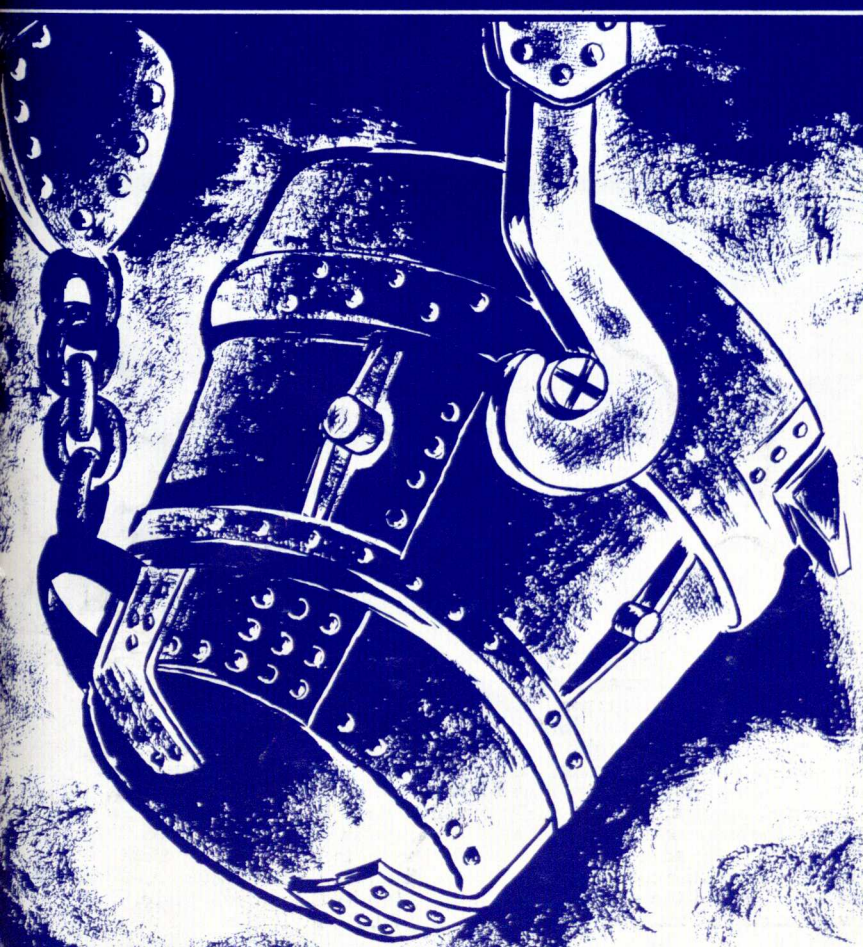
# Spartan Engineer





**The Big Move**

**The Development of the Rocket Engine**

**Technical Writing Opportunities for Engineering Graduates**

VOLUME 8 NUMBER 4 MAY, 1955 PRICE 25c

**James Chisholm, class of '41,**
**speaks from experience when he says,**

# "Men with ability and ambition really have a chance to get ahead at U.S. Steel"

● A responsible position can come quickly to those graduate engineers at U.S. Steel who show ability and ambition. Management training programs are designed to stimulate and develop these qualities as the trainee "learns by doing." His training is always a fascinating challenge and he works with the best equipment and the finest people in the business.

James Chisholm is typical of the young men who rapidly rise to an important position at U.S. Steel. Jim came to U.S. Steel as a trainee in 1941 after graduating as an M.E. Shortly thereafter he entered military service for four years. Upon his return to U.S. Steel in 1946, he advanced steadily until, in 1951, he was appointed to his present position as Assistant Superintendent of Blast Furnaces at the new Fairless Works at Morrisville, Pa.

Jim is now in charge of the unloading of all ore ships and the operation of the plant's two big blast furnaces—each with a rated output of 1500 tons per day.

Jim feels that the opportunities for graduate engineers are exceptional at U.S. Steel. He remarked that in his own department alone, six college trainees have been put into management positions within the last couple of years. He says that chances for advancement are even better now with the current expansion of facilities and the development of new products and markets.

If *you* are interested in a challenging and rewarding career with United States 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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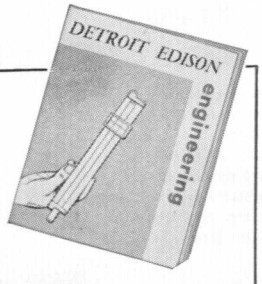
*For the full story of career opportunities at Detroit Edison, simply call or write for a free copy of this new booklet, "Detroit Edison Engineering."*

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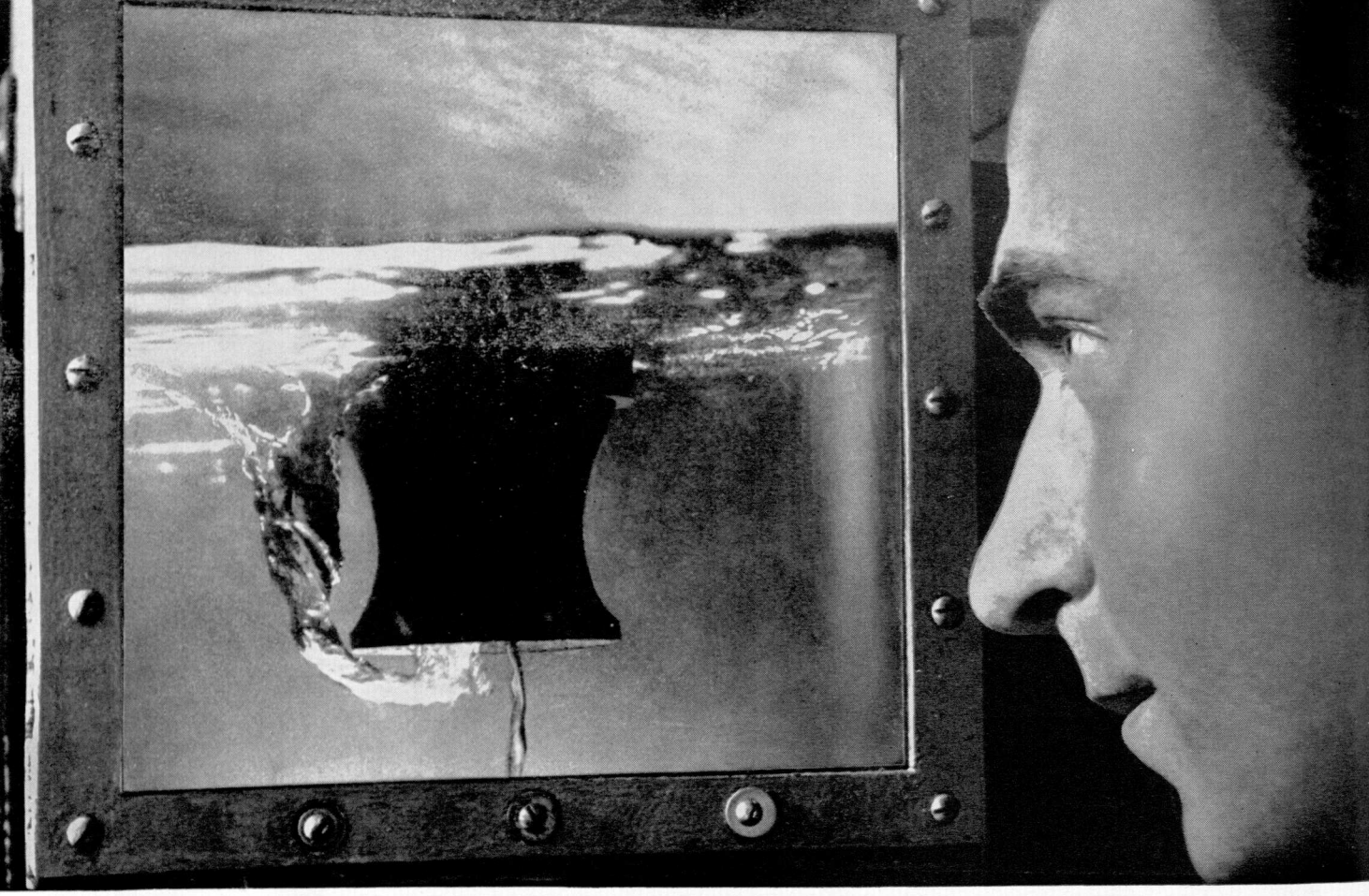

**A WHIRLPOOL SPIRALS** into the inlet of a model pump. This unique picture shows how air, a common cause of pumping trouble, was carried into the pump in . . .

# The Case of the Baffled Whirlpool

Some time ago, the report reached us that two Worthington vertical turbine pumps installed by one of our customers weren't working right. They delivered plenty of water, but vibrated badly and burned out bearings.

The customer asked us to find the trouble fast. After checking we knew the pumps were okay, so Worthington Research had to answer him.

First thing we did was build a one-tenth scale model of the customer's installation. The photo shows what happened when we started pumping.

A whirlpool immediately formed between the water surface and the pump inlet. Air, trapped in the whirlpool and carried into the pump, was the villain in the case.

The solution came with experimentation. A simple baffle arrangement in a side channel eliminated the whirlpool—and the trouble-making air.

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# Spartan Engineer

of michigan state university

## ARTICLES



## FEATURES



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There are easier ways to get a drink.

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# Editorial

## Education Through Cooperation

The Cooperative Engineering Education plan provides a chance to gain practical experience along with the formal education necessary for a degree in engineering. This is possible through the cooperation of several industrial companies.

A student, under this plan, spends part of his time working in his major field instead of just going to classes. The first two years he goes to classes as usual, but starting the third year he alternates terms between school and work. This arrangement gives the student a chance to apply what he has learned in the classroom and laboratory. Better understanding of the class work should result from this chance to put it to immediate use.

Since the student would require five years to complete his schooling there might appear to be the possibility of some financial hardship. The answer to this is that he would be working half of the time during the last three years and would be able to earn enough to pay school expenses during the other half. Thus, after the first two years, it would actually be easier to meet the financial needs. This would help students who otherwise would have to drop out of school because of lack of money.

Why not consider this plan for yourself? Industrial leaders seem to think that is a very good thing, and also most people feel that "experience is the best teacher."

jrs

# More and better jobs for more people

GENERAL MOTORS President Harlow H. Curtice speaking:

"Just as an example of how job opportunities in General Motors have grown, here is what has happened since 1940.

"In 1940, we had 233 thousand employes on our payrolls in the United States and Canada. In 1955, our employment totals 520 thousand —an increase of 287 thousand good jobs in only 15 years."

It stands to reason that a climate where job opportunities expand with such rapidity must be especially fruitful of career opportunities for young men holding engineering degrees.

For, in the final analysis, the very life's blood of our organization is the never-ending production of "more and better things for more people"—and that, very definitely, requires the engineering mind at its best.

In point of fact, although engineering graduates comprise a mere two per cent of total GM employment, they will eventually fill about forty per cent of executive posts if the established pattern continues.

Why not, then, look into the possibility of enjoying a rewarding career as a GM engineer? You'll be interested in a big new 136-page handbook entitled, "Job Opportunities in General Motors." Your college library or placement office should have it.

**GM Positions Now Available In These Fields:**

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## GENERAL MOTORS CORPORATION

*Personnel Staff, Detroit 2, Michigan*

# CLUBS AND SOCIETIES

*by Shirley Prikasky*

## ASME

At a recent joint meeting of the Detroit Section and Central Michigan Sub-section of ASME here at Michigan State, four of the members put on what was agreed by all to be a rather hilarious comedy skit. The quartet entertained the group with a vocal rendition of the "The Thermo Blues," a lively melody sung to the tune of "The Battle Hymn of the Republic."

They crashed into the meeting, completely unannounced and commanded attention, much to the amazement of the surprised and totally unprepared members who had just finished a formal business meeting. The mad four were clad in coveralls and smocks, and carried a six foot slide rule, three foot oil can, several oversized tee squares, clip boards, and a pail of entropy, among other items.

One of the quartet, after exuberantly howling out several verses, collapsed exhausted to the floor, only to be quickly revived with several good gulps of entropy from the entropy pail.

Then after several more off-key verses, they dashed hastily out of the room, leaving all somewhat confused and amusde.

Here are the lyrics to the infamous Thermo Blues:

*Free energy and entropy were whirling in his brain,*
*With partial differentials and Greek letters in their train.*
*For Delta, Sigma, Gamma, Theta, Epsilon, and Pi*
*Were driving him distracted as they danced before his eyes.*

CHORUS:

*Glory, glory, dear old thermo*
*Glory, glory, dear old thermo*
*Glory, glory, dear old thermo*
*I'll get you by and by.*

*Heat content and sugacity revolved within his mind,*
*Like molecules and atoms that you never have to wind.*
*With logarithmic functions doing cakewalks in his dreams*
*And partial molar quantities devouring chocolate creams.*

CHORUS: Same as above.

*They asked him on the final if a mole of ant gas*
*In a vessel with a membrane through which hydrogen could pass*
*Were compressed to half its volume what the entropy would be*
*If two-thirds Delta Sigma equaled one-half Delta Pi.*

CHORUS: Same.

*He said he guessed the entropy would have to equal four*


**Giving out with the Thermo Blues are from left to right: Roger Preuss, Dick Hartung, Roy Cole, and Bill Flynn at a recent ASME meeting.**

*Unless the second law could up it a couple more,*
*But then it might be seven if the thermostat was good*
*Or it might be almost zero if one rightly understood.*

CHORUS: Same.

*The professor read his paper with a corregated brow*
*For he knew he'd have to grade it, but he didn't quite know how.*
*'Till a sudden inspiration on his cerebellum smote,*
*And he seized his trusty fountain pen and this is what he wrote.*

CHORUS: Same.

*Just as you guessed the entropy, I'll have to guess your grade,*
*But the second law won't raise it to the mark you might have made,*
*For it might have been one-hundred if your guess had been good,*
*But I think it will be zero 'till they're rightly understood.*

CHORUS: Same.

Several ASME members have also entered a speech contest. Their speeches had to be limited to fifteen minutes on some technical subject.

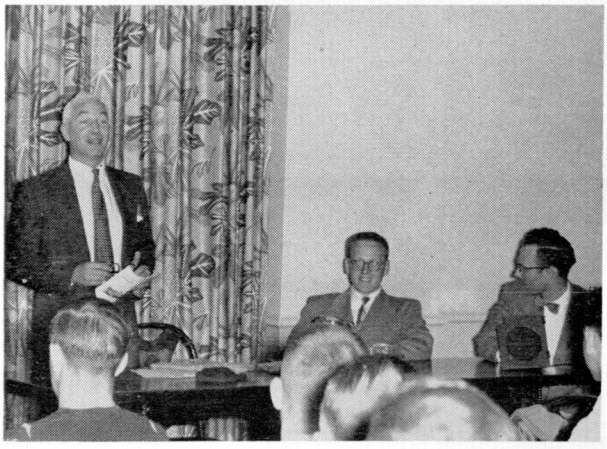
The first presentation of the speeches was at the April 14 ASME meeting before student members and faculty. The top four winners again presented their speeches at the Senior ASME Central Michigan Subsection meeting held at Jackson on April 20. There, members of industry picked the winner and a runner-up to represent MSC at the Student Midwestern Conference held in Toronto, Canada, on April 28 and 29. At Toronto, students from twenty colleges and universities presented their speeches in competition for cash prizes. The first prize was $50 and an embossed certificate.

In addition to the speech competition, delegates

toured laboratories and industry near Toronto, attended discussion groups, a banquet, and a dance.

A resumé of past ASME programs shows an attempt to provide material useful to all those in the engineering field. Dr. Clyde DeWitt spoke on the "Surface of Things." From the Columbia Southern Chemical Corporation, Mr. A. C. Sherrill gave a picture of what Mechanical engineers could do in the Chemical industry. Plastics was the topic discussed by Mr. C. R. Webster of the Dow Chemical Company. And films were shown on the Gas Turbine and Magnesium.

Future programs promise to be just as interesting and informative. A series of two talks on the guaranteed annual wage are planned; the first one by a member of management and the second by a member of the union. Also coming up is a meeting devoted to the subject of atomic energy in power plants.



**From left to right famous sports car racer Mr. Arkus-Duntov, Neil Newman, and Charles Meyka at the April 14 SAE meeting.**

## SAE

Mr. Zora Arkus-Duntov, famous racing driver and Research Engineer with Chevrolet Division of General Motors, really thrilled his audience at the April 14 SAE meeting with a very interesting account of his racing career. He has taken in most of the circuits in Europe, just recently winning a formula class at LeMans, France. The two hour LeMans sports car race is the largest in the world. He also traced the development of the sports car up to present day.

May 3 "Automotive Suspension Systems" was the subject of a talk given by Mr. F. R. McFarland, Chief Engineer of Project Research and Development at the Studebaker-Packard Corporation.

And a Senior-send off will usher off the graduating Seniors into the business world.

## ASAE

Our Society does not differ from the others when it comes to balancing the treasurer's report at the end of the year. To increase the Society's yearly income, we have recently undertaken two projects.

One of these was enacted during Farmers' Week when the A.S.A.E. members served lunch to the exhibitors in our Club Room. Due to campus regulations, we were unable to realize any direct profits from the food, but the exhibitors were very generous in their contributions to the Society.

The second project is slated to take place during this term in connection with the Centennial of Farm Mechanization. This huge show is being sponsored by the Agricultural Engineering Department, from August 15-20, 1955. The Department has agreed to hire Society members to construct a large arch, which will be placed over the entrance to the exhibition grounds, located south of the Agricultural Engineering Building. Approximately seven-eighths of our members have offered to donate the wages from one Saturday's work on this project to the Society's treasury.

Spring term will also see the occurrence of our annual student-faculty picnic and softball game. This event is sponsored by the Society, with the faculty wives bringing delicious home made dishes. Last year, approximately one hundred and twenty faculty members and students attended. We are planning, this year, for an even larger and more lively get together than we had last year.

## ASM

The last meeting of the American Society of Metals was highlighted by the very practical and informative speech given by Dr. Gotsch of the American Can Company. The effect of corrosion from acid foods and carbonated beverages was one of the points he discussed. This corrosion can be inhibited by a zinc or organic coating on the can.

ASM is again having its Senior picnic this spring. Both students and faculty enjoy this annual event.

The Seniors were also honored at the annual Collegiate night put on by the Detroit chapter on April 11. Besides being treated to a wonderful banquet, they were the subject of the main speaker's address, "The Factors Sought for in Graduating Engineers." Mr. Scott Hill who is the Recruiting Superintendent for General Electric brought out the importance of knowledge, imagination, adaptability, and courage in the engineering graduate who would like to make good.

## AFS

During this past college year, the American Foundrymen's Society has on record many good field trips. Fall term AFS members went through Saginaw Malleable Iron, a division of General Motors. There they watched the new shell molding process, a recent modern development in the industry. Afterward at Frankenmuth, Michigan, they had dinner with the Saginaw Valley Chapter.

The Midwest Foundry at Coldwater, Michigan, was visited winter term. Of particular interest to those who went was the precision molding using lost wax process. They saw how a ball and socket joint can be made and fitted to a disabled so that he can walk again. X-ray testing is used on the many different products made there to filter out any possible defects in Government orders.

This term the AFS field trip is out to the Cadillac Motors Production Foundry. It is a practical experi-

*(Continued on page 40)*

Photographs by Eric Lundberg

an interview:

## Sue Johnson

# Miss Engineer

by Emory Geisz
Spartan Engineer Assistant Editor

**"I thought somebody was kidding me!"** exclaimed attractive Sue Johnson, while recalling the phone call informing her of selection as Miss Engineer of 1955.

The 18-year-old, 5'6", 115 pound freshman from Toledo, Ohio, throughout the one hour interview displayed a lively, subtle sense of humor, embodied in a complimentary air of sophistication – reminding me very much of movie star Grace Kelly.

### View on Men

Sue's scintillating hazel eyes sparkled a bit more as she described "my type of fellow." When first confronted with the problem of relating a view on men, she thoughtfully hesitated, then answered, "I don't know – I suppose he should be lots of fun and good looking. As far as marriage goes, he should have ambition – get along well – like to sail and swim (her favorite outdoor pastimes)."

Momentarily she stopped speaking. Then breaking into a laugh, she added, "And he should not be a complete idiot!" Incidentally, Sue is not pinned.

She was entered in the Miss Engineer contest by her dormitory, East Mayo. Sue's quite the gal, brains plus beauty, a 3.7 all-college. Doing desk work for the *Wolverine* and selling books for *STUN* have been her primary extra-curricular activities. Also, she is in the process of pledging Kappa Kappa Gamma sorority.

When asked what she does for recreation on campus, she replied like a typical student, "Oh, I don't know what I do with all my time. It just goes." She is enthusiastic about most sports. Besides sailing and swimming, Sue's favorite hobby is art.

Miss Engineer and interviewer Geisz.

Upon graduation, with a degree in Education, her ambition is to teach elementary school, second or third grade. Teaching art to youngsters would be especially ideal, she said.

## Unusual Experiences

"What was your most unusual experience here at State?"

She appeared puzzled for a moment, then smiled at me, looked puzzled again, and finally with a big grin on her face responded, "This interview – I think." Her most unusual experience before coming to Michigan State occurred last summer. She painted a cottage. Sounds like great fun (?).

Sue graduated from DeVilbill High School in Toledo. At high school she acted in school plays and took a hand in painting scenery.

Members of her court are: Janet Knopf, Mason sophomore and Alpha Omicron Pi; Kathy Arnold, Battle Creek freshman and Abbot Hall; Charlene Herndon, East Lansing junior and Gamma Phi Beta; and Jerry Warner, Kalamazoo sophomore and Alpha Phi.

As traditional, Miss Engineer is crowned at the annual engineer's dance, Holiday Ball, and reigns over the annual Engineering Exposition.

## The Future

Maybe we will be seeing much more of Sue Johnson. Remember what happened to Michigan State's Miss Engineer of two years ago, Jan Somers First, Miss Engineer; then Miss MSC, Miss Big Ten, and finally Miss Michigan.

# Development of the Rocket Engine

*by Charles Puma, M.E. '58*

IN THE EARLY DAYS of the Christian era, the philosopher Hero invented the Aeolipile, a device which demonstrated the principle of jet propulsion.

A long time after Hero's invention came the invention of the "horseless carriage" and the airplane, and much later, the rocket engine – which is dependent on the principle shown by the Aeolipile. From knowledge of the rocket engine, ideas have evolved which include many of the weapons used by the United States Army and Navy, jet airplanes, and even interplanetary and inter-space travel.

The Aeolipile, operating somewhat like a lawn sprinkler, was a spherical or cylindrical vessel free to rotate about its horizontal axis, defined as a pair of Trunnions. One trunnion was hollow to permit the entry of two jets of steam from a stationary boiler. When the pressure in the trunnion was increased, the steam escaped from the hollow one, causing the unit to spin on its axis.

Newton's Third Law of Motion states that "for every action there is an equal and opposite reaction." This demonstrates the principle of jet propulsion and explains the action of the Aeolipile.

A toy balloon can better demonstrate the principle of jet propulsion. If a filled balloon is suddenly released, it will travel wildly in the direction opposite to that taken by the escaping gas. The unequal pressure of gas inside the balloon creates motion. When the nozzle of the balloon is released, it lowers the pressure on that side, while the pressure on the other wall remains constant until much of the air escapes. The balloon stays in motion as long as there is unequal pressure acting on its walls.

Rockets, like balloons, can travel in a void. Rockets are designed to carry all the fuel needed to support the propulsive process. The height at which a rocket can operate is confined to man's knowledge of construction. It has been shown that a rocket will react more efficiently at extreme altitudes. This is possible because as previously stated, the rocket carries its own oxygen, and at higher altitudes, the air is less dense, causing less air resistance to the forward motion.

The rocket is powered by two types of fuel: solid and liquid. Solid fuel is simply a tube packed with poor quality gunpowder, which, when ignited, burns until it is converted to gas. This gas creates pressure in the firing chamber and is released through small openings called jets. When this pressure is released, it causes unequal pressure on that side of the wall which moves the rocket in the direction opposite to that taken by the escaping gas. The liquid power plant's action is somewhat similar to that of the solid power plant, except that the liquid power plant requires tanks and valves for the oxygen and gasoline. The gasoline and oxygen are pumped into the firing chamber, where they are ignited, and react to form hot gases which exert pressure in the same way as the solid fuel power plant.

These principles of the rocket were used as early as 1258 by the Chinese. Their rockets consisted chiefly of gunpowder tightly wrapped in paper, called fire arrows, which were first used by the Chin Tartars in the defense of their capitol.

Until about 1825 rockets had been used mainly for war. New ideas for the use of rockets began arising, and in spite of improvements, rockets were out-performed by guns.

Before 1926 rockets were usually powered by the solid fuel power plant. In March 1926, Dr. Robert H. Goddard first introduced the use of liquid fuel to the combustion chamber. The added power made possible speeds of up to 700 miles per hour, but with the additional weight, the old method of steering was no longer effective and the rocket seldom landed where it was directed.

In 1927 William Hale made an important contribution to rocket engine research by discovering an effective alternative to the stabilizing stick. He installed three curved vanes in the orifice of the rocket motor. The jets, acting on these vanes, caused the rocket to spin, thus providing the necessary stabilization. This principle is still in use today.

The rocket in its more advanced stages was due to German research. The first to be developed was of the type known as the A-3. In this rocket, the fuel supply was sufficient for only 45 seconds, but that was sufficient time to allow the rocket to rise to a height of 45,000 feet. These rockets were small, resembling a long narrow cylinder about two feet in diameter and 25 feet in length, and had wide vanes at the tail for stabilization. It was an example of things to come for from it came the vicious V-2 rocket.

*(Continued on page 38)*

A Campus-to-Career Case History

# "This is what I did yesterday"

"I like a job that keeps me jumping," says Bill Jermain, C.E. from Marquette, '52. "And my first management assignment with Wisconsin Telephone Company does just that. I'm Service Foreman at Sheboygan, with nine installers, and that means variety of responsibility. But judge for yourself. Here's a quick run-down of what I did yesterday, on a typical day—

**8:10**—"Checked day's work schedule. One of my new men was putting in a buried service wire, and I went over the job specs with him to be sure he had things straight.

**8:30**—"Answered mail while my clerk checked time sheets from previous day.

**9:30**—"Out to supervise installation of the first aluminum Outdoor Telephone Booth in my exchange. Reviewed the assembly instructions with the installers, then arranged for special tools and bolts to be delivered to the job.

**11:30**—"Drove across town. Made a 'quality inspection' on a telephone installed last week. Everything checked O.K.

**12:00**—"Lunch.

**1:00**—"Picked up film for next day's safety meeting. Watched the film, made notes for discussion.

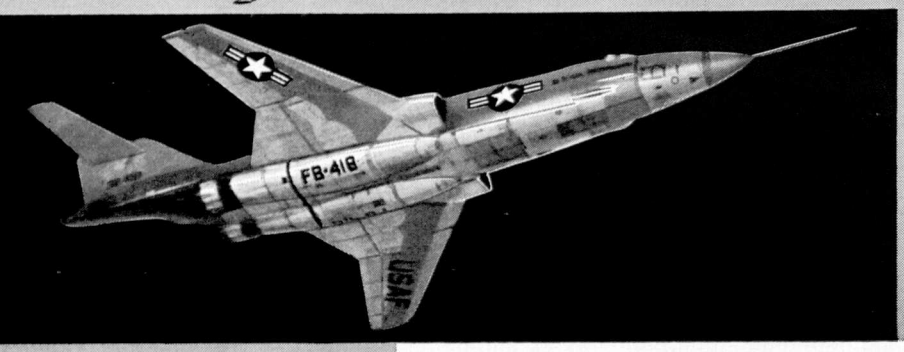
**2:00**—"Met with moving company manager to estimate cost of telephone cable lifting for a house moving job. Drove the route he had planned and worked out schedule for construction crews.

**3:30**—"Returned to aluminum booth installation. Went over wiring specs with the electrician.

**4:00**—"Stopped at Central Office to pick up next day's orders. Met installers at garage as they checked in and assigned next day's work."

**Bill has been in his present job about a year, and is looking forward to new responsibilities as his experience increases . . . as are the many young college men who have chosen telephone careers. If you'd be interested in a similar opportunity with a Bell Telephone Company . . . or with Bell Telephone Laboratories, Western Electric or Sandia Corporation . . . see your Placement Officer for full details.**

BELL TELEPHONE SYSTEM




# 10,000,000 horsepower for America's defense . . .

Two years ago we announced the world's most powerful production aircraft engine.

Since then, the J-57 turbojet has been selected by many top airframe manufacturers to power their most outstanding new designs. For these fighters, bombers and transports, we have built over 1000 complete engines — the equivalent of more than 10,000,000 horsepower.

Today the J-57 is still unmatched anywhere — an important factor in this country's supremacy in the air.

**PRATT & WHITNEY AIRCRAFT**

*Division of United Aircraft Corporation*

**East Hartford 8, Connecticut**

***companies . . . found that scholastic standings gave little indication of success***


**Shown here in conference are the placement bureau officials. From left to right: Robert Clark—asst. director in charge of alumni placement, Wayne Tinkle—placement asst. in charge of part time student employment and summer employment, Jack Breslin—director of the placement bureau, and Frederic Bennetts—asst. director in charge of educational placement.**

**Here, in a typical interview, a company representative is shown with an interviewee.**

# The Big Move

*by Harlow Nelson, M.E. '56*

**"VERY SOON YOU** will be making one of the most important moves of your life – that of obtaining a good job." In a letter sent to the seniors of the School of Engineering by Jack Breslin, director of the Placement Bureau, this was the opening sentence. It calls our attention to a decision that will have to be made in the near future. The letter also informed the seniors of the fine Placement Bureau which we have at our disposal here at Michigan State, and encouraged them to make use of it. It is not too early to extend this advice to all students so that they may become acquainted with this service and learn to use and understand it.

Every major concern in the nation is represented each year at the Placement Bureau. Small companies also are well represented. Last year, 52 concerns that employed 100 employees or less were represented. These companies were from all corners of the nation. Twenty-four states and 436 companies in all were represented. Most of them made two or three visits during the year. Eighty-five percent of these concerns were interested in engineers. An interesting fact to be noted was that from 281 companies there were 17,093 positions available for engineers at an average salary of $4,289. The real opportunity for engineers can be seen when these facts are compared to the 296 graduates of engineering last year.

Naturally, as it seems, the midwest is most heavily represented among these companies. This is probably due to the tendency of college graduates to return to home, or close by, to work. Midwest industry realizes that most Michigan State students are from the midwest and relies on Michigan State heavily for their manpower needs.

These companies all have one stereotyped student in mind when scouting for a prospective employee. Invariably they look for a man who they feel can some day work his way into management. This is always the prime criteria. Because of this attitude, scholastic standing has lost its distinction of being the dominating factor. In surveys made by companies it was found that scholastic standings gave little indication of success, for "average" students were doing as well, and in some cases better, than the "top" students after ten years in industry. Demonstrated leadership has assumed the role of major importance. Industry feels that participation in campus organizations, clubs and societies gives a greater indication of future success.

Another consoling fact is that industry has accepted the fact that many men face military service after graduation, and as a result, 93.2% of the employers last year stated they would employ men who anticipated military service. Incidentally, it is much to your advantage to affiliate with the company for which you plan on working, before service. Money that would be spent contacting employers after service is saved. Also, valuable experience may be gained by military duty along civilian occupational lines if employed by a company doing work for defense.

The tremendous amount of research that needs to be done has put a premium on men with advanced degrees. Experience is also desired by industry.

*(Continued on page 40)*

# Technical Writing Opportunities for Engineering Graduates

*By*

*H. C. McDaniel, Manager of Technical Publicity* and *C. A. Scarlott, Editor of Westinghouse Engineer*

*Westinghouse Electric Corporation*

HERE ARE MANY editor-writer opportunities for the young engineer who has a desire to interpret in a form usable by his profession, the significance of engineering developments. The opportunities lead in two directions: one to the technical periodical publishing business; the other to public relations work in industry. Both have the advantage of offering a continuing education in engineering as the successful editor-writer visits plants where things are made and is brought into intimate contact with people who design and make these things.

The job of reducing to usable form newly-found knowledge is as important as the discovery itself. Unless the significance of the discovery can be explained to others, that new knowledge cannot be put to use by the profession generally. So, the need for competent engineering editor-writers increases with each new branch that is added to the engineering family tree. Of significance also is the fact that pay is comparable to that for engineering work while the opportunities for advancement are equal to those in in any profession.

The qualifications needed for this work can be summed up in seven words: Engineering education; Journalistic skill; Imagination; Diplomacy; and Cooperativeness.

What you should look for and what you need to know about these job opportunities, where to look for this information, who to get in touch with, and how to write that letter of application are covered in detail in this article.

## Technical Periodicals

There are nearly 2000 periodicals published in the United States aimed at 150 different fields of interest in industry and business. A detailed analysis of the editorial content and the readership of each of these magazines can be found in "The Editorial Directory" or "The Standard Rate & Data Service-Business Publications Edition." The former is published by the Galub Publishing Company, New York City; the latter by Standard Rate & Data Service, Evanston, Illinois.

In addition, there are some 1500 periodicals published by industry itself that are aimed at this same group of industrial and business readers. The editorial analysis of this group of publications is to be found in "The Nation's Leading House Magazines," published by the Gebbie Press, New York City.

Study these volumes. As you do, make a list of the magazines you think you might like to work for. Read several issues of each magazine on your list. Note first the number of people on the editorial staff – the larger the staff the greater opportunity to break into the field and get some experience.

Next, study the table of contents and note especially the type and kind of feature articles carried. Also, the departments: Operating Shorts, Maintenance Pointers, Kinks, How-To, Ideas of the Month, etc. As you leaf through the magazine notice the number of by-lined feature articles compared to the staff-written features. This is your tip-off to the time spent editing other people's writing to that of researching, gathering data and writing the article yourself. Scan the news items, new products, and new materials items to get the feel of this end of the book.

Finally, study the advertising carefully. Note specifically the products advertised for this is your cue to the readership; the tip-off to the kind of industries and businesses you'd be associated with if you worked for that magazine.

The name and title of each person on the staff is found on the masthead. Here is what each does: the publisher is charged with the responsibility of making the magazine pay; therefore, has under him a business staff and an editorial staff. The former sells advertising space while the latter develops and produces the editorial copy.

The editor – who reports to the publisher – is responsible for setting the editorial policy and philosophy and with the publisher, of determining the editorial diet. The managing editor – who reports to the editor – sees to it that copy is in on time and that the magazine is printed and mailed on schedule. The technical, associate, and assistant editors must line up articles that have been scheduled for publication during the course of the year, must get these articles written on time, and must edit them for publication. In addition, they are frequently assigned to do a staff story.

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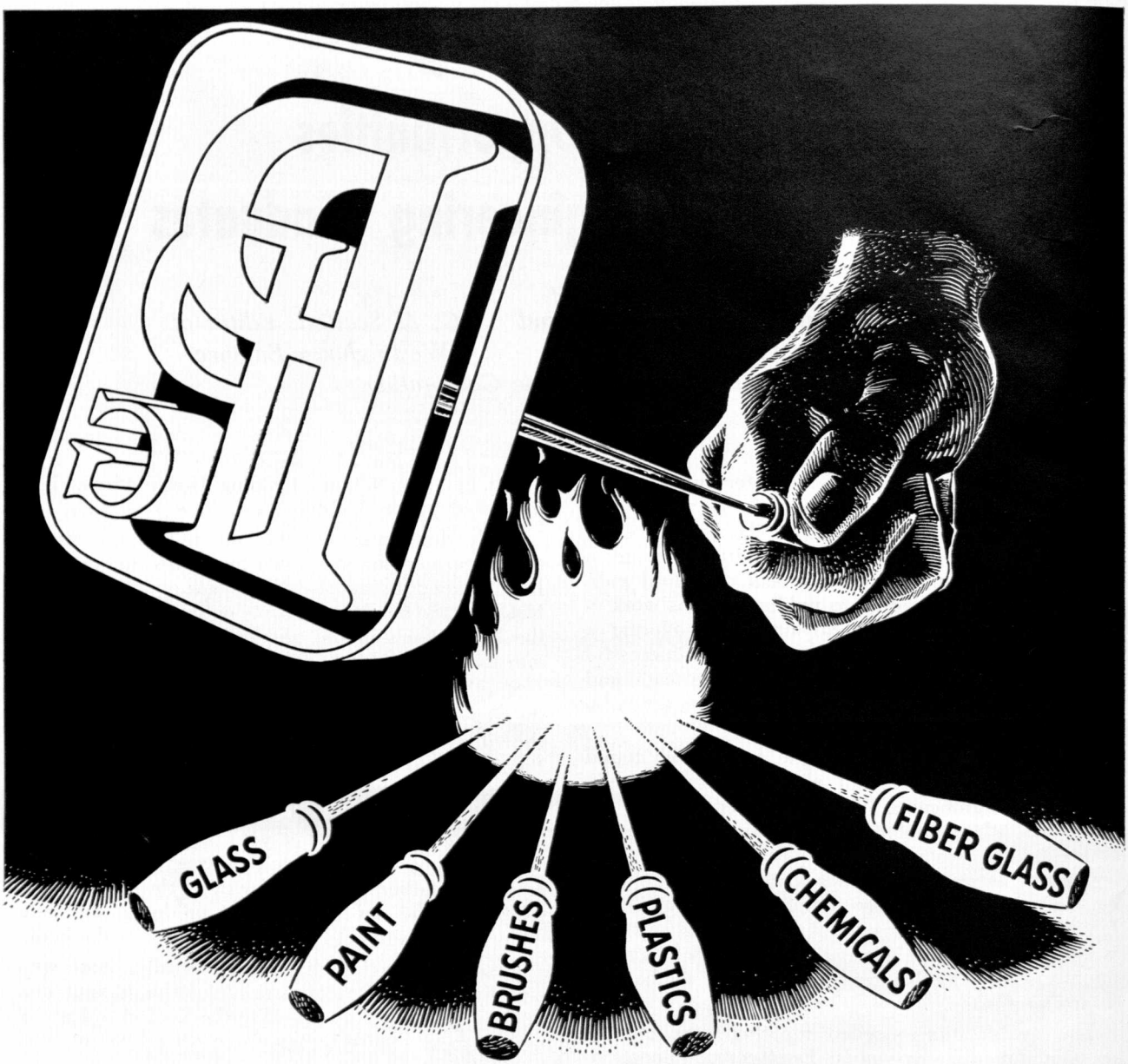



# PITTSBURGH PLATE HAS MANY IRONS IN THE FIRE

## *... maybe you should have a grip on one of them!*

Although Pittsburgh Plate Glass Company is the best known name in glass, it is also one of the nation's leading producers of paints and brushes, of alkalies and related chemicals, of plastics and fiber glass.

These multi-industry operations offer the college graduate many and varied types of careers in manufacturing, research, marketing, sales and administration.

PPG's record is one of continual growth throughout its more than 70 year history. Its operations are nationwide and in many foreign countries. Progressive policies assure unlimited opportunities for alert men who are looking ahead to more than "just a job."

PPG is seeking good men with college training. If you think you'd like to try your "grip" on one of the many PPG "irons," you're invited to write today for more information. Just address: Pittsburgh Plate Glass Company, General Personnel Director, One Gateway Center, Pittsburgh 22, Pennsylvania.

PPG

**PAINTS · GLASS · CHEMICALS · BRUSHES · PLASTICS · FIBER GLASS**

**PITTSBURGH PLATE GLASS COMPANY**

**319 PLANTS, MERCHANDISING BRANCHES, AND SALES OFFICES LOCATED IN 250 CITIES**

## Technical Writing

*(Continued from page 17)*

As a cub editor, you start your career writing and editing "news" and "what's new" items. As you gain experience, develop a feel for your readers, and become more facile with words, you'll find your assignments becoming more interesting; more stimulating; more challenging. Assuming you'll continue to do what's expected of you, you'll find from that point on – usually a period of two to four years – that your responsibilities will increase, your progress will be forward, and your pay will move upward.

In general, staff editors of scientific society journals and of engineering association magazines do not have the freedom and latitude for editing that an editor has on a technical or trade magazine. There are notable exceptions to this general rule and you can spot these the moment you read the introductory paragraph to one of the articles or papers. Where editing is restricted by rules, the opportunity to flex your imagination and to develop an articulate writing style is inhibited, but there are compensating factors. The editors of these journals sometimes serve as secretary or managing director of the society in addition to being editor and in such capacity are afforded an excellent opportunity to develop their administrative, organizational, and managerial abilities.

Staff editors of company subsidized engineering magazines – an outstanding example of which is the *Westinghouse Engineer* – work under a broad spectrum of editing freedom. At one end is the almost zero lack of freedom to develop and edit material. At the other end is complete freedom in the choice of material and in the editing of this material. Within these limits, an editor on one of these magazines works much the same as an editor on one of the technical magazines. The principal difference is in his "beat." In the case of the company technical magazine, the "beat" is largely within the company with only an occasional trip outside. No such limitation is faced by the editor on a technical magazine. So, if you are averse to frequent and extensive travel, but want to be in the technical writing profession, a job on a company published technical periodical might be the solution to your problem.

### Public Relations Work

The work of a technical editor-writer in the public relations department of a corporation is quite different from that of a staff editor on a technical magazine – yet, under the right conditions it can be as challenging, as stimulating mentally, and as rewarding financially. We can best illustrate what we mean by describing the Technical Publicity operation at Westinghouse.

A sizeable staff of editor-writers gather, edit, and place in technical magazines and the *Westinghouse Engineer* technical information about Westinghouse products and services. To do this, each editor-writer is assigned a "beat" of two or three product divisions and one or two engineering service departments. The editor-writers establish personal contact with those doing research, development, design, manufacturing and application engineering work, keep fully acquainted with the progress of developments and guide the planning of publicity for all developments. This includes giving counsel to authors of technical or engineering articles, gathering information and writing news items, new products and sales literature pieces, and similar items of interest to the readers of technical magazines. They assist in planning visual aids, sometimes personally directing the taking of photographs. In addition, they must obtain clearances for publication from interested groups within the Company. They must also plan and assume the responsibility of placement of material with the editors of the appropriate technical magazines.

In the case of technical articles and write-ups to appear in the *Westinghouse Engineer*, the editor-writer, working with the managing editor and production department, prepare the manuscript for printing, plans and assists the art department with the illustrations. In short, he works the story through the actual printing, including proofreading.

This is the basic function. There are others. The editor-writers help plan and execute meetings with groups of editors for the disclosure of a new development or for the exchange of engineering information. They arrange and schedule visits for editors of technical magazines with company engineers, executives, or plants. Random activities include assistance to authors of books, assistance in preparing talks by company executives, and trips to customers' installations to gather information or to assist in taking pictures.

While all technical information operations of corporations may not embrace all the activities found at Westinghouse, basically all do the same thing in varying degrees. The scope is determined largely by the size of the company. In general, the larger the company, the broader the scope. Conversely, the smaller the company, the narrower the scope.

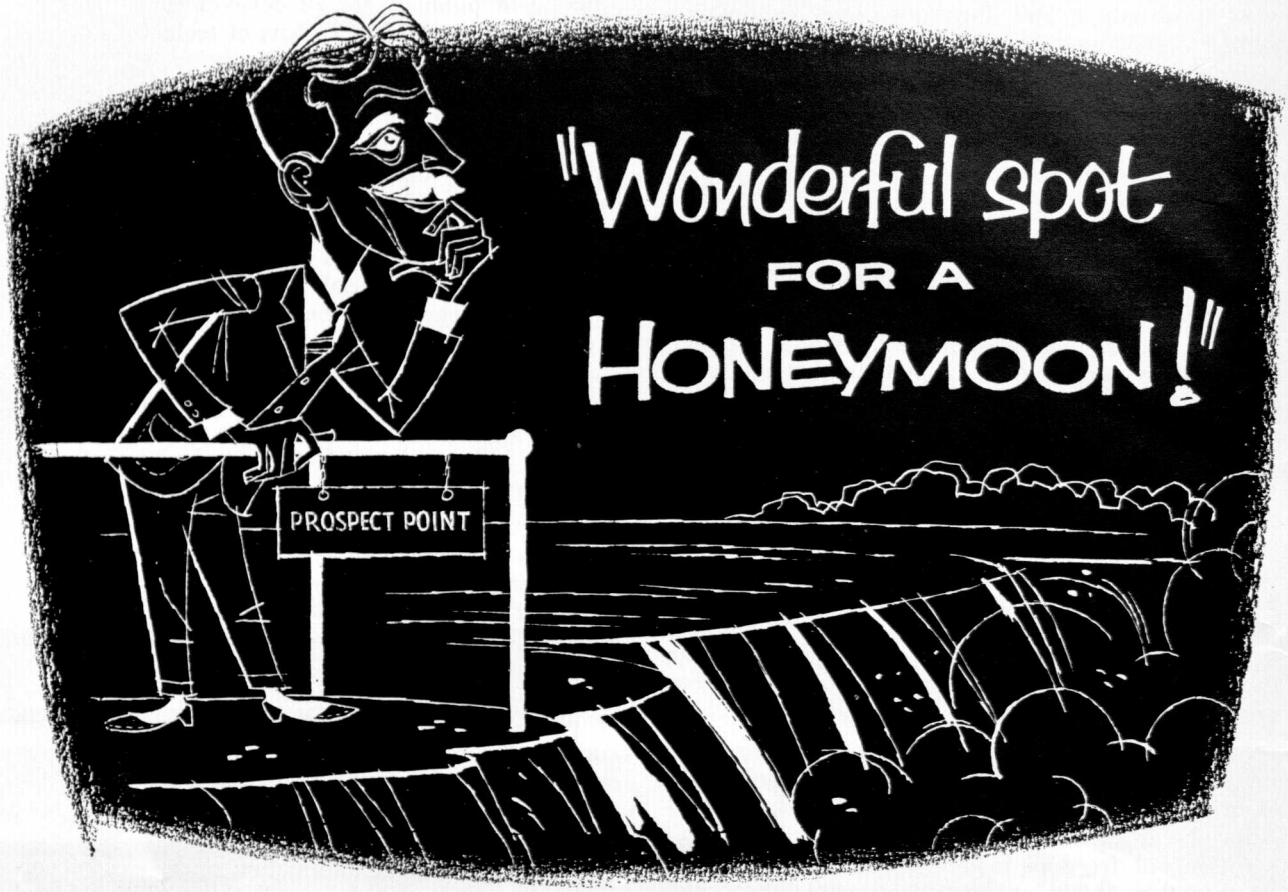
What holds for corporation public relations departments, holds also for public relations departments of advertising agencies. Here, editorial and advertising functions are more closely related as both are frequently handled by the same person for the same client company. In general, agency work involves more fact gathering and creative writing than is the case with the corporation. Of interest is the fact that a few agencies have set up a technical information group separate and distinct from their advertising department.

### Continuing Education

In a way, technical writing offers a continuing education. The successful editor will observe first hand practical engineering from concept of idea to operation of equipment. This requires keeping abreast of developments in the specific and corollary fields.

Such a job develops your powers of observation and discernment . . . your ability to draw out a person, to get him to talk about the things that interest him most . . . and finally, your ability to report all you see and hear to your readers. To do these things

*(Continued on page 35)*



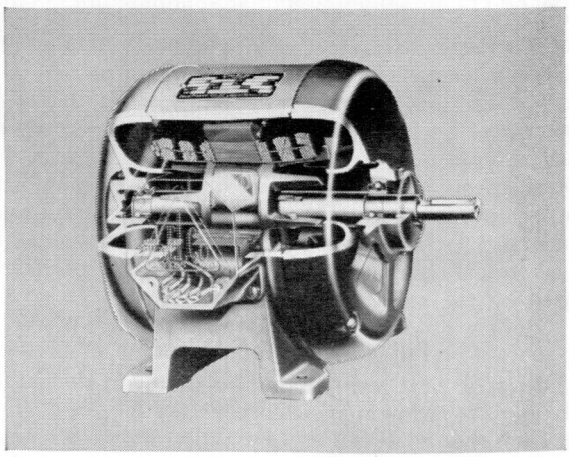

## NIKOLA TESLA, THE MAN WHO HARNESSED NIAGARA

Water, water, everywhere — and no power. That was Niagara Falls when Nikola Tesla began work on its power system in 1888. Now Niagara is one of the world's largest electric power plants.

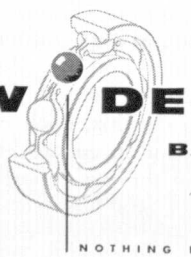
But to make the most of this power, many problems in electric motor design had to be overcome. New Departure ball bearings have helped solve many of them. For example, motors with New Departure self-sealed ball bearings may be mounted in difficult-to-reach locations because the bearings will operate for years without attention for relubrication or adjustments of any kind.

Highly important also are the facts that these ball bearings resist loads from *all* directions and, being grease-lubricated, permit motors to be applied in any position from horizontal to vertical without loss of efficiency or trouble from lubricant leakage. Whatever the loads, New Departure ball bearings maintain accurate rotor-to-stator relationship — are cool-running at all motor speeds.

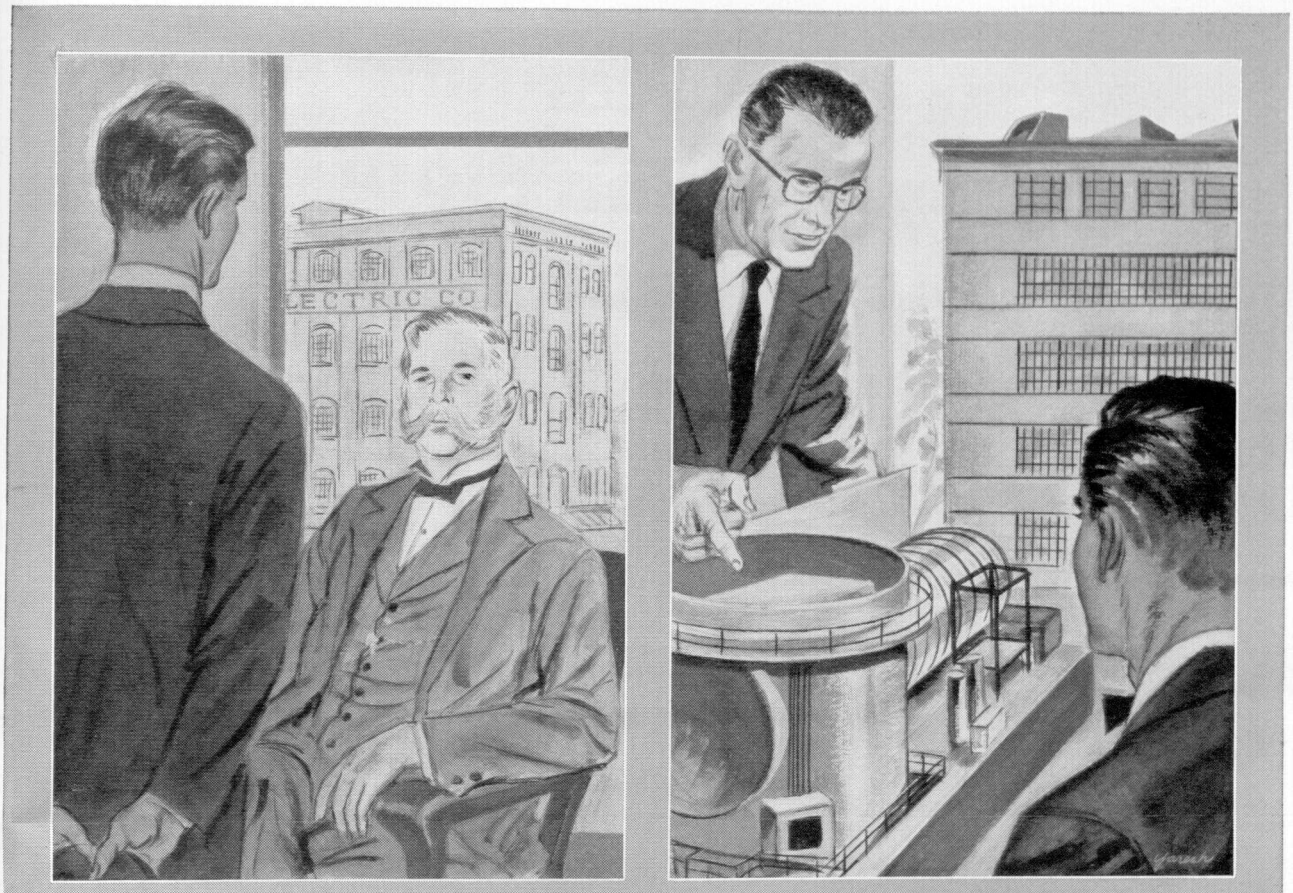
NEW DEPARTURE • DIVISION OF GENERAL MOTORS • BRISTOL, CONNECTICUT



New Departure ball bearings assure positive rotor support under all loads in this motor. Bearing seals, pioneered by New Departure, keep lubricant out of the motor. Shields on the reservoir side keep foreign matter out of the bearings.



NEW DEPARTURE
BALL BEARINGS
NOTHING ROLLS LIKE A BALL




Engineering graduates being interviewed at Westinghouse

...IN 1896 ...IN 1955

# Now...as in 1896...
# there's always room for ambition at Westinghouse

George Westinghouse was the first recruiter of engineering college graduates . . . first to realize that ambitious young men, with the vision, drive and spontaneous enthusiasm of youth were the backbone of American industry.

Going further than recruiting, Westinghouse has led in developing programs for training and helping young engineers to reach their goals. Its famous Graduate Student Program first shows them the many opportunities open to them at Westinghouse, and then helps them take advantage of the one they choose. Its million-dollar Educational Center is the most advanced in industry.

Is it any wonder that much of the success of Westinghouse has been due to engineers who came as graduate students and later directed the Company's efforts.

Here's an example of Westinghouse leadership. The young engineer at the right is looking at the land-based prototype for our country's *first* atomic submarine engine . . . designed and built by Westinghouse . . . working with the Atomic Energy Commission and the U. S. Navy.

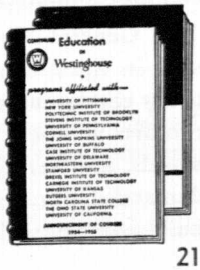
There can be a great future for you at Westinghouse. For professional development, Westinghouse offers its Graduate Study Program, available at 19 universities from coast to coast, and leading to Master's and Ph.D. degrees . . . plus other programs tailored to fit your needs and desires.

Yes, there's *always* room for ambitious men at Westinghouse . . . and we help them reach their goals. G-10284

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

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.*

Write: Mr. J. O. Campbell, Regional Educational Co-ordinator, Westinghouse Electric Corp., 306 Fourth Ave., Pittsburgh 30, Penna.




## Long-Range Development Program Provides for New Engineering Test and Research Facilities

● Allison's $75 million expansion program in ENGINEERING, RESEARCH and DEVELOPMENT facilities creates the need for a 40 per cent increase in our engineering staff.

Completion of the five-year program—financed by General Motors—will give Allison, and Indianapolis, one of the world's most complete, best equipped, centers for the development of new, high performance turbo-prop and turbo-jet aircraft engines for both military and commercial use.

As General Motors President Harlow H. Curtice said in the announcement, "Engines in production today cannot meet the requirements of the aircraft of tomorrow where ability to operate at supersonic speeds, and very high altitudes, will continue to be demanded from engine builders . . . To design and build engines with such advanced performance, test facilities are required which go far beyond the capabilities of equipment in existence today. In recognition of this need, General Motors will add extensive high performance test facilities to those already established and in operation at the Allison Division."

Already a recognized leader in the design, development and production of turbo-jet and turbo-prop engines, Allison NOW is in a position to offer even greater opportunities to the technically-trained, well-qualified, young graduate who is interested in building his engineering career with a pace setter in the field.

Whether you're still in school, or graduating this year, we'd like to tell you more about your engineering future at Allison. Write to:

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

# NEW DEVELOPMENTS

## Diesels to Uruguay

Shipment of the sixty-fourth diesel-electric locomotive to Uruguay this month completes a diesel-electrification program that will make that nation's railroads the first in the world to be completely diesel-electrified.

When this last locomotive is placed in service, Uruguayan railways will be 100 per cent diesel-electrified, except in one area. In northwestern Uruguay, a part of the railway system cannot accommodate diesel-electric locomotives until track and bridge modernization are completed.

Uruguay's diesel-electrification began in 1950, shortly after the railroads of the country were combined under government ownership. At the time, many oil burning steam locomotives with an average age of 45 years were in service and had to be replaced.

A comprehensive study of available types of fuels, motive power, and economics of operation led to the decision to replace and supplement existing steam power with diesel-electric locomotives, despite the fact that Uruguay must import its diesel fuel.

Another important factor was that with diesel-electrics, one kind of locomotive can be used for both freight and passenger services.

The initial main line diesel-electrification began with three standard 1500-horsepower road switcher type locomotives and 20 special 1400-hp, double end, box type cab locomotives. These represent the maximum power in a single unit permitted by rolling stock and road bed conditions.

Specially designed for passenger train haulage, the 1400-hp double end, box cab type has six motored axles with a relatively light axle loading of 37,300 pounds per axle.

Prime mover of the special locomotives is a 12-cylinder, V-type, four cycle, turbosupercharged diesel engine applied at 1400-hp net to the generator for traction at 1000 rpm.

During the first year of operation, the diesel-electric locomotives showed a 5 to 1 fuel advantage over the steam locomotives. Fuel capacity is sufficient to enable them to make the longest round trips without refueling.

Uruguay is slightly smaller than the state of Nebraska.

## Quieter Air

Flight test engineers reported they have developed a new way to make air travel 25 percent quieter, through a scientific "synchrophasing" system which keeps propeller blades in step, with 1,000,000th of a second accuracy.

Synchrophasing actually cuts sound two ways. It reduces sound volume by 10 decibels – approximately 25 percent in the cabin – and smooths and evens the remaining sound to make it more acceptable to the ear.

**This interrupter for a 330-kv, 25 million kva Westinghouse circuit breaker is divided into four identical arc-quenching units. Each of the four units can be tested separately with available facilities, whereas a single-break unit could never be tested at its full 25 million kva rating. Each arc is drawn inside an interrupter block of fiber plates.**

**One feature of these blocks is that each can be removed not only for its own inspection, but to leave a port hole through which the contacts can be inspected without disturbing their alignment.**

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Synchrophasing is a means of controlling the propellers to turn at a specified relationship to each other and at precisely the same relative angle to the fuselage. With the blades in step, vibration forces hitting against the passenger cabin – coming from propeller tip air blast – are reduced 75 percent.

As modern transports increase in speed and power, their sound and vibration levels also rise. But improved soundproofing has held down the noticeable sound level.

Engineers thought this remedy was like donning thicker raincoats when the roof leaked. Preferring instead to "fix the roof," they searched for ways to reduce the sound level at its sources. The synchrophasing theory resulted.

The theory is based on the fact that the human ear is selective and can refuse to hear sounds which offend it. If a noise is regular in frequency, it usually seems unobjectionable, according to acoustics experts, even though it may actually be loud.

For example, the steady croaking of frogs doesn't disturb a sleeping person; but, when the frogs stop the sudden absence of sound awakes the sleeper, scientists noted. That is why sirens – with their up-and-down pitch – command attention.

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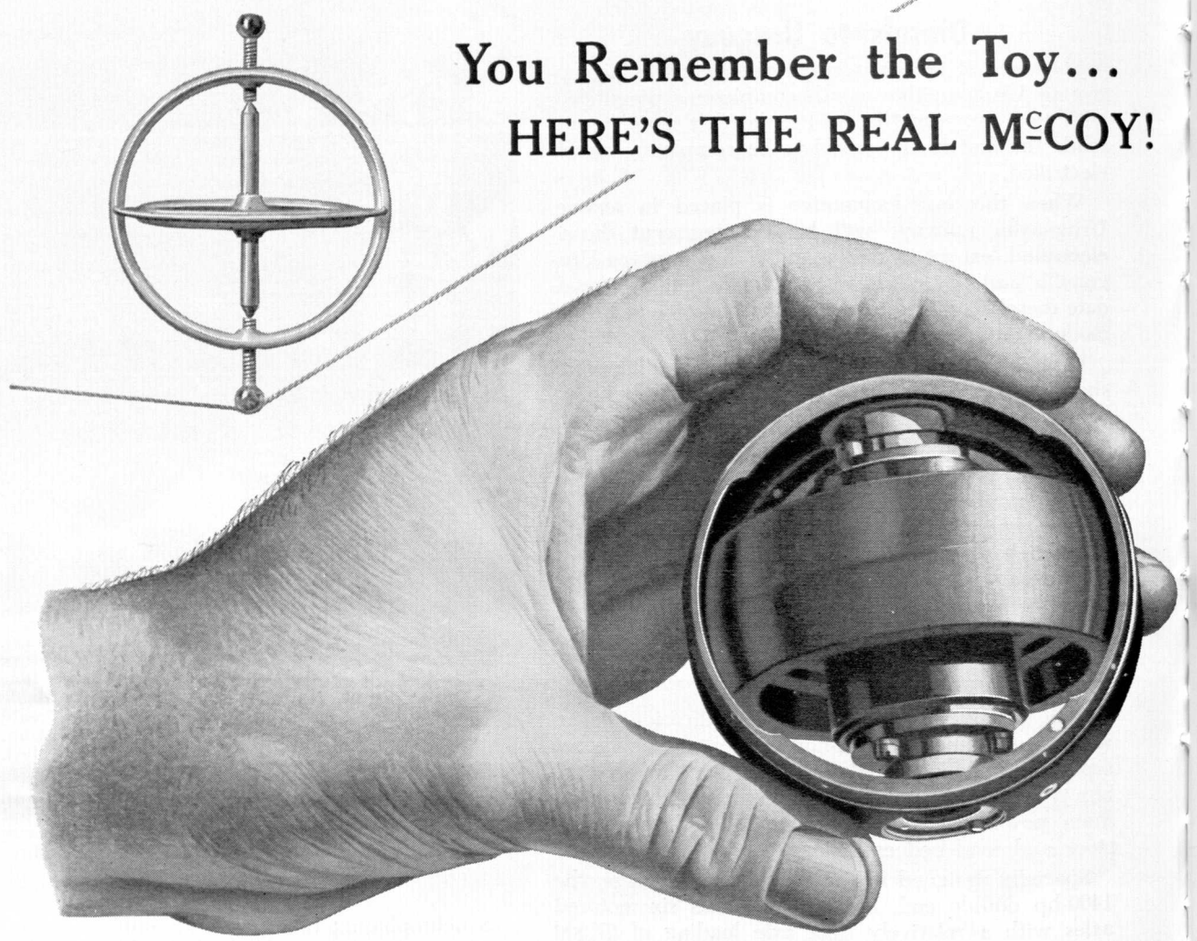


# You Remember the Toy... HERE'S THE REAL McCOY!

## Bendix GYROS... amazingly precise "tops" that help fly and navigate planes, guide missiles, point guns, take pictures, aim radar!

ONE of the first gyroscopes on record is credited to Bohnenberger; the date, 1810. Compared to today's precision-made gyros, of course, it was in the toy class.

The evolution of the gyro from a novelty to a definite place of importance in the field of aviation and our national defense program is worth noting.

The value of a gyro is in direct ratio to its accuracy. Thus, even if early applications had been apparent, the gyros of the 19th century could not have met the requirements.

Some of the first practical applications of the gyro were in instruments for airplanes. And while most Bendix Gyros today still find their way into commercial and military airplanes, they also do many other jobs—help point guns, stabilize aerial photographic platforms, direct and stabilize radar antennas and many others.

It should be explained that a gyro does not stabilize or control anything directly—*except itself*.

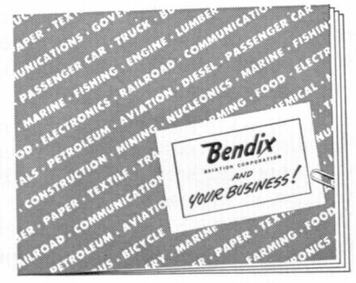
But its peculiar ability to hold *itself* fixed, almost unwaveringly, in any designated position despite the movements of the object to which it is attached, provides the gyro's user with a vital requirement—a firm, stable reference point on which to base calculations or corrective actions.

Developing and manufacturing gyros and gyro-controlled instruments for blind flight, automatic pilots and the famous Bendix Polar Path† compass which has made polar navigation practical, is another facet of the Bendix Aviation Corporation's diverse operation handled by our Eclipse-Pioneer Division, Teterboro, N. J. Contacting E-P will get you quick answers to problems involving aviation instruments and components.

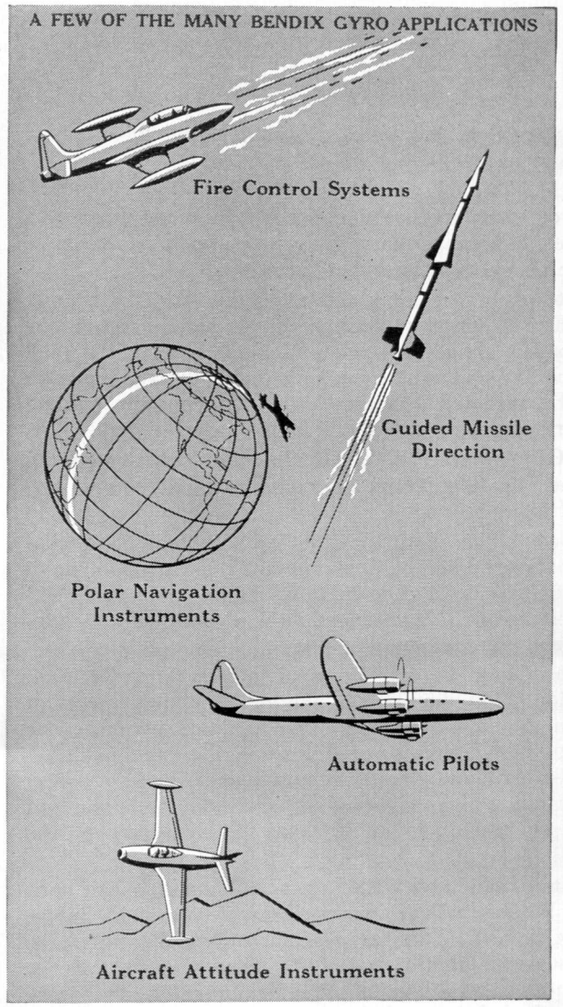
For the complete picture of Bendix and ideas on how some of our thousand products can contribute to the efficiency of your business, write to the address below for the brochure "Bendix and Your Business."

**ENGINEERS:** Bendix diversity offers unlimited opportunity to experienced men and undergraduates. Write for the interesting brochure "Bendix and Your Future."

BENDIX AVIATION CORPORATION
Fisher Building • Detroit 2, Michigan







**PRINCIPAL DIVISIONS AND BASIC PRODUCTS**

ECLIPSE-PIONEER, TETERBORO, N. J.
*aviation instruments and components; foundry.*

SCINTILLA, SIDNEY, N. Y.
*aviation ignition systems; industrial engine magnetos; diesel fuel injection; electrical connectors; ignition analyzers.*

RED BANK, EATONTOWN, N. J.
*electron tubes; dynamotors; inverters; AC-DC generators.*

BENDIX RADIO, TOWSON, MD.
*radar; auto, railroad, mobile and aviation radio; television.*

ECLIPSE MACHINE, ELMIRA, N. Y.
*bicycle coaster brakes, Stromberg* carburetors, electric fuel pumps, starter drives.*

ZENITH CARBURETOR, DETROIT, MICH.
*automotive, marine and small engine carburetors.*

BENDIX-SKINNER, DETROIT, MICH.
*micronic filters.*

PACIFIC, NORTH HOLLYWOOD, CALIF.
*telemetering equipment; hydraulic and electric actuators; depth recorders; boat steerers.*

BENDIX FRIEZ, TOWSON, MD.
*meteorological instruments, precision instruments and recorders.*

BENDIX PRODUCTS, SOUTH BEND, IND.
*automotive brakes, carburetors, power steering; aviation brakes, landing gear, fuel metering.*

MARSHALL-ECLIPSE, TROY, N. Y.
*brake blocks, brake lining, synthetic resins.*

CINCINNATI, CINCINNATI, OHIO
*automatic viscosity regulators, nuclear products.*

BENDIX COMPUTER, LOS ANGELES, CALIF.
*digital computers.*

HAMILTON, HAMILTON, OHIO
*jet engine controls and aircraft pumps.*

LAKESHORE, ST. JOSEPH, MICH.
*power steering and automotive devices.*

UTICA, UTICA, N. Y.
*aviation components.*

MONTROSE, SOUTH MONTROSE, PA.
*aviation components.*

PIONEER-CENTRAL, DAVENPORT, IOWA
*aviation instruments and components; ultrasonic cleaners.*

YORK, YORK, PA.
*electronic devices; test equipment.*

BENDIX-ECLIPSE OF CANADA, LTD.
*Windsor, Ont.*

BENDIX INTERNATIONAL
*New York City*

*REG. U.S. PAT. OFF.
†EXCLUSIVE TRADE NAME OF BENDIX AVIATION CORPORATION

# Firsts in Science and Engineering

Accomplishments in science and engineering have given America an unparalleled standard of living.

Countless men and many laboratories have contributed a steady flow of ideas which have brought new products and new processes. These products and processes have brought about drastic changes in American life.

The first steam turbine was made more than 2,000 years ago by Hero of Egypt. Charles G. Curtis revolutionized steam turbine development about 1900 when General Electric founded their Research Laboratory, the nation's first industrial research laboratory. He invented a steam turbine that was the embryo of the modern steam turbine but it didn't work.

A young GE engineer, W. L. R. Emmett, re-designed the Curtis turbine. By 1901 it was successfully completed and had a capacity of 500 kilowatts.

General Electric then built the first "big" turbine (5,000 kilowatts). It was installed in the Commonwealth Edison Company's Fiske Street Station in Chicago in 1903. The nation's first "big" turbine now stands in GE's Schnectady works with the inscription "Monument to Courage."

By 1908 the Grand Central Terminal in New York City had been electrified. It is now one of the most valuable pieces of real estate in the world. Partially due to this experience, one of history's greatest engineering adventures, the Panama Canal, began in 1914. Involved were the movement of gates weighing 400 tons, the filling and emptying of locks 1,000 feet long and development of "electric mules" to haul the ships through the waterway.

In 1908, eight years after GE's Research Laboratory had been founded, Dr. W. D. Coolidge developed ductile tungsten. Before his discovery, lamps had far less efficient carbon filaments. Dr. Coolidge discovered that tungsten could be made ductile at high temperatures and drawn into fine filaments. This discovery laid the ground work for modern electric illumination and made possible the modern tungsten lamp which was introduced in 1911.

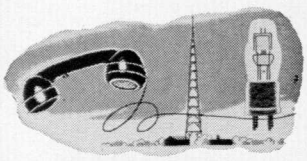
Another development by Dr. Coolidge was the hot-cathode X-ray tube in 1913 that paved the way for X-ray as it is today. Previous tubes, filled with gas, were unstable. The Coolidge tube provided stability and was readily and accurately controllable.

Gas turbine experiments have been conducted since 1895 but it was in 1913 that a turbine was installed on the Navys "Jupitor." Later the aircraft carrier "Langley" was equipped with a turbine generator. On the basis of performance of the "Langley," turbine generators and motors were selected for the "New Mexico." The "New Mexico" was launched in 1915, the first all-electric ship.

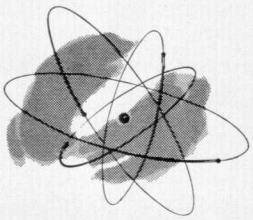
The nation's first turbosupercharger for aircraft was developed by Dr. Sanford A. Moss. This device enabled American fighting planes to fly higher and faster in World War II. The turbosupercharger work provided valuable background for the development of aircraft jet engines.

These are only a few of the developments, involving many scientists and engineers, in research and production. Young engineers and scientists have taken their places alongside the veterans in the continuing assault on the technological frontiers. We, therefore, have sufficient reasons to expect a continuous flow of new products and new processes.

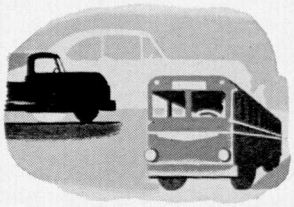
# 12 of the basic industries in which Bendix products play a vital role



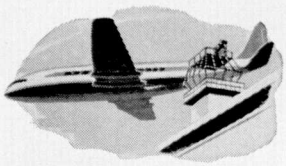
ELECTRONICS



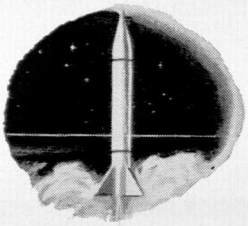
ATOMIC ENERGY



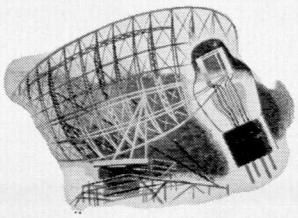
AUTOMOTIVE



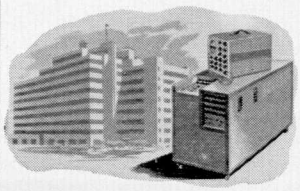
AVIATION



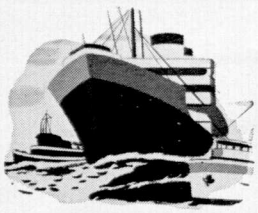
GUIDED MISSILES



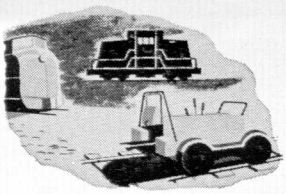
RADAR



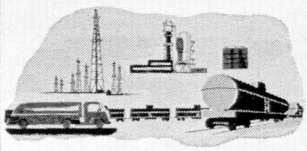
COMPUTERS



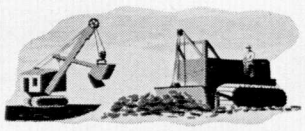
MARINE



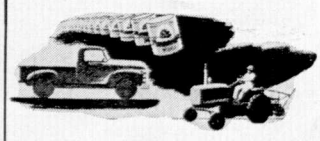
RAILROAD



PETROLEUM



CONSTRUCTION



AGRICULTURE

## A SOUND REASON WHY Bendix OFFERS TODAY'S ENGINEERING GRADUATE AN UNLIMITED FUTURE!

Diversification is an important asset in business.

Especially so from the viewpoint of the engineer because:

It encourages and promotes freedom of ideas. Keeps engineering ingenuity flexible and adaptable. In short, gives full vent to an engineer's creative ability . . .

While at the same time it provides a healthy, stable, secure foundation for both the company and the individual to build and expand.

If diversification in business appeals to you as a graduate engineer, you'll be greatly interested in the Bendix Aviation Corporation.

For Bendix is unlike any other company in America in its versatility, facilities, experience, range of products and different fields of engineering endeavor. Nearly a thousand different products are produced by our 24 manufacturing divisions.

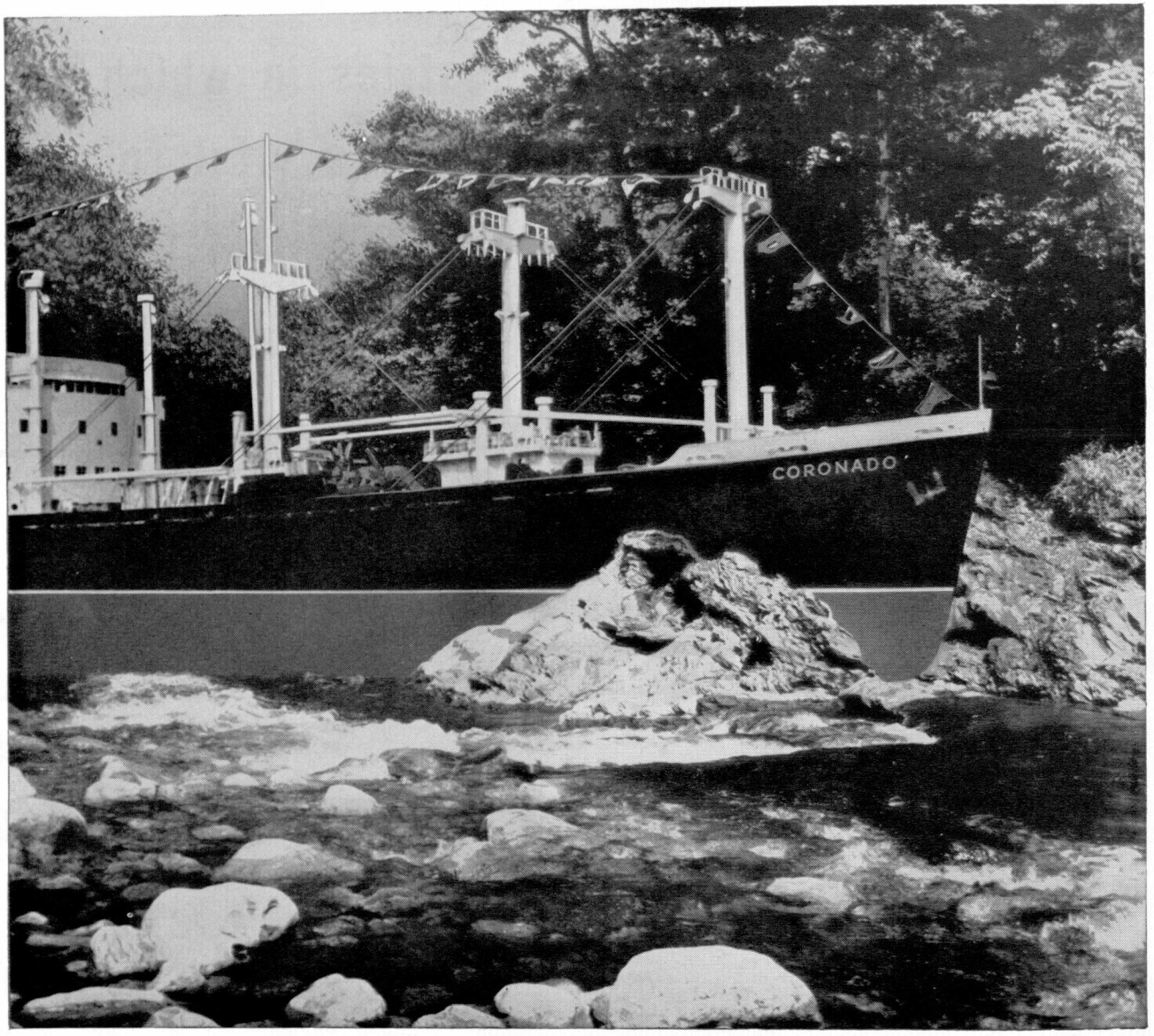
As a result, we not only offer a wide choice of locations coast to coast but also career-building opportunities as broad as your ambition and ability in mechanical engineering . . . hydraulic mechanisms . . . electronics . . . magnetics . . . computers . . . servomechanisms . . . radar research . . . metallurgy . . . solid-state physics . . . instrumentation . . . radiation detection . . . nuclear physics . . . guidance and control systems plus many more engineering fields of challenge.

Write for your copy of "Bendix and Your Future." It gives the full story about Bendix, its products and employment opportunities.

**BENDIX AVIATION CORPORATION**

**Fisher Building • Detroit 2, Michigan**

A Bendix representative will be at your campus soon. Make a note now to talk with him. Check your placement bureau for time and date.




# You can't launch an ocean liner in a mountain stream

Initiative alone is not the answer to a man's career. A man can't travel far in narrow, limited confines. Neither can he expand in an unprogressive, stagnant organization. A man needs opportunity to put his ideas into action. He needs to be able to move ahead without waiting for vacancies to occur from death or retirement.

Columbia-Southern is one of the fastest growing companies in the fast-growing chemical industry. It is progressive, alert, and on the move.

Opportunities exist with Columbia-Southern in engineering, research and development, sales, plant design, mining, construction, maintenance, production, accounting, transportation and related fields.

Columbia-Southern encourages its employees to grow professionally and the management believes in placing men in positions of greater responsibilitity as soon as they are ready for it.

Columbia-Southern is going places and it needs good men. If you would like to be a part of this organization, write today for further information to Department P at our Pittsburgh address or any of the plants.

## COLUMBIA-SOUTHERN CHEMICAL CORPORATION

SUBSIDIARY OF PITTSBURGH PLATE GLASS COMPANY

ONE GATEWAY CENTER • PITTSBURGH 22 • PENNSYLVANIA

DISTRICT OFFICES: Cincinnati • Charlotte
Chicago • Cleveland • Boston • New York
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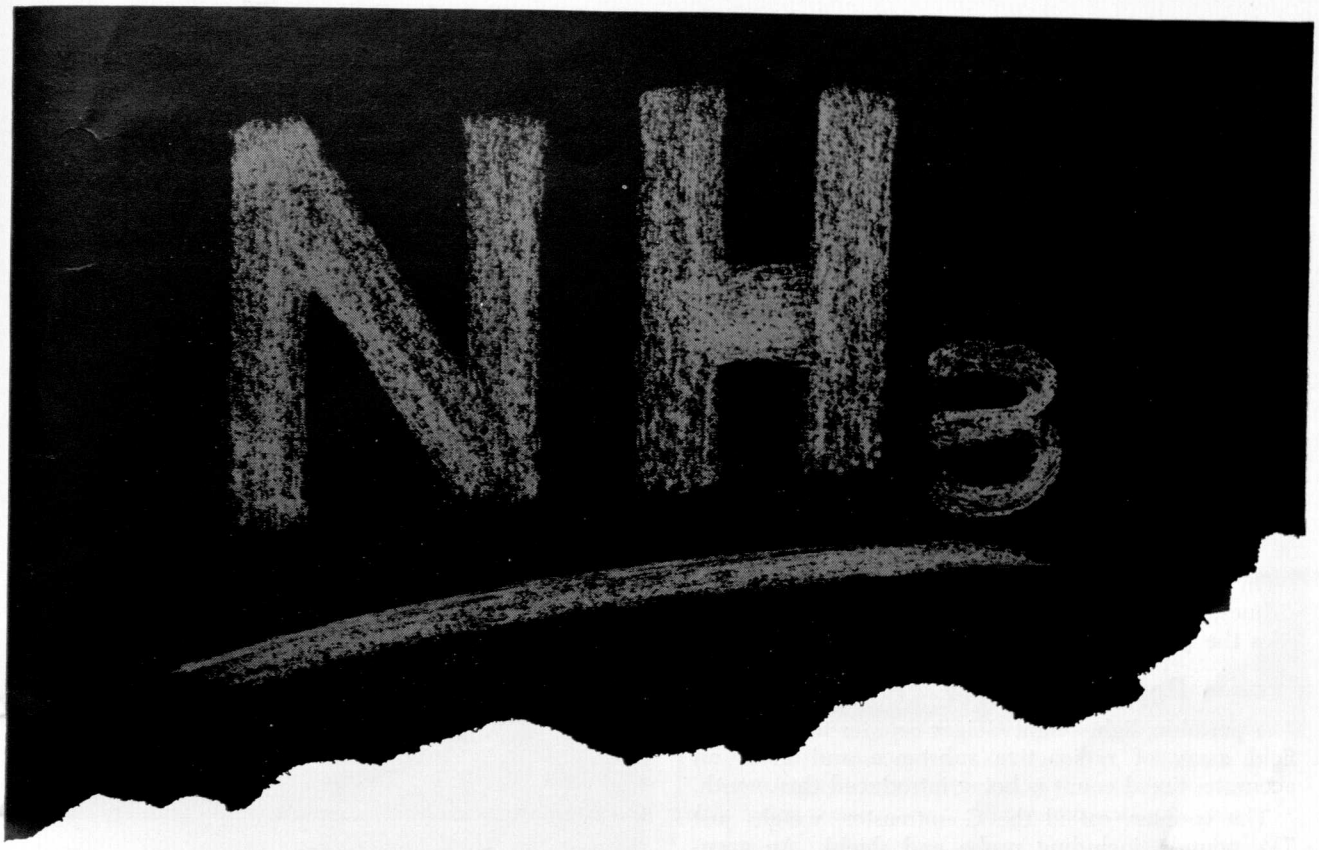
San Francisco

PLANTS: Barberton, Ohio • Bartlett, Calif.
Corpus Christi, Texas • Lake Charles, La.
Natrium, W. Va. • Jersey City, N. J.

IN CANADA: Standard Chemical Limited and its Commercial Chemicals Division




# FORMULA FOR BETTER FARMING

THE PETROLEUM INDUSTRY seeks constantly to extract the ultimate in valuable and useful products from every barrel of crude oil. And progress along this line in one area frequently brings with it advances in other related areas.

For instance, improved catalytic reforming methods developed by Standard Oil have increased high octane gasoline yields. This improvement is accompanied by substantial increases in available by-product hydrogen, which can be combined with nitrogen from the air to produce ammonia. Standard has therefore completed plans to enter this important chemical manufacturing field.

Anhydrous ammonia and nitrogen solutions are increasingly favored by midwestern farmers and fertilizer processors as sources of nitrogen. This nitrogenous soil enrichment raises crop yields and farm profits.

Young scientists and engineers enjoy working where such constructive projects are constantly discussed, planned, and developed.

Standard Oil Company

910 South Michigan Avenue, Chicago 80, Illinois

STANDARD

## New Developments

*(Continued from page 23)*

Here's how the new method works:

An electronic governor of the most precise variety keeps the propeller blades phased properly with an assist from four magnets and four coils.

Flight test engineers put a permanent magnet on each propeller's spinner and a coil on each engine nacelle. When the magnet passes the coil it sets up an electrical impulse – actually becomes a small generator.

The generated impulse travels electrically to the governor, which compares the timing of impulses from each nacelle. If the pulses differ one-millionth of a second, the difference is registered and corrected.

Correction on one type of propeller is accomplished hydraulically. An electrical message from the central electronic governor to a flyweight governor reconciles the errant blade angle with the other propellers.

On the electric type of propeller used by many airlines, a motor in the dome of each spinner reconciles the propellers.

## Portable Geiger Counter

A portable, lightweight Geiger counter that permits field assay of radioactive substance and gives an accurate, timed count is being introduced this month.

The counter, called the Countmaster, weighs just 7¼ pounds, including probe and shield. An accurate counting range is claimed up to 12,000 counts per minute. The "find" is flashed upon four rows of tiny neon lights, where it remains until erased by the operator. More than a year of rugged environmental and type tests preceded the introduction.

In its development, project engineers incorporated in the Countmaster techniques and circuitry developed in the course of military research over the past decade.

## Lose a Planet?

"Lost" planets are having a tough time staying that way when astronomers combine a telescope and the "electronic brain" to locate them.

This time-saving combination was employed recently when the planet Athalia, lost for 50 years, was rediscovered.

The planet, originally discovered photographically at the Heidelberg Observatory in Germany on Sept. 20, 1903, was observed again on Sept. 29, Oct. 13 and 19. It was given the number 515 and the name Athalia.

The orbit was computed for this planet from the observations in the usual manner, but the planet was not photographed again until 1948.

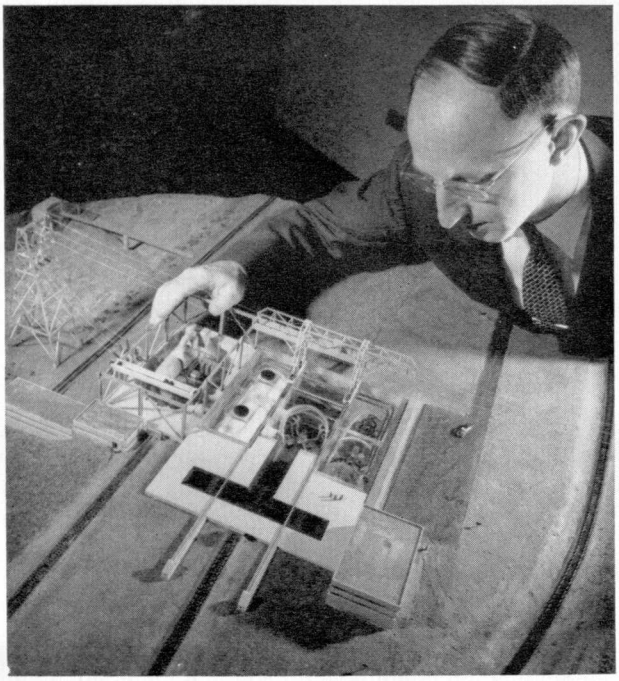
Just recently, by using a computer, it was possible to calculate the planet's orbit in just one minute compared to weeks of hard work with a desk calculator.

The orbit path shown by the "electronic brain" revealed that the recent observations could be brought into full agreement with the old observations of Athalia at Heidelberg in 1903.

## Atomic Power Plant

This scale model, built for the Atomic Energy Commission, shows how the nation's first atomic-powered electric generating station at Shippingport, Pa., may look when completed in 1957.

The core of the underground reactor, where the heat and steam is produced, consists of uranium fuel elements fitted into a cylinder about six feet in dia-



meter and contained in a steel vessel not more than 25 feet high. High pressure water flowing through the core is piped to the four boiler-like heat exchangers located in each corner of the underground reactor building. Each of these "boilers" also is encased in a steel container. Steam generated in the heat exchangers is piped into the adjoining building to drive the turbine generator unit. The power generated will be carried to a switchyard at right and then over electric transmission lines to homes and factories in the Pittsburgh area. The Ohio River is at the left end of the model. The building to the left of the reactor is a control center while the building to the right of the reactor is for laboratories and service facilities. The crane will be used in refueling and maintenance operations.

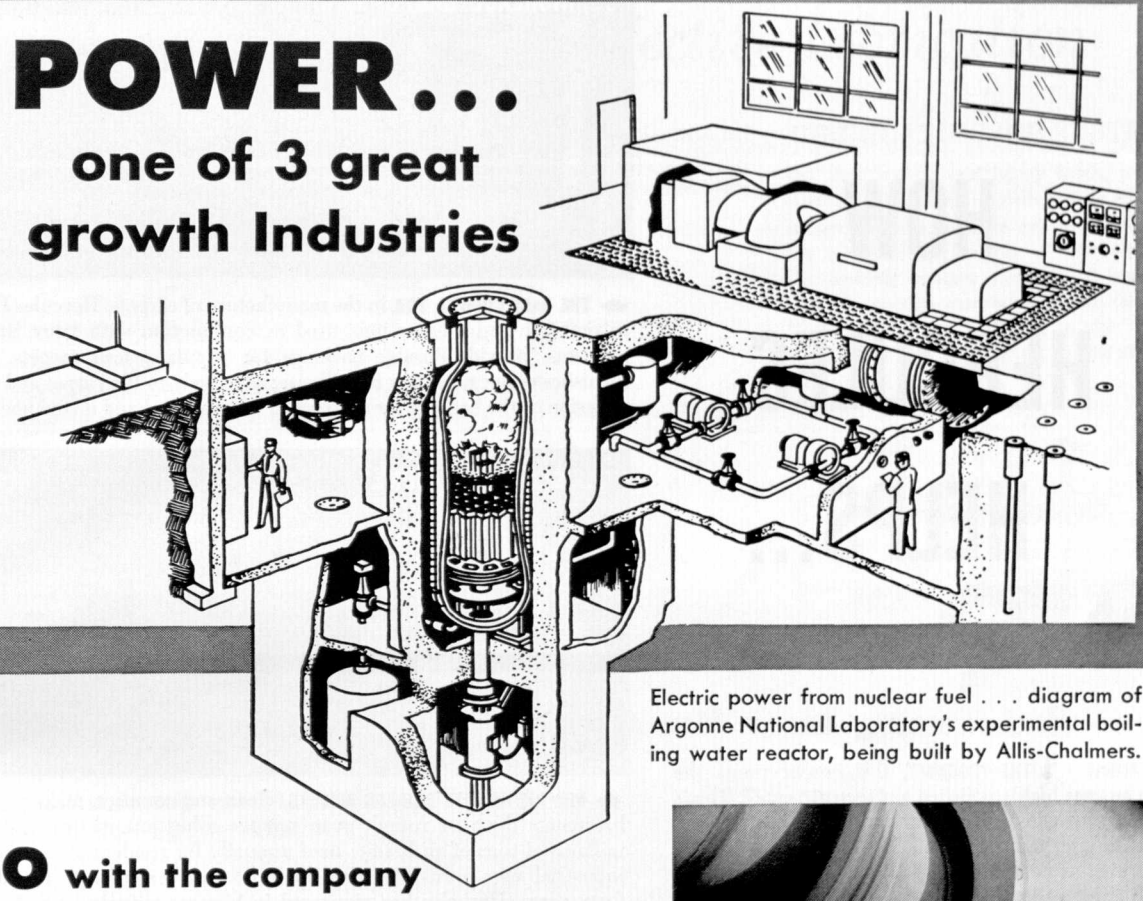
## Ice-slinger Hose

A new ice-slinger hose recommended for loading trucks, refrigerator cars and ice compartments of ships with crushed ice has been announced.

A special hose tube, made of "Armorite," withstands constant pounding from jagged pieces of ice. Armorite is an abrasion-resistant rubber said to outwear steel 20-to-1 in many applications.

The new hose operates as a suction hose up to full vacuum or as a discharge hose up to 30 pounds per square inch. Extra light and easy to handle, the hose is reinforced with patented Spiralock construction in which folds of fabric are locked around a spiral wire in the hose wall.

# POWER...
## one of 3 great growth Industries



Electric power from nuclear fuel . . . diagram of Argonne National Laboratory's experimental boiling water reactor, being built by Allis-Chalmers.

## GO with the company that's strong in all three!

Hitch your future in engineering to the growth of the U. S. A.—and to a company that supplies the basic needs of growth!

This nation is growing at the rate of 50,000 people every *week!* To supply the needs of these people:

*Electric power generation will double by 1965.*

*A multi-billion dollar program of new highway construction is planned within the next ten years.*

*Manufacturing output will have to increase by $3.5 billion by this time next year.*

And Allis-Chalmers builds major equipment for all of these growth industries! Some examples are pictured here.

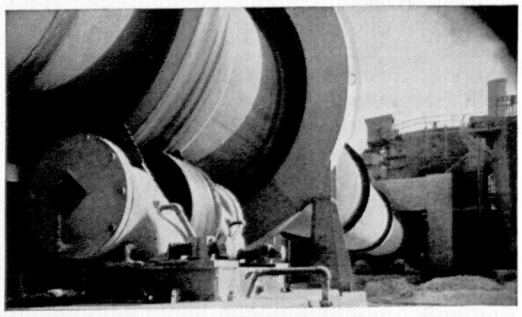
**Here's what Allis-Chalmers offers to Young Engineers:**

A graduate training course that has been a model for industry since 1904. You have access to many fields of engineering: electric power, hydraulics, atomic energy, ore processing.

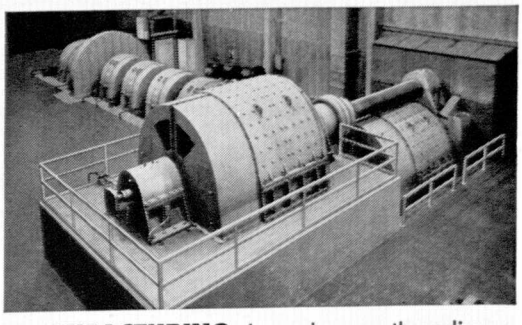
There are many *kinds* of work to try: design engineering, application, research, manufacturing, sales. Over 90 training stations are available, with expert guidance when you want it. Your future is as big as your ability can make it.

Or, if you have decided your field of interest and are well qualified, opportunities exist for direct assignments on our engineering staff.

In any case—learn more about Allis-Chalmers. Ask the A-C manager in your territory, or write direct to Allis-Chalmers, Graduate Training Section, Milwaukee 1, Wisconsin.



**CONSTRUCTION** demands the vast tonnages of cement produced with Allis-Chalmers rotary kilns and other processing machinery.

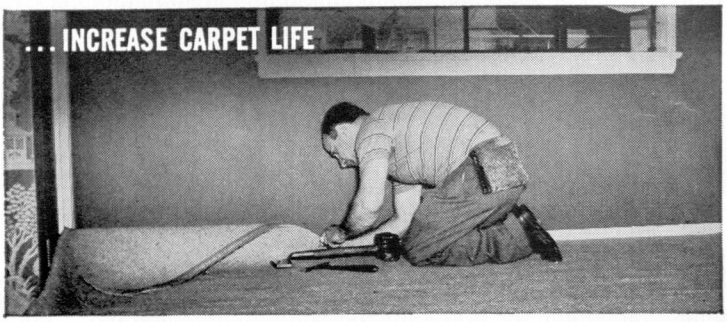


**MANUFACTURING** depends upon the reliable power of electric motors—like these 5000 hp Allis-Chalmers giants powering a rolling mill.

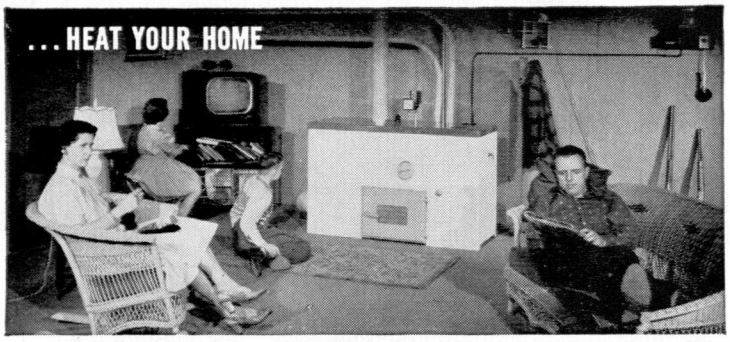
# ALLIS-CHALMERS

A-4683

# HOW HERCULES HELPS...

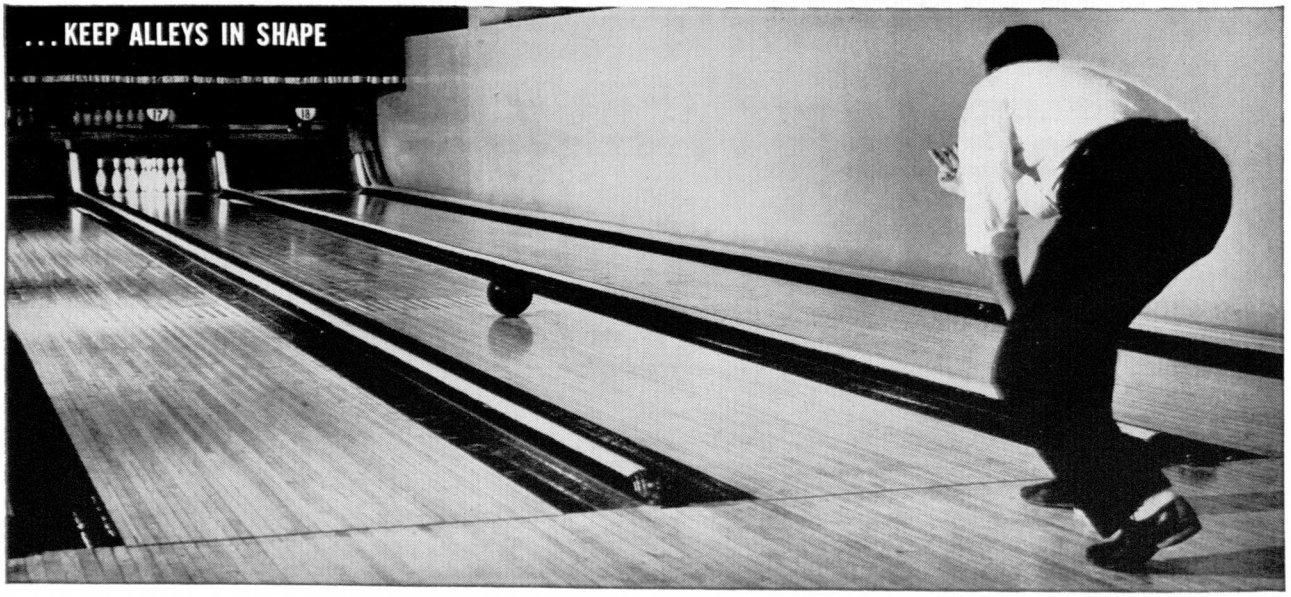



**THE BACK COUNTS, TOO,** in the manufacture of carpets. Hercules Dresinol® solvent-free resin dispersions used in conjunction with latex, starch and pigments, provide durable backings for popular-priced carpets. Dresinol furnishes either flexibility or stiffness; adds body to the carpet and improves adhesion of the backing for all types of cotton, wool and mixed fiber carpets.




**NEW ANTHRACITE-BURNING BOILERS,** clean and compact, make playrooms of basements the year round; even remove ashes automatically. Mining the millions of tons of anthracite used annually for residential, commercial and industrial uses would be impossible without explosives. For more than forty years, Hercules has pioneered in blasting techniques and equipment to increase the efficient and safe use of explosives in mining, quarrying, construction, and farming.

**AIMING FOR THE "POCKET",** this bowler wants the alley he uses highly polished and free of "ruts". That's why bowling alley surfaces are protected with nitrocellulose lacquer to keep them in top condition. The fastest drying protective coating known, lacquer makes it possible to put an alley back in play within hours after it has been refinished. This same tough finish protects bowling pins and other sports equipment.




HERCULES

CHEMICAL MATERIALS FOR INDUSTRY

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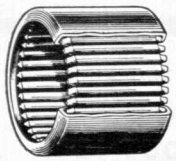
SYNTHETIC RESINS, CELLULOSE PRODUCTS, CHEMICAL COTTON, TERPENE CHEMICALS, ROSIN AND ROSIN DERIVATIVES, CHLORINATED PRODUCTS, EXPLOSIVES, AND OTHER CHEMICAL PROCESSING MATERIALS

G55-4

# *The Torrington Needle Bearing ...designed for easy, effective lubrication*



One major advantage inherent in Needle Bearing design is the ease with which the bearing can be lubricated.

The full complement of small diameter rollers continuously carries a thin film of lubricant to all contact surfaces. The turned-in lips of the outer shell retain the lubricant and effectively seal out foreign matter.

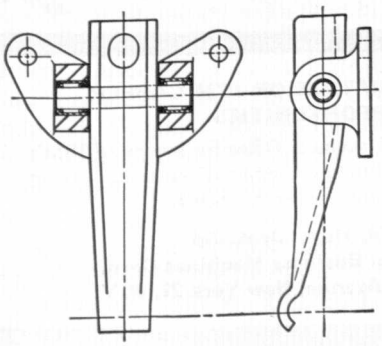
## *Methods of Lubrication*

When Needle Bearings are shipped, they are normally protected with a high-grade slushing compound which has lubricating value at ordinary temperatures. This compound is left in the bearings in most instances. Needle Bearings in many applications run for long periods of time without further attention to original lubrication.

There are several methods of providing additional lubricant to Needle Bearings, as illustrated and described below.

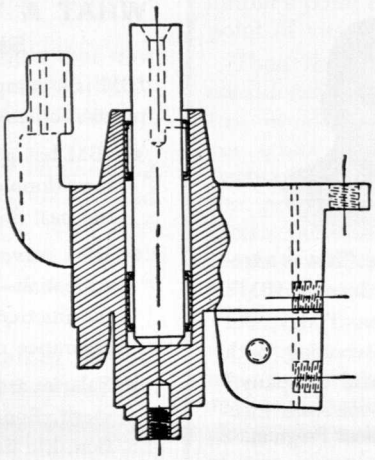
### PERMANENT LUBRICATION

For low speed and light load applications, as in the fingers of the automobile clutch illustrated, the Needle Bearings are packed with grease before assembly. No additional lubrication is needed.



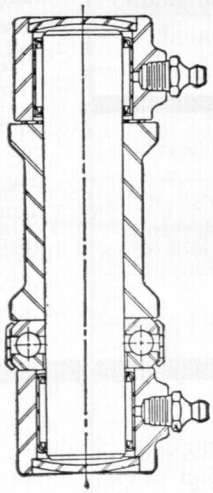
### THROUGH THE SHAFT

If it is necessary to lubricate through the shaft, a hole is drilled along the shaft axis, with a cross hole leading under the lips of the Needle Bearing. This hole is located under the lip of the bearing rather than in the roller contact area. Textile machine spindle swing bracket below illustrates this method.



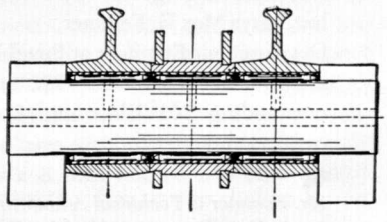
### THROUGH THE HOUSING

When lubricant is to be delivered through the housing, an oil hole is furnished in the middle of the outer shell. In automobile king pin below, Needle Bearings are lubricated with Alemite fittings through the oil hole. This oil hole in the outer shell should be outside the load area.



### CIRCULATING OIL SYSTEM

For high speeds and heavy loads, a circulating oil system is preferred as it aids in carrying away heat as well as in providing a continuous supply of lubricant to the bearing contact surfaces. A typical example of this method is shown in this Needle Bearing application in the valve rocker arm of a large diesel engine shown below.



## *Selecting A Lubricant*

While oil is the best lubricant, it is difficult in many cases to retain it in the bearing housing. In general, a soda base grease is used in the absence of moisture, and a lime base grease when moisture is present. It is usually advisable to consult a grease manufacturer regarding a particular application.

**These features make the Torrington Needle Bearing Unique**

- low coefficient of starting and running friction
- full complement of rollers
- unequalled radial load capacity
- low unit cost
- long service life
- compactness and light weight
- runs directly on hardened shafts
- permits use of larger and stiffer shafts

**THE TORRINGTON COMPANY**

Torrington, Conn. • South Bend 21, Ind.

District Offices and Distributors in Principal Cities of United States and Canada

**TORRINGTON NEEDLE BEARINGS**

**NEEDLE • SPHERICAL ROLLER • TAPERED ROLLER • CYLINDRICAL ROLLER • BALL • NEEDLE ROLLERS**

# IBM news FOR ENGINEERING STUDENTS

## "IBM's a great place to work," says engineer now in his 8th year with the company

"Every year with IBM is more challenging than the last," says Max E. Femmer, Development Engineer at Poughkeepsie. "It was a tremendous satisfaction in 1952 to help develop IBM's outstanding 701 Electronic Computer. Today, our projects and our work are even more interesting. Both my wife and I think IBM is a wonderful company."
*Mr. Femmer is Technical Administrator of the entire Electronic Data Processing Machine Development Program.*

## IBM Introduces 12 New Products in Year

The 12 new products introduced in the past 12 months dramatize IBM's continuing diversification.

Ranging from the versatile "Cardatype"—a major step forward in the simplification of office work—to the gigantic NORC, the most powerful electronic digital computer ever built, IBM's products serve *all* industries plus government and education.

## IBM building 5 new labs

By early next year, 1500 members of IBM's engineering staff will be working in five new buildings now under construction (two sketched above). They will be built at Poughkeepsie, N. Y., and at Glendale, N. Y. overlooking the Endicott Valley.

## Ability is quickly recognized —and rewarded

At IBM, lack of years is no handicap. Frequently, the soundest creative thinking comes from young minds. For example, average age of the engineering team that developed the 701, first of IBM's great electronic computers, was 28 *years*.

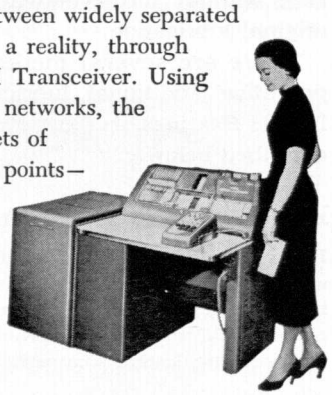
## WHAT A YOUNG ENGINEER SHOULD KNOW ABOUT IBM

IBM is a company on the move! New ideas, new expansion create exciting opportunities.

- IBM has a 41-year record of steady growth. Sales have doubled on an average of every 5 years during the past 25.
- IBM serves all industries, plus government and education—diversified, non-seasonal markets free of the fluctuations of war and peace . . . your best assurance of stability and growth.
- Salaries are excellent—with advancement based on merit. Benefits include company-paid hospitalization, life insurance and retirement plans.

## NEW IBM MACHINE AUTOMATICALLY TRANSMITS DATA OVER TELEPHONE CIRCUITS

Instantaneous and accurate transmission of engineering and research data between widely separated computer centers is now a reality, through development of the IBM Transceiver. Using telephone and telegraph networks, the Transceiver duplicates sets of punched cards at remote points—can be used to link plants or branches thousands of miles apart.



## FOR INFORMATION ON IBM CAREER OPPORTUNITIES

Ask at your College Placement Office for a copy of IBM's new booklet "Opportunities Unlimited" or write, giving details of your education and experience to:

**W. M. Hoyt, Dept. 334**
**International Business Machines Corp.**
**590 Madison Avenue, New York 22, N. Y.**

IBM
TRADE-MARK

OFFERS YOU A REAL FUTURE

## Technical Writing

*(Continued from page 19)*

well means you must go beyond "merely being interested in developments." You must catch the significance of the development: what will its import be on related developments; what is the trend-meaning of the development? To do this kind of interpretative reporting job requires imaginative thinking coupled with a genuine liking for people. Unless you are blessed with both, this technical writing business is not for you.

There is one more aspect of this business that must be considered. It is this: technical writing by its nature precludes a very intensive understanding of any given subject. For anyone who wishes to learn the intimate aspects of a given phase of engineering, the profession of technical writing should be avoided. For the most part the work is done at a fairly high speed on a rigid schedule and time is not available for the full explanation of a subject that appeals to the more technically-minded individual.

### Qualifications Needed for a Technical Writer

First is engineering education. It is essential that a technical editor have had a formal engineering education. Naturally within the Westinghouse Company, with the emphasis on electrical matters, we look for graduate electrical engineers as the editor-writers work directly with design and application engineers and therefore, must be able to "talk their language." They must win the confidence of the engineers, have a fair understanding of the matter under discussion, and be able to judge the engineering significance of a particular development.

Of 32 technical and trade magazine editors polled on this question, all but two required an engineering degree. These two preferred a B.A. in business administration to journalism. All preferred an engineering graduate with one to five years experience in industry to an engineering graduate just out of college. This experience is needed to help the editor more accurately interpret the significance of a development.

Next is journalistic skill. An editor must have a facility as a writer. This is sometimes called "word-smithing." This requirement is less tangible than the engineering training required but no less important. In essence, it means a facility in handling words, a liking for writing, and an ability to express ideas clearly, interestingly, and logically. Also, this skill must extend not only to one's own writing but in addition, to one's editing for frequently a critical view must be taken of the writings of others.

How well someone meets these qualifications generally is hard to measure but it is extremely important. It must be based on something more than on a vague but common "desire to write." Words are tools of the technical editor. Unless he uses them with pleasure and with facility, he is a misfit in technical writing.

Next is imagination. A technical editor must possess imagination in abundance. He must be able to see in a development a potential story that will be of interest to a well-defined audience. This is sometimes called having a "nose for news." Really it is much more than that. It means visualizing a potential story that will have a particular appeal and of enthusing the project engineer over the article possibilities so he will write the piece for you. In addition, as the story develops, it means seeing ways of treating the facts or supplementing the text with visual aids, either photographic or otherwise, that will add to the reader's interest in the story. The editor, in short, must not only have in mind the author's point of view, but also a very specific reader's point of view.

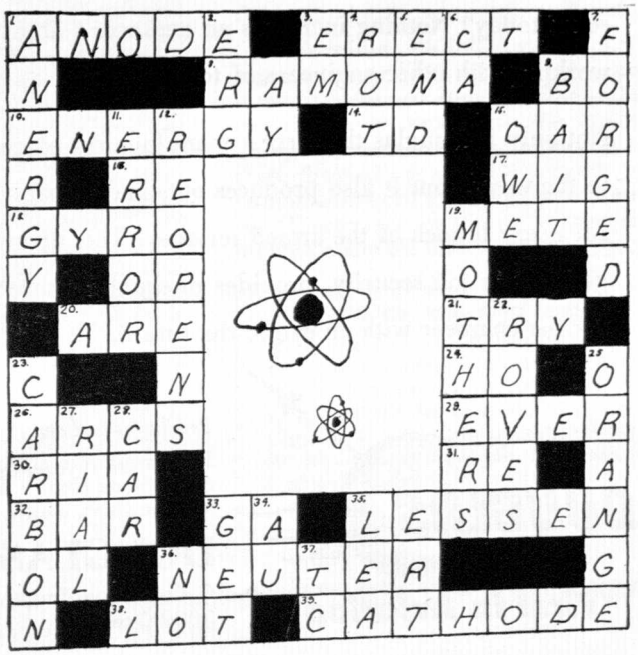
Then there is diplomacy. An editor must possess considerable tact or those personal mannerism qualities usually associated with a successful salesman. An editor contacting engineers must be able, by persuasive methods, to obtain their cooperation in the preparation of articles or the presentation of facts. Because engineers are busy and are not too prone to write, considerable skill to win their respect and confidence for the projects in mind is essential.

Finally, there is cooperativeness. Because a technical editor is part of an organization, he obviously must have these qualities that are necessary in almost any organizational activity. This is the ability to get along well with fellow editors and other members of the organization, and to win their respect and confidence. These involve such things as punctuality, courtesy, personal neatness, and teamwork. While these seem obvious, otherwise good editors have been known to flounder on some of these personal qualifications.

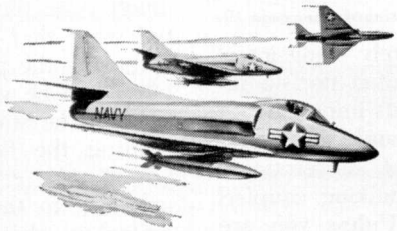
A few random thoughts on qualifications from the editors polled. "We look for dependability, ability to produce, initiative and aggressiveness . . . " ". . . must have a good command of the King's English." ". . . he must have a good 'nose-for-news' . . ." ". . . he

*(Continued on page 44)*

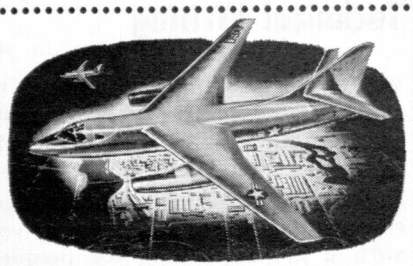
ANSWER TO PUZZLE ON PAGE 48



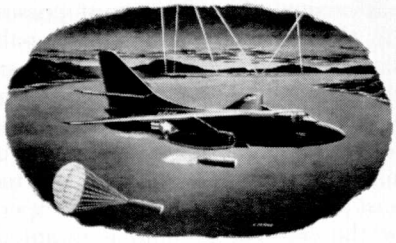
**F4D, "SKYRAY"**— only carrier plane to hold official world's speed record




**A4D, "SKYHAWK"**— smallest, lightest atom-bomb carrier

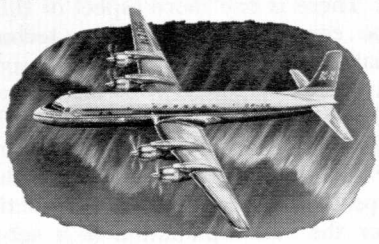


**RB-66** — speedy, versatile jet bomber



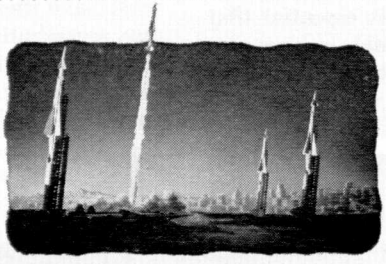
**A3D, "SKYWARRIOR"**— largest carrier-based bomber

**C-124, "GLOBEMASTER"**— world's largest production transport

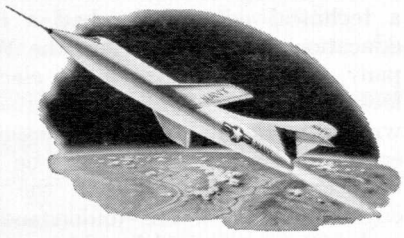


**DC-7 "SEVEN SEAS"**— America's finest, fastest airliner

# Engineers: join this winning team!



**"NIKE"**— supersonic missile selected to protect our cities



**D558-2, "SKYROCKET"**— first airplane to fly twice the speed of sound

At DOUGLAS you'll be joining a company in which the three top executive officers are engineers...you'll be associated with men who have designed the key airplanes and missiles on the American scene today! Nothing increases an engineer's ability faster than working with other engineers of top calibre.

Not only is Douglas the largest manufacturer of commercial aircraft in the world, but it also produces outstanding aircraft and missiles for *every* branch of the armed services! This diversity, besides giving you job security, provides unequalled opportunity for the engineer with an eye to the future.

*Challenging opportunities now exist in the following fields:*

**Mechanical design**
**Structural design**
**Power plant installation design**
**Weapons delivery**
**Aerodynamics**
**Thermodynamics**
**Electronic computers**
**Systems analysis**
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**Stress analysis**
**Servo mechanisms**
**Acoustics**
**Electronics**
**Mechanical test**
**Structural test**
**Flight test**
**Process engineering**
**Missiles**

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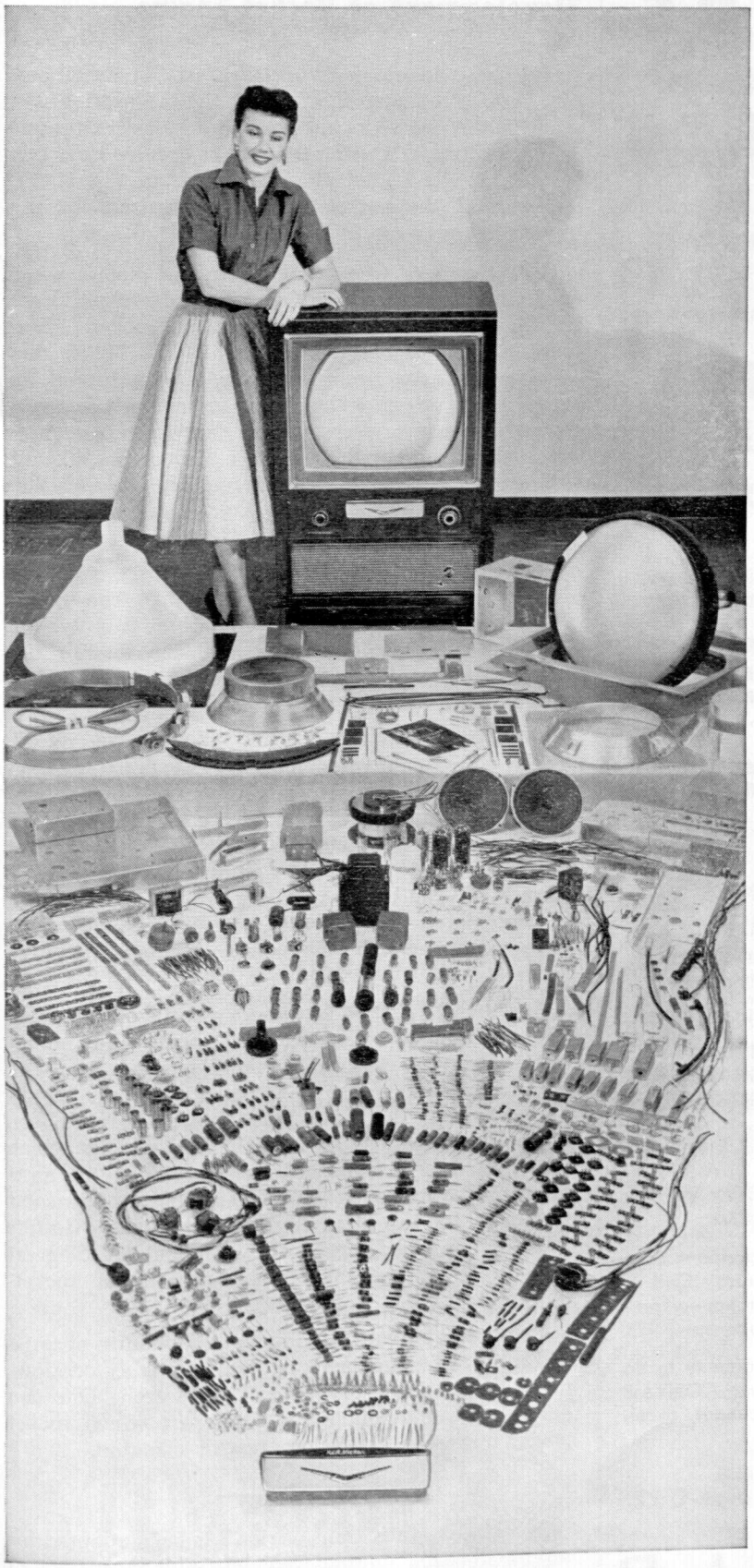
**First in Aviation**

*Brochures and employment applications are available at your college placement office.*

For further information relative to employment opportunities at the Santa Monica, El Segundo and Long Beach, California divisions and the Tulsa, Oklahoma division, write today to:

## DOUGLAS AIRCRAFT COMPANY, INC.

C. C. LaVene, Employment Manager...Engineering General Office
3000 Ocean Park Blvd....Santa Monica, California



# This picture shows how RCA helps small manufacturers grow

Today the inter-dependence between manufacturer and supplier is stronger than ever in the history of American business. For in the challenging new age of electronics, hundreds upon hundreds of component parts are needed in the manufacture of new products.

For example, the superb new RCA Victor 21-inch color TV set shown here contains 2,070 parts. These are made by 600 different suppliers, most of whom are small businesses.

Indeed, more than three-quarters of all RCA suppliers are small business firms that receive nearly one-half of RCA's purchasing dollars. They, in turn, have their suppliers of raw materials. Thus through a long line of cooperative effort, employment is provided for countless people in many fields—and an entire economy benefits.

RCA salutes its full roster of 7,500 suppliers, located in 43 states, for their inventiveness and resourcefulness that contribute so much to the quality and performance of its products. With these firms at our side, RCA continues to march forward, creating new and better "Electronics for Living"—electronics that make life easier, safer, happier.

**WHERE TO, MR. ENGINEER?**

RCA offers careers in research, development, design, and manufacturing for engineers with Bachelor or advanced degrees in E.E., M.E. or Physics. For full information, write to: Mr. Robert Haklisch, Manager, College Relations, Radio Corporation of America, Camden 2, N. J.

RCA®

**RADIO CORPORATION OF AMERICA**

**ELECTRONICS FOR LIVING**

## Development of Rocket Engine

*(Continued from page 12)*

With the advent of World War II the rocket was used in this country for the first time. It varied uses and for the first time was used as a means of propulsion for aircraft. During the war, it became necessary to get heavily-loaded aircraft aloft from a restricted space, and the rocket became recognized for this purpose, known at JATO: jet-assisted take-off.

JATO rockets were attached to the plane's wings and were remotely controlled from the cockpit. Each of these JATO units are in reality a rocket. These rockets are not designed for individual flight: they were made extra heavy and strong to withstand the tremendous power of the charge. The thrust was very strong for only a few seconds, but long enough to assist the aircraft with added acceleration for take-off. Once aloft, the empty rockets could be ejected, thus the added weight of the rockets would be of no hinderance to the aircraft.

The jet engine should not be confused with the rocket engine. The jet engine, unlike the rocket engine, does not carry its own oxygen supply, but absorbs its oxygen from the atmosphere. For this reason the height at which the jet can travel is limited.

The Army also found many uses for the rocket. These were mainly for offensive weapons, such as the 3.5 inch rocket, commonly known as the bazooka, and the 75 mm. rocket rifle. These weapons enabled the infantryman to defend himself effectively against the tank. The projectile weighs approximately 15 pounds and can be effectively fired from the shoulder, as there is no recoil. Later, the Navy began using the rocket effectively as a weapon in anti-submarine warfare.

The rocket has also become a useful tool in scientific research. New knowledge has been gained about cosmic rays, the solar ultra-violet spectrum and the temperature and pressure of the earth's upper atmosphere through its use. This knowledge has been obtained by the use of modified V-2 rockets which contain many recording instruments. Serious attempts are being made to reach other bodies in the solar system by the use of more advanced rockets. Results of these experiments are still secret, but are of great importance to the future development for rocket-powered flight.

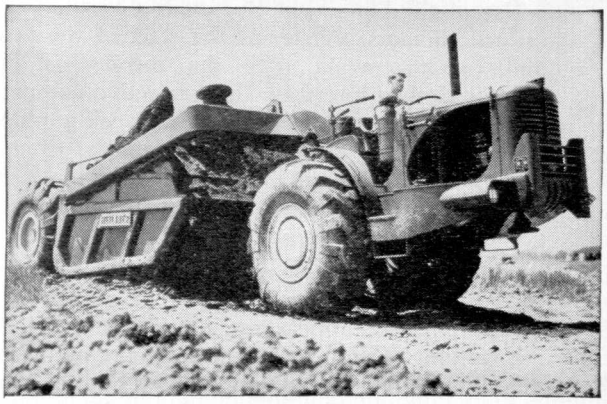
The development of the rocket's capability of navigating in interplanetary space will probably continue to be the ultimate goal of rocket research. One can only speculate upon the integral part which rocket power may play in the progress of mankind.

---

The Hydra-Matic transmission has been adapted for service in many unusual vehicles, such as in tractors in logging camps, zoological garden trains, cog railroads and even in a light camera-mounted truck that a Hollywood producer uses on sets to keep up with fast moving motion picture scenes.

*Another page for* **YOUR BEARING NOTEBOOK**

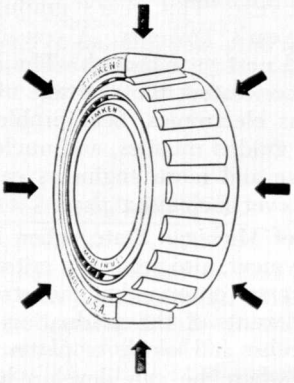
## How to increase gear life in a scraper



When this 13 cubic yard scraper, fully loaded, travels at 25 MPH over rough terrain, the gears in the differential, engine shaft and pinion get a workout. Realizing this, the engineers specified Timken® bearings for these vital applications. The tapered construction of Timken bearings lets them take radial and thrust loads in any combination. Gears are held rigidly in place. Perfect tooth-mesh is maintained. Gears last longer.

## How TIMKEN® bearings hold gear shafts rigid

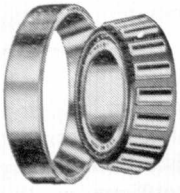
The line contact between rollers and races of Timken bearings gives shafts rigid support over a wide area. Shaft deflection is minimized. And the tapered design of Timken bearings permits them to be set up with the most desirable amount of end play or preload that gives the best performance.



## 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, O.

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



NOT JUST A BALL ○ NOT JUST A ROLLER ▭ THE TIMKEN TAPERED ROLLER ▭
BEARING TAKES RADIAL ⊕ AND THRUST ⊣⊙⊢ LOADS OR ANY COMBINATION ✳

## Big Move

*(Continued from page 15)*

Experience, even if only obtained while working in a summer program after the junior year, increases the value of a degree. Courses, such as business administration, are impressive but they do not alter the companies' attitude toward you to a marked degree. Their value lies in the aid to you in your progress toward higher position.

Mechanical, electrical and chemical engineering, in that order, are the specific majors that seem to be most in demand. Mechanical engineers with the industrial option are at the pinnacle of demand. All the factors that influence the demand for a particular student presented so far vary from one situation to another. There is one attribute that never varies. The right personality is always in demand. A well rounded, intelligent man, capable of working his way into management always carries the advantage. A fact to be proud of is that representatives coming to State feel that they find what they're looking for here at Michigan State. Time after time they have remarked to Mr. Breslin on the fine caliber of students turned out by Michigan State.

Two years ago the demand for engineers hit a "peak." Last year that "peak" was maintained here at Michigan State, and this year the demand is even greater than last year. This year's graduating class is less than last year's, however. A considerable increase is expected next year though. The fields most responsible for accelerating the shortage of engineers are fields such as electronics, heat problems of the aircraft industry, guided missiles, and nuclear energy. They absorb more and more engineers each year as they grow at an ever increasing pace.

The graduate of Michigan State, when looking for his future employment, also sets up a criteria. Analogous to the universal criteria that industry seems to have set up, the wants of the graduating student of Michigan State also fall along a patternlike form. He seeks a job where he can develop himself and progress at his maximum speed. To do this he looks for a place where there are opportunities to further his education. It may be in the form of added schooling or through experience. The size of the company desired can not be fitted to the pattern, for half prefer small companies and the other half lean toward the larger concerns. It can be said, however, that the chemical, automotive and electrical appliance industries absorb the largest number of graduates.

It would be hard to pinpoint the most important factor in job selection, but it is known that more jobs are rejected because of an undesirable location than any other reason. The midwest, as would be expected, is the unanimous favorite at Michigan State. Industrial growth is found usually where industry existed originally. It follows logically that there is a dense placement in areas of dense population. We find, therefore, that cities such as Detroit, Pittsburgh, Chicago and Cleveland take a good share of our graduates. The east coast is next in drawing power to the midwest, with the west coast following. Very few State graduates desire foreign duty.

Although salary is of high interest, it does not assume any significant importance in job selection because the salaries offered to graduates do not vary considerably from the medium. This year the running monthly salary is up about $5 from last year's $370 to $375.

The average senior has the companies in mind that he is interested in and takes approximately four to five interviews. General Motors and General Electric rank high on these lists, along with the aircraft, chemical and oil companies.

Use of the Placement Bureau is a very simple procedure. Seniors register at the start of the year and make arrangements with the receptionist in 101 Morrill Hall to interview the respective companies in which they are interested. The weekly placement bulletins inform them of the companies being represented the following week. The Placement Bureau supplies the interviewer with the personal data and school record of the interviewee.

There is definitely a knack to making a favorable impression at an interview. As in any like situation a neat personal appearance helps create the desired impression. The interviewer expects you to have a certain amount of knowledge of his company and be able to ask intelligent questions. Your scholastic standing will be considered, but your personality will be carefully studied.

The Placement Bureau also is of great service to juniors who seek summer employment in their major field. Also, anyone can browse through the Placement Bureau library of current literature from some 800 different companies, plus Civil Service and government jobs. It would be to your advantage to start this early in your college career.

In a complex decision like choosing your future, a guide such as the Placement Bureau can be very effective. It is there only for you to take advantage. Do not fail to do so.

---

## Clubs and Societies

*(Continued from page 9)*

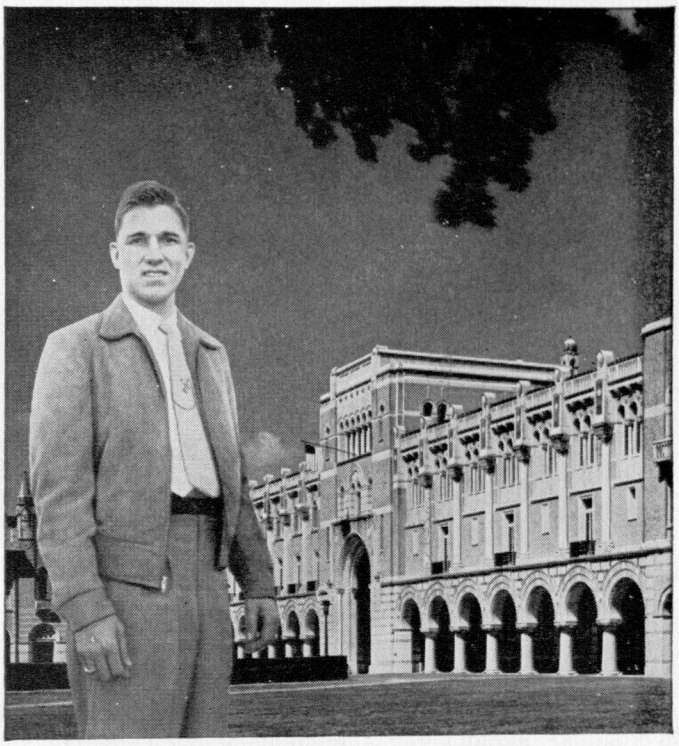
ence in watching a foundry in actual operation. Regardless of your major, any student can take advantage of this opportunity.

With the scheduling of job interviews this term, one of AFS projects is to help the graduating Senior fit into industrial operation. At their last meeting, Dr. Frank Rote, Technical Director of Albion Iron, devoted his talk to this subject – what to expect when stepping into your new job. He also went into the different types of training programs found today in foundry operations.

Here's some good news for foundry students and anyone who hasn't chosen their major field yet. The foundry field is wide open. Professor Sigerfoos, head of job placement, says he has a constant job opening list. Some companies are offering as many as fifty positions in their plants. Salaries are nothing to sneeze at either – they range from $400 to $600 a month. Might be something to look into, huh?

*Cliff Litherland asks:*

# Would I have varied assignments at Du Pont—or would I specialize technically?



**CLIFFORD LITHERLAND** received a B.A. degree from Rice Institute last year, and is now working for a B.S. in Chemical Engineering. He is Business Manager of "*The Rice Engineer*," and Vice-President of the fifth-year class at Rice. By asking questions of prospective employers, Cliff is trying to get information that will help him make the best use of his training in the years ahead.

**ARTHUR I. MENDOLIA** was graduated from Case Institute in June 1941 and started work with the Du Pont Company that same month. In addition to handling challenging assignments at work, he also enjoys some interesting hobbies. Although he makes no claims personally, he's classed as a minor authority on golf and hi-fi music. Mr. Mendolia is Assistant Director of Research for Du Pont's *Electrochemicals Dept.*

*Arthur Mendolia answers:*

Well, Cliff, I'd say the answer to that question depends largely on your own preferences. In a company the size of Du Pont there are opportunities for growth along either line.

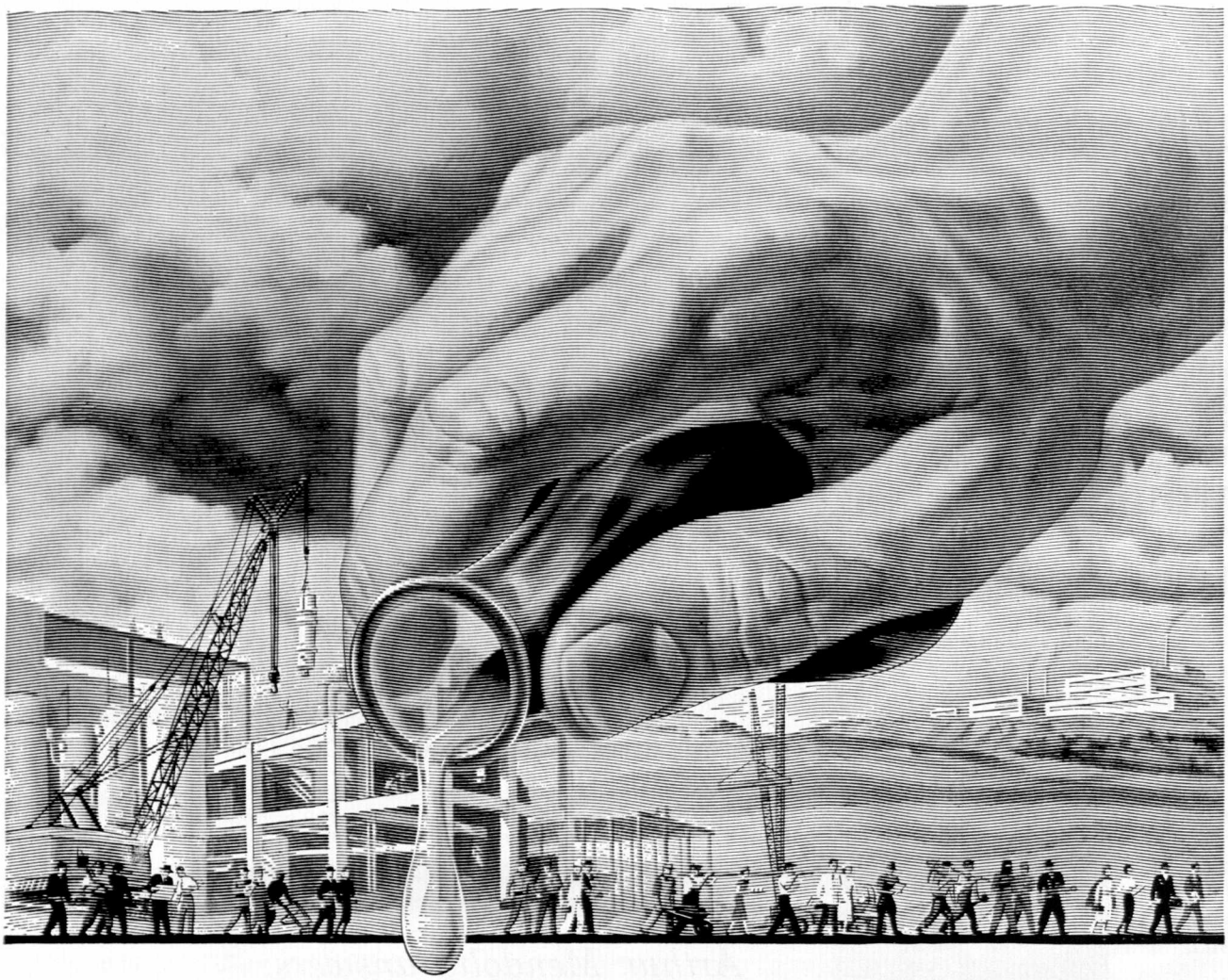
In my own case, I've followed the route of diversification—and I think you'll find that's the general procedure when a fellow is interested in administrative work.

For example, after graduation I started work in the research lab at Du Pont's Niagara Falls plant. That was followed by two years of process improvement work, and a stretch as assistant supervisor over one of the plant areas. Next, I spent a few years in liaison on the design and construction of our first full-scale plant for making nylon intermediates from furfural. Then, I had assignments on "plant start up," and production supervision before I was given my present post. I was made Assistant Director of Research for Du Pont's *Electrochemicals Department* last August.

You see, variety of assignments means contact with new men and with constantly changing problems. That keeps interest alive. It leads to growth, too, because it provides a broad base of experience for future responsibilities.

On the other hand, some fellows prefer to become specialists in a particular field—and Du Pont has many opportunities for that type of professional growth, too. In our research, development and design groups we have experts on distillation, mass transfer, thermodynamics—and most anything else you'd care to mention in the field of engineering. These men are respected throughout the whole company for their technical knowledge.

Whichever route you choose, Cliff—broad or specialized—you'll find that a job well done leads to satisfaction and advancement at Du Pont.



# *More jobs—through science*

## From the earth, air, and water come new things for all of us—and new jobs

THE ELEMENTS OF NATURE are a limitless frontier, a continuing challenge to science. Out of them, scientists are developing new materials that benefit us all in many ways.

**A CHEMICAL A MONTH**—The scientists of Union Carbide, for example, have introduced an average of *one new chemical per month for over twenty-five years.*

Some of these have led to the growth of important industries, such as plastics and man-made textiles. This, in turn, has meant more opportunities, more jobs—in construction, manufacturing, engineering and sales, as well as in research.

**IN OTHER FIELDS, TOO,** the people of Union Carbide have helped open new areas of benefit and opportunity. Their alloy metals make possible stainless and other fine steels; the oxygen they produce helps the sick and is essential to the metalworker; their carbon products serve the steelmakers and power your flashlight.

**PROGRESS THROUGH RESEARCH**—Union Carbide has 23 research and development laboratories constantly working in major fields of science to continue this record of product development—and more jobs through science.

**FREE:** *Learn how* ALLOYS, CARBONS, GASES, CHEMICALS, *and* PLASTICS *improve many things that you use. Ask for the 1955 edition of "Products and Processes" booklet E-2.*

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**1927**—Unloading cargo from Boeing mail plane

**1955**—Loading Boeing C-97 Stratofreighter

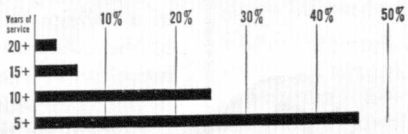
# There's plenty of variety in Boeing engineering careers

America's pioneer passenger-cargo aircraft, the 40A, was a Boeing. So is the Air Force's versatile tanker-transport, the C-97 Stratofreighter shown above.

During the company's 38-year history, Boeing engineers have blazed new trails in the design of aerial freighters and tankers, commercial airliners, flying boats, fighters, trainers and bombers. Today Boeing continues to offer engineers a wide variety of opportunities in Research, Design and Production.

Students sometimes are surprised that Boeing's engineering staff includes those with civil, electrical, mechanical, aeronautical and other engineering degrees. Yet all find application in aviation. For example, the civil engineer may work on airframe structure or stress. Electrical engineers find challenge in the complicated electrical and electronic systems of modern jet bombers and guided missiles. Other engineers will find similar application for their talents.

The high degree of stability in careers at Boeing is reflected in this chart.




It shows that 46% of Boeing engineers have been with the company five or more years; 25% for 10 or more years, and 6% for 15 years.

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

Current Boeing programs include: six and eight jet bombers; America's first jet transport—the 707; F-99 Bomarc pilotless interceptor (guided missile)—and advanced projects such as the application of nuclear power to aircraft.

*For further Boeing career information consult your Placement Office, or write:*

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

**BOEING**

SEATTLE, WASHINGTON WICHITA, KANSAS

## Technical Writing

*(Continued from page 35)*

must know what is and is not worth reporting." "He must have a missionary's zeal to bring the reader little-known facts . . . must have a passion for accuracy and logic." "He must have writing ability, must produce ideas, must have an interviewing ability, must have good analytical ability, and of course be a team player."

### Job Hunting

Where you want to be in the technical writing profession will determine your approach to the job. Basically what you do to land a job as an editor on a technical magazine will differ only in detail to what must be done to get on the public-relations staff of a corporation.

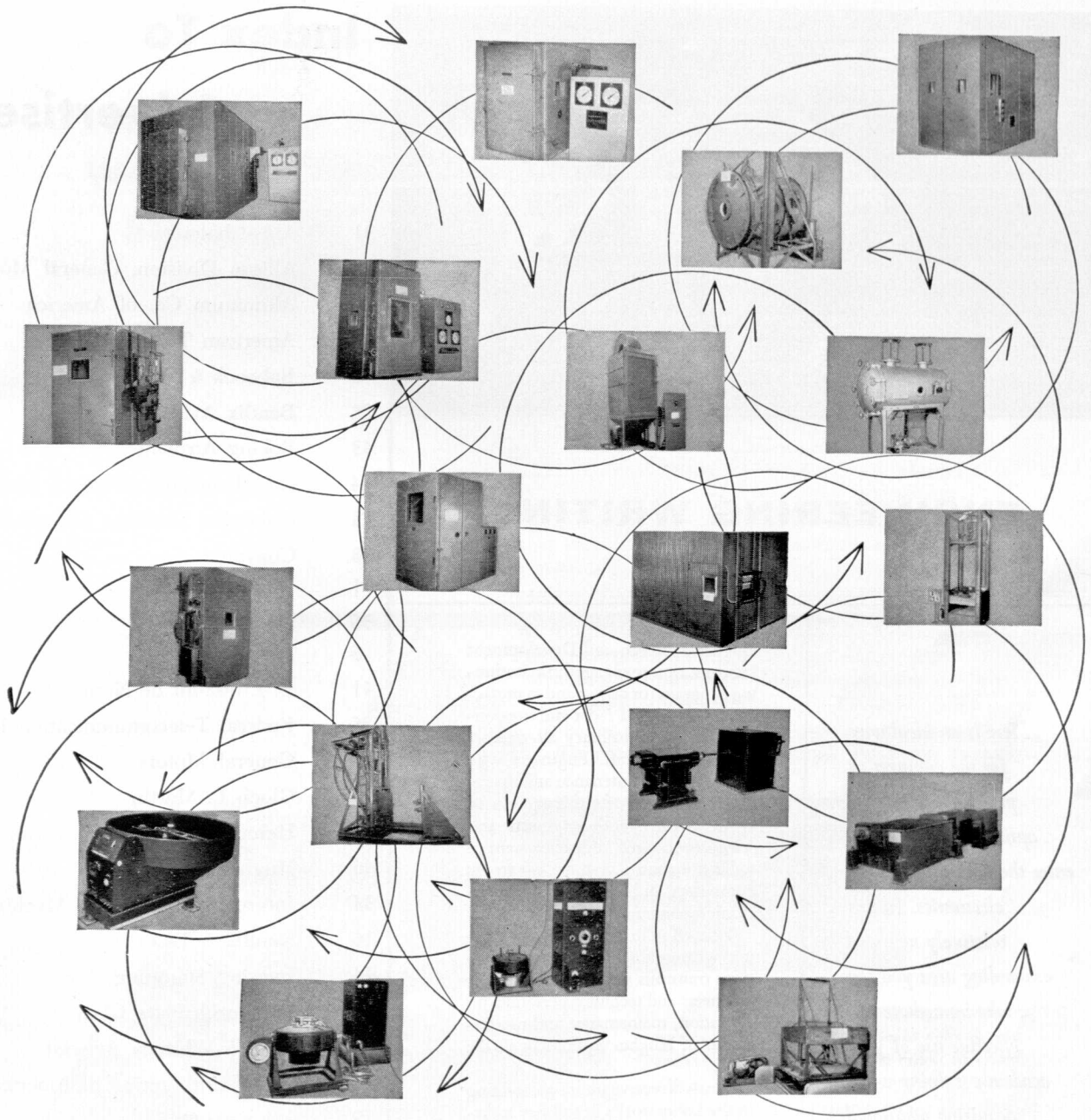
First of all you must find out all you can about the magazine of your choice: the owner, the publisher, the editor, the editorial content and philosophy, and the number of readers and who they are. The need to do this, and do it well is great. You'll benefit personally as you'll learn things you should know about a company you may someday be working for. Furthermore, it will be a lot easier to build your case if you have an intelligent understanding of what is expected of an editor on that magazine. The problem then of evaluating your education, experience and ability in terms of the magazine will be relatively simple. Remember this: The editor must have visible evidence and a good reason for hiring you. Make this part of his job easy by a thorough study of his magazine.

The best visible evidence you can muster is a portfolio of examples of your creative writing. Since every editor looks for genuine evidence on the part of the applicant that he can write, there is no better proof of this than samples of your own work. Include material from your high-school days if you have any as this is evidence that you have demonstrated a special interest in writing early in life. Be sure to include plenty of samples from college.

Direct your original letter of application to the editor. Attach to this a biographical profile that includes personal and experience data. Indicate your desire to see him personally. Take advantage of the study you've made of his magazine and tersely interpret your abilities in terms of his magazine. Do this for several magazines if you want to uncover quickly one or more openings.

Where a corporation does not send an interviewer to a college campus, and you know from your study of the company that it has a public relations department, write the public relations director. Write him in the same vein suggested for the letter to the editor.

Remember this about job hunting: never pass up a detail about your education, experience and ability that can add a plus to your case. The better you package your biographic profile, the better the reader acceptance it gets. And, the better the reader acceptance the better impressions you create. Since impressions help land jobs, create all the good ones you can.



# 19 chambers of hell

You are looking at the units of a $2,000,000 Martin testing laboratory—part of a man-made hell of fire and water, shock and vibration, explosion and corrosion, designed to torture *electronics equipment!*

For these vital components of today's aircraft, guided missiles and weapons systems must carry tremendous responsibilities. Consider, for example, the electronic system of the Martin B-61 Matador:

Incredibly versatile, it comprises the entire brain and nervous system of America's first successful pilotless bomber. Yet this sensitive equipment must withstand the shock of many tons of thrust in the first second of take-off—violent changes in temperature and pressure—and ground conditions ranging from sand storms to arctic blizzards, desert dryness to tropical downpour.

Today, Martin's facilities are among the finest in the world for design, production and proving in the field of avionics...one of the major developments of Martin Systems Engineering which is now tailoring airpower to previously impossible requirements.

*You will hear more about Martin!*

**MARTIN**

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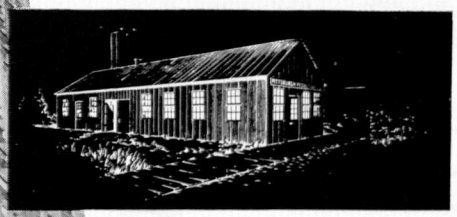
# Index To Advertisers

# THE ALUMINUM INDUSTRY WAS BORN ON SMALLMAN STREET

▶ In 1888, the aluminum industry consisted of one company—located in an unimpressive little building on the east side of Pittsburgh. It was called The Pittsburgh Reduction Company. The men of this company had real engineering abilities and viewed the work to be done with an imagineering eye. But they were much more than that. They were pioneers . . . leaders . . . men of vision.

A lot has happened since 1888. The country . . . the company . . . and the industry have grown up. Ten new territories have become states, for one thing. The total industry now employs more than 1,000,000 people—and the little outfit on Smallman Street? Well, it's a lot bigger, too—and the name has been changed to Alcoa. ALUMINUM COMPANY OF AMERICA . . . but it's still the leader—still the place for engineering "firsts".

As you prepare to trade textbooks for a position in industry, consider the advantages of joining a dynamic company like Alcoa—for real job stability and pleasant working conditions—where good men move up fast through their association with the recognized leaders in the aluminum industry.



Alcoa's new aluminum office building

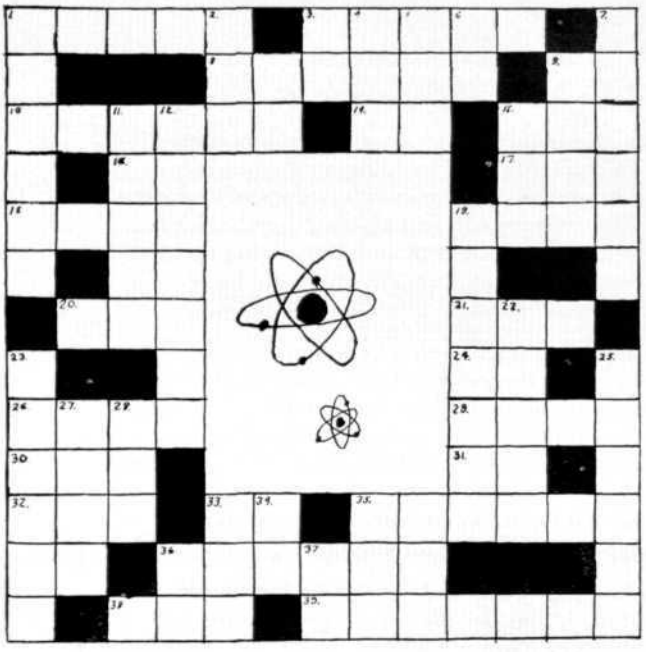
We have fine positions for college graduate engineers—in our plants, sales offices and research laboratories from coast to coast. These are positions of responsibility in production supervision, plant and design engineering, industrial research or sales engineering. Right now it may be quicker than you think from a seat in the classroom to your career with Alcoa. Why not find out?

Your Placement Director will be glad to make an appointment for you with our personnel representative. Or just send us an application yourself. ALUMINUM COMPANY OF AMERICA, 1825 Alcoa Bldg., Pittsburgh 19, Pa.

ALCOA ALUMINUM

ALUMINUM COMPANY OF AMERICA

# Crossword for Engineers



## ACROSS

1. positive pole of an electrolytic cell
3. upright
8. girl's name
9. Little "- -" Peep
10. capacity for doing work
14. a score in football
15. used in propelling or steering a boat
16. prefix meaning over
17. false hair
18. combining form, denoting a ring or circle
19. contest
20. in the state of being (pl.)
21. attempt
24. cry of delight
26. parts of circles
29. at any time
30. river
31. prefix meaning to do again
32. to ban
33. abbreviation for a state in the Union
35. to decrease
36. neither
38. plot of land
39. negative pole of an electrolytic cell

## DOWN

1. lack of energy
2. unit of work
3. printer's measure
4. decay
5. finish
6. symbol for calcium
7. hammered steel
9. lure
11. mistake
12. to open again (pl.)
15. debt
19. female parent (pl.)
22. wanders
23. chemical element
25. citrus fruit
27. monetary unit (Iran)
28. vehicle
33. acquire
34. symbol for gold
35. measure of yarn
36. negative reply
37. Transportation Corps (abbrev.)

## ANSWER TO MARCH PUZZLE