Did you ever hear atoms move?

The physicist positions a single crystal of age-hardened steel under the sharp diamond penetrator. He touches a pedal, and the pyramidal tip of the diamond squeezes into the polished surface of the steel.

The instant that it touches, things begin to happen inside the crystal. Atoms begin to slip and slide, in layers. Some layers abruptly wrinkle and corrugate. If you listen hard when this happens, you hear a faint, sharp "click." This is the sound of atoms suddenly shifting within the crystal.

You can see the action, too — or, rather, the results of it. The photomicrograph above shows the characteristic ridges and ripples. The black diamond in the center is the depression made by the penetrator.

By studying these patterns, and correlating the information with other data, scientists at U. S. Steel are trying to learn what happens atomically when a steel is bent, flexed or broken. Secrets thus learned are helping us to develop new and better steels not only for everyday products, but also for missiles, rockets, submarines, and other intricate machines to explore the universe above and the world below us.

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The Enrico Fermi Atomic Power Plant under construction near Monroe, Michigan, will have the world's largest breeder reactor for the production of electric power.

To the young engineers of America's electric power systems, the hope and promise of the peaceful atom grows clearer day by day. In laboratories and on construction projects these young men are serving our nation's new atomic-electric power industry.

Research and design, development and testing of new equipment, building of special structures and operation of reactor plants—for the more efficient production of electric power—offer opportunities for doing things that have never been done before.

A Detroit Edison representative will visit your campus in the near future to tell you of the job opportunities in the electric power industry. Check your placement office for appointments.

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No matter where your interests lie in the vast field of engineering, there's a better-than-good chance you'll find your place in the sun with one of the 35 Divisions of General Motors.

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You owe it to yourself to investigate the kind of future General Motors is offering young engineers. Make an appointment with the GM Representative next time he visits your campus or write: General Motors Corporation, Personnel Staff, Detroit 2, Michigan.
NOVEMBER, 1958

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Cover

"Welding rods and a spud wrench, a bright colored safety helmet, blueprints, and a pair of sturdy cowhide gloves, all atop a structural foundation, these are the elements chosen by Stanley Meltzoff to symbolize the growth and expansion so evident on every American industrial front. Reproduced through the courtesy of United Engineers & Constructors Inc. of Philadelphia, Chicago and New York."

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Technic Article Contest

$10.00 for the Best Technical Article Each Semester of the 1958-59 School Year.

RULES

1. All students eligible.
2. Articles must be of technical nature.
3. All articles should be approximately 1500 words.
4. Judges will be selected from the Humanities Department.
5. A student may submit only two articles each semester for judging.

Interested students should contact the Editor.

INQUIRE NOW — WIN $10.00 CASH!
THE MAN* WITH KOPPERS

"...versatility recognized"

*Arthur Herman graduated from Johns Hopkins in 1955 and went to work immediately in the Metal Products Division of Koppers as a Design Engineer.

In December of the same year, he was promoted to Supervising Engineer of the Design Section, where he found that Koppers offers truly challenging problems in design engineering.

Then, in September 1957, Art was transferred to the Coupling Sales Department as a Coupling Application Engineer. He is serving in that capacity now.

An employment record alone is seldom descriptive of the opportunities and responsibilities many positions represent. For instance, Art was recently designated as Division Representative to investigate the potentialities of a new product developed by a European manufacturer. This assignment took him abroad.

Art is particularly articulate about his job and the constant challenge it presents for him as an individual.

"When I first started as a design engineer," he said, "I didn’t realize the scope of activities in which I’d be called on to participate. Sure, I had good theory and background for design engineering, but I had little concept of the problems of production, and even less familiarity with the techniques of sales or marketing. My work as an application engineer gets me into almost every phase of the business — development, production, marketing, finance, and so forth.

"At Koppers I feel that I receive the necessary guidance to enable me to contribute fully to the Company’s activities. I am encouraged to make decisions. If these decisions involve factors with which I am not entirely familiar, I can rely on the judgment and experience of others working with me. At all times, I feel that I have real access to upper levels of management where my ideas have always been received thoughtfully and given full consideration. Now, I feel confident that I am doing a job for Koppers, and, what is equally important, that my associates and supervisors understand and appreciate it, too! I have found that through such methods as the Management Appraisal Program, Koppers makes every effort to recognize and reward good performance."

A lot of things could be said about Art Herman, and the career he found at Koppers. But as the manager to whom Art reports commented recently: "Art's an able man... we’re glad to have him. He is making a real contribution to the Company. All we in management can do is try our best to develop a man's best qualities and, when he proves to have the versatility that Art has, to see that this versatility is recognized."

If you feel that this is the atmosphere in which you would most like to build your profession and mark your progress, write to the Manager of Manpower Planning, Koppers Company, Inc., Pittsburgh 19, Pennsylvania or contact your College Placement Director.
WHAT CAN A FISH BOWL TELL? The tiny plants and animals that grow in this "fish bowl" will be similar to those that grew in oceans fifty million years ago and more. The aim of this experiment is to add to man’s knowledge of where to look, for oil deposits. Pictured is Dr. F. G. Stehli.

Time turned back 50 million years; Scientists seek new clues to oil!

Tiny marine plants and animals, very like those living when dinosaurs roamed the earth, are being grown today in a research laboratory.

In glass containers similar to fish bowls, scientists of Pan American Petroleum Corporation, a Standard Oil affiliate, have transplanted sand and sea water from an ocean shore line. Then, by controlling temperature, pressure and salt content, they have simulated the environment of plants and animals that grew 50 to 300 million years ago.

The chemical composition of the microscopic life that grows in the laboratory will offer more positive clues to the type of environment of ancient fossils; that is, whether the tiny animals lived and died in deep, shallow, or protected water.

This knowledge will help scientists to map ancient seas with greater accuracy, to pinpoint the location of prehistoric shore lines and barrier reefs where conditions were ideal for oil to form. Such knowledge will improve our ability to find oil in sufficient quantities to meet today’s steadily increasing needs.

This is another example of the way research works at Standard and its affiliates to discover quicker, surer methods of finding oil, to keep the supply up and the price down.

As the result of such trail-blazing research work as the fish bowl project, America’s proved underground reserves have grown larger, prices have remained reasonable, and America has been assured of an adequate supply to keep its defenses strong.

What makes a company a good citizen? One measure is a company’s concern for the welfare of future generations. In our business, a “let-tomorrow-take-care-of-itself” attitude would be disastrous. Through research, we at Standard are working to make life more comfortable and secure for all—today and for the future.
This electronic centralized air data computing system, pioneered by AiResearch engineers, now enables aircraft to operate at maximum efficiency continuously. By sensing air conditions surrounding the airplane, it automatically makes in-flight adjustments and feeds vital information to the pilot. This centralized combination of transducers, computers and indicators is the most complete air data computing system ever produced by any manufacturer.

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

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

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November, 1958
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
Many of today’s graduating engineering students have the misconception that they are qualified engineers by virtue of their degree alone. While it is true that a few individuals have the unique ability to adjust rapidly to new conditions, unfortunately, most people require considerable time before becoming a financial asset to a company.

One would readily agree that Rose offers a very fine engineering education. However, many things cannot be taught here, or at any other college for that matter, because they are learned only through experience. Actual, on-the-job training gives the young engineer a practical correlation between his class work and the problems of industry. The faster the engineer learns to apply his knowledge and analytical thinking to his problems, the greater his value as an engineer.

Summer employment provides an excellent opportunity for the engineering student to gain valuable experience in industry. Many companies realize the advantages of such a program and a wide choice of summer jobs is available to the undergraduate. Although many of the job openings may not be near the student’s home, the value of experience must be carefully weighed against the difference in cost of living.

Interview time is available for undergraduates with many company representatives visiting the Campus this next school year. In many instances, only sufficient interest need be shown to insure employment on such a basis. The College Placement Manual 1959 lists numerous openings for summer employees. The Placement Office is open to all students and information is readily available upon request.

Remember, “Promotion is not based on what you know, or who you know, but is based on what you do with what you know.” That summer job would be an excellent chance to start “doing” in the field of engineering that you choose.

D.G.M.
At the turn of this century very little was known about the true nature of x-ray radiation and the detailed internal structure of crystals. Although these may appear to be widely different fields, the x-ray has become one of the most important tools in the study of crystals. The electromagnetic wave nature of x-rays was firmly established in 1912 by Friedrich, Knipping, and von Laue, who observed the diffraction of x-rays by crystals. Within a year following the publication of this work, Sir William Bragg at University College in London demonstrated the use of x-rays as a method of studying the detailed structure of crystals. Bragg's work then became the basis for all further study in x-ray crystallography. Since that time many experiments have been performed in this field which have greatly increased the knowledge of crystal structure.

Since Europe was engaged in a war at this time, information concerning Bragg's work was very slow in reaching this country. When Dr. Bragg visited this country in 1915, he inspired Dr. A. W., Hull of the General Electric company to begin work in this field. Dr. Hull set out to determine the crystal structure of iron, which Bragg had been unable to determine. Since a single crystal of iron could not be isolated, Hull developed the technique of using a powdered sample in the hope that the data collected could be sorted and referred to a single crystal. This technique was also perfected in Germany at about the same time and is known as the Debye and Scherrer method, in honor of the two Germans since their findings were published first.

Besides the work of Hull, much of the early x-ray research done in the United States was carried out by Dr. C. L. Burdick. Dr. Burdick had worked with Bragg in England, and was responsible for refining the experimental equipment and techniques considerably. Working at Cal Tech, Burdick and James H. Ellis conducted considerable research which greatly increased the knowledge of crystal structure.

Now that we have seen some of the background for the work in this field, let us take a closer look at the physics involved. X-rays were known for quite a while before scientists were able to determine their exact nature.

The well known penetrating ability of x-rays was actually a drawback in the analysis of their nature. Since the index of refraction of x-rays is nearly unity in all materials, they cannot be refracted by a prism in order to determine their wavelength. Since x-rays are electromagnetic waves similar to visible light, ruled diffraction gratings
CRYSTALLOGRAPHY

By Larry Logue, sr., m.e.

could be used to determine their wavelengths just as they are for light. However, to be useful, a diffraction grating must have grating spaces of the same order of magnitude as the wavelength of the wave being diffracted. The wavelengths of x-rays range from 0.1 Angstroms to 1.0 Angstroms and the smallest ruled gratings have spacings on the order of 10,000 Angstroms. However, solid crystals have spacings between atoms on the order of 1 Angstrom, making them ideal as diffraction gratings for x-ray radiation.

To better understand the way in which crystals serve as diffraction gratings for x-rays, we will now refer to Fig.1. The dots in this figure represent atoms arranged in a crystal. The fact that the angle of incidence equals the angle of reflection can be proven by the same reasoning that applies to the reflection of light. (Huygen's principle) Due to the penetrating power of x-rays, the reflection will not be entirely from one plane of atoms, but will be a series of partial reflections from several planes. If these partial reflections add in phase, a strong reflection will result. In order for the reflections to add in phase, the path A'B'C' must be longer than ABC by an integral number of wavelengths. Expressed in terms of the figure this becomes

\[ n = 2d \sin \theta \]

where \( n \) is an integer, normally unity. This is called "Bragg's law" of x-ray diffraction and the reflection obtained when this equation is satisfied is called "Bragg reflection".

If the equation is not satisfied, destructive interference will result, thus for a certain value of \( \lambda \) and \( \theta \), only one \( d \) will allow reflection, so that the \( \lambda \) and \( \theta \) which allow reflection determine the spacing between atoms in a crystal. Fig 2 shows the set up of the apparatus used in experiments of this type. Fig. 3 shows how x-ray diffraction can be used to determine the distance between various planes of atoms in a crystal structure. If x-rays of the same wavelength are used, will be larger for smaller values of \( d \) and the reflection from the principle planes (planes having the greatest density of atoms) will be the strongest.

The method of x-ray crystallography using powdered solids is shown in Fig. 4. In this case, since the crystals are placed randomly, some of the crystals will be placed so that Bragg's law is satisfied for all the possible planes in the crystal and lines will appear on the film corresponding to all values of \( d \). This method is often used to analyse mixtures of crystals. The "picture" produced by the mixture is compared to those pure materials until a group of pure materials is found which will give \( d \) values like those of the mixture.
Lockheed's 450 m.p.h. Electra—first U.S. four-engine, prop-jet airliner—will be introduced to the American traveling public in December, shortly after one of the new transports completes a two month, 19 nation tour of Europe, Asia, and the Middle East.

The Electra will make its route service debut on the east coast bearing the colors of Eastern Air Lines, now taking delivery on first units of a 40-plane fleet order.

Described by Lockheed as a transport for both short and long routes, the new prop-jet is capable of operating from a new high total of 1300 world airports. The Electra is nearing a peak production rate of 10 1/2 planes a month to meet its backlog of 161 airplanes for 15 different airlines over the world.

A low-wing, four-engine commercial passenger transport, the prop-jet Lockheed Electra was designed to fit a specific air transport mission, to fill a particular requirement of major importance to airlines. This design approach was in sharp contrast to the theory behind design of earlier air transports. With this aircraft, airline needs were surveyed and analyzed BEFORE the airplane was created—and it was therefore possible, starting from scratch, to match the Electra's characteristics to the job to be performed.

This job was to design a plane to bring to hop, skip and bro-o-a-a-a-d jump service the smooth, fast ride that turbine power guarantees.

Lockheed opened America's commercial jet era by hanging a propeller on the jet engine—by choice.

The decision to use propellers on a jet engine stemmed from design studies which began as far back as 1947. Research left the company convinced that, while propeller-less jets are excellent on long-range flights, air lines would be served little or no profit—short and medium routes.

Lockheed chose the prop-jet power plant because all logical consideration proved that only power of the jet geared to efficiency of the propeller provides the right combination of performance and economy for the Electra's specific mission.

These, then, were principal Electra design goals:

1. An airplane large enough to carry up to 99 passengers, yet able to show profits at 50 per cent payloads.
2. An airplane smaller than current four-engine transports, but faster, much quieter, and more economical to purchase, operate, and maintain.
3. An airplane capable of taking off fully loaded with fuel and passengers and making multiple-stop flights most of the way across the United States without pause for refueling.
4. An airplane with new concepts of comfort for passengers and crew; superior handling characteristics; excellent controllability and power response; and 24-hour-a-day, day-in-and-day-out reliability.

OPERATING CYCLE: Air is drawn in through an air inlet housing (1) and is directed to a 14 stage axial flow compressor (2). The compressed air flows through a diffuser (3) to six combustion liners (4) where it is mixed with fuel and ignited. The maximum amount of energy is extracted from the hot gas to drive the turbine (5). The power absorbed by the turbine is transmitted by a shaft forward to drive the compressor and also to the reduction gear (6) to drive the propeller.
Jet Airliners

By Robert Stark, soph., m.e.


But even all this was not enough. Lockheed engineers in Burbank . . . General Motors scientists at the Allison Division in Indianapolis . . . component manufacturers across the country . . . all created their own flight environments to pre-test the Electra, its prop-jet engines and its parts.

They acted as if they were deliberately trying to destroy engines and airplanes. They measured, fitted, laid out, and modified airplane components that the passenger may never realize are present and working for him as he speeds effortlessly, quietly, almost without vibration as much as one-third faster than he has ever flown before on inter-city schedules.

Strong beyond any operational requirement, the Electra’s “fail-safe” fuselage withstood 36 intentional ruptures while under full pressurization.

The idea behind these test was that Lockheed engineers wanted to prove the airplane’s “more than enough” structural integrity. (From the outset, the designers planned that the airplane would have reserve strength so that, should a major structural component fail, damage would remain localized and the airplane retain ability to carry its load to a landing.)

Here’s the way they proved the airplane’s structural integrity: (1) They built a complete, full-sized fuselage and set it in an open area for testing; (2) they raised fuselage pressure to 14.2 pounds per square inch — or 1 ton to every square foot; (3) then, using a remotely controlled axe, they cut and slashed away at the fuselage section to determine whether damage, once incurred, would spread.

They punctured window frames, windshield post, skins and frames, door corners, and the forged main frame for wing-to-fuselage attachment.

Engineers worked out means of simulating extremely turbulent air. Again they moved the robot axe into position. They applied the bending forces suffered in turbulent airs to the fuselage section during and after making the axe cuts. The airplane withstood the punishment. Climaxing the test was a 6-foot-long rupture made in the fuselage. As in all other phases of the test program, damage was localized.

The researchers reported that in every case the Electra remained — though damaged — a reliable, flyable airplane.

As a result of this nation-wide program, whose progress was charted daily on wall-sized graphs of master schedules in Lockheed’s “Chapel Room,” the Electra became the most thoroughly tested airliner in company history — before the first of the series ever took to the skies.

Let us now discuss the power plan and propellers. What does prop-jet power mean?

Prop-jet power — the turbine en-

(Continued on Page 31)
INTRODUCTION

After the first ten weeks organizing, life at Rose has settled down to the old grind. Tests are now being given with deadly regularity, after the first ten weeks of comparative ease. Freshmen pranks are being done commando-style, with seemingly innocent greencaps during the day making nightly painting attacks. They seem to be an industrious group, however, and with the aid of much mechanized equipment, have completed bonfire construction in record time.

Several sophomores, all set to take the "easy year" in stride, received a sudden shock from the first physics tests. Could this be the reason they have been rather lax in disciplining freshmen?

The juniors, getting into the first of their engineering courses are finding that there just aren’t enough hours in the day to prepare for six courses and still have time to goof-off. On the home stretch now, are the seniors, who have become as accustomed to Rose as anyone can. It looks like another long, cold, winter of study for everyone, regardless of class. Anyone interested in an extra-large snow scoop?

HONORS CONVOCATION

The annual Fall Honors Convocation was held on October 2. Larry Grimes, president of Blue Key, welcomed parents, faculty, and students.

Dean Herman A. Moench presented class honors for the 1957-1958 school year. He pointed out that there is a definite correspondence between the good student and the successful man.

Professor F. A. Guthrie presented a "Handbook of Chemistry and Physics" to Ray Clard as the best freshman student of Chemistry. The award to the top senior chemical engineering student went to Jim Barrick.

Professor T. P. Palmer presented a copy of "Standard Mathematical Tables" to John Ray, top freshmen mathematics student.

The bronze medal, which goes to the freshman with the highest cumulative average for the freshman year, was presented by Professor I. P. Hooper. Due to a tie last year, two medals were presented, one to Ray Clark and one to Jim Funk.

Gary Anderson, President of the I-F Council, presented the I-F Scholastic trophy to the fraternity with the highest cumulative average for the preceding semester.

The President of the Student Council, Ken Hollingsworth, awarded Rose Honor Keys to the following men: Bill Bock, Bill Carter, Dave Fassburg, Ron Ireland, Bob Jackson, Bill Johnson, John Ray, Louis Roehm, Lowell Shepler, Ron Staggs, and Jan Sonner.

Bob Hall presented the Tau Beta Pi award to the freshman who improved his grades the most from the first to the second semester. This year's award went to Gerald Nika.

Tau Beta Pi tapping ceremonies were held next. To be eligible, a student must be in the upper one-fifth of his senior class or the upper one-eighth of his junior class. Those tapped were Charles Hamilton, Ken Hollingsworth, Flavian Reising, Bill Perkins, Gary Phipps, and Bob Schukai.

Those tapped for the Blue Key Fraternity were Bob Schckai, Gary Anderson, Elwood Stroupe, Ted (Continued on Page 26)
Engineers' Union?

By Ray Clark, soph., chem.

Engineering unions were first established after World War II. During this crisis many engineers were lured into war production plants. Since these men often had common problems they began to meet together to discuss them. It was in these large groups of engineers working at the same job that unions were organized. Since 1952 these independent unions have united as the E.S.A. (Engineers and Scientists of America).

This organization has many purposes which include; (1) Introducing laws into state and national legislatures in behalf of engineers and scientists, (2) Promoting the cause of unionism, (3) Trying to raise the salary of these professional men to a level commensurate with their contribution to society, (4) Trying to restore the value of experience and proficiency in establishing a future in engineering, (5) Presenting an incentive to develop capabilities to their fullest, and (6) Improving working conditions thus making more creative work possible. The unions realize that salaries paid to newly graduated engineers are increasing, but the wages of the experienced men are not increasing in the same ratio. In 1939 an engineer with ten to fifteen years experience received up to three times the pay of a beginning man while now he receives less than twice that amount. The unions feel that they are best prepared to correct harmful situations and improve the situation of the engineer. There are various reasons given why they can do this.

First of all, unions are protected by statutes so they have a more powerful voice than individuals. Collective bargaining permits more effective communication between industrial leaders and engineers. Unions enable grievances to be adjusted and abuses eliminated and are better able than the individual to obtain information concerning grievances. Collective bargaining prevents management from abusing more qualified or experienced engineers by stopping irregular behavior and the granting of special favors to friends. All in all, the case for unions boils down to the fact that as corporations grow, the importance of the individual engineer and his ability to communicate with his superiors lessens. The engineers must band together if they are not to slip to the strata of the common salaried workers.

The argument against engineering unions begins with the definition of a union. "A union is an organization consisting of that part of a labor force which has the same ideas and interests at heart. It is and must be a completely homogeneous group. Its purpose is to bring before management for consideration the problems of a particular segment of the labor force." "According to this definition, a union is part of the labor force, but engineers should be and always have been considered a part of management. The responsibilities of an engineer certainly moves him above the labor force. A.M. Sargent says in Professional Registration Laws and the Engineer, "any group including such members (engineers) should not hope to obtain recognition as a collective bargaining agency." Furthermore, the word "homogeneous" far from describes a group of engineers. A bricklayers organization could be called homogeneous since all of these men have similar duties and responsibilities. A group of engineers, which contained both research and sales engineers, would have far different duties and responsibilities. Perhaps the greatest hindrance to engineering unions is the lack of a common denominator to compare engineers. Wage scales could not be based merely on experience and education since many of the factors which make a good engineer are innate and cannot be listed on paper.

Another argument against these unions is their restraint in using a union's most valuable tool. In their constitution and by-laws they have declared themselves against strikes and have eliminated their means of accomplishing the tasks which they propose to do. This leaves them only with the power of collective bargaining agencies. An engineer, a professional man with college training, should be able to arrive at an agreement with his employer without the aid of a collective bargaining agency.

(Continued on Page 36)
Since high fidelity has been on the tip of everyone's tongue (approximately six years), there has been constant research to develop a perfect tweeter for the hi-fi bug. First, an explanation of the audio frequency range is necessary to understand the function of a tweeter in a speaker system. An elaboration on the part played by an electrostatic tweeter in spanning this range will follow.

The audible audio frequency range is from approximately 20 cycles per second to 20,000 cycles per second being divided into three ranges: low frequency range from 20 to 500, medium range from 500 to 12,000, and high range from 12,000 to 20,000 cycles per second. The audible frequency range is also divided into about ten octaves. Each octave is a musical interval that sounds like the same change in pitch to the ear and represents a change in frequency of one to two. Example: assume 20 cycles per second as the lowest octave, then 20 times 2 is 40 cycles per second and 20 to 40 cycles per second is the lowest octave. Now 40 times 2 is 80 cycles per second on the upper limit of the second octave. 80 times 2 is 160 cycles per second and so on up the scale. The tenth octave brings us to a little over 20,000 cycles per second with each step representing the same "amount" frequency range as far as the ear is concerned.

Assuming an electrostatic tweeter will perform as stated by the manufacturer, it will give a flat response from 5,000 to 20,000 cycles per second, or one-third of the frequency range. The speaker in covering this one-third is actually, as far as the ear can tell, covering only one-fifth of the useful frequency range. A hi-fi system having a frequency response of 50 to 10,000 cycles per second (or eight octaves) does not sound appreciable inferior to the ten octave response. In the eight octave system the electrostatic tweeter would cover only one-eighth of the useful frequency response. Though the electrostatic tweeter adds only the last or at most the last two octaves, this band is very important in giving a sense of realism or presence to the program material.

There may arise a misconception that an electrostatic tweeter would give added color to the material when compared to another type of tweeter. This is not so in that the electrostatic tweeter will not let you hear any more than what you heard before, but will only make it clearer and sharper.

With some tweeters certain of the higher frequencies have been deliberately accentuated to add color to the program material not giving a true reproduction. The coloration will make some listeners think that the part played by a tweeter is to add more hiss and noise. This is an advantage of the electrostatic tweeter in that it normally gives a smoother frequency response over the last two octaves.

Another important fact to look for in the performance of a tweeter is how well the speaker distributes the frequencies, either directional or non-directional. There is a happy medium between the two points where a good sound pattern will be found for the particular room in which the speaker is used. The distribution of sound should be in the same manner as the speaker used immediately below it in the frequency range. Since the electrostatic tweeter may be manufactured either curved (non-directional construction) or flat (directional construction), it is easier to match to the distribution of the lower frequency speaker.

Just how does the electrostatic tweeter compare with other tweeters? There are three basic types of tweeters, the direct cone radiator, the compression driver, and the electrostatic tweeter. There are two factors used to compare the three speakers: smoothness of frequency response and the directional pattern of radiation. In only the electrostatic tweeter the whole diaphragm is driven with most of the surface radiating the sound, giving a smoother response. The direct cone radiator is really a miniature loudspeaker and may suffer from non-uniformity of cone movement, giving non-uniformity in frequency response and direction characteristics. This is unlike the distribution of most musical instruments. In the compression driver the horn is loaded giving a good uniform response comparable to the electrostatic tweeter. Also the compression driver produces a different radiation pattern by the different shapes of the horn. This also
Sound

By Robert Jackson, sr., e.e.

compares to the different constructions of the electrostatic tweeter. From the above paragraph the compression driver is the only tweeter manufactured to compare with the electrostatic tweeter. Most electrostatic tweeters are less expensive than the compression drivers making another factor to consider in a hi-fi system.

The question has been asked as to whether a full range electrostatic speaker may be built. To understand this is to consider the construction of a present tweeter. Referring to the figure: the space between the fixed plates and the diaphragm is kept at a very high polarization with the audio signal superimposed on the polarizing charge. Also the plates and the diaphragm must be spaced sufficiently close together to give enough acoustical drive to produce the sound. Since air is used as a dielectric between the plates, this places a limit on the polarizing charge. Because of these design problems, the acoustical drive (giving rise to the air movements) requires the area of the speaker to be a little larger than the lowest frequency or the longest wave length. A speaker to radiate a 1,000 cycle frequency, would require an area of slightly greater than one square foot. A 500 cycle frequency would require an area much greater than four square feet or two feet on a side. This fact seems to eliminate a full range electrostatic speaker.

A full range electrostatic speaker not being practical, there must be some type of a cross-over network.

In using the direct cone radiator and the compression driver the load as seen by the amplifier is inductive. In a cross-over network for these speakers an inductor (to filter the highs) and a capacitor (to allow the highs to pass or retard the lows) are used. In using an electrostatic tweeter, (from the figure) it is seen that the tweeter acts as a large capacitor as seen from the amplifier. Since the impedance is inversely proportional to the frequency, it may have a reactance of 20,000 ohms at 5,000 cycles, 10,000 ohms at 10,000 at 20,000 cycles per second. From this it may be seen that as a frequency rises the impedance drops and the speaker will not usually accept any energy below 5,000 cycles per second. In using an “inductive” low-frequency speaker with an electrostatic tweeter you have a built-in cross-over network.

The purpose of this article is to give some advantages of the electrostatic tweeter over the conventional direct cone radiator and the compression driver. There still is and always will be the personal taste of each listener. Therefore I recommend before buying any piece of hi-fi equipment that a trial period be set with the retailer. This should not be too difficult.

November, 1958
The fighting Engineers are having their best season since the days of Eddie McGovern. Phil Brown's boys have won 11 straight over two seasons and barring injuries have a fine chance to go undefeated this year. The Rose offense has rolled up 167 points in four games while a rugged defense has held the opponents to 12 points.

The red and white opened their season on September 27 with St. Procopius at Lisle, Illinois. Captain "Rocky" Herakovich scored 3 TD's and 2 extra points to pace the Engineers to an easy 42-0 win. Bob Michael passed to Bart Gronberg and "Rocky" for 2 scores while also scoring 10 points himself. A pass from Bob Checkley to Harry Booher rounded out the scoring. Gary Anderson and Dick Tucker headed a tough Rose defense which did not allow the Cardinals any first downs.

The following week R. P. I. again traveled to the Chicago area, but this time it was to face a very rugged North Park college squad. The first period was a standoff with each team unable to move the ball very well. In the 2nd quarter with freshman Dave Lindky directing the attack, Rose ground out 6 points with Michael driving for the final eight yards. Herakovich kicked the p.a.t. and the scoreboard showed 7-0 at halftime. Herakovich received the second half kickoff on the 18 yard line and behind fine blocking raced 82 yards to give Rose a 13-0 lead.

Early in the fourth period a penalty set R.P.I. on their own 4 yard line and when they attempted to punt out, North Park returned the kick for 44 yards to score; the Viking's try for the extra point failed. Late in the game the Rose offense again shifted into high gear and drove to the 4 yard line where Herakovich scored off tackle; he then added the final two points with an end run. The Rose defense held the Vikings to 94 yards rushing and offense gained 240 yards net rushing.

The Engineers returned home October 11 to play a weak Eureka ball club. Although Phil Brown cleared the bench both halves, the final score was 78-6. The first period Rose stacked up 30 points which set the pace for the rest of the game. "Rocky" accounted for 40 points by scoring on passes from Lindzy and McWilliams, three fine runs, and 10 extra points. Michael scored twice from 5 yards out with Anderson, Wyrick, and Booher adding one each. The remaining points were scored on a safety and 6 p.a.t.'s. The Rose defense, lead by "Tubby" Scott and Mike "Killer" Munro, held the Red Devils to a total of 78 yards.

The team helped celebrate Rose's 75th anniversary by winning 26-0 over Concordia. The first half almost proved fatal to Rose as the team was unable to get started. Herakovich scored the half's only touchdown on a 4 yard plunge. Phil Brown fired up his boys at the half.

(Continued on Page 38)
'14 Mr. Wilbur M. O'Laughlin passed away during the month of August in Pensacola, Florida. He was sixty-eight years old and had been in poor health for some time.

He moved to Florida from Terre Haute several years ago. Here in Terre Haute Mr. O'Laughlin became a prominent business man, after graduating from Rose with a BSEE.

Requiem mass was said the Saturday after his death and he was buried there.

Mr. O'Laughlin is survived by his widow, Mrs. Opal O'Laughlin, a daughter, and three sisters.

'20 Mr. Whitcomb W. Moore has recently been promoted to the position of District Representative of American Telephone and Telegraph. Mr. Moore received his B.S.E.E. here at Rose and is currently residing at 713 Newton Road, Villanova, Pennsylvania.

'23 Mr. Fred B. Tetzel has recently been elected Vice President in Charge of Sales, Public Relations and Advertising of the Louisville Gas and Electric Company.

Tetzel, who is now sixty-one, joined the company in 1926 as an engineer in the construction department. He then became plant engineer at one of the plant’s generating stations. Next on his climb to his present position he was promoted to assistant superintendent of steam production, and just previous to his present job he was superintendent of steam production.

Tetzel, a native of Terre Haute, is a member of the City-County Air Pollution Control Commission. Here at Rose he received a BSEE degree.

'29 Mr. Abe Silverstein has been appointed one of the top officials in the newly formed National Aeronautics and Space Administration. He is one of three men appointed to posts of equal authority in the newly formed organization. In his new job he will be director of the NASA space flight development program.

Mr. Silverstein was previously director of Lewis Flight Propulsion Laboratory of the National Advancedment Committee for Aeronautics at Cleveland, Ohio.

'49 Mr. Carl W. Cowing has been appointed manager of the Air Force Advanced Development Sales in General Electrec’s Heavy Military Electronics Department in Syracuse, N. Y. This new sales organization has been formed to keep Air Force customers abreast of the wide variety of military electronic research in which General Electric is engaged.

For the past three years Mr. Cowing has been associated with the missile defense equipment and with related long range military electronic systems being produced by general electric.

During World War II, Cowing worked with Naval Electronics. He took special electronic studies at Texas A & M previous to receiving his BSEE here at Rose. He has also done graduate work at the University of Virginia and Butler University.

'50 Mr. William Alsman has been appointed Senior Maintenance Engineer in the Manufacturing Division of Mead Johnson & Company, nutritional and pharmaceutical manufacturers.

After receiving his BSME here at Rose, he became a sales engineer for Gulf Oil Corporation. Prior to joining Mead Johnson, he was maintenance foreman at Southern Indiana Gas & Electric Company.

'57 Mr. John Bizal, who received his B.S. Ch.E. here at Rose, has completed Ranger’s school. He is from Paris, Ill.

'57 Mr. John Cordill is now working for Allison Company, after finishing six months active duty in the Corps of Engineers.

'58 Mr. Max H. Hippensteel has won a Hughes Master of Science Fellowship Award enabling him to continue his education while working part time for Hughes Aircraft Company.

Hippensteel is now attending the University of Southern California. He is doing graduate study leading to a master’s degree. Although he will work only part time during the school year he will be employed full time by Hughes during the summer months.

(Continued on Page 36)
Lambda Chi Alpha

Well, I see most everyone survived the Homecoming festivities with a minimum of injury. It was quite a busy time for all, and a most enjoyable one for Lambda Chi Alpha, which garnered the biggest trophy of them all, the Homecoming display trophy. Theta Kappa's display of "75 Years of Fighting Engineers", erected under the chieftainship of Larry Logue with the help of many Indians and some lovely girls from Indiana State, featured some ingenious inventions such as a double-barreled cannon, (not side-by-side but one inside the other).

Captain Carl Herakovich of the football team is starting out this season with a bang. "Rocky" has scored 93 points in the four games so far to put him up among the national scoring leaders. Other Lambda Chi's on the team besides Herakovich are Bart Gronberg, Bob Michael, Bob Checkley, and Dick Pike.

Congratulations to Gary Phipps, junior electrical, who was tapped for Tau Beta Pi at the recent Honors assembly. Lambda Chi Alpha retained possession of the I-F scholarship trophy with a fraternity average of 2.65. There were also many Lambda Chis on the Honors List.

Congratulations also to Don Dekker, who pledged recently. Glad to have you, Don.

Well, 'tis all for now.

Jim Barrick

Sigma Nu

I thought that the first issue this year would put all the pinnings out of the way for a while, but not so I guess. Brother Rich Carter craftily tried to let the fact go by unnoticed that three weeks ago, he pinned Miss Nancy Louis, of Speedway, Indiana. You just can't keep a secret for long, can you Rich?

Since the big Homecoming weekend is over, I won't dwell too long on the subject, but I would like to put in a good word for our Alumni. They sure came through for us this time. Besides the very nice contribution to the fraternity over the weekend, and the fine time we had, we now are the proud owners of a brand new refrigerator and kitchen range. I'll say one thing-when the Alumni decide to do something, it sure gets done in a hurry. "Mom" is tickled pink, and the kitchen sure looks a lot better.

A hardy "congrats" should be given to our Commander, Brother Anderson, as he recently was tapped for Blue Key. This is one more thing to add to our line of Scholastic achievements. (Such as they may be). We will see if we can't add a slug more "tapps" at this same time next year.

We have quite a calendar of social events coming up in the near future, but I'll only mention a few of the closest. November 7, we are having (by the time you read this it will be "had") a date party. This should be quite an affair as everyone is dressing up for Halloween, but no one stipulated just what kind of dress. We will probably have everything from Tux's to barrels for the attire that night. Also, we have a mixer scheduled with St. Mary's, the following Friday. And, of course, there will be numerous small "get togethers" downstairs which seem to spontaneously occur with reasonable regularity. (These I like also). In addition to these, there are a couple of sororities lined up for parties, which are a few weeks off.

Then there is, for us, another big weekend coming up for which we are already making plans. "State Day"!! That big day when all we serpents in Indiana get together for a weekend of sports, conversation, dancing and ??? Ah, that ??? is what makes the world go 'round.

I guess this is all I've got to say for this month, so I'll quit with this word of advice (take note Brother Tom). Always remember, that a diamond is a women's idea of a stepping stone to success!

Fred Ryker

Theta Xi

Homecoming is just around the corner and Theta Xi is busily preparing for the coming festivities. The TX men have been working hard on the homecoming display and truthfully we can't see how it can miss. We are all hoping the house will be a definite stopping place for all the old Theta Xi's. The gala party (Continued on Page 34)
ELECTRONIC SLIDE-RULE

The Solartron “Minispace” is a small analogue computer designed to meet the needs of Electrical, Mechanical and Civil Engineers and Physicists in Research and Development Laboratories and Educational Establishments.

This small, self-contained unit can handle any problem requiring up to ten operations, such as two simultaneous second or third order differential equations, or one fourth or fifth order equation. It can perform the function of simulation of performance of newly designed systems without the need of building a pilot plant.

The “Minispace” is contained in a cabinet only 51 inches high, 20 inches wide, and 30 inches deep and is reasonably priced. The use of this computer will enable scientists, engineers, and designers, to solve many day-to-day problems without the necessity of a large installation.

NEW STEEL

A new ultra-high-strength alloy sheet steel for missiles and rockets has been developed by U. S. Steel. Tested and evaluated under the laboratory designation of Airsteel X-200, the new steel was evolved after more than two years of research effort to create a sheet steel for missiles and space vehicles that would surmount many welding and fabricating problems.

One of Airsteel’s most unique characteristics is that it can be unformly cooled in the open air of a shop after heating. When cooled in air and tempered, the steel develops tensile strength levels in the 280,000 pounds per square inch range. It is produced in the annealed or “soft” condition, allowing easy forming, cutting, or shaping to desired missile configuration. This steel is also easily welded without loss of strength.

MOON POWER STATION

A working model of an electric power station designed for use on the moon has been demonstrated by scientists at Westinghouse Electric Corporation. This power plant will generate electric power from energy absorbed from the sun’s rays. The importance of this development is dictated by the fact that a United States space base on the moon must, first of all, be self-sufficient.

In the demonstration, a modified vacuum tube, containing the same elements that would be used in a full scale station on the moon, absorbed a beam of light from a nearby sun lamp and generated enough power to drive a small motor.

Since the moon has no atmosphere, the vacuum tube effect can be made to take place on the moon without the need of vacuum tubes as such. Basic components of the actual power station consist only of wire mesh and a chemically coated plastic. Giant sheets of a thin plastic coated with a photosensitive material will be stretched and supported over several acres of the moon’s surface. A thin wire mesh will then be placed parallel to, but slightly separated from the plastic sheet and insulated from it.

As the sun’s rays strike the plastic sheet, the coated surface will emit electrons. These electrons will strike the wire mesh and generate a voltage. Upon closing the circuit between the grid and the coated surface through a suitable load, current will flow.

This type of electric power plant is the lightest known to man. The total weight of required material would amount to about three pounds per kilowatt.

Once the power station is constructed, it would operate for 14 days at a time since there are 14 days of sunshine followed by 14 nights on the moon. Westinghouse scientists envision construction and interconnection of a number of these power stations all around the surface of the moon. With this type of lunar electrical network, continuous power would be assured to any point on the moon.

MUSIC TO WALK BY

If a newly-developed British record player catches on, there should be an album out soon called “Music to Walk to Work By”, reports Product Engineering, McGraw-Hill publication. The machine is said to be small enough to fit into a coat pocket, but will also play regular 12-inch LP records. The transistorized affair has no turntable; the record

(Continued on Page 36)
ISOLATION—Ten square miles comprise the site of Pratt & Whitney Aircraft’s new Florida Research and Development Center. Experimental shops and offices covering some 17 acres are in the foreground, while the tests areas, barely visible in upper left, lie four miles in the background.

LOCATION—The new Center is located at United, Florida, midway between West Palm Beach and Lake Okeechobee, in the upper Everglades area. It is almost surrounded by a wildlife sanctuary. Most employees live in the cities and towns along the east coast of Florida, driving to the Center on excellent new highways.
Future aircraft and missiles may require propulsion systems far different from those in wide use today — different in size, power output, appearance, and perhaps even in the basic method of utilizing energy.

To probe the propulsion future . . . and to build and test greatly advanced propulsion systems for coming generations of flight vehicles, Pratt & Whitney Aircraft is now operating its new Florida Research and Development Center. This facility supplements Pratt & Whitney’s main research and development installations in Connecticut.

The new Florida Center, financed and built by Pratt & Whitney Aircraft, is unique in America’s air industry. Here a completely air-conditioned plant with 17 acres under roof is specially designed and equipped for the development of new power plants of virtually any type. Testing is handled in special isolated areas; the nearest is four miles from the plant and many miles from any inhabited area. The new Center can be greatly expanded on its 10-square-mile site. Continued isolation is insured by a vast wildlife sanctuary in which the Center is located.

Of the many people employed at the Center today, about half are scientists, engineers and highly trained technicians. By late next year, the total number is expected to be almost doubled.

The new Florida Research and Development Center is one more reason why Pratt & Whitney Aircraft is able to continue producing the world’s best aircraft propulsion systems . . . in whatever form they take.

For further information regarding an engineering career at Pratt & Whitney Aircraft, contact your college placement officer.

DEVELOPMENT CENTER...

Another Unmatched Engineering Facility to Advance Propulsion Systems of the Future

PRATT & WHITNEY AIRCRAFT
Division of United Aircraft Corporation
CONNECTICUT OPERATIONS — East Hartford
FLORIDA RESEARCH AND DEVELOPMENT CENTER — United, Florida
The engineer who really keeps abreast of his field must faithfully scan the current periodicals as they are published for it is in the periodical literature that he will first be informed about new advances in his field. In fact, in many areas of science and technology the latest development is outdated by the time it is published in book form.

With this thought in mind, may we list a sampling of the articles to be found in some of our current magazines. Won't you come in and have a closer look at these or something in your field of interest?

**American Journal of Physics** (October, 1958)
- "Vacuum electrodynamics on a merry-go-round"
- "Elliptic orbits in a frictional atmosphere"

**American Machinist** (September 22, 1958)
- "How to reduce machine noise"
- "GE reveals how it makes big gears"

**Audio** (October, 1958)
- "Compatible stereophonic adapter"
- "Two-way stereophonic amplifier"

**Construction Methods and Equipment** (September, 1958)
- "German mixer batches lightweight concrete"

**Instruments and Automation** (September, 1958)
- "Electronic circuitry"
- "Sizing of conventional relief and safety valves"

**Jet Propulsion** (September, 1958)
- "Erosive burning of a colloidal solid propellant"

Now that the flurry of a new semester and Homecoming is over, it's time to buckle down to that serious studying. Here is a list of books which should prove helpful in improving your study habits.

- Armstrong, W. H. *Study is hard work*
- Brown, H. E. *This is the way to study*
- Crawford, C. C. *Methods of study*
- Crawford, C. C. *The technique of study*
- Headley, L. A. *How to study in college*
- Jones, E. S. *Improvement of study habits*
- Smith, S. *Best methods of study*

**FROM THE NEW BOOK SHELF**

*Abandon Ship!*, by Richard F. Newcomb

At two minutes after midnight July 29-30, 1945, in the South Pacific, the heavy cruiser *Indianapolis*, Flagship of the Fifth Fleet, was torpedoed by a Japanese submarine. In exactly twelve minutes, a mass of choking smoke and blazing fury, she sank. But slithering and sliding over the oil-streaked decks, over 800 men went overboard—only to face one of the worst ordeals in Navy history.

By a fantastic turn of fate and error, the Navy did not know the *Indianapolis* had gone down. There was no escort vessel to give the alarm, and on Guam and Leyte, no one had marked her absence. No lifeboats were launched and only a few life rafts. Three and a half days later, the *Indianapolis* had still not been missed. On the fourth day, after the sea, sun, and sharks had taken a frightful toll, a lone patrol plane out of Peleliu accidentally sighted the victims and mustered a huge rescue armada. Of the original crew of 1,196, only 316 survived. The curtain had dropped on the most shocking disaster at sea in the annals of the U.S. Navy.

Here is the tense story of the *Indianapolis* affair, the incredible loss of life (only one-third of which was due to the submarine attack), the laxity of the Navy, and the travesty of a trial which followed. Captain McVay, Commander of the *Indianapolis*, charged with negligence, was court-martialed in December, 1945. A precedent was thus set, for never before had a commander been court-martialed for loss of his vessel during wartime.

*The Time of the Dragons*, by Alice Eckert-Rotholz

This is an absorbing novel of a group of Europeans in the Far East spanning the past thirty years. It follows the careers of a Norwegian diplomat and his three daughters, each by a mother of different nationality, and of the Orientals, French, White Russians, and Americans with whom their lives become enmeshed. As the Japanese make their relentless way, and as the tide swings back to engulf them, we witness through the story of the three girls, the passing of an old order, and the unfolding of a new.

(Continued on Page 39)
ROBERT H. SWISHER, B.S.E.E., GROVE CITY COLLEGE, '54, SAYS:

"I like my job. Here’s why."

"I’m a radio transmission engineer for Bell Telephone Company of Pennsylvania. My work is interesting and full of variety, and I get all the responsibility I can handle. Have a look at today’s assignment, for example —and see for yourself."

"8:30 a.m. I’m at my desk applying a new method for overcoming interference on Pittsburgh’s mobile radio channels. It involves operating inactive channels on reduced power."

"1:30 p.m. After lunch, I take a company car out to the transmitter tower site. Here I check wiring and explain our plan to one of our mobile radio maintenance men."

"Final phase. The operational test is made from an actual mobile radio unit. I’ll make test calls and monitor the channels from various points within the Pittsburgh area."

"10:45 a.m. Before any modifications can be made, it’s important that I check apparatus and wiring options. That’s what I’m doing here at the Remote Control Terminal equipment."

"3:15 p.m. I review my proposed modifications of auxiliary control circuits with Supervisor Sid Graul. Now I’ll prepare work orders, and next week we’ll make operational tests."

"See what I mean? I really get to ‘carry the ball.’ Soon I’ll be taking a special course in advanced electronics at Bell Labs—a great opportunity. As I said — I like my job."

Like Bob Swisher, you may find a bright engineering future with the Bell Telephone Companies. Talk with the Bell interviewer when he visits your campus. And read the Bell Telephone booklet on file in your Placement Office.

BELL TELEPHONE COMPANIES

NOVEMBER, 1958
CAMPUS SURVEY
(Continued from Page 14)
Jaenke, Bill Perkins, and Larry Berger.


THE TRUTH ABOUT FALLOUT

At the convocation on October 9, Dr. Jack Schubert lectured on “The Truth About Fallout.” Dr. Schubert is presently head scientist at the Argon National Laboratories, and is co-author of the book, “Radiation: What It Is and How It Affects You.” Dr. Schubert confined his lecture mainly to radioactivity caused by nuclear explosions, or fallout. He explained how fallout occurs and how it comes in contact with people. He then gave his viewpoint on the so-called “clean bombs.”

“FROM INSIDE AFRICA”

On September 25, Murl Deusing, noted wild life photographer, presented films and a very interesting narrative on African animal wild life. Mr. Deusing has been associated for several years with the Milwaukee Public Museum, and was recently hired by “Zoo Parade” to take pictures for television. The safari on which the pictures were taken lasted four months and covered 10,000 miles. He shot 60,000 feet of film.

The first part of the pictures were of the grazing animals on their migration from the plains to the mountains. The second part covered the marsh animals, such as hippopotami, and the meat eaters.

MATH CLUB ORGANIZED

The Math Department, glowing with pride over its ten math majors, (nine sophomores and Feutz) is sponsoring a newly organized Math Club. Any upper classmen are welcome to join the club and attend its meetings. The Rose organization is planning on joining a national math club and is presently considering several national groups. Besides regular business meetings, the local club plans to have guest lecturers about twice monthly to speak on various areas of mathematics.

Professor Schmidt’s office is to be converted into a math library. Tables will be available for those math majors and elective math students as a place to study math. The library will be composed mostly of books belonging to faculty members of the Math Department. Professors Schmidt reports that this change does not turn his office into an all-school smoker—the library is to be used strictly for study and discussion of mathematics.

At an organizational meeting on October 9, the following officers were elected: Russ Archer, president; Steve Burton, vice president; Jim Coffenberry, secretary-treasurer; and Jay Hirt, librarian.

BLUE KEY

The Blue Key Fraternity and their six new pledges are busily preparing for Rose’s largest Homecoming. Around 1500 guests are expected to appear on the week-end of October 18. As usual, a week and a half before the Homecoming Dance all Blue Key members were turned loose with freshly printed dance tickets clutched in their greedy little hands. Of course, this is no news to the average Rose man, who has been asked at least fifteen time whether “he has a ticket for the big dance.” Quite a selling technique, but I’m waiting till the price drops to $2.00.

Speaking of Blue Key, Col. C. E. Cross is the Fraternity’s advisor now. He replaces Dean Strum. Also being planned by Blue Key is a high school visitation program, whereby members will visit various high schools to give prospective students a picture of Rose from the students’ viewpoint.

STUDENT COUNCIL

The Student Council is busily preparing for Engineer’s Day, to be held this year on November 22. The practical side of engineering from the Rose viewpoint will be presented to visitors. Each department will be asked to set up various exhibits concerning their particular field of engineering.

In elections held earlier this fall, Ken Hollingsworth was elected president; Jim O’Donnell, vice president; and Bill Carter, recording secretary.

CAMPUS CLUB MIXER

On October 3, Campus Club members played host to the student nurses from Union and St. Anthony Hospitals. Larry Hebert, social Chairman, planned the evening of

(Taken from Page 33)

The Rose Technic
Engineering leadership—a bench mark at Alcoa

In exciting new architectural developments . . . in the automotive industry's drive for the all-aluminum engine . . . in superconductors to meet the nation's insatiable power demands, you'll find Aluminum Company of America in the forefront of technological advances. Alcoa produces and sells nearly one-half of the nation's aluminum . . . conducts about three-quarters of all basic research on aluminum applications . . . maintains the world's largest and most completely equipped light metals research center at New Kensington, Pennsylvania.

To maintain this type of leadership, we need outstanding men, men with top backgrounds in both academics and extra-curricular activities. Men who are trained in the nation's top schools . . . who understand and glory in the challenge of engineering . . . who know that therein lies the basis of a better tomorrow. Today, aluminum serves virtually every area of our industrial, commercial and day-to-day lives. Yet its uses have only just begun to be exploited. Your challenge as an engineer lies in finding new applications, in bringing aluminum to its full potential as a servant of mankind.

Whatever your specialty—metallurgical, mechanical, electrical, industrial, or any other type of engineering—whatever your interest—engineering, production, research, development or sales—there's a clear-cut future for you at Alcoa. Write us today—just fill out the coupon—for your copy of A Career For You With Alcoa. Or contact your campus placement director.

Please send a copy of A Career For You With Alcoa.

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There’s a Metal Problem in your future that Inco can help you solve

In the meantime, see if you can tell which nickel-containing alloy proved to be the answer to these problems.

Number the picture captions!

1. Nickel cast iron
2. Chromium-nickel stainless steel
3. 4340 constructional alloy steel
4. Ductile Ni-Resist®
5. Cupro-nickel
6. Nickel-aluminum bronze
7. Ni-Resist nickel cast iron

See answers below

You may have to take this kind of quiz again. You may be designing a machine which requires a metal that resists corrosion... or wear... or high temperatures. Or one that meets some destructive combination of conditions.

When you start to design equipment, you will have to select the proper material to meet given service conditions. Over the years, Inco Development and Research has successfully solved many metal problems, and has compiled a wealth of information to help you.


The International Nickel Company, Inc.
New York 5, N. Y.

Inco Nickel makes metals perform better, longer
Energy conversion is our business

NOVEMBER, 1958

what is energy?

A match burning?
A solar flare?
Is energy really conserved or were Joule, Helmholtz, Mayer and Maxwell only partly right?
Is the Phoenix concept of cyclical energy valid?
An accurate definition of energy is important to Allison because energy conversion is our business—and we have a deep and continuing interest in energy in all its forms.
Basic to our business is an intimate knowledge of every form of energy—solar, nuclear, thermal, chemical, mass, magnetic, electrical, mechanical and radiant. We search for this knowledge to increase the effectiveness with which we accomplish our mission—exploring the needs of present and future flight and space propulsion systems.

Want to know about YOUR opportunities on the Allison Engineering Team? Write: Mr. R. C. Smith, College Relations, Personnel Dept.

ALLISON
Division of General Motors, Indianapolis, Indiana

November, 1958
...TARGET: 100 MILES UP! On a day surprisingly soon 45,000 feet above Wendover, Utah, North American’s rocket-powered X-15 research plane will be released from a modified B-52 to take man 100 miles into outer space. Throughout the flight trajectory, radio contact between the X-15, the mother ship, chase planes and the ground will be maintained by custom-designed units from a Collins CNI (communication, navigation, identification) system, similar to the electronic packages Collins is providing for the new military jet aircraft.

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

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Burbank, California

J. D. Mitchell
Collins
Radio Company
1930 Hi-Line Drive
Dallas, Texas
LOCKHEED ELECTRA
(Continued from Page 13)

Engine geared to a propeller — represents the latest advance in jet propulsion. You may wonder why both the propeller and the jet are used! Combining the best features of both yields unique advantages in propulsive efficiency. Inherent propeller efficiency requires fewer pounds of fuel per hour to produce any given amount of thrust, compared with turbojets. Also this condition is equally effective at all operational altitudes, through the complete flight profile.

Actually both turbo-jets and prop-jets are similar. They are both gas turbine engines and are known as “air breathers,” depending upon outside air for combustion.

In both, the air enters the engine through an inlet duct and is compressed — squeezed tighter and tighter — into combustion chambers where fuel is added and ignited. The mixture burns continuously. As exhaust gas from the combustion expands and seeks an outlet, it is directed through the blades of a turbine which turns on the same shaft as the compressor. So we see that both the jet and the prop-jet have the same basic features. In a turbojet, however, the aircraft propulsion comes from the forward reaction caused by the exhaust gas escaping rearward from the engine jet nozzle — just as air escaping from the neck of a balloon drives the balloon forward. It is absorbed by the turbine to operate the compressor (plus a few accessories).

A prop-jet is pulled forward by the propeller thrust with only a small amount of actual jet thrust obtained at the jet nozzle at the back of the engine. The central shaft which drives the compressor is extended on forward to a series of gears which (gearing down the original shaft speed) are connected to a propeller. This permits as much energy as possible — about 91 per cent — to be utilized.

This enables the prop-jet Electra’s take off smoothly and swiftly from

(Continued on Page 35)
are your plans as precise as your planning?

The proof of the planning is in the finished plans. That's why you're smart to use Eagle TURQUOISE—the pencil the professionals prefer. Look what it gives you: Uniform grading (17 scientific formulas guarantee exactly the blackness you want—from every pencil, every time!). A strong non-crumbling needle point that stays sharp for line after long line of unchanging width. Inimitable smoothness—thanks to Eagle's exclusive "Electronic" graphite. TURQUOISE makes your plans look sharp—and you, too!

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EAGLE TURQUOISE are the largest-selling in the United States!
dancing and “mixing”. We’re sure that after three weeks away from home, Campus Clubbers found the nurses to be just the right remedy to overcome some of the effects of Rose’s female-less atmosphere.

Several more mixers (one on Halloween with St. Mary’s) are being planned for Friday evenings. Further dates have not been announced in an effort to hold to a minimum Saturday morning tests, given by die-hard professors, who still think that we should study on Friday nights.

S.A.M.E.

On October 7, Colonel Muller, P.M.S. & T. of the R.O.T.C. program at Indiana University, lectured on “The History of R.O.T.C. on U.S. Campuses”. The lecture was sponsored by the S.A.M.E. Members of the S.A.M.E. are busily planning the Military Ball, to be held on February 28. All students, especially freshmen are invited to join S.A.M.E., and attend their many functions, both social and educational.

RIFLE CLUB

The Rifle Club has recently elected officers for the coming year. Elected were Jim O'Donnel, president; Jim Barrick, vice president; and Leonard Bennett, secretary-treasurer. Several matches are already scheduled and any prospective sharpshooters are welcome to fire and try for a place on the team.

RADIO CLUB

Rick Slater reports that the Rose Radio Club has been appointed an official bulletin station. The American Radio Relay League has appointed the station as one to help transmit F.C.C. bulletins. Any freshman interested in getting his radio operators license is urged to attend Radio Club meetings.

AIEE & IRE

On September 20, the student branch of the AIEE-IRE at Rose held its annual fall picnic at Deming Park. All electrical engineering students were welcome to attend the picnic dinner which was followed by a baseball game.

CAMPUS SURVEY

(Continued from Page 26)
FRATERNITY NOTES
(Continued from Page 20)

Friday evening will be an opportune time for present students to hear tall tales from the alumni about their glorious days at Rose. We hope the alumni will enjoy themselves as much as we have enjoyed preparing for them.

At present the TX tigers are tied with the Alpha Tau’s for first place in the interfraternity football league. The Tau’s managed to squeeze by the tigers winning 9-6 to give them the tying game. This was only after TX had dealt them a staggering blow two weeks previous by defeating them 12-0. You can be sure the tigers will be in there fighting to keep that trophy on the mantel.

The first date party of the school year will be held on November 1. The house will be set up in a miniature Las Vegas fashion and all couples will be able to try their luck at winning prizes. Play money will be used which makes things all the better. All of the TX men will also be able to see old Santa Claus at the Christmas party which is in the planning.

Several carloads of our men will accompany the football team to Franklin to cheer the team to victory. We of Theta Xi want to let the team know that we are behind them all the way.

Bill Herman and Larry Pitt have recently joined the active ranks of Theta Xi and John Fiddler and John Henke have begun their pledgeship. Congratulations men on your wise choice of a fraternity.

Brother Hitchcock has recently contracted a dreaded disease known as “pinitis”. Lyman lost his pin to Miss Gloria Midciff of Indiana State.

Well I’m running out of both typewriter ribbon and “No Dose”, so I’ll see you in the next issue.

Larry Pitt

Alpha Tau Omega

Congratulations to Lambda Chi Alpha on winning the Homecoming display trophy. ATO is indeed proud that all five mechanisms of our “Can Those Cougars” display worked very well. All told, Homecoming 1958 was an occasion long to be remembered by all.

Coach Louis Roehm has the Tau football team in high gear now. After winning over Lambda Chi easily in the first game of the season, ATO lost to Theta Xi in a hard-fought battle in the next game. Then the Taus finished the first round of competition by polishing off Sigma Nu by a score of 12 to 0. In the fourth game ATO defeated TX 9-6 in another tough game, thus gaining a tie with Theta Xi for first place in the Interfraternity League. Each team now has a 3 won- 1 lost record. Coach Louie seems to think we should be able to capture the trophy now; we still have 2 or 3 games to go, but our squad is looking better all the time.

The Alpha Taus on the varsity team should not go unmentioned either. Hal Booher, right halfback, has scored 14 points thus far for the Engineers; Mike Munro and Bill Kuchar have turned in some excellent line play; and end Woody Stroupe has been instrumental in the Rose victories. Manager Dave Foss certainly has an important job, too.

The old redhead, Larry Grimes, (our social chairman) came up with a whopper of a hayride as the first item on the fall social calendar. On Saturday, September 27, about 30 Taus and their dates rode around all over Clay County. We even tried the Rose victories. Manager Dave Foss certainly has an important job, too.

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The thanks of the Gamma Gamma chapter goes out to Larry Grimes’ father, Mr. James Grimes, for installing our shiny new black, red, and yellow tile floor in the basement. It is really sharp!

Only one Tau got pinned during September—Bob Stark finally gave up and pinned Miss Judy Roberts. Congratulations to Bob and Judy!

One month of school has gone and great times with it, but Alpha Tau Omega is looking forward to many grand events to come.

Bill Perkins

THE ROSE TECHNIC
runways much shorter than are required for companion jet transports. And for landing, the propeller acts as a break, reducing the length of runway required. Because of its propeller efficiency, the prop-jet requires less fuel than a turbo-jet, reducing the fuel load that must be carried in the airplane.

The complete engine consists of a reduction gear box and a power section. The over-all speed reduction from the power section to propeller is 13.54 to 1—resulting in a propeller speed of 1020 rpm when the engine is running at its normal speed of 13,820 rpm.

The power section consists of the compressor, combustion section, and turbine assemblies, plus the various engine controls and accessories.

The operating cycle starts with the air entering the inlet housing and flowing into the 14-stage compressor where it is compressed approximately .152 times its original volume. The air then flows through a diffusion where its velocity is reduced and the proper climate for mixing with fuel and burning is provided. Fuel is introduced through six nozzles in the centers of the combustion liners. Only about 25 per cent of the airflow is used in the combustion process. (The remainder flows into the liners through slots and serves to surround the flame, keeping it from impinging on the liner shell and thus acting as a cooling agent.)

The gasses then are expanded through the four-stage turbine, energy is extracted from the gases as pressure, temperature and velocity are reduced. The power captured by the rotating turbine wheels, driven by escaping gases, is carried forward through shafting to drive the compressor and also the propeller. The exhaust gases discharging through the 18.31-inch exit nozzle as jet thrust — amounting to 9 per cent of usable shaft horsepower.

(Continued on Page 37)
ENGINEERS' UNIONS
(Continued from Page 15)

The final argument against engineering unions comes from the “Canons of Ethics for Engineers,” Section 2, “and he will avoid all conduct or practice likely to discredit or do injury to the dignity and honor of his profession.” Unionization would reduce engineering to the status of a trade in the eyes of management and the public. Also, the present corrupt practices in some unions might slip into an engineering union and thus would certainly harm the dignity and honor of the profession.

The question of engineering unions will probably continue to rise in importance as time goes on. The choice is one for the individual engineer to make, but he must consider the effect on the profession as a whole as he makes his choice. If each man keeps this in mind he will make a thorough study of the question and will arrive at the correct solution whatever that might be.

ALUMNI NEWS
(Continued from Page 19)

'58 Mr. Gordon F. Wolfe was recently married to Miss Mary Nell Miller. Mrs. Wolfe is a graduate of Sullivan High School. She also attended Methodist School of Nursing in Indianapolis, and for several months preceding her marriage to Mr. Wolfe, she was employed here in Terre Haute.

Mr. Wolfe is currently working for Marquardt Aircraft Company in Van Nuys, California as a mechanical engineer.

The ceremony was performed in the Wedding Chapel, Las Vegas, Nevada.

'58 Mr. Gary Giffel has completed his six months active duty at Ft. Belvoir, Virginia.

'58 Mr. Bill Payne has recently completed a three weeks Bobo training at Ft. Belvoir, Virginia.

'58 Mr. Larry Kirts is now living in Santa Monica, California, where he works for the Brown Corporation. He received his B.S. Ch.E. here at Rose.

RESEARCH & DEVELOPMENT
(Continued from Page 21)

simply fits between the upper and lower lids of the case.

PAPER THERMOMETERS

Paper thermometers, printed on post cards, have been developed to tell whether goods have been exposed to excessive temperatures in shipment, reports Food Engineering, McGraw-Hill publication. After a buyer receives his shipment, he sends the card back to the shipper. The color of the normally pearl-grey strips indicates the degree of heat the shipment was exposed to in transit.

MOBILE DATA ProcessORS

Lightweight, mobile electronic data processors will soon become a vital member of the modern U. S. Army, according to a joint Signal Corps-Philco Corporation statement released.

Designed to meet Army field requirements under combat conditions, the data processors will be used for combat computations, con-

(Continued on Page 42)
power — supplement the propeller thrust.

A significant part of the Electra's $50,000,000 development program was spent upon the pampered passenger. Lockheed engineers and consultants — working in close coordination with airline experts — report that they aimed at making every trip, whether a relatively short hop or an extended flight, an enjoyable one. They developed the air conditioning and pressurization systems, self-contained hydraulically operated stairs, baggage systems, seats, windows, sound and vibration suppression systems and the interior. Through it all they kept foremost in mind the passenger — the man who takes an occasional flight, as well as the regular traveler.

They had to ventilate the interior for people who like to smoke, but who don't like smoke. They had to provide fresh cabin air — and heat it, cool it, control it, and eliminate drafts. Lockheed engineers gave the Electra these commercial airline 'firsts': (1) Radiant heating and no draft ventilation, and (2) a self-contained cooling system that operates (for passenger comfort on the ground) independent of any ground hookup.

Cooling is provided by a 6.6-ton capacity air-cycle refrigerating unit and a 10-ton capacity Freon compressor for a total of 16.6 tons of refrigeration capacity. (A ton of refrigeration is the amount required to freeze a ton of water in 24 hours.)

Heat is provided by electric elements mounted in the cabin floor and sidewall panels. A network of wires extends over more than 1000 square feet of cabin surfaces for draft-free uniform temperature control.

Baby powder — the kind that goes to the bottom of many a problem — helped the engineers test the all-new ventilation system. Talcum was blown by the researchers into the mockup ducts so they could see — and photograph — air currents.

(Continued on Page 40)
and the team came out with more determination in the second half.

Early in the third period "Rocky" broke away from four Concordia tacklers and scored on a 44 yards run. The 1st play of the 4th quarter Bob Checkley added a TD on an off tackle play from 12 yards out. The defense continually throttled the Cougars attack and only allowed them 80 yards by rushing. Captain "Rocky" scored from 11 yards out with 2 minutes left in the game.

The 18 points Herakovich scored this game gave him a total of 93 points for the season which makes him the leading collegiate scorer in the state and possibly the nation's leader.

An apology is in order for Dan Kingery. He is a sophomore and not a freshman as we stated in the last issue.

Although the ball club has had a fine half-season, the second half is going to be the roughest, so let's all back the team and have an undefeated season for the first time in 16 years.

**BASKETBALL**

The outlook for the 58-59 basketball season is not very bright. The loss of Gary Giffel, Jim Oakes, and Mike Smith, three of the starting five, leaves Jim Carr with little experience. Returning lettermen are John Tindall and John Ray at center; Jim Sargent, Don Dekker, and captain Woody Stroupe at forwards; and Larry Grimes and Ron Jennings at guards. Backing John Kirk there will be Joe Gladden, Herbert Gormon, Ron Myers, Dick Landenberger, and Bob Johnson.

It is too early in the year to make any prediction on the season, but Jim Carr thinks we could have a good season if some freshmen develop and the team doesn't lose any upperclassmen.

The basketball season opens November 22 against Vincennes. I.M.

**INTRAMURALS**

The intramurals program is moving right along. There have been many battles after school with the seniors and sophomores finishing on top regularly.

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The fall tennis tournament is getting under way and should provide some exciting matches in the next few weeks.

The battle for the I.F. football trophy is going to be a fight to the finish. Theta Xi and Alpha Tau Omega are tied for first place with 3 wins and one loss each. Sigma Nu and Lambda Chi are tied for third with 1 and 3 record. Unless there is an upset in the last four games the home of the trophy will be decided by a play-off. The field house is open every day through the week and on Sunday for those who care to use the facilities.
LIBRARY NOTES
(Continued from Page 24)

Days and Customs of all Faiths, by Rev. Howard V. Harper

Days and Customs of all Faith is a fundamental reference book for the many who want to know how the different religions took on the forms as we know them today. By explaining the surprising origins of some of our most cherished religious traditions, holy days and holidays, Dr. Harper shows that all faiths have certain basic similarities. What is seemingly strange and mysterious in one, may be readily understood in terms of its more familiar counterpart in another. This is truly a family book of religious knowledge that will interest the old and young alike.

Albert Camus: the Invincible Summer, by Albert Maquet.

Albert Camus is the first full-length appraisal of Camus to appear in English. This penetrating and authoritative work contains analyses and discussions of all of the novels, stories, plays, and essays of Camus.

Maquet gives a portrait of Camus the man as well as of Camus the writer, rounding out what is, in the fullest sense, a literary biography. He includes a complete bibliography of the writings in French and Italian about Camus, and this is supplemented with a bibliography of the major articles about Camus in English.

The William Saroyan Reader, by William Saroyan

This collection has been put together with the advice and assistance of the author. It is a representative selection from the major works of this remarkable writer. Saroyan, himself, is host, introducing the features of his work that no reader can afford to miss.

He tells the choicest of his inimitable stories, reenacts the shining moments of his plays, dazzles and delights with the dexterity of his mind and eye, recreates, in one splendid gesture, all of the unforgettable humor and pathos, the entire cavalcade of people, places, and things that make up his singular vision of the human comedy.

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More than 50 sources of noise were muffled by covering pieces of operating equipment (pumps, motors, compressors and the like) with glass fiber "shrouds" and isolation-mounting them with springs and rubber shock absorbers so they would not transmit vibration.

All these things, and many more, help to introduce a new "feel of flying" to the traveling public. The Electra represents a new sound in the sky, a new high in comfort. It will be more fun to fly, an experience eagerly anticipated — and realized.

Takeoff is easy, with the partnership of jet thrust and propeller pull. Climb-out is rapid. The earth fades away gently, quickly, and quietly as the Electra ascends to the most comfortable altitude for the flight. The Electra selects any altitude up to 30,000 feet; it can take them all.

What is there to see from six miles high? Plenty. It's a whole new world. The passenger's vista is greater than most persons have ever surveyed before. It is a new perspective and a new thrill.

Soon the Electra eases down, quickly and purposefully — and comfortably. You are in the traffic pattern at slow speed. Instant power is on tap to take a wave-off or change runways. You touch down lightly. Your propellers become firm, powerful brakes for a quick stop. You are there.

The airplane taxies right to the ramp. No waiting. No delay. The door opens. An automatic stairway unfolds. Look at the passenger disembarking — he is relaxed, fresh, and all smiles.

It's the jet age.
BRAIN TICKLERS

From The Bent of Tau Beta Pi

1. You and an opponent are to take turns placing nickels, assumed discs of 7/8" diameter, on a round table of 2' diameter, until there is no space left for another nickel. The nickels must lie flat on the table without overhanging the edge or overlapping one another, although they need not touch each other, and cannot be moved after being placed. The player who places the last nickel wins the whole batch. Is there any advantage to being the first player, and if so, why?

2. The top 5 places in a tennis tournament were won by Black, Brown, Gray, Green, and White, but not necessarily in that order. Assuming the loser of the finals placed second, determine the correct order from the following clues:

a. Brown had once beaten the winner in tennis.

b. The man who finished fourth left for Boston right after his elimination, where someone telephoned him the results of the finals the next day.

c. Before the tournament, the winner had never seen the man who finished fifth.

d. Black and White often go to New York together.

e. Green defeated White.

f. The winner had lunch with Green the day of the finals. At lunch, the winner was introduced for the first time to his opponent of the afternoon by Green.

3. Fill in the x’s:

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(Answers Next Month)

November, 1958
control data processing, and support data processing.

Official names for the data processors are Basicpac and Logicpac. Both are basically the same, but the Logicpac will have a large core storage (memory) and greater input-output capabilities.

These field service computers will be installed in all-weather shelters—eleven feet long, six and a half feet wide, and six feet high—in order to make the units highly mobile.

Outstanding feature of the mobile data processor will be its rugged construction and reliable components to minimize the effect of such environmental factors as temperatures, humidity, noise, vibration, shock, and dust.

Logicpac and Basicpac will be constructed to provide consistent, reliable, and error-free operation under severe field conditions with a minimum of maintenance. By logical design, the data processors will be adaptable to a wide range of tactical situations and problems. In an emergency, the basic units can be assembled or expanded into a larger unit. The basic data processor also will be designed so that most of Basicpac and Logicpac will be interchangeable and all controls will be standardized.

A stripped, completely operational version of the Basicpac will weigh no more than 175 pounds. It will be designed to handle a variety of combat computations, as part of a larger computer system. For example, the new Philco data processor can be used in an artillery survey system, in a meteorological system or in a drone aircraft control system. It could also be used for data reduction to reduce the volume of data that must be transmitted to Army field units.

Special, highly compact circuit modules will be used extensively in the two mobile data processors. These techniques were developed by Philco in the production of its all transistor control, scientific and large scale data processing systems.

According to the U. S. Army Signal Research and Development Laboratory at Fort Monmouth, New Jersey, “Multiple-use electronic data processors being developed for use by Army units in the field will greatly improve the overall effectiveness of combat operations. These data processors may be used to provide more timely information to combat commanders and their staffs, make analyses and evaluations previously not feasible and improve the speed and accuracy of service in logistical and administrative activities.

“This in turn may significantly reduce the need for large stockpiles of supplies, material, and replacement personnel which frequently restricts the freedom of movement of modern armies and provides the enemy with prime targets. In addition, mobile field data processors may directly improve the speed and effectiveness of fire-support by calculating the optimum choice and employment of weapons.”

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For those desiring a MANAGEMENT career:

BUSINESS & MANAGEMENT PROGRAMS—These are programs of business courses at nine different universities for mature men in business, particularly graduates in engineering and the sciences, who have not majored in business administration.

MANAGEMENT DEVELOPMENT PROGRAM—This program provides position rotation for more breadth of experience, participation in advanced management schools for more senior professional employees, and in-company specialized courses for the development of executive talents.

If you're interested in more information about these programs at Westinghouse, write to Mr. L. H. Noggle, Westinghouse Educational Department, Ardmore and Brinton Roads, Pittsburgh 21, Pa.
An old Indian visited the big city the first time in his life. He entered a building and watched a little old lady step into a small room.

The doors closed behind her. Lights flashed and a dial above the door moved from one to ten and back again. A bell tinkled. The doors came open, and a beautiful young girl stepped out of the elevator.

Blinking in amazement, the Indian grunted, "Me should have bring um squaw."

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A young engineer got a job in a remote mining camp. On his first day off, he approached the boss and asked: "Say, boss, What do you folks do around here for amusement?"

The boss replied, "Well, all of us usually watch Sam, the cook, drink a gallon of whiskey, gasoline, and red pepper juice. It's the funniest thing you ever saw. Why don't you come along?"

The young engineer was obviously shocked. "No thanks," he said, "I don't go for that kind of amusement."

"Well," answered the boss, "I sure wish you'd come. We really need six men for this thing."

"Why is that?" asked the new man.

"Some of the boys have to hold Sam. He don't go for that kind of amusement either."

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She was the "Honey-Chile" in Dallas,
The sweetheart of the bunch, But on the old expense account, She was beer, cigars and lunch.

A circle has no corners. An oval has no corners too. But not so nearly no corners as a circle has.

When a man is twenty and a young lady smiles at him on the street he looks himself over to see what makes himself so attractive. When he is forty and a lady smiles at him, he looks around to see who is following him or what is unzipped.

Of course you've all read the immortal words of Benjamin Franklin: "Kid, keep your damn hands off my kite."

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Home from the capitol, a business man looked out the window and saw a big log floating down the river. He pointed it out to a friend.

"See that log," he said, "That's just like Washington. If you examine that log closely you'd find 10,000 ants on it—and each one thinks he's steering it."

This idea for balancing the national budget without further taxes was advanced the other day in Economics class: The government should put all the men on one island and all the women on another — then go into the ferry business.

Northern visitor: "Zeke, don't the mosquitoes bother the colonel?"

Body Servant: "No, sah, de furst part of de night de kernel is too full to pay 'tenshun to de skeeters; and de last part of de night de skeeters is too full to pay any 'tenshun to de kernel."

A small boy leading a donkey passed a Marine camp. A couple of marines wanted to have some fun with the lad. "What are you holding on to your brother so tight for sonny?" said one of them.

"So he won't join the Marines," the youngster replied.

When teaching a girl to pucker for a kiss which is better to have her say — prunes, peaches, or alfalfa?
PHOTOGRAPHY AT WORK—No. 35 in a Kodak Series

For Jets
more thrust, more range, more payload

The motion picture camera is seeing into a turbo-jet combustion chamber operating on a new fuel.

With photography as a tool, the N.A.C.A. Lewis Flight Propulsion Laboratory studies jet engine combustion chambers, and compounds that can result in new high-energy jet fuels.

How much faster and farther our aircraft and missiles can go seems now to depend on developing new high-energy fuels. This is a job of the Lewis Laboratory of the National Advisory Committee for Aeronautics.

And as in all kinds of industry, photography is playing an important role in this work. Motion pictures are taken of the interior of jet engine chambers through transparent walls. From the pictures the scientist learns the behavior of the fuel, the flame and exhaust through the engine turbine and tail pipe.

The use of photography in research and the development of new or better products is but one of the ways it is helping all kinds of businesses, large and small alike.

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.

EASTMAN KODAK COMPANY, Rochester 4, N.Y.
The United States is now doubling its use of electrical energy every eight years. In order to maintain its position as the leading manufacturer in this fast-growing electrical industry, General Electric is vitally interested in the development of young engineers. Here, Mr. Lewis answers some questions concerning your personal development.

Q. Mr. Lewis, do you think, on entering industry, it's best to specialize immediately, or get broad experience first?

A. Let me give you somewhat of a double-barreled answer. We at General Electric think it's best to get broad experience in a specialized field. By that, I mean our training programs allow you to select the special kind of work which meets your interests—manufacturing, engineering, or technical marketing—and then rotate assignments to give you broad experience within that area.

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Q. Are training assignments of a predetermined length and type or does the individual have some influence in determining them?

A. Training programs, by virtue of being programs, have outlined assignments but still provide real opportunities for self-development. We try our best to tailor assignments to the individual's desires and demonstrated abilities.

Q. What types of study courses are included in the training programs and when are the courses taken?

A. Each of our programs has graduate-level courses conducted by experienced G-E engineers. These courses supplement your college training and tie it in with required industrial techniques. Some are taken on Company time, some on your own.

Q. What kind of help do you offer employees in getting graduate schooling?

A. G.E.'s two principal programs of graduate study aid are the Honors Program and the Tuition Refund Program. If accepted on the Honors Program you can obtain a master's degree, tuition free, in 18 months while earning up to 75% of full-time salary. The Tuition Refund Program offers you up to 100% refund of tuition and related fees when you complete graduate courses approved by your department manager. These courses are taken outside normal working hours and must be related to your field of work.

Q. What are the benefits of joining a company first, then going into military service if necessary?

A. We work it this way. If you are hired and are only with the Company a week before reporting to military service, you are considered to be performing continuous service while you are away and you will have your job when you return. In determining your starting salary again, due consideration is given experience you've gained and changes in salary structure made in your absence. In addition, you accrue pension and paid vacation rights.

Q. Do you advise getting a professional engineer's license? What's it worth to me?

A. There are only a few cases where a license is required at G.E., but we certainly encourage all engineers to strive for one. At present, nearly a quarter of our engineers are licensed and the percentage is constantly increasing. What's it worth? A license gives you professional status and the recognition and prestige that go with it. You may find, in years to come, that a license will be required in more and more instances. Now, while your studies are fresh in your mind, is the best time to undertake the requirements.

Your next four years are most important. During that period you'll undoubtedly make your important career decisions, select and complete training programs to supplement your academic training, and pursue graduate schooling, if you choose. These are the years for personal development— for shaping yourself to the needs of the future. If you have questions still unanswered, write to me at Section 959-6, General Electric Co., Schenectady 5, N. Y.

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LOOK FOR other interviews discussing: • Salary • Advancement in Large Companies • Qualities We Look for in Young Engineers.