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The Wisconsin

engineer

JANUARY, 1955

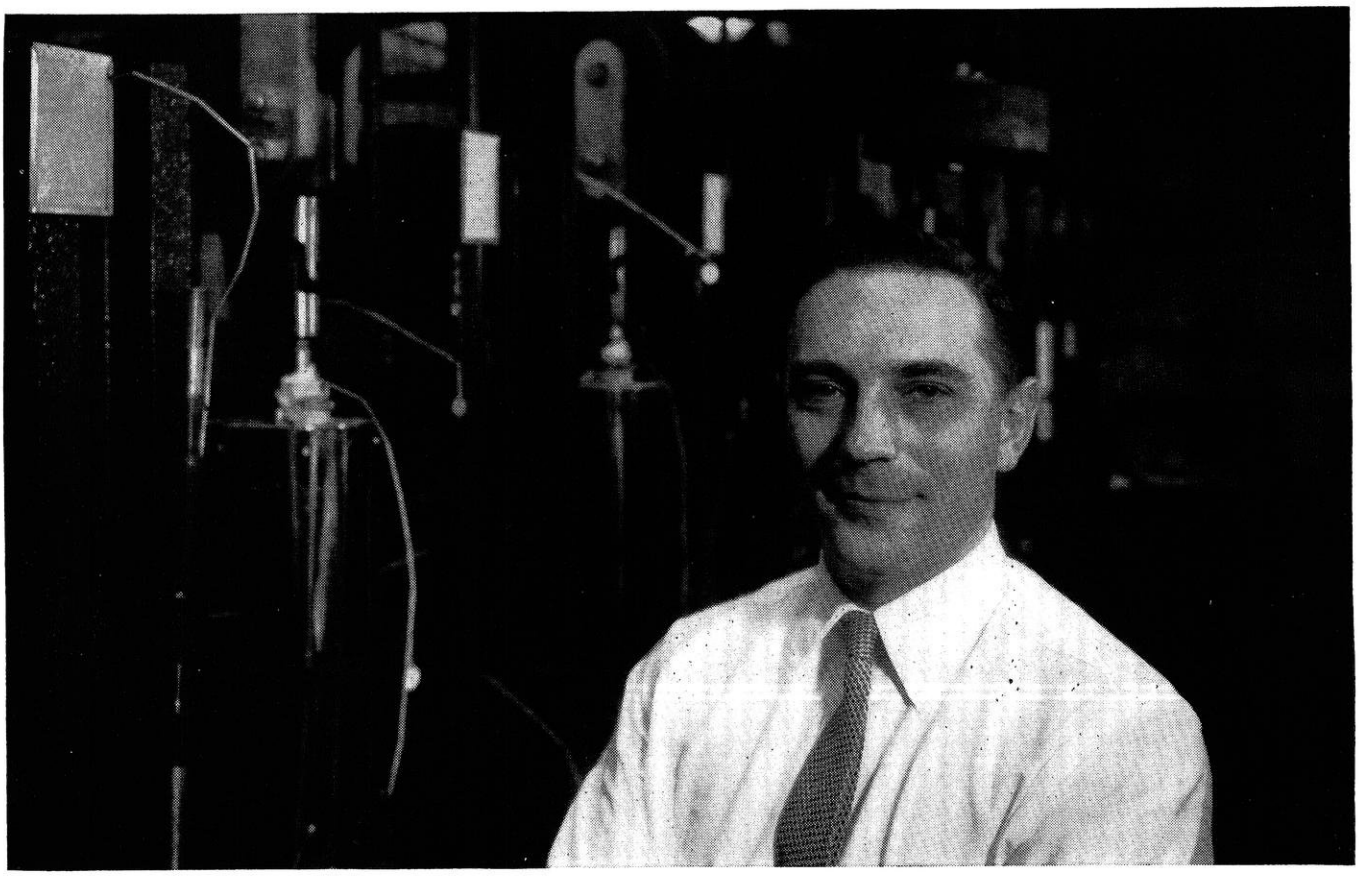
25¢

1955 Ford Crown Victoria (See page 5)

in this issue . . .

John A. Bauscher, *Class of '43*
speaks from experience when he says . . .

"United States Steel offers first-rate opportunities in research and product development"



JOHN BAUSCHER graduated from college in 1943 with a B.S. degree in Metallurgy. After a stint in the Navy, he returned to college as a metallurgical research assistant. In 1949 he received his M.S. in Metallurgy and then came to work at the U.S. Steel Applied Research Laboratory. After just four and a half years, Mr. Bauscher had progressed to Division Chief for Sheet Products Development – responsible for the improvement of present sheet steel products and the development of new and improved types.

Why did Mr. Bauscher choose U.S. Steel? Because, says he, "U.S. Steel produces such a great diversity of products and maintains such a thorough research program on all its products – not only theoretical research, but also applied research or product development. The graduate engineer has unusual latitude in selecting the type of products and the type of research that interest him most. Work is done not only on steel, but on many raw materials and by-products as well.

"And," says Mr. Bauscher, "Opportunities at U.S. Steel are better now than ever before because of the emphasis on product development and the recent expansion of research facilities."

If you are interested in a challenging and rewarding career with U.S. Steel and feel that you can qualify, you can get details from your college placement director. And we will gladly send you a copy of our informative booklet, "Paths of Opportunity," which describes U.S. Steel and the openings in various scientific fields. Just write to United States Steel Corporation, Personnel Division, Room 1622, 525 William Penn Place, Pittsburgh 30, Pennsylvania.

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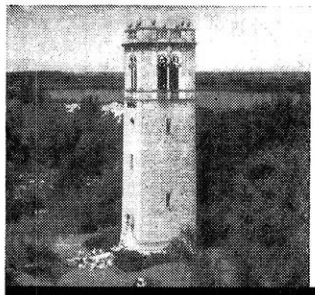
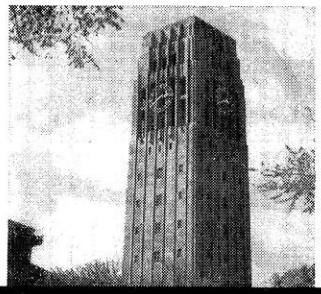
UNITED STATES STEEL HOMES, INC. · UNION SUPPLY COMPANY · UNITED STATES STEEL EXPORT COMPANY · UNIVERSAL ATLAS CEMENT COMPANY 5-47



WISCONSIN



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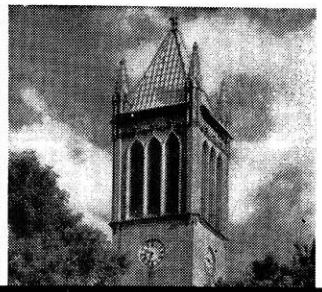
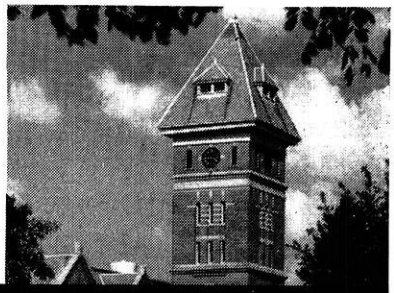


IOWA STATE



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these NINE schools produce FINE engineers!

We know—because, over a period of years, many of them have come with Square D, direct from these nine schools. The vast majority are still with us—growing and prospering in the constantly expanding electrical field.

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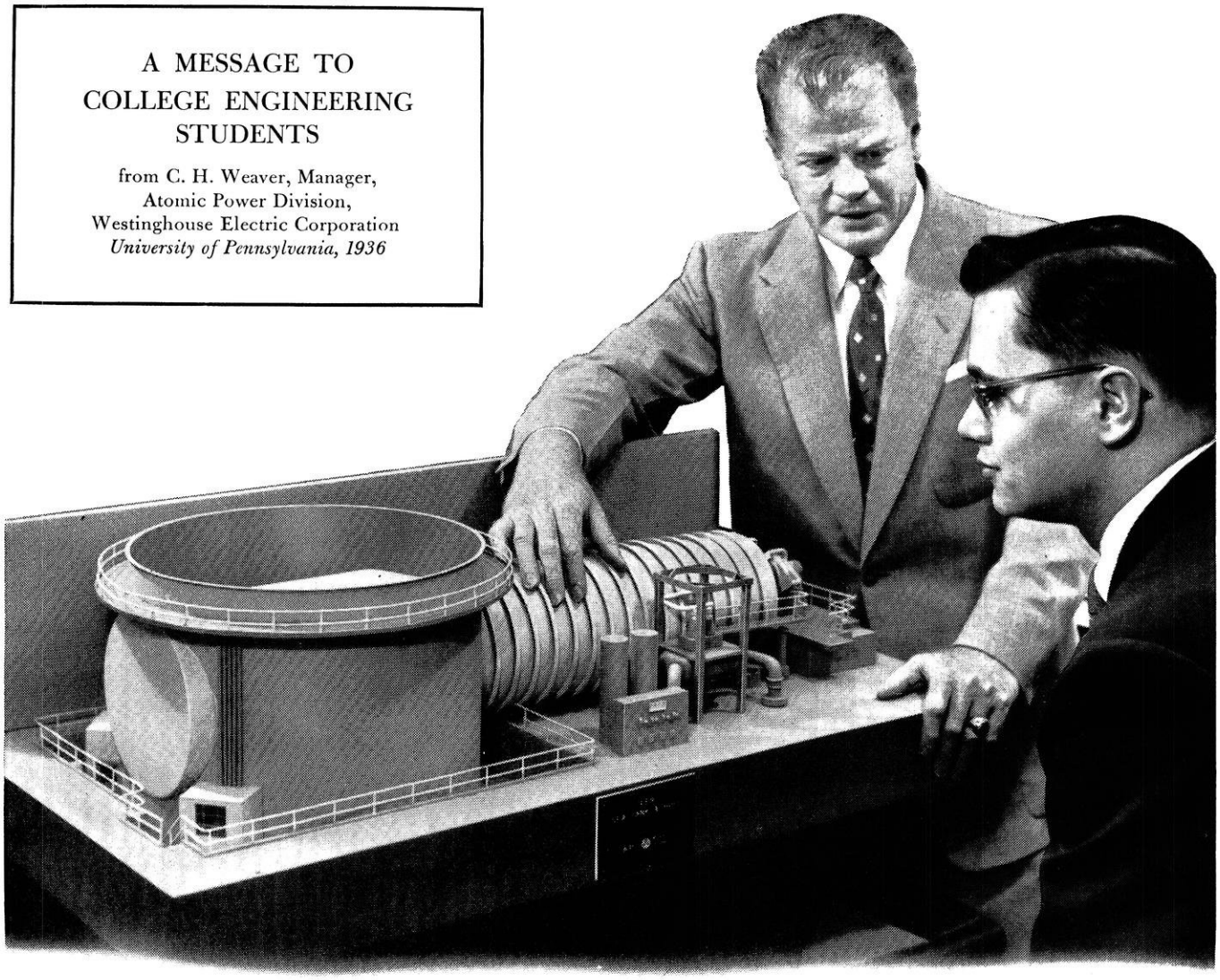
SQUARE D COMPANY

A MESSAGE TO COLLEGE ENGINEERING STUDENTS

from C. H. Weaver, Manager,
Atomic Power Division,
Westinghouse Electric Corporation
University of Pennsylvania, 1936



To you who want to help create the atomic age

You're looking at the practical beginning of an atomic age.

This is a model of the land-based prototype for the first atomic submarine engine, designed and built by Westinghouse—working with the Atomic Energy Commission and the U. S. Navy.

And now, Westinghouse is developing the world's first atomic power plant to harness this vast power for peacetime use. Its output, enough for a city of 100,000 people, will go into a utility's power system.

Since 1948, Westinghouse has had an Atomic Power Division for atomic energy development . . . and it now has an Atomic Equipment Department to develop apparatus for atomic power installations. These are typical of the steps our forward-looking Westinghouse management is constantly taking in leading the way toward development of new sources of energy and new products.

Wouldn't you like to be with Westinghouse . . . helping to create this new era?

We at Westinghouse are interested in you as an *individual* . . . interested in your ambitions as well as your technical ability. For your professional development, there is a Graduate Study Program, available in 19 universities, and leading to your Master's and Ph.D. degrees. And there are other Westinghouse programs to fit your individual needs . . . all aimed at helping you reach your goal. G-10281

YOU CAN BE SURE...IF IT'S
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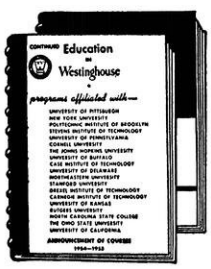

Ask your Placement Officer about career opportunities at Westinghouse, or write for these two booklets: *Continued Education in Westinghouse* (describing our Graduate Study Program) and *Finding Your Place in Industry.*

To get these booklets, write: Mr. C. W. Mills, Regional Educational Co-ordinator, Westinghouse Electric Corporation, Merchandise Mart Plaza, Chicago 54, Ill.

Volume 59 JANUARY, 1955 Number 4

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WISCONSIN ENGINEER

The Student Engineer's Magazine

FOUNDED 1896

ARTICLES

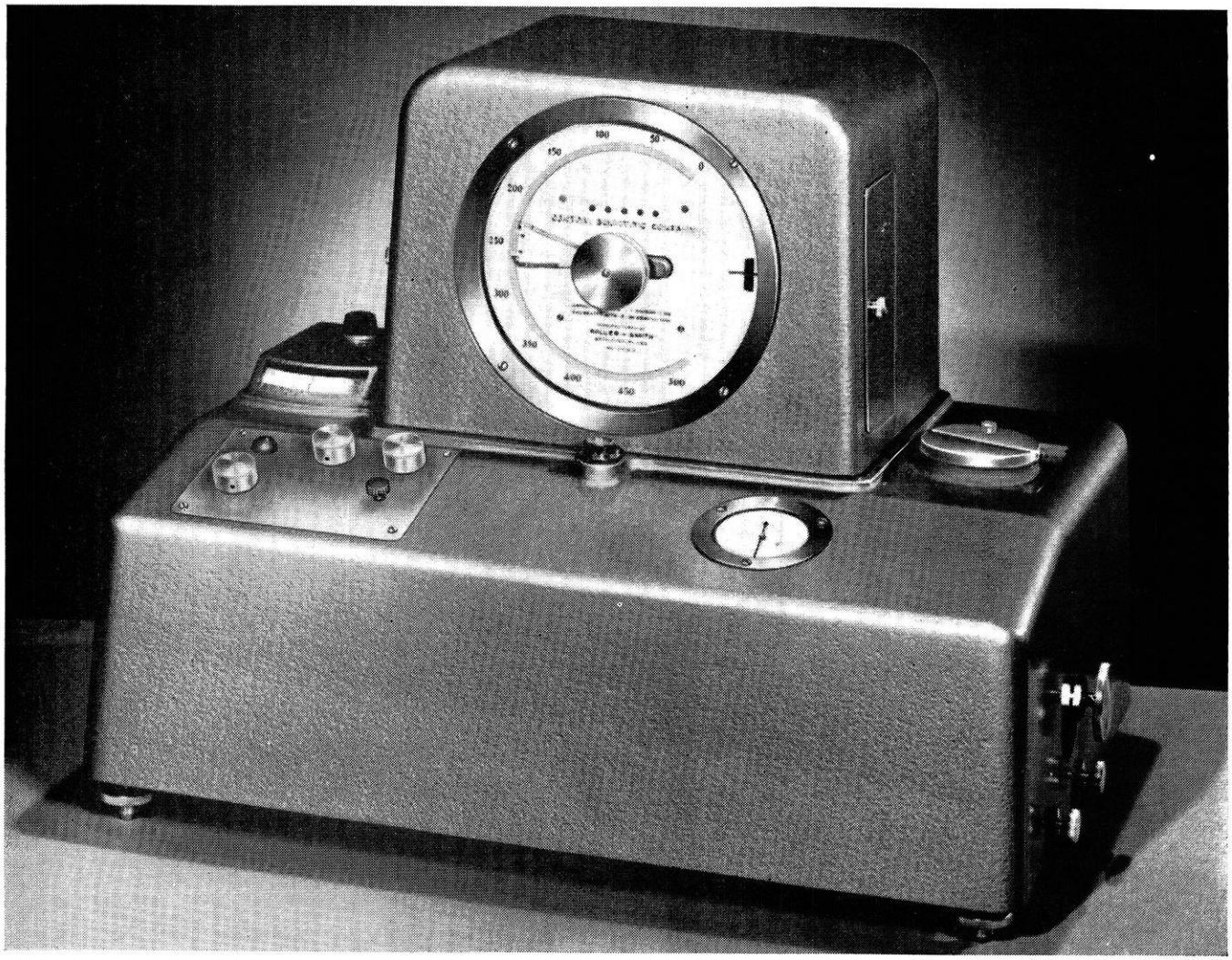
DEPARTMENTS

FRONTISPIECE

Largest Anechoic Chamber Opens—A power transformer is brought into the world's largest anechoic chamber of the General Electric Company's new $1,500,000 Sound Laboratory. Under construction for more than a year at Pittsfield, Mass., the laboratory was completed recently and dedicated today. It was built for study and research on the sound of power transformers.

COVER

The new Ford Crown Victoria hardtop exemplifies the color and glamor to be found in the 1955 cars. Each offers more power, finer upholstery, more choice of colors. All are proof of the need for a manufacturer in the free enterprise system to improve his product from year to year.



THE PERCENTAGE of hydrogen in liquid hydrocarbons can be determined by making two simultaneous measurements on the sample to give (1) density and (2) the absorption rate for beta rays. The weight percentage of hydrogen in the sample is computed from these measurements and a calibration curve. The new instrument shown here, a Standard Oil development, measures the beta ray absorption rate.

BETA RAY

used to speed hydrogen measurement

The problem: How to measure the percentage of hydrogen in organic compounds in a short time.

The established process was combustion. It took about four hours, and so discouraged the use of hydrogen determinations. But such analyses are increasingly important. Processes in the petroleum and chemical industries often involve hydrogenation or dehydrogenation. In addition, the percentage of hydrogen is an index to the performance of critical fuels such as those used in jet planes.

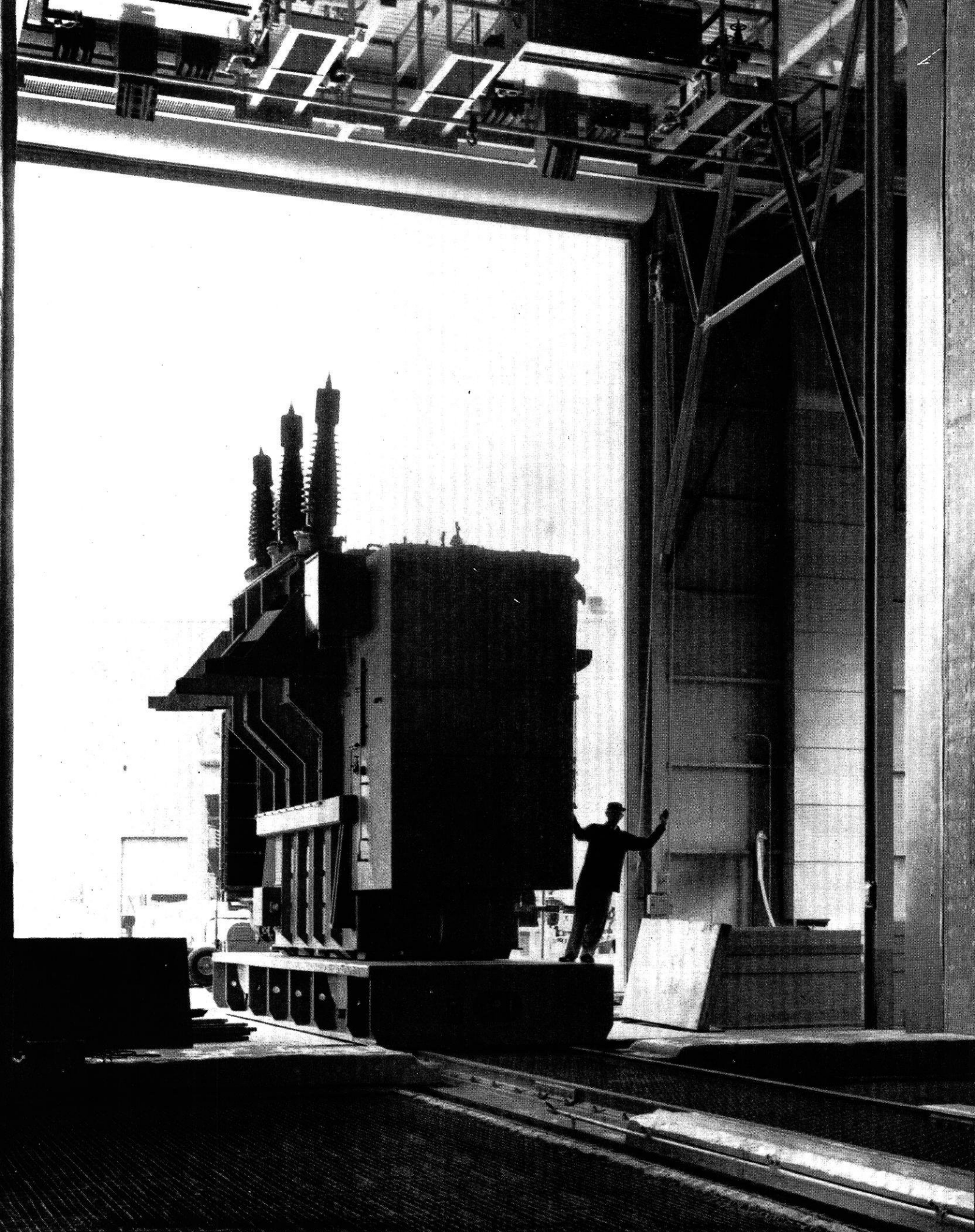
A rapid method for measuring hydrogen content would therefore be a great help in both research work and plant control. Standard Oil's Engineering Research Department, specialists in solving technical problems, took on this challenging assignment.

A new machine—a beta ray hydrogen analyzer—was invented and constructed. It gives results in five minutes, and is twice as accurate as the old combustion method. It is so easy to operate that a laboratory technician can use it.

Problems such as this are met continually in Standard Oil laboratories. They offer an opportunity for young men with training in chemistry and engineering to test their knowledge, skill and ingenuity.

Standard Oil Company

910 South Michigan Avenue, Chicago 80, Illinois



Anechoic Chamber to test the sounds of power transformers.

(See page 5)

editorial

Materialism—Our Biggest Enemy?

Today we are living in an industrial age, a time when material things play a bigger part in our lives than ever before.

Some, those who prefer to be impressed and inspired only by things they can touch and feel, forget the other important aspects of the life of a well-rounded individual. Many young people, for instance, feel they've "arrived" when they own an automobile.

This juvenile group is perhaps the most vital section of American people. The young people are our future leaders—they must learn today how to become real leaders. Older folks are more difficult to teach, but young Americans are ever reaching for new possessions.

Why not present them with possessions in the form of ideas? Ideas like: the importance of a life in which religion plays a significant part, and where reading and constructive thinking have as big a reward, in the long run, as the earning of a dollar by a summer job.

The President of the United States recently mentioned to the nation the importance of prayer and church-going as a sign of religious thinking. He realizes that today, as much as ever, we need to pray for help and for strength to lead the world along the right path. And he realizes that the nation he leads is no stronger than its individuals.

Perhaps the best way to educate a man is to give him selected reading material. Through this, he'll improve his vocabulary and encounter many more facts and concepts than by any other means. Today, children are required to do little reading. They prefer to collect comic books rather than books of history and faith and accomplishment. Doubtless we need to make the important aspects of a real education more interesting, not by colored picture magazines, but through education which treats the student as an adult, and expects adult results from him. It's time to stop pampering and glorifying the child in primary and secondary schools. Instead let's stress concepts like the "lesson of history," the types of government, the development of societies of man. Science and math are fine, but aren't they overstressed in primary and secondary schools?

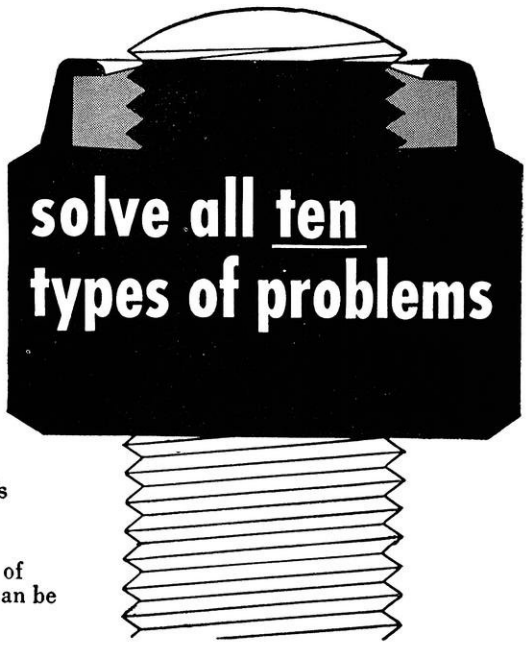
What about the need to bring out constructive thinking in America's youth? Grade and high school teachers talk about the use of the method of class participation, but really there's little of it practiced.

Most schools only expose the student to a subject and then test him on it. There's not much use of the controversial subject to help stimulate independent thinking and discussion.

The practicing of these ideas, it seems from this corner, would help combat the over-importance we place today on material possessions. We must make our growing men thinkers so they can best use the material heritage they cherish.

K. A. G.

elastic stop nuts solve all ten types of problems

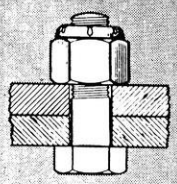


Here are ten typical fastening problems. One device, the ELASTIC STOP nut, solves them all—without additional parts or operations. Deliberately undersized in relation to bolt diameter, the red elastic collar grips the bolt with a perfect fit, exerting a continuing self-locking pressure against the threads, and holding the nut securely in place at any point on the bolt. It also provides a tight seal against the bolt threads, which prevents seepage and wear-producing axial play. And because the bolt threads are protected against moisture from without, the nuts are not "frozen" to the bolt by corrosion.

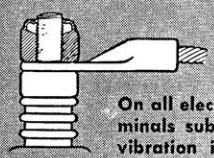
ELASTIC STOP nuts stay tight, right where you put them, in spite of vibration and stress reversals. Yet they are not jammed in place, and can be removed with a wrench and reused many times.

For further information on ESNA self-locking fasteners, mail the coupon below.

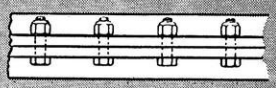
TIGHTENED AGAINST THE WORK



Wherever a vibration or impact proof bolted connection is desired.

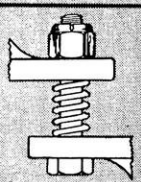


On all electrical terminals subjected to vibration in transit or operation.

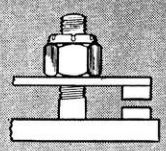


For uniform and precise prestressing of multiple bolt assemblies . . . adjusted by predetermined wrench torques.

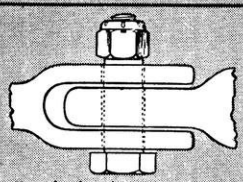
LOCATED ANYWHERE ON THE BOLT



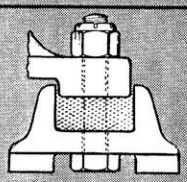
Spring-mounted connections or dynamic balancing, where nut must stay put yet be easily adjusted.



On make-and-break adjustment studs where accurate contact gaps are required.

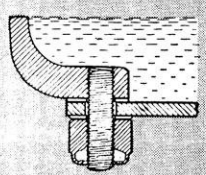


For bolted connections requiring predetermined play.

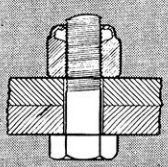


For rubber-insulated and cushion mountings where the nut must not work up or down.

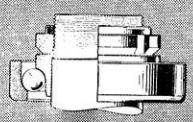
FOR MANY SPECIAL APPLICATIONS



To seal bolt threads where elimination of leakage past stud threads is necessary.



To seal bolt threads where it is necessary to protect them from corroding elements.



To obtain delicate adjustments for applications such as bearing locknuts where precise adjustment is essential.

ELASTIC STOP NUT CORPORATION OF AMERICA

ESNA® TRADE MARK

ROLLPIN TRADEMARK

Dept. N40 , Elastic Stop Nut Corporation of America
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Please send the following free fastening information

☐ Elastic Stop nut bulletin
☐ Rollpin bulletin
☐ Here is a drawing of our product. What self-locking fastener would you suggest?

Name_____ Title_____

Firm_____

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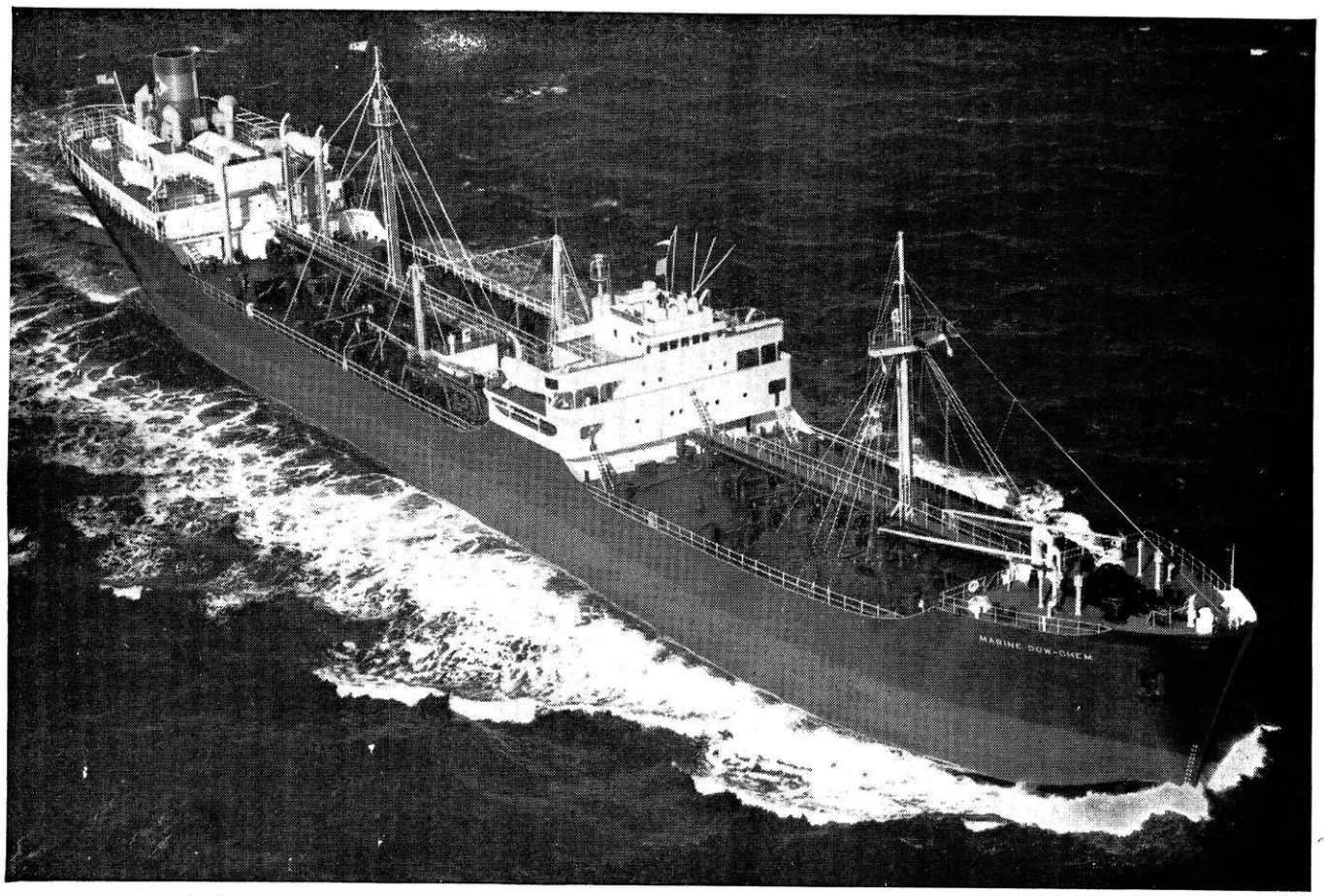
City_____ Zone_____ State_____



S. S. Marine Dow-Chem, first ship ever built specifically for the transportation of liquid chemicals.

CHEMICALS GO TO SEA...

REDUCING FREIGHT COSTS AND BRINGING FASTER SERVICE TO MANY DOW CUSTOMERS

Newest link between Dow's important Texas Division and eastern terminals is the 18,000-ton chemical tanker, "Marine Dow-Chem". First ship ever designed and built to carry chemicals, this huge tanker has a capacity of 3,500,000 gallons, including special nickel-clad, heated tanks that safely carry 73% caustic soda solution. The "Marine Dow-Chem" made her maiden voyage in April, completing three years in the planning and building of the vessel.

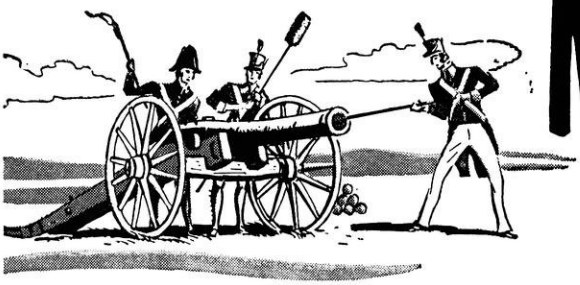
Transportation of Dow chemicals by way of water routes did not begin with this new ship. Dow has pioneered in this technique of shipment. On any given day, you may see a tanker steaming out of Freeport, Texas, steering for East Coast terminals; a powerful tug herding its charge of barges up the Mississippi to Cincinnati; and a freighter leaving California, heading through the Panama Canal toward the Atlantic coast. All have one common purpose —delivering Dow chemicals by the most convenient, most economical routes possible.

Just as Dow's research and production are making giant steps in the progress of the chemical industry, so Dow's distribution keeps pace through new techniques in transportation and service.

Whether you choose research, production or sales, you can find a challenging career with Dow. Write to Technical Employment Department, THE DOW CHEMICAL COMPANY, *Midland, Michigan or Freeport, Texas for the booklet, "Opportunities with The Dow Chemical Company"—you'll find it interesting.*

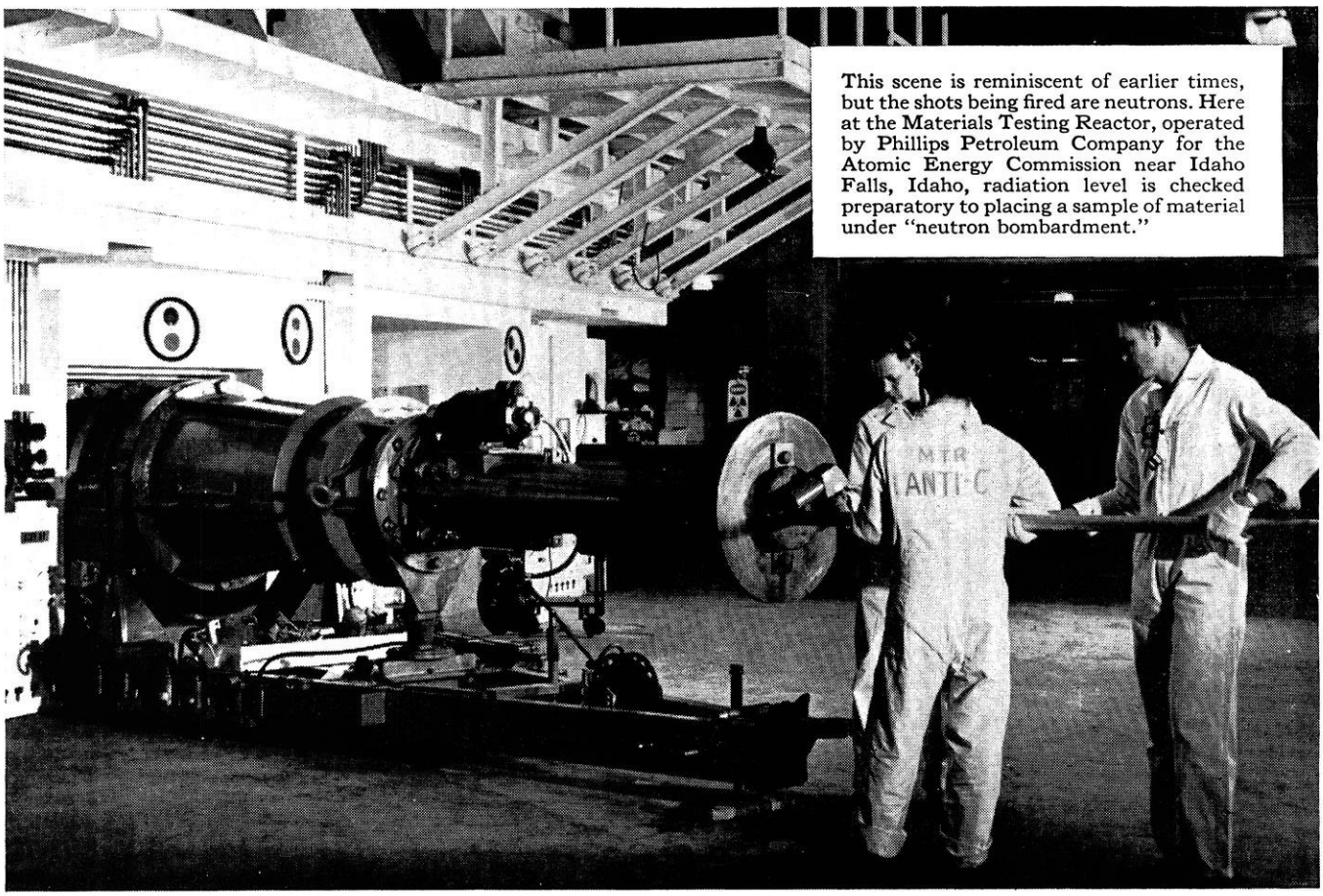
you can depend on DOW CHEMICALS

DOW



Muzzle Loader—

1955 STYLE



This scene is reminiscent of earlier times, but the shots being fired are neutrons. Here at the Materials Testing Reactor, operated by Phillips Petroleum Company for the Atomic Energy Commission near Idaho Falls, Idaho, radiation level is checked preparatory to placing a sample of material under "neutron bombardment."

Broad assignments in atomic energy represent just one phase of the widely diversified interests of Phillips Petroleum Company.

Whatever your specialty in engineering or the sciences, you may be sure that we are interested in your abilities and your achievements. Already, well over 2,800 technical graduates are found among our 23,000 employees.

Some of these scientists and engineers work to produce and improve our automotive fuels and lubricants. Others develop and manufacture such products as carbon black, synthetic rubbers, chemical fertilizers, sulfur compounds, and chemicals used in synthetic fibers.

If you're looking for a career with a future we invite you to write to our Employee Relations Department for further information about opportunities with Phillips Petroleum Company and its subsidiaries.

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PHILLIPS PETROLEUM COMPANY, Bartlesville, Oklahoma

Meet the Authors

by Fritz Callies, m'55

DONALD W. EDWARDS
"Progress Through Research", p. 14

Living proof that Door County grows other things besides cherry trees is Don Edwards, Mechanical Engineering senior from Sturgeon Bay. Don is an old-timer on the **Wisconsin Engineer** staff, having had his fingers in the ink for the past three years. An ex-Layout-Editor, he is now co-Stories-Editor.

An honor student, he is a member of Pi Tau Sigma, honorary mechanical engineering fraternity, and is recording secretary of Tau Beta Pi. He is also a member of Tau Kappa Epsilon. Summer finds him a shipfitter's helper in the Sturgeon Bay shipyards.

ARMEN G. FISHER
"Too Much Security", page 17

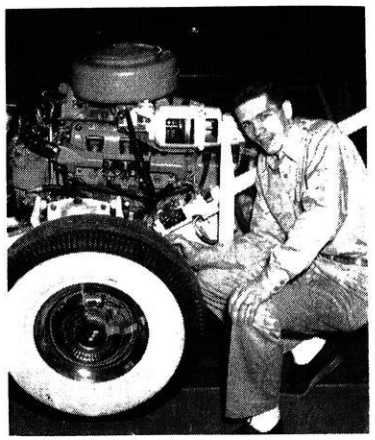
Armen is a Chemical Engineering senior from Montclair, New Jersey. He is a graduate of Cornell University, where he received his B.A. in Chemistry, and was on the Cornell lightweight Rowing Team.

In 1952 he came to Wisconsin to work toward his doctorate in the field of physical chemistry. He soon developed an interest in industrial management, and transferred into Chemical Engineering. In June of '55 Fisher expects to receive not only his B.S. in Chemical Engineering, but also a Bachelor's Degree in Business Administration and a Master's Degree in Chemistry.

RONALD Y. PARKINSON
"Scholarship Opportunities", page 23

Ron, a senior Chemical Engineer, is from Rhinelander, Wisconsin. He received Sophomore Honors, and is a member of Tau Beta Pi and Pi Lambda Upsilon, the honorary chemical fraternity. He is also a member of Sigma Nu.

Ron is Chairman of the Union All-Campus Relation Committee, and is on the Union Public Relations Committee. He is Story Editor of the **Wisconsin Engineer** this year, having been promoted from Copy Editor. Hobbies, besides studying, include skiing and skin-diving.



CANDEN R. NELSON
"New Cars", page 24

Canden is a senior Mechanical Engineer. He commutes daily from Evansville, where he lives with his wife.

Canden is a member of Tau Beta Pi. He is also Chairman of the University of Wisconsin Chapter of the Society of Automotive Engineers, and is interested in automobiles not only from a professional viewpoint, but also as a hobby. He worked last summer for the Ethyl Corporation, and after graduation next June would like to get into the field of gas turbine research and development as applied to the automotive industry.

The photo shows Nelson in the Truck Research Laboratory along side the cut-away model of a 1954 Lincoln, which was presented to the University recently.

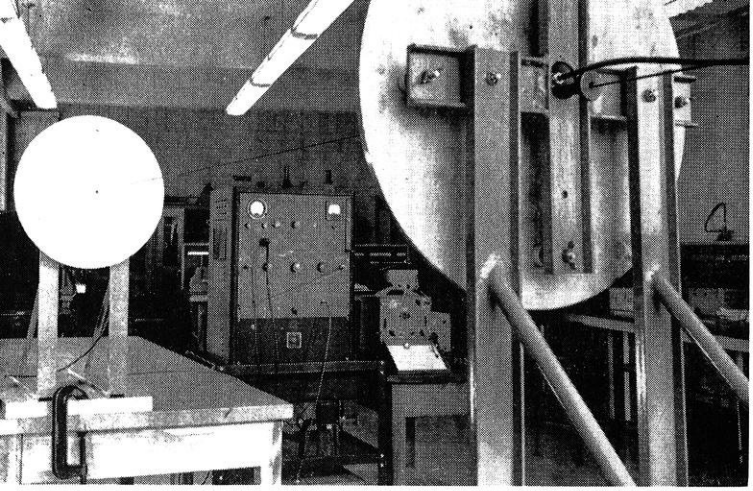
RICHARD N. WHITE
"Mackinac Bridge", page 20

See "Meet the Authors" in the December, 1954, **Engineer.**

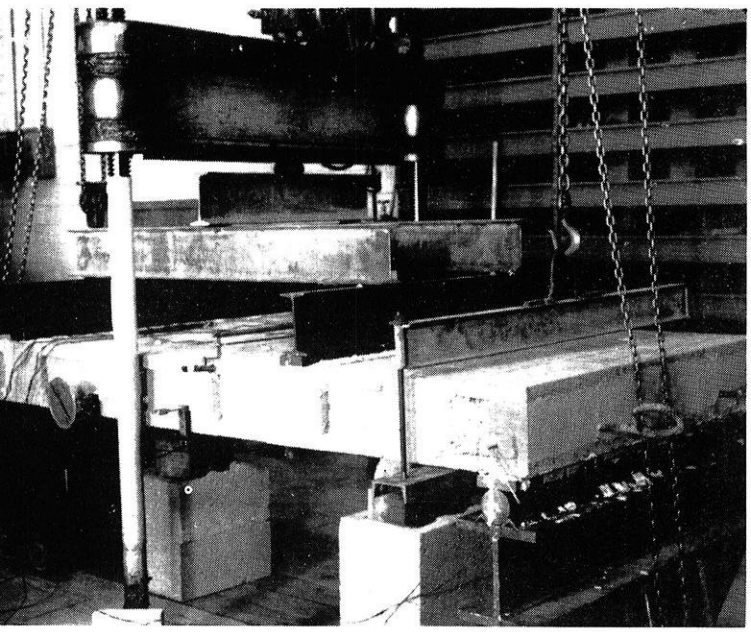
Bank Teller: "What's your name?"

Indignant Patron: "Don't you see my signature?"

Teller: "Yes, that's what aroused my curiosity."

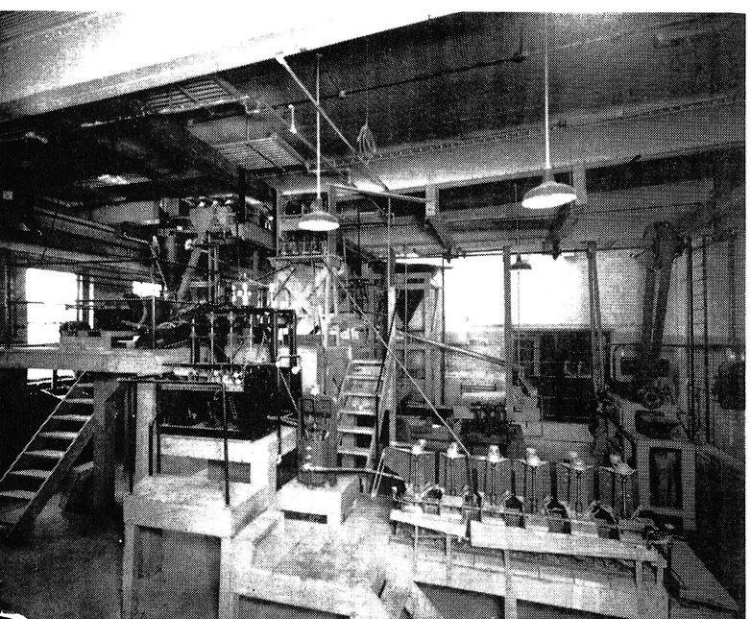


An apparatus to measure the loss on a surface wave line by use of a resonator at 10,000 megacycles in a research lab of the EE Dept.



Wall section under test in the Reinforced Concrete Masonry program in the material testing lab of the Mechanics Dept.

The Mineral Dressing Research Lab, Department of Mining and Metallurgy.



Progress . . .

by Don Edwards m'55

Research has long been an important function of the College of Engineering. The Engineering Experiment Station was authorized by the board of regents in 1914. Due to lack of funds, however, its progress in rendering aid to industries and engineers was not as rapid as desired. During World War II there was a further reduction of research activities due to drafting of students and assignment of faculty to other duties. It was not until 1947 that legislative grants to the Station first made an extensive research program possible.

Under the new program the dean of the college is the director of the station, and W. R. Marshall, the associate director, is in immediate charge. The staff of the Experiment Station is composed of staff members of the various departments of the College who do research. There are no separate staff members which are not associated with one of these departments. The laboratories of the Station are the various laboratories of the individual departments. All money spent for research is accounted for as an Experiment Station expenditure even though these funds may be allocated to and spent by the separate departments.

Three fundamental principles which guide the operations of the Experiment Station are:

1. Graduate training of superior young men in the research and professional phases of engineering.
2. Service to the state and industry.
3. The pursuit of fundamental research in engineering and the engineering sciences.

While performing the above functions, the Station is *not* intended to become a commercial testing laboratory for the conduct of routine tests and is not to offer a consulting service to compete unfairly with the professional engineer.

It is the purpose of this article to discuss further the third basic function of the Experiment Station which is fundamental research in engineering. It is difficult to class research in engineering as basic or fundamental in the sense of Vannevar Bush's definition that "Basic research is performed without thought of practical ends." Much of the research in engineering has an applied aspect. However, by pursuing the research problems through fundamentals and scientific premises rather than from empirical trial and error procedures, engineering research will maintain a basic aspect making possible discoveries of new scientific facts. Thus, it is not impossible for research in engineering to lead to problems of a strictly basic nature wherein the immediate utility of the results is unforeseen.

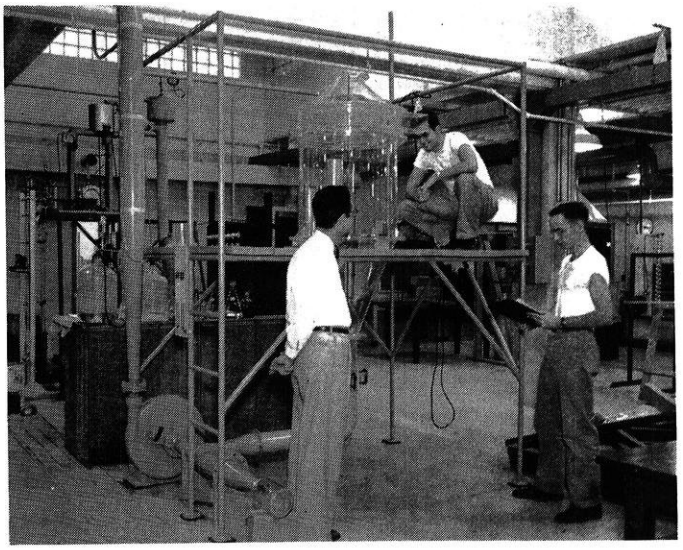
Through RESEARCH

Although all research projects in the College of Engineering are regarded as part of the Engineering Experiment Station operations, nevertheless the actual direction and administration of the projects are usually handled by the individual departments. In only a few instances are projects administered directly through the Experiment Station, and even in these cases the projects must be associated with the particular departments which supply the necessary staff and technical direction. For the current year, three projects are being administered through the Station. They are Truck Research, Drying of Heat Sensitive Organisms, and Research on Solar Energy Utilization.

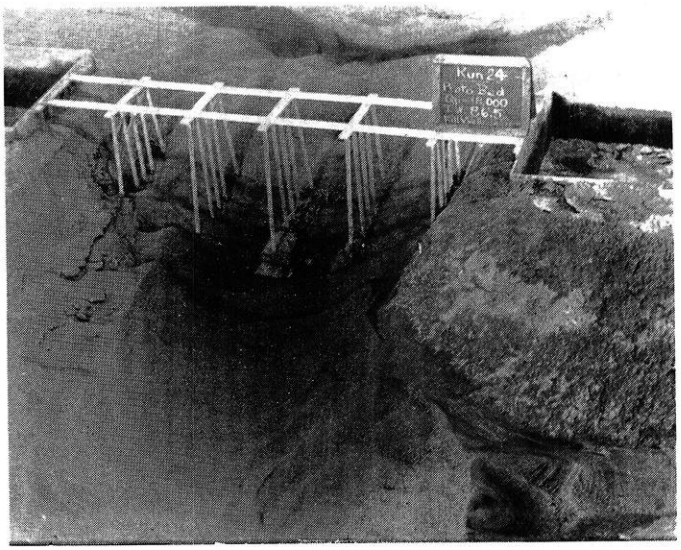
Truck Research is under the direction of Professor A. H. Easton and is housed in the Motor Vehicle Research Laboratory. This project has been sponsored by a number of state industries. A specialized laboratory for motor vehicle research has been developed by this project. The laboratory's facilities include a one ton mobile crane, experimental pit, wash rack, dynamometer bed plate, 200 horsepower absorption engine dynomometer, and various machine tools necessary for efficient laboratory operation. The major instrumentation is a recording oscillograph and strain gage control unit capable of recording time and six variables simultaneously. This instrumentation is portable and adaptable to almost any measurement problem encountered in vehicle research. Because of the versatility and adaptability of the measuring equipment, the possible measurements are limited mainly by the ingenuity of the laboratory personnel. The Truck Research program has brought together research interests in both Civil and Mechanical Engineering.

Drying of Heat Sensitive Organisms concerns the drying of vegetative bacteria produced by fermentation processes and is sponsored by the Federal Government. Supervision of the program is carried on by Dr. J. C. Garver, Project Associate in Chemical Engineering. The project provides opportunities for graduate research in the Department of Chemical Engineering and several graduate students from this department are engaged in research for their Ph.D.'s on various phases of the program.

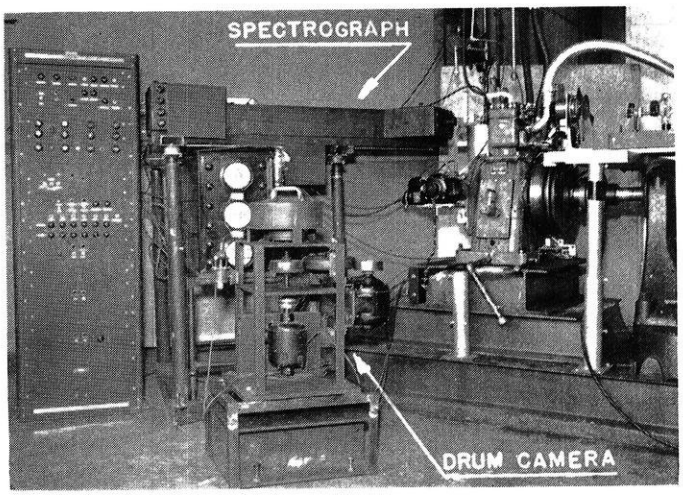
The most recent Experiment Station project is an extensive program to study engineering methods for utilizing solar energy. This project was started in the fall of 1953 as a joint program with other university departments. Dr. J. A. Duffie, Project Associate, is responsible for the direction of the program. Some of the engineering problems to be studied under this program are:



Spray drying research in the chemical engineering department.



In the Hydraulics Lab, a model study of scour under bridges. It is a reproduction of Buckhorn Bridge in Wisconsin.



Apparatus to measure compression temperature in an operating spark ignition engine in the Internal Combustion Engine Research Lab.

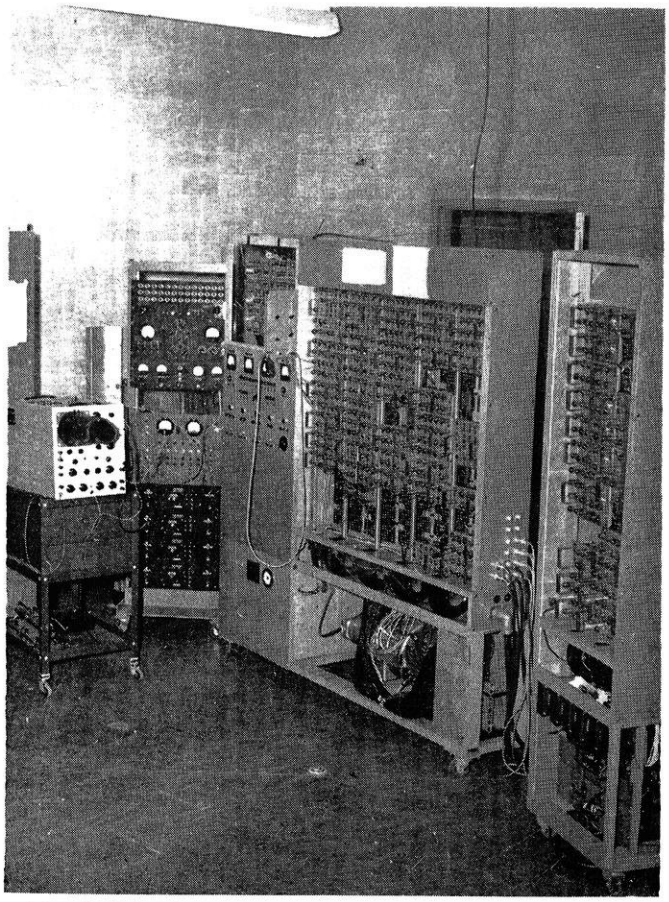
1. The development of low cost solar engines to be studied in the departments of Chemical and Mechanical Engineering.
2. The fundamental problems in collecting and storing solar energy for space heating.
3. Considerations of the combined use of a heat pump and solar energy for heating buildings.
4. The conversion and utilization of solar energy through biochemical processes.

The departments of Chemistry, Meteorology, Bacteriology, and Agricultural Engineering are also closely associated with this program.

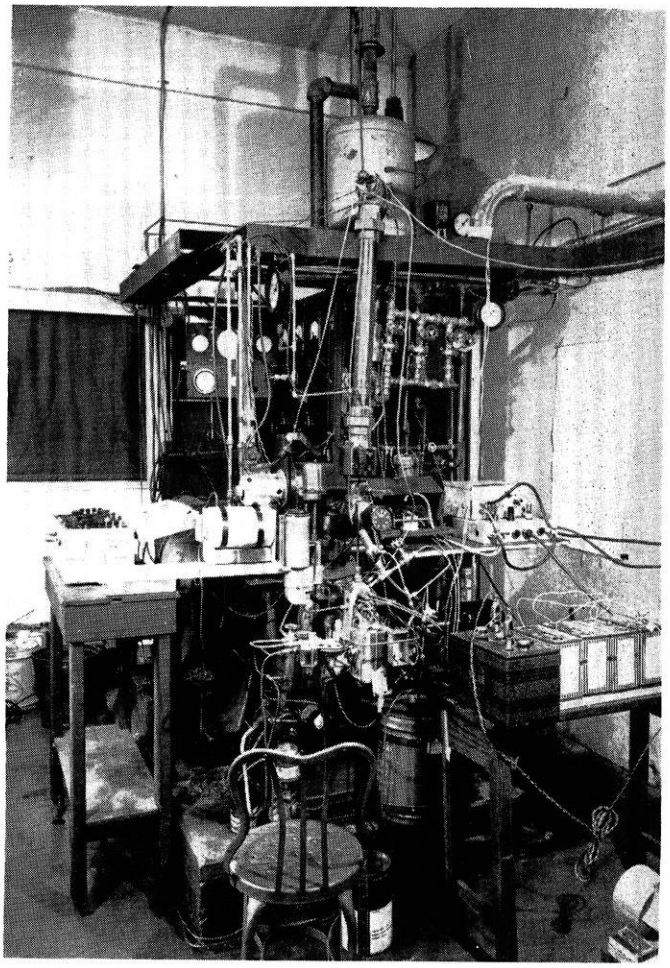
By far the largest number of research projects are being carried out under the supervision of the various departments. According to the latest Report of the Engineering Experiment Station there were 170 such active projects on record.

Research in the Department of Chemical Engineering is distributed among the fields of biochemical engineering, instrumentation, reaction kinetics, thermodynamics, the unit operations of drying, atomization and spray drying, and heat and mass transfer.

Research in Civil Engineering is distributed among the broad fields of highway design and engineering, hydraulics, hydrologic studies, and sanitation and sewage treatment.



The WISC Electronic Digital Computer being built in the Department of Electrical Engineering. This machine will provide valuable assistance in furthering research as well as in educating young engineers in the new and rapidly growing field of automatic computers and data processing equipment. See *Wisconsin Engineer* of February, 1954.



Engine test set-up for measuring compression temperatures by infrared radiation technique.

Research activities in Electrical Engineering include the development of a high speed digital computer with a magnetic drum storage system. Its development over the past three years is expected to culminate in its operation early in 1955. Research in electronics includes studies of noise and signals and their methods of detection, a specialized type of computer for measuring and counting droplet images and other fundamental studies along related lines. Studies of semi-conductors have led to fundamental problems in the field of solid-state physics.

Research in Mechanical Engineering is carried on in the general fields of internal combustion, heat transfer, thermodynamics, and fluid flow.

In the Department of Mechanics projects include a number of studies on concrete and factors affecting its properties, studies of plastic flow and stresses in concrete beams, and fundamental studies in stress analysis.

In Mining and Metallurgy such projects as nonferrous melting practice, intergranular corrosion of stainless steel, beneficiation of low-grade iron ore, effects of melting variables on malleable iron, and interrelation between stress and transformation of steel are being carried out.

Funds are made available for research from industry, federal contracts and grants, research assistants and grants (WARF), and the university budget.

END

Too Much Security

by Armen Fisher

Among the requirements for initiation to Tau Beta Pi, honorary engineering society, is the submission of a non-technical paper. Mr. Fisher received first prize during the current semester for this provocative essay.

It is said that necessity is the mother of invention; it might be added as a corollary that competition is the father of production. A society may be evaluated largely by its material well being; its productivity and standard of living; and its moral fiber. Neither is stimulated by an economic system that eliminates insecurity, obligation, and effort.

Certainly the trend toward collective security was initiated by the laboring classes in self protection from exploitation and industrial tryranny maintained by a class protecting its own security. But some industries now sustain fringe benefits as high as twenty to twenty-five per cent of the wage paid. I would be the last to advocate a return to the days before the graduated income tax, social security, or pension funds; and it cannot be denied that a man is not motivated to work effectively when his family must live in a condemned tenement or when his whole community lives under the shadow of a severe business cycle. But such an extreme argument is no answer. What will be the effect on a man's desire to work hard if he is born into a society that provides for his wants without exacting an equitable effort from him? He will make little effort indeed, unless Marx was right—that man is essentially social and will produce for the social good with no thought of competition or gain. This hypothesis is highly doubtful. Somewhere between fear of the foreman's right to fire or anti-union blackballing on the one hand, and the indulged, even subsidized inefficiency of the featherbedder or the 200-bricks-a-day clan on the other, there must be an answer.

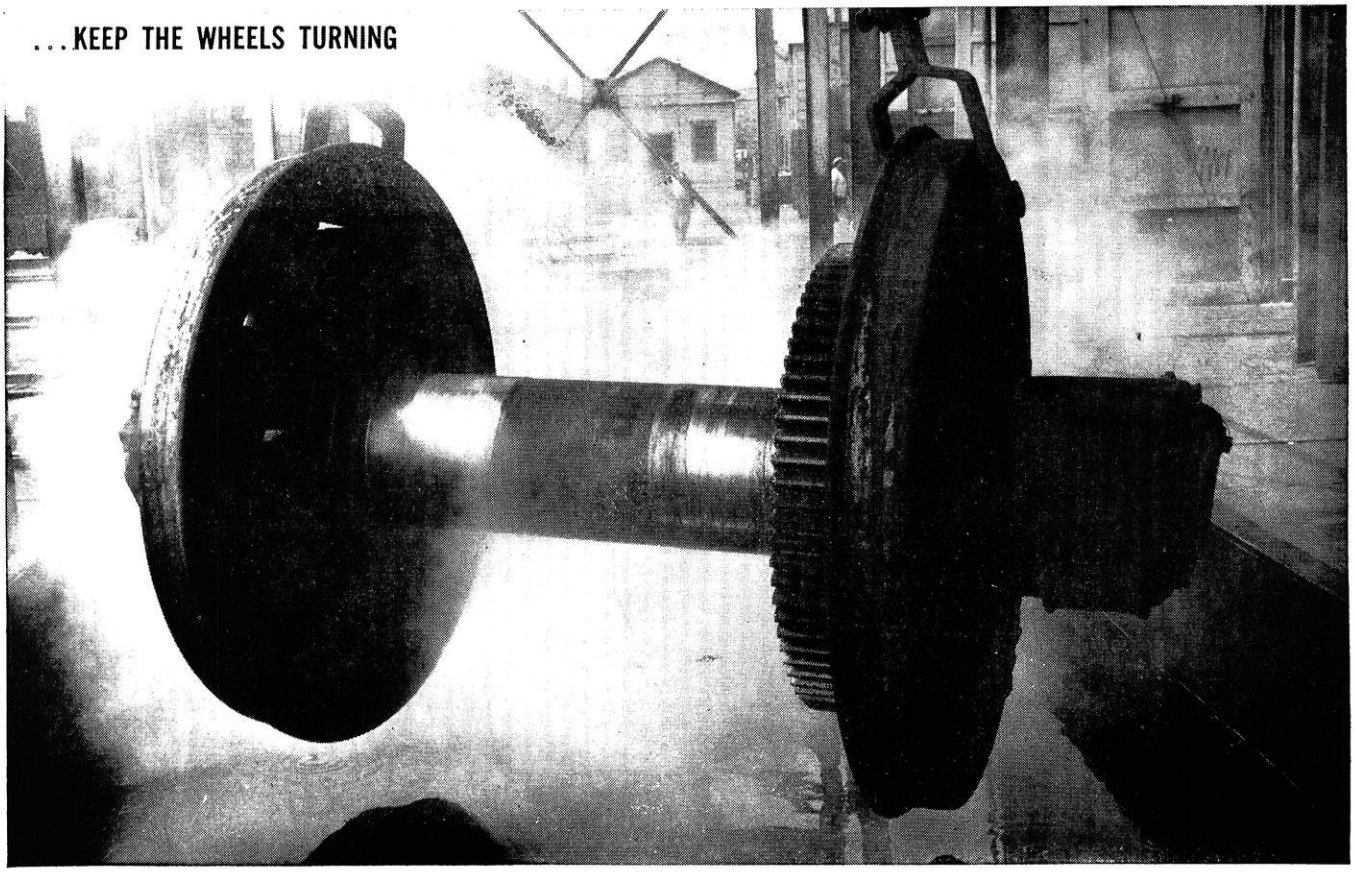
Even management is promoting the trend with increased ballyhooing of promotion from within—on the surface a fine policy, but a further example of compensation for seniority and elimination of the perils of competition. The man with tenure faces few competitors; the man casting around for opportunities to demonstrate, competitively, his worth, or the man who is for some reason released from his job, finds doors shut by "promotion from within." The very essense of professional work is contrary to such security; the professional man is supposed to have a salable commodity which he can freely market anywhere—his technical education and training. More and more the engineer is being tied to the company with which he now finds himself —essentially an industrial feudalism. We cannot deny that men want security, but we can certainly point out the consequences and corelationships: Increased security, decreased competition, decreased motivation, decreased productivity, and increased dissolution born of too much leisure and not enough necessity.

Today's college graduates are asking "What is your company's pension plan? What is the retirement age? Am I sure of promotion and of regular wage raises?" Security and opportunity are to a large extent mutually exclusive and we graduates cannot expect to gain one without sacrificing the other.

Another indication, of interest to all professional technical men, is the movement to unionize engineers which, though still relatively small, is gaining. This movement has been studied by sociologists, social psychologists, and industrialists alike; all seem to agree that the cause lies in poor intra-organizational communications—a comparatively recent field of concern for industrial relations departments. The laborer expresses himself through his union, the manager carries the weight of his prestige and organizational authority, but the wishes and opinions of the engineer are overlooked and he incurs the frustration of being ignored, hence the appeal of unionization. If obligations on both sides were met, such a situation need not arise. On his part, the engineer—if he expects to be considered a professional, not a laboring man, and as potential managerial material—will derive his job satisfaction not from wielding his voice in a collective movement for his own working group, thus setting himself apart from the company's interests, but from his accomplishment and the recognized competence of his work. The management, on the other hand, is composed and derived primarily from the ranks of engineers and other professionals and must hold the interests and opinions of this group foremost. If the professional man finds opportunity, he should not and will not see security first.

There is no such thing as the "freedom from fear and want," nor any "inalienable right to life, liberty, and the pursuit of happiness;" any such is a privilege earned. Nor is there a "right to work," or to hold a job, or to be absolved from the insidious incentive of being competed against. Some progress has been made towards a guaranteed annual wage. But what next? Does the mere fact of being born entitle us to cradle to grave security?, to a guaranteed lifetime wage?, to a 30-hour work week? If our civilization is decayed by any "ism," it will be collective protectionism and consequent elimination of the incentive of competition.

END

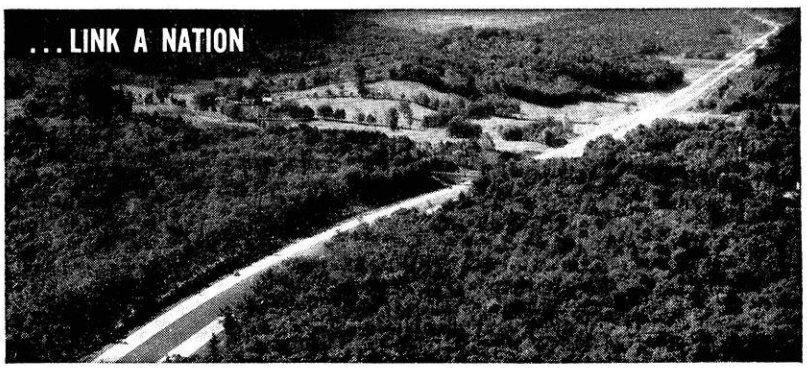


CHEMICAL BATH—Hercules Dresinate®, added to alkaline cleaners, increases the efficiency of cleaning solutions for large equipment such as these railroad wheels. In other applications—as an emulsifier, detergent, dispersant, foaming and flotation agent—this water-soluble resinate helps increase performance, reduce cost of other compounds.

HOW HERCULES HELPS...

Most businesses are helped today by Hercules' business . . . the production of synthetic resins, cellulose products, chemical cotton, terpene chemicals, rosin and rosin derivatives, chlorinated products, and many other chemical processing materials—as well as explosives. Through close cooperative research with its customers, Hercules has helped improve the processing or performance of many industrial and consumer products.

VERSATILE RAW MATERIAL—The linters left on cotton seed are made into chemical cotton (bleached cotton linters) by Hercules' Virginia Cellulose Department. In high-grade paper, chemical cotton replaces rags, eliminates costly rag sorting. And chemical cotton is the best source of cellulose, key to products ranging from lacquers to plastics.



IMPOSSIBLE WITHOUT EXPLOSIVES—Modern highway construction, such as the $555-million, 427-mile New York State Thruway, would be impossible without explosives. Whether it means cutting through a mountain, spanning a gorge, or even moving a river—the modern highway can go straight and level, thanks to the controlled energy supplied by Hercules® explosives.

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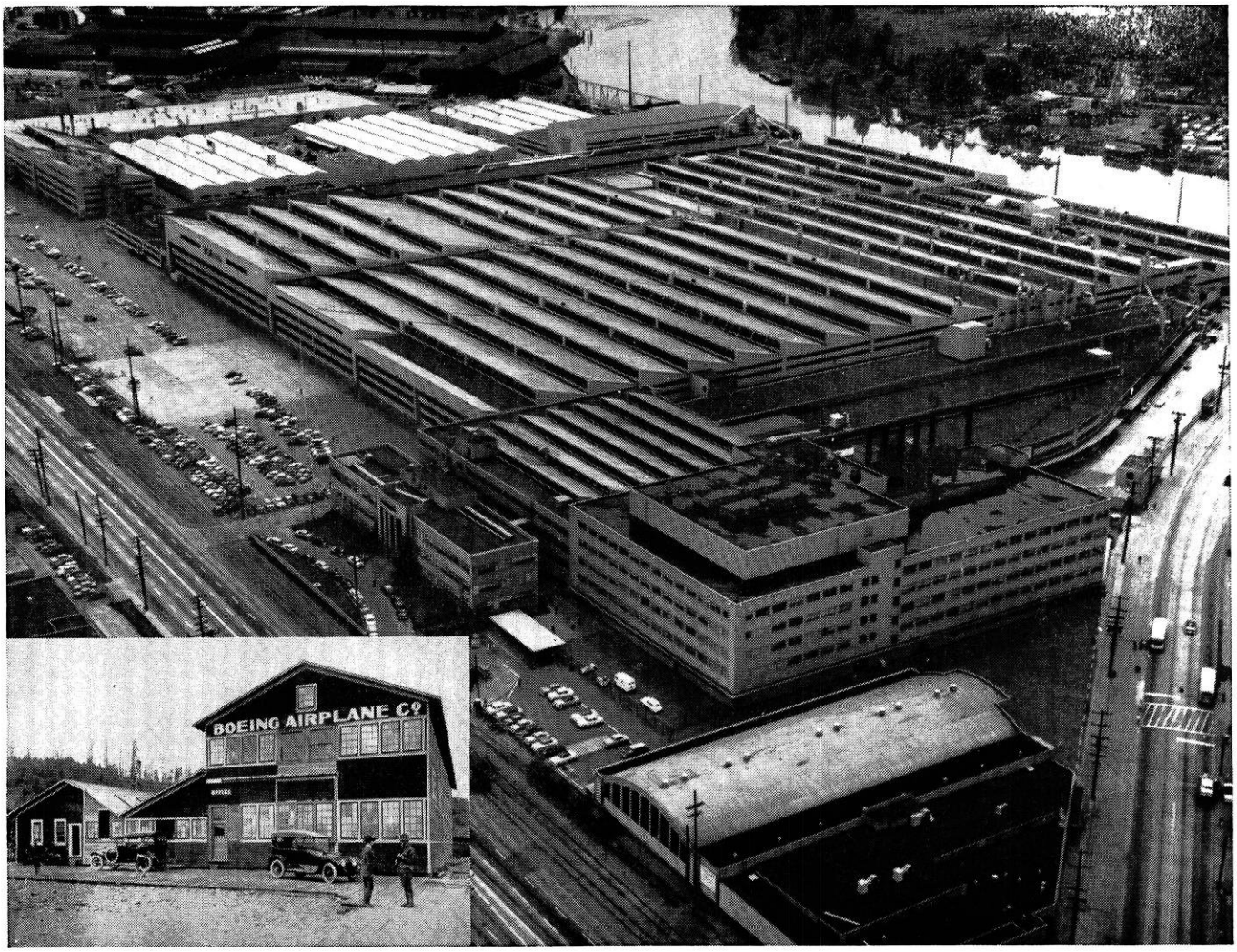
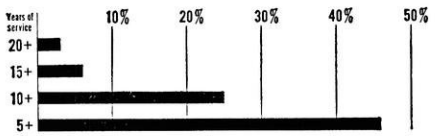


1916—The first Boeing plant, Seattle

1954—Boeing's Seattle plant as it appears today. New Engineering Building is shown in foreground.

Is career stability important to you?

Then the chart below will be of interest. It shows that 46% of Boeing's engineers have been with this company for five or more years; 25% have been here 10 or more years, and 6% for 15 years.



One reason for this stability is that Boeing has grown steadily for 38 years, providing plenty of room for advancement. Another reason is the highly interesting type of work at Boeing, such as designing and building America's first jet transport and the revolutionary B-47 and B-52 jet bombers, as well as work on pilotless aircraft, supersonic flight and research in nuclear-powered aircraft.

Still another reason is this: Boeing always has put dominant emphasis on engineering development. Pioneering in this field has meant that Boeing constantly has increased its engineering staff in relation to total employees. Fifteen years ago, one out of 16 employees was in engineering. Five years ago the proportion of engineers had been raised to one in ten and today it has climbed to one in seven.

Boeing has rewarding openings for engineers of EVERY category—electrical, civil, mechanical, aeronautical and related fields, as well as for applied physicists and mathematicians with advanced degrees.

Careers at Boeing afford a wide variety of experience in research, design and production, as well as work with new materials and techniques, and contacts with a cross section of industry through Boeing's vast subcontracting program.

Boeing promotes from within and holds regular merit reviews to assure individual recognition. Engineers are encouraged to take graduate studies while working and are reimbursed for all tuition expense.

For further Boeing career information consult your PLACEMENT OFFICE, or wri

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

BOEING

SEATTLE, WASHINGTON WICHITA, KANSAS

—U. S. Steel Photo

Fig. 1.—Two main steel towers rise majestically 552 feet above water from piers founded on rock approximately 195 feet below lake level. These main towers support cables for a center span of 3800 feet, second only to the 4200 feet of the Golden Gate Bridge in San Francisco. The total length of the bridge and approaches is 26,195 feet, while the suspension bridge, 8,614 feet from anchorage to anchorage, is the longest in the world.

The Mackinac Straits Bridge

A GREAT MAN-MADE LINK NOW BEING BUILT BETWEEN UPPER MICHIGAN AND THE LOWER PART OF THAT STATE

by Richard N. White, ce'56

A Short History of Bridges

Undoubtedly the first bridges were formed by Mother Nature—fallen logs across streams, natural arches formed by erosion, and similar devices. Man soon came to imitate these structures, and then started to improve on them and devise new and different types of bridges. India was the birthplace of the modern suspension bridge and the cantilever bridge. Mesopotamia, in 4000 B.C., produced the first true arch bridge; and the Romans, who usually needed many bridges in a short time, built the pontoon and timber trestle bridges during their military conquests.

After Rome the Church became the chief bridge-builders because of the unruly order and dangerous traveling conditions. As the Renaissance came into being, Leonardo da Vinci drew plans for portable and bascule bridges, and Palladio first used the truss, which is the framework of most modern bridges. Many large masonry arch bridges were being constructed at this time, especially in Paris. It was also in the Renaissance period that the bridgebuilders became known as civil engineers and gained stature in the eyes of the public.

It was not until the 18th century that bridges were designed using some type of scientific analysis. The first engineering school was headed by Jean Perronet who has been called the father of modern bridgebuilding. A few years later iron and wrought iron came into use as a building material, and many new wrought iron truss type bridges were constructed. However, during the 1870's and 1880's about 25 railroad bridges

per year were failing in the U.S. alone, and this weakness ushered in a new era in bridgebuilding and material-steel.

The increased strength of steel made it possible to build the first examples of today's long, majestic spans. The suspension bridge, which is now the leader of all types, was built in ever increasing span lengths until the completion on the Golden Gate Bridge in 1937 overtook all bridges with a span of 4200 feet. This will be eclipsed by the Messina Straits Bridge which is presently in the planning stages and will have a 5000-foot main span. New techniques in the use of reinforced concrete, and even more recently, prestressed concrete, have resulted in much longer spans for concrete arch construction. This is a type used widely in building the many shorter bridges needed on all highways and railways.

The U.S. has around 400,000 bridges in its truly great, though inadequate, transportation system. Both civil defense plans and the ever-increasing number of vehicles on America's roads cry out the need for bigger and better highway systems. Under President Eisenhower's 50 billion dollar highway improvement plan (which has recently been recommended to be cut to 26 billion dollars) many more bridges will be designed and built by the engineers of America.

As for the bridges of the future, it is safe to say that span lengths will be increased still further with the perfection of super high-strength alloy steels and lightweight structural materials such as aluminum and magnesium alloys. Dr. David B. Steinman says, "In many ways the story of bridgebuilding is the story of civilization."

The Mackinac Straits Bridge

Ever since 1884 farsighted Michigan businessmen and newspaper editors have realized the necessity and eventual construction of either a bridge or tunnel across the Straits of Mackinac which would link the upper and lower peninsulas of the state. Now the dream is coming true with the construction of a five-mile bridge of steel and concerete featuring the second longest suspension span in the world—3800 feet. This center span, linked with two 1800-foot side suspension spans, two 472-foot unloaded backstay spans, and two 135-foot anchorages, makes a suspension bridge of 8,614 feet—the world's longest of this type. Replacing the old ferry system now in use, the bridge will allow the largest Great Lakes boats to pass under the center span (minimum clearance height is 148 feet).

The Mackinac Bridge Authority, which is behind the building of this great transportation link, was started 20 years ago and made numerous studies through the 1930's and 1940's with the help of the state highway department and Army engineers. However, limited funds and then World War II made it impossible to carry out the actual building of the bridge, and the Authority was abolished in 1947 by the Michigan State Legislature.

The people of Michigan were not to be denied. Through their efforts the Authority was recreated in 1950, but this time only with the power to determine feasibility. They reported that the cost of the bridge would be $86,000,000, and in 1952 the Authority was granted the powers to finance and build the structure. While the R.F.C. was studying the Authority's request to purchase $85,000,000 worth of bonds, a group of investment dealers offered to underwrite the sale of the bonds. The Authority accepted, and by the end of 1953, $99,800,000 worth of bonds had been sold on a nationwide market. Merritt-Chapman and Scott Corporation was awarded the contract to build all the foundations for a total of $25,700,000, and the American Bridge Division of United States Steel Corporation is building the superstructure for $44,500,000. On May 7, 1954, the bridge building job was begun, and will be completed in the latter part of 1957.

Design and Construction Details

The bridge will be supported by 33 piers, some of which extend to 195 feet below the lake level. The anchorage piers (the suspension cables are anchored by embedding the ends in huge masses of concrete, each containing 85,000 cubic yards of concrete and capable of resisting a pull of 60,000,000 pounds) are among the most massive ever constructed, having foundations 135 feet long by 115 feet wide.

Thirty of the 33 piers are being built by the cofferdam method. This means that a watertight enclosure made of interlocking sheet piling will be driven into the lake bottom around the space occupied by the pier. After the enclosure is braced adequately, the bottom is excavated to the depth desired and concrete is poured into the cofferdam building the base of the pier. The bracing is concreted into the pier with the sheet piling acting as an exterior form. The cofferdam is then pumped out and the pier is finished by pouring the remainder of the concrete. This method is usually used for relatively shallow depths and stable bottom conditions.

The two tower piers and the southern cable rest pier are using the caisson method because of their extreme depth. A caisson is similar to the cofferdam in that it serves as an enclosure and matches the shape of the pier. It is fabricated on the shore, towed to the pier site, and sunk to the bottom. The lower section of the caisson is a cutting edge built up of steel plates and structural shapes. This edge cuts into the bottom when the caisson is lowered. The bottom is then removed, usually by dredging, and concrete is poured into the spaces around the dredging wells causing the caisson to cut deeper into the bottom. This process is continued until the desired depth is reached.

The caissons used for the tower piers will be 116 feet in diameter and will require 2,530 tons of steel for their construction. They are designed in the shape of a giant doughtnut with an 86-foot diameter center for dredging out the bottom and a 15-foot space into which concrete is poured.

All the concrete used for the foundations will be placed by the Prepakt method—a technique in which coarse aggregate is placed in layers about 10 feet thick and intrusion mortar is forced into the voids by pressure through previously placed 1-1/4 inch pipes. All equipment is then raised 10 feet, and the procedure is repeated until the pier is completed. Four hundred and thirty-eight thousand cubic yards of concrete and 21,200 tons of steel will be used in the construction of the 33 piers. To build the piers, Merritt–Chapman and Scott has assembled the largest and one of the most costly fleets of floating construction equipment ever used by a single contractor for one job. Valued at $4,000,000, the fleet consists of about 50 pieces of floating equipment, most of it newly built for this project.

The superstructure is being built by American Bridge, which has constructed many of the major bridges of the world and fabricated or built such sky scrapers as the Empire State Building, the Chrysler Building, the United Nations Headquarters, the Chicago Post Office, the Chicago Board of Trade Building, and the Woolworth Building. The Mackinac Straits Bridge will be fabricated at the Gary, Indiana, and Ambridge, Pennsylvania, plants, both of which specialize in the heavy members required in such large structures as this.

The approach spans to the suspension bridge are made up of 28 deck-truss spans each, 34 feet wide and varying in depth from 16 to 53 feet. The roadway slab is 6 inches of reinforced concrete topped with a layer of bituminous concrete.

The suspension cable towers are 552 feet above low water which is equivalent in height to a 46-story office building. Each tower has two cellular shafts connected at four levels by horizontal struts (Photo, p. 20). The main cables are 24-1/4 inches diameter and 68 feet apart; 12,876 galvanized steel wires (each 0.196-inch diameter) are required for each cable. The suspended bridge trusses are supported from these main cables by two 2-1/4 inch diameter steel wire ropes at 39-foot intervals. The suspended spans are 68 feet wide and 38 feet deep.

I–Beam–Lok steel flooring will be used on the 8614-foot suspension span, and two 3-foot sidewalks are provided for maintenance and emergency use.

Other facts and figures—more than 41,000 miles of cable wire will be needed for the two main cables, and 75,000 tons of structural steel will be used in the bridge. A combined force of approximately 1,000 men will be employed during the construction peak. Two million, four-hundred thousand sacks of cement will go into the foundations.

About the Designer—Dr. David B. Steinman

The Mackinac Bridge Authority has one of the world's top bridge engineers in Dr. David B. Steinman. He graduated summa cum laude from the City College of New York in 1906 with a B.S. degree and then went to Columbia to earn his C.E., A.M., and Ph.D. degrees. After teaching civil engineering at Idaho and C.C.N.Y. until 1920, Dr. Steinman has spent his time designing bridges for every corner of the world. Those among the more notable of the 300 bridges for which he was designer or consultant are the Henry Hudson Bridge in New York, the Thousand Islands Bridge across the St. Lawrence River, the Constitution Bridge in Puerto Rico, the Mount Hope Bridge in Rhode Island, and the Florianapolis Bridge in Brazil. He is now working on the plans of the most gigantic bridge in the world—across the Straits of Messina between Sicily and Italy.

DAVID B. STEINMAN
Bridge engineer and designer of the Mackinac Straits Bridge

Dr. Steinman has received innumerable awards and honors, both national and international, and has ten honorary degrees for his distinguished achievements not only as an engineer but also in many other fields of life. Perhaps one of the best indications (other than his bridges) of his true stature in the world is the fact that he occupies more space in *Who's Who* than Presidents Eisenhower and Truman combined. His life and his work have inspired thousands of engineering students and young engineers to greater heights and will continue to do so long into the future. **END**

ACKNOWLEDGEMENTS

1. Mackinac Bridge Authority News Kit.
2. David B. Steinman, "Bridges" *Scientific American,* 191: 60–71, November, 1954.

Scholarship Opportunities

Nearly Four Dozen Scholarships Are Available to UW Engineering Students

by Ron Parkinson, Che'55

$ $ $ NEED CASH $ $ $

for Bills, Seasonal Expenses, Household Needs, or Other Purposes?

Get up to $1000 on your signature only.

Repay NEXT YEAR.

How many times have you seen a similar article in the ad section of your daily newspaper? Most of us tend to regard these advertisements somewhat dubiously since no mention is made of interest rates, and we have a feeling that considerably more than our signature is required as collateral. What, then, would we think if we saw an advertisement of this type posted on our Engineering bulletin boards?

$ $ $ NEED CASH $ $ $

for Books, Tuition, and Other Expenses?

Get up to $800 on your scholastic ability and financial need only.

Interest—required in Engineering subjects.

Repay—by continued proficiency in Engineering.

Perhaps many Engineers don't realize it, but on nearly every bulletin board on our Engineering campus there is an announcement, offering cash for Wisconsin Engineering students on just those terms. Admittedly the announcement isn't written with a flair for sensationalism, but it's there. Look for it. It begins

FELLOWSHIPS AND SCHOLARSHIPS

available to

STUDENTS IN ENGINEERING

This bulletin offers over forty-five scholarships in the undergraduate field alone. These scholarships are of an average value of $400 apiece and are available to Sophomores through Seniors in every field of Engineering. Often the company donating the scholarship will offer summer employment between the student's Junior and Senior year, although a scholarship appointment does not imply that an offer of employment will be made by the company, nor that the student is obilgated to accept such an employment offer, if made.

All that is necessary to apply for a scholarship is to obtain an application blank from any departmental office, the Dean's office, or the Engineering Library; fill it out, giving the personal data called for, and submit on a separate sheet of paper a statement clearly explaining financial situation and the need for assistance; and then file the blank in the required departmental office before February 15, 1955.

The following is a list of undergraduate scholarships available:

Remember, application must be made before February 15, 1955.

Name of Award	Students Eligible
Louis Allis Company Engineering Scholarship	Students who will be senior Electrical Engineer's next fall.
American Smelting and Refining Company Scholarships*	Students in Mining or Metallurgical Engineer who will be juniors or seniors next fall.
American Society for Metals Scholarship	Metallurgical Engineers who will be sophomore, junior or senior next fall.
Bates and Rogers Foundation Scholarships*	Civil Engineers who will be sophomore, junior or senior next fall.
Charles and Constance Bleyer Memorial Scholarships Engineering*	All Engineers.
Foundry Educational Foundation Scholarships*	Any student demonstrating interest in foundry work by summer employment or courses in Metallurgical Engineers.
General Electric Engineering Awards*	Students who will be senior Engineers next fall.
The Grainger Charitable Trust Engineering Scholarships*	High school seniors expecting to enroll in Electrical Engineering.

(Continued on page 42)

The finest of Chevrolet's "sport coupe" hardtop models is the Bel Air. It features a special two tone paint styling. Chevrolet's new V–8 has the shortest stroke (3.0″) of any of the new V–8's, and has a unique rocker arm design which eliminates the rocker shafts. Chevy's six and V–8 models can be obtained with horsepower ratings from 123 to 180.

NEW CARS

The Motoring American Public Finds More Changes Than Ever in the 1955 Models

by Canden Nelson, me'55

Now that most of the automobile manufacturers have introduced their 1955 models, it is interesting to review the features which have made the current models the most anxiously awaited in many years. It is true that sales department publicity created much of this "suspense", but the engineering developments offered this year are every bit as numerous and advanced as claimed prior to the unveilings.

Among the most publicized new features offered by a number of manufacturers are:

1. **V–8** engines. Plymouth, Chevrolet, Pontiac, and Packard have brand new V–8's, available for the first time this year. On other makes, last year's engines have been re-engineered to give horsepower boosts of as much as fifty horsepower.

2. **Body styling,** inspired by the experimental cars publicly displayed only several years ago. Wrap-around windshields have all but swept the field and hooded headlights, giving a rakish, longer look, are common.

3. **Striking color schemes,** both interior and exterior, in such variety as to make the customers selection of just one difficult. In the low priced field, for example, Chevrolet offers 14 solid color options and 21 two-tone color options, while Ford lists 13 single colors and 36 two-tones. This is quite a contrast to the days of the Model T when the customer could choose any color he wished, as long as it was black.

4. **Tubeless tires.** First introduced in the low priced field by Ford in 1954, tubeless tires are now standard on all makes and may prove to be the most practical of the many new features.

The long list of optional equipment items generally available throughout the industry has been extended again this year with the addition of power-package" engine modifications, duel exhaust systems, and unit, under-hood mounted air conditioning systems. Such items as tinted safety glass, automatic transmissions, power brakes, power steering, power seats, and power windows afford the same luxuries in all price brackets.

The number of model possibilities available from a single manufacturer is in the tens of thousands, as a little arithmetic will demonstrate. In the Ford line, for example, there are:

16 body models
49 color options (single and two-tone)
7 engine-drive combinations
4 power-assist options

There may be, then, 16 x 49 x 7 x (2x4) = 43,904 model combinations from the factory, not including minor accessories which may be dealer installed. While some of the above combinations may not be deliverable, it is seen that the customer has a wide field from which to choose even within a single manufacturers' line.

Perhaps in no other single year have so many unusual, yet unique, features been offered, each bidding for proof of its practicability and public acceptance on a limited number of models. While not new this year, Studebaker's "Hill-Holder" prevents rolling backward

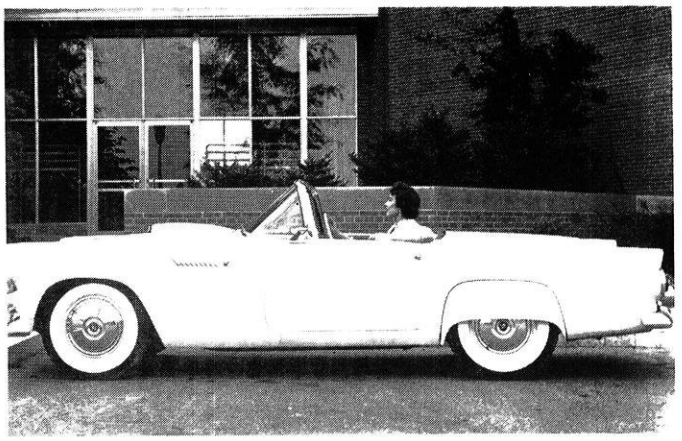
Ford, the leading producer of station wagons in 1954, now is making this eight passenger Country Squire as the leader of five wagon models.

on a hill and eliminates automatic-drive creep while idling in drive, as at a stoplight.

Variable pitch stator blades on the Buick Dynaflow adjust automatically for top performance when the accelerator is depressed to the floor but return to an economy setting for other positions of the accelerator.

What seems to be the natural next step in simplifying the mechanics of driving has been taken this year

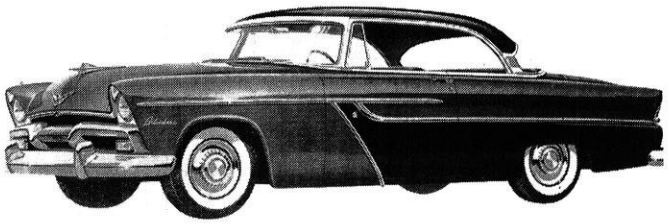
The simple, attractive front end of the new Plymouth sets it apart from its direct competition. The car is longer than other cars in its field.



Ford's new "personal" car, the Thunderbird, has roll-up windows and an adjustable steering wheel. The car may be purchased with either a folding top, a fiberglas hard top, or both. It has a V–8 motor of about 195 horsepower.

by Chrysler Corporation in reducing the shift level to just another control on the dash. On the dashboard also, Pontiac has done away with the speedometer needle this year, replacing it with a red line which curves its way around the dial like a thermometer. Lincoln and Mercury offer a dash control, a push-button, which enables the driver to lubricate front end chassis points in a few seconds from inside the car. The manufacturer recommends greasing every 100 miles or oftener, the lubricant being supplied from a reservoir which holds a year's supply.

Imperial, the newly established fifth member of the Chrysler family, has made the industry's only disk brakes standard on the Crown Imperial models. These



Plymouth's most expensive hard-top coupe is this Belvedere model, distinguished by the stylish paint treatment. The car can be had with a V–8 of 157, 167, or 177 horsepower.

higher capacity brakes have been offered on Chryslers in previous years. Another Chrysler Corporation "first" is the three-tone paint job sported by the Dodge Lancer hardtop.

The many new functional features, the imposing list of optional equipment, and the rash of special or novel features offered by the automobile manufacturers on the 1955 models are all evidences of the estimated billion dollar investment in tools and equipment made by the industry to bring out the current models.

END

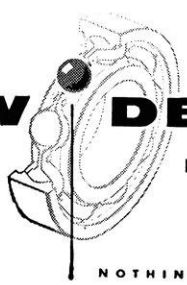
COUNT VON ZEPPELIN—MODESTY PREVAILS

If Zeppelin had said his dirigible was "just a big bag of wind," he'd have shown vision. He knew that its record of 60 miles in two hours was only a beginning.

And so it was. Now the sound barrier has been smashed . . . and New Departure has helped. With ball bearings to withstand high jet engine temperatures. With ball bearings to carry heavy propeller loads. With ultra-precise instrument ball bearings that help make "blind flight" and pinpoint navigation possible.

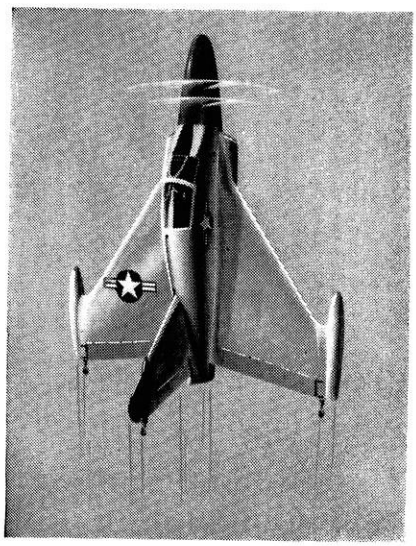
Just as New Departure was ready for today's advances in aviation, New Departure will be ready tomorrow, too—with the finest in ball bearings . . . *first*.

NEW DEPARTURE • DIVISION OF GENERAL MOTORS • BRISTOL, CONNECTICUT



NEW DEPARTURE
BALL BEARINGS

NOTHING ROLLS LIKE A BALL



Navy's new vertical take-off fighter, the "pogo stick," has some 80 New Departure ball bearings in its Allison T40 turbo-prop engine. New Departures also carry heavy thrust and combination loads in the Curtiss-Wright Turbolectric propellers.

ELECTRICAL ENGINEERS
MECHANICAL ENGINEERS
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for { electrical and mechanical engineering design and development, stress analysis, airborne structural design, electrical and electronic circuitry, systems studies, instrumentation, telemetering, electro-mechanical test, applied physics problems.

Sandia Corporation, a subsidiary of the Western Electric Company, offers outstanding opportunities to graduates with Bachelor's or advanced degrees, with or without applicable experience.

Sandia Corporation engineers and scientists work as a team at the basic task of applying to military uses certain of the fundamental processes developed by nuclear physicists. This task requires original research as well as straightforward development and production engineering.

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Sandia engineers design and develop complex components and systems that must function properly under environmental conditions that are much more severe than those specified for industrial purposes. They design and develop electronic equipment to collect and analyze test data; they build instruments to measure weapons effects. As part of their work, they are engaged in liaison with the best production and design agencies in the country, and consult with many of the best minds in all fields of science.

Sandia Laboratory, operated by Sandia Corporation under contract with the Atomic Energy Commission, is located in Albuquerque — in the heart of the healthful Southwest. A modern, mile-high city of 150,000, Albuquerque offers a unique combination of metropolitan facilities plus scenic, historic and recreational attractions — and a climate that is sunny, mild, and dry the year around. New residents have little difficulty in obtaining adequate housing.

Liberal employee benefits include paid vacations, sickness benefits, group life insurance, and a contributory retirement plan. Working conditions are excellent, and salaries are commensurate with qualifications.

A limited number of positions for Aeronautical Engineers, Mathematicians, and Physicists are also available.

Make application to: **PROFESSIONAL EMPLOYMENT**

DIVISION A-5

Or contact through your Placement Office the Sandia Corporation representative with the Bell Telephone System College Recruiting Team for an interview on your campus.

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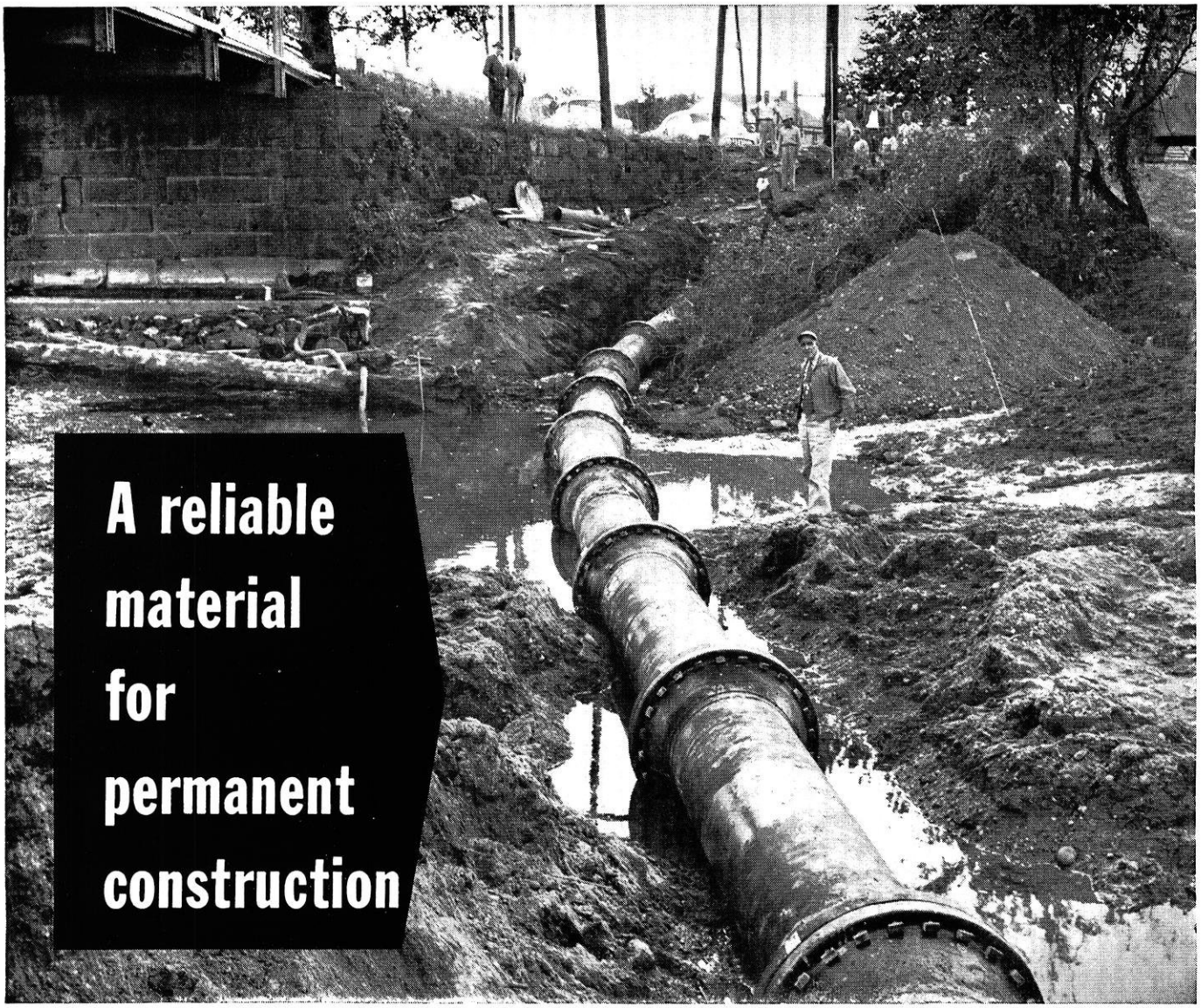
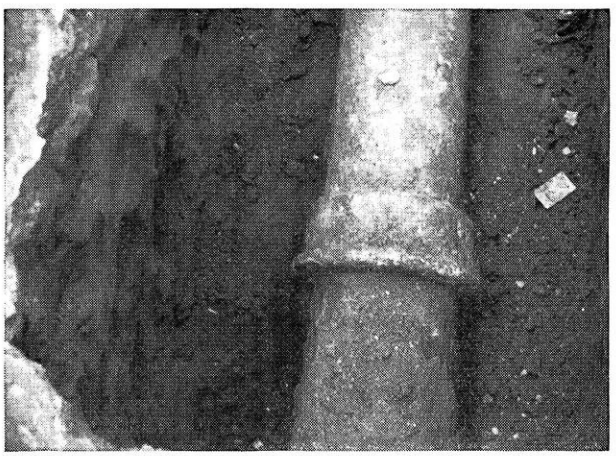


Ball-and-socket joint cast iron pipe for water main crossing river at Newark, Ohio.

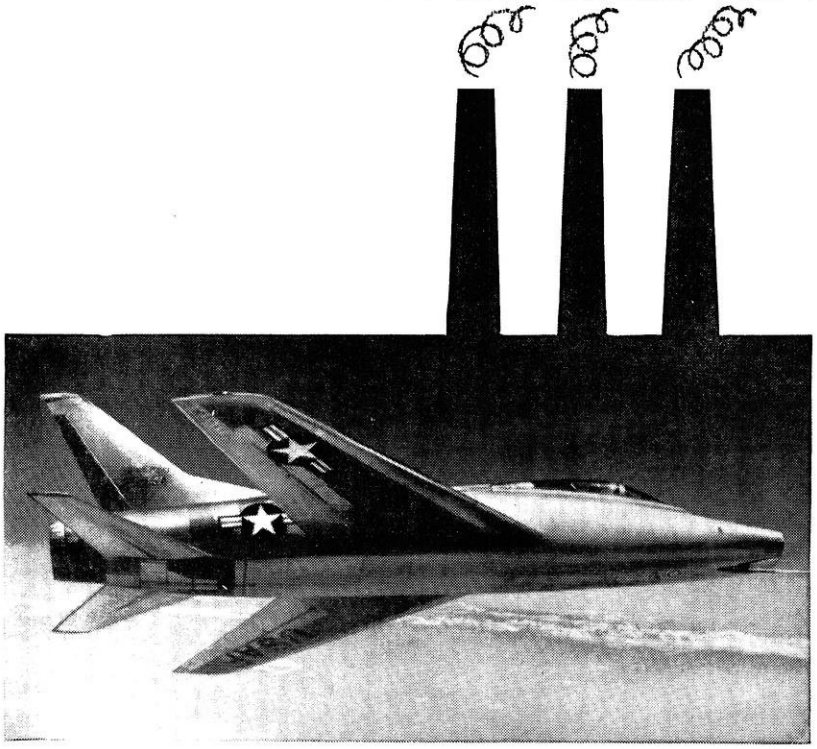
Where installations are planned for long-term service to assure low cost per service year, engineers rely on cast iron pipe as a dependable and adaptable material. Consequently, it is specified for a wide variety of applications, both utility and industrial, including water supply, sewerage, fire protection, process industries and many forms of special construction. Long life and low maintenance cost are *proved* results of the high beam-strength, compressive-strength, shock-strength and effective resistance to corrosion of cast iron pipe. Cast Iron Pipe Research Association, Thos. F. Wolfe, Managing Director, 122 So. Michigan Ave., Chicago 3, Ill.

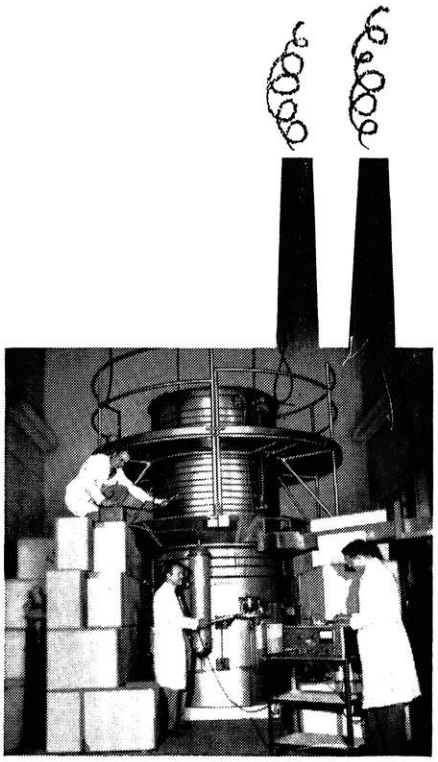


Cast iron water main still functioning in Philadelphia after 135 years of service.

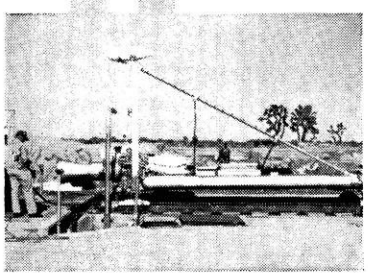
CAST IRON PIPE SERVES FOR CENTURIES

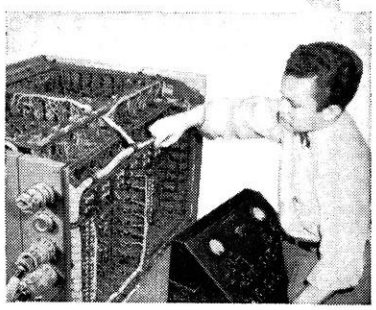
NORTH AMERICAN HAS BUILT MORE AIRPLANES THAN ANY OTHER COMPANY IN THE WORLD





DIVERSITY CREATES OPPORTUNITY





Although best known for design and production of world-famous aircraft like the Korea-famed F-86 *Sabre* Jet and the new, record-smashing F-100 *Super Sabre* . . . North American Aviation also offers engineers excellent opportunities in other technical fields.

North American needs engineers with imagination to help design and build the aircraft of the future. Other fascinating careers are created daily in its rapidly developing guided missile, jet, propulsion systems, electronic and atomic energy programs.

When you are ready to enter the engineering profession, consider the well-paid opportunities at North American. Meanwhile, write for information on your future in the aircraft industry.

Contact: **Your College placement office or write:**

Engineering Personnel Office
5701 West Imperial Highway,
Los Angeles

12214 South
Lakewood Blvd.,
Downey, Calif.

North American
Aviation, Inc.
Columbus 6, Ohio

ENGINEERING AHEAD FOR A BETTER TOMORROW

NORTH AMERICAN AVIATION, INC.

W. S. P. E.

ENGINEERS' CREED

As a professional engineer, I dedicate my professional knowledge and skill to the advancement and betterment of human welfare.

I PLEDGE

To give the utmost of performance, to participate in none but honest enterprise, to live and work according to the laws of and the highest standards of professional conduct. To place service before profit, the honor and standing of the profession before personal advantage, and the public welfare above all other considerations. In humility and with need for Divine Guidance, I make this pledge.

Twelfth Annual Meeting

What your professional engineering society is doing and should do for you will be the theme of the Twelfth Annual Meeting of the Wisconsin Society of Professional Engineers, to be held at the Schroeder Hotel, Milwaukee, Wisconsin, on Janury 27, 28 and 29.

Discussion of this subject, which will offer an opportunity to learn just how effective our society is or can be, will be handled on Saturday morning by a panel of professional engineers well qualified in their respective fields. This panel will consist of Kurt F. Wendt, P. E. Dean of Engineering, University of Wisconsin; John Gammell, P.E., Director of Graduate Training, Allis–Chalmers Manufacturing Co., Milwaukee, Wisconsin; Henry J. Hunt, P.E., Vice-President, Mead & Hunt Inc., Madison, Wisconsin; William F. Steuber, P.E., Assistant Engineer, Wisconsin State Highway Commission, Madison, Wisconsin; Louis J. Larson, P.E., Consulting Welding Engineer, Allis–Chalmers Manufacturing Co., Milwaukee, Wisconsin; Le Roy A. Griffith, P.E., Director of Engineering, Transistor Division, Minneapolis Honeywell Regulator Co., Minneapolis, Minnesota; and Edwin W. Seeger, P.E., Vice-President and Ass't. Secretary, Cutler–Hammer, Inc., Milwaukee, Wisconsin.

Guest speakers at the luncheon on Saturday will be Leo E. Brown and Don Hyndman, Directors of Public Relations of the American Medical Association and American Bar Association, respectively, who will tell us of the importance of their societies to their professions.

Presiding at the Functional Group Meetings on Friday morning will be Robert W. Smeaton, P.E., Industrial Group, John Gammell, P.E., Educational Group, Herbert O. Lord, P.E., Public Employment Group and Robert H. Hopwood, P.E., Consulting Group.

Other guest speakers will be Dr. Fred A. Replogle, of Rohrer, Hibler and Replogle, Chicago, Illinois, at the Friday evening banquet and Dr. Allen Abrams, Vice-President, Marathon Corporation, Rothschild, Wisconsin, at the Friday luncheon.

For the ladies, a style show will be presented at a separate luncheon on Friday and this will be followed by a card party.

Your Society can do much for you but Remember—it can be no stronger than the support you give it.

Public Relations

Chapter Public Relations Activities of Interest

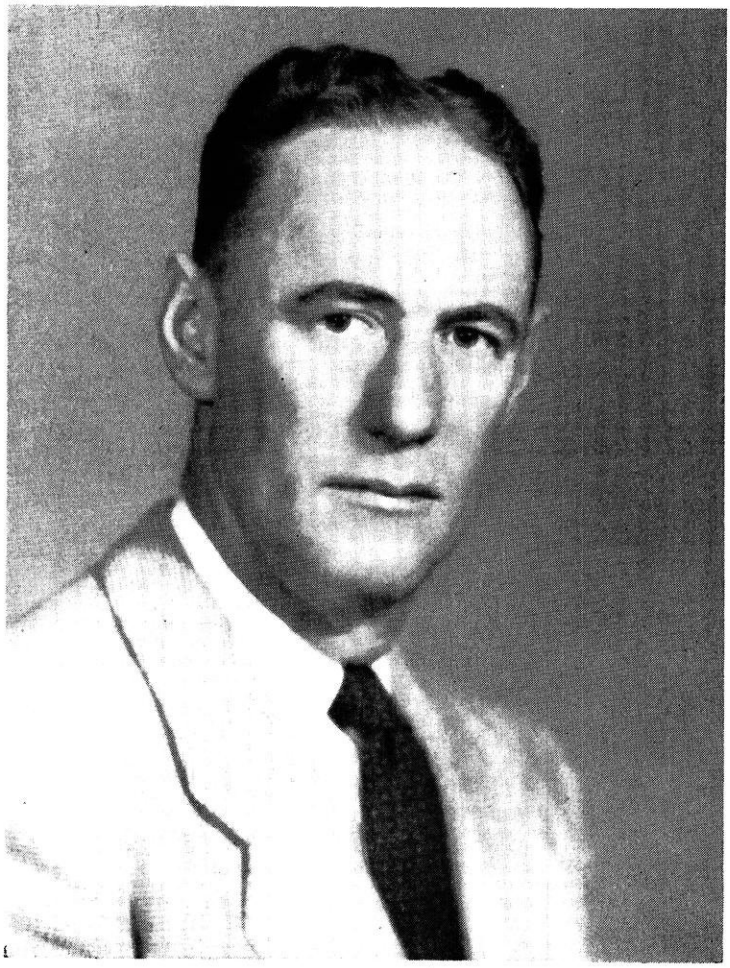
Fox River Valley Chapter in announcing its November 4th meeting, included in its pre-meeting news release suggestions as to the types of people who would be interested in the scheduled talk, data as to percent of engineers registered in its area and total membership in WSPE, a statement that WSPE is fostering a board program of technical betterment and an invitation to non-members to attend their meetings. A list of certain engineer-members of the Chapter was also included.

The post-meeting news release included a reminder by the Chapter President that examination for registration of professional engineers was scheduled for January 31–February 1, 1955, at Madison.

All Chapters are no doubt securing worthwhile news. Copies of such publicity will be welcome, particularly as they may be of interest to other Chapters.

(Continued on page 32)

Meet the President



WAYNE G. BRYAN
Fox River Valley Chapter

Wayne G. Bryan, president of the Fox River Valley chapter, has served as city engineer in Neenah, Wisconsin, for the last eight years. In addition, in 1949 he assumed the duties of the director of public works for the City of Neenah. Earlier, he worked on various state and federal work programs, supervised the municipal water utility in Portage, and served as assistant water supply engineer at the Badger Ordnance Works. During the second World War, Lieutenant Bryan of the U. S. Navy commanded a net tender in the Aleutians.

Mr. Bryan was born in Portage, Wisconsin in 1910 and while attending high school there participated in track, football and the school band. He studied civil engineering at the University of Wisconsin, receiving his B. S. degree in 1933. In college, he was active in the university band and orchestra.

A charter member of the Wisconsin chapter of the American Public Works Assn., Mr. Bryan is now vice-president of this group. He has served as president of the Portage Kiwanis Club and has been active in many other civic organizations. Another of his responsibilities has been the 1954 chairmanship of the engineering and public works section of the League of Wisconsin Municipalities.

Mr. Bryan and Louise Possett were wed in 1935. They have two children, Wayne, age 13 and Jane, 9 years old. His recreational interests center on curling and fishing.

W.S.P.E.

(Continued from page 30)

Young Engineers Committee Recommendations

Three Chapters have returned their questionnaires to date. Indications thus far point to general acceptance of the program with certain restrictions (particularly with reference to non-member office holding and voting privileges).

Please return your filled in questionnaire as soon as practicable so that the results may be tabulated and a report made before the January WSPE Convention. To complete this report and give an opportunity for review means all data should be in my hands not later than January 2, 1955.

Each Chapter Public Relations Chairman should have received, early in October, directly from National Headquarters, the Promotional Kit for National Engineers' Week. (In case any of you have not received the Kit, please let me know and one will promptly be forwarded from here).

It will be necessary to have available at the time of the WSPE State Convention in January, 1955 a brief report of the activities of our Statewide Public Relations Committee. In this connection, it is suggested that you include a statement of the Chapter's program for National Engineers' Week.

Yours truly,

R. C. Siegel

Public Relations Chairman

Report on Nominations

In accordance with Article VI of the By-Laws, the following report of nominations for officers, directors and national representatives is submitted. Members of the Nominating Committee are:

Representing	Name
Public Employment	E. J. Duszynski, Chairman, E. C. Kesting
Educators	Karl O. Werwath, J. G. Woodburn
Private Practice	Harry Gute, Henry Olk
Industry or Private Utility	E. H. Nelson, C. E. Pflug

Nominee for President

Owen Ayres

Mr. Ayres is President of the Eau Claire Sand and Gravel Company. Has served as Director of the Northwest Chapter and the Eau Claire Technical Society. Served as WSPE Director 1949–50, and as Second Vice President, 1953–54. He is now serving as First Vice President.

Nominee for First Vice President

Arthur G. Behling

Mr. Behling is a Consulting Engineer, Steam Power Plants. Member of Engineers' Society of Milwaukee, Charter Member WSPE, NSPE. Director WSPE 1949–50; National Representative WSPE for term 1951–54. Chairman of Awards Committee NSPE from 1951–52; He is now serving as Second Vice President WSPE.

Nominee for Second Vice President

Anthony L. Genisot

Mr. Genisot is an overseas veteran of World War I; graduate of Wisconsin Institute of Technology of 1923. Pres. of Genisot Engineering Co. from 1946 Past. Pres. of Wis. Valley Chapter WSPE, Member of State Board of Directors WSPE.

Nominee for Secretary–Treasurer

Harold N. Kingsbury

Mr. Kingsbury received a B.S. in Civil Engineering at Illinois in 1934, Master of Public Health at University of Minnesota in 1948. District Sanitary Engineer Wis. State Board of Health at Ashland from 1936–50; transferred to field of Industrial Waste Treatment in Feb. 1950. Secretary–Treasurer of Chapter at the present time.

Nominees for Directors

Walter E. Dick
Frank D. Carlson
John Gammell

Mr. Walter E. Dick is City Engineer of Waukesha. He is a member of Engineering and Public Works Section of League of Wisconsin Municipalities, American Public Works Association. Charter Member of Southeast Chapter and Sec'y–Treas. of Chapter since its organization in 1946.

Mr. Frank L. Carlson has served for the past seven years as Supervisor of Property Records Dept. of Dairyland Power Cooperative with headquarters in La Crosse. Chairman of Membership Committee 1953–54, and holds this office at present time. He was President of Western Chapter in 1950. Is an Associate member of AIEE.

Mr. Gammell received a B.S. in EE from University of Washington in 1928; graduate of Allis–Chalmers. Training Course and then Sales Engineer for Allis-Chalmers. Has been connected with graduate training work at Allis-Chalmers and is presently Director of Graduate Training Department, concerned with recruiting, training and placement of engineering graduates. Member of National Education Committee of NSPE Chairman of State Educational Committee of WSPE served as Chairman of Membership Committee of Milwaukee Chapter of WSPE in 1953. Also Member of ESM, ASME, AIEE and ASEE.

Nominees for National Representatives

Harold C. Trester
Richard C. Clark

Mr. Trester is an Engineer with the C. R. Meyer and Sons Company, General Contractors, Oshkosh. Active in FRV Chapter as Director in 1947; Vice President in 1948; President in 1949; Director, WSPE 1951–52. Member of Tau Beta Pi, Chi Epsilon, Associate Member ASCE, Member of ACI, Member of Society of American Military Engineers an Alternate Member of AGC–AIA Cooperating Committee. He is currently serving as National Representative.

Mr. Clark is the District Engineer of the Wisconsin State Highway Commission at Superior. He has served as Director, WSPE; Second Vice President, WSPE; First Vice President, WSPE and as President of WSPE.

National Convention Financial Report

The Finance Committee for the 20th annual convention held in Milwaukee last June reported a surplus of over $1,300. It was recommended that this money be refunded to the individual WSPE chapters, prorated on the basis of money contributed. The general committee accepted this report subject to approval by the state society. As an additional recommendation the general committee suggested that the money be used to further the interests of nonprofit tax-free organizations, preferably engineering in character. The state society recently approved the report and recommendations as above. It instructed the chapters to submit lists of the tax-free uses to which the money shall have been applied.

Chapter News

SOUTHEAST CHAPTER
JOSEPH H. KURANZ
Reporter

The Southeast Chapter held its regular Quarterly Dinner Meeting Wednesday, December 1 at the Avalon Hotel in Waukesha, Wisconsin. The Dinner was preceded by a cocktail hour and plant visitation at the Waukesha Cement Tile Company. This annual plant tour and cocktail party has developed some legendary aspects, and for those who have not attended one of these affairs, all we can say is "don't miss the next one."

The principal speaker of the evening was one of our own members, Mr. Fritchof A. Fosdal, P.E., owner of the Fosdal Electric Company in Waukesha, who presented a 3-D Travelogue of his recent trip to Norway, France and England.

Following Fritz's interesting program, the regular business meeting was conducted, the most important matter being the election of a new slate of officers for the coming year. The following men were unanimously elected:

President—Donald C. Bengs, Waukesha
Vice President—Elroy F. Spitzer, South Milwaukee
Secretary-Treasurer—Walter E. Dick, Waukesha
Director—Rudolf R. Gocht, Racine

Reports were submitted by the membership and Public Relations Committees, after which considerable discussion followed. The Southeast Chapter has laid plans for a concerted membership drive, as well as active participation in an Engineering Week program.

NORTHWEST CHAPTER
WM. ROSENBERG
Reporter

The Northwest Chapter WSPE held its annual Ladies Night dinner meeting at the Hotel Eau Claire on Wednesday, December 1.

Mr. Virgil Dufek, Entertainment Committee Chairman, introduced Miss Grace Walsh, Speech Department Head at Eau Claire State College. Miss Walsh, in turn, introduced four members of the College Forensics squad, Mssrs. Ralph Zimmerman, Ronnie Erickson, Charles Busch, and Dick Seiler. These men had just returned from the Forensics tournament at Bradley University, Peoria, Illinois. Several examples of humorous folktales and after dinner speeches were presented to the delight of the audience. The excellence of the presentations left no doubt as to the reasons for the extraordinary success the Eau Claire State College Forensics squad has achieved. Its national reputation is well deserved.

A short business meeting followed the entertainment program. William Rosenkranz, Nominating Committee Chairman, presented the following slate of candidates for next month's election of officers:

President—R. F. Bott, Chippewa Falls
Vice President—V. M. Dufek, Eau Claire
Member Board of Directors—T. E. Thoreson, River Falls
Secretary—Walt Hestekin, Eau Claire

The Chapter is considering the appointment of an Assistant Secretary to assist the Secretary and to become familiar with this important office in order that a man familiar with the secretarial duties will always be available. Mr. Dale Gordon of Eau Claire was suggested for this office.

SOUTHWEST CHAPTER
L. W. STOCKNER
Reporter

The December meeting of the Southwest Chapter was held at Nakoma Country Club, Madison on Wednesday, Dec. 8th.

President Harvey Wirth presided and introduced Mr. Geo. Steinmetz, State President of WSPE who presented membership pins to new members and then told the Chapter of activities at the State level including the convention scheduled for January 28, 29, 1955 in Milwaukee.

Reports were made by several committees including Membership Public Relations, and Engineers Week.

Program Chairman A. Ahearn then introduced the speaker of the evening who was Mr. John Bunch, Traffic Engineer, City of Madison. Mr. Bunch spoke of one way traffic and the reversal of direction of Gorham and Johnson streets. He also told of the purposes of the one way system and what they hoped to accomplish. A question period concluded the interesting session.

FOX RIVER VALLEY CHAPTER
JOHN K. PRIMM
Reporter

Over 100 professional engineers and their ladies enjoyed a buffet supper at the Beaumont Hotel, Green Bay on Dec. 3rd.

A highlight of the meeting was a well received talk by John Holloway, Acting Director, Brown

County Civil Defense Council, who accented the importance of civilian preparedness in a world of potential turmoil. Chapter President Wayne G. Bryan, Neenah, was master of ceremonies.

After the supper, the engineers and their guests enjoyed an evening of dancing.

The committee on arrangements included Robert Hall, Robert E. Lee, and Emil Zapfe, all of Green Bay.

On Nov. 5, professional engineers of the Fox River Valley Chapter, heard Willis D. Kimmel, district engineer for the Portland Cement Association give a slide talk on "New Developments in Concrete". Kimmel was introduced by Berry Brevik, PCA field engineer and a member of the Chapter.

Kimmel outlined recent important trends in concrete structures "pre-stressed concrete, a tremendous and popular development of recent times, allows very close control of product quality," Kimmel stated, "and this engineering control is an important factor in producing better buildings at lower costs." Of the 225 factories in the U. S. now making structural units, about 45 already are producing prestressed concrete products.

Chapter President Wayne Bryan, Neenah, announced that examinations for registration as Professional Engineer will be held in Madison Jan. 31–Feb. 1, 1955 by the Wis. Board of Architects and professional Engineers, with further information available from W. A. Piper, Board secretary, 1140 State Office Bldg., Madison.

Robert W. Stieg, Clintonville, was appointed Vice President of the Chapter, to fill the unexpired term of Milo Griggs, Green Bay, and J. Robert Egan, Oshkosh, was appointed a Director and program chairman.

WISCONSIN VALLEY CHAPTER

JESS HOLDERBY
Reporter

No chapters news submitted.

WESTERN CHAPTER

D. W. GRUNDITZ
Reporter

"Highway Problems of Wisconsin" was the subject of an address by Edward J. Konkol given to Western Chapter, Wisconsin Society of Professional Engineers at the Cerise Club, Tuesday evening, October 19. Mr. Konkol is Executive Secretary of the Wisconsin Good Roads Association.

In his speech Mr. Konkol outlined the classification and character of our state, county and town roads, and the construction, financing, and administration of State and Federal Highways in Wisconsin.

On Nov. 16, an inspection trip was conducted thru WKBT La Crosse television station, which started telecasting Aug. 1, 1954. A dinner and business meeting at Cerise Club preceded the tour.

The following list of officers corrects the inaccurate account in an earlier newsletter.

Officers and Directors

Merlin A. Eklund, 1444 Redfield St., *President*
Lawrence F. Kohoe, 1616 Mississippi St., *Past President*
A. L. Mathy, 1504 South 19th St., *Vice-President*
John R. Mangan, 1904 King Street, *Secretary–Treasurer*
Edwin C. Keating, 1644 Travis Street, *Director (1 year)*
Andrew B. Esser, 809 South Fifth St., *Director (2 years)*
James Allen, 516 North 23rd St., *Director (3 years)*

Committees

Fees and Salaries—Milton L. Hoglund, *Chairman*, 345 South 21st St.
Membership—James W. Johnson, *Chairman*, 1720 Mississippi Street
Public Relations—Donald W. Grunditz, *Chairman*, 2147 Hoeschler Drive
Legislation—Richard B. Brindley, *Chairman*, Northern Engraving Co.
Program—Arthur M. Moody, *Chairman*, 416 S. 22nd St.
Education—E. T. Neubauer, *Chairman*, 1216 Bluff Street
Practice and Ethics—Robert T. Luxford, *Chairman*, 2028 Main Street
Registration Promotion—Wilfred J. Herried, *Chairman*, 1230 Pine Street
Engineers Week—A. L. Mathy, *Chairman*, 1504 South 19th Street

MILWAUKEE CHAPTER

ROBERT J. MENDENHALL
Reporter

Milwaukee chapter president George A. Sievers, P.E., Industrial Engineering Institute, has disclosed that a new committee, as yet unnamed, under the chairmanship of E. C. Koerper, P.E., E. C. Koerper Associates, is being organized to increase the value of the chapter to its members.

Approval of the over-all plan was obtained at a steering committee meeting, at which considerable enthusiasm was expressed. In brief, these plans include programs involving the adequate indoctrination of new members on a personal basis, discovering how the society can best serve them and informal discussions, for old and new members, relating to the aims and ambitions of the society.

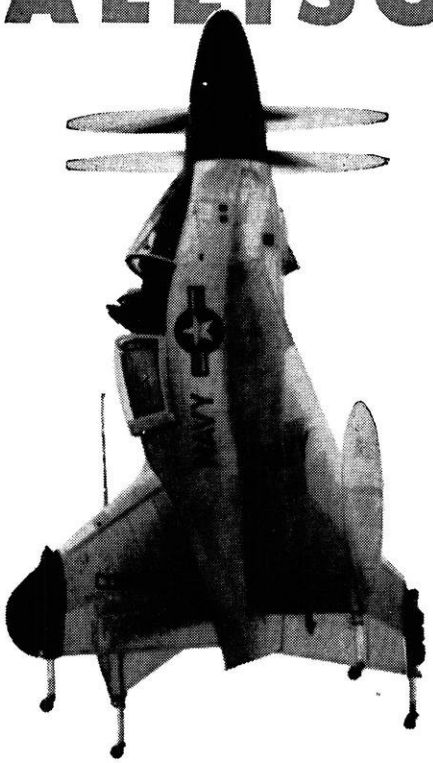
The weekly Thursday noon luncheons, noted for their informality will figure substantially in the program which was originally conceived by Karl O. Werwath, P.E., Milwaukee School of Engineering.

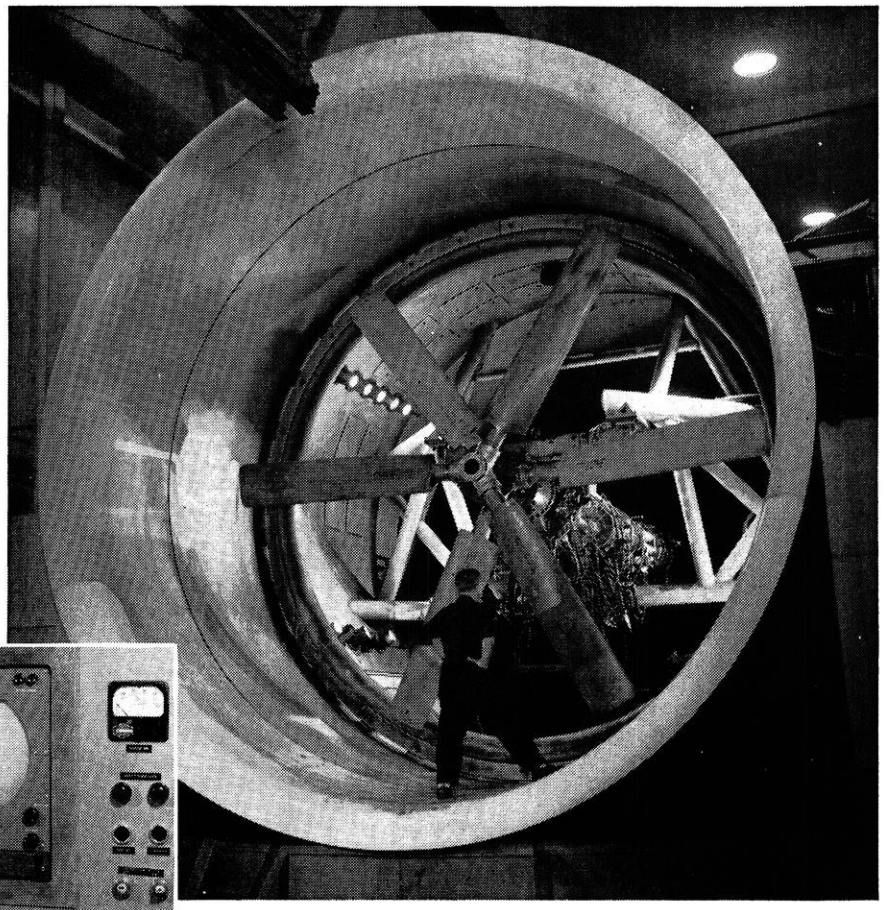
On Dec. 14, the chapter met in the ESM building for a dinner and business meeting. Louis J. Larson of Allis–Chalmers Mfg. Co. gave a preliminary report on the studies of the engineer-in-industry committee of N.S.P.E. Factors leading to the present professional and economics status of the engineer in industry were discussed. Other phases of the report will be presented early in 1956.

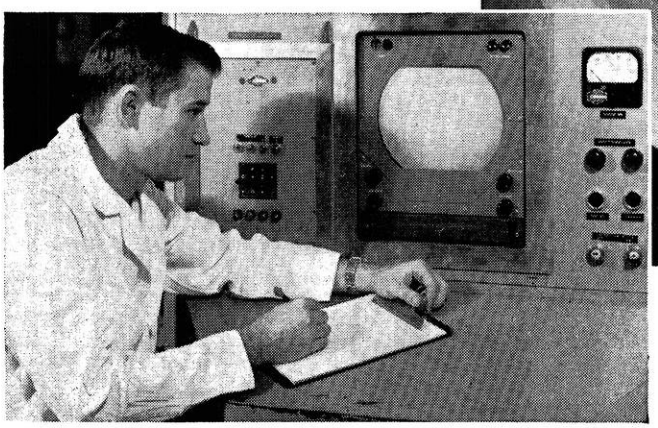
Guy V. Woody, P.E., has accepted the position of special assistant to the vice-president, director of sales, general machinery division of the Allis–Chalmers Manufacturing Company, Milwaukee, Wisconsin, according to a recent announcement by J. L. Singleton, P.E., vice-president in charge of that division. Succeeding Woody as manager of the firm's processing machinery department will be William M. Wallace, P.E.

END

ALLISON Engineers Pioneer VTO Power Plant Development







GEORGE D. KEMP, who received his B.S. in Mechanical Engineering from Colorado A. and M. last June, is shown recording data on the engineering log sheet from the industrial TV screen in the VTO test cell. George—now in the Test Operations group in the Experimental Test Section at Allison—is working on the T40 turbo-prop engine which powers the Convair XFY-1 and the Lockheed XFV-1 vertical take-off aircraft.

● Early in '51, Allison undertook the power plant development for vertical take-off airplanes following the Navy's request for a high-power, low-weight turbine engine which could be adapted to vertical operation.

With modifications, the Allison T40 turbo-prop engine—with its extremely high power-to-weight-ratio—was selected to do the job. The vertical operation necessitated basic design changes, such as changing the oil system so it would function in both vertical and horizontal positions. Too, it was necessary to modify the reduction gear, giving a higher propeller RPM and increased thrust. And, with the specially designed propellers required by the VTOs, the control system was redesigned.

Then, to test the engine, a radically new test stand was designed and built. Allison engineers converted a test stand previously used for low horsepower reciprocating engines to one (shown above) capable of accommodating VTO engines in the various positions from horizontal to vertical. With the huge 72,000 pound tunnel completely enclosing the engine and propeller, a television was installed in the control room so engine operation could be observed in any tunnel position.

The VTO power plant project is typical of the variety of challenging problems handled by the Allison Engineering staff. And, because it is continually pioneering in advanced engineering developments, Allison needs additional technically trained men, especially young graduate engineers. Why not plan now for your engineering career at Allison. Write for information:

R. G. GREENWOOD, Engineering College Contact,
ALLISON DIVISION, General Motors Corporation,
Indianapolis 6, Indiana.

Schroeder's

ENGINE-EARS

by Ron Schroeder m'57

Here we are again with more news of the engine societies and clubs on campus. The holiday vacation period cut down the amount of activity this month, but here is what I have on events both past and present.

ASCE

The second annual ASCE Fall Dance held on November 19 in Tripp Commons of the Wisconsin Union was a great success, and as the saying goes, a good time was had by all who attended. The Bachelors, a campus quartet, topped off the lively floor show that was M C'd by Bill Huegel.

Professor W. S. Kinne of the CE structures department gave an interesting talk to the local chapter on December 15 on the Tacoma Bridge failure. To acquaint the fellows with the situation at Tacoma, movies of the project were shown.

The Executive Vice-president of the Milwaukee Braves, Mr. Joseph Cairnes, spoke to the group on "Niagara Power," on January 12. Mr. Cairnes also brought color movies.

A.S.M.E.

The December 15th meeting marked the end of the membership contest in the student branch of A. S. M. E. (At the time this article was written, the winner was not known, but the two leading contestantes were Sylvester Hoersch and John Bowers). A Mechanical Engineers' Handbook was presented to the winner.

Mr. Frederick E. Schulte, a project engineer from Collins Radio Company of Iowa, spoke on, "A Gyro-Stabalized Magnetic Compass System for Aircraft." The gyroscope and various mechanical aspects were emphasized. He also discussed the earth's magnetic field, compass history, and gave a description of possible future developments.

Mr. Schulte is a graduate of the University of Wisconsin. He received a B. S. degree in both Mechanical and Electrical Engineering.

The next meeting will be a joint meeting with S. A. E. on Wednesday, January 15, 1955, in the Union. The topic for the evening will be, "Must Jets be Pampered?", a discussion by Mr. H. A. Fremont of the General Electric Company.

The annual speech contest of the student branch will be held at the February 16th meeting. Speeches will consist of the presentation of papers on any subject pertinent to engineering. All members are eligible. The speeches should be about 15 minutes in length. Any type of teaching aids, such as slides, films, etc., may be used. The winners will be judged on the basis of contest, delivery, and use of teaching aids. A total of $25 in cash will be awarded to the winners. The first place winner will be given an expense paid trip to the regional meeting to compete in the regional contest. Let's have a lot of contestants at that February meeting! ! ! !

For those interested in this contest, see any ASME officer or Prof. Harker for further information.

TAU BETA PI

Wisconsin's Alpha Chapter of TAU BETA PI, the all-engineering honor fraternity, initiated 44 juniors and seniors on December 8, at the Fall Banquet at the Cuba Club. The speaker for the evening was Dean Wendt, who spoke on the topic "Integrity."

Election to Tau Beta Pi is the highest honor an engineer can attain in school. The names of the new men are posted in the Mechanical and Electrical Engineering buildings. To be eligible for Tau Beta Pi, an engineer must be in the top 20% of his class as a senior and in the top 12% as a junior. All eligible candidates are invited to be interviewed by the active members of the chapter. The members weigh the attributes of the candidates and select only those men who best meet the high qualifications of the organization.

James E. Christenson, CE, and Phillip F. Noth, Jr., ChE, received the annual Tau Bate presentations as the two outstanding freshman engineers (1953–54) at the December 17 Freshman Lecture session.

The officers for this year are: Richard Bond, President; Robert Mills, Vice-President; Carl Lewis, Corresponding Secretary; Donald Edwards, Recording Secretary; and A. Henry Mills, Cataloger. The faculty adviser is Professor C. C. Watson of the ChE department.

AFS

The American Foundrymen's Society student chapter recently completed its first semester schedule, one of the best in its history. The program included five talks by men in the foundry industry on such topics as, "Sand and Materials Handling Problems." Other subjects considered at different times included "Sand Control and the pH factor," "Foundry Pattern Practices," and "Stress Analysis and Casting Design."

Officers for the present term are James Selle, President Warren Ranscht, Vice-president; Walter

(Continued on page 52)

DEANS' COLUMN

KURT F. WENDT
Dean, College of Engineering
•
W. R. MARSHALL, JR.
Associate Dean
•
K. G. SHIELS
Assistant Dean

Last month in this column, Dean Wendt stressed the importance of maintaining a good scholastic record during undergraduate schooling. The importance of this advice may become more apparent to those of you who desire to do graduate work in engineering. Admission to the graduate school in most universities is predicated in the first instance on the undergraduate scholastic record. For example, at Wisconsin a student must have an undergraduate grade point average of 2.75 (basis of 4.0) for admission to the graduate school. This requirement will vary from one university to another but in general a grade point average not less than about 3.0 is essential for graduate study. Thus, grades constitute the primary qualification for entrance into graduate work. It is true, of course, they are not the sole criterion.

It usually becomes apparent to each senior that his undergraduate training in engineering has been confined to just about two years. Consequently, undergraduate work has served primarily to "get one's feet wet" but has not permitted one to use or develop his newfound tools. Graduate study offers this opportunity in a manner and in an atmosphere not available in industry. Since graduate work is taken at a reduced level of course credits, not more than 12 credits per semester, it permits one to give more concentrated, as well as broader, attention to engineering principles and practice. This period of study also furnishes the student with an opportunity to become better acquainted with his professors and to discuss with them through seminars and personal conferences the professional aspects of engineering.

W. R. MARSHALL, JR.

The need for one or more years of graduate work in engineering is becoming more and more apparent. The recognition by industry of the desirability of and the need for training beyond the bachelors degree is implied by the higher salaries offered advanced degree candidates (this year's average offer to Ph.D.s is $525–$575 per month, to Masters men $400–$425, to Bachelors men $350–$375), by the extent of the additional training, either in service or at university extensions, offered by industry to B.S. men.

Besides the increased compensation, an additional year of study in engineering has the advantages of providing a student with a better insight into the fundamentals of his chosen field of engineering and an opportunity to apply these principles to problems of a more advanced nature. Graduate study is also valuable in permitting a man to investigate the various fields of specialization within the broad framework of his profession. It is also true that graduate training contributes greatly to the development of professional consciousness. It is preferable but not mandatory to do graduate work at a university other than one's Alma Mater. This naturally offers broader experiences and develops new viewpoints.

Graduate study is open to all students with the required undergraduate scholastic record. A high percentage of graduate students receive scholarships or research assistantships with stipends ranging, on the average, from $125.00 to $150.00 per month. Information on available appointments at many leading universities can be found posted on each departmental bulletin board or can be obtained by writing directly to the university in question. At the University of Wisconsin, information on graduate fellowship opportunities can be obtained from each departmental office or from any member of the Fellowship and Scholarship Committee. This committee, under the chairmanship of Prof. Ragatz, Ch.E. consists of Profs. Rohlich, C.E., Myers, M.E., Parent, E.E., Rosenthal, M.&M., and Williams, Mech.

This column urges all seniors with high scholastic standing to give serious consideration to graduate study, either at Wisconsin or at another university. The Masters degree is an excellent terminal degree for many engineers, while a smaller number of men with research aptitude should definitely strive to achieve the Ph.D. Remember your education in engineering never ceases, so that graduate study will train you to continue your education in industry with greater efficiency.

—W. R. MARSHALL, Jr.

CAMPUS NEWS SECTION

ENGINEERING INSTITUTES

ELECTRIC METERS

January 19, 20 and 21

Fundamentals of AC current and meters, single and polyphase applications, calibration and testing, wiring, selection and location of metering equipment, measuring instruments, new developments, etc., are some of the topics to be covered. The institute is arranged for persons responsible for the testing, calibration, maintenance and installation of electric meters of various types.

Fee: $20. Ralph D. Smith, Institute Co-ordinator.

(Continued on next page)

Campus News Section

(Continued)

TECHNICAL REPORT WRITING
January 27 and 28

A clear, concise technical report is a joy to read and a boon to management. The purpose of this institute is to help engineers and other technical personnel prepare such reports. Frequently, important information is overlooked or improperly evaluated simply because of a faulty presentation; therefore, considerable emphasis has been placed upon the report to management. Of importance, also, is the preparation of the technical paper for publication. Some time will be spent discussing this phase of technical report writing.

Fee: $15 (Includes text). Robert A. Ratner, Institute Co-ordinator.

ELECTRICAL ESTIMATING AND WIRING
February 10 and 11

The purpose of this institute is to give builders, architects, electrical contractors, plant electricians, and any others connected with electrical estimating or contracting the latest information about this type work. Emphasis will be on the wiring codes, design problems and methods of estimating.

Fee: $15. Ralph D. Smith, Institute Co-ordinator.

TELEVISION
February 17 and 18

Color television will form the major part of this institute. What it is, how it works, and servicing problems are some of the topics that will be covered. Also included will be the latest information on antennas, interference, coupling, UHF converters, methods and principles of service with demonstration. This program is for servicemen, technicians, and representatives of retail and wholesale outlets.

Fee: $15. Ralph D. Smith, Institute Co-ordinator.

OPERATIONS RESEARCH
February 24 and 25

The content of this institute is directed to engineers and upper level management personnel. Its purpose is to acquaint the participants with what is involved in an opsearch program, to present some fundamentals of statistics and probability, and to explore with them some of the practical applications in decision making, with particular emphasis placed upon manufacturing operations, storage and shipment of goods, and allocation of the labor force.

Fee: $15. Robert A. Ratner, Institute Co-ordinator.

Faculty News

University of Wisconsin Geophysics **Prof. George P. Woollard** has been given the task of setting up the program for gravity measurements within the wider program for the International Geophysical Year (IGY).

In relation to this assignment, he met in Washington, D. C., late in December with an informal planning group for the seismology and gravity activities under the IGY program. The group, a body of the U. S. National Commission, gathered at National Science Foundation headquarters Nov. 30 to consider the outline for seismic and gravity measurement studies including seismic measurement of the thickness of ice cover in the Antarctic. The wider program of IGY will call for a series of coordinated geophysical projects in which the countries of the world will cooperate.

Areas of gravity measurement work will include:

1. Observation from ships using underwater measurement devices along continental shelves of various continents;

2. Observations, particularly in the Southern Hemisphere, to be made from submarines submerged to a depth of 150 feet, working across the Pacific, South Atlantic, and Indian Oceans, and equipped with pendulum measurement devices;

3. Observations in areas that are not normally accessible such as Antarctic, the jungle areas of Central Africa and South America, and mountain regions including the Himalayas and those of Bolivia and Peru;

4. Picking up of all loose ends of work that have been done on an international basis;

5. If the political situation is improved enough, integration of known gravity measurements with those of the Russians.

The National Science Foundation has the responsibility of insuring that American participation in the IGY program is prominent.

ON MAKING ANNOUNCEMENTS IN "THE WISCONSIN ENGINEER"

I. The "Wisconsin Engineer" magazine wishes to print more campus activities each month—Engine Ears (Engineering Society News), Announcements, Awards, Scholarships, Contests, Engineering Institutes, Banquets, and job opportunities, which are of interest to the student engineer at Wisconsin. We will be glad to consider any material you believe to be newsworthy.

II. News Reaches:

1. A cross-section of the student body.
2. All members of the faculty.
3. The 1,100 members of The Wisconsin Society of Professional Engineers.
4. 450 high schools throughout Wisconsin.

III. Requirements for submitted material:

1. Neatly typewritten—Double-spaced.
2. Submitted in advance of deadline.
3. Check the following deadlines to insure material and announcements are printed in correct issue.

Issue	*Deadline for Submitted Material*	*Mailing Date*
March	February 7	March 11
April	March 11	April 13
May	April 6	May 13

DR. AKSEL LYDERSEN

Dr. Aksel Lydersen left the University of Wisconsin late last month to return to Norway. Dr. Lydersen

served as a Project Associate in the Department of Chemical Engineering from September, 1952 until the time he left. He will assume the post of Assistant Professor at the Norway Institute of Technology, from which he received his M.S. (1943) and his Ph.D. (1950).

Before coming to this country, Dr. Lydersen worked as an engineering consultant in the field of refrigeration engineering, and has had papers in that subject published in Norway, Sweden, and Germany. During his two years at the University of Wisconsin he has done considerable work on estimation of critical properties, which will be reviewed in a forthcoming paper to be published; he has also worked on generalized thermodynamic correlations in collaboration with Prof. Hougen and others.

★

LOCKHEED SCHOLARSHIPS FOR HIGH SCHOOL SENIORS

Fifteen outstanding U. S. high school seniors will win four-year college scholarships this year through an award program sponsored by the Lockheed Leadership Fund. The awards call for full tuition and fees plus $500 per year for personal college expenses. They will go to students with "demonstrated or potential leadership."

Cyril Chappellet, a Lockheed Aircraft Corporation vice president and president of the Fund, announced the continuance of the Lockheed program for the third year. Forty students have won the awards in the past and now are enrolled in college. Chappellet, in letters addressed to the nation's 13,000 secondary school principals, said:

"Our program is to seek demonstrated and potential leadership—leadership among fellow students, community activity, personality and citizenship as well as leadership in scholastic studies."

"We believe industry has a continuing and pressing need for leadership," he continued, explaining

(Continued on page 53)

HONOR SOCIETIES

TAU BETA PI
HONORARY ENGINEERING SOCIETY
Initiates—December 8, 1954

DeWayne C. Hillman, EE 4
Francis Lyle Hird, CE 4
Armen G. Fisher, ChE 4
Clarence G. Sprague, CE 4
Paul W. Padrutt, ME 4
Eugene C. Cnare, EE 4
Dietrich E. Weinauer, BChE 4
Ngo Dinh Long, EE 4
Norbert W. Lenius, ME 4
Guenther K. Machol, EE 4
Bruce Marggraf, ChE 4
William Nack, ChE 4
William E. Miller, ME 4
Loren G. Pless, ME 4
David L. Hagen, ME 4
Carl A. Schaefer, ChE 4
Clarence G. Reider, CE 4
Robert A. Hentges, ChE 4
Gregory J. Weiss, ChE 4
Duane F. Bruley, ChE 4
William G. Splees, EE 4
Murray R. Ritland, ChE 4
Albert E. Sabroff, EE 4
Marshall W. Hughes, EE 4
Edward G. Martin, ChE 4
James R. Derusha, ME 4
James A. Leinwander, ChE 4
Fred Wiviott, EE 4
Duane J. Schmatz, MetE 4
Ronald Yohe Parkinson, ChE 4
David A. Woolhiser, CE 4
Kenneth C. Holtz, EE 3
Jon H. Baumgartner, ChE 3
Raymond E. Harrison, EE 3
Robert C. Costen, EE 3
Charles R. Luebke, EE 3
Thomas C. Rooney, MetE 3
Jack D. Kingsley, EE 3
Robert F. Engel, EE 3
David L. Hannon, EE 3
Vern D. Overbye, ME 3
Martin M. Berndt, EE 3
Phillip A. Reed, ME 3
Allin W. Schubring, ME 3
Calvin D. Fowler, EE 3

★

ETA KAPPA NU
HONORARY ELECTRICAL ENGINEERING SOCIETY
Initiates—December 9, 1954

Robert C. Costen
Lowell Thomas Coulson
Robert Forrest Engel
Calvin Dennis Fowler
David Lee Hannon
Hans Petter Haraldsen
Raymond E. Harrison
Kenneth Charles Holtz
Jack D. Kingsley
Ngo Dinh Long
Charles Richard Luebke
Kenneth Ellsworth Niebuhr
James Jacob Reinhardt
Donald D. Spencer
William George Splees
Thomas Albert Tilley

★

PI TAU SIGMA
HONORARY MECHANICAL ENGINEERING SOCIETY
Initiates

Donald J. Beebe
Norbert W. Lenius
David L. Hagen
Erwin E. Eberle
Arthur L. Morsell
Eugene K. Buchholz
Frederick A. Luhman
Ralph C. Hombsch
Daniel L. Van Ert
Irvin J. Benard
Vern D. Overbye
Evelyn L. Knocke
John G. Akey
Richard F. Stieg

The *Wisconsin Engineer* wishes to add its congratulations to these engineers who have already distinguished themselves in academic and extra-curricular work and who hold promise for their professional futures. Keep up the good work fellas (and you too, Evelyn).

Scholarship Opportunities

(Continued from page 23)

Lakeside Bridge and Steel Company Scholarships*	Civil Engineers who will be juniors next fall.
Maytag Scholarship in Engineering	Male students who will be first semester seniors next fall.
Milwaukee Society of Iron and Steel Fabricators Scholarships*	Civil Engineers interested in Structural engineering, who will be juniors next fall.
Monsanto Chemical Company Senior Scholarship in Chemical Engineering	Chemical Engineers who will be Seniors next fall.
John Morse Memorial Foundation Scholarships*	Students who will be juniors next fall.
Ray and Theo Owen Scholarship	Civil Engineers who will be juniors or seniors next fall. fall.
Pelton Steel Casting Company Scholarships*	Metallurgical Engineers who will be juniors or seniors next fall.
RCA Scholarship	Students who will be juniors or seniors next fall in Electrical Engineering, Physics, of Applied Mathematics and Mechanics.
Square D Company Scholarships*	Students who will be juniors next fall.
The Trane Company Scholarships*	Students who will be juniors or seniors next fall.
Union Carbide and Carbon Corporation Scholarship in Chemical and Mechanical Engineering sponsored by the Carbide and Carbon Chemicals Company	Chemical or Mechanical Engineers who will be juniors next fall.
Universal Oil Products Company Senior Scholarships in Chemical Engineering	Chemical Engineers who will be seniors next fall.
Francis D. Winkley Scholarship	Mechanical Engineers who will be juniors or seniors next fall.

*Offering more than one scholarship,

After the Student submits his application blank, it is considered by either his department or The College of Engineering Fellowship and Scholarship Committee, depending upon whether the scholarship is restricted to a specific field or available to all Engineers. Consideration is based upon scholarship, financial need, character, and extra-curricular activities. Their recommendations are subject to approval of the College of Engineering Fellowship and Scholarship Committee or the faculty of the College of Engineering respectively.[1]

Acknowledgement is made to R. A. Ragatz, Chairman College of Engineering Fellowship and Scholarship Committee.

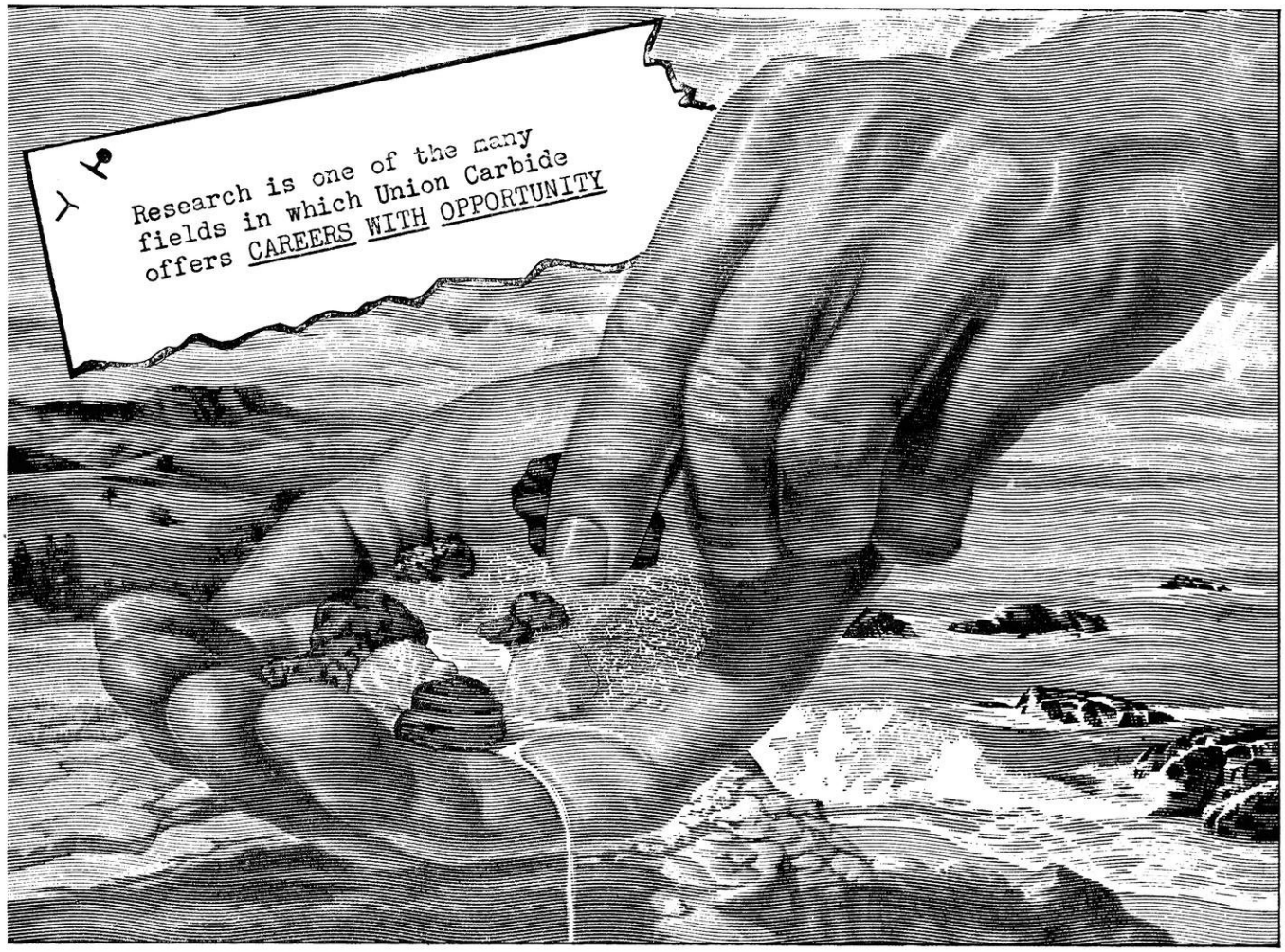
[1]There are a few exceptions to this general procedure of scholarship appointments. For specific details consult your departmental office. **END**

No sportsman takes his favorite sport more seriously, nor plays it more intensely than the golfer. As proof, consider the fellow who returned from several hard rounds on the course. His wife kissed him and remarked that their son, Junior, had just come in, too.

"He said that he caddied for you today," she added brightly.

"By golly!" cried the golfer. "No wonder that kid looked so familiar!"

Definition of a neurotic: a relatively stable individual with both feet planted firmly in mid-air.



Search is exciting!

Scientists are constantly probing deeper into the secrets of nature —bringing new and better things to you

AS THE PROSPECTOR thrills to the search for treasure, so does the scientist as he searches out the secrets of the earth, air, and water.

THE TREASURE that the scientist seeks is better understanding of nature, and ways to bring better living for all of us. To find them, he is constantly probing, taking the elements apart, putting them back together in different ways—always looking for something new and promising.

How important is such research? Today, more than one-third of the work of the people of Union Carbide is in providing products and processes that did not exist in commercial quantities 15 years ago. Each new product, each new process, was born of intensive search.

FROM CHEMICALS TO METALS—The results of these achievements are serving all of us today—chemicals for life-saving medicines and many other uses...a wide range of carbon and graphite products... oxygen for the sickroom and industry... a variety of wonderful new plastics... alloying metals for stainless and other fine steels.

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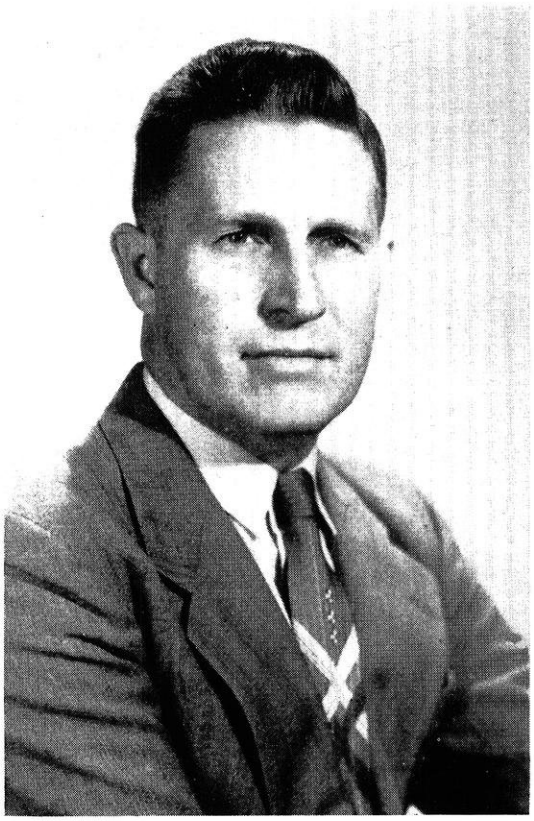
BAKELITE, VINYLITE, and KRENE Plastics PREST-O-LITE Acetylene PYROFAX Gas ACHESON Electrodes

ALUMNI NOTES

by Dick Paske, ee'56



CHESTER C. BOESEWETTER

RUSSELL W. HENKE

Boesewetter, Chester C., EE '35, has been appointed Chief Engineer of Penn–Electric Corporation. He will supervise all of the company's engineering activities, in addition to directing the development of new products, and construction of new and enlarged testing laboratory facilities.

Mr. Boesewetter was formerly manager of the engineering testing laboratory of the Boodman Manufacturing Company. He is a member of the American Institute of Electrical Engineers, the American Mining Congress, and a registered professional engineer.

Lange, Sylvin Rae, CE '54, recently married Lee Burton of Baton Rouge. He is an Engineer with Ethyl Corporation, Baton Rouge, Louisana.

Glenn, Al, CE '42 (MS '46), is currently operating a private weather predicting service; he specializes in wave forecasting along the Gulf of Mexico. Since wave heights affect oil drilling and transport of submarine oil, his clientele consists almost exclusively of offshore oil drillers. Glenn, a former Air Forces weather officer, was hired in 1947 by the Humble Oil Company to do wave forecasting along the Gulf. He proved so successful that he went into business for himself. (Paraphrased from an article in LIFE, October 4, 1954.)

Correction: The following names were mispelled in the November Alumni Notes column.

Gordon F. Zucker, M.S., Mining Engineering, 1954

B. L. Polster, B.S., Mining Engineering, 1954

J. G. Murkve, B.S., Mining Engineering, 1954

Robert F. Cnare, B.S., Metallurgical Engineering, 1954

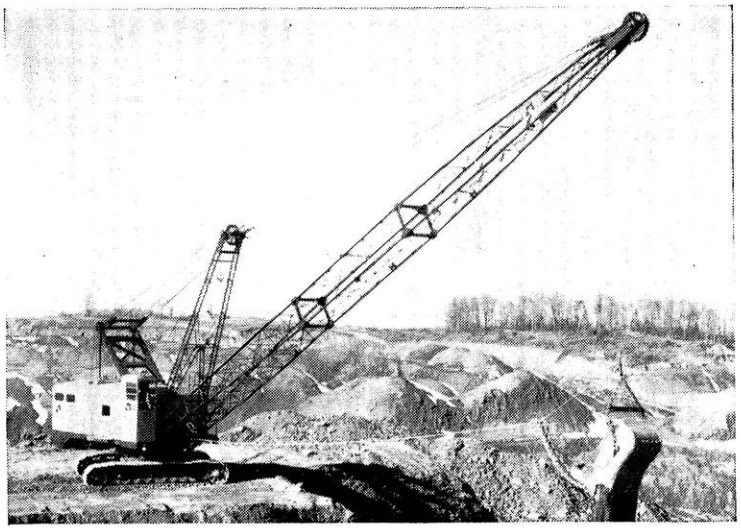
Jack C. Bokros, B.S., Metallurgical Engineering, 1954

Henke, Russell W., ME '49, was awarded the $250.00 second prize in the 1954 nationwide redesign contest sponsored by the Gray Iron Founders Society. The contest is held annually, and entries are judged on originality, practicality, and excellence of design of a product to be made from gray cast iron material.

Formerly associated with the Heil Company, Mr. Henke is now situated as Chief Mechanical Engineer of the Research and Development Division of Badger Meter Manufacturing Company.

After graduating from the University of Wisconsin, Mr. Henke went on for his Master's degree in the evening graduate program in Milwaukee. His society affiliations include ASM, ASTM, and NACE. He is a registered professional engineer. **END**

Another page for **YOUR BEARING NOTEBOOK**

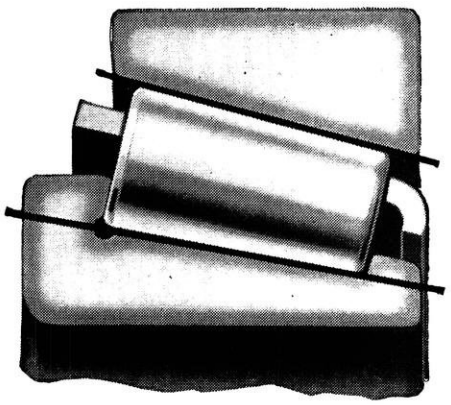


How to beat shock loads in a big dragline

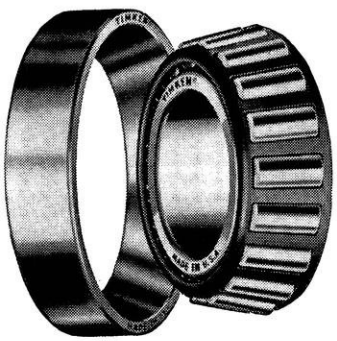
Imagine the shock loads put on this big dragline's intermediate swing shaft when the cab, the boom and an 8-yard load of dirt being swung through the air are suddenly stopped and the direction reversed! Engineers solved this problem by specifying Timken® tapered roller bearings. Timken bearings not only take radial and thrust loads in any combination, they also assure long, trouble-free operation.

Why TIMKEN® bearings have high load capacity

This cross section of a Timken tapered roller bearing illustrates one reason why Timken bearings do such a good job under heavy load conditions. Notice that there is full line contact between the rollers and races. It's this full line contact that distributes the load over a wider area, gives Timken bearings their extra load-carrying capacity.

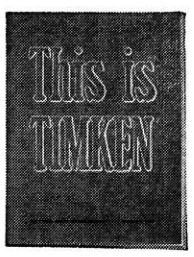


TIMKEN
TRADE-MARK REG. U. S. PAT. OFF.
TAPERED ROLLER BEARINGS



Want to learn more about bearings or job opportunities?

Some 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 ◎ AND THRUST →◎← LOADS OR ANY COMBINATION ✳

SCIENCE HIGHLIGHTS

Edited by Carl Burnard, CiE'57

STUDY OF SOAP BUBBLES TO AID METAL DEVELOPMENT

Study of soap bubbles by scientists in the General Electric Research Laboratory at Schenectady, N. Y., may aid in the development of metals that are stronger than those now in use and that have other improved properties. Such bubbles are helping to explain fundamental data on the behavior of metals.

The soap bubbles resemble in many respects the crystals or grains of which all metals are made. In particular, it has been found that the way that little bubbles grow into big ones is closely analogous to the growth of metallic grains.

Neither the bubbles nor the grains ever grow by the coalescence of two smaller units into a larger one, it said. Instead, when a bubble or grain gets bigger, its boundaries expand at the expense of adjacent ones which contract and finally disappear.

The bubbles to be studied not blown in the open air, but in special glass cells, about five inches in diameter and half an inch thick. Each cell is half-filled with a special soap solution. It consists of a liquid sold in toy stores for making bubbles, to which other chemicals have been added to improve the performance. Then the air is pumped out of the cell and the space above the liquid becomes filled mainly with water vapor. The tube to the vacuum pump is sealed off so the exhausted cell may be handled.

When the cell is shaken vigorously and then laid on a flat surface, thousands of tiny bubbles appear above the liquid. After it has been allowed to stand a little while (ten or fifteen minutes) the bubbles are larger and fewer. At this stage their continued growth may easily be observed.

The bubbles have varying numbers of sides, but when there are only three sides on a bubble, it starts to disappear. The three sides shrink, while the vapor inside migrates through the walls into adjacent bubbles, which are enlarged accordingly.

In a single metal grain the atoms are lined up like bricks in a wall. So are the atoms in a grain next-door, but the rows in one grain do not line up with those in the other. The line of discontinuity is the boundary between the grains.

When a metal is heated, some of the grains enlarge, while others shrink and disappear, just as in the soap bubbles. As the boundary of a grain passes an atom, the atom shifts its position a little to get into line with the rows in the expanding crystal.

Many metallurgical applications, such as the steel used in electrical transformers, depend on accurate knowledge and control of metal grains. Hence, studies of their behavior, by the buble technique and other means, is expected to lead to new knowledge which may greatly improve the performance of metallic structures.

NEW BORE GAGE

Two engine blocks per minute! That's the rated capacity at 100% efficiency of the latest model automotive cylinder bore gaging and classifying machine designed and manufactured by the Sheffield Corporation, Dayton 1, Ohio.

This unique machine is used to simultaneously measure and classify bore diameters in a six cylinder engine block, to inspect out-of-roundness and taper, and to stamp the classification of each bore on the block. Bores are divided into 10 classes with a .0003 difference between each class. Classifying bore diameters in this manner permits selective matching of pistons to bores during assembly.

Six air spindles, each having two diametrically opposed air jets at four positions along its length, are motorized for rapid travel into and out of the block. They explore the bores to full depth. Each pair of air jets is connected to a glass column in the 24 column Precisionaire. The position of the floats in the Precisionaire instantly indicates any taper, out-of-roundness or deviation in diameter.

RADAR ON WINDSHIELDS

Interceptor aircraft eventually may have radar information displayed directly on the cockpit windshield. An electrical firm has developed transparent phosphors which, in combination with flat picture tube developments now in progress, may permit radar images on windshields instead of on special screens.

FISHING FOR SCIENCE

Scientists at the Hanford Atomic Products Operation spend a lot of time fishing the nearby Columbia River. Not for fun, however. They're sampling all marine life in the river to determine how much radioactivity seeps into the water,

which is used for cooling nuclear reactors at the Hanford facilities, operated by General Electric for the Atomic Energy Commission.

In a 30-foot power boat the men cruise along a section of the fast-moving river from Priest Rapids dam 100 miles to McNary dam, trawling for samples of river life to study at the new Aquatic Biology laboratory at Hanford.

Other fish, along with invertebrates and algae specimens, are collected from the shore line of the river by men wading in rubber boots. In the deepest parts of the river a dredge, operated from the stern of the boat, gathers samples of the river bottom so that scientists can measure any radioactivity in inert or living material.

So far these studies have shown that radioactivity levels in the water are so low they're not harmful to man or fish.

SAFER AND EASIER DRIVING AT NIGHT PROVIDED BY IMPROVED HEADLAMPS

A new, brighter, sealed-beam automobile headlamp, designed to increase visibility in clear weather, but especially in rain, snow, fog, and dust, was introduced recently by the General Electric Company. As a result of this development driving at night and in poor-visibility conditions is expected to be both safer and easier for America's motorists.

"All-Weather" headlamps will give more powerful and better-controlled headlighting than has been available heretofore. Here's what the improvements mean to the motorist:

The high beam, or driving beam, gives 25 per cent more light. The beam pattern remains virtually unchanged, but the driver should be able to see objects about 100 feet farther from the car than with existing upper beams.

The low beam, or passing beam, produces about 23 per cent more light and, more important, directs twice as much light down the right side of the road, where it is needed most. The driver will be able to see a pedestrian as much as 80 feet farther ahead.

The improved low beam reduces the upward "spill" light, which becomes blinding when it is reflected to the eyes by fog, snow, rain, or dust. As a result, it is as effective in poor visibility conditions as special fog lamps.

Control of the lower beam is such that, if the lamps are properly aimed, glare is reduced for approaching motorists in the critical passing zone.

Several modifications have been made in the design of the new headlamps to effect their improved performance.

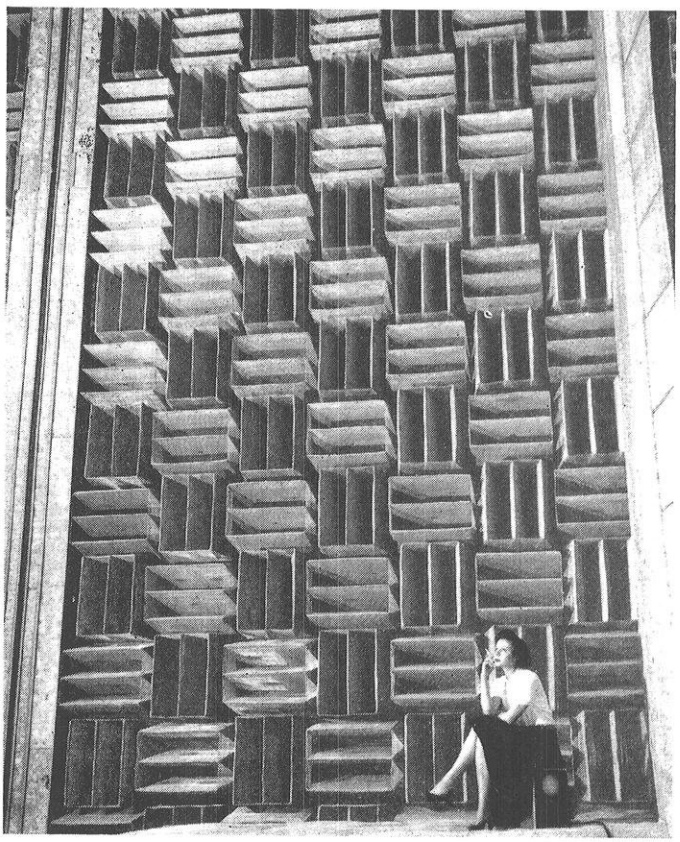
Upper and lower beams are stronger because new filaments, 7 per cent more efficient, are operated at higher wattages—50 and 40 watts, respectively, instead of 45 and 35.

A little metallic hood above the low-beam filament keeps stray light from shining upward to be reflected into the driver's eyes.

The reflector is tilted two degrees downward, this also to reduce up-shining light.

The lens is redesigned to give better distribution of lower beam light down the right-hand side of the road, and also to prevent upward-directed light.

The new headlamp is completely interchangeable physically with existing sealed beam headlamps, the only visible difference, externally or internally, being the small cap



QUIET, IT'S WONDERFUL!

This comely lass finds the world's largest "quiet" room a perfect place for taking a break from her work. The room, one of the quietest places ever constructed, is part of a new $1,500,000 Sound Laboratory of the General Electric Company's Power Transformer Department at Pittsfield, Mass. The laboratory was built for advanced research on the sound of electrical equipment. The relaxing girl is seated in front of a 41-foot-high door covered with fiber glass wedges that absorb sound. More than 12,000 of these wedges were used to cover the floor, ceiling, and walls of the room.

above the lower-beam filament. Its advantages are most apparent when it is used in pairs.

Prices of "All-Weather" headlamps are: 6-volt, $1.80 per lamp; 12-volt, $1.90 per lamp.

NEW HIGH SPEED ROLL FILMS

The Eastman Kodak Company has recently announced the introduction of a new, high speed, roll film—Kodak Tri-X.

The film is approximately twice as fast as the company's current Kodak Super-XX Film, and is intended for amateur, business and industrial, and professional use.

The new Tri-X film achieves its increased speed and sensitivity with no corresponding increase in graininess. This new emulsion represents the result of a new era in emulsion chemistry and sensitivity.

The increased speed of Tri-X film is such that it will open exciting new picture-taking possibilities for many photographers. Its A.S.A. daylight-exposure index is a conservative 200. This means that the film can readily be used, without supplementary flash or flood illumination, for indoor snapshots by existing light, night sporting events without flash, and fast action pictures on very dull days outdoors.

The speed of the new film is also so great that it will extend the picture taking day for owners of simple box type cameras having a fixed lens aperture and single shutter speed. With these cameras it can be used for picture taking much earlier or later than has been possible up to now.

The exposure and development latitude of the new film is described as "exceptional." Considerable over or under-exposure can be tolerated and excellent prints still obtained.

The new film gives improved tone reproduction. It also provides improved shadow detail and contrast with minimized highlight contrast. Harsh, blocked highlights are reduced and excellent prints from a wide variety of subjects and exposures are more easily obtained.

Color balance of the new film is Type B panchromatic. Tri-X film has a high green-low red panchromatic sensitizing. This color balance will produce excellent flesh tones and avoid overcorrection of reds.

CHROMIUM PLATED ENGINE CYLINDER WALLS

More than $15,000,000 has been saved in the cost of aircraft engine cylinder walls since the Navy adopted a process of chromium plating the walls of engine cylinders to extend their service life. The process has extended the service life of engine cylinders from 1200 to more than 3,000 hours of operation. By eliminating corrosion of the cylinder bores, the coating reduces by 50 per cent the wear on pistons and rings, oil consumption, and accumulation of carbon and sludge in oil systems.

HOT WATER

Radioactive water is being used in paint research to measure moisture penetration of protective coatings. Paint concerns believe it might aid in the development of house paints.

SHIPS IN SECTIONS

According to a publication in the Soviet shipping industry, the Russians have developed an entirely new method in general ship overhauling. After the ship is checked for needed repairs, it is "sectionalized," or cut into two and three-dimensional sections, then hoisted to machine shops on the shore where specialists cut out the parts to make repairs.

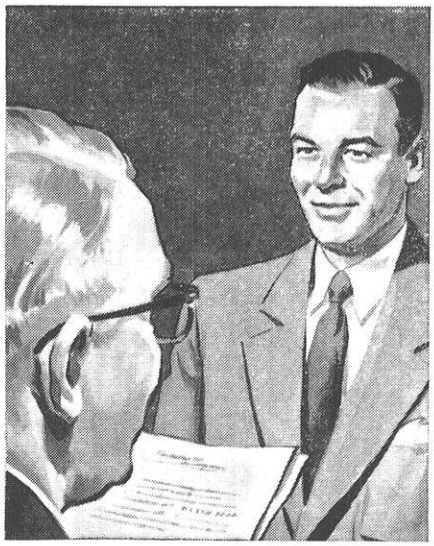
SWITCH TO SOLUBLES

A growing trend toward soluble coffee in the U.S. is indicated by the significant increase in its consumption during the past ten years, Chemical Week, McGraw-Hill publication, says. From six per cent (on a cup-for-cup basis) of all coffee sold in 1945, soluble coffee has increased its share to an estimated 30 per cent in 1954.

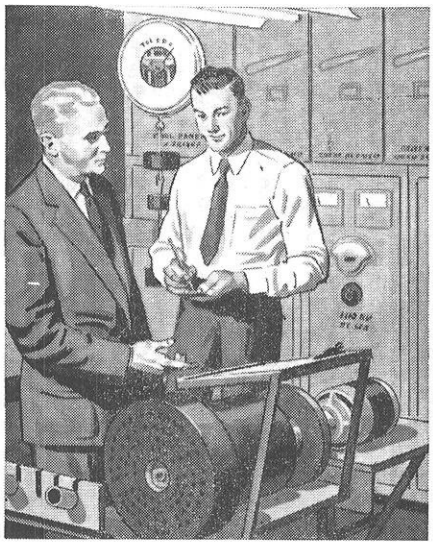
END

Here's what happens when you take a job with DELCO PRODUCTS

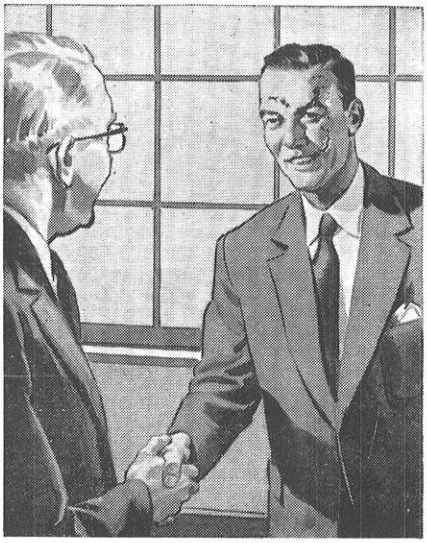
1 When you take a job with Delco Products, you start a career with General Motors—with a division known throughout the world as a leading manufacturer of electric motors, hydraulic shock absorbers, and many other products.



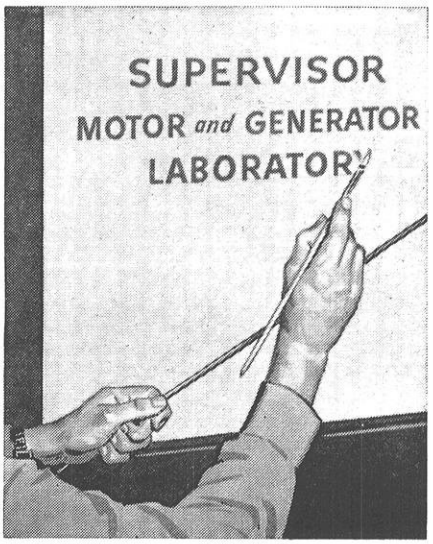
2 You enter into a well-organized training program—a program specifically designed to take full advantage of your particular interests and abilities. You don't just "go back to school." Instead, you *learn* by *doing*, with top-flight supervision.



3 As a trainee you get into every conceivable phase of Delco's engineering operations — engineering laboratory, plant engineering, drafting, sales, processing, standards, quality control. Additional assignments are often made in related departments for broader experience.



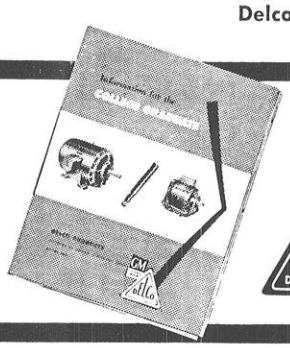
4 Training completed, you'll be given a specific departmental assignment. Progress can be made in product development, technical staff operations, sales, or in manufacturing supervision—according to your interests and capacity for future development.



5 With Delco's policy of promotion from within, your opportunities for advancement are virtually unlimited. Not every trainee becomes a supervisor, but some go much farther. Many General Motors top executives today are "graduates" of Delco Products Division.

If this opportunity interests you, sign up for the GM interview on your campus and ask for referral to Delco Products. For booklet detailing Delco's engineering activities, write to:

E. J. Bentley, Supervisor, Graduate Training
Delco Products Division, GMC
Dayton 1, Ohio



DELCO PRODUCTS

DELCO DAYTON OHIO

GM GENERAL MOTORS

Division
General Motors
Corporation
Dayton, Ohio

So You Think You're SMART!

by Sneedly, bs'59

Now that the student directories are out, people have been calling me at every conceivable hour of the day or night to find out whether or not they have the right answer to such and such a problem. Unfortunately, I am too lazy to sit down and dash off the solutions until an hour or two before the page proofs go to the printer; as a result, I usually don't know anything about whether or not such and such a soldier C took 473.5 hours to walk a certain distance. If you readers would realize this and have patience enough to wait a few issues, you would probably get the right answers sooner or later. As it is, when people call me these days, I try to discourage them by quoting a few sentences in the language of Goospiere—that is an Indonesian Mongoose writer comparable to Mickey Spillane. (Since no engineers ever get to the top of the Hill, they haven't learned the language yet.) This method works very effectively.

* * *

On one of my infrequent trips to the engineering campus, I discovered that a few engineers actually solved the commuter problem of last month without using a sliderule and a set of simultaneous equations—they deserve a tip of the hat (or something) for that feat. In a manner befitting the best researchers, they investigated the literature until they found the magazine from which I had pilfered the problem. This procedure is in keeping with the letter of the law, but hardly with the spirit of it, fellas. The answer, incidently, is 2.73 MPH, or in a more familiar form, 30/11 MPH.

As you may have realized, I am departing from standard procedure by giving last month's answers at the beginning of the column—that is so that you will be able to put your mind to the problems that follow without thinking about last month's answers. To continue, now, that abortive attempt at a trick problem involving motel and guests was not a problem at all; if you read closely you'll find that there were only seven men, and every engineer knows that it is no problem to give seven men each a single room if there are seven rooms available.

Despite typographical errors and such, some people were able to solve that arithmetic problem. Thanks to F.C.M. I am able to give you one of the two possible solutions to it.

$$
\begin{array}{r}
344 \\
\sqrt{118336} \\
9 \\
\hline
283 \\
256 \\
\hline
2736 \\
2736 \\
\hline
\end{array}
$$

Unfortunately, no one has yet sent in the other solution. . . . I lost the one that I worked out.

Despite my efforts to track down the German field lieutenant through the U. S. Army of Occupation, I could not reach him in time to find out how in the world he made it across that desert by using less than 1600 gallons of gasoline. Perhaps when he gets out of prison in 1986, we'll be able to publish the correct answer.

* * *

During Christmas vacation I read a novel for my archeology course and discovered this interesting problem. Recently (about 1909) explorers uncovered records of Babylonian mathematics. After much study they were forced to take the system to some outstanding engineers to translate the Babylonian algebra. One of their literal translations follows:

$$36x^2 - 16x - 224 = 0$$

for which the roots were $x = 45/17$ and $x = -2$. Despite the fact that algebra wasn't invented until the University instituted Math 50, what is the difference between the ancient and modern systems of mathematics? You can assume (correctly too) that the Babylonian mathematical development was much like the modern counterpart. **END**

"I chose Worthington for opportunities in international trade"

• "Worthington was my choice," Mr. Berger says, "because of the excellent training and the unusual experiences that are possible with a manufacturer having a worldwide reputation, and worldwide distribution. Then, when a company has seventeen divisions, including air conditioning, refrigeration, turbines, Diesel engines, compressors and pumps of all kinds, construction machinery, and power transmission equipment, a graduate engineer's chances for getting into his chosen field are even better.

"Supporting these divisions are research, engineering, production, purchasing, and sales, domestic and export. The real opportunity, however, is in Worthington itself. This is a company that is growing, just as it has for more than a century. It is always looking for new, related products and good men to engineer, produce, and sell them—at home and abroad.

"I began my career with Worthington's training program in the Research and Development Laboratory, where full-scale equipment is designed, tested and improved. This experience gave me an understanding of the tremendous part the company plays in the everyday life of millions of people. Within fourteen months I was sent to Mexico to inspect the facilities of our distributors there.

"The opportunities for first-hand laboratory experience, sales training and contact, travel and field trips, among many others, make Worthington a first-rate company for the young engineer with a desire to learn and progress in his work."

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

3.26

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

WORTHINGTON

THE SIGN OF VALUE AROUND THE WORLD

Engine Ears

(Continued from page 38)

Krubsack, Sec.–treas. The second semester's program will get under way early in March and will again include a series of talks. An added attraction will be one or possibly two foundry inspection trips. All interested people are urged to attend these meetings, time and place to be announced.

POLYGON BOARD

To all you brawny beard-growing engineers. The annual long-beard growing contest started January 10 and 11. If any of you think you can still beat the rest who have already entered the contest, contact Lee Reese and he will enter you. For those who can't grow for length, there are other contests: Lincoln-like, best all-around, curliest, best color, densest and puniest. These contestants will register February 7 and 8. The final registration will be March 11. All registering will be in the afternoon in the M. E. lobby. *Remember*, you must register Friday March 11 with your beard for your department to get those points in the election of St. Pat.

A.S.A.E. NEWS

The December meeting of the Student Branch of the American Society of Agricultural Engineers was held Tuesday the 14th. The program included movies and a talk on the new Minneapolis Moline "Uni-Farmor". Ken Volkman was presented with a Lincoln Arc Welding Foundation Scholarship. "Prof" Duffee, Chairman of the Ag. Engr. Department, made the presentation. The scholarship is awarded on the merits of outstanding scholarship, participation in campus activities, and imagination in engineering.

The A.S.A.E. has accepted an invitation from the Case Company to visit their plant at Rockford, Illinois Friday, February 4th. General farm machinery is manufactured at this plant. The trip to a large manufacturing plant is an annual event for the A.S.A.E. and usually takes place between semesters.

END

Campus News

(Continued from page 41)

that he hoped the Lockheed Fund's activities would help stimulate the development of future industrial leaders.

Ten of the four-year grants are for engineering majors and five are for students who plan to take up business occupations applicable to the aircraft and missile industry, such as business administration, accounting and industrial relations.

Each of the schools participating in the program chooses a winner through its director of admissions. Scholarships are open at Massachusetts Institute of Technology, California Institute of Technology, Carnegie Institute of Technology, North Carolina State College, Rensselaer Polytechnic Institute, University of Michigan, Georgia Institute of Technology, Cornell University, Purdue University, Stanford University, Harvard University, Emory University, Pomona College, Northwestern University, and University of Southern California.

The aircraft firm does not require the winning students to accept employment at Lockheed nor does it guarantee work to the winners upon their graduation.

High school students interested in applying for these awards should obtain further information from their high school principals as soon as possible.

★

HIGHWAY ENGINEER TRAINEE

The United States Civil Service Commission has announced an examination for Highway Engineer Trainee positions paying $3,175 and $3,410 a year. Most of the jobs are located in Washington, D. C., and throughout the United States.

For trainee jobs paying $3,175 a year, applicants must have completed at least ¾ of the total number of credits required for the bachelor's degree in civil engineering; and for $3,410 jobs, they must have completed a full 4-year or longer professional curriculum in civil engineering or must have had four years of professional experience in civil engineering. Students who expect to complete the required amount of academic study by September 30, 1955 may apply. A written test will be given. Deadline Feb. 8, 1955.

Further information and application forms may be secured from the U. S. Civil Service Commission, Washington 25, D. C., and from many post offices throughout the country. END

Since government regulations prohibit paid advertising for civil service positions, these announcements are placed here for the benefit of those readers who might be interested in working for the federal government. Job applicants should not overlook the job opportunities listed in the Student Placement Offices.

STATIC

by I. R. Drops

Mary on her bright new skates
Around the pond did frisk
Now wasn't she a little fool
Her little *

* * *

A man fell overboard on a Caribbean liner and screamed for help as he saw a school of man eating sharks heading his way. A famous criminal lawyer called from the liner, "I'll help you," and dove in the ocean. Immediately the sharks formed a two-lane escort and convoyed the two men back to the ship. "It's a miracle," cried the rescued man. "Not at all," said the lawyer, "merely professional courtesy."

* * *

Students are like blotters; they absorb what the instructor says, but get it backwards.

* * *

Professor: "Well, what did you think of the course?"

Student: "I thought it was very well covered. Everything that wasn't covered during the semester was covered on the final."

* * *

"Did you get home from the party all right last night?"

"Fine, thanks, except that as I was turning into my driveway some idiot stepped on my fingers."

* * *

Little Jack Horner
Sat in a corner
Crib notes under his eye.
He opened his book
And took a quick look,
And now he's a Tau Bet Pi.

* * *

Want Ad: Young man transferring from Engineering to Bus. Ad. would like to trade one good study lamp for a comfortable bed.

Two men, strangers, met on the golf links and agreed to play around the course together. After a couple of holes they got behind two very slow women. One man offered to ask the women if they might go ahead. When he returned he said he hadn't asked because just as he neared them he recognized his wife and girl friend. Understanding the situation the other gentleman offered to ask the ladies. In a few seconds he returned, only to comment, "Small world, isn't it?"

* * *

It isn't age that makes engineers sensible, it's the lack of strength for raising hell.

* * *

Then there was the Scotsman who wrote the editor saying that if any more Scotch stories appeared in his columns, he'd quit borrowing the magazine.

* * *

A college graduate was out hunting for a job. While waiting to see the manager, he struck up a conversation with the office boy.

"Do you suppose there is an opening here for a college graduate?"

"There certainly will be," replied the boy, "unless the boss raises my salary to $25 a week."

* * *

Deft-nition: Deficit—What you have got when you haven't got as much as you had when you had nothing.

* * *

It is remarkable how many doubtful meanings an alleged pure-minded person can find in an entirely respectable joke.

Professor to the noisy class: "Order, please."

A voice from the rear of the room: "Two beers."

* * *

A married man returned home one night at a late hour and, having difficulty with his equilibrium, made considerable noise in the hallway. Suddenly there was a sound of crashing glass which awakened his wife.

"John," she called, "what's the matter?"

From downstairs came a low mumble, "I'll teach those damn goldfish to bark at me."

* * *

Student: Well, what do you think of our little college town?

Visitor: It certainly is unique.

Student: What do you mean "Unique"?

Visitor: It's from the Latin "Unus" meaning "one" and "equus" meaning "horse".

* * *

This column doesn't cost much to produce because raw material is cheap.

* * *

Editor: "Give me a sentence with the word 'Discrepancy' in it."

Joke Editor: "Read discrepancy how you like it."

* * *

If it's funny enough to tell, it's been told; if it hasn't been told it's too clean; and if it's dirty enough to interest an engineer, the editor gets kicked out of school.

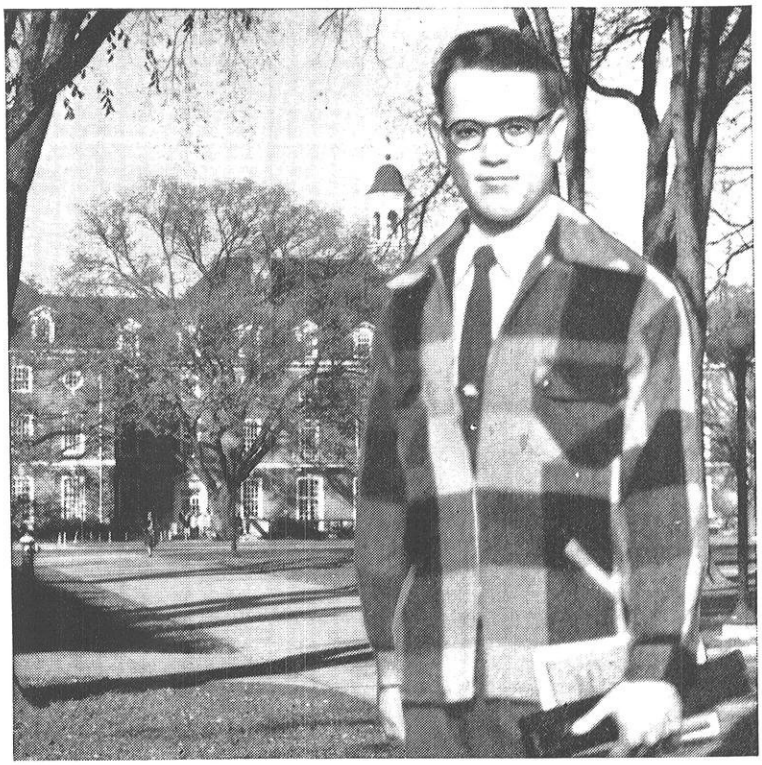
* * *

Voter: "Why, I wouldn't vote for you if you were St. Peter himself."

Candidate: "If I were St. Peter, you couldn't vote for me—you wouldn't be in my district."

Bill Zartman wants to know:

What effect would an advanced degree have on my opportunities for advancement at Du Pont?



William N. Zartman is studying for a B.S. in Chemical Engineering at the University of Illinois. Last summer he worked in the Technical Laboratory at Du Pont's Chambers Works to gain industrial experience. He has not yet selected a permanent employer, however; and right now he's asking the kind of questions which will help him select the right job and plan a successful career.

Dr. Sheldon Isakoff received his Ph.D. degree in Chemical Engineering from Columbia University in 1952, doing his graduate research work on the problem of heat transfer in liquid metals. Since graduation he's been engaged in fundamental research work at the Du Pont Experimental Station, Wilmington, Delaware. Dr. Isakoff is now a Research Project Engineer in the Engineering Research Laboratory.

Sheldon Isakoff answers:

An advanced degree would undoubtedly have a *favorable* effect in technical work, Bill, but let me enlarge on that just a little. In my own field—chemical engineering—a doctorate is considered to be evidence of demonstrated ability in carrying out original research. An advanced technical degree is therefore helpful in obtaining work in research and development, where that skill is definitely important. You might say it gives a man a head start in proving his ability in those areas.

It's less important in some other areas, though. For example, in production or sales work a manifest ability for handling human relationships is just as important for advancement as technical competence. If an engineer is sold on production work or sales, a graduate degree in marketing or business administration might be more helpful to him than advanced technical training—in getting started.

But I've noticed this at Du Pont. Once a man lands a job in his chosen field and actually begins to work, his subsequent advancement depends more on demonstrated ability than on college degrees. That's true throughout the entire company—in scientific work, administration, or what not.

So an advanced degree is not a royal road to anything at Du Pont, Bill. But when coupled with proved abilities, an advanced technical degree is unquestionably helpful to a man in research and development work. It often gives him a chance to demonstrate his abilities more rapidly.

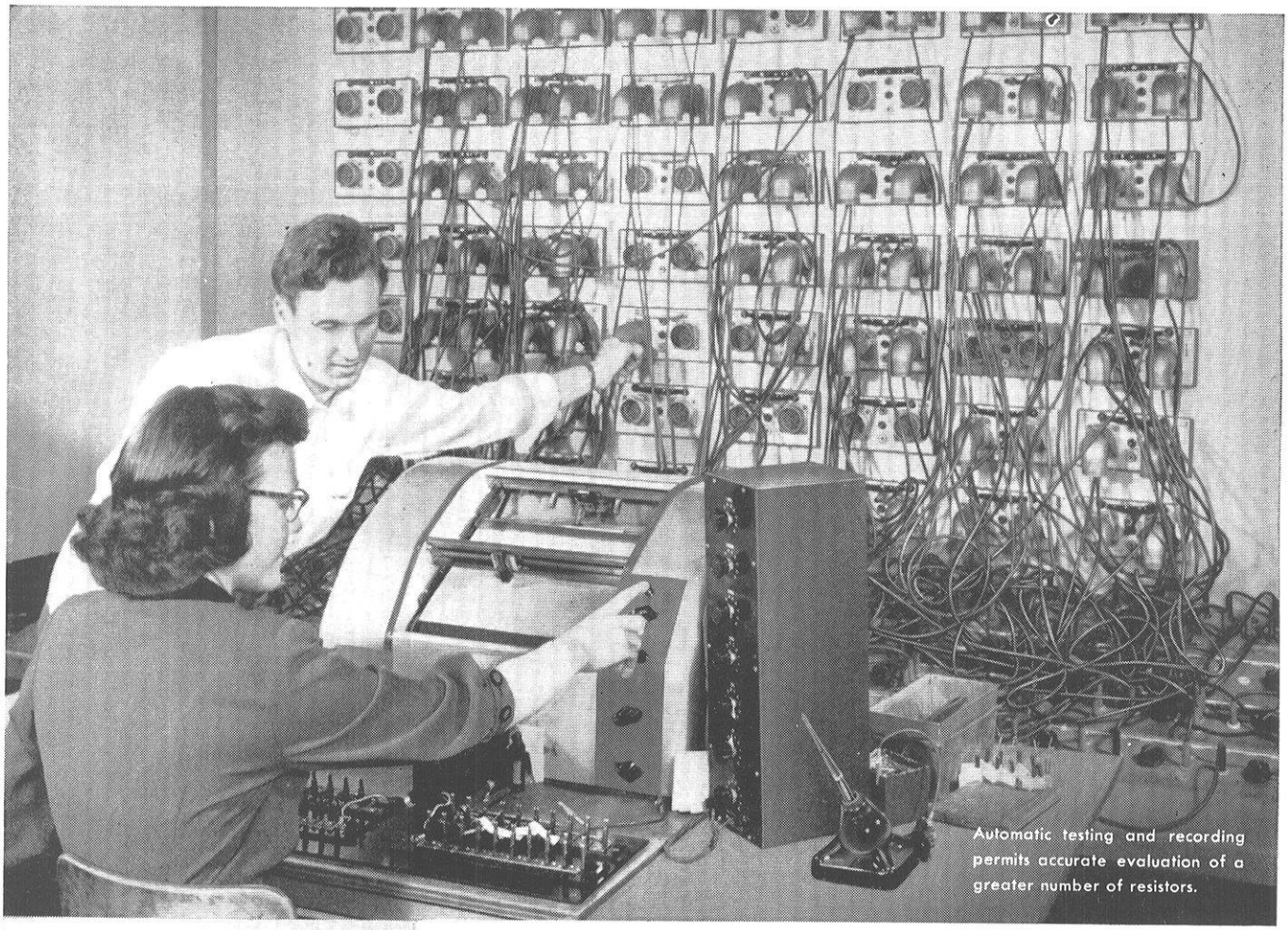
Are you interested in research work?

About 2000 Du Pont scientists are currently engaged in research, aided by some 3500 other employees. Laboratory facilities of the highest quality are available at the Du Pont Experimental Station near Wilmington, and elsewhere throughout the country. Full information about research work at Du Pont is given in "The Story of Research." Write for your copy of this free 28-page booklet to E. I. du Pont de Nemours & Co. (Inc.), 2521 Nemours Building, Wilmington, Delaware.

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

BETTER THINGS FOR BETTER LIVING
...THROUGH CHEMISTRY

WATCH "CAVALCADE OF AMERICA" ON TELEVISION



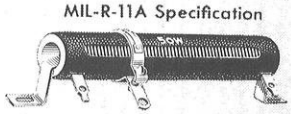
Automatic testing and recording permits accurate evaluation of a greater number of resistors.

BASIC REQUIREMENTS

JAN and MIL Specifications are basic guideposts for electronic advancement, whether used as engineering reference points or as procurement standards. IRC's dual emphasis on mass production and exacting testing assures highest performance standards at lowest possible cost.

SPECIFIC EXAMPLES

Type BT Insulated Composition Resistors
MIL-R-11A Specification



IRC Power Wire Wound Resistors
MIL-R-26B Specification

Type BW Low Wattage Wire Wounds
JAN-R-184 Specification

Sealed Precision Voltmeter Multipliers
JAN-R-29 Specification

ONLY IRC MAKES SO MANY JAN AND MIL TYPE RESISTORS

. . . another reason why engineers prefer IRC Resistors

56 different IRC resistors is today's figure—all equivalent to JAN or MIL specifications. Manufacturers of military equipment who must meet these specifications depend on IRC for all their resistor requirements. Offering the widest line of resistors in the industry—138 different types in all—IRC is the logical source of JAN and MIL type units.

IRC

Wherever the Circuit Says

INTERNATIONAL RESISTANCE CO.

401 N. Broad St., Phila. 8, Pa.

In Canada: International Resistance Co., Toronto, Licensee

Westbound Rio Grande freight in Ruby Canyon of Colorado River.

The freight rolls away an hour sooner

because photography cuts yard bookkeeping

The Denver and Rio Grande Western Railroad microfilms its waybills in minutes, cuts running schedules, saves costs in train idling time.

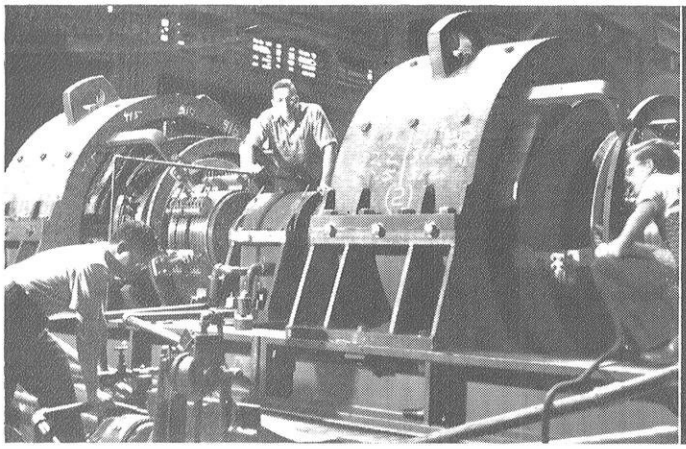
You don't find a Rio Grande freight idling at the terminal while waybills are copied by hand. Instead, Recordak Microfilming copies them. Then they're put aboard and the train is off in just about one-fifth the time it used to take, thus saving hours of valuable crew and train time. Then the wheel reports are made up from the films and teletyped ahead.

Railroading is but one of over a hundred types of businesses now saving money, time and space with microfilming. It is one of the fast growing and widely used ways photography works for industry.

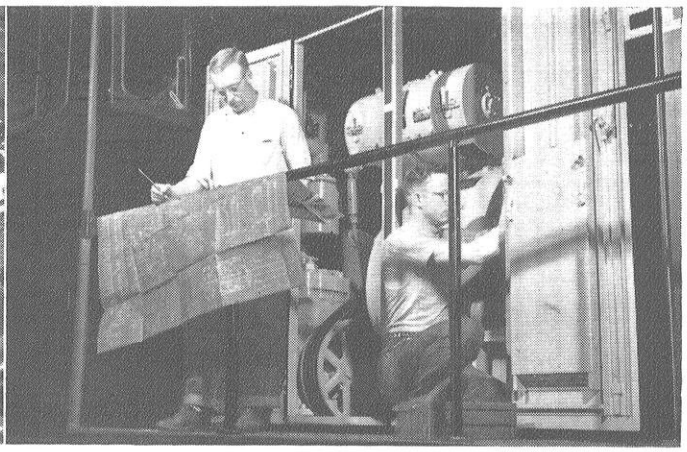
Small businesses and large are finding that photography helps in simplifying routine procedures, in product design, in personnel relations. It improves production, saves time and cuts costs.

Graduates in the physical sciences and in engineering find photography an increasingly valuable tool in their new occupations. Its expanding use has also created many challenging opportunities at Kodak, especially in the development of large-scale chemical processes and the design of complex precision mechanical-electronic equipment. Whether you are a recent graduate or a qualified returning service man, if you are interested in these opportunities, write to Business & Technical Personnel Dept., Eastman Kodak Company, Rochester 4, N.Y.

Eastman Kodak Company, Rochester 4, N.Y.



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

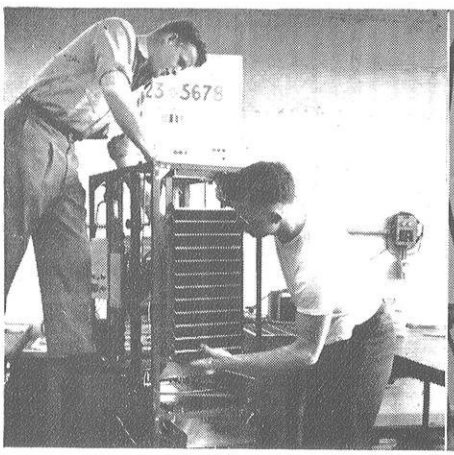
Like these young men pictured here, hundreds of scientists, engineers, chemists, physicists and other college graduates are "getting ahead" fast at General Electric . . . . and they are working on projects with the assurance that their contributions are meaningful and important.

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.

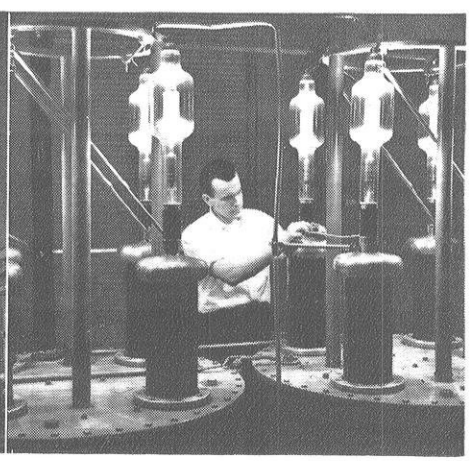
And by placing prime importance on the development of talent and skill, developed through G-E training programs and broadened through rotational job programs, and by providing incentives for creative minds, General Electric is hurrying young men into success in an industry that is devoted to serving 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