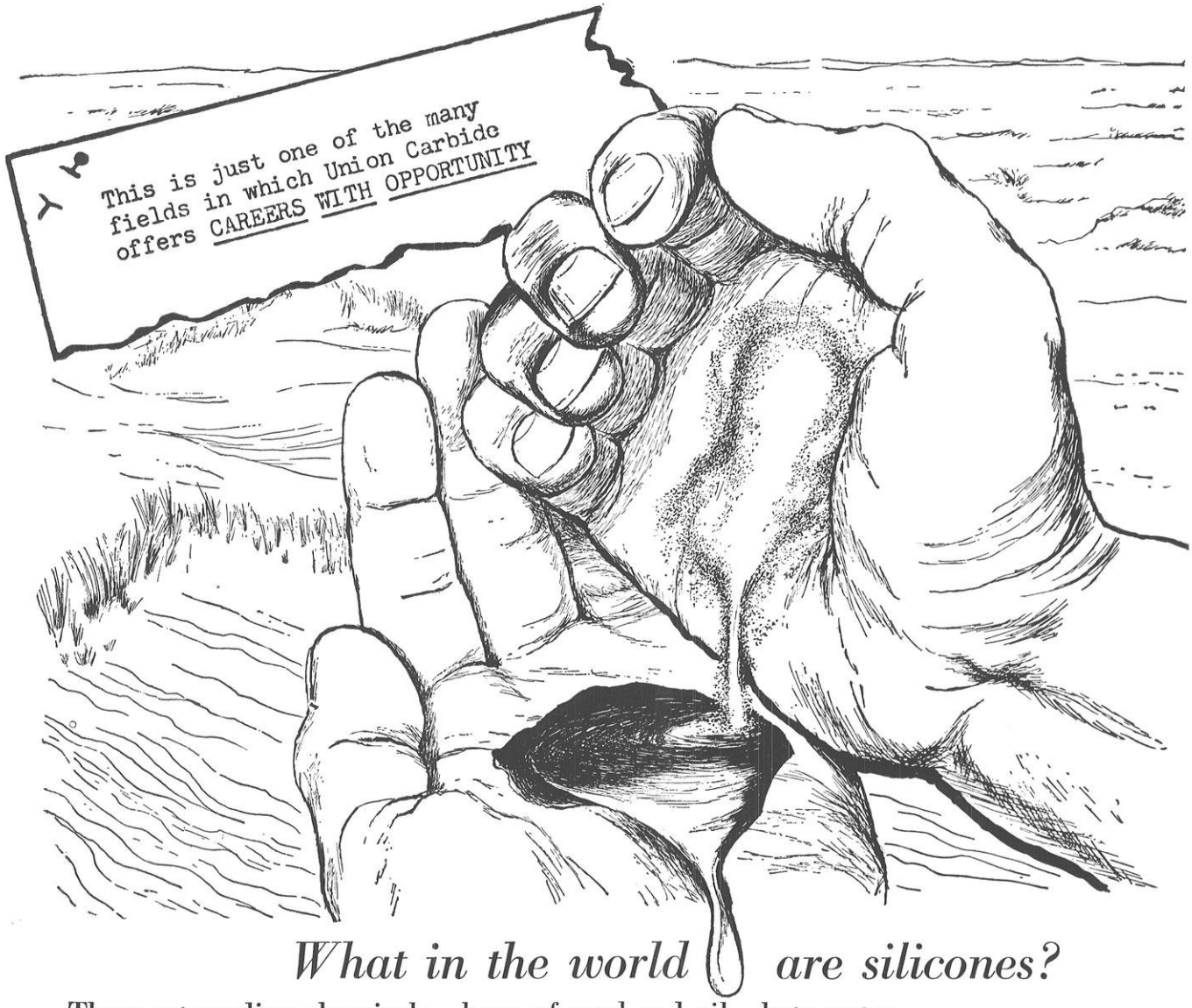
A lady bought a parrot from a pet store only to learn that it cursed everytime it said anything. She put up with it as long as she could, but finally one day she lost her patience. "If I ever hear you curse again," she declared, "I'll wring your neck."

A few minutes later she remarked rather casually that it was a nice day. Whereupon the parrot promptly said, "It's a hell of a fine day."

The lady immediately seized the parrot by his head and spun him around in the air until he was almost dead.

"Now, then," she said, "It's a fine day, isn't it?"

"Fine day!" exclaimed the parrot. "Where in hell were you when the cyclone struck?"



What in the world are silicones?

These astounding chemicals—born of sand and oil—hate water, laugh at heat and cold, and are doing remarkable things for you and industry

SILICONES are the fabulous offspring of an unusual chemical marriage between sand and oil. Sand, the basic material for glass, gives silicones some of the best features of glass. Oil, source of many plastics, gives silicones some of the special qualities that have made plastics so useful to all of us.

WIPE ON . . . WIPE OFF—Silicones are the secret of the new, long-lasting automobile and furniture polishes that you simply wipe on and wipe off. Another silicone forms a water-tight bond between tough glass fibers and plastics that go into radar domes for airplanes, boat hulls, even washing machine parts.

WHEN APPLIED TO MASONRY WALLS, silicones are at their amazing best. A one-way street for water, they keep rainwater from penetrating, yet let inside moisture out!

THEY LAUGH AT HEAT AND COLD—Heat-resistant silicone insulation protects electric motors at high temperatures. Yet silicone insulation on jet plane wiring remains flexible, even in the brutal cold of the stratosphere. And silicone oils and greases withstand both arctic cold and tropic heat!

SILICONES AND THE FUTURE—Even the scientists don't know all the answers about silicones. But they do know there is an exciting future ahead for them. The people of Union Carbide, who pioneered in many of the special silicones now used by industry, are helping to bring that future closer to all of us.

STUDENTS and STUDENT ADVISERS: *Learn more about the many fields in which Union Carbide offers career opportunities. Write for the free illustrated booklet "Products and Processes" which describes the various activities of UCC in the fields of* ALLOYS, CARBONS, CHEMICALS, GASES, *and* PLASTICS. *Ask for booklet G-2.*

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SYNTHETIC ORGANIC CHEMICALS • EVEREADY Flashlights and Batteries • NATIONAL Carbons • UNION Carbide • PYROFAX Gas

Austin Bush, Rensselaer, '50, Helps Develop New Pump

AUSTIN BUSH, inspecting stuffing box assembly on boiler feed pump.

Reports interesting project engineering assignments at Worthington

"Despite its size as the leading manufacturer in its field," says Austin Bush, "I have found Worthington pays considerable attention to the interests of the individual. The company's excellent training program consists of several months of working with the various types of equipment manufactured, augmented by technical lectures, and talks on the organization of the corporation.

"Following this training, I was given an opportunity to choose the department in which I wanted to work—engineering, sales, or manufacturing. My choice was the engineering department where I have already been assigned to several interesting projects.

"In addition to the training program, the members of our engineering department hold monthly seminars at which engineering topics of general interest are discussed.

"Opportunities for advancement are good, and pleasant associates make Worthington a fine place to work."

When you're thinking of a good job, think *high*—think *Worthington.*

FOR ADDITIONAL INFORMATION, see your College Placement Bureau or write to the Personnel and Training Department, Worthington Corporation, Harrison, New Jersey.

WORTHINGTON

The Sign of Value Around the World

2.54X

Photography helps a New Steel Mill roll into action

Fairless Works, U. S. Steel's new Eastern Seaboard mill, is now starting operations—and growing—at the same time. And camera and film play their parts in both.

. . . to help locate ore, plot transportation, lay out plants, control quality, improve production, U. S. Steel puts Photography to work.

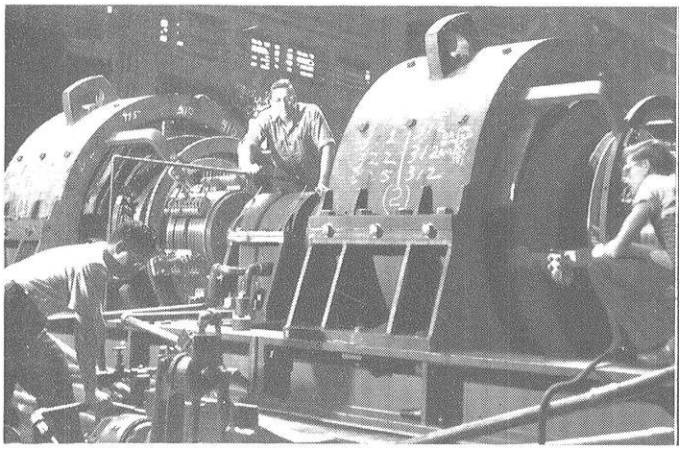
From ore through research and production, Photography is one of Steel's important operation tools. It helped locate and appraise the new Venezuelan Cerro Bolivar deposits which sparked this great new seaboard mill. It helped chart the ore's course to the sea—helped plan the plant and keeps a running record of its growth. And day after day it's at work in the research lab improving steel metallurgy, and on the production line controlling quality.

Countless numbers of America's varied industries, large and small, use photography in many ways to save time, speed accomplishment, increase production, and cut costs.

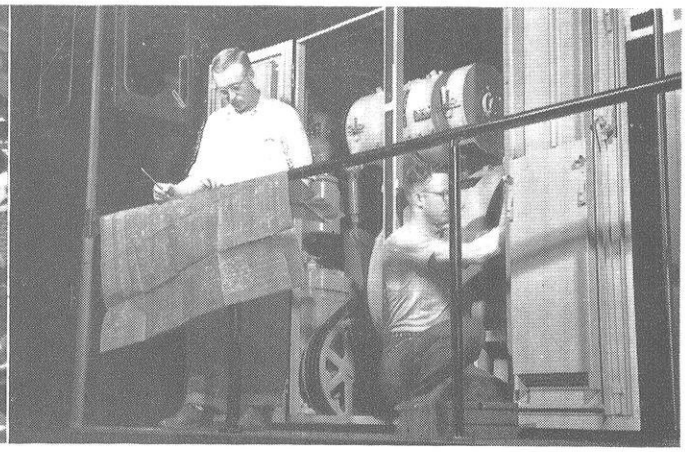
In fact, so many new applications of photography are being found, that many well-qualified graduates in the physical sciences and in engineering have been led to find positions with the Eastman Kodak Company. Returning servicemen, too, have found new opportunity here.

If you are interested, write to Business and Technical Personnel Dept., Eastman Kodak Company, Rochester 4, N. Y.

Eastman Kodak Company
Rochester 4, New York



CHARLES SNYDER, R.P.I., (center) adjusting 5250 triple-unit d-c mill motor for use in a steel mill.



Engineers RICHARD RENK, IOWA STATE, (left) and ALLEN FRINK, CATHOLIC UNIV., make last-minute check on 1600-hp diesel-electric switcher before it is moved to test track.

THEY'RE "GOING PLACES" AT GENERAL ELECTRIC

Like these young men pictured here, hundreds of scientists, engineers, chemists, physicists and other college graduates are "getting ahead" fast at General Electric . . . . and they are working on projects with the assurance that their contributions are meaningful and important.

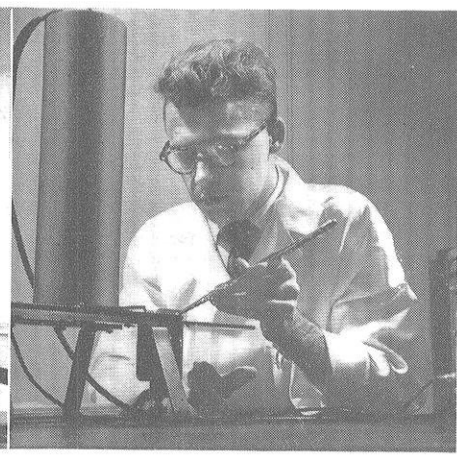
They are moving up rapidly because at General Electric a world of opportunity awaits the college man of today—a world limited only by his own ability and interest. The variety of General Electric products and the diversity of the Company's operations provide virtually unlimited fields of opportunity and corresponding rewards, both materially and in terms of personal satisfaction to young men who begin a G-E career.

New developments—in silicones, electronics, semi-conductors, gas turbines, atomic power, and others—springing from G-E research and engineering, are creating exciting new opportunities, and are giving college graduates the chance of finding satisfying, rewarding work.

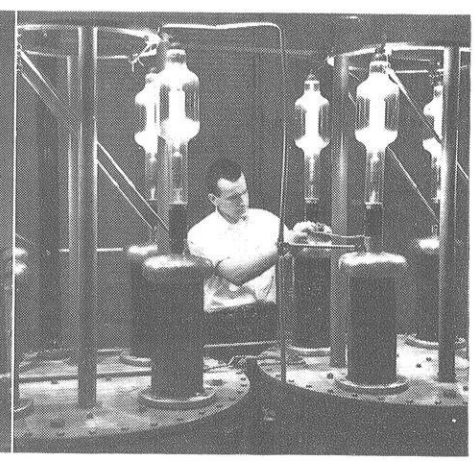
And by placing prime importance on the development of talent and skill, developed through G-E training programs and broadened through rotational job programs, and by providing incentives for creative minds, General Electric is hurrying young men into success in an industry that is devoted to serving all men through the ever-increasing and ever-widening uses for electricity, man's greatest servant.

If you are interested in building a career with General Electric see your college placement director for the date of the next visit of the General Electric representative on your campus. Meanwhile, for further information on opportunities with General Electric write to College Editor, Dept. 2-123, General Electric Company, Schenectady 5, New York.

Test engineers E. K. VON FANGE, U. OF NEB., (left) and R. E. LOVE, U. OF TEXAS, work on stacker and stapler built by them for homework project.



Physicist ROGER DEWES, BROOKLYN POLY., working with scintillation counter in G.E.'s Engineering Laboratory.



ANTHONY TERZANO, PRATT INSTITUTE, checks connections on direct-current rectifier which charges 7,500,000-volt impulse generator in G.E.'s new High-voltage Laboratory.

GENERAL ELECTRIC