Follow this and additional works at: https://scholar.rose-hulman.edu/technic

Recommended Citation
https://scholar.rose-hulman.edu/technic/141

Disclaimer: Archived issues of the Rose-Hulman yearbook, which were compiled by students, may contain stereotyped, insensitive or inappropriate content, such as images, that reflected prejudicial attitudes of their day—attitudes that should not have been acceptable then, and which would be widely condemned by today's standards. Rose-Hulman is presenting the yearbooks as originally published because they are an archival record of a point in time. To remove offensive material now would, in essence, sanitize history by erasing the stereotypes and prejudices from historical record as if they never existed.
In This Issue

THE FIRST MAN
SATELLITE SLEUTHS
IMPROVED POWER SOURCES
"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!

No temporary setback can stop the growing needs of our population. That's why United States Steel has gone ahead with expenditures totaling $770 million to provide more and better steels for tomorrow's citizens. This is the practical way that we've demonstrated our faith in the future.

USS is a registered trademark

United States Steel
Translate your imagination into action at General Motors

GM positions now available in these fields for men holding Bachelor’s, Master’s and Doctor’s degrees: Mechanical Engineering • Electrical Engineering • Industrial Engineering • Metalurgical Engineering • Chemical Engineering • Aeronautical Engineering • Ceramic Engineering • Mathematics • Industrial Design • Physics • Chemistry • Engineering Mechanics

Modern production methods demand new concepts in automatic controls for process machinery. Here a development in servomechanism control undergoes performance evaluation tests.

Here at the Technical Center and throughout GM’s 35 divisions and 126 plants, engineers and scientists have an opportunity to turn their imagination into action...see their ideas grow into reality. For General Motors is involved with the entire field of science and engineering. Whatever your interests...automobiles or astrodynamics, motors or missiles...there’s a place at GM where you and your imagination might fit in.

Along with the unlimited search for new paths of progress, you’ll find opportunity for unlimited personal progress. General Motors is always searching its own organization for talented men who can be promoted to supervisory and executive positions.

If you are interested in a fascinating future and have an urge to see your imagination translated into action...write General Motors, Personnel Staff, Detroit 2, Michigan.

GENERAL MOTORS PERSONNEL STAFF DETROIT 2, MICH.

MAY, 1959
NASA directs and implements the Nation’s research efforts in aeronautics and the exploration of space for peaceful purposes and the benefit of all mankind. We offer unique opportunities in basic and applied research to scientists and engineers with degrees in the various disciplines.

Briefly described here are representative current NASA programs. Openings exist in all of these programs, at the facilities named.

SPACE TECHNOLOGY
Space vehicle development, including basic planning, development, contract coordination, and operational programming and planning for manned and unmanned satellites. Systems studies for auxiliary power supplies, air regenerative systems, instruments, guidance and communication equipment for space vehicles.

Space probes: Development and operation of vehicles, payload and instrumentation, programming and operation of flight, trajectory, communication systems, and ground support systems for near space and deep space probes.

Beltsville

SPACE MECHANICS
Experimental and analytical study of orbital mechanics including parameters of preliminary and refined orbits, ephemerides, lifetimes, equator crossings and perturbations.

Beltsville; Langley; Ames

PROPULSION AND PROPULSION SYSTEMS
Developmental studies of boosters, launchers, multi-stage engines, guidance and attitude control systems for space vehicles.

Basic research on the interrelationships between electrical, magnetic and thermodynamic energy, and application of such knowledge to space propulsion.

Magneto hydrodynamics: Research on plasma and ion accelerators for space propulsion and auxiliary power systems.

Research on reactors and reactor shielding for aeronautical and space propulsion systems.

Beltsville; Lewis

AERODYNAMICS AND FLUID MECHANICS
Investigation of the thermodynamics and transport properties of gases at high temperatures as encountered in entry into planetary atmosphere.

Research on performance, stability and control, automatic guidance, and navigation for subsonic, supersonic, and hypersonic aircraft.

Aerodynamic heating and satellite re-entry phenomena.

Langley; Ames; Lewis; High-Speed Flight Station

INSTRUMENTATION AND COMMUNICATION
Research and development of new sensing devices and instrumentation techniques in electronics, optics, aerodynamics, mechanics, chemistry and atomic physics.

Systems studies and evaluation of control, guidance, navigation, and communication equipment for space vehicles and other high performance applications requiring rugged and compact design.

All Facilities

GEOPHYSICS, ASTRONOMY AND ASTROPHYSICS
Experimental programs and evaluation studies of astronomical and geophysical measurement and scientific equipment used in space vehicle payloads.

Studies of fields and particles in space, investigations of the composition of planetary atmospheres, and development of instrumentation and experimental techniques for these investigations.

Beltsville

STRUCTURES AND MATERIALS
Investigation of the characteristics of high temperature structures and materials. Study of fatigue, structural stability, and other problems of structural dynamics.

Solid State Physics: Study of the elementary physical processes involved in mechanical behavior of materials, such as fractures; the nature of the corrosion process; and physical-chemical relationships governing behavior of materials.

Langley; Ames; Lewis

MATHEMATICS
Application of advanced mathematical techniques to the solution of theoretical problems in aeronautical and space research, involving the use of large modern computing equipment.

All Facilities

RESEARCH FACILITY ENGINEERING
Translation of research specifications into complete experimental facilities, involving mechanical, electrical, structural, architectural and machine design, and construction engineering.

Langley; Ames; Lewis

Please address your inquiry concerning any of the programs listed here to the Personnel Director of the appropriate NASA research center:

Langley Research Center, Hampton, Virginia
Ames Research Center, Mountain View, California
Lewis Research Center, Cleveland, Ohio
High-Speed Flight Station, Edwards, California
Beltsville Space Center, 4555 Overlook Ave., Washington, D. C.
May, 1959

Contents

Editorial ......................................................... 7
The First Man .................................................... 8
Satellite Sleuths .................................................. 13
Improved Power Sources ......................................... 14
Speaker Enclosures ............................................... 16

****

Letters To The Editors .......................................... 4
Alumni News ....................................................... 12
Locker Rumors ..................................................... 15
Library Notes ....................................................... 18
Fraternity Notes ................................................... 22
Brain Teasers ...................................................... 25
Campus Survey .................................................... 26
Research and Development ....................................... 28
Sly Droolings ....................................................... 32

****

Advertising Index .................................................. 31

Cover Note

This month’s cover, “Base on Titan,” is a result of the artistic efforts of Francis Hirt, sophomore math major, and Joe Dickey, freshman. The futuristic design depicts a rocket base on one of Saturn’s moons, Titan.

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.
Dear Sirs,

This letter concerns fraternity politics on the Rose campus. It is not a letter of complaint, but rather it is being written with the hope that it will cause some constructive thinking.

By fraternity politics, I am referring to the control of school organizations, elections, etc. by a fraternity or fraternities. During just the past year, there have been several instances in which fraternity politics have caused much ill feeling between members or organizations and classes. When this ill feeling exists, the organizations simply cannot operate at top efficiency. The various organizations at Rose help the school in many ways, but they could help much more operating harmoniously.

In closing, I wish to say that I am as guilty as anyone that this situation exists. However, I would like very much to see something done about it. It is my belief that all four fraternities at Rose do not want excessive school interference in their affairs; let's try and keep fraternity interference from school affairs. If anyone has any ideas along this line, why don't you present them—they might lead to a solution to this problem.

Sincerely yours,

Gary W. Phipps

Dear Editors:

Anyone who has been in the Student Center during lunch recently has certainly noticed the confusion caused by the students trying to eat their lunches and those trying to play cards. The students that use the tables for playing cards deprive some students from eating. To make matters worse other students will grab chairs from various tables and sit at a table just to watch a card game. This not only deprives others from the proper use of the tables but it also creates confusion by blocking the aisles.

Anonymous
The vortex tube is a refrigerating machine with no moving parts. Compressed air enters the vortex chamber pictured here and spins rapidly down an attached tube. Pressure and temperature differences build up, forcing cold air out one end and hot air out the other. Requiring no maintenance, a large vortex tube developed by AiResearch scientists and engineers can be permanently sealed in nuclear reactors, and has many uses in industries with spot cooling problems.

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.

ENGINEERING AT GARRETT OFFERS YOU THESE ADVANTAGES:

- An eight-month orientation program is offered prior to permanent assignment to help you aid us in determining your placement from a variety of analytical or development projects.
- Intensified engineering is conducted by small groups where individual effort and accomplishment is quickly recognized providing opportunity for rapid growth and advancement.
- Advanced education is available through company financial assistance at nearby universities.

THE GARRETT CORPORATION

9851 S. SEPULVIDA BLVD., LOS ANGELES 45, CALIFORNIA

DIVISIONS: AIRESEARCH MANUFACTURING, LOS ANGELES • AIRESEARCH MANUFACTURING, PHOENIX • AIRSUPPLY • AIRESEARCH INDUSTRIAL • AERO ENGINEERING • AIR CRUISERS • AIRESEARCH AVIATION SERVICE

May, 1959
ROSE POLYTECHNIC INSTITUTE
Terre Haute, Indiana

HIGH SCHOOL GRADUATES OF 1959

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

CHEMICAL ENGINEERING
ELECTRICAL ENGINEERING
MECHANICAL ENGINEERING
CIVIL ENGINEERING
MATHEMATICS
PHYSICS
CHEMISTRY

The next freshman class will be admitted
September 14, 1959
**One Vote for Hazing**

This editorial is addressed to next year’s sophomore class, in particular, and to the whole school in general. It deals with a matter of great concern to the whole school—HAZING. The faculty has almost decided that hazing will be stopped. Therefore, it is up to the student body to prove that it is a valuable thing, and a necessity to school spirit.

There are several facets to hazing here at Rose. They include beanies, laking parties, mandatory attendance at athletic events, and the annual freshman-sophomore games.

The beanies provide one of the most important benefits of hazing. They identify the freshmen as a class, help everyone to get to know them early in the year, and help them to get to know one another better.

The laking parties also help the mixing of the classes. Everyone enjoys the parties and comes out feeling more a part of the school.

Athletic events are also an integral part of Rose. However, if things keep on the way they are, soon the teams will be the only ones here on weekends. If men can be induced to get in the habit of attending the games and supporting school activities, the whole school will benefit by the increased school spirit.

The interclass games gives everyone a chance at a little physical competition which lets their minds relax from their studies for a while.

All of these things demand an intense interest and enthusiastic participation by the student body. If the upper classes show little or no interest, the freshmen can not be expected to show any interest at all. If the upper classes attend school activities, the freshmen will get the idea that it is the proper thing to do, and no enforcements will even be necessary.

The best thing hazing can do is to allow the freshmen to get their minds away from the books and to enjoy a little relaxing fun. Rather than simply coming to Rose with the idea of how rough it is and how they will be so lucky to graduate, they will be able to get into the spirit of things and become really good Rose men.

*R. L. B.*

May, 1959
Consider the moment. Every human being will be waiting. Some calculating . . . some praying. The hates of man around the globe will be forgotten, momentarily at least. All of the earth will be charged with an electricity of anticipation. Historians will perpetuate every detail, every thought—an addition to man's posterity until the end of time. And after the ultimate, joy will reign supreme: some men will humble themselves, and ask for guidance. Others will assume the role of gods. Conflicts will not be forgotten. Achievements will follow, true. But it will be both a beginning and an end. The termination of man's dreams since he first looked at the heavens, and the commencement of universal travel. For man will at last have freed himself from the bonds of his native planet.

Let us now consider the preparations being performed today to insure that the first man, whoever he may be, will be able to withstand the unavoidable physical stresses due to acceleration which will be encountered in his lonely flight into space.

What is known about the influence of relatively prolonged acceleration on human subjects has come mostly from the use of large centrifuges. It is easy to see how the centrifuges are useful in studying the effects of prolonged linear acceleration which have come to prominence with the development of rocket driven vehicles.

A man seated on the end of the arm of a centrifuge facing its axis is exposed to a forward (centripetal) acceleration comparable to the acceleration a man would feel seated facing forward in a rocket vehicle. As he accelerates forward, he is pushed back into his seat with an inertial force proportional to his acceleration. If he accelerates at a rate of 32.2 fps/sec, or 1 g, he will be pushed back in his seat with a force equal to his weight, at 2 g twice his weight, etc. This inertial effect, which is responsible for most of the physiological consequences of acceleration, is opposite in direction to the acceleration, and is sometimes expressed with the same symbol as that used for acceleration, with the inertial effect understood.

By turning the man around on the centrifuge he can be accelerated backward, thus throwing him forward against his restraint straps and stimulating the condition of the forward facing passenger in the rocket vehicle when he is decelerated as, for example, on re-entering the atmosphere after a trip out into space.

Similarly, the man can be arranged so that he accelerates headward, footward, laterally, or in any other direction. The chief advantage of using the centrifuge is that prolonged acceleration, of varying degrees and in varying patterns can be studied with the subject remaining in one location convenient for the recording and measurement of effects. For example, subjects have been run at 3 g's for an hour on the centrifuge.

There are some disadvantages in the use of centrifuges to study linear acceleration. One is the vertigo that results from the stimulation of the organs of equilibrium by the complex force pattern developed when the centrifuge changes rate of rotation. Another is the inability to reduce the acceleration suddenly and to coast in the manner of a rocket at burnout.

The velocity required to maintain a vehicle in a stable orbit around the earth will vary with distance from the earth; but for reference purposes, let us say that 5 mps, or 18,000 mph, would be required for one of the relatively low-altitude orbits. To attain this velocity the rocket must accelerate for a g-time product of about 13.7 g-minutes, ignoring, for the moment, the pull of gravity and the effect of the earth's rotation. At present this is accomplished by two- or three-stage rockets giving a sawtooth acceleration profile, with peaks which vary in amplitude with different systems, but usually do not exceed 8 g with the total duration of thrust lasting 4 to 5 min.

When a vehicle traveling in orbit, say, 5 mps, re-enters the atmosphere
to land on earth, it must decelerate the same number of g-minutes as was required to put it into orbit in the first place. Some slowing can be achieved by retrorockets, but the major slowing will come from frictional resistance of the atmosphere. If the vehicle follows a ballistic trajectory with very little lift, the deceleration will all come in one stage.

The critical factor here is the angle of re-entry. Maximum deceleration rate will be very great if the re-entry path is a steep one; and although the duration may be quite short, it will exceed the tolerance of man. By making the angle of re-entry shallow, it is possible to trade-off magnitude for duration, and thus keep acceleration within tolerable range. If the vehicle is a high-lift, low-drag shape, it is possible to keep the maximum g quite low by very gradual re-entry, or even to stage the deceleration by dipping into the atmosphere and pulling up repeatedly. This would involve shifting acceleration vectors, so that a forward-facing seated subject would be thrown alternately forward and downward. The forces would be small, however.

When a man is accelerated headward, the inertial effect tends to displace every part of his body forward. The physiological limit to acceleration in this position is caused by difficulties in the circulation of blood. The inertial effect opposes the arterial flow of blood from the heart to the head and the flow of blood in the veins back to the heart from the lower parts of the body. Although there are compensatory constrictions of blood vessels and an increase in the rate of heart beat, the circulation to the head is progressively impaired with increased acceleration. The first effect of this is a dimming of vision, then visual failure (blackout) and finally unconsciousness, possibly with convulsions as the brain is deprived of blood.

The g-level at which blackout occurs varies with the rate of increase of acceleration, with the light intensity and with the psychophysiological state of the individual, among other things. In general, we can say that blackout occurs in less than a minute at 4 to 6 g and that there is a high probability that a subject riding a rocket vehicle into space head first would lose vision and perhaps consciousness during the boost phase. If he wore an anti-g suit to compress the lower part of his body, he could add another g-minute or so to his tolerance, but he would still be vulnerable in most rocket profiles.

The footward, or caudad acceleration vector, we mention only to dismiss as unsuitable. The inertial ef-

(Continued over leaf)
fect exerted on the blood in the longitudinally arranged great blood vessels causes a painful congestion in the head. Small unsupported blood vessels around the eyes and in the nasal and sinus areas may leak blood. The circulation to the brain is protected in that it is in a water-filled rigid container, but the voluntary tolerance to acceleration in this caudal direction is limited by the other factors mentioned, being less than half a minute at one g and only a few seconds at higher levels.

The body positions most favorable to resisting the effects of acceleration are those in which the g-vector is across one of the transverse axes of the body. The inertial effect is across the columns of blood in the large blood vessels so that gross effects on the circulation do not appear so readily as they do when the vector is parallel to the long, longitudinal vessels of the body.

The principle limiting factor in transverse g is respiratory. Above 6 g it is difficult to inspire, so that the duration of tolerance at higher levels is largely limited to the breath-holding time, which is shortened under conditions of acceleration by the involuntary increases in muscle activity (including cardiac muscle) which occurs in this situation.

In addition to the handicap to stimulate probably caused by traction on sensitive membranes due to the shift of certain body parts. A prime example is the movement of the relatively heavy heart in the air-filled chest.

Apparently most suitable for tolerating the accelerations anticipated in the boost phase of rocket flight is a seated, forward-facing position with the trunk inclined forward and with the knees flexed. The optimal degree of forward inclination has not been determined. A number of considerations influence this. It has been found that chest pains from the upright, seated position at 6 to 8 g was relieved by leaning forward 25 deg.

The positioning of the legs has an influence on g-tolerance in this position. When the legs are flexed at the hip, there is some gain in tolerance, presumably by virtue of the blood displaced from the legs to the trunk; but if the lower legs are extended forward, their circulation is impaired, with disappearance of pulse in the lower leg arteries, and the subject feels pain.

If the forward accelerating subject is inclined backward, he becomes vulnerable to the congestion of the head characteristic of footward acceleration.

This means that it may not be necessary to turn the seat of a space capsule around for re-entry into the atmosphere. Here again, the flexion of the knees is important, because in the backward position extended legs become painfully congested.

The "side-ways" position, encountered if the subject were laying on his side during blast-off, has not been studied as completely as the anterior-posterior transverse vector, but tolerance appears to be of a similar order. X-rays of subjects accelerated laterally show a remarkable shift of some viscera to the opposite side, particularly the heart, liver, and stomach, as well as the blood in the lungs.

As has been previously indicated, the primary protective measures have to do with body positioning and, in general, involve keeping the hydrostatic columns of blood parallel to the accelerative vector as short as possible. Counter pressures can be used to minimize hydrostatic effects. The importance of restraint on backward acceleration has been mentioned. It is probable that a form-fitting support would be of value in all acceleration vectors.

The ideal protection would appear to be complete immersion in a rigid water-filled container, in which the buoyancy of the body effectively counteracts its weight. Indeed, the highest tolerance in terms of g-minutes have been demonstrated using this principle. However, respiration is still a limiting factor, and shifts of viscera due to variations in their
Lubrication of enclosed parts can now be inspected without disassembly. Standard Oil scientists have developed the instrument system shown here which measures the presence or absence of the required lubricant on concealed parts by checking the ability of the entire assembly to cut down radiation passed through it.

How to “see” without looking

At a final inspection station how would you make sure that enclosed parts were properly lubricated? Until recently, if you really wanted to know, you had to remove the housing, disassemble the mechanism—a costly, time-consuming process—and take a look.

But now Standard Oil research has solved the problem with a new instrument system that does away with disassembly. It passes radiation through the assembly and measures the amount that gets through. Inspectors can tell whether or not the proper level of lubricant is present without looking inside.

This remarkable device is just one of hundreds of ways in which Standard has helped industry solve problems connected with lubrication. It was developed by a team of Standard Oil scientists and engineers who saw the need for a new approach to an old problem.

Such creative thinking is the product of the atmosphere in which Standard Oil scientists work. They have the time, the equipment and the opportunity to contribute to the progress of their industry and their country. That is why so many young scientists have chosen to build satisfying careers with Standard Oil.
Every student at Rose Poly is or at least should be interested in the school's alumni. There are many alumni who are top men in their fields. The editors feel that it is their job to introduce these men to the students at the Institute. A few select alumni were chosen and letters sent to them asking for their personal opinions on how they succeeded. The editors hope that this feature may help to create a little thought as to why we are here and what we intend to do when we graduate.

The subject for the first article is Mr. D. A. Young. Mr. Young, a native of Terre Haute, is a chemical engineer who graduated in the class of 1922. He is President of the Sinclair Crude Oil Company. His story is not one of easy living, but hard work and determination.

When they graduated from Rose, Henry Offue, Malcolm Scott and D. A. Young purchased a motor boat in Terre Haute and ended up in New Orleans, La., without a job. They sold the boat in an effort to get back home. At that time, Rex Self, now manager of the Sinclair plant at Marcus Hook, Pa., obtained a job for Mr. Young in the experimental department.

He worked shift work for three years, became very disappointed and attempted to find other jobs which were available, but his supervisors talked him into staying because of the future of the oil business.

He was sent from East Chicago to Marcus Hook, Pa. with the Sinclair Companies where he spent three years organizing a technical department. From there he went to Wellesville, New York, with the same assignment and later became assistant manager. He was sent from there to Houston, Texas, where he became manager of the Sinclair Refinery and the Sinclair Rubber plant. From Houston, he was sent in to New York to organize the present Sinclair Oil Company of which he was made president.

In his earlier years with Sinclair, he found the engineering background that he obtained from Rose Poly Technic of great help. He was associated with engineers from many other larger schools and found that his qualifications were equivalent to theirs.

His recommendations to students at Rose at to how to obtain success would be (1) Obtain a good education while in school. (2) Find some type of work that they enjoy. (3) Attempt to do a little better job than the fellow next to you. (4) Always accept new assignments with enthusiasm even if you know nothing about the assignment. (5) Give due respect to other peoples' opinions in the business and be guided accordingly.

Read these opinions carefully. These words are words of experience. Mr. Young made his education count. He took what he had learned and with the drive that is needed for success, he made his way to the top.

The editors hope that this feature will be an inspiration to both students and alumni. The editors feel that we can learn from books, but also, there is much to learn from the experiences of others.

(Continued on page 21)
The earth satellite programs being carried out by the United States and the USSR are designed to secure great varieties of information such as measurement of solar stream protons, auroral radiations, measurement of the earth's magnetic field, meteorological measurements, ionospheric structure, and meteoric bombardment. However the value of this data depends to a large extent on the position of the satellite vehicle at the time it records and/or transmits the information obtained from its instrumentation.

There are several methods of tracking earth satellites, or of predicting its orbit, including those that physically observe the vehicles position relative to the earth and those that use mathematical processes (such as a periodic Fourier series of a step by step process whereby using a second derivative formula, the positions of the vehicle at the ends of different time intervals can be obtained). This article will be chiefly concerned with the physical measuring of the vehicle's orbit.

Before going further, a brief summary of the findings of the United States Office of Naval Research regarding the observability of a satellite vehicle moving in an equatorial orbit will serve as a brief review of what has been discovered so far.

1.) An observation program of an equatorial satellite is inapplicable to an inclined orbit.

2.) Trying to increase a vehicle's brightness by use of fluorescent paints is impractical.

3.) Infrared observation has been impractical so far.

4.) Much development is needed before the use of photo-electric guiding devices for photography and position determination will be possible.

From recent guided-missile test range instrumentation and astronomy developments at White Sands Proving Grounds, it has become apparent that the major problems in optical satellite tracking are due to diminished contrasts against the sun-illuminated sky and to the tracking acceleration component. Even under the most favorable optical environment the difficulties are increased by the problems introduced by the rapid changes in sky brightness, angular velocities, and the vehicle's acceleration.

It is quite reasonable to consider the possibility of using astronomical-type instruments for precise optical location and to even check if a satellite vehicle does exist.

Unfortunately, there are many difficulties to such a location system. First of all, there is never a time when the satellite can be viewed against a night background when the vehicle will be eclipsed from the end of dusk until the beginning of dawn. The apparent motion of a satellite vehicle through the sky can be compared to that of a meteor. therefore an acceleration component will limit an image-forming tracking system to a very few seconds of actual observation. Also, while a satellite will have a unit brightness approximately 12 times greater than the moon, its illumination as compared to a star will vary between the third and tenth magnitude (this is to say that the satellite will appear similar in size and brightness to one of the larger moons of Jupiter). And finally, narrow-angle optical trackers will be able to track the satellite only after the orbit can be predicted to approximately 1 degree of an arc of 15 seconds of time.

The illumination on earth due to the satellite will depend on:

1.) The illumination of the satellite from a combination of earthlight, moonlight, and sunlight.

2.) The distance, phase, and atmospheric conditions.

It has been found that when the satellite is not eclipsed $E_s$ equals 14.5 lumens/cm.$^2$ This can be compared to the maximum possible illumination from the moon of $E_m$ equals $4 \times 10^{-5}$ lumens/cm.$^2$ The effect of scattering by dust particles, water vapor, and air molecules can be reduced by using infrared light. However, in as much as only 5% of natural sunlight lies in the intermediate infrared region (5% in visible region and 25% in near infrared region) this gain is not too significant. The effect of short wave scattering can be reduced by using a red filter against a blue sky or, possibly, by using a polarized filter. At this time it is believed that it may be possible to improve daytime illumination to stellar magnitude by using detection systems in the near infrared region during conditions of slight haze.

Electronically controlled optical systems have certain advantages over visual equipment. Two varieties are required to fulfill location and tracking functions. The first is

(Continued on page 20)
One of the most promising scientific fields in the future is in the supply of cheap electric power. Although the electric power generating industry has made great strides forward, it is always faced with the inefficiency of a steam turbine system. Forty per cent efficiency is about the best possible with a steam dynamo system. However, plans are now in the development stage which can raise the efficiency approximately to sixty percent or a fifty percent increase. Success with these plans would truly be rated as revolutionary.

It has been known for some time that electricity can be generated by heat without a steam turbine. Pelletier was one of the first to discover the principles which we now employ in a thermo-couple. If two dissimilar wires are joined at their ends, and their junctions are kept at different temperatures, electrons will flow. Very small currents are obtained in this method and the system is less than one percent efficient. However, the thermo-couple is not at all to be considered useless for all practical usage. There are many applications in which the thermo-couple is a satisfactory source of current. Probably, the most novel use is the kerosene powered radio in which a kerosene lamp is used to heat the thermo-couple which supplies the current to power the radio. The couple would be a fairly good source of power if the metals used were not such good conductors of heat. Their conductivity allows the hot end to warm the cool end which then decreases the current and efficiency of the circuit.

To maintain the favorable temperature differential, one may insulate the junction with a steam dynamo system. However, plans are now in the development stage which can raise the efficiency approximately to sixty percent or a fifty percent increase. Success with these plans would truly be rated as revolutionary.

Some say that anything a tube can do, a solid component can do and maybe do better. Silicon rectifiers and transistors are excellent examples of the validity of this statement. There is much promise that such crystals as lead telluride and bismuth telluride will form very efficient thermocouples. These substances are poor heat conductors so the temperature differential is easily maintained. Military scientists are claiming great strides in the development of such power sources. A great future exists for such devices on nuclear submarines where the generated heat could be used to great advantage.

Direct heat converters are expected to flourish in installations where there is wasted heat. It is highly probable that these units may achieve forty percent efficiency. By adding these units to present power generating stations, the overall efficiency could be raised to approximately sixty-five percent.

Another different but newly recognized source of power is the fuel cell. This device consists of nothing more than an overgrown battery except that it never runs down.

The chemicals which activate this cell are supplied by an outside source and, as long as they are added, the cell will continue to supply electric power. Such a cell now being developed utilizes hydrogen and oxygen. These elements flow into porous carbon rods in a potassium hydroxide solution and a reaction involving a catalyst on the electrodes yields water and a useful current. The water is then carried away in the excess hydrogen stream. This fuel cell has been found to be ninety percent efficient and, accordingly, has been the subject of widespread interest and development. Present plans for these cells involve produc-

(Continued on page 24)
April 8, Rose played host to Greenville College. Hal Booher led a strong Rose team to a 82-49 victory. Rose walked away with first place honors in 10 of the 15 events. Booher, Andel and Mike Munro each topped two events. Booher also scored two seconds. Again Rose is lacking distance men being able only to score 1 point in the three distance events.

April 14, Rose traveled to Indiana Central to face the hosts without the services of pole vaulters John Ray, Bob Mewhinney or weight man Mike Munro. Joe Andel took first place in the 220 and 100 yard dashes while Booher topped the field in both hurdles races and the broad jump. However Rose did not have enough depth to overcome Indiana Central’s depth in the distances and lost 51½ - 70½.

Rose broke back into the win column with a victory in a 5-way meet at River Forest, Ill. Rose took 6 firsts and backed this with plenty of seconds and thirds to take the meet. Hal Booher again took first place in the hurdles and broad jump. Mike Munro won the shot and discus and Bob Mewhinney and John Ray tied for first in the pole vault. The final score was: Rose 76, Navy Pier 63 5/6, Concordia 41 1/6, Illinois Tech 22 1/2, and Concordia of St. Louis 17 1/2.

April 25, Rose played host for the relays and for the first time in its history Rose won the relays. Rose won the high hurdle shuttle relay and 440 yard shuttle relay. Booher set a new record in the 220 yard low hurdles, tied the record in the broad jump and won the hop, step, and jump, and ran on both of Rose’s winning relay teams. Mike Munro won the discus, Bob Mewhinney took top honors in the pole vault, Larry Grimes won first place in the javelin, and McCardle tied Phillips of Earlham for first place in the high jump.

When the final race was finished the score was:

- Rose 84
- North Park 40
- Earlham 34½
- Concordia 34

(Continued on page 30)
MONOURAL AND STEREO

High fidelity sound systems are becoming more and more prevalent on the scene every day. At present the monaural sound equipment is in use by more individuals than is stereo equipment. This stems from the fact that, although most of us enjoy hearing the “ultimate” in sound reproduction, the purse strings of the average high fidelity enthusiast cannot stand the strain incurred by stereo systems. Granted, there are some stereo systems that are inexpensive as monaural, but these are not the type that will reproduce the quality of sound that is desired.

The secret to good listening in high fidelity comes in the speaker. Admittedly, a poor amplifier can ruin the sound in the best of speakers, but without a good speaker system, high fidelity is but a dream.

Let us assume that you have just purchased a new monaural reproduction system and you are trying to find a place to put it. Corner placement is considered best by most experts. The corner should be chosen with regard to frontal and wall obstructions. Some horn-type enclosures reproduce and function more satisfactorily when the walls forming the corner are free of obstructions for several feet on either side of the enclosure. Since it is not always possible to have absolutely free wall space in a room, it is sometimes advisable to move furniture a few inches away from the walls. The bass unit of your system should be as near the floor as possible while the high frequency tweeter should be elevated more and should be as free of obstructions as possible.

If a corner is not available for placement of your enclosure, try to place it in the center of a short wall of a rectangular room, still as close to the floor as possible. The bass responses of any enclosure will be diminished as other alternate positions are chosen. Positions at eye level, at the center of a floor area, and behind diffusing, absorbing, and obstructing objects are least desirable.

Now that we have hashed over the monaural type of reproduction, we can now devote a more intensive study to the stereophonic system. Stereo is truly the ultimate in sound reproduction. It is designed to give the listener exactly the same sounds that he would get if he were sitting in the best seat of the best theater in the world. Some of us may have a difference of opinion when it comes to which is the best seat in the concert hall. Some may even prefer music which is never performed in the concert hall. Most of us, however, know when we are hearing good sound. For the sake of simplicity, let us assume for a moment that we all agree on the best seat in the theater. Just what are the sounds that we are apt to hear? Strangely enough, only a very small percentage of these sounds come directly from the orchestra. Most of it is sounds that have been reflected from the walls of the hall. Yet, our ears and brain are able to differentiate and analyze these sounds into enjoyable tones, even though they come from every conceivable direction. We can tell which sounds come from what instruments and still distinguish the direct from the reflected sounds. Now, if a microphone were to be substituted for the human ear, and the music recorded for later playback, we get monaural or monophonic sounds, which has already been discussed as to speaker placement. If, however, we place two microphones in the hall, we get binaural sound results. This is the basis of stereophonic reproduction.

Now that we have recorded this binaural track, how are we going to convey it to the listener? One alternative is to give the listener a set of earphones and play one side of the track through one phone and the other side through the second. Unfortunately, wearing earphones is uncomfortable and impractical for prolonged listening. Therefore, the system of two speakers is the other alternative. Since the recording microphones are placed anywhere from five to twenty-five feet apart, it is advisable to place the speakers anywhere from three to ten feet apart in the average size listening room. This gives us the feeling of “three-dimensional” sound, since the instruments of the orchestra that are closer to one recording microphone will...

Page 16 THE ROSE TECHNIC
ENCLOSURES

By Francis Hirt, soph., math.

record more heavily on that side of the track than on the other. This now gives our sound direction as well as tone. There is an additional competition in stereo that entails the sound of the speakers being reflected off the walls of the listening room. This sound delay, as it is called, has a time lapse of much smaller magnitude in the listening room than in the concert hall. This must be fairly important since it is rather unusual for a hundred-piece orchestra to play a symphony in an eight by ten room. Thus, the main function of stereophonic reproduction units is to enlarge the room acoustically, as well as give direction to the sound.

Swell. Now we know what stereo is, but what are we going to do with this two-speaker monstrosity when we get it? Again, let's make a supposition.

You are one of the elite few that has taken the bull by the horns and plunged headlong into stereo. Now you have your set, complete with two large speaker cabinets, sitting in the middle of your living room floor and you want to know where to put it so you will get this so-called “ultimate sound reproduction.”

The idea of speaker placement for stereo has run the gauntlet of controversy for some time. This, however, is to be expected since the listening rooms, and the preferences of the people who listen, vary widely. No hard-and-fast rules can be laid down to cover the placement of speakers, but there are a few suggestions that can be made. The following have been tried under numerous conditions and have been found to be most satisfactory. Remember that your own experimentation may lead to better sound reproduction than anything mentioned here.

There are several producers that put out a “packaged” system. By this it is meant that both speakers are complete in one cabinet. These are carefully designed to function in the home listening room, but it is the author’s opinion that they are not as satisfactory as the two-cabinet type of stereo equipment. The stereophonic effect is produced by a combination of intensity, time, and frequency differences at the two loudspeakers. It follows that these previous conditions must be maintained in order to have good stereo reproduction. Maintaining this balance can be controlled only by correct loudspeaker placement. For example, if the loudspeakers are arranged so that the general listening position is much closer to one speaker than the other, the balance of time and intensity will be upset, resulting in a poor stereo effect. It is preferable to have the wall opposite the two speakers as non-reflective as possible. These reflections are caused by general diffusion of sound which would destroy the important intensity differences in the two speakers. It is a rather interesting experiment to set up the equipment outside and to notice the astounding and pleasant effect that results. This is due to the absence of reflection.

To date, the most common and successful set up for speakers is to place them face outward from the short wall of the listening room and at a distance from each other or anywhere from six to twelve feet. This distance will have to be determined by the individual according to his own type of room and listening likes and dislikes.

There are other suggestions, such as toeing the speakers away from each other slightly. This keeps the tones from mixing together before they reach the listener’s ear.

The main thing to do is to buy a good brand of equipment and place it correctly. From here on you are on your own as to the minor adjustments you want to make to satisfy your listening ear. Many hours of enjoyment can be obtained from having a good system that is well placed.
Library Notes

By Carson W. Bennett and Anita Walden

Interested in baseball? Would you like to hear Carl Hubbell recount striking out Ruth, Gehrig, Foxx, Simmons and Cronin; Leo Durocher admit he's a genius; the Braves win the 1957 World Series? How about listening to Babe Ruth talk about the importance of getting a youngster started in baseball; Ted Williams hit one out of the park; and Ty Cobb talk about how to make your own breaks? This is just a sampling of what is included in BASEBALL—AN ACTION HISTORY, one of the latest records added to the library's record collection.

No sir, there just isn't anything as exciting as a good baseball game—unless maybe it's the 500-mile race at Indianapolis on Memorial Day. For excitement and thrills, it certainly has no equal. Before seeing or listening to the race, or even after the race, may we suggest the following titles for your reading.

We have included a pictorial history of the race, an autobiography of Wilbur Shaw, and several titles on racing and racing cars in general.

Automobile Year (we have 1956/57 and 1957/58)
Clouten, Cecil. The Racing Car; Development and Design

NEW BOOKS

On our list of Notable Books of 1958 which appeared in the April issue of The Technic, we included a title which we feel deserves a longer review than was given on that list. We are referring to The Odyssey: A Modern Sequel by Mike Kazantzakis. This work by the world-renowned author of Zorba the Greek and The Greek Passion has been acclaimed as one of the towering achievements of contemporary literature. It is not a new version of Homer but truly a modern sequel, an epic in its own right. In 24 books (one for each letter of the Greek alphabet) and 33,333 lines of magnificent poetry, Nikos Kazantzakis takes up the story of Odysseus at the point in the narrative where Homer left off. His hero cleans the blood of Penelope's suitors from his body and leaves Ithaca once more. He abducts the full-blooded, still-beautiful Helen, destroys the decadent civilization of Crete, and sets off on voyages and adventures which carry him to Egypt, the southern tip of Africa, and finally to the remotest regions of the Antarctic.

Kazantzakis' modern epic is a work of rich narrative content and philosophical overtones, a lofty and moving evocation of the spirit of timeless Greek legend. It communicates a pagan delight in the joys of total abandon to life, a delight which becomes all the more poignant as Odysseus renounces the world of the senses and turns ascetic. Through the entire epic runs a rich Homeric music, which is fused with a strong, simple, spacious narrative told boldly and often with naked simplicity.

Two Women, by Alberto Moravia
This is not a war book in the ordinary sense of the term, but a novel about two good people caught up in the profanatory and infectious violence of war. Alberto Moravia tells with compassion and insight of the resilience of two human beings who have been subjected to an almost intolerable experience.

What We Are For, by Arthur Larson
In today's turbulent world, the need for a simple statement of What We Are For has become crucial. It is not enough to say what we are (Continued on page 24)
He’s been on his way up from the day he started work

James C. Bishop got his B.S. in Electrical Engineering from the University of Illinois on June 23, 1953. On July 1, he went to work as a lineman in the Illinois Bell Telephone Company management training program. On July 2, he was “shinnying” up telephone poles.

And he’s been “climbing” ever since. A planned rotational training program, interrupted by a stint in the Army, took Jim through virtually every phase of plant operations.

He was promoted to Station Installation Foreman in July, 1957. Then came more training at company expense—in human relations and other supervisory subjects—at Knox College.

Since early 1958, Jim has been Central Office Foreman in the Kedzie District of Chicago, which embraces about 51,000 telephone stations. He has 19 men reporting to him.

“I was hired as ‘a candidate for management,’” he says. “I know I’ll get the training and opportunity to keep moving ahead. How far I go is up to me. I can’t ask for more than that.”

* * *

Find out about career opportunities for you in the Bell Telephone Companies. Talk with the Bell interviewer when he visits your campus. And, meanwhile, read the Bell Telephone booklet on file in your Placement Office.

Jim Bishop holds training sessions regularly with his men. At left, he discusses cable routes in connection with the “cutover” of his office to dial service. At right, he and a frameman check a block connection on the main frame.
the wide-angle intercept equipment which fulfills the search-location function. It forms a “picket” image of the sky which detects a satellite image as it passes over the detector. The major advantages of this detector are its field of view, readiness, sensitivity, and time constant. As the vehicle’s image passes through the “picket”, it can be detected by measurements of its velocity and acceleration parameters over a short interval of time. The servo-aided tracking system fullfills the tracking and precise location functions. It consists of a precision mount, electric servo input, and radar output. It is designed to be used for photoelectric, photoconductive, and photographic detectors. The mount has two external surface plates to hold detection devices. It is capable of photographing stars and the satellite simultaneously.

Even the best optical equipment will have difficulty finding a satellite, so as an additional safeguard, the “minitrack” radio system was devised by the Naval Research Laboratory. This system provides information about the satellite’s orbit so that the telescopic equipment can be aimed. A “fence” of ten minitrack stations covers a zone across which any satellite is bound to cross. These stations extend from Blossom Point, Maryland, to Havana, Cuba. All observations are fed into a central computing bureau where the satellite orbit is defined.

The principle of operation of the minitrack system is easily understood. Suppose that two of the stations are a short distance apart and the satellite, emitting radio signals, passes overhead. At some given moment, the waves received at both stations will be exactly in phase. At some other given moment, one station will receive its signal slightly earlier than the other. Through simple geometry, knowing the extra distances the waves must go to reach the further receiver, the angle between the satellite and the vertical can be computed. It should be realized that accuracies of measurement within a thousand-millionth of a second are necessary to obtain angular accuracies of one-hundredth of a degree.

There are two newer solutions to satellite tracking that are being worked out at present. One is to place an electronic flash in the satellite, exactly like those used by photographers. The other is to mount a special “retrodirective” mirror on the satellite, and by using powerful searchlights, illuminate the satellite from the earth.

It has been characteristic in the last several years to put insufficient emphasis on satellite tracking programs. If the satellite program of the United States is to measure up to all expectations, it is necessary that the tracking program receive more interest so that trackers will be able to step into their future job of space probe tracking with ease and accuracy.
J. T. Jones

Another of Rose's outstanding alumni is Mr. J. T. Jones. He is a native of Neodesha, Kansas. He graduated from Rose in 1932 as an electrical engineer. Mr. Jones was very active while here at Rose. His social fraternity was Alpha Tau Omega. He was also a member of the Tau Beta Pi and Tau Nu Tau fraternities. His extra curricular activities included track, Modulus staff, R.O.T.C., Chairman of the Rose Show, member of the Rifle Club, member of the Camera Club, and a member of the A.I.E.E. He was also a recipient of the Ray Scholarship.

His school activities have carried over into his life now. He is very active in his community. He has served on the Joplin City Council, is a past president of the Junior Chamber of Commerce, and is a past president of the Y.M.C.A. He has also been a board member on the Senior Chamber of Commerce, the Joplin Blind Association, Big Brother's, Inc., plus numerous other civic and professional organizations. He also received the Distinguished Service Award from the Junior Chamber of Commerce.

Mr. Jones is employed by the Empire District Electric Company in Joplin, Missouri. He has been associated with them for the past 24 years. For the past several years, Mr. Jones has been steadily moving up in the Empire organization. He started in the merchandise sales and service department. He headed that department until 1956 when he was appointed Asst. General Manager.

Mr. Jones has recently received another promotion. He is now General Manager, and he was also elected to a vice-presidency in the company.

Mr. Jones is a fine example of what an education at Rose can do for a man. He has certainly set a fine example for us to follow. We would like to send our congratulations to him for his new promotions.
THETA XI

Happy growls to you, as again we say hello from the Tiger house. Many events have taken place since last we filled a space on these pages, so here goes with the run-down.

President Bill Brummett and Brother Bob Honneger recently attended the National Convention of Theta Xi at Detroit. They brought back many new ideas for fraternity improvement and also reported a swell time.

At our Parents Day, which was held April 5, Kappa was host to about 125 parents and relatives. The program for the day consisted of getting acquainted with the parents, showing them through our house, and a buffet lunch which was followed by short talks from Dean Monech and Bill Brummett. We want to thank all of the parents for their fine attendance and many favorable comments.

Song practice is well underway with director Jim Tubby trying hard to squeeze a few mellow tones from our rasp and scratchy voices. Since Theta Xi is host at the I. F. Dance this year, we think this would be a good year to take the song trophy home with us. O.K. gang?

The pledges of Kappa Chapter held a car wash recently to raise money for their annual Bowery Ball. They did a very fine job and I’m sure they enjoyed every minute. The actives wish to compliment the pledge class on their Bowery Ball. It was a big success and a good example of what real TX men can accomplish.

Last but not least we wish to congratulate Mr. Larry Cunningham on his engagement to Miss Janet Miner, and Vern Gross on his pinning to Miss Linda Hawkins.

That just about concludes the news for this month. Tune in next month though, same time, same station. That is station T-E-C-H-N-I-C.

Larry Pitt

ALPHA TAU OMEGA

As ATO headed down to the “wire” of another year things happened in rapid succession. Sunday, April 5, the pledges got a little overconfident and challenged the actives to a softball game. However, the rebellion was put down as they were beaten 11 to 10. Speaking of softball, the Taus, behind the excellent pitching of Brother Larry Grimes, picked up their first win of the season, a 13 to 0 victory over Lambda Chi Alpha. The eyes of every man in the chapter are on the Interfraternity softball trophy that is sitting on our mantle, and if we have anything to say about it, it will still be sitting there in June.

The Interfraternity Dance is almost upon us, and, as usual, there are the feverish sessions which are producing several on-key notes and one very nervous director, Brother Charlie Sechrest. We’re shooting, or rather singing, for our seventh trophy in a row, after retiring our second consecutive trophy last year.

With a little bit of luck, we should be able to do it.

April 26, the entire chapter is giving a tea in honor of “Mom Srofe,” our housemother. “Mom” has been with us for twenty one years, and we’re all mighty proud of her and what she has done for us. As a personal note, but one I’m sure is in the hearts of all the men of Gamma Gamma, I’d like to say, “Thanks, Mom! You’re the BEST!”

Brother Jack Fenoglio is in charge of the Interfraternity Help Day to be held on April 25. On that day Goodwill Bags will be passed out in the community to be filled. It’s a big job coordinating the activities of the four fraternities in an operation of this size, but under Jack’s leadership, it is sure to be a success.

ATO is due to be busy another day with Goodwill, as we pick up the filled bags on May 16. This is an annual function of this chapter, and one we are proud to be able to do for the community. Brother Larry Berger will direct the collection of the bags.

Of course, there is the usual round of mixers and the gala Pledge Dance to help finish out the year. With a South Sea theme, the Pledges are well on their way to having one of the best pledge dances the chapter has seen.

Just over the horizon looms final week, and the books are beginning to be dusted off and leafed through. With a very effective study program set up by brother Bill Johnson, it
looks as though the Taus are going to come through them with flying colors.

Bill Carter

LAMBDA CHI ALPHA

It finally happened! Brother Hera-kovich met his match and finally succumbed to the charms of a woman! Congratulations go to Miss Marlene Vukowich from East Chicago, Indiana, who snared Rocky’s pin. Oh, yeah! Congratulations to you, too, Rock.

It was a tired bunch of pledges who finally got to bed Saturday night, April 25. Yes, you guessed it—Help (?) Weekend! The pledges worked their tails off. The whole house was cleaned—inside and out. Not a speck of dust was left unturned. The usual calisthenic “break” was held midway in the proceedings.

Although Theta Kappa dropped its first I. F. softball game to ATO, 13-0, great expectations for a top team are hoped.

An interesting sidelight to regular softball practice was a game held between the actives and pledges. It was a real pitcher’s duel and ended in a tie, 16-16. However, it was a well known fact that if the game had progressed further, the actives could have won in a breeze.

Carl, “one race a year” Herakovich joined the track team for the very successful Rose Relays. He and Captain Larry Logue, Ron Ireland, Joe Andel, and Jerry Hahn contributed greatly to Rose’s victory.

Playing baseball for Rose this year are Brothers Bill Fenoglio, Larry Myers, Bob Michael, and Don Dekker. Knock the cover off of that ball, men!

Initiation was held May 15 and May 17. Congratulations go to all of you new Lambda Chis. We are proud to welcome you as members.

Saturday, May 16, was a big day. Brother Schmidt held a barbecue for the chapter at his new house; night brought the annual Pledge Dance. All in all, it was a very memorable weekend.

As this year comes to a close, we would like to extend our best wishes for an industrious, profitable, and active future to the Class of 1959. Good luck, Men!

Tom Feutz

SIGMA NU

It’s still 6 weeks till the big vacation, but the old Sigma Nu’s are ready right now. The spring heat seems to be dragging more and more of the boys ou to the porch for their evening seranading. Tch, tch, those poor neighbors.

But, that spring heat has brought out much more than mere singing desires. Some of the boys have turned of all things—to girls. Yes, even brother “Davie Herrington” has heard that distant call. He’s now wearing a Chi Omega’s pendant, from his pin girl, Miss Karen Cochran. Yet Dave’s not the only one new to this catagorie. Al Raquet is now pinned to a Gamma Phi from State, Miss Shirley Otolski, and brother Chuck Gilbert is pinned to another Gamma Phi, Jane Weathers. Congratulations, boys.

Beta Upsilon has undergone an annual, with the election of officers for the coming school year. Hal Miller is our new Commander; Al Raquet, recorder; Johnny Kirk, Treasurer; Ron Higgenbothan, Chaplain; Jim Onnen, Reporter; Gary Anderson, Alumni contact officer; Mike Smith, Asst. Treasurer; Ed Kostra, Marshall; Bill Yochum, Sentinel; and Dick Landenberger, Chapter Historian. Like all new leaders, we know they have a tremendous job in store for them, but the chapter’s out to give their full cooperation for a successful 59-60 year.

We also wish to extend Sigma Nu’s congratulations to our retired Commander, Gary Anderson, for the success of the current year.

With I. F. Sing only a few days off, we feel certain—that we’ll be out there singing. Bob Carter’s been working, and working the entire year to improve our singing—so here’s hoping.

Spring has also allowed us to play, once more, that famous body contact sport—Softball. After losing our first two games, each in the last inning (Well, it’s some consolation) we’re ready to gather all our bats, balls, gloves, umpires, rooters, and players together, and win one.

Jim Onnen
IMPROVED POWER SOURCES
(Continued from page 14)

ing the oxygen and hydrogen during
low load times at generating stations
and then using the fuel cell in
such applications as electrolytic re-
fining of metals and electro-plating
which require constant low voltage
sources.

The future of the fuel cell holds
the possibility of combining natural
gas with air at elevated tempera-
tures in one of these cells and pro-
ducing inexpensive power. There
are a great number of oxidation-
reduction reactions which also offer
possibilities for the operation of this
cell. Each of the three mentioned
methods of producing power is still
new and offers many opportunities
for improvement in the future. It
can safely be said that the future
of engineering along this field looks
bright since it may come to be that
these methods of power generation
will become standard and they will
challenge the resourcefulness of the
engineer and scientist.

LIBRARY NOTES
(Continued from page 18)

against—Communism with its falla-
cies and evils—because Communism
propagandizes itself to most of the
world, and particularly to the newly
developing nations, as a change for
the better, whereas the United
States projects the image of “an ill-
defined force for countering change.”
This is an absurd position for us to
be in since we ourselves have been
traditionally one of the greatest ex-
ponents of change in history. Here,
in practical terms, is a re-definition
of “Americanism” which combines
due reverence for our traditional
concepts with practical application
for today’s world.

The Rainbow and the Rose, by Nevil
Shute
This is the story of a seasoned
pilot whose desperate crash-landing
on the Tasmanian coast brings into
play actions and emotions that span
a lifetime. He is Johnnie Pascoe, a
born flyer who has been piloting
aircraft since 1916. From the dare-
devil days of World War I to this
final crack-up in his own small
Auster, Pascoe’s life has been a med-
yley of planes and pilots, of routes
and landing fields that epitomize the
course of 20th century aviation.

Warmly characterized, tense with
action, poignant in its effects, The
Rainbow and the Rose shows Nevile
Shute at the top of his form.

The Scientists, by Eleazar Lipsky
Here is a thrilling novel of great
power, written about the men who
more than any others are determin-
ing our destinies, about their wom-
en, their families and friends, and
the world in which they move. It
concerns not only the day by day
existence of one particular scientist,
but the moral problems which con-
front all scientists and all men. A
man stands accused. Even if he is
innocent, the accusation has opened
a whole Pandora’s box of ills, not
only for the man himself, but for all
with whom he comes in contact. No
matter what the outcome, life is
never the same for those who are
involved.

THE PARKMORE
RESTAURANT

Where R.P.I.
Men Meet

A Good Place
For Grads
To Eat

Experience
is a great teacher
but . . .
you can learn more
from books
cheaper and faster

Order your books through
Rose Polytechnic
Book Store

He had the toughest job in the world. He sold sleeping pills at
Niagara Falls.

Her head is just as vacant as
the breakfast room in Niagara
Falls.

A basom companion sometimes
turns out to be a false friend.

In a parlor a davenport stands,
A couple sit there holding hands
So far—no—farther
Now in the parlor a cradle stands
A mother sits there wringing hands
So far—no father.

Over cocktails looks seem so
sweet.

How will they look over shredded
wheat?

Mrs. H.: “How’s George doing in
the Army?”

Mrs. J.: “Oh fine. He’s reached
the grade of AWOL, and next
they’re going to make him a court
martial.”
1. A phonograph record has a total diameter of 12 inches. The recording leaves an outer margin of 1 inch, and has an unused center of 4 inches diameter. There are 90 grooves to the inch. How far does the needle travel when the record is played?

2. One Saturday morning Jack, who lives in Midvale, decided to visit George who lives in Springfield. Upon arriving in Springfield, he found that George had left for Midvale 20 minutes earlier. He immediately turned back. Now George, upon arriving in Midvale, found that Jack had been gone for 60 minutes, and he likewise immediately turned back. The two men throughout their trips traveled at constant but different speeds. On their return trips they met at noon halfway between the cities. When had each started?

3. If we were to assume that the earth were a perfect sphere with a circumference of 25,000 miles; and, if it were possible to erect a telephone line around the earth at the equator so as to form a concentric circle, would a man be able to crawl under it if the total length exceeded the circumference by only 200 feet?

4. A certain farmer owned a square tract of land one mile on each side. He had three grown sons, and decided to retire. He wanted to split the farm among his sons so he divided it into quarters. He kept the quarter with the homestead on it, and gave each of his sons a plot of land of equal size and shape. His neighbor liked the plan and decided to do the same. He wanted to retain one quarter of the land for himself, so since his farm was the same size and shape, he staked off a corner, half a mile on a side for himself, but then hit trouble, since he has four sons, and still wanted to give each a tract of equal size and shape. Can you help him out?

5. Recently a young engineer went into a candy store to buy a dimes worth of jellybeans. While making the purchase he clumsily knocked over the whole jar, spilling 573 jellybeans on the floor. The angry proprietor demanded payment; but the engineer, being more agile with his brain than he had been with his hand, challenged the proprietor to a contest. Each would take turns picking up jellybeans, and anywhere from one to 25 jellybeans could be picked up each turn. The person forced to pick up the last bean would lose the contest. The engineer allowed the proprietor to take the first turn. The proprietor did, and it was his downfall. How did the engineer force the proprietor to take the last bean?

Answers on page 31.

THE FIRST MAN

(Continued from page 10)

specific gravity from the surrounding medium are not prevented by immersion in water. This is particularly true of the air-surrounded heart. A notable disadvantage of such a system would be its great weight. Theoretically, the quantity of water could be greatly reduced by making the rigid container closely correspond to the body of the subject; unfortunately, this would also reduce the mobility of the subject, which is one of the great advantages from water immersion.

Finally, we have the problem of pilot performance when under acceleration stress. The first consideration in regard to performance is that with acceleration there is diminished capacity for whole limb and body movements as the weights of body parts are multiplied by acceleration. This handicap increases with the addition of bulky personal equipment. It makes necessary arrangement of controls so that they can be operated with fingers and wrists, and displays which are visible without body movement.

The capacity of a man to perform several tasks while undergoing a three-stage acceleration typical of rocket boost into orbit has been measured. Although there will be some deterioration of his performance, it was felt that a man could be expected to assist in the control of such a vehicle during the launching phase. Other workers have indicated that there is little decrement in performance at relatively low accelerations. There is still need, however, to measure the capacity of a man to observe, make decisions, and react during high-sustained, and repeated accelerations.

We have thus summarized some of the many unusual problems that engineers and medical men are facing today in attempting to enable man to withstand the physical punishment imposed by escape accelerations. In closing, just remember one thing—the First Man is walking on the earth today.
Again, as during the past several months, the administration and different school organizations have done a very commendable job in selecting convocations. It is also interesting to note that the attendance at convocations has increased considerably due to good presentations.

ST. PAT’S DANCE

The Blue Key Honor Fraternity presented the annual St. Pat’s dance on March 21 in honor of the patron saint of Engineering, St. Patrick. The dance was held in the school auditorium. A blending mixture of stage and table decorations presented a gay, modest atmosphere. The wide variety of music played by Norm Carey’s orchestra was enjoyed by all who attended the affair. The entire Blue Key Fraternity deserves praise for such good work and coordination of efforts.

INHERIT THE WIND

A dramatic presentation of this title was portrayed by the DePauw University Players to an attentive Rose audience. The play was a stage production of the famous story concerning a school teacher in Tennessee teaching Darwin’s theory of evolution and the results of his lectures. The end result was a court case between the two finest lawyers of that era, Clarence Darrow and William Jennings Bryan. The stage presentation was very ably conducted by the visitors from the DePauw campus. It also gave the students an idea of the activities carried on at campuses of larger schools.

I.U. OPERA WORKSHOP

Also in the line of good cultural convocations, the student body viewed an opera presented by the Indiana University opera workshop on April under the able direction of Mr. W. Vacano. The male and female singers presented excerpts from the “Merry Wives of Windsor”, “Madame Butterfly,” and a short comedy entitled “The Research.” The visiting actors and actresses personally thanked the student body for their attentiveness and rich applause.

MATH CLUB CONVO

The math club sponsored a convocation April 2 on the demonstration of the different operations and capabilities of a digital computer. A representative of the Royal McBee Corporation did an excellent job of explaining exactly the functions of these computers and of discussing the opportunities for their future use. The speaker also shed a favorable light on the possibilities of students with engineering and pure science backgrounds operating these machines. The rewards, it was pointed out, are very enticing and are constantly drawing more graduates into the field of operations and research pertaining to such mechanisms. The representative left a very favorable impression by his comments that the science student of today holds the world of tomorrow in his hands.
Every year new opportunities for graduate engineers in various phases of oil producing, refining, research, transportation and oil marketing—on a world-wide scale.

MOBIL OIL CO., MOBIL INTERNATIONAL OIL CO.
Divisions of SOCONY MOBIL OIL CO., INC.

AFFILIATED COMPANIES: General Petroleum Corp., Magnolia Petroleum Co.
300 HP TURBINE ENGINE

Development of a 300 horsepower supercharged gas turbine engine has been announced by Ford Motor Company. Known as “The 704”, the new gas turbine has been under development for two and a half years. Its weight is only one-fourth that of a truck diesel engine of comparable horsepower while its fuel economy rivals that of a diesel. It is superior to conventional gasoline engines under most operating conditions.

Until now, experimental gas turbines designed for trucks and passenger cars have employed one stage of air compression; “The 704” has two. One is a supercharging stage enabling the engine to deliver more horsepower from a smaller size. Each compressor effects a 4 to 1 compression with the low speed compressor turning 46,500 RPM and the high speed compressor 91,500 RPM. The most significant advance in this turbine is the fact that it attains maximum fuel economy in a range of 25 to 100 per cent of power. Earlier designs are efficient only when operating at full power, with fuel consumption rising sharply as power slides below the 100 per cent level.

The Ford 704 weighs 650 pounds installed, complete with all accessories built into it and requiring only the addition of electrical power and fuel. A diesel truck engine of comparable horsepower weighs about 2,700 pounds.

“The size of the 704 is approximately 38 inches long, 29 inches wide and 28 inches high. To draw a comparison, it would fit easily into the engine compartment of most 59 cars.”

A wide variety of fuels can be used: unleaded gasoline, kerosene, jet engine fuel, or light diesel fuel. No warmup period is required.

Both the primary and re-heat combustion chambers operate at 1,700 degrees Fahrenheit. Exhaust gases are discharged at about 740 degrees Fahrenheit, or roughly the same temperature as conventional passenger car engine exhaust.

Ford expects to be testing the new engines in vehicles before the end of the year.

ULTRASONIC SEAM WELDER

An ultrasonic seam welder than can weld sheets of dissimilar metals continuously has been developed by the Westinghouse Electric Corporation. Although still in the development stage, this welder brings to seam welding the advantages of ultrasonic welding. The new apparatus will weld dissimilar metals which are not now weldable by fusion processes. The only other available method for joining dissimilar metals is that of cold welding in which there is also a minimum of diffusion, and has the very serious disadvantage of requiring a large deformation of the metal pieces being joined. Ultrasonic welding on the other hand does not require these large deformations.

Sheets of metal to be welded are passed between two wheels vibrating at 20 kilocycles per second. The periphery of these wheels press against the metals on opposite sides of the sheets. At the point of contact, the wheels break up the oxide coating on the metal surfaces and by a kneading action weld the metal lattices on the surfaces of the metals themselves. No electric current is passed through the spot being welded although in appearance the ultrasonic seam weld is similar to that of an electric weld. A variable speed drive moves the metals through the unit as the weld is completed by means of the vibrating wheels.

The center of the vibrating wheel is attached to a transducer assembly which is used to convert electrical energy to the high-frequency mechanical vibrations. This assembly consists of a magnetostrictive transducer, a coupling bar and an enclosure for water cooling. In operation, electrical power causes the transducer to vibrate longitudinally. The vibration is passed down the coupling bar and enters the wheel causing it to vibrate as a solid disc with a free circumference. This action causes the center of the wheel to be pulled in and out and causes
flexural vibrations to move radially out from the center of the wheel to its circumference. The wheel surfaces in contact with the work move in opposite directions by having the transducers work in opposition to each other.

With the experimental welder that has been developed, two sheets of aluminum 0.010 inches thick have been seam welded continuously at a rate of 15 inches per minute. Also, light silver foil was seam welded to \( \frac{1}{4} \) -inch-thick copper strap at a rate of 20 inches per minute. Investigation is being continued on the ultrasonic seam welded to increase the welding speed, and to increase the thickness of the metals that can be welded.

**TALKING SATELLITES TO SPEED MAIL**

Practical uses for satellites will soon be upon us; their job, communications. The small compact spheres will soon relay radio messages around the world. The next step is live television from Europe, and finally, letters will be flashed overseas at a fantastic rate.

Although these ideas seem very futuristic, the detailed plans have already been worked out. This year a large plastic ballon satellite, coated with aluminum will be placed in orbit. It will be used to bounce radio signals back to earth. Next year, three satellites carrying receiving and transmitting equipment will continue last December's test of repeating messages. In 1961 repeater satellites for use by the Signal Corps overseas communications will be in orbit. A five ton satellite containing equipment to relay television signals will be placed in orbit in 1962. An interesting fact about this satellite is that its orbit will be such that the satellite will always remain over one spot on the earth, probably the middle of the Atlantic Ocean.

The cost of several satellites for a good communications relay is another bright spot in the program. The cost will be about $100,000,000. These facilities would be able to handle 1000 telephone conversations and several television channels all at one time. When this cost is compared to the $40,000,000 it cost for the recently completed transatlantic cable, which carries fewer than 100 telephone conversations, it is found to be very economical for the services it will perform.

**COLD CATHODE VACUUM TUBE**

The discovery of a new type vacuum tube has paved the way for many new developments in portable radio and TV sets. Present tubes use a hot filament to “boil off” electrons from the cathode. Most of the electricity required in present tubes is used to heat this filament. When a present tube goes dead, the filament has burned out very similar to a burned out light bulb. This new tube which requires no heat in its operation should last indefinitely. A second advantage of these tubes is that they require only about one tenth the power needed to operate present tubes. Cold tubes are very quick starting, about one quarter second, and can be made to start in one thousanth second by using a trickle current of .00001 ampere.

The new tubes operate by pulling off the electrons with electric force. To start operation, energy from outside, (an electron, heat, or a ray of light), knocks loose an electron inside the magnesium oxide electrode. This free electron frees several more electrons so that in effect an avalanche is started inside the cathode. The surface loses so many electrons that in effect it becomes positively charged. This positive charge attracts electrons from inside the cathode; consequently, the avalanche continues and results in a stream of electrons emitted from the cathode.

This new tube will make possible really portable TV sets, tubes that won’t burn out, on-the-wall television, picture tubes, good portable radios much cheaper than present sets, and lights, similar to florescent, but brighter and much longer lasting.

May, 1959
BASEBALL

The Rose baseball team opened the 1959 season with a 5-11 loss against Indiana Central in an away ball game. Going into the last inning 9 runs down, Rose tried a comeback but only managed 3 runs before they were retired.

April 18, the Engineers traveled to McKendree for a double header. Rose's hopes for a win were stamped out in the third inning when McKendree scored 5 runs on 2 walks, 3 errors and 2 hits. Rose only managed one run on three hits. Final score: McKendree 7, Rose 1. In the second game Rose only committed one error but could not put together enough hits in any one inning. McKendree won the second game, 5-0.

Rose started rolling with a 17 to 10 win over Marion at Indianapolis. Louis Roehm connected for 3 hits in 5 trips to the plate and Larry Myres and Don Lanning drove in 3 runs apiece. Marion scored only 1 earned run while Jim Godwin and Wes Spoonamore spaced 9 hits very well.

The Engineers traveled to Springfield to face Concordia on April 24. Again errors cost Rose both games of a double header. The first game Rose out hit the home team 9-6 but 7 unearned runs gave Concordia the game, 11-6. The second game the home team scored 5 unearned runs to down Rose 5-4.

With some backing for Rose's pitching staff, the '59 season can be a bright one.

INTRAMURALs

The spring intramural program is in high gear with softball started and a track meet and tennis tournament completed.

The standings in the softball league are:

<table>
<thead>
<tr>
<th>Sr.</th>
<th>W</th>
<th>L</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jrs.</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Soph. Bears</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>BII</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>BI</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Ind. Fresh.</td>
<td>0</td>
<td>1</td>
</tr>
</tbody>
</table>

Soph. Giants 0 0

It looks like Speedy Phillips of the juniors or Larry Grimes of the seniors will be leading the team to first place.

Sophomore Dick Landenberger and senior Ross Kuykendall are the finalists in the ping pong tournament. We should be seeing a real battle in the student center.

The schedule and school record of events for the intramural track meet is:

<table>
<thead>
<tr>
<th>EVENT</th>
<th>RECORD</th>
</tr>
</thead>
<tbody>
<tr>
<td>120 yd. hurdles</td>
<td>15.3</td>
</tr>
<tr>
<td>3/4 mile</td>
<td>4:13</td>
</tr>
<tr>
<td>100 yd. dash</td>
<td>11.0</td>
</tr>
<tr>
<td>Medley Relay</td>
<td>1:54</td>
</tr>
<tr>
<td>330-110-110-330</td>
<td>2.35.0</td>
</tr>
<tr>
<td>880 yd. run</td>
<td>1:51.5</td>
</tr>
<tr>
<td>880 yd. relay</td>
<td>5' 6 1/2</td>
</tr>
<tr>
<td>High jump</td>
<td>19' 5'</td>
</tr>
<tr>
<td>Broad jump</td>
<td>36' 11&quot;</td>
</tr>
</tbody>
</table>

INTERFRATERNITY

After each team has played twice ATO and TX are fighting for first place with records of 2 wins and 0 losses while Sigma Nu and Lambda Chi Alpha follow with 0-2 records.
**MARCH BRAIN TEASERS**

1. 2250 cubic inches.
2. (a) Are you both the same type?
   (b) Does the right fork lead to Truefalseville?
   If both answers are alike, the right fork does lead to Truefalseville. Otherwise, the left fork is the correct path.
3. 5 miles.

**MAY BRAIN TEASERS**

1. The phonograph record, 3 inches.
2. Jack @ 10.45
   George @ 11:15
3. Yes, the line would be 32 ft. above the earth.
4. The form: By ordinary (x,y) coordinates draw a square with corners at (0,0) (4,0)
   (4,4) and (0,4), now draw the following line segments (0,2)
   to (2,2) to (2,4); (1,2) to (1,1)
   to (3,1) to (3,3) to (2,3);
   (2,0) to (2,1); (3,2) to (4,2)
5. The jellybeans: By taking at each turn 26 minus the number just taken by the proprie-
tor. Then after 22 turns by each, there is just one jelly-
bean left.

* * * *

“Congratulations, my boy. You will always look upon this as the happiest day of your life.”
“So I’m not getting married until tomorrow.”
“Yes, I know.”

* * * *

It may be tough on you keeping up with your neighbors, but think how hard it must be on them to
keep ahead.

* * * *

Three slightly deaf men were motoring from the north to London, when one asked, “Is this Wembly?”
“No,” replied the second, “this is Thursday.”
“So am I,” put in the third. “Let’s stop and have one.”

* * * *

“Whatcha lookin’ for?” the boy asked.
“How, my son. We’re looking for a drowned man.”
“Whatcha want one for?”

---

**Cleaners**

**STAR**

**Launderers**

11th and Lafayette

Phone L-6177

We Operate the Most Modern
Dry Cleaning Plant
In The City

---

**ADVERTISING INDEX**

1. A.T.&T. .................................. 19
2. Asphalt Inst. ............................ 20
3. Eastman-Kodak .......................... cover
4. Freitag-Weinhardt .......................... 31
5. Garrett Corp. ............................ 5
6. General Electric .......................... cover
7. General Motors .......................... 1
8. Heinl’s Flower Shop ....................... 21
9. Hornung & Hahn .......................... 31
10. Hunter, Gillum & Hunter ................. 21
11. Indianapolis Brikcrete ................. 30
12. Johnson Sunoco .......................... 30
13. Mace Service ............................ 26
15. One Hour Martinizing ..................... 21
16. Overfels ................................. 25
17. Parkmore ................................. 24
18. Pepsi-Cola ............................... 21
19. Pfeffer Dairy Queen ...................... 26
20. Rose Poly Book Store .................... 24
21. Rose Poly ................................. 6
22. Socony Mobil ............................ 27
23. Standard Oil .............................. 11
24. Star Cleaners ............................ 31
25. U. S. Steel ............................... cover
Freshman: “I dreamed about you last night, sugar.”
Sweetie: “Did you?”
Freshman: “No, you wouldn’t.”

Pilot to tower: “Plane out of gas; am one thousand feet and thirty miles over ocean. What shall I do?”
Tower to pilot: “Repeat after me—Our Father who art in heaven . . .”

And then there was the condemned golfer who asked the hangman, “Mind if I take a couple of practice swings?”

Critic: “It strikes me as being an impressive statue, yet isn’t that rather an odd posture for a general to assume?”
Sculptor: “It isn’t my fault, I had the job half done when the committee decided they couldn’t afford a horse for the general.”

The wolf wasn’t doing so well. After she’d downed her eighth drink he asked, “Don’t you ever feel your liquor, honey?” “Of course not,” she said, “Why should I get my fingers wet?”

“Answer the door.” . . . “Hello, door.”

You can’t fool all the people all the time . . . some of them are fooling you.

Two wealthy industrialists fell into an argument about whether the Russians were really our friends or not. The one who admitted that they were said, “Why, I’ll bet I could ride a Russian ship to Russia, tour the country, and nothing at all would happen to me.”

The other man called his bet and the sum was set at one million dollars. Two weeks later as the Russian ship left New York harbor, the ship’s captain called the American from his cabin. “We haff cable for you from New York, friend,” he snarled. “Read it.”

The American, puzzled at the captain’s belligerent manner, looked at the cable. It read: If you can’t get Khrushchev, try for Mikoyan.

A pink elephant is a beast of Bourbon.

Officer: “Are you interested in a commission?”
Recruit: “No, I’ll work on a straight salary.”

“To you keep stationery?” he inquired of the girl behind the counter.
“Oh, up to a point,” she giggled. “Then I just go all to pieces.”

Marriage is the real road to happiness . . . but there are a lot of good side trails.

Tourist Guide: “We are now passing the largest brewery in the United States.”
C.E. “Why?”

She: “Did you hear the horrid things they have been saying about me?”

Engineer: “Why do you think I came over?”

Two burly cannibals caught a beautiful young girl and brought her before their chief. He yawned while muttering, “I believe I’ll have breakfast in bed this morning.”

“My heart is in the ocean,” cried the poet.
“You’ve gone me one better,” said the seasick friend taking a firmer grip on the rail.

Said the cannibal to the witch doctor, “Something’s wrong with my kid, Doc. He won’t eat anybody.”

Didja hear about the strip-tease dancer who awoke with her clothes on and yelled, “Ye gads, I’ve been draped!”

When a girl finds that she isn’t the only pebble on the beach she generally becomes a little boulder.
How to look out a window before the building is up

A feature of The Comstock, San Francisco's new co-operative apartments on top of Nob Hill, will be the spectacular panoramic views of the Bay area from their picture windows.

How could these views be spread before prospective buyers—before the building was up? The developers, Albert-Lovett Co., found the answer in photography. From a gondola suspended from a crane, color photos were made from the positions of the future apartments. Now, the sales representative not only points out the location of a possible apartment on a scale model, but shows you the view from your window as well.

Photography rates high as a master salesman. It rates high in other business and industry tasks, too. The research laboratory, the production line, the quality control department and the office all get work done better and faster with photography on the job.

Whatever your field, you will find photography can save you time and cut costs, too.

EASTMAN KODAK COMPANY, Rochester 4, N. Y.

CAREERS WITH KODAK

With photography and photographic processes becoming increasingly important in the business and industry of tomorrow, there are new and challenging opportunities at Kodak in research, engineering, electronics, design and production.

If you are looking for such an interesting opportunity, write for information about careers with Kodak. Address: Business and Technical Personnel Dept., Eastman Kodak Company, Rochester 4, N. Y.
General Electric interviews
Dr. Richard Folsom, President of Rensselaer Polytechnic Institute,
to explore . . .

Teaching—
A Career Opportunity
For the Engineer

Leading educators, statesmen and industrialists throughout the country are greatly concerned with the current shortage of high-caliber graduates who are seriously considering a career in the field of science or engineering education. Consequently, General Electric has taken this opportunity to explore, with one of America’s eminent educators, the opportunities and rewards teaching offers the scientific or engineering student.

Q. Is there in fact a current and continuing need for educators in technical colleges and universities?
A. Colleges and universities providing scientific and engineering educational opportunities are hard pressed at the present moment to obtain the services of a sufficient number of well-qualified teachers to adequately carry out their programs. Projected statistical studies show that this critical need could extend over the next 15 or 20 years.

Q. Why is this need not being met?
A. There are probably three main reasons. These might be classed under conditions of financial return, prestige associated with the position, and lack of knowledge and understanding on the part of the college student of the advantages and rewards teaching as a career can afford.

Q. What steps have been taken to make education a more attractive field to engineering students?
A. Steps are being taken in all areas. For example, we have seen a great deal in the newspapers relating educators’ salaries to the importance of the job they are doing. Indications are that these efforts are beginning to bear fruit. Greater professional stature is being achieved as the general public understands that the youth of our nation is the most valuable natural resource that we possess . . . and that those associated with the education of this youth have one of the most important assignments in our country today.

Q. Aside from salary, what rewards can a career in education offer as opposed to careers in government or industry?
A. The principal rewards might be freedom to pursue your own ideas within the general framework of the school, in teaching, research and consulting activities. As colleges and universities are normally organized, a man has three months in the summer time to engage in activities of his own choice. In addition, the educator is in direct contact with students and he has the satisfaction of seeing these students develop under his direction . . . to see them take important positions in local and national affairs.

Q. What preparation should an engineering student undertake for a teaching career?
A. In college, the engineering student should obtain a basic understanding of science, engineering science, humanities, and social sciences with some applications in one or more professional engineering areas. He should have frequent career discussions with faculty members and his dean. During graduate work, a desirable activity, the student should have an opportunity to do some teaching.

Q. Must an engineering student obtain advanced degrees before he can teach?
A. It is not absolutely necessary. On the other hand, without advanced degrees, advancement in the academic world would be extremely difficult.

Q. How valuable do you feel industrial experience is to an engineering or scientific educator?
A. Industrial experience for a science educator is desirable; however, with a senior engineering educator, industrial experience is a “must”. An ideal engineering educator should have had enough industrial experience so that he understands the problems and responsibilities in carrying a project from its formative stages to successful completion, including not only the technical aspects, but the economic and personal relationships also.

Q. What do you consider to be the optimum method by which an educator can obtain industrial experience?
A. There are many methods. After completion of graduate school, perhaps the most beneficial is a limited but intensive work period in industry. Consulting during an academic year or summer is a helpful activity and is desirable for older members of the staff. Younger educators usually need experience in “living with the job” rather than providing consultant’s advice to the responsible individual.

Q. Based on your experience, what personal characteristics are possessed by successful professors?
A. Primarily, successful professors have an excellent and growing knowledge of their subjects, are interested in people, and transmit enthusiasm. They have an ability to explain and impart information with ease. They generate ideas and carry them out because they are devoted to developing their fields of knowledge. They desire personal freedom and action.

For further information on challenging career opportunities in the field of science and engineering education, write to: Mr. W. Leighton Collins, Secretary, American Society for Engineering Education, University of Illinois, Urbana, Ill.