In This Issue

PUMPED HYDRO STORAGE
ONE OF THE SPIRITS
ELECTRONIC ABACUS
"So then U.S. Steel invested $770 million in us"

An American baby is born every eight seconds—11,000 every day—4,000,000 a year. Our population will soon be over 200 million. And as our population grows, our production must grow. We'll need millions of new homes . . . new schools and hospitals . . . new highways to carry 75 million motor vehicles by 1970 . . . not to mention countless appliances and conveniences that haven't even been invented yet!

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Most important, Frank Willard is doing exactly what he wants to be doing. Upon completion of the Westinghouse Student Training Course, he was assigned to the Control Division and, soon thereafter, was selected to attend the Westinghouse Advanced Design Course at the University of Pittsburgh. He has submitted 12 patent disclosures; and he has 8 U. S. patents pending.

Frank Willard is one of many talented young engineers who are finding rewarding careers with Westinghouse. You can, too, if you’ve got ambition and you’re a man of exceptional ability. Our broad product line and decentralized operations provide a diversity of challenging opportunities for talented engineers. Guided missile controls, atomic power, automation, radar, semiconductors, and large power equipment are only a few of the fascinating career fields to be found at Westinghouse.

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CBS TV MONDAYS

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Cover Note

"Against a work-worn blueprint—capable, creative hands cooperating to get the job done. So Stanley Meltzoff symbolizes the effective teaming of engineering skill and fabricating know-how in our ever-expanding steel industry, the very bone and sinew of America's strength." Reproduced through the courtesy of United Engineers & Constructors Inc., of Philadelphia, Chicago, and New York.

Printed by Moore-Langen Printing and Publishing Co.
140 North Sixth Street, Terre Haute, Ind.

Published monthly except June, July, August, and September by the Students of Rose Polytechnic Institute. Subscription $2.00 per year. Address all communications to the ROSE TECHNIC, Rose Polytechnic Institute, Terre Haute, Indiana.

Entered in the Post-office at Terre Haute as second-class matter, as a monthly during the school year, under the act of March 3, 1879. Acceptance for mailing at special rate of postage provided for in section 1103, Act of October 3, 1917, authorized December 13, 1918. This magazine does not necessarily agree with the opinions expressed by its contributors.
Letters to the Editors

Editors Note: In the November issue of the Technic, Ray Clark wrote an article entitled “Engineering Unions”. Shortly thereafter, the Technic received a letter from Julian Furness, a Class of ’47 graduate of Rose, concerning this article. The editors of the Technic felt the student body would be interested in reading his views. The Technic has also received additional literature from Mr. Furness which is available in the Technic office.

Perhaps the working engineer thinks that he is a part of management, but the National Labor Relations Board in general, and my employer, Sperry Gyroscope Company in particular do not. The latter entity indicates its position on this question by refusing the benefits of our tuition refund plan to all those engineering employees who are taking graduate courses in Business Administration, on the grounds that those courses would not be of “definite value on their job”.

The problem of wage scales has been met in our and other unions by establishing a minimum salary for each grade of engineer. Granted, it would be extremely difficult, if not impossible, to establish wage scales for different engineering functions. But, is such a structure necessary or should it really be a hindrance to establish a collective bargaining agency for a group with so many other common interests? The answer probably lies in the establishing of professional qualifications for engineer by themselves, which our union is presently implementing, but which will be really effective only if conducted on a national or international level.

I must agree with your position concerning those so called unions that have no-strike clauses in their constitutions. In fact the Engineers and Scientists of America in 1957 was split down the middle by the secession of those of its members units who adhered to the use of the strike or, more accurately, the use of the threat of a strike in order to negotiate satisfactory contracts.

Our organization, The Engineers Association, is one of those that withdrew from the ESA and is presently attempting to organize a new national engineering union (The Engineers and Scientists Guild) from those groups which left the ESA and other independent engineering unions. Other secessionists have since affiliated with established labor unions (EA of Arma is in the IUE AFL-CIO). On the other hand, I cannot agree with your opinion that an individual can negotiate the number of holidays, premium pay for work over 40 hours per week, the length of vacations, amount of pension and insurance benefits, etc., with his employer, since these policies are set at a level so high in the corporation that the individual in all probability does not even know the names of the responsible parties much less be in a position to talk with them.

In our union, the individual is not barred from contact with the employer, in fact, he has a grievance procedure under which his particular problem can be processed to the Vice President for Industrial Relations, and thence to an impartial, mutually acceptable, arbitrator, should the problem still not be resolved.

Your position that organization of engineers would reduce their status in the eyes of management and the public raises the question of whether the organization of the Doctors by the AMA or the lawyers by the Bar Association lowered their position. As for corrupt practices slipping in, this could only occur with the consent of the members. I have from time to time read of lawyers being disbarred and of doctors being decertified for corrupt practice, but this does not lower the position of the balance of the members of those associations.
Investigation in detecting cavitation, or forming of vapor bubbles in liquid flow, led AiResearch engineers to the discovery of an important new phenomenon...that flow of bubbles in liquids generates a magnetic field. This discovery, among other things, helps solve critical flow problems in missile and industrial fields. The AiResearch cavitation detector pictured picks up these tell-tale signals as the liquid passes through the grid, pinpointing the cause of trouble.

Many such pioneering developments are underway in challenging, important work at AiResearch in missile, electronic, nuclear, aircraft and industrial fields.

Specific opportunities exist in system electronics and servo control units; computers and flight instruments; missile auxiliary power units; gas turbine engines, turbine and air motors; cryogenic and nuclear systems; pneumatic valves; industrial turbochargers; air conditioning and pressurization; and heat transfer, including electronic cooling.

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April, 1959
The story of Standard Oil’s contributions to oil progress through research is told to the public in advertisements like this during the year.

When a boy asks "WHY?"
...anything can happen!

Ever since Bob Hansen was old enough to hold a wrench, he has been tinkering with machines. Next year his repair shop on his driveway at home will disappear because Bob, an honor student, is going to college to study engineering.

Bob is one of thousands of American boys with a restless curiosity about things mechanical. What makes a clock tick? What makes a bicycle brake hold? What makes a car run? From such curiosity comes the mechanical progress that has helped to make America great.

In Standard Oil’s big automotive laboratory in the research center at Whiting, Indiana, engineers are going through a similar process every day—asking questions and finding answers. How do fuel additives affect combustion? How do they affect engine deposits? How do burning rates differ?

And the questions continue outdoors, too. In all kinds of weather—hot, cold, wet, dry, low barometer, high barometer—different blends of gasoline are tried to see what happens under what conditions. Fuels are designed in the laboratories for experimental engines that won’t appear in an automobile for five years.

Standard Oil products are under constant improvement to give the finest performance possible. You get years-ahead quality with Standard Oil products—and at a reasonable cost.

Where does progress start? Does it start on the private driveway of a boy’s home or in a huge research laboratory? Progress starts whenever someone asks "Why?" and sets out to find an answer.

What makes a company a good citizen?
Perhaps even more than an individual, a company must have a healthy respect for the future. Many companies, like Standard Oil, have large families—tens of thousands of people who depend on Standard for their livelihood. Progress through research is one way of protecting the future of both employees and investors and of helping to assure economic stability for the communities in which they live and work.

STANDARD OIL COMPANY
THE SIGN OF PROGRESS
THROUGH RESEARCH

Page 6
X-15 AWAY

TARGET: 100 MILES UP! On a day surprisingly soon 45,000 feet above Wendover, Utah, North American’s rocket-powered X-15 research plane will be released from a modified B-52 to take man 100 miles into outer space. Throughout the flight trajectory, radio contact between the X-15, the mother ship, chase planes and the ground will be maintained by custom-designed units from a Collins CNI (communication, navigation, identification) system, similar to the electronic packages Collins is providing for the new military jet aircraft.

At Collins you receive professional recognition, unlimited opportunity, the most completely equipped research and development facilities, the opportunity to work on the most challenging developments in electronics. Your placement office will tell you when a representative will be on campus. Or write for illustrated brochure “Career with Collins.”

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HIGH SCHOOL GRADUATES OF 1959

You are cordially invited to visit Rose Polytechnic Institute where you can earn a degree in:

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ELECTRICAL ENGINEERING
MECHANICAL ENGINEERING
CIVIL ENGINEERING
MATHEMATICS
PHYSICS
CHEMISTRY

The next freshman class will be admitted
September 14, 1959

THE ROSE TECHNIC
How About A Plug?

Many times during our stay at Rose, due to a bad test or an untimely conflict with a teacher, we become prone to excessive criticism and complaining. A certain amount of complaining is to be expected and is accepted. However, when excessive complaining occurs to the point where high school graduates and other prospective Rose students fear Rose’s reputation instead of respecting it, we should all stop to consider how we might be damaging the school’s future existence.

It is difficult to tell if a “casual” critical statement might influence a prospective student against Rose. Some comments from that last letter home in which you told of the “excessive” homework burden thrust on you might have been relayed to some other local parent of a high school student. Maybe you forgot to tell of that evening you went to a show with three unfinished assignments on your desk or the night you were “bushed” from football practice and went to bed after supper. But, as usual, these items never reach our parents’ ears.

Think back to the last time you were home. Did you manage to put in a “plug” for “dear old Rose” with some of your high school friends headed for engineering? Possibly you told them of the low curve on last week’s test instead of relating some of the advantages of Rose over other engineering colleges such as the following:

1. Small . . .
   a. Low student-teacher ratio.
   b. Conference-type classes.
   c. High degree of faculty interest in students.
   d. Complete laboratories—always open to students.
2. Highly rated among engineering schools.
3. De-emphasized athletics, but a complete athletic program available.
4. Active, interested alumni.

You may want to add some of your personal reasons for coming to Rose.

It is the responsibility of the alumni AND THE STUDENTS to encourage others to investigate an engineering education at Rose. A little more concern for the school’s future existence might be all that is needed to place one hundred seventy-five names on the roster of the class of 1963.

R.L.S.
The cost to produce electricity for consumer usage was, is, and will be a chief concern of electric power companies. The trouble develops in the fluctuations of the load requirements in the load center. During the daytime, when factories and homes are in use, a large amount of electric power is needed. But, during the nighttime, very little is used. Pumped Hydro Storage is an answer to this problem facing the power companies.

This hydro system is a hydroelectric power process whereby relatively high-cost, off-peak power is used to pump water from one reservoir or elevation to another reservoir of higher elevation. This upper reservoir, subsequently discharges this water through a hydraulic turbine-generator to generate low-cost electric power during times of maximum load demand.

Let us examine this method of operation in further detail. For any load center, the base load generators must be kept in constant operation to take care of the consumers’ basic needs, and, with the peak load generators, they must be able to supply the maximum demands. When the demand is low, the peak load stations must be shut down or taken off the line. However, modern steam-turbine generators operate most economically when they are running 24 hours a day at full load. Therefore, it is better to take the peak load generators off the line rather than to shut them down. But, it would be more economical if the power capacity of a percentage of these generators could be utilized. The innovation of PHS affords the opportunity for such to occur. Accordingly, a reduction in the differential between the high and low points on a daily load curve is obtained. The efficiency of the power source is increased, and the cost of electricity is held to a minimum, offering greater profits to the power producers.

Pumped storage was developed as a method to utilize the excess electric power capacity of the peak load generators and, at the same time, to produce low-cost power to supply peak loads. The excess power is used to drive a motor which, in turn, powers a pump that lifts a volume of water from a lower to a higher elevation. This water falls through the penstocks and drives a turbine, connected axially to a generator which, in turn, delivers electric power over transmission lines to a load center.

With PHS, the reduction in the differential between the high and low points on a daily load curve is obtained when some of the surplus, off-peak generating capacity is used to fill the upper reservoir. The entire power system becomes more economical through the relatively low-cost power delivered by the PHS plant to peak load and the utilization of some of the peak load generators during off-peak times. Figure 1 depicts a typical daily load curve. Let us assume the following requirements of the various power sources supplying the load center that has as its daily load curve that of Figure 1.

**POWER SOURCES**

<table>
<thead>
<tr>
<th>Source</th>
<th>Operating cost</th>
<th>Period of Utilization, with PHS, in hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plant A</td>
<td>3.0 mils/kilowatt</td>
<td>24</td>
</tr>
<tr>
<td>Plant B</td>
<td>3.5 mils/kilowatt</td>
<td>24</td>
</tr>
<tr>
<td>Plant C</td>
<td>4.0 mils/kilowatt</td>
<td>24</td>
</tr>
<tr>
<td>Plant D</td>
<td>6.0 mils/kilowatt</td>
<td>16</td>
</tr>
<tr>
<td>Purchased Power (E)</td>
<td>7.0 mils/kilowatt</td>
<td>15</td>
</tr>
<tr>
<td>PHS Plant</td>
<td>5.7 mils/kilowatt</td>
<td>12</td>
</tr>
</tbody>
</table>

If a PHS plant had not been built, power to supply the load center at peak demand, would have to be purchased from another power producer at a possible cost of 7.0 or more mils
per kilowatt. The PHS station allows cheaper power to be available for consumer use.

If this graph represents the load curve of a hypothetical load center, it is served by six power sources. The cost to produce a kilowatt (kw) varies from source to source by the type of plant, period of utilization, and inherent efficiency of the particular plant. The variance is illustrated by the Power Source Chart. According to the estimated peak power that must be delivered, a predetermined volume of water must be pumped to the storage reservoir. Plants B and C offer the cheapest, off-peak power which is available to pump water at the PHS station. From 10:30 P.M. to 1:30 A.M., the surplus power from Plant C can be used to pump water, but the pumps will not be operating at full capacity until 1:30 A.M. when all of the power from Plant C and an increasing amount of power from Plant B is available. The pumps can operate at top speed until 6:30 A.M. when the power from Plants B and C must be put on the line for consumer use only. However, enough water has been stored by this time to supply the load center with power at the peak, since the PHS plant will not be operating constantly at maximum capacity.

In order to produce two kilowatts at a Pumped Hydro Storage station, three kilowatts must be put into the plant. If the average input power to the PHS plants costs 3.8 mils/kw, the power supplied by the PHS station costs 3/2 this amount or 5.7 mils/kw. Now, power, which costs less than that which would have to be purchased for peaking demands, has been developed and can be used.

Pumped Hydro Storage has received favorable consideration by many American power companies with its several definite advantages to the process. It is quite practical in areas where steam-turbine generating stations supply the entire load requirements along with purchased power. The off-peak generators operate at low efficiencies, since not all of their available power is used, and they usually are the older, less efficient generating units. The amount of purchased power is held to a minimum with its high cost, and this power is used for peaking demands only. With PHS, the cheapest available power is used to produce relatively low-cost PHS power (no fuel cost at a PHS Plant). The power system efficiencies are increased, and the power company realizes greater profits.

The flexibility of the design of the project may enable a PHS plant to be located closer to a load center, and, therefore, transmission line losses may be reduced. It may be possible to construct a PHS plant at a location where it might be impossible to build a conventional hydroelectric plant. Along the Mississippi and Ohio Rivers, it would be impractical, if not impossible, to build a dam because of the width of the river, river traffic, and flooding of valuable land. However, there are many industrial centers along these rivers which would have a high demand for peaking power. The existence of high bluffs on either or both sides of these rivers makes PHS attractive in these areas. The rivers offer a large supply of water, and the bluffs afford the required height for a suitable head.

The flexibility of the project in regard to the size of the unit is another advantage. Pumped Hydro Storage plants may be equipped with pump-turbines that have capacities fitted to the expected loads. Also, a developed PHS site is readily adaptable to additional units when (Continued on page 22)

By Bob Schukai, jr., e.e.

Figure 2. — Pumped Reservoir System.
The purpose of this article is to discuss school spirit and the methods by which the student body can improve it, thereby making their stay at college more enjoyable and more worthwhile.

I believe that school spirit is dependent upon the scholastic standing of the school, the success of the school's athletic teams, the presence of wholesome hazing, the availability of outside interests to balance scholastic endeavors, and student-faculty relations.

Let us take each factor separately to see if we have the components for good school spirit. If some components are lacking, let us see if there is some way that we, the students, can improve the particular factors in question.

The scholastic standing of the school is most easily judged by the success of the alumni. We can determine how successful our alumni have been by looking through the Rose Catalog and noting the positions that our alumni hold. Try it. It is impressive. We should be able to agree that Rose is of high scholastic standing, by virtue of the success of its alumni, and that our first requirement for good school spirit is favorably satisfied.

Next, let us take the component dependent upon the success of our athletic teams. Taking into account that we are small in numbers and do not bring in talent by granting athletic scholarships, Rose has been very successful in athletics. We all can be proud that our athletes play for the love of the sport and that our coaches stress sportsmanlike conduct.

However, we do have a shortcoming concerning varsity sports. This shortcoming is in student support. We can correct this by having more students out for varsity sports and by having better attendance at the games and meets.

Another component that can add to good school spirit is wholesome hazing and, along with it, class and departmental rivalries. It seems that when hazing and class rhubarbs are in season, all of us are in better spirits. We must, however, keep in mind that the purpose of hazing is to instill in the freshmen a feeling of belonging and of pride in his school. Hazing also provides a conducive atmosphere for the freshmen to get acquainted and to rapidly adjust to college life. The purpose of hazing is not to have the sophomores get revenge for what they went through the year before! If the students keep this in mind, and the faculty sanctions hazing, an occasional class rhubarb, this component of good school spirit will be present.

There are things about hazing that appear to make it unfavorable. Naturally, there is a possibility of an occasional broken bone. However, I feel that it contributes enough constructively for the student (and if for the student, for the school) that a broken bone now and then should not have the effect of de-emphasizing hazing and class rhubarbs.

Another component of school spirit is dependent upon the availability of outside interests. The adage is that all work and no play makes Johnny have poor school spirit. There are many fields of outside interests available to Rose students.

Thanks to Max Kidd we have a very good intramural program. Max has every sport available in which adequate interest has been shown. If you think that there is student interest in a sport that is not included in our intramural program, ask Max about it. This is how bowling got started last year.

Women is another field in which some may have interest. We needn't specify where to find them, but we should acknowledge that they are available.

We might also acknowledge that there are bowling alleys, theatres, government parks, drive-ins, and a degree of night life close to campus.

With these outside interests available to the Rose Man of ingenuity, this component of school spirit is satisfied.

(Continued on page 27)
For the last month, activities have increased considerably on the Rose campus due to the welcomed change in the season. In late afternoon as I leave the campus, I have noticed the track teams and the baseball team working out to face future competition. Here's hoping their diligent efforts prove to be an asset to the name of Rose. I am confident that we will come out ahead victory-wise, for our teams have many well-trained athletes in the respective sports. These men are putting previous experience to Rose's advantage. Those who aren't participating must support the teams now with their attendance at the games.

Also, one may notice several games of tennis being played on the campus courts. Several of the boys playing have very good form. With comments that I have heard both last year and this spring, I wonder if a tennis team would be an asset to Rose. I have heard several fellows speak of a Rose tennis team. It must be remembered by the student body that all new school activities are brought about by a popular request of the student body. These requests should be presented to the Athletic Committee, headed by Prof. Bloxsome. Other committee members include Prof. Eckerman, Mr. George Moench, and Coaches Brown, Carr, and Kidd. For best results, you tennis enthusiasts should organize somewhat, get some leadership, and present your case to the members of this committee.

The last month has also shown an increase in activity around the fraternity houses. After rush, the different fraternities gave their new pledge classes a new social status by holding mixers and date parties in their behalf. These functions gave these men some diversion from the books, but not enough diversion to affect their grades. Instead, time that would have been spent in inevitable bull-sessions was put to their advantage. The whole school spirit benefited from the rush parties, it is felt, because now the freshmen are on a much closer relationship with the upperclassmen. Now that these freshmen have completed one semester and one six weeks period, I am sure that each one is aware that Rose is a school where educational success is reached only through a disciplined time schedule and diligent work on studies.

The different engineering societies, the math club, and the administration should be commended on their selections of convocations this previous month. The distinguished speakers and actual material content of these convocations have drawn a very large percentage of the student body. However, I feel that this percentage could easily be increased and by all means should. The school sponsors these meetings and presentations for the benefit of the student body; let's take advant-

(Continued on page 28)
The International Geophysical Year. What is the IGY? How did it get started? Who sponsors it? What are its objectives? Most of all, what will we, as potential engineers, gain from this year?

To start with, what does geophysical mean? Webster defines it as "The physics of the earth or the science treating of the agencies which modify the earth". The IGY concerns the studies of meteorology, geomagnetism, physics of the ionosphere, aurora and airglow, cosmic rays, oceanography, latitudes and longitudes, glaciology, gravity, seismology, rockets and satellites, nuclear radiation, and solar activity.

The IGY is an outgrowth of plans for a Third International Polar Year. The proposal for the Polar Year was made by L. V. Berkner in 1950 at College Park, Md. It has become the greatest nonpolitical international project ever undertaken. This project was undertaken by scientists devoted to their common objectives of finding how the earth effects our lives.

How did the scientists accomplish this unity needed to make the IGY a success? The scientists of the world are organized into Unions covering such general fields as physics, chemistry, astronomy, biology and geophysics, and specialized fields such as radio, biochemistry, physiology and crystallography. These Unions are controlled by the scientists themselves, the governments have nothing to say about their operation. These Unions represent a large proportion of the scientific activity being carried out over the world today. The scientists are kept informed of activities through their principle national scientific body. The scientists of the United States adhere to the Unions through the National Academy of Science. Through frequent world assemblies and special symposia, each of the Unions stimulates scientific growth. These Unions put emphasis on fruitful and exciting opportunities, specification of cooperative programs of research, agreement on standards and nomenclature, and gives advice to other international agencies on scientific problems on request.

The separate Unions are further organized under the International Council of Scientific Unions or ICSU which coordinates the common interests. The members of the ICSU are the scientific representatives of the Unions and the national representatives of the principal scientific body of the nations adhering to the policies. This, in other words, provides a common meeting place for the scientists and national scientific bodies of the world.

Not only does the ICSU coordinate the activities of the Unions but they also have the responsibility to encourage international scientific activity, to enter into relations with governments of the countries adhering to the Council to promote scientific investigation in these countries, and to maintain relations with the United Nations and its specialized agencies, particularly UNESCO.

The ICSU has organized a special committee (Comite Special de l’Annee Geophysique Internationale) to stimulate research on an international scale. When several Unions realized that a common effort would be needed to describe the events of the earth, they asked the ISCU to appoint a special committee (CSAGI) to plan the effort in 1950-51. It was realized by the Unions that only through simultaneous worldwide cooperation of all nations would this be possible.

The Committee met first at Brussels in October, 1952, where the basic principles were laid down. These principles were as follows: each nation was to organize a national committee to advise how its nation could contribute to the achievement of specified objectives and to plan and supervise its national contributions. At the next meeting in June, 1953, Sydney Chapman, Sedleian Professor of Natural Philosophy, Oxford, and a distinguished geophysicist, was named...
President of CSAGI. Marcel Nicolet, Chairman of the Solar Radiation Laboratory, Institute of Meteorology, Brussels, became Secretary General. Other meetings were held in Rome, 1954; Brussels, 1955; Barcelona, 1956; and Moscow, 1958. The last meeting will be held at Washington, 1959. There have been regional meetings between the large meetings on Arctic at Stockholm; Antarctic at Paris; and other regions: Africa south of Sahara, Bukavu; Rio de Janeiro; Moscow; and Tokyo.

The administration of I G Y is being carried on by the Bureau of the CSAGI with the officers together with Professors Coulomb of Paris and Belousov of Moscow.

There are several points in the organization that are worth taking notice of: (1) It is successful in catalyzing extensive research. (2) The organization of the research is through national machinery. (3) Research can be stimulated that would not otherwise be done. (4) The organizational machinery of the special committee is financed from international funds. (5) The special committee is entirely nonpolitical. (6) This method captures the imaginations of the world’s best research scientists.

How is the data that is collected transported to the other scientists? This is accomplished through the establishment of World Data Centers. There are three Data Centers: I G Y World Data Center A, National Academy of Science, 2101 Constitution Avenue, Washington 25, D. C.; I G Y World Data Center B, Academia Nauk, SSR, Kaluzhskoye sh. 71a, Moscow B-134, U.S. S.R.; I G Y World Data Center C, A decentralized group of centers for different disciplines in Western Europe and Japan. With the idea of multiple centers there is insurance against accidental loss of data and minimizes the likelihood that artificial barriers arising from political and military action could restrict access of any scientist to the data he needs. All three of the data centers are decentralized within themselves. The main center coordinates and catalogs the data for the separate locations.


From this list it may also be seen the scope that the I G Y has taken. Scholars may go to or write to the centers for the data or research. The data is now flowing freely to and from the three data centers.

You may already have some idea of the reason for the I G Y. On the planet earth there are various phenomena that provide the environment that enables man to inhabit this planet and to turn its natural phenomena to his benefit. A purpose of I G Y is to bring us a step nearer to unifying our comprehension of these phenomena into an orderly and coherent whole.

There are several far reaching results in which we as engineers may benefit from this I G Y. There will be a second phase: the analysis and synthesis of all of the data into this advanced description of our planet. Of course there are all the technological developments that will be found from these experiments and new data. With all of this basic research going on there will be a need for engineers, particularly good engineers that are being developed at Rose.

April, 1959
PLANS FOR MOON BUILDING

Plans for a permanent "moon building" to house living quarters for moon explorers, laboratories for scientific research, maintenance shops for space vehicles, and stations for earth-moon communications have been announced by the Wonder Building Corporation of America.

A detailed 5x6 foot scale model of the structure — a cigar shaped corrugated metal cylinder covered by a protective metal "meteoric shield" — was recently unveiled to military and federal government officials in Washington, D.C.

The moon building has been designated for the worst condition anticipated on the moon's surface, a sea of dust upon which the building would float, anchored by heavy weights suspended by cables from the body of the structure. If the moon's surface proves to be sufficiently solid, it could then provide normal support for the building.

In actual size, the moon building would be 340 feet long, 160 feet wide, and 65 feet high. Including air lock and plastic observation bubble, it would measure 520 feet in length. The building would be fabricated of aluminum alloys which combine high strength and low weight with ease of fabrication. Aluminum also provides a good reflecting surface which aids cooling problems.

Above and separated from the roof of the building is a slightly curved umbrella-shaped protective meteoric shield, designed to ward off the gnatlike rain of interplanetary meteoric dust which descends with great velocity on the barren surface of the moon. The shield would be 460 feet long, 380 feet wide, and 83 feet high.

The entire shell of the building, and the protective barrier, would be fabricated of pre-engineered metal sheets secured by simple nut and bolt fasteners and welded structural connections. A unique "Truss-Skin" design provides completely useable interiors, without internal supports of any kind. With space at a premium inside the moon building, the trussless concept would eliminate space wasted by ordinary structural supports, while the pre-engineered design would permit quick erection with minimum labor and tools.

Inside the moon building are:

- Living quarters, including rooms for sleeping, cooking, eating, and recreation.
- Physics, chemistry, and biological laboratories.
- Control tower for communication, meteorological studies, earth observations, astronomical observations, traffic control, etc.
- Air conditioning, heating, power, and refrigeration plants, oxygen producing units, extreme-temperature regulating devices, water supply, and sewage processing plants.
- Machine shop and equipment maintenance areas.

Entrance to the moon building is made through an air lock at one end, adjacent to which would be constructed a rocket landing area. Complete internal pressurization of the hermetically-sealed building provides an air pressure of at least 10 pounds per square inch, close to

(Continued on page 30)
The Rose Poly trackmen opened the '59 season with a 54-50 victory over Earlham College. As usual Rose showed strength in the sprints and hurdles but are weak in the distance runs. Hal Booher, transfer from DePauw University, gathered four firsts and set a new field house record to bring home 20 points for Rose. Hal lowered the record for the 60 yard low hurdles 3 tenths of a second to 7.2 sec. Booher also headed the field in the 60 yard high hurdles, the 60 yard dash, and the broad jump. Mike Munro, Ron Ireland and Bill Kuchar finished 1,2,3 respectively in the shot put to sweep this event for Rose. R.P.I.'s mile relay consisting of Logue, Andel, Gladden, and Staggs took the event with a time of 3:49.0. Mewhinney, Ray and Logue rounded out the scoring with several second places in their events.

One Mile
1 Knutsen (E) 2 Simkin (E) 3 Treadway (E) 5:05.8

Two Mile
1 Knutsen (E) 2 Simkin (E) 3 Ray Treadway (E) 11:23.0

Half Mile
1 Ray Treadway (E) 2 Zuck 3 Stiles (R) 2:14.9

60 Yard Dash
1 Booher 2 Morgan (E) 3 Lev- inger (E) 6.8

440
1 Zuck 2 Logue (R) 3 Staggs (R) 55.8

High Hurdles
1 Booher 2 Mewhinney 3 Cook (E) 8.2

Low Hurdles
1 Booher 2 Mewhinney 3 Cook 7.2

Broad Jump
1 Booher 2 Jenkins (E) Stiles (R) 21' 2 1/4"

Pole Vault
1 Phillips (E) 2 Ray (R) 3 Mewhinney (R)
11' 6"

High Jump
1 Phillips (E) 2 Ray (R) 3 J. Munro (R) 5' 10"

Shot Put
1 M. Munro (R) 2 Ireland (R) 3 Kuchar (R) 40' 4 1/2"

**TRACK SCHEDULE**

- **March 24**
  - Tues. Earlham (indoors)

- **April 8**
  - Wed. Greencastle—H
  - April 11
    - Sat. Wabash Relays—Wabash
  - April 14
    - Tues. Ind. Central—There
  - April 18
    - Sat. Concordia—T
  - April 25
    - Sat. Rose Relays
  - May 9
    - Sat. Earlham Relays—Earlham
  - May 16
    - Sat. Prairie College Con. Meet —H

**BASEBALL**

The spring rains kept the baseballers inside again this year but Coach Carr thinks the outlook is good if his pitching staff lives up to expectation. With 9 lettermen re-

(Continued on page 34)
Mr. Ruel F. Burns, one of the local alumni, was born in Sullivan County, Indiana in March of 1893. He moved to Terre Haute in 1903 where he attended Wiley High School and was president of his senior class. After graduation in 1911, he came to Rose. During his four years here, he was a member of Sigma Nu fraternity, served as a class officer, and served on the Modulus staff. He graduated in 1915 with a Bachelor of Science in Mechanical Engineering. After graduation he worked at the Terre Haute Paper Company, where he had worked previously during the summer.

During World War I he served his country in the air service. After the war he went back into industry, working at the paper mills in Bogalusa, Louisiana. He soon returned, however, to the Terre Haute Paper Company and spent some time at their other plants in Ohio and Illinois. When the owner retired, Mr. Burns became in charge. He has been in the paper industry ever since, and is presently Vice-President and Production Manager of the Weston Paper Company here in Terre Haute.

Mr. Burns is married, and has a family he can well be proud of. He has a son who graduated from West Point, and recently retired from the army. His daughter is presently teaching at Indiana State Teachers College.

He has a great many outside interests and hobbies which keep him more than busy. He has a great liking for the outdoors in general, and has hunted various game all over the North American continent. He is an amateur writer, and has written many articles and stories for Outdoor Life, Saturday Evening Post, and many others. He is presently making plans for a trip which he will make to Santa Barbara, California in May. He will take one of his two quarter horses and ride through the mountains and scenic countryside of that area with a group who have been doing this annually for seven years. Paul Grafe, a Rose alumnus presently on the Board of Managers, is also a member of this group.

On December 24 of last year he began a trip which he had planned for a long time: a safari in Africa. He arrived at Nairobi, where he met his safari, consisting of a white hunter, a photographer, and many natives who acted as drivers, cooks, gun-bearers, etc. For two days they prepared for the trip into the bush country by obtaining the necessary permits, and getting guns, ammunition, food, and other essentials together. After completing all of their preparations, they traveled south 75-100 miles to a game preserve where Mr. Burns shot many of the small game common to the African plains. It was here that he

(Continued on page 27)
Convair-Astronautics' great new $40 million facility in San Diego was created solely for the purpose of putting America first and farthest into space. Here, graduates will participate in the program of the nation's mightiest missile, the Atlas ICBM, which powered the biggest satellite into orbit. Other programs involve lunar and interplanetary exploration. Many members of our staff rank among the world's leading authorities in their fields — distinguished scientists and engineers to direct your career progress. We urge you to consider a future at Convair-Astronautics.

We are seeking undergraduate and graduate students majoring in

AERONAUTICAL, MECHANICAL, ELECTRONIC, ELECTRICAL AND CIVIL ENGINEERING

plus graduate students majoring in

PHYSICS AND MATHEMATICS

Please write at once to Mr. R. M. Smith, College Placement Coordinator,
CONVAIR-ASTRONAUTICS, SAN DIEGO, CALIF.

CONSULT YOUR PLACEMENT OFFICE FOR FURTHER DETAIL
Sigma Nu

The end of school is in the foreseeable future now, and as always happens every year, senioritis is setting in. Even the really stalwart seniors—like Brother Parr—are laying the books down now and then for a quick game of pin the tail on the Commander.

We once more this year have a prominent member in the house as Brother “Soggy” Crisp capped a prize for his chin whiskers at the St. Pat’s dance. He had to shave it off though. It didn’t quite match the upholstery in his new car.

We have a slug of parties coming up soon. There is a “Hillbilly” dance in the works with the Chi Omega’s, a dance with the A.O.Pi’s, and a quiet evening of rest and relaxation with the T.K.E.’s in the latter part of April. A date dance is just around the corner, and a “Parents Day” for the house is being worked on. This just about covers the social corner for the present. Of course “Help” week and the I.F. dance are due also.

There has been only one pinning called to my attention since last issue and that is Brother Raquet’s pinning to Miss Shirley Otolsky. And with that last bit of news, I’ll bid you—So long for now.

—Fred M. Ryker.

Theta Xi

Well, Spring has sprung and all of the little TX tigers are just bubbling over with energy. Many scholastic, social, and fraternal events crowd Theta’s Xi spring calendar. One of these all important dates is the Bowery Ball which is given annually by the pledges. With pledge social chairman Dan Pool doing the planning we are sure to have a tremendous party awaiting us. While I’m on the subject of pledges and pledge activities I’d like to mention the new pledge class officers.

President—Ron Andis
Secretary—Mike Gilpatrick
Treasurer—Jim Malone
Social Chairman—Dan Pool

Other dates which also mark our calendar are April 5—Parent’s Day Open House, and April 12—IF Picnic. These and many other occasions are being eagerly awaited by all.

Congratulations go to Brothers Dean Brown and Ed Goheen for being selected as pledges in the Tau Beta Pi Honor Fraternity. Congratulations also go to Brothers Hollingsworth and Spoonamore on being presented with Rose Honor Keys.

The TX tigers ended the fraternity basketball season with a sizzling 7-1 record to retain the championship for the second straight year. All of the players and coach Jerry Schmidts deserve a definite pat on the back for this fine achievement. We are very proud of the two sports trophies which will continue to grace our mantelpiece.

With spring weather just around the corner we are looking forward to a victorious season of softball. Our pitching staff looks as if it may be a little weak but with extra effort in the infield we can see no present threats.

Theta Xi is happy to announce the initiation of three new active members. John Henley, Jerry Manley, and Mike Eckard are now wearing the ring of pearls.

The men of Theta Xi wish to extend their hardest sympathy...er congratulations to Brother Dale Starks who has finally done it. The date is May 2. I’ve got my bag of rice. What about you?

The rumor has it that song practices are going to start in the very near future. Brother McCardle will be leading the Theta Xi larks this year, replacing Brother Bock who could never get the piano tuned.

Well that’s just about all of the tiger growls for another issue. So until next month I’ll just say Grrr.

—Larry Pitt

Alpha Tau Omega

Alpha Tau Omega proudly announces the election of the following officers for the coming year:
Worthy Master (President)—Larry Berger
Worthy Chaplain (Vice-President)—Sherm Smith
Worthy Keeper of Exchequer (Treasurer)—Bill Perkins
Worthy Keeper of Annals (Historian)—Dave Trueb
Worthy Scribe (Secretary)—Bob Schukai
Worthy Usher—Louie Roehm
Worthy Sentinel—Ted Jaenke
Fiscal Assistant—Jon Stiles
Pledge Trainer—Woody Stroupe

The Rose Technic
These incoming officers have a big job to do in the next year. The shoes they are stepping into are certainly big, for the retiring officers have done a tremendous job. The entire chapter wishes to take this opportunity to compliment and thank the retiring Worthy Master Jack Fenoglio and all the old officers for a job well done.

The Tau interfraternity basketball team ended the season with a 49-39 win over Lambda Chi Alpha. Since all positions in the I-F League were determined regardless of the outcome of the final scheduled game, this game was not played. The Alpha Taus thus finished the season with a 5-won, 3-lost record to give us our second 2nd-place finish in interfraternity sports competition this year. Congratulations to the Tau basketball squad for their splendid showing, and congratulations to Theta Xi for capturing the 1958-59 interfraternity basketball championship!

Athletic Director Louie Roehm deserves a good deal of credit for the upsurge of ATO in I-F competition this year. With his year of office now over, Louie has led the Taus to a championship in softball, and a second-place finish in football and basketball. This is quite an improvement over previous years!

The spring sports are now beginning to get underway, and Alpha Tau Omega is well represented on both the baseball and track squads. Taus on the baseball team include first baseman Louie Roehm, second baseman Jerry Waltz, pitchers Jerry Heiniger and Jim Godwin, catcher Dave Trueb, and managers Scott Herrin and Bill Perkins. Two of the tri-captains of the track team are ATO's: Bill Kuchar and Mike Munro. Other Taus on the squad are Bob Mewhinney, Hal Booher, Jon Stiles, Dave Lindzy, Jack Munro, and manager Dick Foss.

ATO is proud to have had two of its number tapped at the Spring Honors Assembly. Woody Stroupe, Junior Ch.E., was tapped for membership in Tau Beta Pi, and Louie Roehm, Junior C.E., was tapped for membership in Blue Key National Honor Fraternity. Good work, Louie and Woody!

It seems that a few (hundred) pieces of silverware, all of the paddles, and a few other items have disappeared from the ATO house during the month of March. Pledge rowdiness seems to have begun, but retaliation is not far away! Beware, pledges!!

Preparation is now going on in defense of two trophies ATO now holds. Our new Athletic Director, Jerry Waltz, is getting the softball squad shaped up to try to capture our second consecutive I-F softball championship. Song Director Chuck Sechrest also has the Taus at work on our songs for the interfraternity sing. ATO would certainly like to wrap up our seventh consecutive song trophy this year. The competition will undoubtedly be tough in both the softball league and the song contest, but Alpha Tau Omega will certainly be in there fighting for two more victories.

—Bill Perkins

Lambda Chi Alpha

It's beginning to look like the pledges can pick up where the actives leave off. They are completing some of the jobs we didn't get done before rush, mainly the remodeling of the downstairs bathroom. Good work, men! However, you'll have to quit picking on Rocky. He's an old man now (over the hump!) and won't tolerate any foolishness.

The parlor ceiling has been painted (also by the pledges) and the walls are to be papered in the near future (by a professional).

It seems our poet laureate, Bill Young, has finally succumbed to the inevitable. Bill was recently pinned to Miss Dayrl Pifer from Danville, Illinois. Congratulations Trummy! You went down fighting.

Lambda Chi Alpha is proud to have retained the I.F. scholarship trophy for the tenth straight semester.

Congratulations to brothers Huff and Phipps. Noble was tapped for Tau Beta Pi and he also received the AICHE award for the Ch.E. with the highest grades through the first two years at Rose. Gary, who is a member of TBP, was tapped for Blue Key.

We've had a couple of mixers since last reporting. The Delta Gammas and Chi Omegas were our guests on February 20th and March 13th respectively. A good time was had by

(Continued on page 32)
PUMPED HYDRO STORAGE

(Continued from page 11)

greater peak load power is necessary.

Naturally, with any system, there are some disadvantages. The main disadvantages in PHS systems are: that they can only be peaking plants; that they must depend upon some other off-peak power for pumping; and that a sufficient supply of water must be available during pumping. However, it is generally believed that the advantages outweigh the disadvantages, and, with further development, PHS systems will become more useful.

In consideration of a location for a PHS plant, several primary requirements must be met. The terrain should allow at least a 200-foot water head. It is preferable to have a higher head to reduce the amount of water quantities required and the size of the penstocks. Water, stored at a high elevation, contains a large amount of potential energy. When the water falls through the penstocks, this potential energy is converted to kinetic energy. When the water strikes the blades or vanes of the turbine, most of the kinetic energy of the water is transmitted to rotational energy in the turbine. The shaft, running off the turbine to a generator, turns the generator which produces the electric power. Therefore, with a higher head, greater potential, kinetic, and rotational energies may be developed. Also, smaller penstocks and volumes of water are required for a PHS site, and greater economics may be realized in such a system.

The supply of water to the system is a consideration of major importance. It must be adequate and reliable. Existing suitable sources may be large lakes and rivers and water retained by dams. If water supplies have to be created, they must be adequate for the required service, but no larger, to minimize the cost of land and clearing.

Usually, the reservoir, or upper storage pool, has to be built. An exception to this is at such a site where a dam furnishes a suitable head.

When the reservoir has to be constructed, it should be built as near as possible to the site of the source to reduce the length of the penstocks.

The operating cost of the system can be kept low if the PHS site is near the load center. Line losses in transmission of power to and from the unit can be lessened with reduced distance between site and load center. It is also advantageous to make use of existing transmission lines both in tying the generated power to the load and in supplying the pump with off-peak energy.

Although there are many methods of pumped storage, they all evolve from two basic methods. In the first, a reservoir is created above an existing water source. The powerhouse is constructed below the reservoir, and penstocks are constructed from the reservoir to the powerhouse. The powerhouse is located on the shore of an adequate body of water from which water will be pumped to the reservoir.

The second basic method is the hydro-chain system. In this operation, a series of dams are constructed. This system can only be used on non-navigable rivers without going into a considerable expense. Its principle of operation is the usage of the same water several times to generate electricity when a dam affords a suitable head. This water is used at separate, but related, locations. This system is very adaptable to mountainous regions.

The retention dam serves as a suction pool and holds the water which supplies the reservoir of Dam #2 with water. The reservoir of Dam #2 serves as a suction pool for the pumps of Dam #1 and is the source of water for Reservoir #1. Figure 3 shows how the same water may be used to produce electricity at separate locations.

With the advent of the vertical, Francis-type pump-turbine, the required machinery for Pumped Hydro Storage has become simpler, since the same unit can act as a pump and a turbine rather than have two separate units for each operation. The pump-turbine is directly connected by an axle or shaft to an electrical machine which serves as a motor when the unit operates as a pump and as a generator when the unit operates as a turbine. The pump-turbine combines the designs of a hydraulic turbine and a centrifugal pump. Because of the dual function, the pump-turbine was developed as a two-speed unit so that it could be operated at the proper speed for best over-all efficiency when pumping as well as when generating power. At the higher speed, it will operate as a pump with a comparatively lower horsepower input. When the unit operates as a turbine, a higher horsepower output will be obtained at the lower speed.

The capacity of the unit can be fitted to the amount of power that is desired to be generated. These units can be constructed to unbelievable capacities. At the TVA Hiwassee Plant in North Carolina, a pump-turbine rated at 102,000 horsepower as a pump and 120,000 horsepower as a turbine was installed in 1956. Such a unit has an output capacity of 90,000 kilowatts. A private power company in Missouri is considering the construction of a PHS plant using a pump-turbine rated at 167,500 horsepower as a turbine and a discharge of 7,775 cubic feet of water per second. As a pump, it is rated as having a pumping capacity of 5,500 cubic feet of water per second requiring a 149,000 -horsepower motor. The penstocks for this unit will have a diameter of 27.33 feet as they enter the pump-turbine.

Next to thermal generating stations using atomic power to convert water to steam, Pumped Hydro Storage is the newest innovation to the electric power world in the United States although the process itself is quite old in history. The favorable future of the Pumped Hydro Storage systems lies in its comparative low cost of construction and operation, low depreciation, and flexible usage as a peak load supply of low cost energy, offering greater profits during the time of peak load demands.
New "post-grad" program helps engineers move ahead at Western Electric

Careers get off to a fast start—and keep on growing—at Western Electric.

One big help is our new Graduate Engineering Training Program. This unique full-time, off-the-job study program starts soon after you join Western Electric... continues throughout your career. Students are offered courses in various fields including semiconductors, computers, feedback control systems, and problem solving techniques. What's more, they study methods for improving skills in communicating technical information and the art of getting ideas across.

You'll find the work at Western Electric stimulating, too. As manufacturing and supply unit of the Bell System, we pioneered in the production of the transistor, repeated submarine cable, and the provision of microwave telephone and television facilities spanning the country. Engineering skills can't help developing—careers can't help prospering—in the lively, exciting technical climate at Western Electric.

Western Electric technical fields include mechanical, electrical, chemical, civil and industrial engineering, plus the physical sciences. For more information pick up a copy of "Consider a Career at Western Electric" from your Placement Officer. Or write College Relations, Room 200D, Western Electric Company, 195 Broadway, New York 7, N.Y. And sign up for a Western Electric interview when the Bell System Interviewing Team visits your campus.

MANHATTAN'S COLISEUM TOWER building houses Western Electric's New York training center. Here, as in Chicago and Winston-Salem, N.C., Western Electric engineers participate in a training program that closely resembles a university graduate school.

CLASSROOM SESSION at one of the centers takes up the first part of the three-phase program, Introduction to Western Electric Engineering. During this initial nine-week training period, new engineers are provided with a better understanding of Western Electric engineering methods and technical practices.


APRIL, 1959 Page 23
The following article is a condensed report taken from a booklet published by IBM entitled “World of Numbers”.

Digital computers are nothing new. The abacus, the adding machine, and the desk calculator are all digital computers. They owe their name to counting numbers on our ten fingers or “digits”. Because we have ten fingers, most computation is based on the familiar decimal system. However, an increasingly important basis for counting is the binary system, which uses only two digits, 0 and 1.

Some of the fastest electric and electronic computers use the binary system. Since only two digits are required, binary numbers may be represented by the physical state of the circuits, on or off. Many machines accept decimals, convert them to the binary system for computation, and reconvert the answer to decimals for recording.

Elements of the Digital Computer

Digital computers contain the following elements in one system: Input, Control, Storage, Processing, and Output.

Input—Information is fed to the system on punched cards or tapes, magnetic tapes, or inserted manually from a keyboard of switches.

Control—The computer operates under the direction of a control unit. The sequence of steps to be performed must be translated into a set of detailed instructions, or “program”, which the system can understand. Special instructions enable the processing unit to make logical decisions based on intermediate results.

Storage—Data can be internally stored in a system by electromechanical, magnetic, or electronic devices. The stored information may be referred to at any time, and may be original data, intermediate results, reference tables, or instructions.

Processing—The processing unit can add, subtract, multiply, divide, or compare numbers at lightning speed. Complex calculations are always a combination of these basic operations. The processing unit also has the ability to make logical decisions.

Output—After processing, the computer can transfer answers to storage, print it on cards, record it on magnetic tape, or print it in report form.

As stated before, a “program” is the precise way to say “series of instructions.” A program defines in complete detail exactly what the machine will do under any given set of conditions. If some instruction is omitted from the program, the machine is helpless when it comes to that part of the problem.

The number of instructions required for a complete solution to a problem may be a few hundred or a many thousands. They are stored in the internal memory or storage unit of the computer.

The electronic computer depends on memory devices that have the ability to remember fantastic quantities of information. Because of their capacity and flexibility, these storage components have prompted new approaches to the control and internal organization of the machine components.

Memory Systems

Modern storage methods—tapes, drums, disks, and cores—are all based on magnetic principles.

Magnetic Tape—The ancestor of magnetic tape is punched paper tape. The magnetic tape is usually 1/2 inch wide and made of a plastic or metal coated with a material which can be easily magnetized and retains its magnetized condition. A typical tape might have seven parallel tracks along the length of the tape on which coded information could be stored.

Seven reading-writing devices called “heads” are spaced across the tape, one for each track. These heads are electromagnets wound with a read-coil and a write-coil.

The write-coils record by setting up tiny magnetic fields or spots in the appropriate tracks of the tape. For reading, the process is reversed. The magnetic fields on the tape induce pulses of current in the read-coils of the heads. The pulses are amplified electronically and accepted by the processing system.

It is possible to have 25,000 unit records of 80 bits of stored information each on one reel or 2400 feet of tape. This compactness and the great speed of tape reading and writing are the major advantages of
Magnetic tape.

Magnetic Drums—If you were to take forty lengths of five track magnetic tape and wind them side-by-side around the outside of a cylinder, you would have a magnetic drum in principle. Each track on the drum has a read-write head for reading and recording data. The drum is mounted on the shaft and is rotated by a motor, causing the surface to travel by the heads thousands of times a minute. Each drum holds from 5,000-100,000 characters or bits of information. The drum cannot store as much information as a tape merely because it doesn't have as much magnetic surface area. However, any information may be read or written in a few thousandths of a second, a speed which gives drums a major advantage over tapes.

Magnetic Disk—A new storage method is based on magnetic disks. A typical memory unit consists of 50 magnetic disks slightly separated from each other and mounted on a vertical shaft. Each disk face has 100 circular tracks and each track holds five 100-character records. Data is stored on both faces of the disk. Read-write arms move horizontally and vertically in searching for information. Any information can be located in a fraction of a second, and each unit holds millions of characters of information.

Magnetic Cores—The most powerful memory devices use core storage. These units consist of thousands of tiny doughnut-shaped, ferromagnetic rings threaded on wires. Currents in the wires in opposite directions gives the magnetic field opposite directions. Thus the direction of the field may represent a 0 or 1, yes or no condition. Core storage has two major advantages—dependability, and "instantaneous access" to stored information. It provides access to data and instructions in a few milliseconds of a second and can remember data for as long as needed.

Recent developments—increased processing speed, larger storage capacity, and ability to make logical decisions—have made it practical to apply electronic computers to an ever-widening area of use. The applications of computers seem to have no limit. Computers today manage businesses, enable scientists to "fly planes" on a machine, and control our air defense. Tomorrow's computing systems will help solve traffic problems, unemployment problems, nuclear power problems—even psychological problems.

In a few short years, electronic computing systems have been invented and improved at a tremendous rate. They have evolved from the simple beginning of numbers. They were born and are being improved as a consequence of man's ingenuity, his imagination, and his mathematics.
Due to the cooperation of the student body, the Library was recently the recipient of a $100 award. As part of an advertising campaign, Time, Inc. conducted a contest in which two pieces of a map puzzle were sent to each student enrolled here at Rose. The object of the contest was to name the persons whose pictures appeared on the completed puzzle map of the world. The library acted as a depository for the pieces and a group of underclassmen assembled the puzzle and identified the persons. As a result, Time, Inc. will buy the library $100 worth of books. We are preparing the list now and shall welcome any suggestions from the students or faculty.

RECORD COLLECTION

As we reported last month, the Library is starting a record collection. We have the following titles now and have on order some thirty more.

Chopin—Sonata #2 in B-flat minor/Ballades
Gilbert and Sullivan—The Mikado
Gilbert and Sullivan—Pirates of Penzance
Goldmark—Rustic Wedding Symphony
Loewe—My Fair Lady
Mendelssohn—Midsummer Nights’ Dream/Symphony #4 in A minor
Mozart—Don Giovanni
Nicolai—Merry Wives of Windsor
Puccini—Highlights from Madam Butterfly
Rodgers and Hammerstein—Carousel

Strauss—Die Fledermaus
Tchaikovsky—Nutcracker Suite/Festival Overture

And here is a sampling of the titles on order (these should be in the library by the time this article appears in print).

Anderson—Blue Tango and other favorites
Chopin—Polonaises
Dvorak—Slavonic Dances
Foster—Songs of Stephen Foster
Hines—Concert Encores
Hollywood Bowl Symphony Orchestra—Starlight Concert
Mantovanni—Romantic Melodies
Offenbach—Gaite Parisienne
Respighi—Fountains of Rome/Pines of Rome
Rodgers and Hammerstein—Flower Drum Song
Rodgers and Hammerstein—Oklahoma

NOTABLE BOOKS OF 1958

Each year the Notable Books Council of the Adult Services Division of the American Library Association selects titles published during the year which they feel are among those worthy of note for their intrinsic qualities, such as literary excellence, factual correctness, sincerity and honesty of presentation, or skill in presenting specialized knowledge for the general reader. This year, of the forty-seven titles listed, the Rose Poly library has the following fourteen:

- Capote, Truman. Breakfast at Tiffany’s. A short novel of a Manhattan playgirl plus three short stories expertly told with sensitivity and shrewdness.
- Churchill, Winston. The Great Democracies. Volume 4 of History of the English Speaking Peoples covering the period from Waterloo to the Boer War, with a stirring account of the American Civil War.
- Cowley, Malcolm, ed. Writers at Work. Interviews with contemporary novelists revealing methods and ideas of their craft.
- Fortune (Periodical). Exploding Metropolis. A probing survey of the expansion and decay of the “big city.”
- Gavin, James M. War and Peace in the Space Age. A sharp appraisal of the dangers and opportunities of United States foreign policy and military planning.
- Gunther, John. Inside Russia Today. Broad and amazing variety of pertinent information on post-Stalin Russia and its leading personalities.
- Joyce, Stanislaus. My Brother’s Keeper. An illuminating memoir of the formative years of James Joyce.
- Kazantzakis, Nikos. The Odyssey. A modern version of the further adventures of Odysseus translated.

(Continued on page 32)

THE ROSE TECHNIC
The most important factor in school spirit is student-faculty relations. It is important because Rose is a small school whose main offering is its low student to teacher ratio. This low ratio allows the students and faculty to know each other on a much more personal basis than the number basis of a large school. At Rose the student is known to the faculty as Joe, not as number “four hundred and thirty-eight point four”. This is desirable if the student and faculty uphold their obligation to the system.

The obligation of the student is exactly the same as the reason that he came to college. This obligation is to learn and to allow others to learn. As students, we can fulfill our obligation by concentrated study and by pursuing the following three conditions.

1. We should have an open mind toward the instructor when having him for our first course. If we go into class with preconceived notions of his ability to teach or his method of teaching, it will be a psychological barrier around us that will be hard for him to pierce. By not giving him the chance to prove his teaching ability or the worth of his teaching methods, we will not learn as much from him.

2. We should adjust ourselves to each instructor’s methods. This can be fostered by getting to know the instructor as an individual as well as a teacher, and by asking him why he teaches as he does. He certainly has reasons for his methods or he would not use them. We must remember that the teaching profession is not the most financially rewarding. This places men in the teaching field who receive pride and satisfaction from their work. Therefore, we know that the instructors are trying to help, not hinder us.

3. We should keep unjustified or non-constructive griping to a minimum. This is especially applicable to the upperclassmen. It seems as if griping has a snowballing effect, and by the time the upperclassmen griping reaches the freshman, this snowball can have a crushing effect on his spirit and desire to continue through Rose.

A study of the components shows that we have what it takes for good school spirit and that we can put them together to form a spirit that the Rose Man can be proud of. All that this will take is a little effort from the student body.

If we can work as a group to increase interest in varsity competition, to get to know and adjust to our instructors, and to keep griping to a minimum, I am sure that we can improve our school spirit and contribute to a more pleasant atmosphere for study and relaxation.

ALUMNI NEWS

(Continued from page 18)

also shot a lion and a leopard, two of the “big five”: lion, leopard, buffalo, elephant, and rhinoceros.

After a two weeks stay there, the safari moved southeast to hunt for elephant, rhinoceros, and buffalo along the Athi River. As can be seen from the photograph, Mr. Burns (on the right) achieved his goal, and shot a variety of other animals which abound on the Dark Continent.

He was very impressed with the climate in Africa, and remarked that he felt that it could do wonders to improve a person’s health. He would definitely like to return there someday, and have another try at big game hunting.

Mr. Burns has led a life which would seem completely typical of that of an engineer, but with his wide range of interests and abilities he has maintained an interest in many different activities, and at the same time held a high position in industry.

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EDSEL - ENGLISH FORD

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CAMPUS SURVEY
(Continued from page 13)

tage of these opportunities. I am sure that we all can afford one hour a week to attend these convocations because they aid in broadening our educational background both technically and in a cultural fashion. Comments on the presentations are always appreciated by the sponsoring organization.

Several students have expressed their preference for a continuation of non-technical convocations such as were held this past month. These requests did not intend for a complete exclusion of technical convocations, but rather more of the cultural programs alternated with the technical.

BYRON C. McNABB

Mr. Byron C. McNabb, Operations Manager for Convair Astronautics Atlantic Missile Range, presented a discussion to the student body on February 23 about the present Atlas Missile Program. Mr. McNabb is a former student of Rose and is a graduate of the Illinois Institute of Technology. In Mr. McNabb’s position as Operations Manager, he has been responsible for the supervision and construction of all the Atlas launching facilities. Mr. McNabb stimulated the student body by expressing the assets of being a student majoring in the engineering and pure science fields and what they might expect from diligent efforts in following such a curriculum. Movies of the present day situation of the missile program were shown, and its hopes for future developments were expressed. Mr. McNabb had a small scale model of the Atlas missile and spoke of its many intricate parts and complications. Closing his presentation, Mr. McNabb gave a very thought provoking comment which is the motto of Convair—“The heavens are not too high.”

THE BELLES OF INDIANA

On March 17, the Belles of Indiana, an all girl choir from Indiana University, presented a convocation which was held in honor of St. Patrick’s day. The school was honored by their presence, and their performance proved to be excellent in quality. Various songs were sung in honor of St. Pat’s day; many of the present popular musicals were also sung. The casual manner in which the director presented the choir and the solo singers seemed to add to the enjoyment of the performance. I am sure that the entire student body is looking forward to a possible return engagement.

As a reminder to the under-classmen, in order to leave the most favorable impression on the guests, I would like to comment that the entire front row of seats of the auditorium is always reserved for seniors at all convocations. This is a tradition of Rose; let’s not ignore it for our own benefit.

This article being a survey of campus activities, it is open to the opinions of the entire student body and faculty. The author would be appreciative of any comments from the faculty or student body pertaining to any matter which is thought to be important and should be expressed to all.

---

To students who want to be SUCCESSFUL highway engineers

There’s a real need for qualified men in America’s 100 billion dollar highway program. It’s a big job. For example, for the new Interstate Highway System alone, 35,000 miles are still to be built.

Choice assignments await engineers at every level. They will go to the men who prepare for them.

As part of that preparation, you must have basic material on Asphalt Technology. For if you don't know Asphalt, you don't know your highways. Asphalt is the modern paving for today's and tomorrow’s roads. Asphalt surfaces more than 4/5ths of all roads and streets in the country.

We have put together a special student portfolio to meet that need for information on Asphalt. It covers the Asphalt story, origin, uses, how it is specified for paving . . . and much more. It is a worthwhile, permanent addition to your professional library.

It’s yours, free. Send for it today. Prepare now for your future success.

THE ASPHALT INSTITUTE

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Gentlemen:
Please send me your free student portfolio on Asphalt Technology.

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ADDRESS ____________________________________________
CITY_________________ STATE_____________________
SCHOOL ____________________________

THE ROSE TECHNIC
Why metals corrode...and how to prevent it

The equipment you will design most probably will have to stand up against one or more of these 6 different forms of corrosive attack:
1. General tarnishing or rusting with occasional perforations in highly affected areas.
2. Highly localized attack by pitting.
3. Cracking induced by a combination of stress and corrosion.
4. Corrosion confined to crevices, under gaskets, or washers, or in sockets.
5. Corrosion of one of an alloy's constituents leaving a weak residue.
6. Corrosion near the junction of two different metals.

HOW CORROSION OCCURS

The basic cause of corrosion is the instability of metals in their refined state. Metals tend to revert to their natural states through the processes of corrosion. For example, when you analyze rust, you will find it is iron oxide. When you analyze natural iron ore, you find it, too, is iron oxide.

In all of the six forms of corrosion mentioned above, corrosion has the same basic mechanism. It's similar to the electrochemical action in a dry cell.

The electrolyte in the dry cell corresponds to the corrosive media, which may be anything from the moisture in the air to the strongest alkali or acid.

The plates of the battery correspond to the metal involved in corrosion.

A potential difference between these metals or different areas on the same metal causes electricity to flow between them through the electrolyte and a metallic bridge or contact that completes the circuit.

At the anode, a destructive alteration or eating away of metal occurs when the positively charged atoms of metal detach from the solid surface and enter the solution as ions.

The corresponding negative charges, in the form of electrons, travel through the metal, through the metallic bridge, to the cathode.

Briefly then, for corrosion to occur, there must first be a difference in potential between the metals or areas on the same piece of metal so that electricity will flow between them. Next, a release of electrons at the anode and a formation of metal ions through disintegration of metal at the anode. At the cathode, there must be a simultaneous acceptance of electrons. Action at the anode cannot go on alone, nor can action at the cathode.

CONTROLLING CORROSION

When corrosion occurs because of the differences in electrical potential of dissimilar metals, it is known as galvanic action. Differences in potential from point to point on a single metal surface causes corrosion known as local action.

When you plan against galvanic corrosion it is essential to know which metal in the couple will suffer accelerated corrosion...will act as the anode in the corrosion reaction.

The galvanic series table shown below can supply this information. In any couple, the metal near the top of this series will be the anode and suffer accelerated corrosion in a galvanic couple. The one nearer the bottom will be the cathode and remain free from attack or may corrode at a much slower rate.

How to use the chart

Notice how the metals are grouped in the galvanic series table. Any metal in one group can be safely used with any other metal in the same group. However, when you start mixing metals from different groups, you may run into serious galvanic corrosion of the metal higher on the list. And the further apart these metals are listed, the worse this corrosion may be.

But, if you have to mix metals, pay particular attention to the electrical contact between them. Eliminate any metallic bridges or contacts of metal to metal that will permit the flow of electrons through them. You can do this by separating the metals physically, or by using insulation or protective coatings. Another factor is the relative areas of the metals in contact with each other. Parts having the smaller area should be of a metal with a lower listing on the galvanic series table than the metal used for the larger area.

When you plan against local action, keep in mind that the corrosion process is similar to galvanic action...a movement of electrons from one point on the metal to another. Naturally, the easiest way to avoid local action is to use a metal with little or no impurity...or an alloy with constituents that are listed closely on the galvanic series table. Local action on other metals, however, can be controlled by stopping any flow of electrons...such as with protective coatings. Environment, too, is a factor for consideration.

FILM ON CORROSION AVAILABLE TO ENGINEERING CLASSES

Inco's full-color sound film — "Corrosion in Action" — gives a graphic explanation of corrosion and how to control it. The film is in three parts: The Nature of Corrosion, 20 minutes running time; Origin and Characteristics of Corrosion Currents, 26 minutes; Passivity and Protective Films, 17 minutes. 16mm prints can be loaned to engineering classes. For details, write Inco for descriptive folder on "Corrosion in Action."

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earth's normal atmospheric pressure of 14.7 pounds per square inch, the same as pressure used in high altitude airliners.

Special refrigerating and heating plants cope with the extreme temperatures and tremendous temperature gradients which abound on the moon. Day and night on the moon are about two weeks long, with temperatures at lunar midday reaching 214 degrees F; at sunset, 32 degrees F; and at midnight, —243 degrees F.

There are no windows in the moon building, since ultraviolet radiation, normally absorbed by the earth's atmosphere, would be sufficiently intense to render panes of glass or plastic useless through discoloration. Metal shutters protect the plastic observation bubbles.

At the present time the building would have to be transported to the moon in small sections with no section larger than the load capacity of future moon rockets. It is estimated that man could establish a building of this type within the next two years.

A completely integrated high-temperature induction melting, sintering, and pressing facility has been put into operation by Westinghouse ceramics engineers at East Pittsburgh, Pa. The laboratory, designed for large-scale research and development work, will help predict product designer's requirements in ceramic materials.

Since its completion, the facility has been used for ceramic development projects on nuclear fuels, infrared transmission glasses, thermoelectric generator materials, and the preparation of unique high-temperature oxide and intermetallic compounds. It was constructed for flexibility, ease of maintenance, and economy of operation.

The equipment in the Westinghouse laboratory consists of three basic units: a power supply, a hot press, and a vacuum furnace—equipment that will aid materials development engineers to meet varied demands such as flexibility at 60 degrees C below zero or strength at 2000 degrees C above.

The power supply with an output of up to 40 kw, can be switched to either of the other two units. It provides maximum power for the cost of the equipment, minimum space requirement, and maximum use of the supply.

In the hot-pressing operation forming and sintering are done simultaneously. A powdered material is placed in a graphite or other suitable mold material consisting of multiple cavities with upper and lower punch. The mold is then placed in a tubular graphite susceptor and pressure is transmitted to it through a water-cooled head. The total load produced by the hydraulic system can be varied up to 60 tons capacity.
How to keep the world’s largest clock sign turning on time

THis revolving clock sign, the world’s largest, weighs in excess of 77 tons, has numerals 25 ft. high. And it turns day and night atop the Continental National Bank in Fort Worth, Texas. To keep this giant clock turning, the engineers specified two double-row Timken® tapered roller bearings for the Brewster RSH 18” Rotary Table which turns the clock.

Timken bearings are used because the full-line contact between their rollers and races gives extra load-carrying capacity. Their tapered construction lets them take both radial and thrust loads in any combination. And Timken bearings are geometrically designed and precision-made to roll true. They practically eliminate friction.

Timken bearings solve countless problems wherever wheels and shafts turn. Problems that you may face in your future job in industry. Our engineers will be ready to help you. And if you’re interested in a rewarding career with the world’s largest maker of tapered roller bearings and removable rock bits, the leader in special fine alloy steel, send for our free booklet: “Better-ness and your Career at The Timken Company”. Write Mr. Russ Proffit, The Timken Roller Bearing Company, Canton 6, Ohio.

How Timken bearings are mounted in the Brewster RSH 18” Rotary Table to take heavy loads, assure easy-rolling dependable performance.

BETTER-NESS rolls on TIMKEN®

tapered roller bearings

First in bearing value for 60 years

APRIL, 1959
FRATERNITY NOTES
(Continued from page 21)

all! Also, our annual White Rose Dance was held April 4th.
Another basketball season ends and the Theta Xi’s have it all wrapped up. Congratulations, men!
Softball season is here and we have high hopes of our regaining the trophy after a year’s absence from our mantle.
Brother Mook is doing all the driving to school lately. It seems like some Herbie Highschool rammed Brooks’ car and Davis never drives his—just works on it.

We are proud to welcome Jerry Hahn as the latest addition to our pledge class. Jerry is from Chicago Heights, Illinois.

Rumor has it that brothers Brady, Hallcom, and Kennedy are joining brothers Barrick, Brittain, Hartley, and Huff on the marriage trail this summer. Congratulations. It looks as though we will be doing a lot of baby-sitting next year.

—Tom Feutz

LIBRARY NOTES
(Continued from page 26)

into distinguished English verse. MacLeish, Archibald, J. B., A Play in Verse.
The ancient story of Job’s suffering forcefully re-enacted in modern poetic drama. Overstreet, Harry, and Overstreet, Bonaro W. What We Must Know About Communism.

Salient facts for the intelligent American citizen. Pasternak, Boris L. Doctor Zhivago.

A powerful novel expressing indictment of the totalitarian way of life in Russia, by a modern Russian poet. Swanberg, W. A. First Blood; the Story of Fort Sumter.

Prelude to the Civil War dramatically documented. White, Theodore H. The Mountain Road.

A dramatic fictionalized account of an American demolition team in wartime China and of the psychology of command.

Hornung & Hahn

Finer Footwear

Two Stores to Serve!
21 Meadows Center
28 South 7th Street
He has confidence born of knowing where he’s going and how he’s going to get there. The graduate training program at Allis-Chalmers helped him decide on a specific career — and he had a choice of many. He knows his future is bright because Allis-Chalmers serves the growth industries of the world ... produces the widest range of industrial equipment. He is confident of success because he is following a successful pattern set by Allis-Chalmers management.

Here is a partial list of the unsurpassed variety of career opportunities at Allis-Chalmers:

**Types of jobs**
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- Design
- Development
- Manufacturing
- Application
- Sales
- Service

**Industries**
- Agriculture
- Cement
- Chemical
- Construction
- Electric Power
- Nuclear Power
- Paper
- Petroleum
- Steel

**Allis-Chalmers Equipment**
- Steam Turbines
- Hydraulic Turbines
- Switchgear
- Transformers
- Electronics
- Reactors
- Kilns
- Crushers
- Tractors
- Earth Movers
- Motors
- Control
- Pumps
- Engines
- Diesel
- Gas

**Fields**
- Metallurgy
- Stress Analysis
- Process Engineering
- Mechanical Design
- High Voltage Phenomena
- Nucleonics
- Electronics
- Hydraulics
- Insulation, Electrical
- Thermodynamics

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The graduate training course helps you decide on your “Very Important Position,” by giving you up to two years of theoretical and practical training. This course has helped set the pattern of executive progress since 1904. For details write to Allis-Chalmers, Graduate Training Section, Milwaukee 1, Wisconsin.
turning, there is plenty of experience to count on this season.

Forming the core of the pitching are letter winners Dave Spoonamore, Bob Manning, Jim Goodwin, and veteran Jerry Heiniger. They will be backed by Ray Gomph, Larry Hebert, and McClung.

Three sophomores are fighting it out for the other half of the battery. Letterman Don Lanning is being pushed by Chuck Gilbert and Dave Trueb for the catching position.

There is a big hole in the left side of the infield, graduation has taken the third basemen and shortstop. Bill Bock, Ed Goheen or Bill Fenoglio will fill this gap while Goheen or Jerry Waltz will man second base. Backing these lettermen will be D. Cummings, Bob Johnson, Jack Schreiner and Dick Ferency.

All positions in the outfield are open. When they aren’t pitching, Godwin, Manning or Soonamore will be in left field. Ron Myers or Don Decker will be in centerfield with Fenoglio or Bob Michaels in right. Freshmen Tom Brown and Ron Bilyou will be lending their help in the outfield.

INTRAMURALS
The Jr. Hawks defeated the Soph. Lakers and Seniors to take top honors for the season in basketball. The Soph. Bears and Jr. Hawks advanced to the finish of the past season tournament when the Bears won by 2 points on a pair of free throws in the last 10 seconds.

PRAIRIE COLLEGE CONFERENCE
TRACK RECORDS

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<td>127'8½”</td>
<td>Munro (RPI)</td>
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<td>1957</td>
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APRIL, 1959
A farmer was driving past an insane asylum with a load of fertilizer when an inmate called to him: "What are you going to do with it?"

"Put it on my strawberries."

"You ought live here, we get cream and sugar on ours."

The folks in the next apartment must have had a big blowout last night. They hollered and pounded on the walls until two a.m. Luckily I was up late practicing on my drums, so they didn't keep me awake.

A patient at a mental hospital who had been certified cured was saying good-bye to the head psychiatrist.

"And what are you going to do when you get out in the world?"

"Well, I may go back to Rose and finish my civil engineering course. Then, I liked the Army before, so I may enlist again. He paused a moment and thought.

"Then, again, I may be a tea-kettle."

Wife: "Darling, tell me, how did you ever get Junior to eat olives?"

Ch.E.: "Simple, I started him with martinis."

Salesman: "Young man, this handbook is just what you need. It will do half your college work for you."

Freshman: "Fine, give me two."

An M.E. was very indignant at being arrested. He staggered into the police station and before the captain had an opportunity to say anything he pounded his fist on the desk and said: "What I wanna know is why I've been arrested."

"You were brought in for drinking," answered the captain.

"Well, thass different—thass fine—let's get started."

Two morons each had a horse, but they couldn't decide which belonged to whom. So they cut the mane off one to differentiate, but it soon grew back. Next they cut the tail off one, but that also grew back. Finally they measured them and found that the black one was four inches taller than the white.

Have you heard about the two engaged nudists who decided to break it up because they had been seeing too much of each other?

Porter: "Did you miss the train, sir?"

Running Passenger: "No, I didn't like the looks of it, so I chased it out of the station."

One cigarette said to another, "I hope I don't get lit tonight and make an ash of myself."

The wilder fraternities around here have a new game going. Three men rent a hotel room and each brings a quart of Old Screech with him. They sit and drink for an hour, then one of them gets up and leaves. The other two have to guess which one left.

Through the smoke and ozone fumes the student slowly rises; His hair is singed, his face is black, his partner he despises:

He shakes his head and says to him, with words so softly spoken, "The last thing that you said to me was, "Sure, the switch is open."

The tall 7 ft. lad walked into the employment agency and asked about a job as a life guard.

"Can you swim?" asked the man.

"No", said the boy, "but I can wade like Hell."

"I was in love with a twin."

"Wasn't that awkward? I mean—didn't you ever kiss the wrong one by mistake?"

"Oh, no-her twin brother wore a moustache."

Did you hear about the engineer with the waterproof, shockproof, unbreakable, anti-magnetic watch? He lost it.

Physics prof: "If in going down this incline, I gain four feet per second, what will be my condition after 25 seconds?"

Smart soph: "You'll be a centipede."
By setting templates of standard components on photo-sensitive paper and exposing it, hours of hand drafting are saved.

With this plotter, stereo aerial photos become contour maps, show highway routes, mineral-bearing formations, volume of coal piles.

Slides give the sales staff quick understanding of the engineering superiority of their product—equip them with facts for their customers.

Photographs of freight cars as loaded and as received provide information for engineers to develop better loading practices (as well as data for damage claims).

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Although many surveys show that salary is not the prime factor contributing to job satisfaction, it is of great importance to students weighing career opportunities. Here, Mr. Gouldthorpe answers some questions frequently asked by college engineering students.

Q. Mr. Gouldthorpe, how do you determine the starting salaries you offer graduating engineers?
A. Well, we try to evaluate the man's potential worth to General Electric. This depends on his qualifications and our need for those qualifications.

Q. How do you evaluate this potential?
A. We do it on the basis of demonstrated scholarship and extra-curricular performance, work experience, and personal qualities as appraised by interviewers, faculty, and other references.

Of course, we're not the only company looking for highly qualified men. We're alert to competition and pay competitive salaries to get the promising engineers we need.

Q. When could I expect my first raise at General Electric?
A. Our primary training programs for engineers, the Engineering Program, Manufacturing Program, and Technical Marketing Program, generally grant raises after you've been with the Company about a year.

Q. Is it an automatic raise?
A. It's automatic only in the sense that your salary is reviewed at that time. Its amount, however, is not the same for everyone. This depends first and foremost on how well you have performed your assignments, but pay changes do reflect trends in over-all salary structure brought on by changes in the cost of living or other factors.

Q. How much is your benefit program worth, as an addition to salary?
A. A great deal. Company benefits can be a surprisingly large part of employee compensation. We figure our total benefit program can be worth as much as 1/6 of your salary, depending on the extent to which you participate in the many programs available at G.E.

Q. Participation in the programs, then, is voluntary?
A. Oh, yes. The medical and life insurance plan, pension plan, and savings and stock bonus plan are all operated on a mutual contribution basis, and you're not obligated to join any of them. But they are such good values that most of our people do participate. They're an excellent way to save and provide personal and family protection.

Q. After you've been with a company like G.E. for a few years, who decides when a raise is given and how much it will be? How high up does this decision have to go?
A. We review professional salaries at least once a year. Under our philosophy of delegating such responsibilities, the decision regarding your raise will be made by one man—the man you report to; subject to the approval of only one other man—his manager.

Q. At present, what salaries do engineers with ten years' experience make?
A. According to a 1956 Survey of the Engineers Joint Council*, engineers with 10 years in the electrical machinery manufacturing industry were earning a median salary of $8100, with salaries ranging up to and beyond $15,000. At General Electric more than two thirds of our 10-year, technical college graduates are earning above this industry median. This is because we provide opportunity for the competent man to develop rapidly toward the bigger job that fits his interests and makes full use of his capabilities. As a natural consequence, more men have reached the higher salaried positions faster, and they are there because of the high value of their contribution.

I hope this answers the question you asked, but I want to emphasize again that the salary you will be earning depends on the value of your contribution. The effect of such considerations as years of service, industry median salaries, etc., will be insignificant by comparison. It is most important for you to pick a job that will let you make the most of your capabilities.

Q. Do you have one salary plan for professional people in engineering and a different one for those in managerial work?
A. No, we don't make such a distinction between these two important kinds of work. We have an integrated salary structure which covers both kinds of jobs, all the way up to the President's. It assures pay in accordance with actual individual contribution, whichever avenue a man may choose to follow.

We have a limited number of copies of the Engineers Joint Council report entitled "Professional Income of Engineers—1956." If you would like a copy, write to Engineering Personnel, Bldg. 36, 5th Floor, General Electric Company, Schenectady 5, N. Y.

LOOK FOR other interviews discussing: • Advancement in Large Companies • Qualities We Look For in Young Engineers • Personal Development.