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Rose Technic Staff

Rose-Hulman Institute of Technology

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Rose Technic

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February, 1955



Sanford W. Wilson, class of '48

speaks from experience when he says . . .

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opportunity, security and an interesting job”**



MR. WILSON was interviewed by U.S. Steel representatives in March of 1948. After receiving his B.S. in Chemical Engineering in June, he chose his U.S. Steel offer over several other job offers and began working at the huge Gary Works as a Foreman Relief Trainee. He gained experience in the Blast Furnace Department and in the front office learning the business end as well. In November of 1954 Mr. Wilson was made assistant to the superintendent of blast furnaces at Gary. His duties now include developing data for control of production, quality of materials, costs, and making technical reports. In addition, he directs the activities of Technological Co-Ordinators and part of the training of management trainees.

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changing. Talk to anyone who has been in the steel industry for any time and he will tell you that steel has gotten into his blood.”

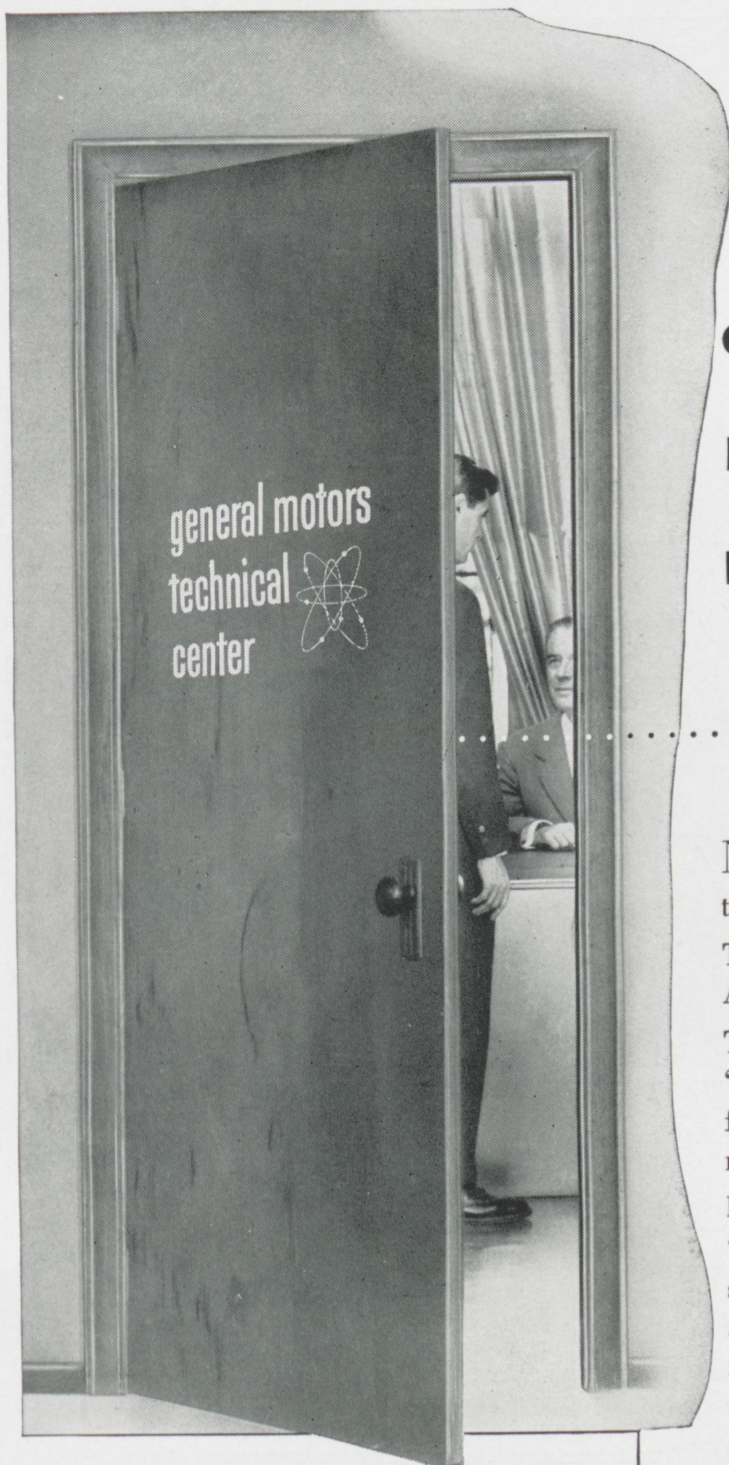
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Rose Technic

VOLUME LXVI, NO. 5

FEBRUARY, 1955

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The Cover

Iron ore shipped from overseas ends its water journey at the new Delaware River Pier in Philadelphia. The two traveling towers, shown one behind the other, can handle ore from two freighters at once, depositing 3600 tons per hour of it into waiting railroad cars. Courtesy STEELWAYS, published by The American Iron and Steel Institute.

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Men of Rose

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attention to our

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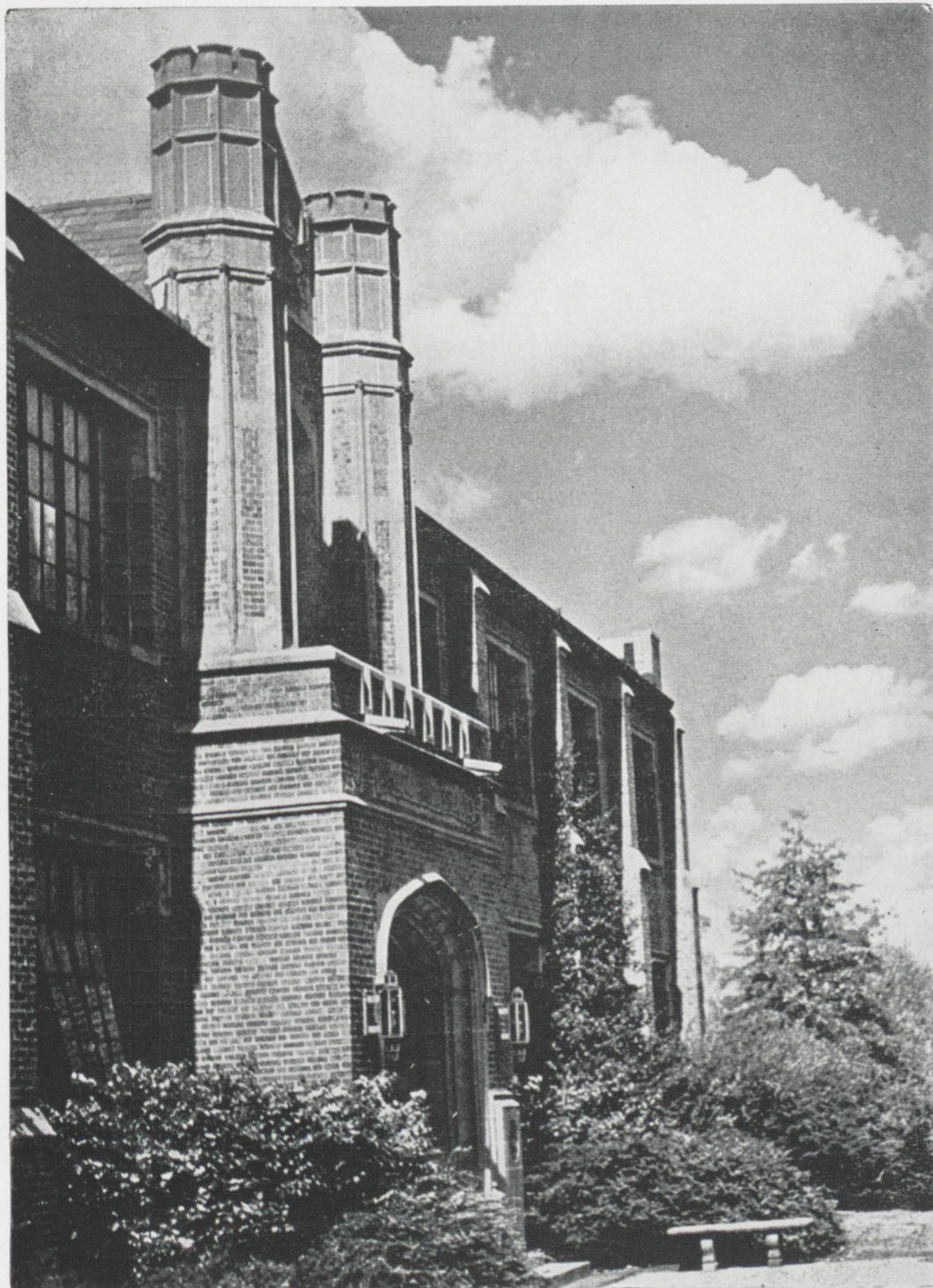
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HIGH SCHOOL GRADUATES OF 1955

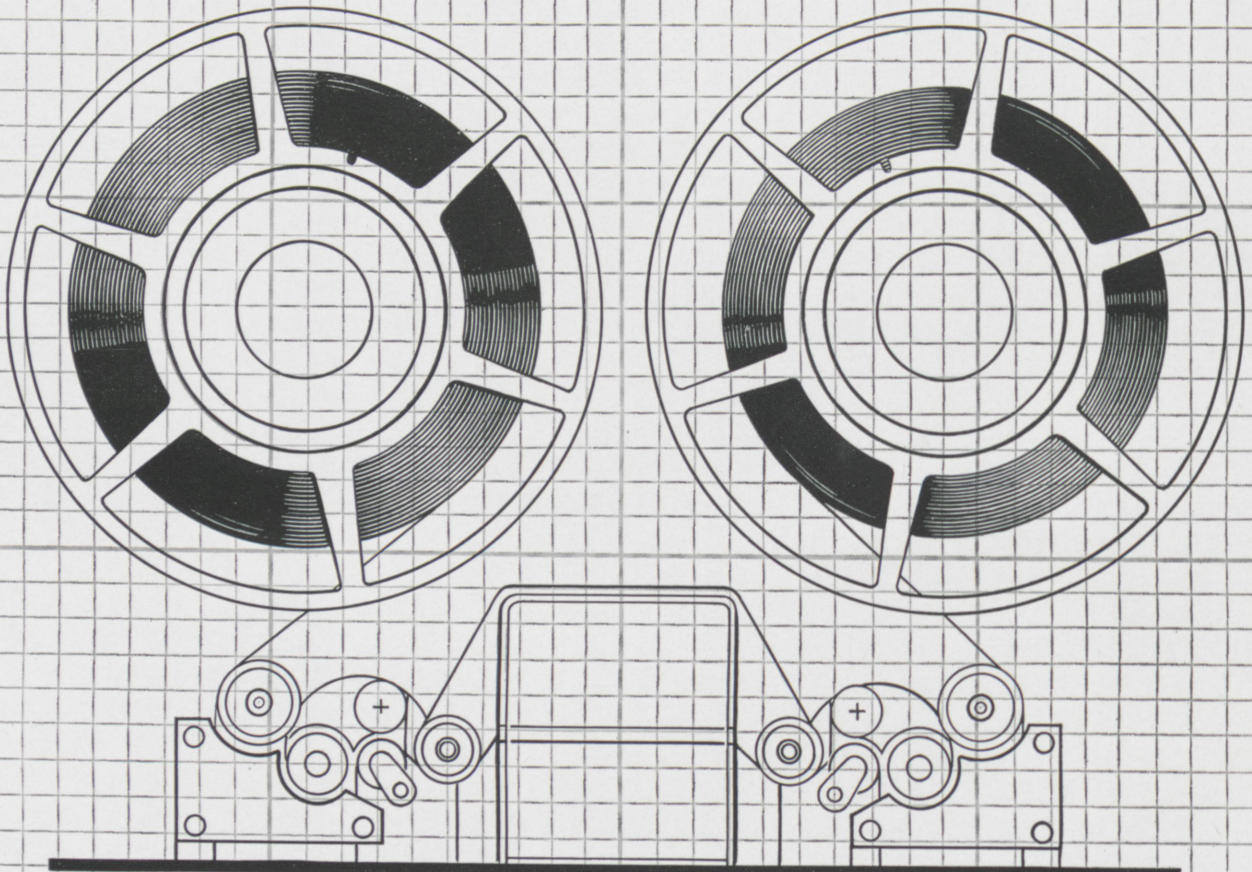
You are cordially invited to visit Rose Polytechnic Institute during the present school year to learn more about your college entrance and the highly accredited engineering courses available to you at Rose. The next freshman class will be admitted September 12, 1955.

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A MESSAGE TO
COLLEGE ENGINEERING
STUDENTS

from Donald C. Burnham, Vice-President
Manufacturing,
Westinghouse Electric Corporation
Purdue University, 1936



To the young engineer with a creative mind

America is on the threshold of the *automation era*.

New automatic machines with their electronic brains are opening the way to a tremendous industrial development in which machines will largely replace man's routine brainwork and handwork.

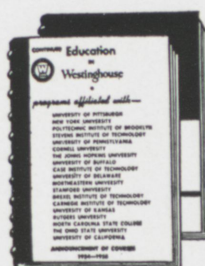
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To get these booklets, write: Mr. C. W. Mills, Regional Educational Co-ordinator, Westinghouse Electric Corporation, Merchandise Mart Plaza, Chicago 54, Ill.



Change Over

Each year with the beginning of the Spring semester, the **TECHNIC** undergoes its annual staff change. Each year at this time the magazine is several weeks behind schedule, and the new staff promises to do their best to catch up. This year is no exception. We are about three weeks late, and we wish to apologize to our readers for this inconvenience. In the future, we shall try to do better and get the magazine back on schedule. There are a few other things we would like to do.

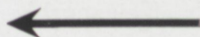
First of all, we plan to give you more student-written articles on a broader class of technical subjects that should be of interest to all our readers. Any student, or for that matter, anyone else, wishing to submit an article for publication is welcomed and encouraged to do so. Any article submitted will receive due consideration.

The feature now appearing in the **TECHNIC** under the title of "Locker Rumors" will be continued throughout the year. A column of this sort, which deals with the varsity and intramural sports programs of the school, is, at most schools, handled by the student newspaper. However, since Rose has no publication of this sort, it is felt that running this column is justified. So far its reception has been excellent, and we hope it will continue on in this manner.

Like any magazine the **TECHNIC** also welcomes any constructive criticism that deserves to be mentioned. The **TECHNIC** has a critic who helps build a better magazine from a technical point of view; however, the editorial matter is quite a different story. If there is anything in the **TECHNIC** that you don't think should be there just get in touch with one of the editors and explain what is wrong. Criticism makes a magazine better, and improvement is what everyone should strive to attain.

J. W. E.

C. R. H.



FRONTISPIECE: Metallurgists at the Research Laboratories of Westinghouse Electric Corporation have been conducting tension tests on metals at temperatures as low as minus 452° Fahrenheit. This is done by encasing the metal to be tested in liquid helium. Courtesy of Westinghouse Electric Corporation.

SOLAR POWER

By John Scott, jr., e.e.

To many people, especially scientists and inventors, the first-time mention of solar power probably arouses some curiosity at least, if not a more intense interest.

As a subject, solar power contains some of the fascination of perpetual motion. The sun, as far as life on earth is concerned is eternal. If the sun were suddenly extinguished the earth's temperature would begin a slow descent toward a temperature close to absolute zero. Unlike perpetual motion, which has been long proven an impossibility, solar power seems to promise great things for the future.

Devices for producing solar power have taken many forms. Some of them have been successful enough to operate water pumps and small generators. These devices are best discussed by describing a few separately.

Mirrors and Lenses

Mirrors or lenses are the most successful means of trapping solar energy thus far; that is, they have been more widely used than other solar energy devices. Mirrors are easier to make than lenses and less expensive, therefore they receive more attention than lenses. Both mirrors and lenses concentrate the sun's heat (and light) upon a certain region. A type of boiler employing water or some other liquid is usually placed in this region.

As long ago as 1913 a network of curved mirrors laid side by side on the ground collected enough heat to generate steam which drove a 100 hp piston engine. This plant was at Meadi, Egypt and finally was abandoned at the end of World War I.

A more recent heat collector is located at the French Pyrenees Research Station. This station consists of a fixed thirty-one foot diameter parabolic mirror containing 3500 plane mirrors, and a movable forty-three by thirty-four foot plane mirror which is kept facing the sun and which reflects sunlight to the parabolic mirror. A laboratory has been built around the focal point of the parabolic mirror, at which point a four inch spot of concentrated solar energy can melt 130 pounds of iron per hour.

Any device using mirrors or lenses for solar energy collectors must be kept facing the sun. Mechanisms for accomplishing this purpose are not hard to construct but require an added investment and maintenance.

In considering mirrors and lenses as the answer to the problem of how to best use solar energy most efficiently, it is of course necessary to note the purposes which they serve. Collection of heat is the primary objective of use of mirrors or lenses, but the heat collected may be used in a variety of ways.

A mirror device was recently pub-

licly shown which uses collected solar heat directly to cook food. Solar water heaters have been used in Florida. Small scale units such as these are feasible, but large scale installations to evaporate a liquid for use in engines have not been perfected and seem to be economically impractical at present. Research conducted by Doctor C. G. Abbot of the Smithsonian Institute has shown many ingenious ways of using solar heat on a small scale.

Theoretically heat collected from the sun could be used to supply thermocouples. The best thermocouples produced thus far however have an efficiency of only 5 percent and seem not to offer much promise of greater return.

Photocell

Last spring (1954) The Bell Telephone Laboratories announced the development of a solar battery which uses strips of specially treated silicon. The strips are connected together electrically and mounted in plastic. Each strip contains a "p-n" junction which enables the battery to produce a small electric current when exposed to light. At the time this battery was first shown it had an efficiency of six per cent. Since that time the battery's efficiency has been improved to eight per cent. Bell scientists estimate the top theoretical efficiency at twenty-two per cent.

Another battery using a crystal of

cadmium sulphide was announced at about the same time by scientists of the Wright Air Development Center near Dayton, Ohio.

These batteries employ principles not used heretofore and show good prospects for future development.

Thermal Differential Process

In any discussion of solar power the question of energy storage arises. If solar energy is to be used to generate electricity commercially the supply of electricity must be "firm," that is, available at any time of day.

Very few methods of energy storage are known, and those which are known (storage battery, lifting water from one level to a higher, etc.) are impractical for storing energy in amounts needed for commercial use.

There is one method which seems to solve the problem. It may be called the Sea Water Thermal Differential Process.

Water at standard pressure (14.7 pounds per square inch absolute) boils at 212° F. By changing the pressure the boiling point is changed also. While many modern boilers operate at high pressures and temperatures, the opposite is true of the boiler in a process first described in writings by Professor Jacques d'Arsonval in 1881. The process described was the same as any other boiler process except that the water in the boiler would boil at a much lower temperature due to decreased pressure in the boiler. The "steam" produced would be capable of doing work if the process were maintained at the proper rate. This rate would be determined by the temperature of the condenser (also having a partial vacuum).

Several other men concurred with the ideas of Professor d'Arsonval in the years following 1881, but no serious attempt was made to test them experimentally until 1926, when two French scientists, Dr. Georges Claude and Paul Boucherot, began experiments. Dr. Claude conducted some successful experiments and his work was widely publicized. He proposed to evaporate "warm" water at around 82° F taken from the top of a tropical ocean and use

"cold" water at about 40° F from the bottom of the ocean to put in the condenser. Steam thus produced would have a low pressure of about one half pound per square inch. Dr. Claude pointed out that the cold water from the bottom of the sea would rise to within a few feet of the surface in the insulated intake pipe (the difference in levels being due to differences in specific gravities due to temperature differences). The pumps would need only to raise the water a few feet. The vacuum inside the apparatus would be maintained for the most part by the condensing action. To start the process, air pumps would evacuate enough air from the system to allow the warm air to boil.

Although Claude abandoned his efforts in 1934, the principles upon which he based his efforts are believed sound. More research has been done recently by a French concern, Energy Des Mers. At last report this partly government owned firm was undertaking to construct a plant using the process just described, at Abidjan on the Ivory Coast of French West Africa. Original plans called for two 3500 kw units at an estimated total cost of \$2.5 million, plus the cost of the cold water intake pipe (unestimated).

Research on this process has also been carried on at the University of California at Berkely.

The solar power implications of the process just described are, of course, in the fact that the warm ocean water used is heated by the sun. Moreover, a plant using the process could operate twenty-four hours a day, thus eliminating the problem of intermittent power. There would be no fuel costs and fresh water would be available as a bi-product. A disadvantage of the process is that it is limited to geographical locations where the ocean bottom gets deep enough close to shore to yield a 40° (F) temperature difference.

Other Possibilities

Still other methods for production of solar power are known, and more will probably be discovered. An interesting possibility exists in the use

of electricity generated by a solar device to decompose water into hydrogen and oxygen. The hydrogen thus produced could be combined with some other element, such as carbon obtained from carbon dioxide from the air, and transported for use when needed. Such chemical processes are known but not economically practical now.

Photosynthesis is sometimes talked of in connection with solar power discussion but this process in its natural form is primarily one which is used by living plants to grow. Some of these plants are used for food by man and animals and others such as trees for fuel. Unless some way can be found to speed up the process and carry it on artificially to produce a fuel for use in a man-made device, the connection between photosynthesis and use of solar energy to provide mechanical or electrical power is not of great consequence.

Future Outlook

Like all other engineering problems, the problem faced in successful exploitation of solar power is not merely one of technological know-how but involves economic considerations which up to this time have made its solution unprofitable.

While atomic power is being hailed as the answer to dwindling fossil fuel supplies, atomic power production has disadvantages which solar power production may not have. Aside from the problems of disposal of radioactive wastes and enormous initial capital investment, the fact remains that atomic power has yet to win a competitive position with power produced conventionally. Besides government backing for the first atomic power plants, the process of refining radioactive ores which in itself requires electric power and a large capital outlay is one which thus far has been undertaken only by the governments of the nations having an atomic energy program.

If sufficient investment in research on the problem of producing solar power are made, such devices as the Bell Solar Battery seem to suggest that large scale use of solar energy can become common.

Rose Graduates

This report was undertaken with the intention of correcting this fault: many engineering students have little idea, even in a general way, of what will be expected of them in their jobs in industry, and are, consequently, unable to make intelligent choices of courses and activities which would better prepare them to meet their future job requirements.

It was felt that graduates of Rose who had been in the field of engineering long enough to gain considerable experience would, on the basis of that experience, be able to offer suggestions and recommendations that would aid a student in making these choices. At the same time, it was felt that the persons offering these suggestions should have been recent enough graduates that the ideas they held as students would still be clearly remembered and that no drastic changes would have been made in the curriculum between their graduation and the present time. It seemed that graduates of the classes of 1946 through 1950 would best meet these requirements.

The next problem, then, was to decide the best way of contacting these men. It was decided that the only practical method would be by written questionnaire. Accordingly, such a questionnaire was constructed, and sent to thirty men, picked at random from the graduating classes of '46 to '50.

The survey contained twenty-two questions, divided roughly into three parts. It contained a section of general questions concerning the contact's date of graduation, the department from which he was graduated, and the field he is now following. Also asked in this general section were questions concerning the size firm the contact is now with, his out-

side activities, and whether he entered industry directly upon graduation or continued his schooling or entered the armed forces. It was felt that the answers to these questions would help in evaluating and weighing the answers to the main body of questions. The next section of the survey was concerned with the contact's own experiences as he advanced from a beginning engineer to his present position. It was hoped that from the answers to this set of questions an idea could be formed, at least in a general way, of what a graduating engineer can expect in industry. The last part of the questionnaire asked the contact to draw upon his own experience and give his opinion of the curriculum at Rose, what recommendations he would make, and suggestions he would offer to junior and senior engineering students.

Of the thirty questionnaires sent out only twelve were recovered. Of these twelve, however, a great deal of unanimity of opinion on the major questions was observed and it was felt, therefore, that the pattern formed would be a representative one. Only one of the twelve contacts indicated that he had held any misconceptions of his job requirements before graduation. He learned that, "The majority of graduates are hired for their ability to learn — not directly for what they know."

Of the twelve questionnaires returned, eight indicated that the contacts are now following the field of engineering. Two are in management, one is in aircraft structure and one in physics. The various size firms were rather evenly divided as five of the men stated they were working for large firms, four are employed by medium sized companies and three are in small organizations. Nine of the group of twelve are engaged

in a few activities outside of their field of work. One stated that he was active in many social, civic and religious groups and two stated that they took part in no such activities at all.

It would seem that little competition from fellow workers is encountered by beginning engineers. Only three men replied that they had met with much competition at the start of their careers and of these three one remarked, "Competition in a good job is friendly and very helpful in encouraging continued development." Two men advanced as a reason for lack of competition their belief that most young engineers, "Won't work hard enough." One man from the class of '50 noted, "It is surprising how few people apply themselves to the fullest extent of their ability when starting out." Most of the contacts found about the same degree of competition as they advanced, although four found some increase. Only one had had the experience of less competition as his position advanced.

One of the questions that was expected to be of interest to students was, "As a beginning engineer was a great deal of pressure to produce exerted upon you?" Results indicated that a beginning engineer will find very little push exerted by the firm by which he is employed so long as he works reasonably hard. Only one man felt that pressure had been applied to him and then only "Sometimes."

A majority of the men questioned felt that they had been employed to their fullest capacities since graduation. Four felt that they had not been. Of these four, one made this explanatory note, "I feel that no man is ever employed to his 'fullest capacity' in the truest sense of the word." There was nearly one hun-

In Engineering

By Charles Schukai, jr., ee. and Ralph Lockhart, jr., e.e.

dred percent agreement that in each man's experience, the education received at Rose was as good as, if not superior to, that received at other engineering schools. One man only felt that the education he had received at Rose was technically poor. Of the twelve men questioned, two had not received interviews at school and so were unable to answer the question, "In the job interviews at school do you think you received a true picture of what industry expected of you?" Of the ten that were able to reply, six felt that they had not received a true idea of the requirements of industry. However, none of them gave specific examples of misunderstanding.

In answer to the questions of whether or not it would be advisable to add more liberal arts courses to the curriculum at Rose, one man felt unqualified to answer since he had had three years at a liberal arts college before coming to Rose. Of those eleven who answered, seven felt that more liberal arts would be advantageous. The recommendations for additional courses were varied, but those connected with business administration ranked high, followed closely by psychology and other human relations courses. Nine men felt that business courses should be *required* and one felt that they should be optional in a fifth year. Five men felt that engineering as it is now offered should be a five year course and some of the others felt that it might have some advantages, but that most students are not willing to or able to wait that long to start earning an income. Four felt that it should definitely remain a four year course. In answer to the question, "Would it be advantageous to have only one general engineering curriculum covering all fields?" it seemed generally agreed that it

would not be a good idea. One man thought that it might have some merit in sales work.

The last question of the list asked the men to give advice that would help junior and senior engineering students in better preparing themselves for their place in the industrial world. This, of course, brought a variety of suggestions. The idea mentioned by the most men was to start reading technical publications during school and never lose the habit. Six of those answering stressed this as being very important. Three men stressed the importance of rationalizing the role money plays in industry. Working summers on engineering jobs, trying to understand thoroughly the problems worked in class work, learning as much as possible about the company and the business they are in, keeping interests and personal contacts varied in order to develop poise and broaden personality — all these suggestions were given by two or more men. Finally, it was stated that at all times an engineer should, "THINK."

Although the return of the questionnaires sent out was not as great as it was hoped that it would be, the men that did return them showed a great amount of interest and made many notes and comments that were much appreciated. A majority of the contacts felt that courses in the field of business and management should be required, and many indicated that liberal arts courses other than those now required might do the young engineer good if he could take them. No suggestions were made, however, as to when these courses might be followed on the present time schedule. Many indicated that, in their opinion, engineering ought to be a five year course. This might allow more time for following non-technical subjects. One man mentioned that

a graduate who felt a need for this type of course might take an extra year after graduation from his engineering school to develop them. Possibly the present graduate could pick them up while serving in the armed forces or take them through a correspondence course. The question arises about the need of an engineer for business and management courses. Could this be because as he advances his responsibilities shift, and he is less affected by the actual technical problems and is more interested in such things as the cost of production and marketing? There seemed to be no noticeable relationship between the department from which the contact graduated and his answers to the questions or the suggestions he offered to students. There was also no obvious correlation between the size of the firm for which the contacts worked and the answers concerning their experience in the field of engineering.

It was found, contrary to the impression held at the conception of this report, that misconceptions of what industry expects of a beginning engineer are not prevalent, or at least were not among the group questioned. A general consensus of opinion seems to be that the Rose graduate is well prepared technically to take his place in the engineering and business world. It seemed generally agreed, however, that an ideal engineering education would require a wider range of business management, cost analysis, and related subjects and would offer a larger number of liberal arts courses. It can be concluded from this survey that the Rose graduate entering industry need fear no excessive pressure by the company for which he is working and if he applies reasonably well will have no undue competition from other beginning engineers.

Research and Development

By Bill Cade, jr., m.e.

Rocket Power Tests At North American

Rocket power developed by this guided missile engine is being measured on a static test stand at North American Aviation's Propulsion Field Laboratory in the Santa Susana Mountains north of Los Angeles. Rocket power plants capable of delivering, over a short period of time, jet horsepower substantially greater than the total energy output of the Hoover Dam have been built and tested by personnel of the company's Missile and Control Equipment organization.

Westinghouse Tests New Jet Engine Lubricant

A new silicone lubricant with outstanding thermal and load bearing properties is being vigorously tested by Materials and Aviation Gas Turbine engineers of the Westinghouse Electric Corporation.

The new lubricant has been tested under the most severe laboratory induced conditions. One such device is the Shell Four-Ball testing machine. Here a steel ball is rotated while held against three steel balls. The entire Four-Ball assembly is immersed in a container filled with the fluid to be tested. While one ball is turned at a constant speed, the other three stationary balls can be accurately pressed against the rotating steel ball, the system acting as a finely controlled "nutcracker." Metal to metal pressures can be built up until the parts actually "seize" or weld in the terminology of lubrication engineers. It is in this piece of testing equipment that bearing pressures of 107,000 pounds per square inch have been attained. Presently available jet engine lubricants will cause "seizure" of the metal parts between 14,000 to 27,000 pounds per square inch bearing area.

"The new lubricant has also been tested in a Westinghouse turbojet engine," Dr. Gainer said. At the completion of this test, the engine is completely torn down and examined. No evidence of wear was found by the Gas Turbine Division engineers and the system was entirely free of any sludge derived from the new lubricating silicone oil.

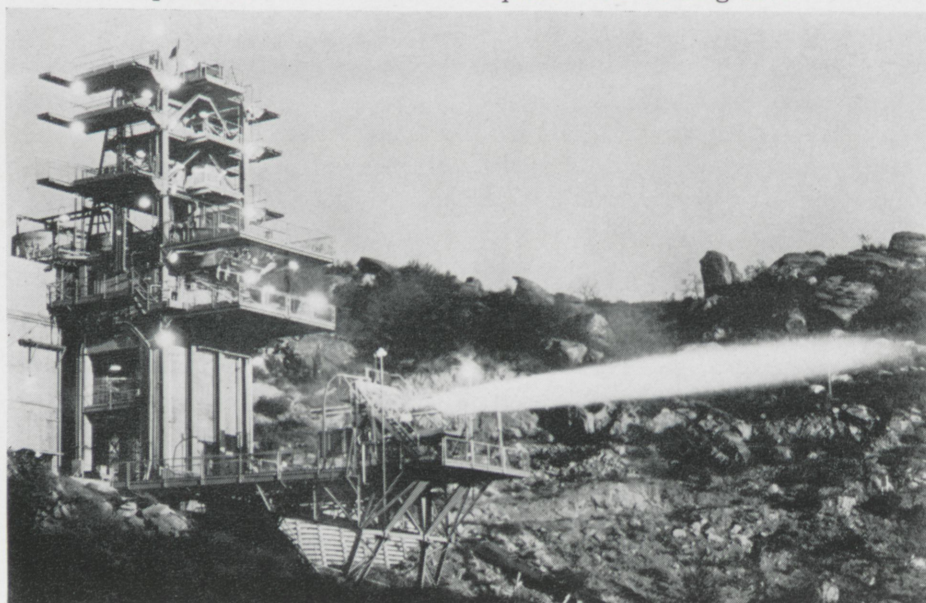
This type of lubricant is being manufactured by Dow Corning Corporation of Midland, Michigan. The latter company is now supplying the lubricant to the military services for further testing.

The silicone fluid has satisfactorily passed thermal stability and viscometric tests ranging from — 65 degrees F to 500 degrees F. Steel-to-steel bearing load tests have shown the fluid to have excellent lubricating qualities up to 107,000 pounds per square inch bearing area.

Present commercial silicone oils are well known for their high degree of thermal stability combined with a favorable viscosity - temperature relationship. These oils also possess desirable properties such as high flash temperature and low pour and freezing temperatures. In spite of this array of good qualities, however, they have always been poor lubricants for ferrous metal surfaces under boundary lubricating conditions where the film of lubricant between surfaces approaches the thickness of two or three layers of molecules.

The new lubricating silicone fluid was developed by Dr. Gordon C. Gainer, who supervises chemical development activities of the Westing-

(Continued on page 26)

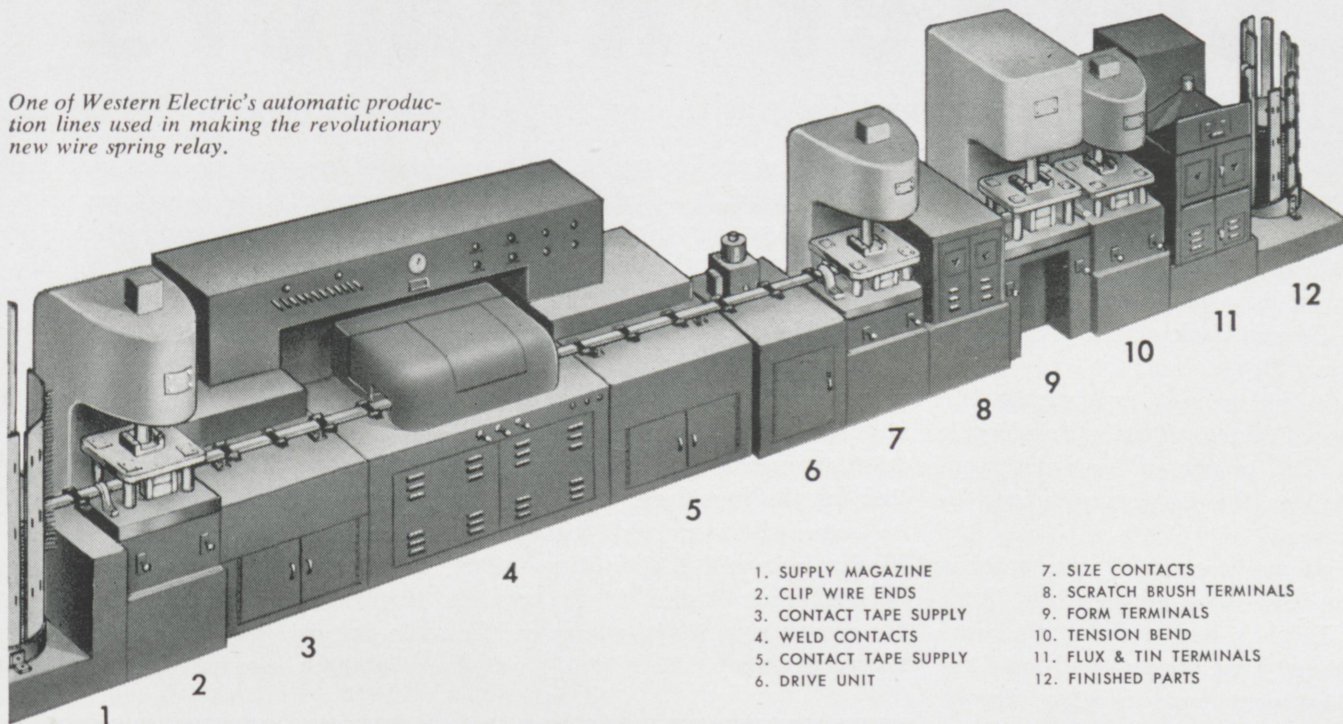


Static Test Stand for measuring rocket horsepower.

AUTOMATION at work

How a revolutionary new design was translated into a production reality

One of Western Electric's automatic production lines used in making the revolutionary new wire spring relay.



- | | |
|------------------------|----------------------------|
| 1. SUPPLY MAGAZINE | 7. SIZE CONTACTS |
| 2. CLIP WIRE ENDS | 8. SCRATCH BRUSH TERMINALS |
| 3. CONTACT TAPE SUPPLY | 9. FORM TERMINALS |
| 4. WELD CONTACTS | 10. TENSION BEND |
| 5. CONTACT TAPE SUPPLY | 11. FLUX & TIN TERMINALS |
| 6. DRIVE UNIT | 12. FINISHED PARTS |

So great was the departure in design of the new Bell System wire spring relay as compared with conventional relays that it posed a major undertaking for development engineers at Western Electric, the manufacturing and supply unit of the Bell System. Indeed, it was an undertaking that called for new machines and new methods because none was available to do the job.

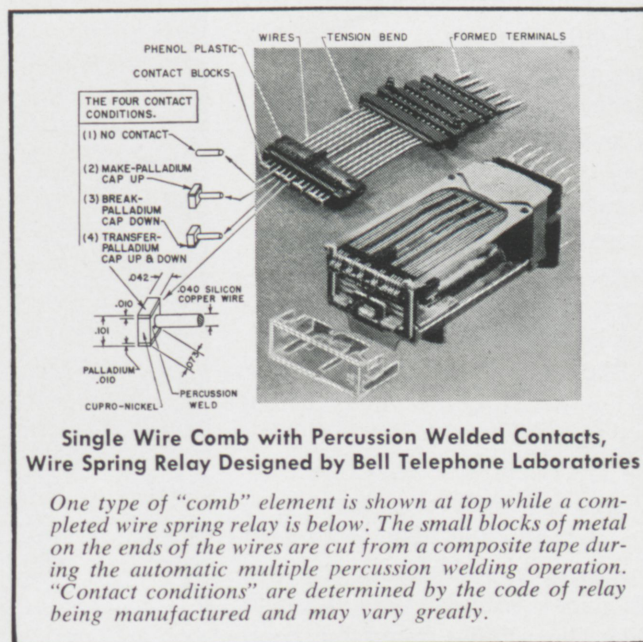
Longer life, higher operating speed, lower power consumption, and lower manufacturing cost were some of the advantages promised by the new relay design. Engineers reasoned that a lower manufacturing cost could be achieved through greater precision in manufacture (which would cut adjustments) and through extensive use of automatic processes.

One of the products of this reasoning is pictured at the top of this page. This battery of equipment, developed by Western Electric product engineers, constitutes one phase of wire spring relay manufacture, which automatically performs several separate operations. Its function begins after one of the fundamental elements of the new relay has been fabricated. This element, known as a "comb," consists of a multiplicity of small diameter wires in parallel array imbedded for part of their length in molded phenol plastic.

These molded elements, of which there are two types used in the new relay, are delivered to this line of machine units in magazines. By fully automatic means they are removed from the magazine, carried by a reciprocating conveyor through each of the several processes and, when completed, placed into another magazine to await further assembly.

Between the first and final magazine the automatic battery of equipment does the following operations: clips wire ends, attaches palladium contacts to wire ends by means of percussion welding, sizes contacts, forms terminal, tension bends wires, fluxes and tins terminals.

Most remarkable of all is the fact that this is a *precision* operation throughout. For example, the small block con-



Single Wire Comb with Percussion Welded Contacts, Wire Spring Relay Designed by Bell Telephone Laboratories

One type of "comb" element is shown at top while a completed wire spring relay is below. The small blocks of metal on the ends of the wires are cut from a composite tape during the automatic multiple percussion welding operation. "Contact conditions" are determined by the code of relay being manufactured and may vary greatly.

tacts, which are percussion welded to the tips of wires of one type of "comb," must be located on the same plane across the twelve contact positions to within a tolerance of $\pm .002$ ".

Western Electric

MANUFACTURING AND SUPPLY UNIT OF THE BELL SYSTEM

Manufacturing plants in Chicago, Ill.; Kearny, N. J.; Baltimore, Md.; Indianapolis, Ind.; Allentown and Laureldale, Pa.; Burlington, Greensboro and Winston-Salem, N. C.; Buffalo, N. Y.; Haverhill and Lawrence, Mass.; Lincoln, Neb.; St. Paul and Duluth, Minn. Distributing Centers in 29 cities and Installation headquarters in 15 cities. Company headquarters, 195 Broadway, New York City

Locker Rumors

By Harold Brown, soph., ch.e. and Bob Bright, soph., ch.e.

The Rose Poly cagers ushered in the new year by compiling a 5-3 record to date. One of these losses, a 73-60 defeat by Illinois College, was avenged by a 55-51 win on the Illinois floor at Jacksonville. In the 73-60 loss, Bright was the only Engineer to hit the nets consistently. He collected 16 points while Bob Young added 10, in one of the worst performances the Engineers turned in all season.

Principia accounted for another of the losses by upsetting Rose 62-57. Bob Bright's best night of the year could not offset sloppy ball-handling as Rose went down in defeat. Bright collected 25 points, followed by Gary Giffel with 16 points.

One of the powers of the Prairie Conference, McKendree College, eked out an 85-81 double overtime victory on the Engineers' home floor. Although out-manned in size, the Engineers were very effective against the zone defense used by McKendree because of the accurate long shooting of Bob Young and Gary Giffel. Jim Blair was high scorer of the game with 20 points and Young tallied 18.

The Engineers first win of the new year was an 85-60 win over Concordia of Springfield. They also used a zone defense, and, needless to say, the Engineers solved it without much trouble. Gary Giffel found the hoop most often as he scored 19 points, followed by Young with 17, and Blair with 15.

Soon after the loss to Illinois College Rose subdued Harris Teachers College, 68-63. The game was not so close as the score implies, however, because the Engineers led by as much as 20 points at one time in the second half. Coach Carr then gave his first team a rest and Harris began to find the range, but Rose survived by stalling the last minute of the game.

Rose split the last two games play-

ed by losing to Greenville and beating Oakland City. Don Snape, who seems to have found the range, was high scorer in both contests with 19 and 17 points respectively, followed by Bob Bright with 17 and 16 points.

Intramural basketball is in full swing as a new league was begun with the start of the new semester. At the present time, five teams are tied for the loop lead. Trouble may be expected from the Sophomore Mechanicals with the addition of Jim Blair to their roster. At the end of the season, a series of games will be played between the winning squad

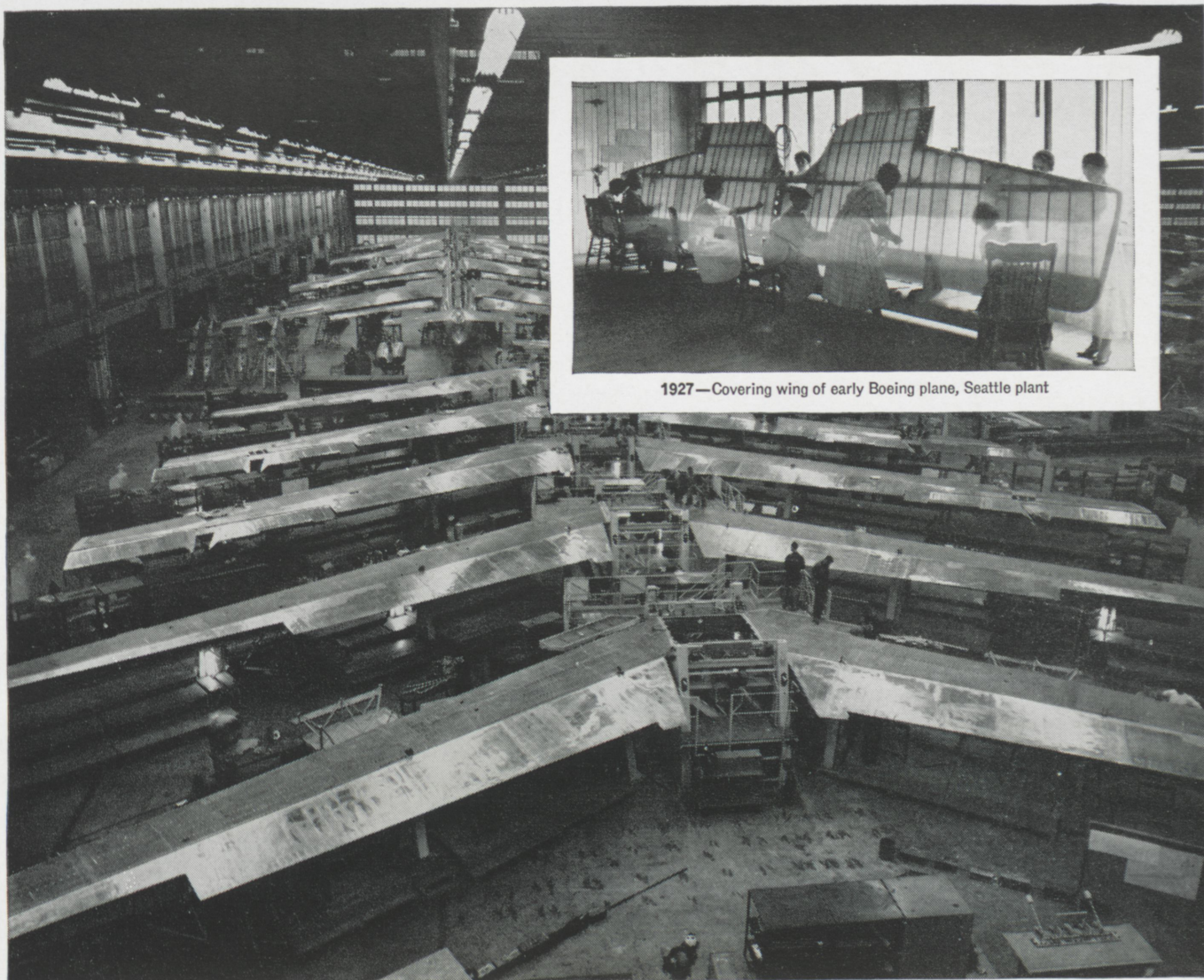
and a team composed of outstanding players from the remaining teams.

Mr. Kelly announces that a ping-pong tournament will be played February 23 and the authors of this column list Phil Kirk, Ralph Branson, and Dick Williams as favorites with Gordon Whitesell as the dark horse.

Reliable sources report that strange creatures have been seen circling the basketball floor and reports have it that these oddities are track men. If this interest is kept up through out the season, Rose may enjoy a winning track season.



Does anyone have a stepladder?



1927—Covering wing of early Boeing plane, Seattle plant

1955—B-47 Stratojet assembly, Boeing Wichita Division

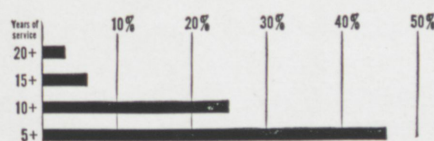
Boeing offers engineers long-range careers

Throughout its 38-year history, Boeing has consistently pioneered advanced new types of military and commercial aircraft, and new methods of production. This history of leadership has meant continued growth for the company. It means continued opportunities for Boeing engineers to move ahead according to their ability in Research, Design and Production.

Today Boeing is producing the jet age's outstanding bombers, the B-52 and the B-47. Other Boeing projects that mean continued growth and stability include: America's first jet transport (the Boeing 707). Research in nuclear-powered and supersonic flight. And one of the nation's major guided missile programs. These and other new-horizon

projects are expanding at such a rate that Boeing now employs more engineers than even at the peak of World War II.

The high inherent interest of these programs, together with the stimulation of expanding opportunities, add to the stability of careers at Boeing. One measure of stability is given in this chart.



It shows that 46% of Boeing engineers have been with the company for five or more years; 25% have been here 10 or more years, and 6% for 15 or more years. Another measure is the increasing pro-

portion of engineers to total employees. Fifteen years ago the figure was one to 16. Today one out of each seven employees is an engineer.

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 expenses.

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

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

RAYMOND J. B. HOFFMAN, Admin. Engineer
Boeing Airplane Company, Wichita, Kansas

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SEATTLE, WASHINGTON WICHITA, KANSAS

Library Notes

By Carson W. Bennett and Nina J. Mahaffey

Notable Books of 1954

The Committee on Notable Books of the American Library Association has published its 1954 list. Books were selected on the basis of quality, authenticity, honesty of purpose, and potential contribution to the resources of the reader as a citizen and as an individual.

Starred titles are in your Rose Library.

- Abrahams, Peter. *Tell Freedom*.
Arnold, Harriet. *The Dollmaker*.
*Barzun, Jacques. *God's Country and Mine*.
Basso, Hamilton. *View from Pompey's Head*.
Bowles, Chester. *Ambassador's Report*.
Brooks, Van Wyck. *Scenes and Portraits*.
Buck, Pearl. *My Several Worlds*.
Carson, Gerald. *The Old Country Store*.
Catton, Bruce. *U. S. Grant and the American Military Tradition*.
*Commager, Henry Steele. *Freedom, Loyalty, Dissent*.
Coon, Carleton. *Story of Man*.
*Davis, Elmer. *But We Were Born Free*.
*Dodson, Kenneth. *Away All Boats*.
Gheerbrant, Alain. *Journey to the Far Amazon*.
*Gouzenko, Igor. *Fall of a Titan*.
*Hagedorn, Hermann. *The Roosevelt Family of Sagamore Hill*.
*Harrer, Heinrich. *Seven Years in Tibet*.
*Highet, Gilbert. *Man's Unconquerable Mind*.
*Hunt, Sir John. *Conquest of Everest*.
Krutch, Joseph W. *Measure of Man*.
Lafarge, John. *The Manner is Ordinary*.

- Lie, Trygve. *In the Cause of Peace*.
*Murchie, Guy. *Song of the Sky*.
*Robertson, R. B. *Of Whales and Men*.
St. John, Robert. *Through Malan's Africa*.
Smith, Lillian. *The Journey*.
Stegner, Wallace. *Beyond the Hundredth Meridian*.
Thomas, Norman. *The Test of Freedom*.
Ward, Barbara. *Faith and Freedom*.
*White, E. B. *The Second Tree from the Corner*.
*Whitehead, Alfred North. *Dialogues of Alfred North Whitehead*.
Woodham-Smith, Cecil. *The Reason Why*.
Woolf, Virginia. *A Writer's Diary*.

Backgrounds of Engineering

Because backgrounds are important in any field, we are listing some of the titles which you will find interesting on the growth and development of engineering and science in general.

- Baxter, J. P. *Scientists Against Time*.
Butterfield, Herbert. *The Origins of Modern Science, 1300-1800*.
Conant, J. B. *The Growth of the Experimental Sciences*.
Conant, J. B. *On Understanding Science*.
Dingle, Herbert. *A Century of Sciences 1851-1951*.
Dingle, Herbert. *The Scientific Adventure*.
Finch, J. K. *Engineering and Western Civilization*.
Forbes, R. J. *Man, the Maker*.
Gray, G. W. *The Advancing Front of Science*.
Haynes, Williams. *American Chemical Industry*.
Jackson, D. C. *Engineerings Part in*

- the Development of Civilization*.
Jeans, J. H. *The Growth of Physical Science*.
Kirby, R. S. *The Early Years of Modern Civil Engineering*.
Mees, C. E. K. *The Path of Science*.
Straub, Hans. *A History of Civil Engineering*.
Struik, D. J. *Yankee Science in the Making*.
Usher, A. P. *A History of Mechanical Inventions*.
Wightnam, W. P. D. *The Growth of Scientific Ideas*.
Wilson, Mitchell. *American Science and Invention*.
Wolf, Abraham. *A History of Science, Technology, and Philosophy in the 16th and 17th Centuries*.
Wolf, Abraham. *A History of Science, Technology, and Philosophy in the 18th Century*.
Woodruff, L. L. *The Development of the Sciences*.

New Periodicals

The library has added the following periodical titles to the list of those now being received:

- American Institute of Chemical Engineers. *Journal*.
Atomic Energy Newsletter.
Battelle Technical Review
Chemical Engineering Costs
Construction Review
Control Engineering
Electric Light and Power
Facts Forum News
Industrial Design
Mathematical Tables and Other Aids to Computation
Noise Control
Petroleum Week
Quarterly of Applied Mathematics
A complete list of periodicals received will be found in the February issue of the Library Newsletter.



put yourself in his place . . .

A year ago he was knee-deep in textbooks, plugging for his B.S. Tonight he's on his way to Vancouver, or Miami, or Portland, Maine. Tomorrow he'll help an Alcoa customer make a faster ship, a stronger shovel, a lighter highway trailer.

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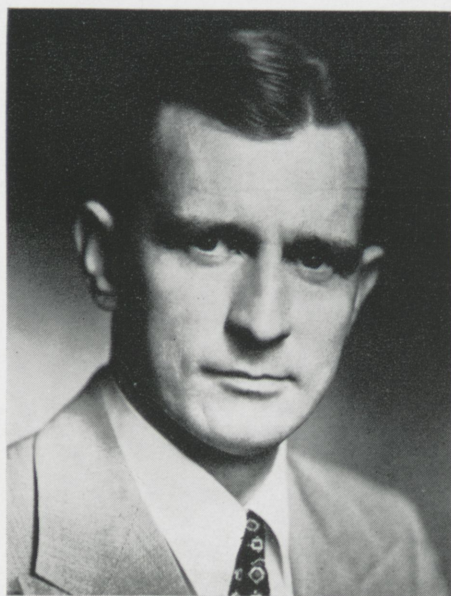
ALUMNI NEWS

By Birt Kellam, jr., e.e.

'99 Platts, J. Milton, e.e., died February 3, 1955. Mr. Platts, who held an M.A. Degree from Stanford University in addition to the degree from Rose, was retired at the time of his death, having been an instructor at the Fresno Technical High School in California.

'29 Dicks, A. Wayne, e.e., formerly Field Engineer for the Michigan Bell Telephone Company is now with the Southern Telephone and Telegraph Company at Fort Lauderdale, Florida.

'32 Fischer, Hans M. F., ch.e., plant manager of the Terre Haute plant of the Commercial Solvents Corporation, has been transferred to the company's Dixie Plant at Sterling, Louisiana.



Brent C. Jacob, Jr.

Mr. Fischer, Alumni Association Sixth District Representative for the past two years, has been associated with C. S. C. since 1933.

'34 Jacob, Brent C., Jr., e.e., joined Chrysler Corporation in 1938, when he entered the graduate school of the Chrysler Institute of Engineering. After receiving his Master's Degree in Automotive Engineering in 1940, he was assigned to the Central Routing and Estimating Departments. Then four years in the U. S. Navy, leaving the service as a Lieutenant Commander, he returned to Chrysler in 1945 in the Research Design Section of the Central Engineering Division. In 1949, he was placed on special assignment on the staff of the Vice President of Manufacturing, Chrysler Division. He was appointed Supervisor of Quality Inspection on the staff of the Vice President and Operating Manager of the Corporation in 1952. This month, he was again promoted; this time to Chief Industrial Engineer of the Chrysler Division of the Chrysler Corporation. In his new position he will be responsible for Time Study, Cost Estimating, Methods Study, Cost Control and Budget Department.

'35 Asbury, Robert B., m.e., is now an aviation safety agent for the Civil Aeronautics Administration at Fresno, California.

'37 Snedekar, Walter R., ch.e., of Arlington, Va., has been appointed chief of the standardization

branch of the corps of Engineers' Research and Development Laboratories, Fort Belvoir, Va.

Employed by the Laboratories since 1946, Mr. Snedekar is a Lieutenant Colonel in the Army Reserves, having served more than four years in the Corps of Engineers during World War II.

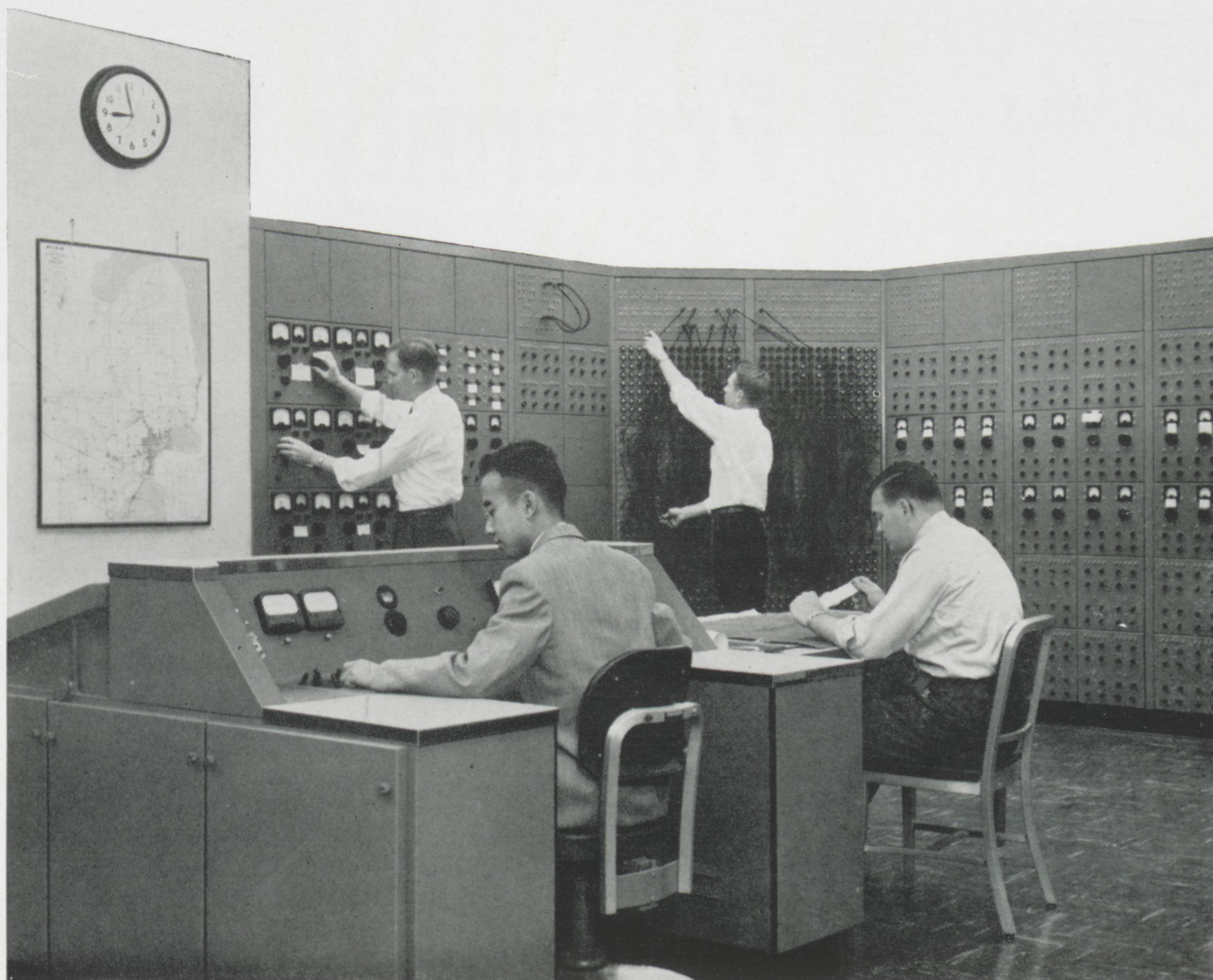
Oct. '48 Nevins, John M., m.e., formerly Service Manager for the M. H. Detrich Company, is now employed by the Wisconsin Centrifugal Foundry, Inc. at Waukesha, Wisconsin.

April '49 Mitchell, Leroy W., e.e., has become associated with the Chicago firm of Carlson, Pitzner, Hubbard & Wolfe, attorneys at Law, in the practice of patent law.

July '49 McGlone, C. Gene, ch.e., formerly a Project Leader for the E. I. du Pont de Nemours & Company, is now in the U. S. Army Chemical Corps and is living in Baltimore, Maryland.

Nov. '49 Orbaugh, William, ch.e., has been promoted to the position of Supervisor of raw materials requirements for the Eli Lilly & Company in Indianapolis.

'53 O'Brien, William J., m.e., has joined the newly formed 54th Anti-aircraft Missile Battalion at the Army Chemical Center in Baltimore. He is a member of Battery A of the "Nike" guided missile unit, part of the "Ring of Steel" guarding the Baltimore-Washington area.



and building Looking ahead with Detroit Edison

Important new addition to the engineering facilities of Detroit Edison is this huge System Analog and Network Computer, bringing new speed, accuracy and convenience to solving the problems of providing better power systems, both for today and for tomorrow.

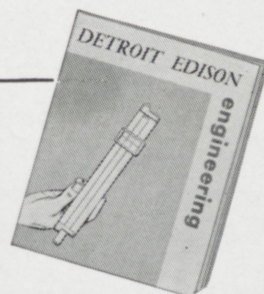
Designed and built by Detroit Edison engineers, this unique four-ton machine reproduces in miniature the company's power system, and can be varied to simulate other power systems as well. The effect of any

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.

The System Analog and Network Computer, along with other advanced electronic equipment, such as the digital computer, serves Detroit Edison engineers in a variety of fields, including research, system operation, and production, planning, project and design engineering. . . . Such ad-

vanced facilities, combined with the steadily rising demands for electrical power in Detroit and Southeastern Michigan, enable Detroit Edison to offer young engineers an outstanding opportunity and challenge to build for their own futures.

For the full story of career opportunities at Detroit Edison, simply call or write for a free copy of this new booklet, "Detroit Edison Engineering."



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Fraternity Notes

Sigma Nu

A cheerful note in an otherwise dull week end was provided by the Sigma Nu—Chi Omega mixer played to the tune of a “combo” provided by that one and only Jess Knowles. This party, I’m sure, tided some of the boys through a successful finals week. Thus ended a “very good” semester in the annals of Sigma Nu history.

As the second semester progresses, the new pledge class will add its weight to the fraternity, producing a strong team on the campus. The new pledges number thirteen and are as follows: Dick Irey, Dick Wegrick, Howard Knipple, Dave Williams, Bob Durrel, Joe Beckes, Bill Deck, Louis Laposa, Bob McBride, Charles Crum, Jack Gaughn, Dave Peter, and Jim Boyer.

A “date-dance” is slated at the student center for the actives and pledges of the chapter. It will be held Feb. 26 and played to the tunes of “Raz’s Record Round-up.”

It would appear that the Southern Confederation finally won Missouri, for our Eminent Commander of Edina, Missouri, Jerry Hebb pinned Miss Suzzie Jones of Galveston, Texas.

The fraternity extends its thanks to the assistance provided for the rush parties by the Alpha Omicron Pi Sorority. The value of their presence can not be underestimated!

John Rhodehamel

Theta Xi

Interior improvements have been the order of Theta Xi. Between semesters Schramm, Wilcox, Mrava, Moore, Scharpenburg, Merrelli, Lai, and Masouka stayed to work on the house. Floors were refinished, rooms painted, and the recreation room brought near completion.

With the end of last semester Bill Elsy graduated. Bill and his family

now reside in Fort Wayne, Ind.

Between semesters a get-together was held at the house, with Mr. Newport as chaperon. Refreshments were served and everyone had a good time.

Ray Fischer

Alpha Tau Omega

After a very successful rush weekend ATO is proud to announce the names of nineteen pledges. Harry Bitner, Dave Cundiff, John Kassebaum, Phil Kennedy, Crone Knoy, James Pierson, Chuck Skidmore, Bob Sutton, Dick Trueb, Gordon Wolfe, Don Grantham, Norm Grimshaw, John Irvin, Jeff Potter, Tom Reese, Jim Stott, Joe Vendel, John Williams, and Reed Wythe were pledged Tuesday, February 15, and have begun their twelve week pledge training.

The fraternity is very grateful to Mr. Lawrence Thomas who did a tremendous amount of work lithographing our rush booklets. The results were something we were all proud of.

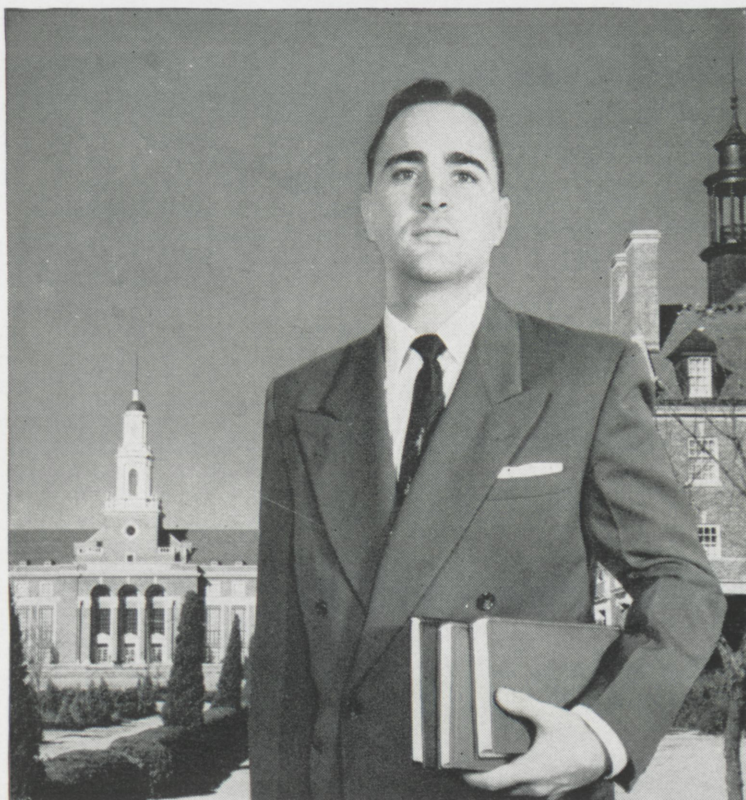
Our thanks are also extended to the pledges of the Chi Omega Sorority of Indiana State, a wonderful bunch of girls who served at the rush parties and won the hearts of all of us.

February 26 the Taus pack up and head for Danville, Illinois to attend the annual ATO State Day. Attending will be the seven ATO chapters in Indiana and Illinois. The program is planned to include a banquet and two rounds of meetings. Trophies will be awarded for attendance, scholarship, and for the annual chapter sing. Gamma Gamma has won five of these beautiful silver pitchers in the past five years, and we’re all hoping to win one or two more this year to keep up our average.

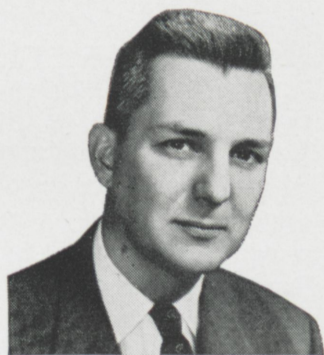
Art Masters

*"Dress" Pruett
wants to know:*

What type of training program does Du Pont have?



DRESSLAR M. PRUETT expects to receive his B.S. in Industrial Engineering this summer from Oklahoma Agricultural and Mechanical College at Stillwater, Okla. He is president of the local student branch of A.I.I.E. Naturally, he is interested in selecting the best job opportunity for a successful career based on his technical training.



DONALD C. MILLER received his B.S. in Chemical Engineering from Ohio State University in June 1937. During the following month he started work with the Organic Chemicals Department of Du Pont at Deepwater Point, N. J. Since then he has received and given many kinds of technical training. Today Don Miller is a general superintendent at Du Pont's Chambers Works—well qualified to answer questions about training programs for college men.

Don Miller answers:

Training has many facets in a big firm like Du Pont, Dress, and a great deal of thought has been given to make it truly effective. We look upon training as a very important factor in a man's career. We think that the best way to train a college graduate is to give him a maximum of on-the-job responsibility in a minimum length of time. That's the general guiding policy at Du Pont, Dress.

Of course, each department varies this general policy to suit its special needs. A new man being trained for production supervision may first spend a year or so in laboratory or plant development work. Or he may spend his training period as a plant operator. Thus a man obtains firsthand knowledge of his process, and establishes a bond of mutual respect with the men he'll be working with on his first major assignment.

A young man interested in sales is often first assigned to a plant or laboratory dealing with the products he will later sell; or he may join a group of trainees to learn selling techniques right from the start.

An engineer, chemist, or other technical graduate is usually chosen for a specific job within his major field of study. Such a man brings specialized knowledge and skill to his job, and he is encouraged to put them to use promptly. But at Du Pont his experiences on the job are supplemented with lectures, conferences and discussion groups. In a very real sense, new technical employees continue training in their specialties after joining the Company.

To sum it all up, Dress, Du Pont's training program is individualized to provide a new man with specific opportunities to learn from contacts with more experienced men. The *prime objective* of Du Pont training is always kept clearly in mind—to develop men for future advancement and effectiveness in the organization.

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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BETTER THINGS FOR BETTER LIVING . . . THROUGH CHEMISTRY

WATCH "CAVALCADE OF AMERICA" ON TELEVISION

**TRANSISTOR &
DIGITAL COMPUTER
TECHNIQUES**

*applied to the design, development
and application of*

AUTOMATIC RADAR DATA
PROCESSING, TRANSMISSION
AND CORRELATION IN
LARGE GROUND NETWORKS

**ENGINEERS
&
PHYSICISTS**

Digital computers similar to the successful Hughes airborne fire control computers are being applied by the Ground Systems Department to the information processing and computing functions of large ground radar weapons control systems.

The application of digital and transistor techniques to the problems of large ground radar networks has created new positions at all levels in the Ground Systems Department. Engineers and physicists with experience in the fields listed, or with exceptional ability, are invited to consider joining us.

fields include

TRANSISTOR CIRCUITS
DIGITAL COMPUTING NETS
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LOGICAL DESIGN
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VERY HIGH POWER MODULATORS
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**RESEARCH AND
DEVELOPMENT LABORATORIES**

Culver City, Los Angeles County, California

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

Engineers...

In Demand

By Fred L. Maytag, II

(Editor's Note:) Fred L. Maytag, II, president of The Maytag Company, Newton, Iowa, is the third generation head of the washing machine manufacturing company which bears his name. One of the country's leading manufacturers, Mr. Maytag is active in a wide range of business, industrial and public affairs. He is a member of the board of directors and chairman of the taxation committee of the National Association of Manufacturers, trustee of Grinnell College, Grinnell, Iowa, and a member of the board of governors of the Midwest Research Institute. A former Iowa State Senator, he has received numerous special recognitions for his accomplishments, including a ten-page picture layout in Life Magazine featuring his community activities. Mr. Maytag is an enthusiastic flyer and pilots his own plane on business and pleasure trips.

A casual glance at the classified advertisements in any of our metropolitan newspapers, today, makes it apparent immediately that there is a tremendous demand in industry for graduate engineers of all types.

This demand has grown to its present proportions because of two basic conditions: An insufficient supply of graduate engineers, and a tremendous increase in the number and types of industrial jobs requiring engineering graduates.

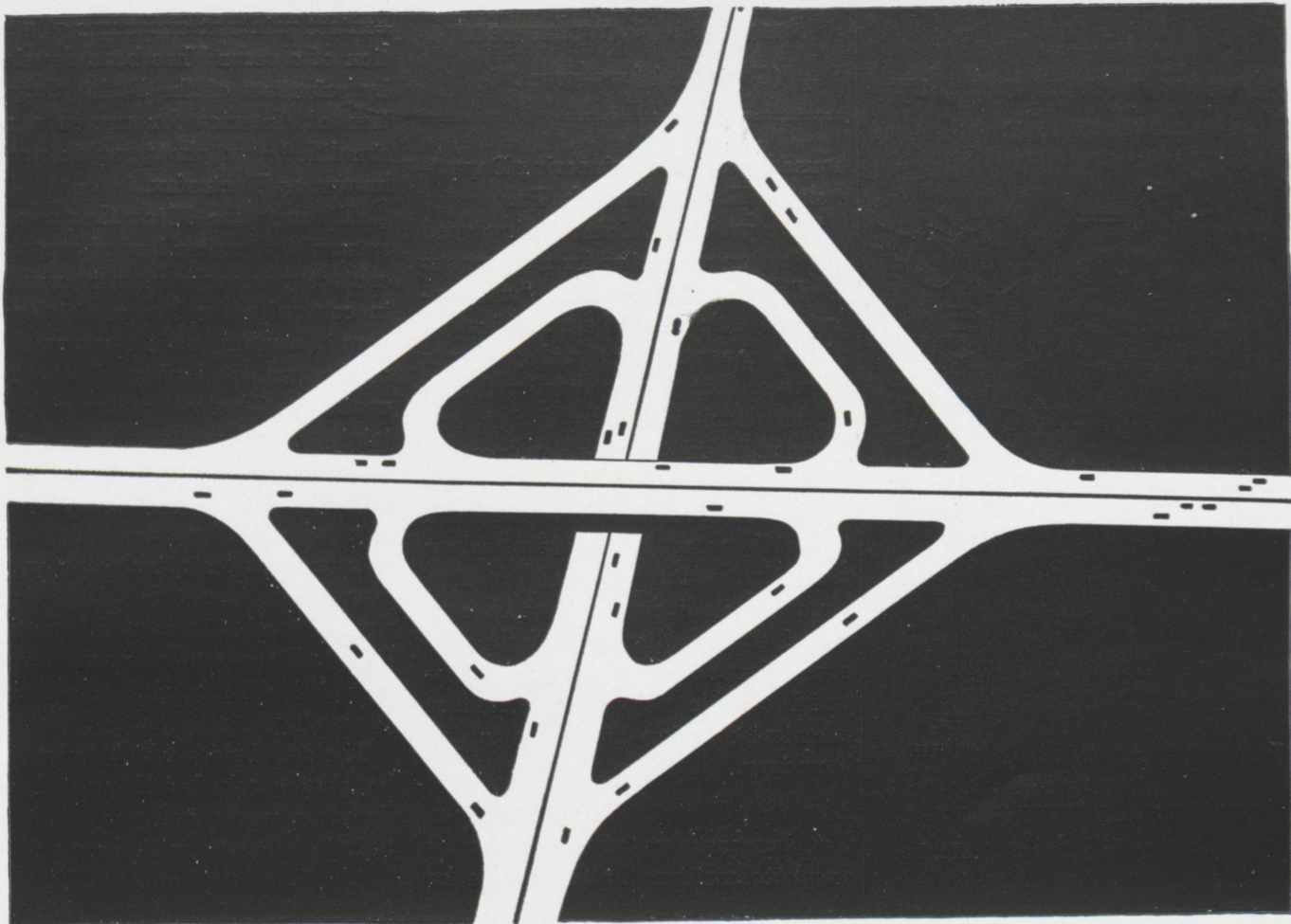
As industry, generally, has advanced, the complexities of its operation have increased markedly. As mass production techniques have been developed, the need for technical know-how has grown correspondingly. In the development of new products, and the improvement of existing products and processes, industry has found it necessary to depend more and more upon the engineer.

There was a time, not so long ago,

when the engineer was required in industry primarily to direct the maintenance and research activities required by the employer. Long since, however, employers have been looking to engineers to fill an increasingly large percentage of positions concerned with the production function. Gradually, employers have begun to fill the vacancies in top management positions with engineers who, because of their technical training and experience, are able to comprehend the problems of production management, as well as those of the specialized staff functions.

For these reasons, there is almost no limit to the opportunities available to competent graduate engineers. I would add one word of caution, however, and that is this: Industry is more and more concerned in finding in its engineers, something more than mere technical competence, or even technical brilliance. Industry wants engineers who, in addition to their technical competence, have an adequate concept of historical and sociological aspects of the industrial function. Furthermore, industry wants in its engineers, a facility for maintaining satisfactory personnel relationships. Industry is concerned in employing engineers who are, first of all, good citizens in the broadest sense of the term; and who are, secondarily, good engineers.

The present employment opportunities for engineering graduates are undoubtedly the best in the history of our economy. Even the man who has narrowly specialized, at the expense of developing "the whole man," can almost write his own ticket—initially. Furthermore, he can feel reasonably assured that industry's need for his specialized skill will not diminish.



FROM COW-PATHS TO CLOVERLEAFS...

The narrow, twisting, rut-ridden roads of yesteryear are being replaced by new multi-lane, high-speed highways. Crossroads have been bridged and cloverleafed... hills have been leveled... curves lengthened.

These changes have happened in the half century since the advent of the automobile. For more and better cars and trucks demand faster, safer roads and turnpikes.

SPACE FOR SPEED...

The traffic that flows over America's three-million mile network of roads represents the very life stream of our progress. Nowhere else in the world do people travel so far and so freely... nor do so many trucks deliver such a wide and plentiful supply of merchandise so fast and to so many places.

AMERICA WORKS LIKE THAT...

Here in America we have men who dare to dream and build for future needs... machines to move mountains... materials to make roads... and an all-seeing, all-hearing, and reporting Inter-Communications System that acquaints every branch of science and engineering... every technical skill... with the needs and the accomplishments of every other field of endeavor.

THE AMERICAN INTER-COM SYSTEM...

Complete communication is the function, the unique

contribution of the American business press... a great group of specially edited magazines devoted to the specialized work areas of men who want to manage better, research better, sell better, buy better.

COMMUNICATION IS OUR BUSINESS...

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

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

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HEADQUARTERS FOR TECHNICAL AND BUSINESS INFORMATION

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COCA-COLA BOTTLING CO.

924 Lafayette Ave. Terre Haute, Ind.

Research & Development

(Continued from page 14)

house Materials Engineering Department at East Pittsburgh, Pa.

"The problem of developing good lubricating properties for steel versus steel", Dr. Gainer said, "was approached through the modification of the silicone oil molecule." It was assumed that the conventional silicone molecule is not absorbed strongly enough on the steel surfaces to form a close-packed film or protecting layer or layers. As a result metal to metal contact is not prevented on parts that continually rub together. Research studies were thus concentrated on the alteration of the silicone oil molecule to produce a material capable of forcing a surface chemical reaction at the metal oil boundary.

Low-cost Photosensitive Paper

A low-cost, coated paper that is so photosensitive that it can make

contact prints at exposures of a fraction of a second has been developed by scientists of the Radio Corporation of America for use in a new, simplified dry photographic process known as Electrofax.

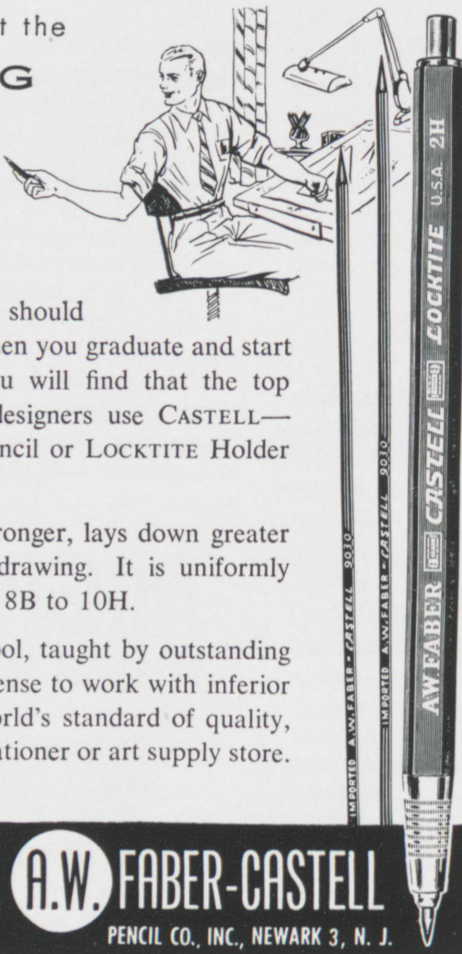
Although the Electrofax paper is as sensitive as standard photographic contact printing papers, it compares in cost with the low-sensitivity papers in common use for reproduction of diagrams and plans. Created for use in the Electrofax process for obtaining rapid and permanent prints from photo negatives, microfilm enlargements or projected images, the new paper has proven its sensitivity in numerous tests, including experimental use in a camera. At exposures of one-half a second in outdoor light, it has produced positive prints in a few seconds, with no chemical processing.

The speed with which images can be photographed and printed with the new paper and the Electrofax technique has permitted experiment-

(Continued on page 28)

Now is the time to get the
LIFE-LONG

CASTELL HABIT!



Your tools of tomorrow should be your tools of today. When you graduate and start upon your own career you will find that the top engineers, architects and designers use CASTELL—either the famous wood pencil or LOCKTITE Holder with 9030 lead.

CASTELL is smoother, stronger, lays down greater depth of graphite on the drawing. It is uniformly excellent in all 20 degrees, 8B to 10H.

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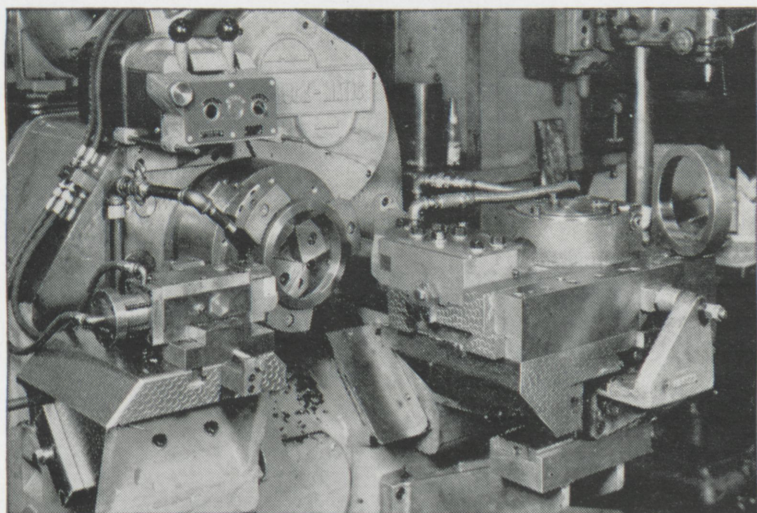
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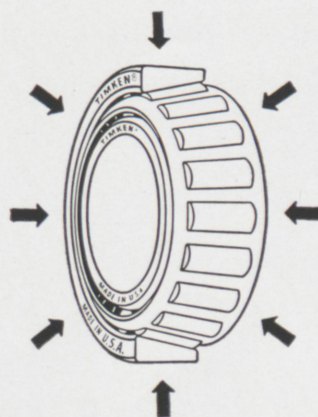


How to machine with high precision at high speeds

This lathe is designed to machine the races of bearings from 4" to 8" in diameter. And it must deliver high precision at speeds and feeds as fast as carbide tools can handle. To keep the spindle rigid under heavy combination loads, it's mounted on Timken® tapered roller bearings.

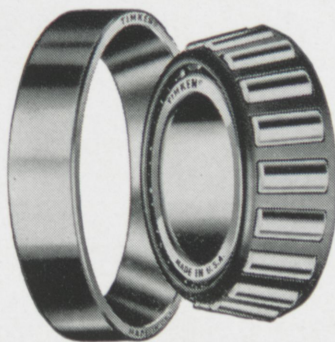
How TIMKEN® bearings maintain spindle rigidity

Because Timken bearings take radial and thrust loads in any combination, they hold spindles in rigid alignment, insure precision. And full line contact between the rollers and races of Timken bearings provides extra load-carrying capacity, prevents breakdowns.



Want to learn more about bearings or job opportunities?

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



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



NOT JUST A BALL ○ NOT JUST A ROLLER ▭ THE TIMKEN TAPERED ROLLER BEARING TAKES RADIAL ⊙ AND THRUST →○← LOADS OR ANY COMBINATION ☼

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Research & Development

(Continued from page 26)

al development of a mechanized system of continuous-strip reproduction that may be adapted for use with electronic computers or other devices which produce a flow of visual information. It is also regarded as a practical and inexpensive method of producing master copies of letters, diagrams, microfilm records and other documents.

The sensitivity of the new paper has been achieved by applying a thin layer of a special zinc oxide in a resin binder. Both are inexpensive materials and readily available. The coating may be applied to a wide range of papers, from those of low-cost wood pulp base to high strength bond, according to the requirements. When the paper has been coated, it remains insensitive to light, and hence may be handled without fear of inadvertent exposure, until the coating is given a negative electrostatic charge.

The charge is applied in the dark by transfer of ions as a charged wire is moved across the coated surface. Once the charge has been placed on the layer, the paper is sensitized and must be shielded from light in the manner of ordinary photographic film. The uncharged coated paper, however, will keep indefinitely without deterioration.

In the Electrofax process, the charged paper is exposed by any of the conventional photographic procedures. The electrostatic charge is reduced in the areas exposed to light, depending upon the intensity of the light, leaving a latent electrostatic image on the coated surface.

The latent image on the paper is developed by applying a pigmented resin powder carrying a positive electrostatic charge which causes the powder to stick to the negatively charged areas on the coated surface. To accomplish this, the RCA research team developed a magnetic "brush" consisting of a mass of iron

(Concluded on page 30)



A Key to K & E Leadership

Thorough knowledge and care of minutest detail were essential to the designing of the sturdy, accurate Paragon® Drafting Machine. Draftsmen prefer the Paragon, because it is time-saving, work-sparing, reliable, easy to operate, and because they don't have to treat it with kid gloves. Thoroughness is one of the keys to K&E leadership in drafting, reproduction, surveying and optical tooling equipment and materials, in slide rules and measuring tapes.

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Experience

is a great teacher

but . . .

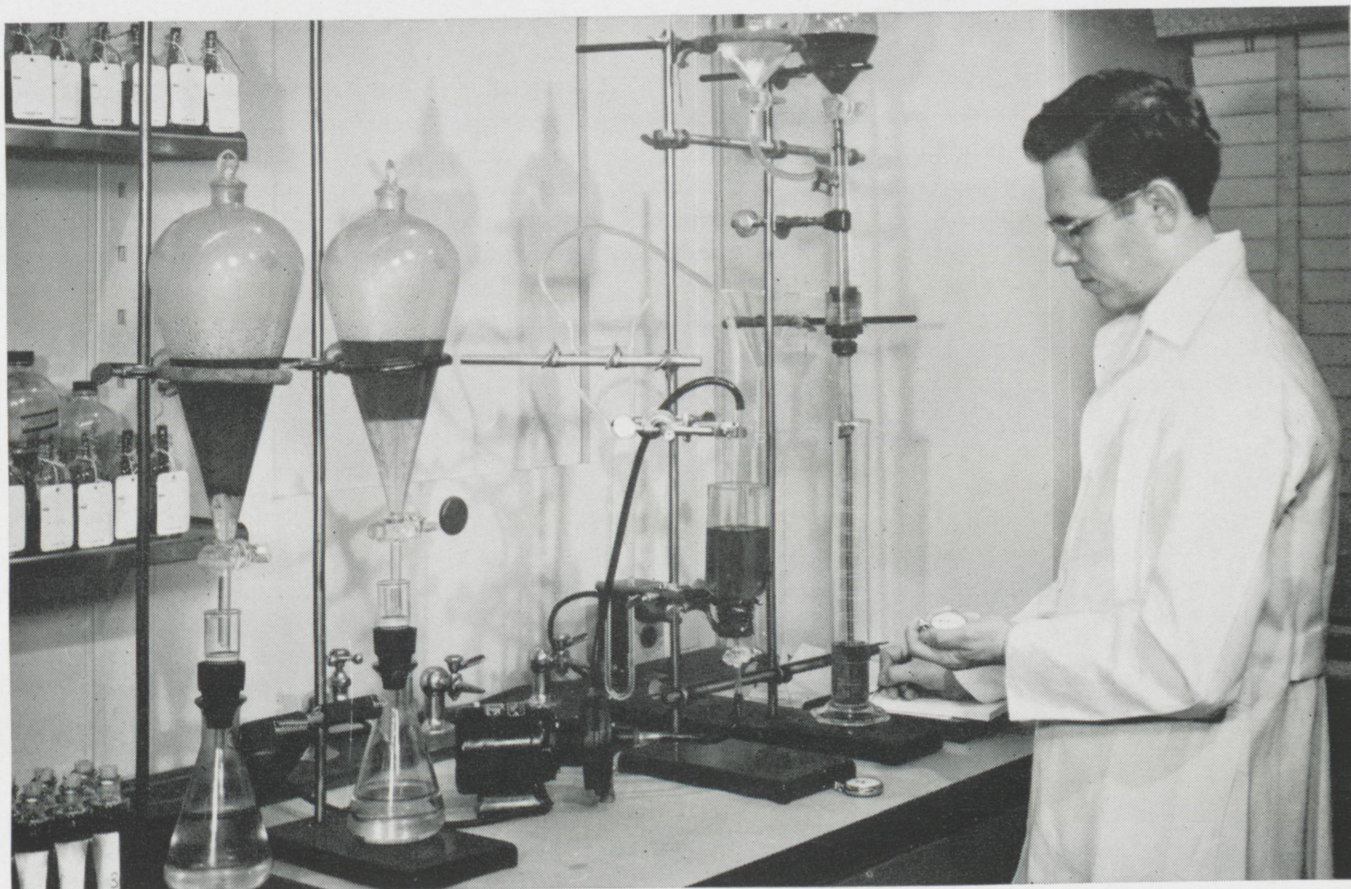
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from books

cheaper and faster

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Book Store**



To help develop STA-CLEAN for STANDARD Furnace Oil, the testing apparatus shown here was constructed. Running an experiment on the improved oil is Dr. Jack A. Williams, a chemist at Standard Oil's Whiting laboratories.

HOW TO SOLVE A BURNING PROBLEM!

Scientists in Standard Oil laboratories work with the stimulating knowledge that practical and valuable results will be obtained from their discoveries. A recent achievement of Standard Oil scientists is now benefiting hundreds of thousands of STANDARD Furnace Oil users throughout the Midwest.

In 1952 our research people undertook the problem of finding a method to eliminate oil burner failure or inefficiency arising from clogged filters and burner nozzles.

After months of painstaking laboratory work and many more months of thorough field testing through-

out an entire heating season, Standard Oil scientists perfected a new, efficient additive—STA-CLEAN. Blended into our furnace oil, the new additive acts as a detergent, sludge inhibitor and rust stopper—all in one. STA-CLEAN assures clean oil filters and nozzles—a dramatic contribution to efficient and economical heating.

The development of this remarkable new additive is further proof of the progress possible when scientists are given time and equipment to explore and develop thoroughly their ideas. Young scientists find such an atmosphere inspiring.

Standard Oil Company

910 South Michigan Avenue, Chicago 80, Illinois



Research & Development

(Concluded from page 28)

filings mixed with the powder and picked up on the end of a permanent magnet. The iron particles take on negative charges, while the particles of powder become positive. When the "brush" is swept across the paper, the image is revealed immediately as the particles cling to the areas of lesser light intensity.

When the "brush" has been swept over the entire surface of the paper, the resulting powder image is fixed permanently by baking the sheet for a few seconds at a temperature which will cause the resin powder to melt and fuse to the coated surface, creating a durable, light-fast picture. If for any reason the image should be unsatisfactory, it may simply be brushed off before the baking process takes place, and the paper used again. After baking, the image is as rugged and permanent as any ink-printed image.

For mechanized operation of the

Electrofax process, the RCA team has been experimenting with a large, continuous-strip device and a smaller unit capable of making single prints from projected images. A rudimentary, portable unit also has been developed with which the process is carried out by hand. Even with the hand unit, finished copies can be produced in a fraction of a minute, from exposure to development of the print.

Worthington Builds Largest Concrete Mixer

Worthington Corporation is building the world's largest standard concrete mixer for Miron Freres Ltd., of Montreal, Canada.

The unit will be installed in a new pre-mixing concrete plant and will materially increase the production of concrete in an area where the demands are constantly increasing.

Many benefits are to be gained from a horizontal type central pre-mixing plant, the most important of which are greater efficiency and

speed, minimum truck cycle time, rapid uniform mixing, reliability of operation and reduction of maintenance problems due to simplified design. He further explained that with pre-mix operation, agitators are substituted for transit mixers with a corresponding increase in pay-load per trip and a reduction in maintenance costs of Truck Mixers.

The large central mixer will have a rated capacity of 9 cubic yards plus ten per cent overload.

North American Tests An Atomic Water Boiler

Atomic energy engineers of North American Aviation's Nuclear Engineering and Manufacturing Department measure the background radiation level around a water boiler type atomic energy reactor. Concrete blocks, used to shield the reactor, have been removed, showing the tank-like housing where the graphite reflector and core are located. Designed and built by North American in 1952, it is the first operating atomic energy reactor in California.

Woodridge Motor Court

ON U.S. 40 — 1¼ MILE

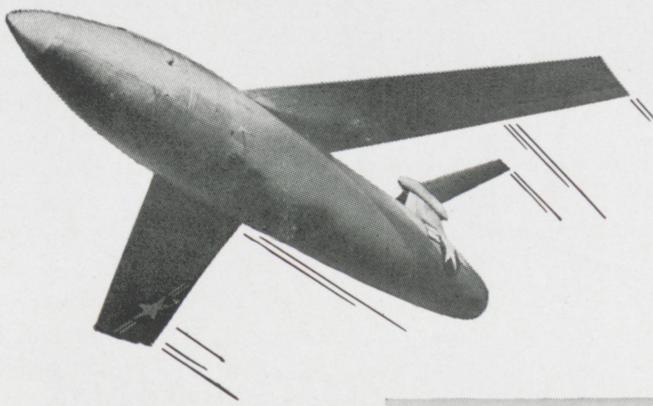
WEST OF ROSE POLY

PHONE C-1808

Terre Haute, Indiana

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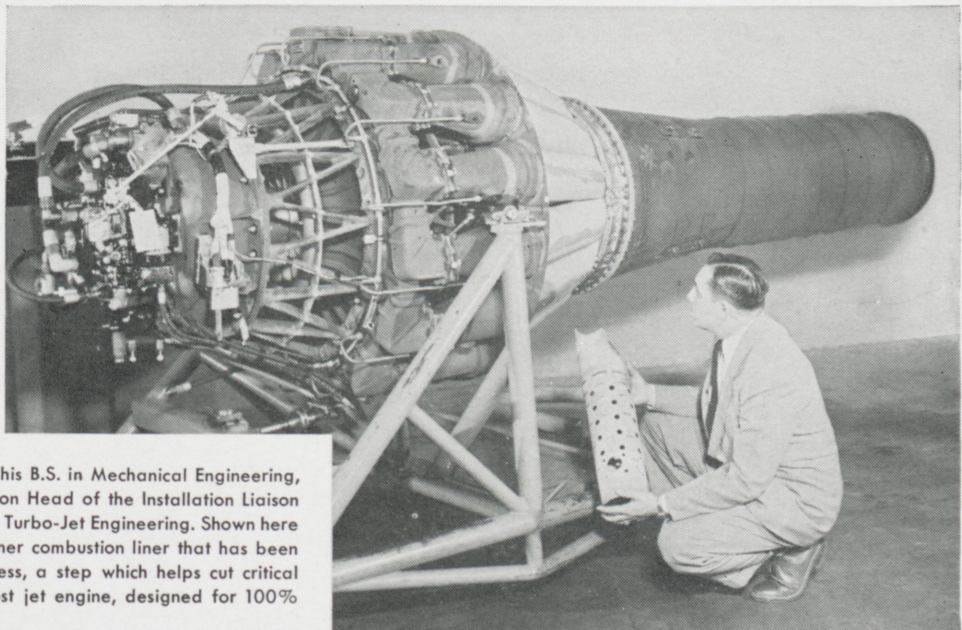


ALLISON

Engineers Pioneer

MISSILE

Power Plant Development



W. S. "Gus" Broffitt, who received his B.S. in Mechanical Engineering, U. of Kentucky in 1938, is now Section Head of the Installation Liaison and Engineering group of the Allison Turbo-Jet Engineering. Shown here by a J33-A-37, he is holding an inner combustion liner that has been through the aluminum dipping process, a step which helps cut critical materials in this high speed, low cost jet engine, designed for 100% reliability.

● The Allison jet powered USAF B-61 Martin Matador is the country's first operational ground-to-ground pilotless bomber. And, it's the first such missile to be sent overseas for duty.

The B-61 engine—an Allison J33-A-37—is based on the proven Allison centrifugal flow engine. This engine has accumulated more than 2½ million hours of flight in such aircraft as the Lockheed F-80 Shooting Star, the T-33 Trainer, F-94 Night Fighter, and in the Grumman F9F Panthers and the Cougars!

In 1950, Allison undertook the project of engineering and developing a 5-hour, low-cost, expendable jet engine for the Glenn L. Martin Co. which was under contract with the Air Force. The missile assignment made it necessary for Allison to design a J33 model—incorporating reduced material, manufacturing and testing costs—and still maintain a 100% reliability.

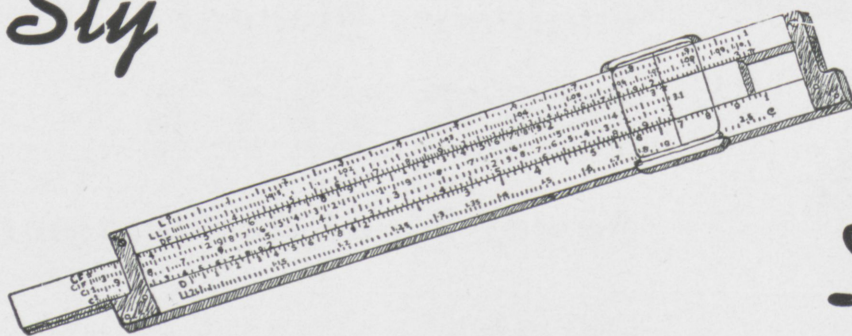
The concentrated efforts of Allison engineers resulted in an 85% reduction of critical materials in missile engines in comparison with the similar centrifugal flow engines built for piloted aircraft.

An aluminum dipping process, developed by Allison engineers—in cooperation with General Motors Research—helped materially in reduction of critical materials. This process was used on inner combustion liners and permits using a low alloy steel in place of highly critical material. The aluminum dipping process affords corrosion protection, and still enables the liners to withstand high combustion temperatures. First to use aluminum dipping equipment on large parts, Allison now uses the process on turbine engines scheduled for piloted aircraft.

The missile power plant project is another example of the variety of problems handled by Allison engineering. Because Allison is continually doing pioneer work in advanced engineering developments, we need more technically trained men, especially young graduate engineers. Want to know more about your engineering future at Allison? Write now for information:

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

Sly



Droolings

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

Words of Wisdom: Some people are so busy learning the tricks of the trade that they don't learn the trade.

Signs along the highway:

"Soft Shoulders"

"Dangerous Curves"

"Five gals for a dollar"

and as a final warning,

"Watch out for children."

Pappa Bear: "Who's been drinking my beer?"

Mama Bear: "Who's been drinking my beer?"

Baby Bear: "Barf."

Steel wool: Shearings from a hydraulic ram.

Arts Student: "I have a splinter in my finger."

Engineer: "Been scratching your head?"

Dean: "Order, please."

A voice from the rear of the room:

"Two beers."

She: "My Dad is an engineer. He takes things apart to see why they won't go."

He: "So what?"

She: "So you better go."

Looking coldly at the man who had just given him a nickle for carrying his bags twelve blocks, the little boy said, "I know something about you."

"What?" asked the man.

"You're a bachelor."

"That's right. Know anything else about me?"

"So was your father."

Bess, Harry, and Margaret Truman were sitting in the parlor of the White House one afternoon, when Bess said to Harry:

"Harry, dear, I think that you ought to have something done to our front lawn. It's all dried up, and is turning brown."

Harry replied, "I guess that you're right dear. I'll have the men spread some manure on it tomorrow."

Just then Harry was summoned to the telephone, and after he left, Margaret said to Bess, "I wish that you would teach daddy to say 'fertilizer' instead of that awful word 'manure.' After all, he is the President, now."

Bess replied, "Daughter, I believe in letting well enough alone. It took me 27 years to teach him to say 'manure.'"

Hubby: "Of all the crazy things; that fellow on the third floor says he has kissed every married woman but one in this apartment house."

Wife: "I'll bet it's that stuck up Mrs. Bailey on the third floor."

C.E.: "Let's give the bride a shower."

M.E.: "Count me in. I'll bring the soap."

A happily married couple believed in reincarnation. Finally, the husband died. Keeping a pact they had made, the wife communicated with him in the spirit world, twelve months after his untimely demise.

"Are you happy there, dear?" she asked.

"Happier than I ever was before," he replied. "The pastures here are greener, and it's indeed a beautiful world. And the weaker sex are the most gorgeous creatures you ever saw. Wistful eyes that speak of love; sleek bodies and beautiful rounded forms."

"Oh, dear," she expostulated. "With so much temptation about you, I'm afraid you'll do something you'll be ashamed of. I do hope I can soon join you in heaven."

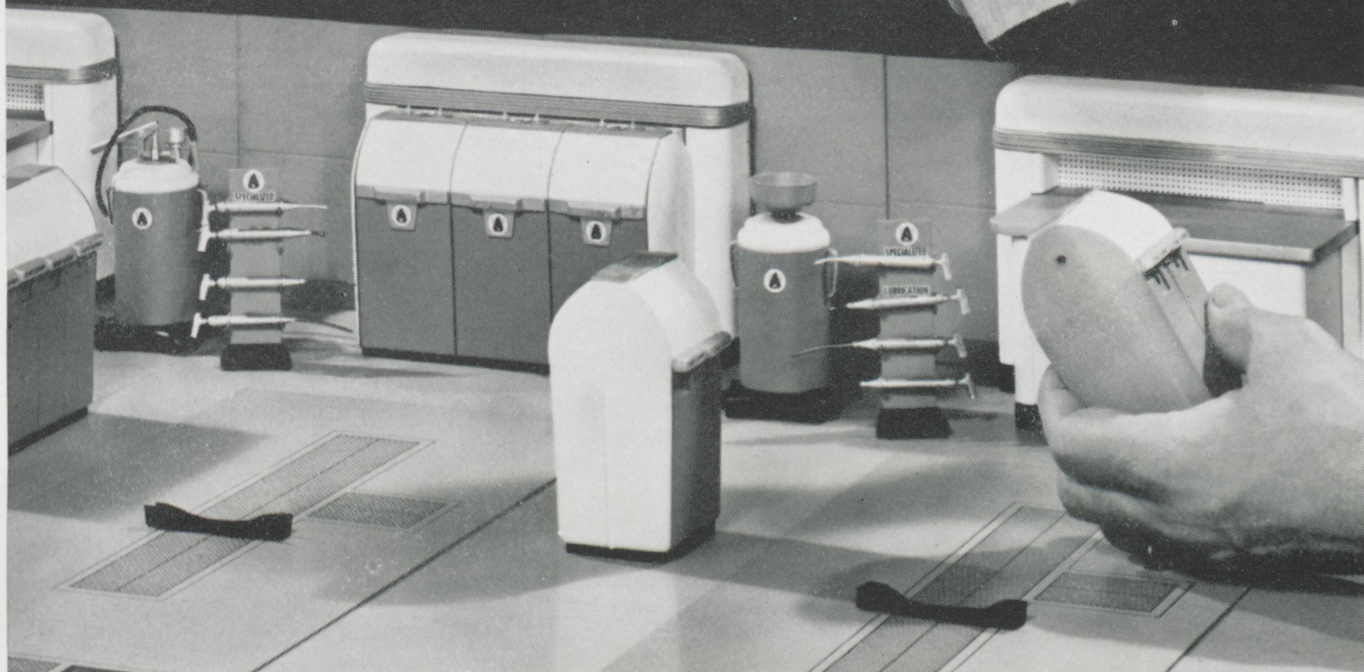
"Heaven?" boomed back the reply, "Who said I was in heaven? I'm a bull in Montana."

PHOTOGRAPHY AT WORK—No. 8 in a Kodak Series

Kodak
TRADE-MARK

Photography shows prospects

how their new service stations are
going to look and operate



**Alemite sets up scale models of their
service station equipment on the customer's own floor plan—photographs them—
and portrays the new custom-built station ready for action**

SALESMEN don't just pull lube racks, grease pumps and other service station equipment out of a sample case. They're far too big—far too bulky. Besides, final location and arrangement count heavily in how well they are going to work out.

The Alemite Division of Stewart-Warner solves the problem with photography. Prospects see new service station equipment virtually right in their own premises.

It works this way. The salesman sends in a rough sketch of the space available, with windows and columns marked. Experts fit exact replicas of racks, lifts, and other equipment to the plan, then put the camera to work. The customer pictures his new station—modern, efficient, handsome—and the sale is well on its way. It's an idea for any company with

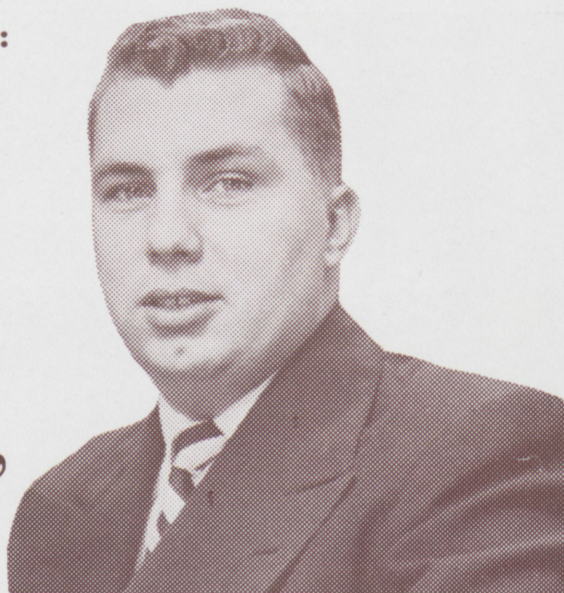
bulky products to sell. Photography is a great salesman for any business, large or small. And it's very much more. It works in all kinds of ways to save time, cut costs, reduce error and improve production.

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.

Eastman Kodak Company, Rochester 4, N.Y.

JOHN B. NOLTE, Purdue University '54, asks:

"What is G.E.'s Manufacturing Training Program?"



The Manufacturing Training Program at General Electric is a program of basic training for manufacturing leadership, including planned rotational work assignments and related classroom study for outstanding young men who are interested in a career in manufacturing. It was organized to meet the increased demand for effective manufacturing leadership and technical "know how," in line with the expansion and development of the Company's operations by developing trained men to fill future key positions in the organization.

Who is eligible for this program?

In general, the Program is open to college graduates with degrees in engineering and science, and a limited number of business administration and liberal arts graduates. We are looking for outstanding young men with sound educational backgrounds, well-balanced personalities, demonstrated thinking abilities, and having the potential to develop toward top level responsibility in key assignments.

How long is the program?

The normal length of the Program is three years. Assignments are normally 6 months in duration and provide experience opportunities in diversified manufacturing operations. Geographical moves occur at annual intervals.

What type of work assignments are made?

Work assignments are provided in all phases of manufacturing and related functions so that each man will acquire knowledge of manufacturing engineering, including manufacturing methods and techniques, shop operation, production control, personnel administration, labor relations, engineering activities, sales and manufacturing co-ordination, and general business administration.

In addition to job assignments, related study courses

cover such subjects as Company organization, manufacturing operations, labor and personnel relations, business administration, law and relationships between manufacturing and other functions of the business. Progress on the job and in classroom work is carefully observed and reviewed periodically with each man to assist him in his career.

What happens after training is completed?

After completing the training program, graduates are placed in operating departments and divisions throughout the Company in positions where leadership and initiative are needed. All placements are made in relation to the aptitudes, abilities, and interests of the graduates.

At General Electric, manufacturing operations involve the administration and supervision of activities of more than 100,000 men and women in more than 100 plants, who are involved in the making of some 200,000 different products.

The wide scope of these activities, the great variety of products, and the diversity of manufacturing activities offer limitless opportunities and exciting challenges to college graduates today.

Manufacturing training is a foundation for leadership—and an opportunity to build a satisfying, rewarding career in one of America's most important industries.

If you are a graduate engineer, or a graduate with definite technical inclinations that include an interest in the career possibilities in manufacturing, see your college placement director for the date of the next visit of the General Electric representative on your campus. Meanwhile, for further information on opportunities with General Electric write to Manufacturing Training Services Section, Bldg. 36, General Electric Company, Schenectady 5, New York.

You can put your confidence in—
GENERAL  ELECTRIC