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## Volume 66 - Issue 6 - March, 1955

Rose Technic Staff

*Rose-Hulman Institute of Technology*

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# Rose Technic

*Member Engineering College Magazines Associated*

*March, 1955*





Robert L. Land, Jr., Class of '51,  
speaks from experience when he says,

U.S. Steel offers thorough training . . .  
exposes the graduate engineer to many  
interesting phases of the steel industry



ROBERT L. LAND, JR., graduated with a B.S. in Chemical Engineering in February 1951. He had previously been interviewed by U.S. Steel college recruitment representatives and had been offered a job. He began working in the Coke Plant at the Gary, Indiana Works of U.S. Steel immediately after graduation.

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Bob feels that U.S. Steel really gets the young graduate engineer off to a good start

with a well-planned and complete training program. He says, "U.S. Steel offers the graduate engineer an excellent chance to work in a number of different fields."

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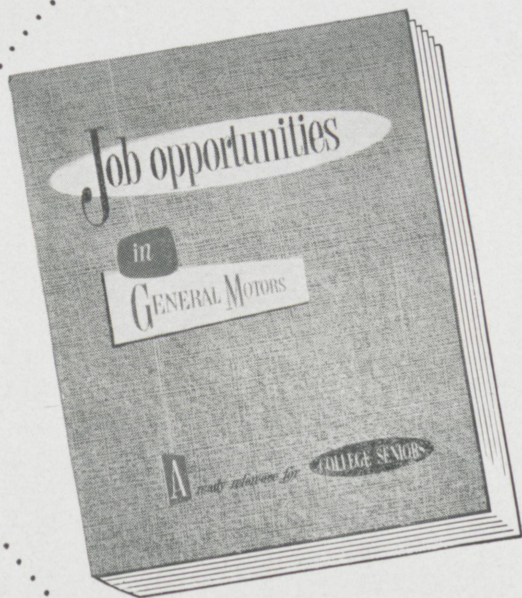
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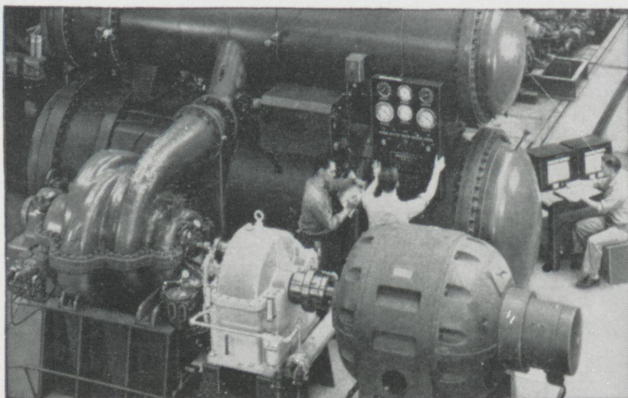






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# Rose Technic

VOLUME LXVI, NO. 6

MARCH, 1955

## Contents

Editorial .....	9
Miles of Pollution .....	10
Plastic Films .....	14
Analyze Your Cake .....	22
Sugar Check .....	24
* * * * *	
Research and Development .....	12
Library Notes .....	16
Fraternity Notes .....	18
Alumni News .....	20
Locker Rumors .....	26
Sly Droolings .....	36

### The Cover

In the gigantic catalytic cracking unit of the El Segundo refinery is housed pipes which have 18,000 horsepower running through them. These huge pipes carry in circulation 7,000,000 pounds of catalyst every hour, and in the regenerator the catalyst is blasted with 140,000 cubic feet of air every minute to burn off coke deposits. Courtesy of BULLETIN, published by Standard Oil Company of California.

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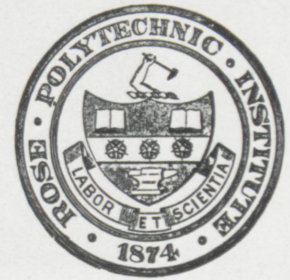
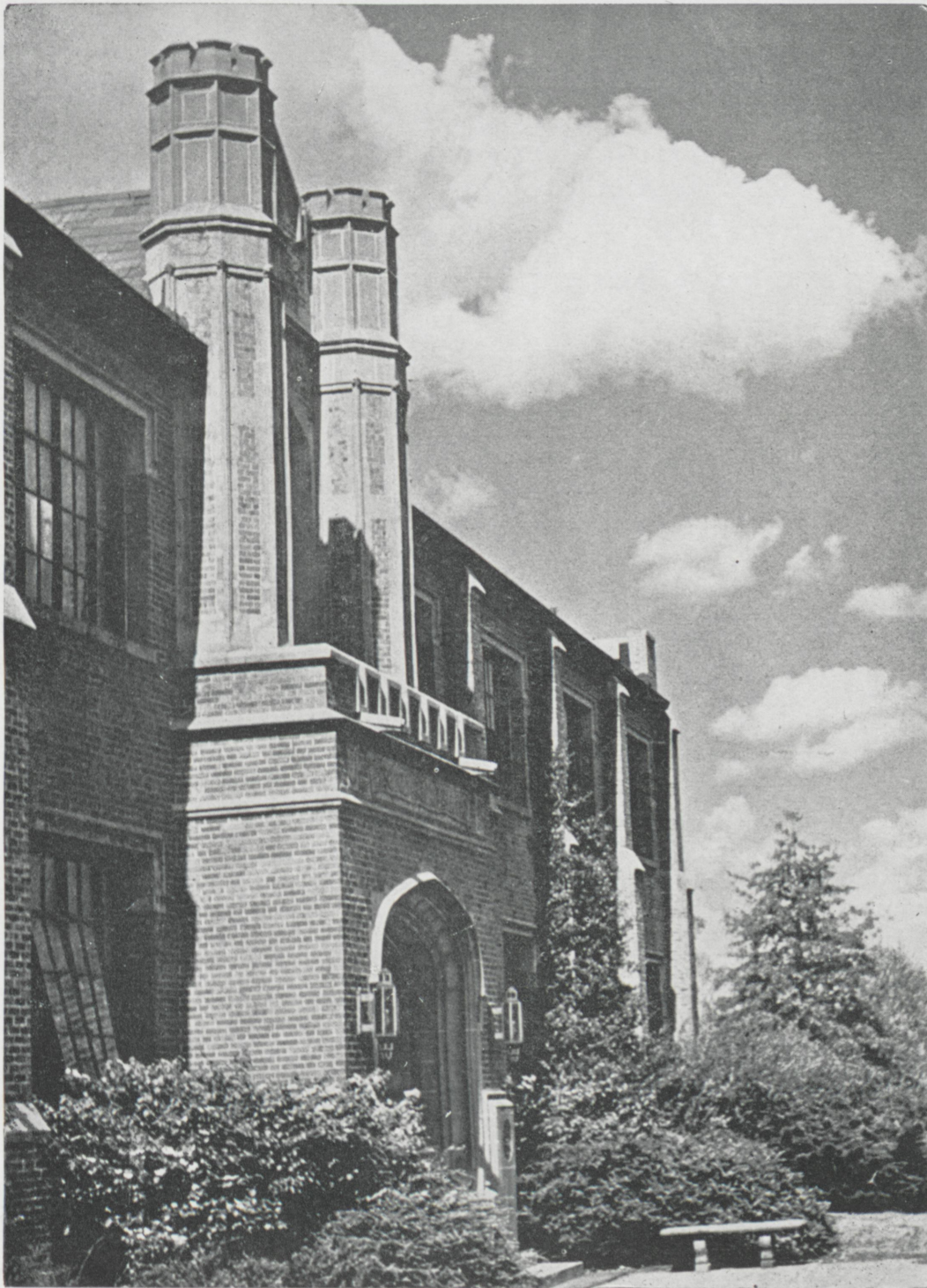
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## HIGH SCHOOL GRADUATES OF 1955

You are cordially invited to visit Rose Polytechnic Institute during the present school year to learn more about your college entrance and the highly accredited engineering courses available to you at Rose. The next freshman class will be admitted September 12, 1955.

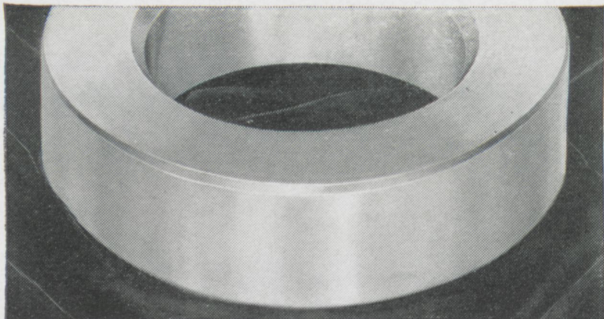
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○ Another page for

**YOUR STEEL NOTEBOOK**

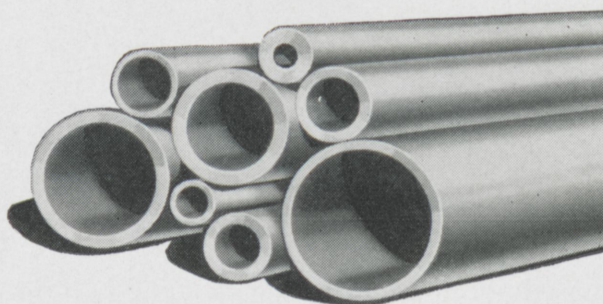
## How to make a boring job go faster



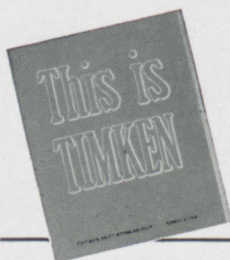
With teeth cut into it, this gear blank becomes an engine part. One manufacturer thought these blanks were costing him too much to make. The center hole had to be bored out of solid bar stock. It took one hour to make 29 blanks. A lot of steel was wasted in the process. He took his problem to Timken Company metallurgists. After study, they recommended a change in production methods together with the use of Timken® seamless steel tubing.

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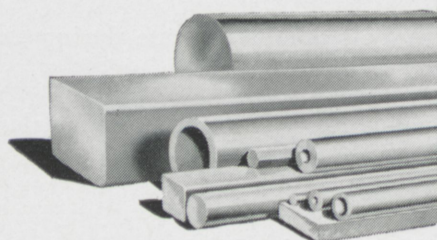
## Want to learn more about steel or job opportunities?



Some of the engineering problems you'll face after graduation will involve steel applications. For help in learning more about steel, write for your free copy of "The Story of Timken Alloy Steel Quality".

And for more information about the excellent job opportunities at the Timken Company, send for a copy of "This Is Timken". Address: The Timken Roller Bearing Company, Canton 6, Ohio.

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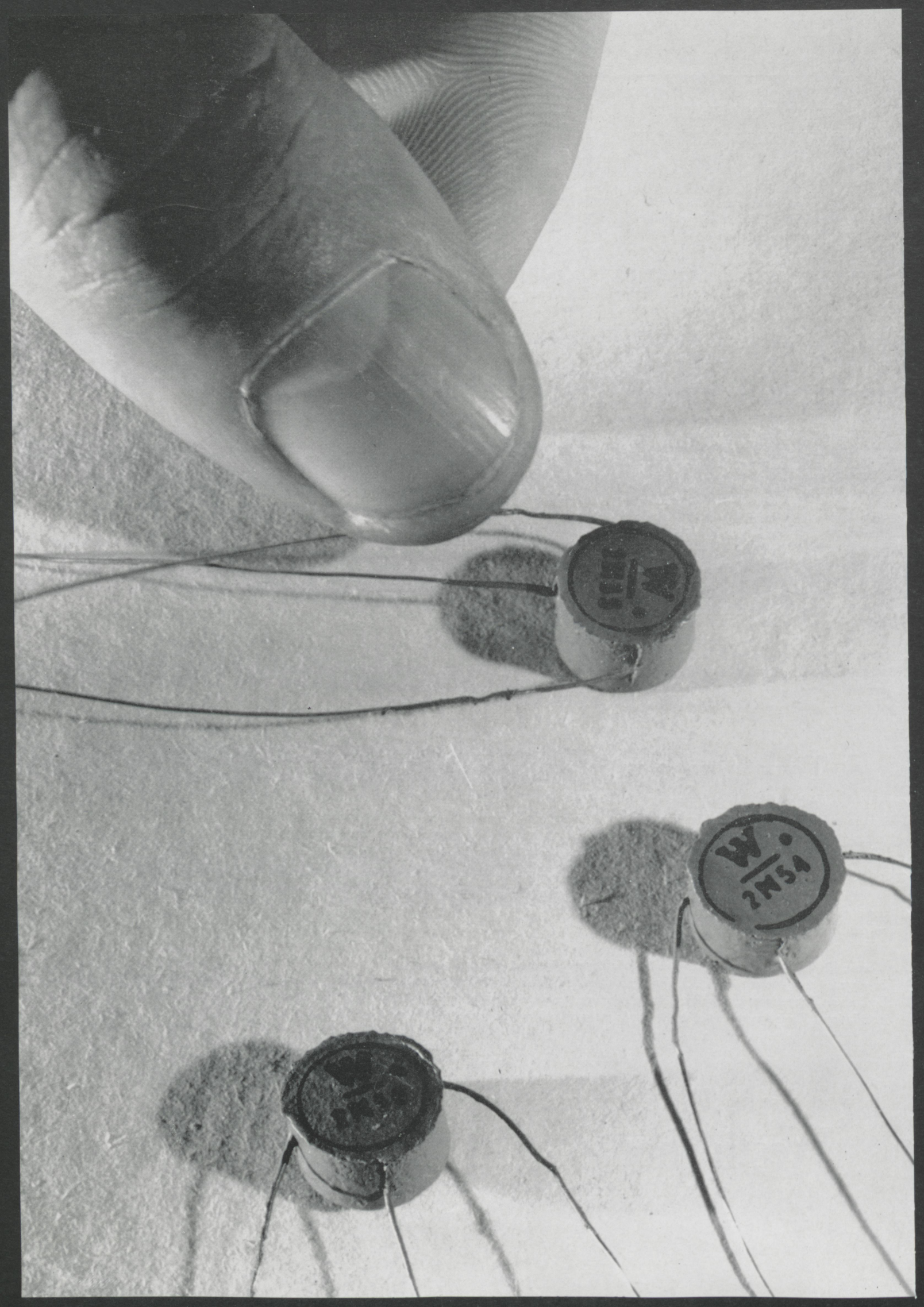
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## *Playing Ball*

The intramural program recently inaugurated at Rose has certainly come into its own. This program was provided by the administration to take the place of an antiquated hazing system. It has done a fine job of building the competitive spirit of the students.

The success of the intramural program has been due mainly to the enthusiastic work of Clarence Kelly, the director of the intramural program. He has done an excellent job in organizing the various activities and has the playing fields in the best condition that they have ever been.

Playing ball is not wholly a sporting term. It should also mean co-operation with one another. The student body may not be aware of it but it is no easy job to put out the TECHNIC when there are more advertisements than copy. This necessitates the use of outside articles which may not have an interest to the Rose students. No matter how good these articles are it would still be desirable to get some student participation in another of Rose's activities. Remember the Technic is your magazine. It is a publication by the students and for the students. Why not write something for it.

This issue is the exception rather than the rule for there are three student written articles in it. This is what makes a magazine interesting for fellow students to read.

*C. R. H.*



FRONTISPIECE: Note the small size of these transistors when compared to a man's thumb. Even though these transistors are available only in one watt sizes, they make the dream of a high efficiency d-c transformer become a reality. Courtesy of WESTINGHOUSE ELECTRIC CORPORATION.



# Miles Of Pollution

By John Rhodehamel, jr., ch.e.

The national problem of pollution may be explained in a few words, but the practice of corrective pollution measures is often very difficult to instill in the people responsible for the pollution. This difficulty is due principally to two reasons—meager knowledge of the specific effects of most pollutants on stream ecology and water usage, and realization of the large part played by subjective judgment in deciding on control methods.

The term pollution may be defined technically and definitely by experts in this field as “the sample of water in which the amount or kind of substances discharged into it which continually is greater than the reasonable fraction of its capacity for self-purification.” If this term of pollution seems vague, an inspection of the lakes and rivers below any of the large community or industrial sites not yet fitted with some type of purification plant will show the black, oily, sludge filled river beds, their banks and shores, naked of vegetation and scorched by erosion—a scene typical of extensive pollution.

The Schuylkill River in Pennsylvania is a graphic example of one of the foulest rivers in the nation. It has often been said that this river is “Too thick to navigate, too thin to cultivate.”

The Schuylkill River, before any action was taken to clean it, was a sorry excuse for a river. Its 130 mile bed contained approximately 40,000,000 tons of coal silt and other settled solids. The river itself seldom flowed freely but was choked by dirty, black sand bars and muddy reefs. Its body was confined to pools of stagnant

water, flowing only with heavy floods. The whole length of the river was unfit for any type of recreation, and few forms of life were able to live with the poisonous suspensions in the water.

Downstream at the Philadelphia Navy Yard, delicate instruments were ruined. Hydrogen sulfide fumes from the river would tarnish silver or gold objects near the water, and would corrode the steel hulls of naval vessels in the harbour.

Philadelphia and many of the communities along the banks of the Schuylkill get most of their water from this river. All of these communities spend hundreds of thousands of dollars apiece each year to keep the silt and sludge from their water-purification plants only to turn around and dump their sewage back into the same river.

The poisonous fumes alone from the river are a hazard to any community or home along its banks; causing some persons to become sick, while at the same time creating unsafe recreational areas and beaches.

In many places along the river's path, vegetation is so choked by silt and sludge that no greenery will grow; consequently flash floods are able to rip out the naked banks, adding to the rate of depreciation on the surrounding land.

All of this fouling of a once clean river can be attributed for the most part to the great number of mining industries at its headwaters. These mining companies use the river waters to wash their coal. This coal-washed silt is then returned to the river as a waste product.

The various communities along the way then add their industrial and home wastes to the same river, creating a dirty, black, monstrous snake, half solid and half liquid which winds its way downward into the Delaware River.

In this example of a typical river in the Pennsylvania industrial region, it is hoped that the reader will realize that in all regions of the country there are many other rivers affected in a similar manner, and in these regions there has been little or nothing done to correct the pollution.

The Schuylkill “clean-up” is a good example of what can be done to correct and purify our nation's industrial and recreational waters. For all the “clean-up” and pollution elimination projects about the country, the government has appropriated the sum of \$4,000,000,000, the remaining amount to be supplied by the states' governments.

The next article presents a closer picture of the affect of a polluted river upon the people, such as the affect of the Withlacoochee River, which runs through the city of Valdosta, Georgia.

The action which follows took place as a result of the many complaints received from irate county citizens who lived on or near the Withlacoochee River, below the city of Valdosta, Georgia. Other county residents along with a group of urban residents appeared before the County Commissioners and the Board of Health demanding action. Both groups complained of the nuisance created by the raw sewerage dumped into the river by the city of Valdosta and by the cotton-milling plant below



the city. Their arguments were also supported by numerous letters to the city paper from communities and residents below the city demanding immediate action in correcting the source of the foul odors and dead life which contaminated the river. The result was a resolution passed by the Lowndes County Board of Health providing for proper taxation for the building of a sewerage-treatment plant. The plant was to be built below the city where the city's two main truck-lines met to pour through a 21 inch-pipe into the river. The land which was to be used for the project was owned by the cotton-milling plant near-by. An agreement was made by which the mill furnished the needed land in return for the plant's treatment of their wastes.

Most important is the protection of persons who are apt to be in frequent contact with a river or lake. Such might be the case when a polluted lake or river is located near a college town or a resort area. Although the amount of sewage may be too slight to be noticed, the poison which it carries is everywhere. These locations should have purification plants before the areas may be classed as safe from possible epidemics.

Before any positive action can be taken, facts, reasons, sound arguments, and a method must be presented to enlighten the people as a whole.

An opinion found in the *Science Monthly* states, "The paramount objective of all pollution control measures should be to maintain those stream conditions that will best serve the over-all interests of particular localities." Further it states, "Stream should be utilized fully to the extent that unsatisfactory conditions will not occur oftener than once in five to ten years. A higher degree of waste treatment would increase the tax burdens unjustifiably."

The problem of pollution is treated as a whole in an article entitled "What Stream Pollution Means Nationally." This article covers a recent meeting of the Federation of Sewage and Industrial Wastes Association held in St. Paul, Minnesota. At this meeting four questions were

asked; these were, "How serious is stream pollution? Are the present controls over it adequate? What governmental level should have the responsibility for pollution control? And who should pay for pollution reduction?"

To answer the first, stream pollution is serious, but we've made a lot of progress. A United States Public Health survey of eleven major river valleys, representative of the country as a whole, showed major streams gravely affected. This pollution, if not corrected, will eventually affect all water resources, whether developed for flood control, irrigation, hydro-electric, municipal use, industrial, or recreation.

The other three questions were also answered by Mr. Howson, Consulting Engineer of Chicago, Illinois. Mr. Howson stated that in his opinion, present controls over stream pollution are adequate to bring about necessary abatement practices and that the local governments, or groups of local governments, should have the responsibility for correcting pollution without recourse to grants from the federal government.

From the West Coast a sound argument as what must be done with sewage water after it has been treated appeared in the *Science News Letter*. Written by A. M. Rawn of the Los Angeles County Sanitation District, it covers the basic and pertinent problem of restocking our waning underground water resources. In his article Mr. Rawn states, "Water reclamation from sewage depends upon the application of sound, established engineering principles applied with two basic concepts in mind. First, it is essential that the process of reclaiming water from sewage be based on the water requirements and not on the need for treating the sewage. Second, public acceptance of unstructured reuse of sewage waters depends upon the inclusion of a natural purification process such as blending the reclaimed water with a lake, a stream, or with underground waters."

From the other side of the United States, another dual-purpose method of pollution control has been put to practical use.

proper method for the disposal of

Ever since the problem of the sewage wastes became paramount to communities and industries, new and more successful methods of sewage disposal have been sought. One of the newest methods developed was that in southern New Jersey by the Seabrook Freezing Plant, a Quick-Frozen Products plant which has a disposal of over 5,000,000 gallons weekly. This waste is polluted with vegetable scraps and dirty water which pour untreated into a river. In order to save funds for an expensive bio-filter plant, the company's climatologist was consulted, and the company began a series of disposal experiments. The first of these experiments centered around a theory of spraying the waste water over non-productive land and allowing nature to purify the water as it was absorbed into the ground. The most successful of these experiments was carried out in a fifty-four acre woodland. For weeks water was poured onto the forest floor. No apparent change in the amount of moisture in the ground was observed when the project was checked a week later. However, later readings about the country showed that the general water table had risen and that many springs had appeared, all running with clean, pure water.

Here was demonstrated a new and inexpensive way of replenishing the water tables of the whole country which have fallen so alarmingly in the past fifty years.

Briefly, it has been shown that the problem of pollution is a national problem. It has also been shown that this problem does not only affect the water we use but also the earth, and the air we breathe. How useless and wasteful it is for us to continue the practice of pollution when proven methods of improvement are so accessible, and in many cases profitable. Although the people are slowly becoming more aware of the pollution problem, it will take much more than the minority groups now working to once and for all clean up our waterways and again present to the country the many miles of healthful beauty found only in clean, free-running waters.



# Research &

## Silicon Solar Batteries May Furnish Power For Household Use

Solar batteries of silicon probably will someday furnish enough power for household use in sunny areas, but do not appear practical for powering autos and other vehicles, a General Electric Company scientist has predicted.

However, he said that there is no way of predicting when such systems would be economically feasible.

Dr. R. L. Cummerow, scientist at the Knolls Atomic Power Laboratory near Schenectady, N.Y., said that there is enough surface area available on house roofs to make this energy conversion method practical. But he said that the optical method would not provide sufficient power for vehicles.

He pointed out that a practical type of solar energy converter might be made to yield up to three times home power needs "to take care of emergencies, peak loads or protracted spells of dark weather."

This capacity might also have to be increased to take care of the fact that the efficiency predicted for such household solar batteries would not be feasible, he said.

The sun-gathering surface of such a solar converter would take up thirty to one hundred square feet to produce enough household power, the G-E scientist estimated.

"This area and more is very easily attained on a roof, with most home roofing areas running in the order of 1,000 square feet," he stated. "Thus, given a good supply of high-purity silicon and mass production methods, there is no technological reason why such a system should not work."

He cautioned, however, that "it is difficult to predict what may be the economic feasibility of such systems because of the present day manufacturing costs and the fact that silicon of exacting purity has not been produced on a large scale."

"However," he continued, "there is no doubt about the abundance of the raw material and so it seems that if there is a large potential market for it, ways and means of production will be found which will make it economically feasible."

He pointed out that the comparatively large surface areas needed seem to rule out these solar batteries for use in autos and other vehicles.

To operate any vehicle on only ten horsepower he said, would require at least 500 square feet of surface area for soaking up enough sun rays.

"Even if one could raise the efficiency by a factor of two, this would not suffice," he said. "One would also have to concentrate the incoming radiation by a factor of ten and thus cut the necessary surface area to twenty-five square feet. The optical system to accomplish such a feat would, to put it mildly, be costly and bulky."

## G-E To Build Nation's First Color TV Center

Schenectady, N.Y., will have the nation's first television and radio studio designed specifically for color television facilities, a \$2 million center to house Radio Station WGY and Television Stations WRGB, both owned by General Electric.

The center will serve an area of 14,000 square miles with a population of more than 2 million people and 400,000 television receiving sets.

Engineers and designers have visited many broadcasting facilities

across the country and have incorporated the best ideas they have seen in the plans for the local center.

They are pioneering by actually designing a new building to meet the space and equipment requirements of local color programming. It was pointed out that even the most recent of the other stations have had to make adaptations for color television origination.

The new structure will be of the most modern construction and will occupy nearly an acre of land. It will include three television and two radio studios. The largest studio actually will be an auditorium seating approximately 300 persons and will permit audience-participation television shows. It will be big enough to accommodate a symphony orchestra or a moving automobile. Occupancy is expected in mid-1956.

Dominating the technical aspects of the building will be a giant master control room of more than 4,000 square feet located at the center of the studios to provide control for both radio and television.

Other features of the new center will be a modern news room, music and record library, a special room for the processing, editing and storage of film and large storage areas. Offices will line the outer walls of the building.

Plans call for the use of approximately 10 acres of land at a location convenient to Schenectady, Albany and Troy, in the heart of the broadcasting coverage area for both WGY and WRGB. Adequate parking space will be provided adjacent to the new studios.

Floor area of the building will be approximately 54,000 square feet, or more than an acre and a quarter.



# Development

By Bill Cade, jr., m.e.

Total studio area of 9,000 square feet will surpass that of the largest television stations in such cities as Detroit, Seattle, Cleveland, and Boston.

WGY, one of the country's first radio stations, has been on the air since February, 1922. Winner of many awards, it has maintained its position of leadership as the radio industry grew during the ensuing years. The station operates on 50,000 watts, the maximum permitted by the FCC.

## Simple-To-Use Technical Close-up Attachment for Color Photography

To reduce the problems of close-up color photography to an absolute minimum, the Eastman Kodak Company has announced a newly developed technical close-up attachment, particularly suited to solving photographic problems in industrial and scientific laboratories.

This attachment is offered in two basic kits. One, for use with the Kodak Pony 828 or 135 camera, is known as the Kodak Close-Up Kit.

The Technical Close-Up attachment is engineered for use by people who want to produce color transparencies of maximum quality with a minimum of difficulty. Production line people and laboratory technicians who have no photographic training can learn to use it in a matter of minutes since they need master only a few basic operations.

The Technical Close-Up device is built around a simple, sturdy frame to which camera and flashholder are attached. Two arms extend from this plate, out in front of the camera, to support a half-frame.

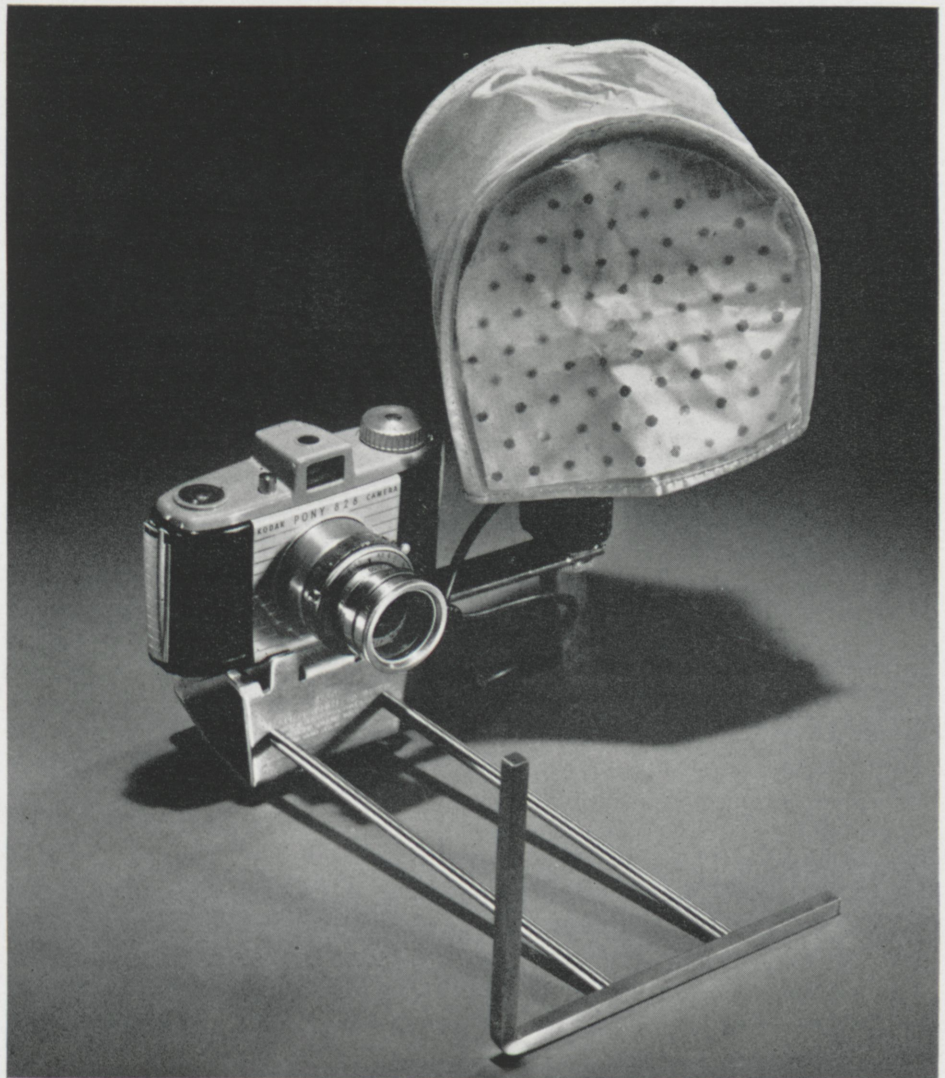
The mounting plate holds the camera rigidly and accurately and positions the flashholder so that the light

is beamed correctly. The half-frame in front of the camera accurately outlines the field of picture coverage—3"x4" at a distance of 6"—and makes it easy for the operator to position the camera at the correct distance merely by placing the frame at the subject area to be photographed.

The unit was designed with a half-frame to eliminate the shadow which the top and side of a full frame would cast when the camera is used outdoors. The half-frame is clearly

marked with dots and notches which indicate accurately the slightly different fields of coverage of 35mm and 828 cameras so that the operator can visualize the exact center of his picture.

The frame attachment is designed to accommodate a Kodak Pony 828 or Pony 135 camera. A Kodak B-C Flashholder is recommended as a light source. The special flashguard provided protects the subject from the  
(Continued on page 28)



The Kodak Technical Close-up Outfit



# PLASTIC FILMS

By Charles Bruner, jr., ch.e.

## Method of Production

One of the common methods of producing this film is this: The plastic polymer is softened by the use of a fast drying solvent to form a mix. This mix is then extruded through a slit instead of the customary holes of a spinneret, which would give a collection of fibers, onto the highly polished surface of a drum or continuous band moving at a constant speed.

As the drum or band travels forward, the solvents evaporate from the plastic mix under very carefully controlled conditions. The film is then stripped off the roller or belt and passed to a receiving roll. The conditions required vary widely with the properties desired in the finished film.

Techniques have been developed to produce laminates, films which have been built up of layers of several kinds of polymers, each performing a special function. Laminates up to seven layers of materials are produced, although often the outermost layers are applied in the form of lacquer.

## The Packaging Industry

The principle reason for the spectacular growth of the films used for package wrapping has been the shopper's acceptance and demand for merchandise which is visually packed.

A current Department of Commerce report on containers and packages comes up with the following estimates:

Of the approximately sixteen billion pounds of meat consumed annually in the United States, only some four billion pounds is at present packaged in transparent film; this syphons some forty million pounds of film.

Of the near twenty-five billion pounds of fresh poultry consumed, about eight hundred fifty-eight million pounds is plastic wrapped

—an eight million pound film market. In addition, frozen poultry—which accounts for about twenty-one percent of all poultry sales—takes an estimated fifteen million pounds of packaging films produced, and that use could be doubled.

From the preceding paragraphs, one can see that the surface has just been "scratched" and that the consumption in this field, barring unforeseen circumstances, should continue to grow.

Along this same line, fresh fruits and vegetables are also great potential fields for the plastic film manufacturers. At the present time, about four or five billion pounds of the fruits and vegetables consumed are prepared in transparent films. This amounts only to about ten percent of the present crop.

## Cellophane

Although a great many different types of polymers are manufactured in the form of plastic films, cellophane leads the other plastic films by about eighty percent. Of the cellophane used, about seventy-five percent of the total production is used for the packaging of foods. The remainder, about twenty-five percent, is used for packaging tobacco products, textiles, drugs, paper products, and many other things. Cellophane wrapping material is available in some fourteen classifications and in more than one-hundred different types.

## Polyethylene

Though it is not as transparent as cellophane, polyethylene is the most likely new type of plastic film to approach the cellophane consumption level in the near future. Currently about forty million pounds of polyethylene plastic film are used each year.

## Pliofilm

One of the earliest and most unique of the plastic films was pliofilm. This

film is radically different from other films because of its rubber base, rather than the cellulose base most polymers have. This film has found a successful use in the packaging of some liquids and foods with a high moisture content because of its moisture proof qualities.

## Cellulose Acetate

Cellulose acetate is another polymer much used in the packaging industry. This film is insensitive to softening by water and has a high rate of water and gas transmission through its pores. Because of these properties, as one might expect, the film is much used for fresh produce packaging. Also because of these so-called "breathing" characteristics, an increasing use for this film is in the windows for paper board boxes.

In this day and age, not many industries are looking forward to a record-breaking volume of business, but at least one industry expects no letup in the present-day surge. This is the plastic film industry. In the past few years this industry has grown from the one-hundred twenty-five million pounds per year wartime quota to a present all-time high of over four-hundred million pounds per year of plastic films.

The number of plastic films has also increased considerably since then. Eighty percent of today's films are cellophane. Acetate, Pliofilm, cast vinyl, polyethylene, saran, cry-o-rap, ethly cellulose, and many others are also widely used.

Plastic film is usually defined as any plastic substance which has a thickness of not over ten mils, (one mil equals 0.001 inches) although some films are somewhat thicker. This film is produced mainly for package wrapping, lining, and sealing. These and other uses will be discussed later on. The average price of the film is about sixty-five cents per pound.

*(Concluded on page 32)*



## A Campus-to-Career Case History



*Jim O'Hara (left) works out a problem with a member of his crew*

*His territory:*

### **TWO CITY BLOCKS**

James O'Hara, Stevens Institute of Technology (M.E. '51), is an installation foreman for the New York Telephone Company. His present assignment is two city blocks between 45th and 47th Streets in the middle of Manhattan.

. . . .

"It doesn't measure very big horizontally," Jim says. "But vertically it makes up a lot of telephone business—7500 telephones to be exact. My eight-man crew does everything from installing a single telephone to working on complete dial intercom systems for some of the nation's biggest businesses.

"I've got to know about each of these jobs that my men do. My training with the telephone company took me through the installation, repair and testing of the various types of telephone equipment and service for which I am responsible. I even had a chance to do a little experimenting of my own and developed a new way of preventing oil seepage on automatic switching equipment. I understand it's being written up for use throughout the Bell System.

"That's what I like about telephone work. Even two city blocks are full of opportunity."

**You'll find that most other college men with the telephone company are just as enthusiastic about their jobs. If you'd be interested in a similar opportunity with a Bell System telephone company—or with Sandia Corporation, Western Electric or Bell Telephone Laboratories, see your Placement Officer for full details.**



**BELL TELEPHONE  
SYSTEM**



# Library Notes

By Carson W. Bennett and Nina J. Mahaffey

"True glory consists in doing what deserves to be done, in writing what deserves to be read, and in so living as to make the world happier and better for our living in it.

Our library moved into its present quarters just five years ago this month. It has also been under its present administration during this time. The library personnel think that our resources (books, periodicals, and miscellaneous materials) are well organized. This means that one has an excellent chance of finding the material wanted at the time when it is wanted.

It is the opinion of the library administration that we need to concentrate upon getting a proper quiet atmosphere in the library in order that its resources may be used to the fullest extent.

You are most welcome to use the library if you are coming in to study or read quietly. If you are coming to visit or work on problems which necessitates talking, you will be asked to use other facilities. May we hasten to add that you are most welcome to use the recreational resources in our library. However, recreation in the library does not consist of loud talking and laughing.

May we have your cooperation in bringing about a proper quiet atmosphere in the library? The administration of the Institute is cooperating to the fullest extent with the librarian in enforcing proper conduct in the library. We are sure that you will all appreciate having a pleasant and quiet place to study and read.

Recent additions to the library of special interest:

*The Cornerstone*, by Zoe Oldenbourg.

The author takes us into the early 13th century when life was lived at a high pitch, whether for good or bad. *The Cornerstone* brilliantly reflects these contrasts: on the one

hand there is the world of tournaments and courtly love with all its pageantry and stylized beauty. Here, young knights court their ladies according to the intricate rules of the age of chivalry. On the other hand, power and passion rule ruthlessly. The lord of the manor thinks nothing of seducing his half-sister and then marrying her off to his swineherd. The cruelty and horrors of religious warfare ravage the cities and the countryside, and alongside faith stand superstition and belief in witchcraft. But throughout the book runs the motive of spiritual man, capable of wholehearted devotion and charity, of total renunciation and self-sacrifice for gains no longer earthly. It is he who redeems the vice, the squalor, and the violence of his times, supported in his vision by the cornerstone of faith.

*The Adventures of Hajji Baba*, by James Morier.

All the elements for thoroughgoing entertainment can be found in this book. The story is laid in nineteenth-century Persia, a romantic land remote geographically and in way of life from the western world. It is peopled with potentates and slave girls, robbers and rogues, and — above all — a hero, a resourceful, tongue-in-cheek rascal named Hajji Baba. This adventure's ups and (mostly) downs take him through every employment from barber to executioner, into caravans, harems, and camps, and introduce him, and us, to every type of individual in the human comedy. We may suspect, as we pursue our hero from one crisis to another, that James Morier is using these tales to comment on the pride, affectation, hypocrisy and chicanery which are universal in human nature, but Hajji Baba himself asks only a relaxed and sympathetic lis-

tener for the varied episodes of his career.

*Water: Miracle of Nature*, by Thompson King.

Have you ever stopped to think of the simple everyday element necessary for your very existence—*water*? It can be called the common denominator of the entire physical world—accounting for 70% of the composition of our bodies, and sustaining and nourishing all forms of plant and animal life. A unique solvent, it is at the heart of all chemistry and hence all industry. A leveler of mountains, and the very stuff of the seas, water has to a large extent determined the geography of the world, and in many cases the political and economic life of nations. It is the only substance found abundantly in all three natural forms — solid, liquid, and gas.

Water presents a fascinating paradox; it is the most common and the most uncommon of substances. It is common because it is plentiful and familiar. It is uncommon because its qualities, properties, and characteristics are strange, rare, and in some instances unique. The properties, as Mr. King points out, have made possible the existence and development of life since it began in the primeval sea; yet of them and their effect upon our modern world most of us know very little. It is a subject of universal importance and interest to each of us.

This is the story of what water, in all its forms, has done to the world and life. It is no less the story of what man has done with and to water. Mr. King writes it with an enthusiasm which is thoroughly contagious. Whether discussing water in a flowing stream, an iceberg, a steam boiler, or a cloud, he is always entertaining as well as informative, clear as well as complete.



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## Farm-fresh to you...

How a remarkable plastic helps bring fresher food to your table

A WONDERFULLY useful plastic called polyethylene\* is now giving a new kind of protection to food that is on its way to your kitchen.

**WHEN FOOD IS PACKED** in thin, strong bags of polyethylene, it is able to "breathe," and yet not dry out. Because polyethylene has this peculiar advantage, apples, carrots, and other fruits and vegetables—as well as poultry and meat products—can reach your table more nearly farm-fresh than ever.


**POLYETHYLENE IS ONLY ONE** of a number of plastics produced by the people of Union Carbide to help bring foods to you in prime condition. Some of these plastics coat cardboard for milk cartons and frozen food packages, while others line the tins for canned foods and beverages.

**SCIENCE "SETS A GOOD TABLE"** These and other materials produced by UCC help protect food while growing, in storage, during preparation, when packaged for your use, and when stored in your pantry or refrigerator. This protection helps provide a more healthful diet for all Americans.

**STUDENTS AND STUDENT ADVISERS:** Learn more about career opportunities with Union Carbide in *ALLOYS, CARBONS, CHEMICALS, GASES, and PLASTICS*. Write for booklet A-2.

\*Pronounced pol'y-eth'ī-lēn

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EVEREADY Flashlights and Batteries	UNION Carbide	LINDE Silicones	PRESTONE Anti-Freeze	NATIONAL Carbons
SYNTHETIC ORGANIC CHEMICALS	ELECTROMET Alloys and Metals	HAYNES STELLITE Alloys	PREST-O-LITE Acetylene	



# Fraternity Notes

## Sigma Nu

Honors of the Spring semester went to Art Sutton and Joe Leppert for their initiation into Tau Beta Pi and also to Myron Clark for his initiation into Blue Key.

Birt Kellam, a Junior Electrical, won the local A.I.E.E. paper competition with brothers Kenneth Cross and Thatcher Richardson winning second and third honors respectively. These three along with Art Sutton and Bill Handsford made the trip to Purdue where another competition is being held.

Brothers Art Sutton and George South are the fraternities actives who are competing in the school's track events with pledges Jack Gaughn and Dick Irey working out in the field events.

Again this year Sigma Nu's State Day s being held at Butler University in Indianapolis. It is to be held April 2 with a basketball game in the afternoon and a dance in the evening. All five chapters of Sigma Nu Fraternity in the state are expected to attend.

The fraternity basketball team having a more difficult road to travel in the inter-fraternity basketball league than in the football season, finally won the B.B. trophy only after a tough play-off game with the Lambda Chi's. With about the same team of brothers making up the fraternities' Softball team, we are looking toward a third trophy for the season.

Both the actives and pledges of the chapter were sorry to learn of pledge Dave Peter being ill and of the necessity of his leaving school. We wish him the best of luck and hope he be able to return again to Rose.

*John Rhodehamel*

## Lambda Chi Alpha

Lambda Chi Alpha welcomes its new pledges. They are Donald Cook, Joe Donniger, Norbert Failing, Dale Hoak, Frank Malinaro, James Massey, James Oakes, Erick Ressler, and Thomas Steproe. Best of luck men.

New officers were elected Tuesday, March 8. They are Bob Young, President; Terrill Vanover, vice-president; Walt Johanningsmeier, pledge trainer; Jerry Rose, treasurer; Fred Goetch, secretary; Charles Bruner, ritualist; Don Simpson, rush chairman; Jim Roach, social chairman; Gerry Mattern, house manager; and Charlen Harris, steward. With these new officers Lambda Chi hopes to do better than ever.

Lambda Chi of Rose went together with Lambda Chi of State to hold a White Rose Formal, Friday evening, February 18, 1955.

Miss Joan Parker, who is engaged to Sam Hart was chosen as Crescent Girl. Miss Parker was ill and could not attend the dance. We hope that she will soon be well and gracing the campus of DePauw with her presence again.

Congratulations are in order for Bob Scofield who pinned Miss Judy Hill of Terre Haute, Ed Pugh who pinned Miss Delight Mace of Terre Haute, and Terry Webster who has become engaged to Miss Rose Williams.

*J. R. Fromholz*

## Alpha Tau Omega

State Day, February 26, proved to be a most enjoyable day for the Taus, not only from Gamma Gamma, but also for the six other chapters in Indiana and Illinois which attended. Gamma Gamma was fortunate in winning the trophy for the best attendance. Forty-one of our forty-five actives attended the afternoon meet-

ings and ten pledges attended the pledge meetings. The University of Illinois won the song contest which was held at the banquet that evening.

Congratulations to Brother Ralph Llewellyn who was named the outstanding senior engineering student for 1955. Also receiving honors at the March 10 assembly were: Frank Eppert and Jack Elder, who were tapped for Blue Key, Chuck Hayward who was tapped for Tau Beta Pi, and Bob Travis, Frank Eppert, Harry Bitner, and John Williams, who received their honor keys.

Congratulations are also in order to Dave Thomas who recently pinned Miss Carolyn Kord, a sophomore at I.S.T.C.

*Art Masters*

## Theta Xi

This month there are many people to be congratulated. First, welcome and congratulations to our new pledges Bill Pruess, Ken Denney, Dave Bailz, Bob Coma, Bill Bock, Ray Gompf, Dick Potzler, Jim Tobias, Gene Blastic, and Bill Ogden.

The second round of congratulations goes to Jack Wilcox and Lewis Marshall, who "lost" their fraternity pins this month. Jack is pinned to Miss Danuta Skalmowski and Lewis to Miss Dorothy Elliott.

Joint parties were held with the Sigma Nu's before and after the St. Pat's dance. The party before the dance being at TX and the one after the dance at the Sigma Nu's.

During rush a party was held in the new recreation room for the nurses from St. Anthony's who helped with the parties.

*Ray Fischer*





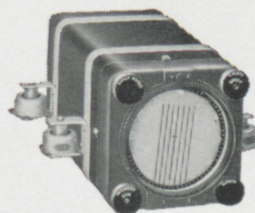
## New RCA Radar "Weather Eye" Sees Through Storms

In our time, Man has won round after round in a contest against the elements that started thousands of years ago.

The most recent scientific victory is something new in Radar—an electronic "Weather Eye" developed by RCA.

In airplanes, this supersensitive instrument peers miles ahead. It gives advance warning of weather disturbances. The signals on its radar screen point the way to a safe course *around* storm areas, or even *through* them.

The leadership in electronic research that made the "Weather Eye" possible is inherent in all RCA products and services. And at the David Sarnoff Research Center of RCA, Princeton, N. J., scientists are continually at work to extend the frontiers of "Electronics for Living."



New RCA Weather Mapping Radar weighs under 125 pounds, takes little space in a plane.

For information regarding design and development engineering positions on such projects as "Weather Eye" Radar and military electronic equipment—write to Mr. Robert Haklisch, Manager College Relations, Radio Corporation of America, Camden 2, N. J.



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# Alumni News

By Birt Kellam, jr., e.e.

'06 Wilkins, Hal E., e.e. Retired.

The Institute was sorry to hear that Mr. Wilkins had been seriously ill for several months. However, he is now home from the hospital and is much improved.

'29 Krochenberger, Emil A., ch.e.,

formerly a Formulator with the Baltimore Paint & Color Company, has recently been employed by the National Gypsum Company at Tanawanda, New York, as a research chemist.

'30 Rockwood, John W., c.e., em-

ployed by the Kelly Island Lime and Transport Company of Cleveland, Ohio, has been promoted from General Sales Manager to the office of Vice-President of the same company.

'33 Withers, Edwin J., e.e., has

been promoted from Lieutenant Colonel to full Colonel. Colonel Withers is in the Corps of Engineers, U. S. Army, and currently stationed at Pusan, Korea.

'41 Dreher, Joseph W., e.e., who

has been employed by General Electric as a Supervisor-Professional, Technical and Drafting Personnel, has been promoted to Manager Engineering Administration-Cathode Ray Tube Engineer for G. E.

'41 Jeffries, Quentin R., ch.e., re-

ceived his Ph. D. from the University of Illinois in 1953. He now occupies the position of Principle Chemical Engineer for the Battelle Memorial Institute in Columbus, Ohio.

'42 Gaston, Edwin E., e.e., was

killed recently in a mining accident. Mr. Gaston was electrocuted while changing a transformer at the Piney Fork Mine of the Hanna Coal Company in Adena, Ohio. He was employed by the company as their chief electrical engineer. Mr. Gaston was born in Bicknell, Indiana, and was President of the Open Pit Min-

ing Association at the time of his death.

'46 Kerstein, Donald J., e.e. &

m.e., formerly with Bevington, Taggare & Fowler in Indianapolis, is now with Tammen & Denison, Consulting Engineers in Baltimore, Maryland.

'46 Kylander, Robert L., ch.e., a

Process-Sales Service Engineer, Petrochemical Department, Continental Oil Company in Baltimore, Maryland, has been transferred to Houston, Texas. He was recently engaged to Miss Jesse Ellen Childs of Baltimore.

April '49 Quattroni, Emil, m.e.,

with the Chase Aircraft Company as a Junior Stress Analyst, has recently been employed by the J. A. Roebling & Sons, Corporation, in Tittusville, New Jersey.

## NOTE:

The fifth annual meeting of the Board of Directors of the Rose Polytechnic Alumni Association was held at the Terre Haute House on March 5, 1955.

Those present were:

## Executive Officers:

Bert L. Combs, '18—President  
J. Robert Wisely, '15—Vice President

Darrell E. Criss, F-'43—Secretary-Treasurer

Frederick M. Crapo, '19 and  
Frederick W. Kingery, '16—Representatives on the Board of Managers

## District Representatives:

*Second District*  
Clyde E. Cromwell, '37

*Third District*  
Lawrence D. Gwinn, '15  
Harry J. McDargh, Jr., '23  
Kenneth R. Allison, O-'43

*Fourth District*  
Edward J. Hegarty, '15  
Harry H. Richardson, '35

## *Fifth District*

Clarence L. Corban, '26  
Robert Shattuck, '36  
Kearney E. Harmas, '22

## *Sixth District*

Robert K. Price, '23  
John M. Phelps, '33

## *Seventh District*

Arthur E. Eble, A-'49

## *Rose Polytechnic Institute*

Ford L. Wilkinson, Jr.—President

The agenda of this meeting consisted of the following reports and discussions:

- 1) A report from Dr. Wilkinson
- 2) A report on the Alumni Fund by Chairman Wisely
- 3) A discussion of Alumni Association activities
- 4) The approval of the Scholarship Fund payment to the Institute
- 5) Discussion of Homecoming, October 8, 1955

X'56 Stutts, Harry C. Jr., Chicago, Illinois, recently graduated from the U. S. Naval Pre-Flight School at Pensacola, Florida.



Harry C. Stutts





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combination of generators, transformers, lines, cables and other equipment, and of any variations in components within the system, can be determined in a fraction of the time required by conventional methods.

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# Analyze Your Cake And Keep It Too With X-Ray

By Vern W. Palen, North American Philips Co., Inc.

Undoubtedly, there are vexing problems in your laboratory and shop that defy solution or are costly by ordinary methods. You may have questions which involve identification and measurement of elements and constituents of compounds that should be answered. Perhaps there are some unsolved mysteries in your plant processes that need clarification.

V-rays can do these jobs for you without harm to your specimens. If your laboratory studies and production control problems are chiefly concerned with compounds and the atomic structure of materials, *you need the X-ray Diffractometer*. When your investigations merely deal with elements present in a substance, *then get yourself an V-ray Spectrograph*.

Specimen preparation is relatively easy. The usual precautions must be taken, of course, to be sure that it is truly representative of the lot from which it is selected. In some cases, the specimen will be powdered and seived. In other instances, it need only have its surface polished. Most important, it will come back to you unharmed after the analysis, a point of extreme importance when dealing with rare or costly materials.

Once the specimen is ready and is inserted in the X-ray Diffractometer or the X-ray Spectrograph, the instrument takes over in semi-automatic fashion. The operator merely sets the controls to obtain the desired results, then waits for the answer, usually in the form of a strip-chart on which a hill-and-valley curve is recorded.

For production control the chart may not be needed. For example, where one wishes only to check presence or absence of specific elements or other constituents, the in-

struments can be set up to give rapid visual answers. In such cases, preliminary laboratory chart investigations are the basis for later shop procedures.

One recent new field in which X-ray analysis has been applied effectively deals with thin films. Coatings of six micrograms per square centimeter of stainless steel were readily identified on plastic base materials. In other words, the new technique easily and quickly determines percentages of chromium and nickel present in a specimen of 18-8 stainless steel where one square centimeter of the film actually contains about one microgram of chromium and less than one-half microgram of nickel.

Micro X-ray spectrography techniques have distinct potentialities for evaporation control through rapid an-

alysis of rates of deposits from solvents or through checking tiny quantities of condensate. Flash coatings, used for protective and decorative purposes, can readily be controlled as to thickness—a process heretofore extremely tedious and difficult, as well as inaccurate.

Air contamination and industrial plant flue recovery are important fields in reducing outputs of hazardous smokes, and in recovery of valuable by-products. Machine friction, a subject of great interest in aircraft, automotive and stationary engine design, is now susceptible to more efficient attack by analysis of thin films. This technique gives clues to the transfer of metals in the formation of superstrata alloys under heat and pressure. It will also reveal the degeneration of bearing surfaces due to chemical interaction with constituents of lubricants.

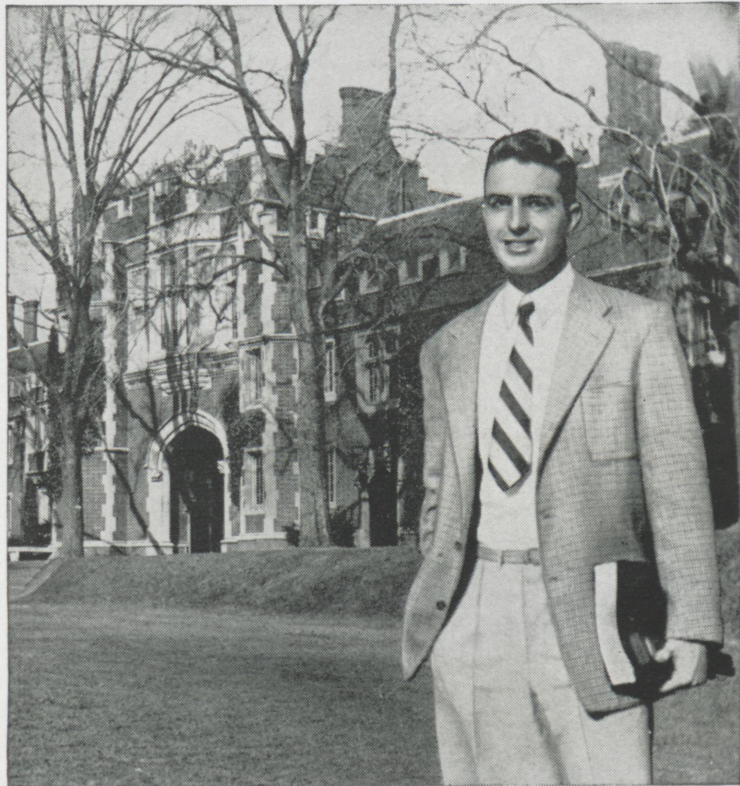


Complete Diffractometer and Spectrograph Installation



Donald C. Pote asks:

What bearing  
would my field  
of training have  
on my assignments  
at Du Pont?



**DONALD C. POTE** will receive his B.S. degree in Mechanical Engineering from Princeton University this June. He's been quite active in interclub athletics—football, basketball and baseball—and served a term as Club Athletic Director. He's also found time to work on "The Princeton Engineer" as Associate Editor. Right now, Don is making thorough plans for his employment after graduation.



**CHARLES H. NOREN** received his B.S. in Mining Engineering from the University of North Dakota before he entered the U. S. Air Force. Later he returned to school for an M.S. from the Missouri School of Mines, received in 1948. During the course of his Du Pont employment, Chuck Noren has had a wide variety of job assignments. At present he is engaged in a fundamental research project concerned with commercial explosives at Du Pont's Eastern Laboratory in Gibbstown, N. J.

"Chuck" Noren answers:

The answer to that is easy, Don, if you mean *initial* assignments. Generally speaking, a graduate's first assignment is influenced by his previous training and his expressed interest in a particular type of work. Whenever possible, Du Pont assigns a man to the type of work he is trained for and wants—he'll do better in any field if he's highly interested. For example, my master's thesis was on the use of explosives, and my first Du Pont assignment was a study of the efficiency of explosives.

But experience on the job really constitutes *new training*. You learn about other branches of science and engineering—you broaden your horizons through daily contacts with men having other skills. The result is that arbitrary divisions between technical branches gradually dissolve, and you become ready for new assignments and new responsibilities—even outside your original field. In my own case, I developed quite a bit of skill in mechanical and civil engineering techniques when I was called upon to supervise the "shooting" of an experimental tunnel for the evaluation of new explosives—even though my original training was in mining engineering.

Of course, specialization in a definite field may be continued if the man specifically wants it and reveals a talent for it. The best opportunities for that are in research and development. Naturally, the value of this kind of work is also recognized at Du Pont.

So, no matter what your initial assignment may be, Don, Du Pont is anxious to bring out your best. A good rule to remember is this. A graduate's *first* assignment is often necessarily based on his field of training and his degree, but his subsequent progress at Du Pont is *always* based on his demonstrated ability.

**NOW AVAILABLE** for student ASME chapters and other college groups, a 16-mm. sound-color movie—"Mechanical Engineering at Du Pont." For further information write to E. I. du Pont de Nemours & Co. (Inc.), 2521 Nemours Bldg., Wilmington 98, Delaware.



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# SUGAR CHECK

By Ron Criss, fr.

A recent report from the National Bureau of Standards outlines a new method for the determination of aldehydes in glucose. In this method sodium acid chlorite is used for the quantitative determination of aldehyde groups in glucose, which is one of the principle building blocks in cellulose. The presence of these aldehyde groups in increasing amounts is related to the degradation of the carbohydrate polymer.

The cellulose in wood, paper, and other textiles is a high polymer built up from carbohydrate monomer units, chiefly glucose. Other aldose sugars, as well as modified sugar units may also exist in cellulose. These aldose sugars, as the name suggests, contain an aldehyde group. In carbohydrate polymers such as cellulose this aldehyde group is initially tied up at one end of the chain, but when the polymeric molecule has been modified by light, heat, or chemical reagents, it may contain other free aldehyde groups. Methods for determination of aldehyde in aldose sugars are thus of considerable importance for research into mechanisms of cellulose determination.

Commonly accepted methods for this determination employ an alkaline medium. Although these methods are often useful, some modified celluloses are quite sensitive to alkali and may be hydrolyzed or otherwise degraded by it, which results in an ambiguous result for aldehyde content.

Acid solutions of sodium chlorite, on the other hand, do not attract functional groups in cellulose or sugars with the exception of the aldehyde group, which is quantitatively oxidized to carboxyl. This fact suggested that aldehyde in cellulose

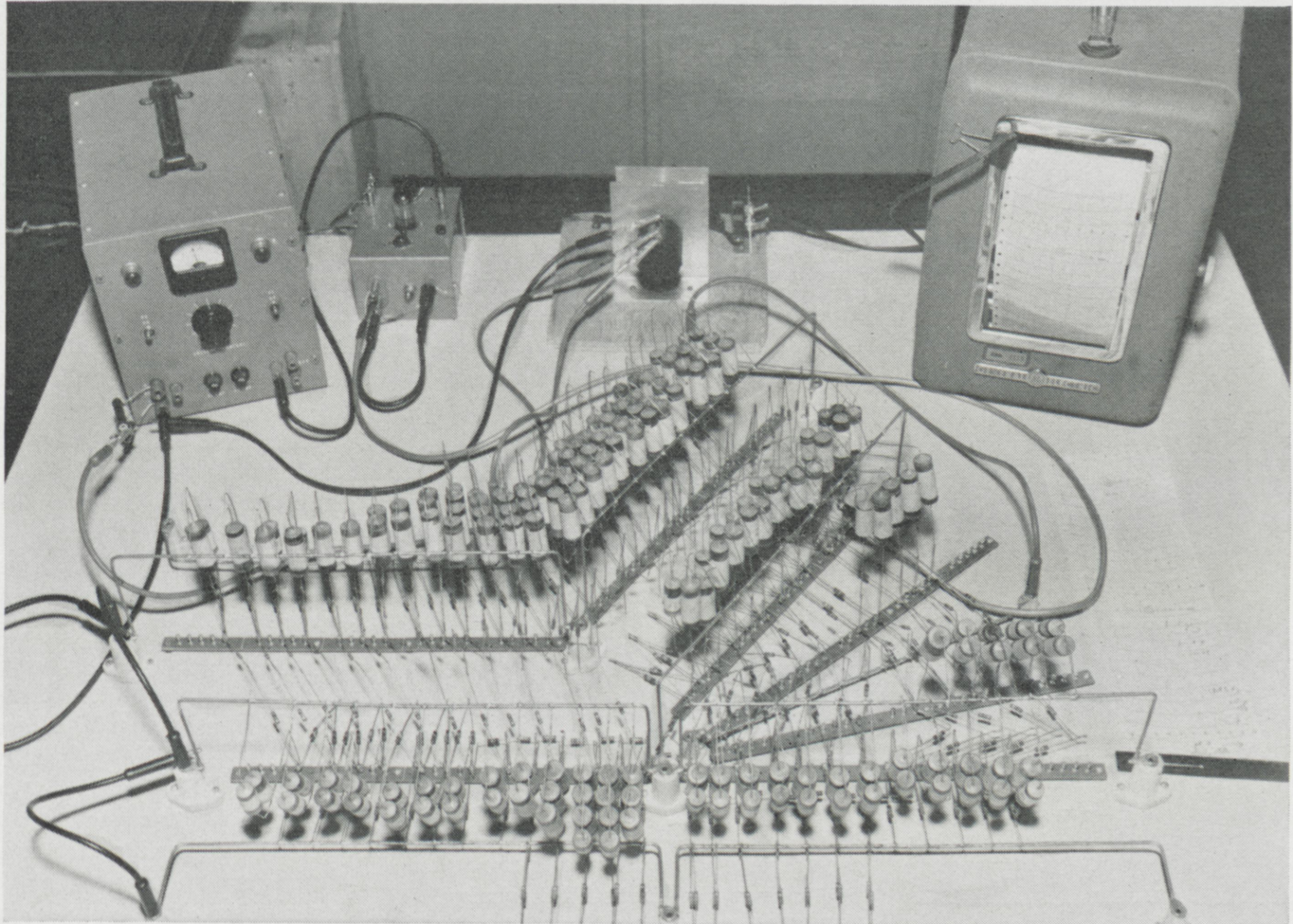
could be determined by means of oxidation with acid chlorite, and N. B. S. has undertaken the investigation of this process.

One difficulty with this method is that solution of chlorite salts are unstable in acid medium. Since the reaction between the chlorite and the aldehyde takes place rather slowly, there is appreciable decomposition of the chlorite during the process. In preliminary work with glucose this has been overcome in two ways: (1) by use of a calibration curve relating chlorite consumed to aldose oxidized for specific conditions and (2) by development of an analytical expression from kinetic and stoichiometric considerations.

The former procedure is more accurate, but the analytical expression is more flexible, as it applies over a range of experimental conditions. However, either procedure gives experimental values for glucose within a few percent of the theoretical value, depending upon the amount of glucose present.

The kinetics of the oxidation of glucose have been studied over the experimental ranges of 3.4 to 4.4 pH, 30° to 65°C, 0.005 to 0.15 Molar sodium chloride, and 0.00006 to 0.0016 Molar glucose. The reactions were followed by determining the change in chlorite concentration, as shown by iodometric titration and by photometric measurement of the soluble yellow gas, chlorine dioxide, formed in the reaction. Cellobiose, melibiose, maltose, and lactose were all oxidized at about the same rate as glucose, but nonreducing sugars and sugar acids were not appreciably oxidized under the conditions of the experiments.





This analogue computer, a pioneer in this age of "thinking machines", was developed by Standard Oil scientists.

## New Electronic "Engineer" Solves Tough Refinery Problem

THE MEN who design modern oil refineries need specific information about temperature distributions in different parts of pressure vessels. Such information, essential to safety and efficient operation, is often extremely difficult to obtain by conventional mathematical methods.

Scientists at Standard Oil's Whiting laboratories recently developed and built an electrical analogue capable of simulating specific conditions within a refinery unit still in

the design stage. Using this device, they could determine in advance the temperature distribution in the joint between two pressure vessels having a common head. Thus they were able to duplicate in 20 seconds the heat stress picture within the unit during an 8 hour start-up to shut-down period.

Creative scientific thinking made possible this constructive achievement by engineers who have chosen to build their careers at Standard Oil.

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# LOCKER RUMORS

By Bob Bright and Harold Brown

The Rose Poly Cagers made a 138 mile trip to Greenville College February 15, only to lose by an overwhelming score of 124-86. Greenville's center, Ron Shives, scored 41 points to break the school record. He had the able assistance of Young and Cook who scored 29 and 19 points respectively. Don Snape swished the nets for 26 points and was the only bright spot of the evening for Rose.

Greenville showed tremendous scoring punch, but did not display a good defense. Shurtleff, whom the Engineers met, February 22, displayed a good offense and a good defense as they defeated the Rose Men, 85-47. Brochers, Shurtleff's center, poured in 24 points for the best individual effort of the evening. Bob Young was the high man for Rose, collecting 13 points.

Don Snape and Gary Giffel, two regular starters, did not play in the Shurtleff game or the Blackburn game because of the flu. Rose posted a stylish 71-56 victory over Blackburn College on the home floor. Bob Young paced the Engineers with 21 points, while Bob Bright tallied 14. Other ten point producers were Jim Oakes and Harold Brown with 13 and 10 points respectively. Rose, using a zone defense, held the Blackburn players in check most of the game. High scorer for Blackburn was Hughes with 22 points. Blackburn never challenged the Engineers as the home team scorched the nets with a .450 shooting percentage.

Rose finished the basketball season with an impressive 76-67 victory over Eureka. In each of ten games preceding their encounter with Rose, Eureka had hit the hoop for an average of over 100 points per game. The high scoring trio of Brownfield, Strickland, and Gioletti had been averaging 57 points per game. The

Engineers applied their zone defense effectively, however, and the trio was held to 31 points. Bob Bright found the nets most consistently for Rose, netting 19 points followed by freshman center Jim Oakes' 17 points. Harold Brown, playing mostly in relief, netted 15, and Walt Johanningsmeier, a recent starter, proved his worth with 14 points. This win gave the Engineers an over-all season's record of 10 wins and 8 losses.

Intra-mural basketball also came to an end with the Junior Electricals winning the league. The team, comprised of Rodabaugh, Kalen, Pruitt, Dodson, Carpenter, Sutton, and McIndoo, was undefeated in 16 starts. Kalen was the high scorer for the winter season, averaging 17.6 points per game. Two of these victories were over an All Star Team comprised of outstanding members of other teams in the league. Included on this team were Potts, Stork, Boller, Lott, Davis, Branson, Runyan, Gordon, Molinero, Donninger, Mattern, Light, and Kallis. Spring activities of the intra-mural program include a doubles horseshoe tournament, which begins April 7, and an intra-mural softball league, which begins April 1. We hope the faculty will field a team this year, which will not lose to such teams as Freshman Section B, last years winning team.

Sigma Nu ended inter-fraternity competition with an impressive 53-47 victory over Lambda Chi Alpha thus giving them the league championship.

Intercollegiate activities are getting under way for the spring season. Thirty-two men reported to Jim Carr on the first day of baseball practice, and track men are trying to get in shape for meets with Marian College, March 17, St. Joseph's, March 22, and Franklin, March 26.





IN ORDNANCE

## HONEYWELL OFFERS DIVERSIFIED OPPORTUNITIES

THE opportunities for engineers in the automatic control field are unique in their variety and in the insight provided into all of the industries of today's modern world.

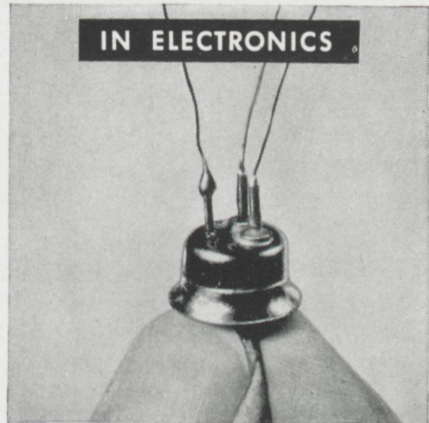
The development and manufacture of tiny transistors for electronic control . . . the design and manufacture of quality electronic photo flash units . . . the challenge of finding fish with underwater sonar . . . of providing automatic flight for supersonic jets . . . temperature controls for today's modern home . . . for atomic piles . . .

These are a few of the fields in which Honeywell's several divisions are engaged, providing automatic controls for industry and the home.

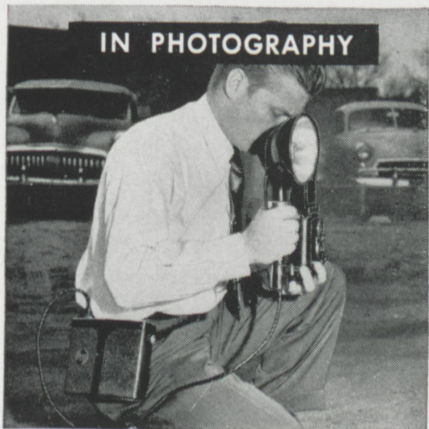
These controls are made possible by the creative imagination of highly trained engineers working with the very latest research and test facilities.

With twelve separate divisions located throughout the United States and with factories in Canada, England and Europe, Honeywell offers unlimited opportunities in a variety of challenging fields. Based on diversification and balance between normal industry and defense activities, Honeywell will continue to grow and expand because automatic control and instrumentation are so important to the world's progress.

That is why we are always looking for men with ideas and imagination and the ambition to grow with us. In addition to full time engineering and research employment we offer a Cooperative Work Study program, a Summer Student Work Study program and Graduate Fellowships. If you are interested in a career in a vital, varied and diversified industry, send the coupon for more information.



IN ELECTRONICS



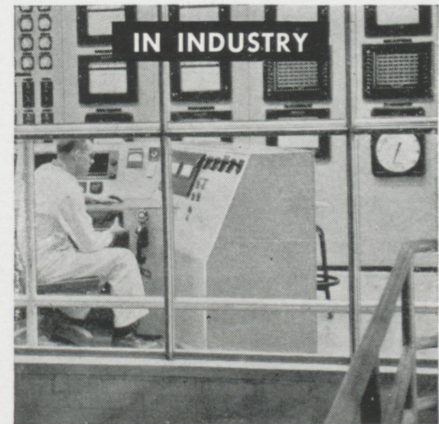
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## Research & Development

(Continued from page 13)

heat and possible shattering of the flashbulb. This flashguard also reduces the light intensity to 1/10 of normal brilliance, the correct lighting for the extreme close-ups. The flashholder is positioned slightly to one side of the camera to produce better light modeling and give good roundness and detail.

With the attachment correct exposures and focus are easily achieved. A simple guide shows how to make extreme close-ups, as well as medium or long distance shots.

The new unit is designed so the frame need not be removed, even for distant shots. The camera is instantly usable for any desired pictures. The frame is rugged enough for field work as well as laboratory use.

Simplicity and high-quality results make the camera and this new close-up attachment potentially useful in many fields. Amateurs will find it useful for flower and nature photography, for instance. As a scientific tool, it has applications in medicine, criminology, botany, entomology, biology, and paleontology, to name only a few.

### Inco's Open Pit is one of Canada's Most Spectacular Mining Activities

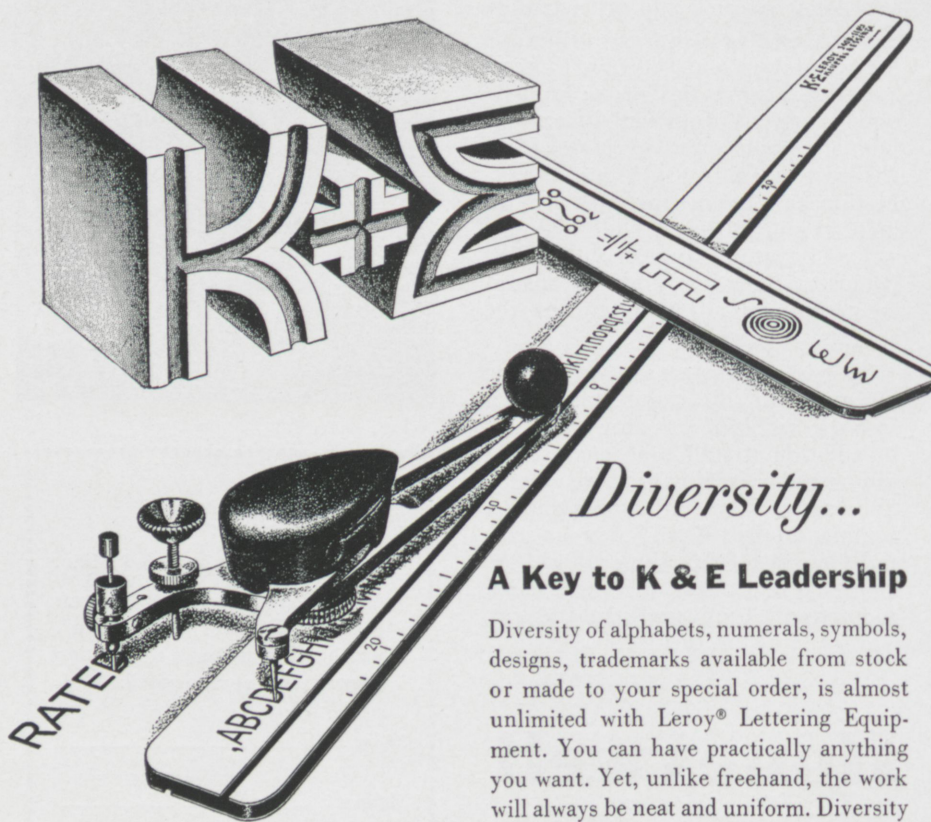
The Sudbury District of Ontario is probably best known as the heart of Canada's nickel industry. From this area, about 300 miles north of Lake Erie, comes more nickel than the rest of the world combined, as well as large quantities of copper, platinum metals and other elements. Many mines have contributed to Sudbury's foremost position as a nickel producer, but none has the sweeping scale and scope of the Frood-Stobie Open Pit of The International Nickel Company of Canada, Limited.

The Open Pit is part of the great Frood-Stobie ore body, the largest

single nickel ore body ever discovered. Ten thousand feet long and more than 4,000 feet deep, this wide column has enormous tonnages of ore still waiting to be mined despite the millions of tons already produced. The Frood-Stobie ore body was already being mined by underground methods when surface operations began, and it has been worked upward and downward from the 2,800-foot level.

During World War II the Open Pit alone supplied more than 40 per cent of the Allies' nickel requirements. Mined in steps or "benches," the huge excavation is more than 500 feet deep, and measures about 6,300 feet at its greatest length and 1,400 feet at its widest. Although the crushing plant is actually only about 1,000 feet from the place on the pit floor where the shovels are working, the trucks used to transport ore must travel more than a mile over a road winding upward around the inside of the pit walls before they reach the plant on the surface.

(Continued on page 30)



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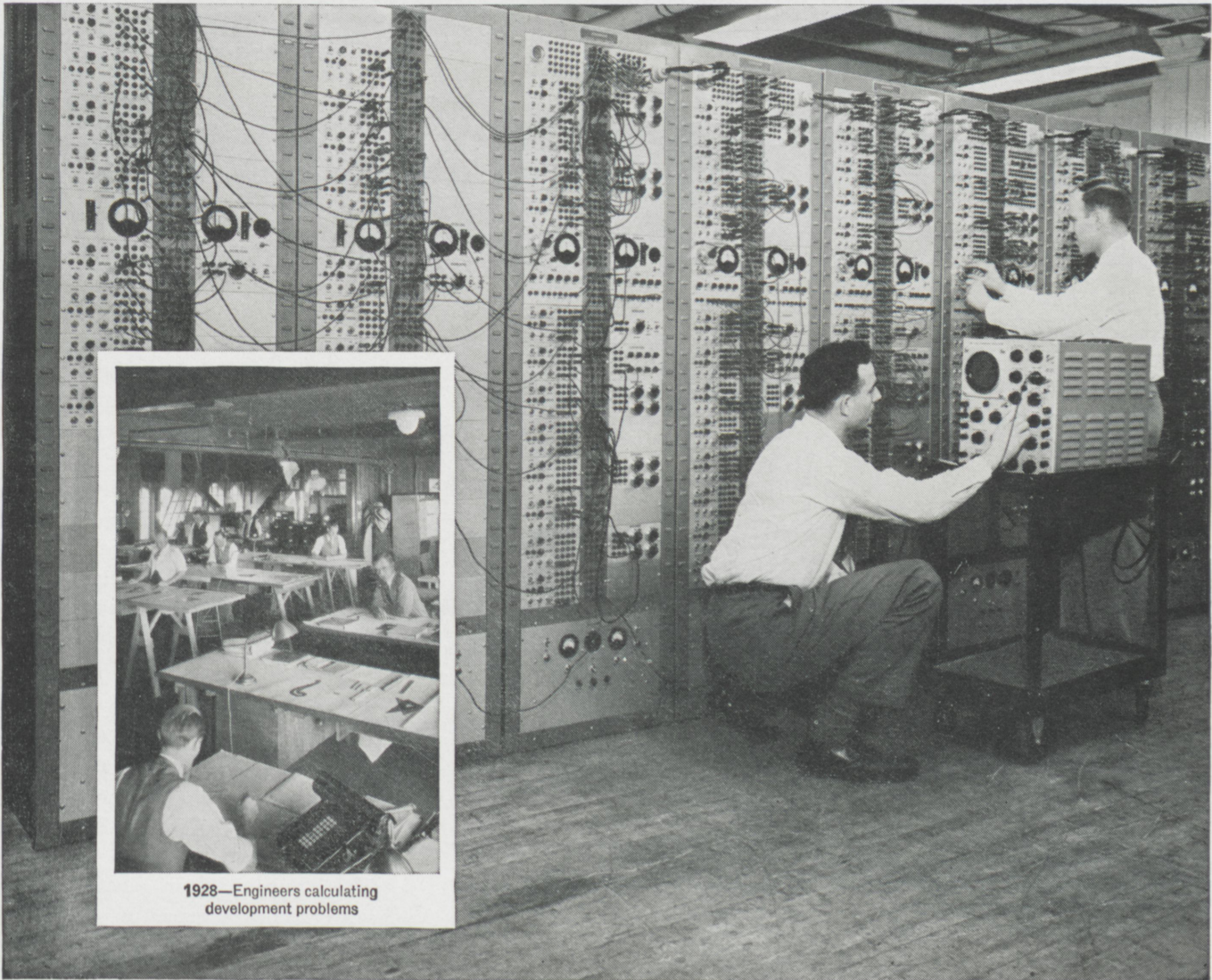
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1955—Solving complex engineering problems with Boeing computer



1928—Engineers calculating development problems

## The best research facilities are behind Boeing engineers

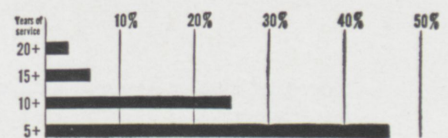
The Boeing-designed electronic computers shown above solve in seconds problems that once required weeks—typical of the advanced “tools” that help Boeing engineers stay at the head of their field.

Boeing engineers enjoy such other advantages as the world’s fastest, most versatile privately owned wind tunnel, and the new Flight Test Center—the largest installation of its kind in the country. This new Boeing Center includes the latest electronic data reduction equipment, instrumentation laboratories, and a chamber that simulates altitudes up to 100,000 feet. Structural and metallurgical research at Boeing deals with the heat and strain problems of supersonic flight. Boeing electrical and electronics laboratories are engaged in the development of

automatic control systems for both manned and pilotless aircraft. Other facilities include hydraulic, mechanical, radiation, acoustics, and rocket and ram-jet power laboratories.

Out of this exceptional research background engineers have developed such trend-setting aircraft as America’s first jet transport, and the jet age’s outstanding bombers, the B-47 and B-52. Research means growth—and career progress. Today Boeing employs more engineers than even at the peak of World War II. As the chart shows, 46% of them have been here 5 or more years; 25% for 10, and 6% for 15.

Boeing promotes from within and holds regular merit reviews to assure individual recognition. Engineers are



encouraged to take graduate studies while working and are reimbursed for all tuition expense.

There are openings at Boeing for virtually all types of engineers—electrical, civil, mechanical, aeronautical and related fields, as well as for applied physicists and mathematicians with advanced degrees.

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

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Since 1948 Hughes Research and Development Laboratories have been engaged in an expanding program for design, development and manufacture of highly complex radar fire control systems for fighter and interceptor aircraft. This requires Hughes technical advisors in the field to serve companies and military agencies employing the equipment.

As one of these field engineers you will become familiar with the entire systems involved, including the most advanced electronic computers. With this advantage you will be ideally situated to broaden your experience and learning more quickly for future application to advanced electronics activity in either the military or the commercial field.

Positions are available in the continental United States for married and single men under 35 years of age. Overseas assignments are open to single men only.

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Relocation of applicant must  
not cause disruption of  
an urgent military project.

*Research &  
Development*

*(Continued from page 28)*

The southern section of the vast Open Pit has given over to underground mining, which at this point now extends below the 2,800-foot level, but surface operations continue in the central and southern sections. It is in the central section where the Open Pit reaches its maximum width of 1,400 feet and where also it will achieve the maximum depth by surface mining—now planned for 580 feet below surface level. This has been determined to be the economical limit for surface operations. From here the ore body will be mined from underground.

Meantime, drilling rigs continue to pound nine-inch holes 60 feet down into the ore body. Blasting powder is placed in the set of holes and the charge is fired. About 12,000 tons of ore are shattered with each blast. Then huge 170-ton electric shovels, with a bucket capacity of 4½ cubic yards, scoop up the ore and dump it into the 30-ton diesel trucks for transportation to the crusher on the surface. Bulldozers and graders are continually engaged maintaining the bottom of the pit and the roads as part of an orderly program of "good housekeeping."

The time is approaching when the famous Frood-Stobie ore body will be mined exclusively by underground methods. But the yawning Open Pit, standing astride the largest body of nickel ore the world has known, will be remembered as one of the most spectacular activities in Canadian mining history long after its walls cease to echo to the familiar sounds of surface operations.

**Synchrophased Propellers**

Flight test engineers at Lockheed Aircraft Corporation today reported they have developed a new way to make air travel 25 percent quieter,  
*(Concluded on page 34)*



# "I needed to 'Find' Myself— that's why I picked Allis-Chalmers,"

says **A. J. MESTIER**

*Massachusetts Institute of Technology Sc. B.—1943  
and now Manager, Syracuse District Office*

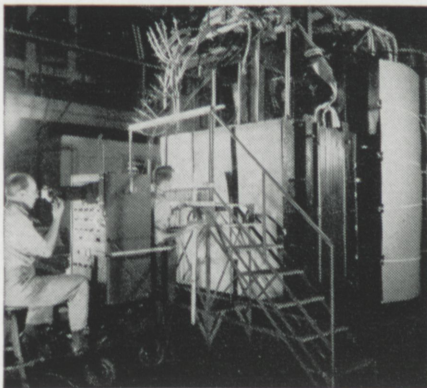
"I WAS LOOKING for an engineering job, but I wasn't very sure just what phase of this broad field would interest me most. I didn't know whether I wanted straight engineering, sales engineering, production or some other branch of industrial engineering.

"Allis-Chalmers Graduate Training Course gave me a means of working at various jobs—seeing what I liked best—and at the same time obtaining a tremendous amount of information about many industries in a very short time."

## Experience Typical

"My experience is typical in many ways. I started the Graduate Training Course in 1946, after three years in the Army. My first request was to go to the *Texrope* V-belt drive department. From there I went to the Blower and Compressor department; then the Steam Turbine department. By the time the course was completed in 1948, my mind was made up and I knew I wanted sales work. I was then assigned to the New York District Office and in 1950 was made manager of the Syracuse District. The important thing to note is that all Allis-Chalmers GTC's follow this same program of picking the departments in which they want to work.

"Best of all, students have a wide choice, for A-C builds machines for every basic industry, such as: steam and hydraulic turbine generators, transformers, pumps, motors and other equipment for electric power; rotary kilns, crushers, grinders, coolers, screens and other machinery for



**Taking** surge voltage distribution tests on power transformer in A-C shops with miniature surge generator and cathode-ray oscilloscope.

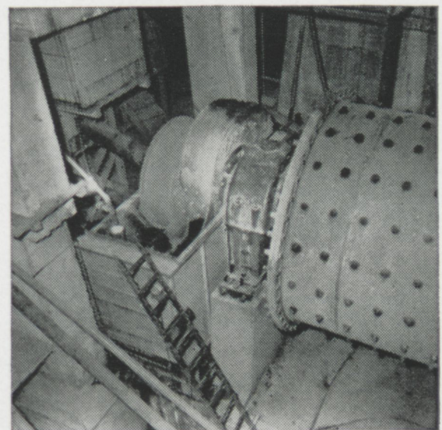


mining, ore processing, cement and rock processing. Then there is flour milling machinery, electronic equipment and many others."

## A Growing Company

"In addition, new developments and the continuing growth of the company offer almost endless opportunities for young engineers.

"From my experience on the Graduate Training Course, I believe it is one of the best conducted in the industry and permits a young engineer to become familiar with a tremendous variety of equipment—both electrical and mechanical—which will serve him in good stead in his future profession."



**Ball Mill** grinds ore for large copper producer. Same type of equipment from Allis-Chalmers pulverizes much of nation's cement.

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## Plastic Film

(Concluded from page 14)

### Polyethylene-Cellophane Laminate

The boon in packaging specialties and fruit juices got a boost with the recent development of a polyethylene-cellophane laminate produced without the aid of adhesives of any sort. The advantages of the new combination film, according to the developers and manufacturers, is that the film has all of the best features of the two component films, without their faults. As an example, the combination films have the transparency, gloss, and printability of cellophane, added together with the durability, stability, and resistance to sunlight of polyethylene. The big advantage over other combination films, again according to the developers and manufacturers, is that there is no delamination with age, high temperature, and with solvents, as there is with the laminated films using some type of adhesives.

As example of the success of this co-polymer laminated plastic film is that of its use in the citrus fruit industry. Orange juice from fresh oranges can be made into a thick concentrated juice, packed into bags made of this laminated film, and then frozen. This frozen concentrate can then be shipped to its destination and converted back to its full strength. For this purpose a two and one-half ounce bag of orange concentrate can be converted into a ten-ounce glass of orange juice. The Walgreen Company has already adopted this method, and it is estimated that this method of obtaining citrus fruit juices is saving the Walgreen Company about seven cents' worth of labor on each glass of juice. This amounts to a tremendous sum of money considering this company sells approximately thirteen million glasses of juice a year.

### Minor Industrial Uses

The use of plastic films is not limited to the packaging industries. As was mentioned, it deals with many

industries. Another of the fields of endeavor is that of molded films. In this industry, the film is molded to a specified shape and size with some specific job in mind. The film used in this type of industry depends entirely upon its use and either mono-polymer or poly-polymer plastic films may be used. Some of the products developed are rain boots, a snugly fitting rain cover for United States Naval officers' hats, application of protective coatings to metal refrigerator parts, and the production of extremely thick dip-molded insulation on marine radio equipment.

Most plastic films can be colored, shaded, lacquered, and printed upon. This fact opens up the possibility for another type of film industry. As an example, a new vinyl film recently was released called Weavtex. Weavtex is produced with reproductions of fabric textures on both sides of the film. The reproduction of the texture of the cloth is so near perfect that when comparing the actual cloth to the plastic film, the two resulting materials must be touched to determine which is the actual cloth. This film, Weavtex, is soft and drapes well, is completely crush proof and wrinkle-proof, and is easily cleaned. Present uses for Weavtex are for window shades, draperies, wearing apparel, and wherever cloth material of this type may be used.

Going back to the packaging industry, we have another film having a specialized use. This film is polychlorotrifluoroethylene (fluorothene). This film is very good for many packaging and protective applications which involve the handling of many highly corrosive chemicals. Along with the non-corrosive property, this film is also non-flammable, highly resistant to transmission of air, oxygen, and water vapor, and shows excellent weathering and sunlight resistance.

In the preceding paragraphs an attempt has been made to bring to light the industrial importance of plastic films and to expound upon the uses for these films. In my opinion, the field of plastic films has grown, is growing, and will continue to grow for some time.

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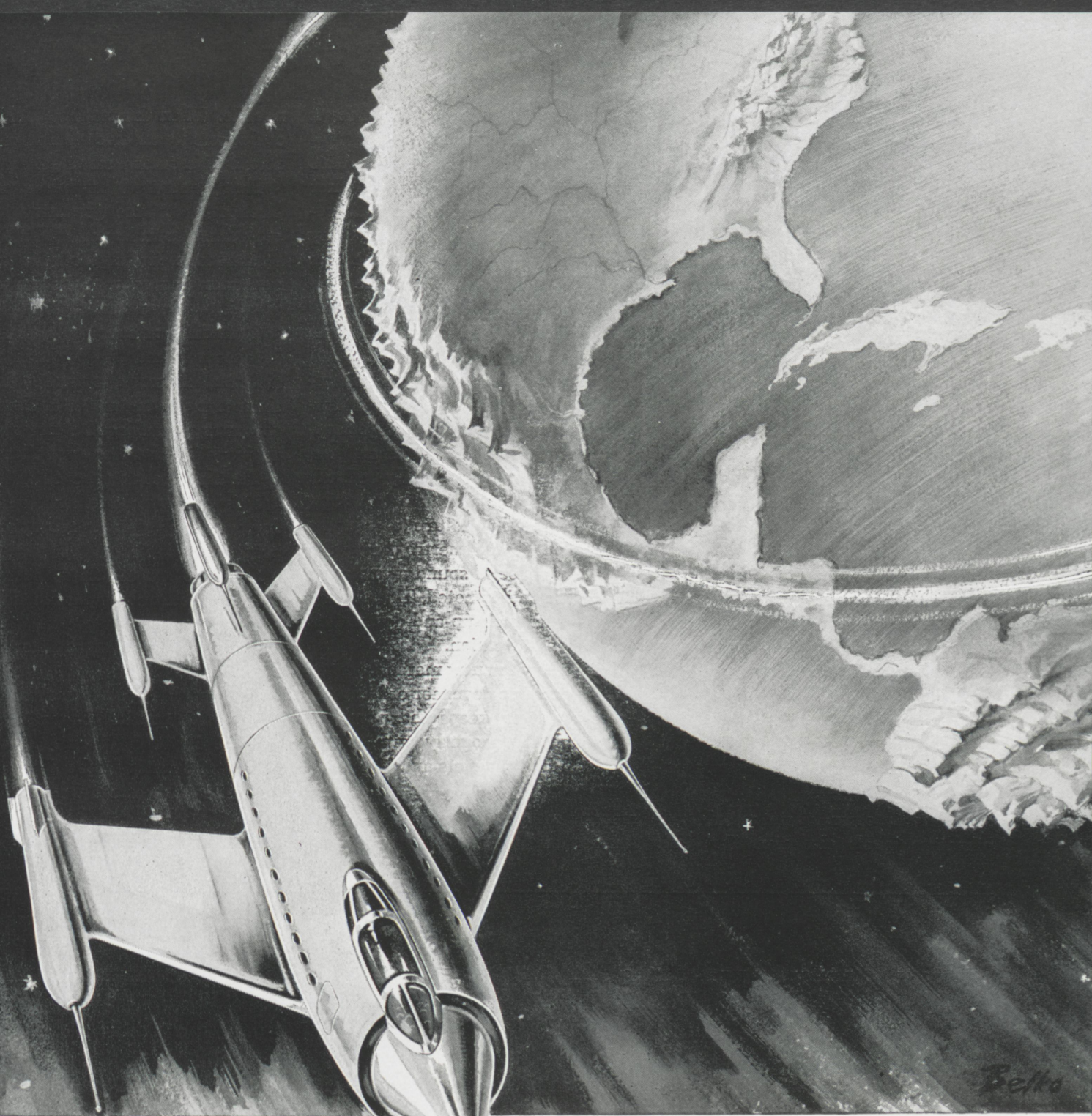


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## Research & Development

(Concluded from page 30)

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," said C. L. Johnson, chief engineer for Lockheed's California Division. "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."

Johnson explained that 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 im-

proved soundproofing has held down the noticeable sound level.

Lockheed 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.

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.

Research on the new theory has been carried out by Lockheed's engineering flight test department, which requested two propeller manufacturers to build synchrophasers for flight test demonstrations. Both the Hamilton Standard Propeller Division of Pratt & Whitney Aircraft, Hartford, Conn., and the Curtiss Propeller Division of the Curtiss-Wright Corp., Wood-Ridge, N. J., have cooperated in the research work.

### Woodridge Motor Court

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WEST OF ROSE POLY

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### CAMP MANITOU FOR BOYS PHIL BROWN, Camp Director



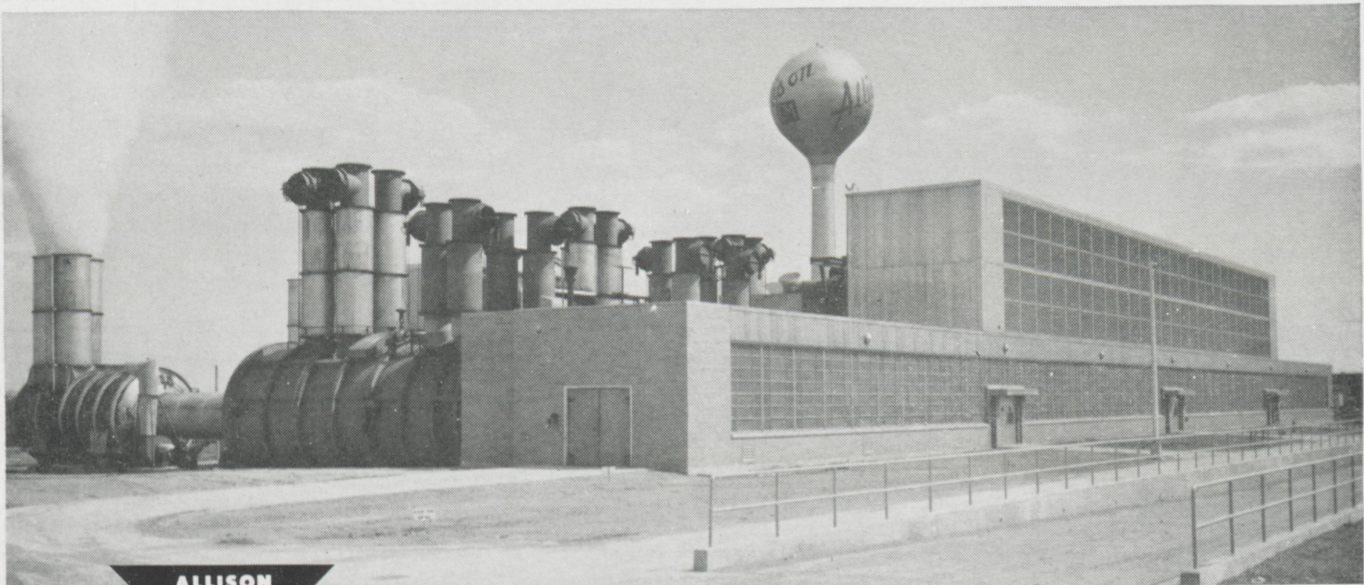
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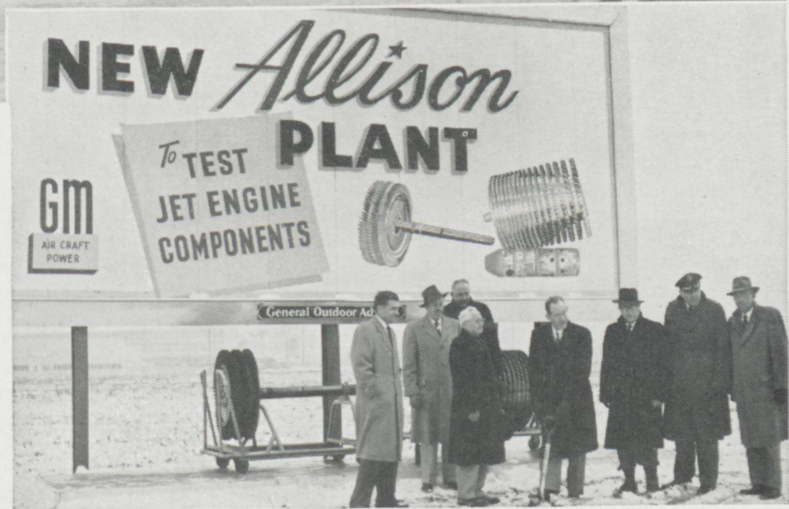


# ALLISON Engineers Break Ground for New Turbine Engine Test Facilities



**ALLISON  
PLANT  
8**

E. B. NEWILL, Georgia Tech, '15, now General Manager, Allison Division and Vice President of General Motors Corporation, breaks ground on another addition to our turbine engine test facilities.\*



Allison Jet engine designers soon will have even larger and improved test facilities to use in developing turbo-jet engines.

Performance requirements for future military and commercial aircraft make necessary the development of new turbo-jet engines far more complex and powerful than present types. New and specially-designed test equipment is required to accurately determine per-

formance of the principal engine components—compressors, turbines, and combustors—before the complete engine is tested.

For instance, capacity for 75,000 horsepower is being established to pump air at the rate of 300 pounds per second. This air must be compressed and heated to 1000 degrees, or cooled to a minus 67 degrees, enabling Allison to test combustors at simulated altitudes up to 65,000 feet.

With our expanding and long-range engineering program, we need additional young engineers. Allison, a leader in the design, development and production of turbo-jet and turbo-prop engines, NOW offers young graduate engineers unusual opportunities for progress where future development is unlimited.

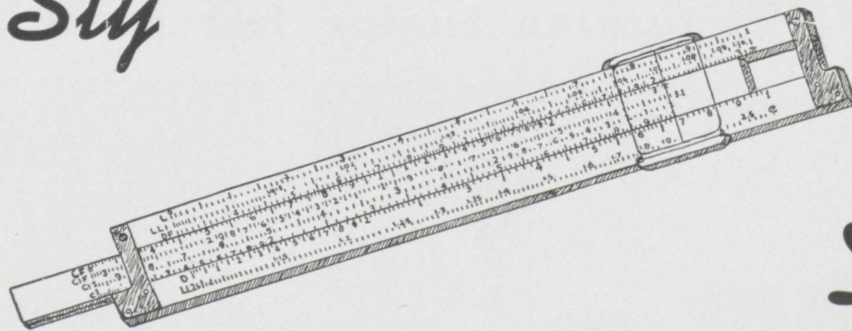
Write for information:

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

\* Left to right—Dimitrius Gerdan, Chief Engineer, Turbo-Jets, U. of Michigan, 1932, BS in Mechanical Engineering and Industrial Engineering; T. W. Meeder, Chief Test Engineer, U. of Michigan, 1932, MS in Aeronautical Engineering; R. E. Settle, Assistant Director of Engineering, Purdue University and Indiana Central College, BS in Mathematics; Paul Hunt, representing Huber, Hunt & Nichols, Inc., contractor; E. B. Newill, Georgia Institute of Technology, degrees in Mechanical and Electrical Engineering; Harold H. Dice, U. of Illinois, 1929, BS Business Administration; Col. S. A. Dallas, USAF Plant Representative; R. M. Hazen, U. of North Dakota, U. of Michigan, 1922, BS in Mechanical Engineering and attended graduate school, U. of Minnesota, majoring in Metallurgy.



# Sly



# Droolings

Stolen by Frank Potts, jr., m.e. and Carter Smith, jr., m.e.

### Words of Wisdom:

If most of us practiced what we preached we'd work our fool selves to death.

"Blessed are those that go around in circles, for they shall be called Big Wheels."

\* \* \*

"Was he surprised when you told him you wanted to marry his daughter?"

"Was He! The gun nearly fell out of his hands."

\* \* \*

A window washer related this experience to his friends: "One day I was cleaning a window when a young woman entered and started to undress. She took off her shoes and stockings and then her dress when suddenly the ladder broke."

"What a calamity at a time like that," remarked one of the listeners.

"It sure was," answered the window washer, "but what could you expect with twenty guys on the ladder?"

\* \* \*

A small boy was very interested in watching a baldheaded man scratch the fringe of hair around the side of his head. After some time the boy said in a loud whisper, "Say, Mister, you'll never catch him that way. Why don't you run him out in the open.."

A man wandered into a tennis tournament the other day and sat down on the bench.

"Whose game?" he asked.

A shy young thing sitting next to him looked up hopefully.

"I am," she replied.

\* \* \*

A backwoodsman mountaineer one day found a mirror which a tourist had lost. "Well, if it ain't my old dad," he said as he looked in the mirror. "I never knew he had his pitcher took." He took the mirror home, stole into his house and hid it in the attic, but his actions did not escape his suspicious wife. That night while he slept she slipped up to the attic and found the mirror. "Mmmmm," she said, looking into it, "so that's the old hag he's been chasin'!"

\* \* \*

The one-ring circus was visiting a town in the hills. The folks there recognized all the instruments in the band except the slide trombone.

One old settler watched the player for quite some time, then, turning to his oldest son, said,

"Don't let on that you're watching him. There's a trick to it; he ain't really swallerin' it."

Secretary: But, professor, isn't this the same exam you gave last year?

Professor: Yes, but I've changed the answers.

\* \* \*

Three deaf gentlemen were on a train bound for London. "What station is this?" inquired the first gentleman.

"Wembley," answered the guard.

"Heavens!" said the second. "I thought it was Thursday!"

"So am I," exclaimed the third. "Let's all have a drink."

\* \* \*

A divinity student named Tweedle Refused to accept his degree. He didn't object to Tweedle, But he hated to be Tweedle, D.D.

\* \* \*

"Doctor, my son has cholera, and the worst of it is, he admits he caught it from kissing the maid."

"Well, well. Young people do thoughtless things, don't they?"

"But doctor, I've been kissing the maid myself."

"Too bad."

"And what's more, I've been kissing my wife."

"What? Oh, my gosh! Now we'll all have it."

\* \* \*

Judge: "I'm sorry, but I can't give you a marriage license until you have a properly filled out form."

Coed: "Listen, if my boy friend doesn't care, why should you?"

\* \* \*

Now go back and read the rest of the magazine.



PHOTOGRAPHY AT WORK—No. 9 in a Kodak Series

**Kodak**  
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*Richmond Station of the Philadelphia Electric Co.*

## Weeks of work shrink to days as photography weighs mountains of coal

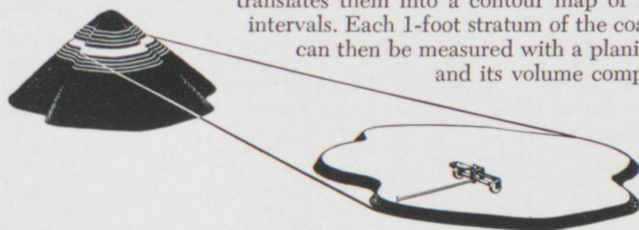
**Aero Service Corporation takes stereo pictures of the coal piles at a utility's 10 storage sites—reports the fuel reserves on a single inventory date at 25% lower cost than with other methods**

It used to take a surveying crew weeks to measure and figure the contents of the Philadelphia Electric Co.'s big coal piles. Now a camera and an airplane work together to cut the time to days. Overlapping pictures are taken from the air. Then with stereo plotting equipment the volume of the heap is calculated.

Streamlining the inventory job is a natural for photography. It's being used to count metal rods, automotive parts, telephone calls as well as tons of coal. But photography works for business in many other ways as well—saving time, reducing error, cutting costs, improving production.

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

Aero Service Corporation takes its stereo photographs and translates them into a contour map of 1-foot intervals. Each 1-foot stratum of the coal pile can then be measured with a planimeter and its volume computed.



**Eastman Kodak Company, Rochester 4, N. Y.**



WHERE PROGRESS IS UP TO YOU...



## What will you add to jet engine progress?

New, dramatic advances being made at General Electric's aircraft gas turbine operations bring into clear focus the vital role recent college engineering graduates play throughout the company. Typifying such responsibility are R. W. Bradshaw, ME, Lehigh, '48, responsible for design of development engine controls and accessories, and B. C. Hope, EE, UCLA, '49, supervisor of test programs for development of aerodynamic and mechanical components.

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lege program of practical engineering assignments. In this program, as in his ultimate career, the engineer chooses the field and location—from the entire range of G-E activities including plastics, large electrical apparatus, electronics, jet propulsion, automation components and atomic power.

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