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In This Issue:

AMERICAN TOLL ROADS
OPPORTUNITIES IN ENGINEERING
THE TRADITIONAL SENIOR BENCH
Only STEEL can do so many jobs so well

Steelaire Home. The entire structural frame of this house is made from tough, cold-formed steel, so it is unaffected by rot, fungus, and termites. Even more important is the fact that the steel frame resists warping and sagging. It’s one of a line of Steelaire homes and is made by the U. S. Steel Homes Division of United States Steel.

World’s Biggest Crowd. On power shovels, a “crowd” is the arm which moves the dipper and dipper-stick forward and back. It coordinates closely with the lift motion of the dipper, and is a key part in the operation of the shovel which must withstand extremes of stress at any temperature. This is a picture of the biggest crowd ever built, now installed on the biggest power shovel in the world. It’s made from USS “T-1” Steel, the remarkable new constructional alloy steel developed by United States Steel. An exceptionally strong and tough steel, it is noted for its welding characteristics. “USS” and “T-1” are registered trademarks.

Slap That Bermudavarius! The Talbot Brothers of Bermuda, famous for their colorful calypso music, recently retired their homemade packing-case “bass viol,” and proudly premiered in its place the world’s first Stainless Steel bass viol (or dog house or Bermudavarius, as it’s customarily referred to). An exact replica in USS Stainless Steel of their original homemade design, it was built for them under U. S. Steel’s supervision by a well-known manufacturer of Stainless Steel sinks who commented that the fabricating job wasn’t difficult—but certainly was different.

UNITED STATES STEEL

Watch the United States Steel Hour on TV every other Wednesday (10 p.m. Eastern time).
“Glowing wafer” of light (electroluminescence) sheds illumination on the faces of three Westinghouse scientists who helped to develop it. Left to right: Dr. Wilili Lehmann (University of Brunswick, Germany); Dr. Henry F. Ivey (University of Georgia, Massachusetts Institute of Technology); and R. W. Wollentin (Rutgers University).

The Light
With no Third Dimension

A new source of light is nearing practicality. Called electroluminescence, it comes from a flat surface. By the twist of a knob, you can change the brightness, or even the color, of a room.

Since electric lighting first became practical, only three basically different light sources have achieved widespread use—inandescent, fluorescent, and gas-discharge lamps. Now a fourth basic type—electroluminescence—is nearing practicality. With fewer theoretical limitations than any of its predecessors, it promises to revolutionize lighting and become a practical light source of the future.

In an incandescent lamp, light comes from a single point. In a fluorescent lamp (form of gas-discharge), light comes from a straight line. In electroluminescence, light comes from an area or flat surface. Electroluminescence is light emission from phosphor powders embedded in an insulator, excited by an a-c field.

Westinghouse engineers gave the first practical demonstration of this new light source. They lighted an entire room with flat electroluminescent panels on the ceiling and three walls. These panels were one-foot-square flat glass plates about as thick as a window pane and coated with a plastic containing the phosphor. They were topped off by an aluminum conducting coating. Hooked up to a source of power, these plates had a brightness of 100 foot lamberts in their present stage of development.

Since some phosphors have more than one emission band, the color and brightness of electroluminescent lighting can be changed by varying the frequency. It is possible to control the color of a room, and brightness too, simply by twisting a knob. Besides supplying ordinary light, this new light source has other fascinating possibilities. Just one is “picture framing” television. An electroluminescent cell might replace the conventional cathode-ray tube in such a set.

Westinghouse engineers, under the supervision of E. G. F. Arnott (Princeton '28), developed electro-

Changing Colors in Electroluminescence

Multicolored panels of one type is made by stacking red (R), yellow (Y), green (G), and blue (B) phosphors. Inductors are used to tune each layer. 

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Personnel Staff, Detroit 2, Michigan

THE ROSE TECHNIC
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The Demas Deming Hall, Rose Polytechnic Institute.

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RECIPE FOR MUD

Mud pies and oil wells have one thing in common—mud.

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HIGH SCHOOL GRADUATES OF 1957

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

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- In the course of their technical work, engineers participate in such broad managerial functions as production, merchandising, installation, and many others. What's more, we have a record of promotions from within. It's not surprising, therefore, that fifty-five percent of the college graduates in our upper levels of management have engineering degrees.

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- Besides this company-wide program, a number of our divisions offer individual engineering courses in their own specialties. We also sponsor a Tuition Refund Plan for out-of-hours study at nearby colleges. Open to all employees, this plan helps our engineers study for advanced degrees at Company expense.

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The New Position of Science

For the past hundred years we have looked to the methods of science to guide us to verifiable truth about the world we live in and to free us from old-fashioned dependence on tradition. The gulf between science and faith had become too wide to bridge. We had to choose, and without admitting it to our conscience, we chose science as the most trustworthy guide for life.

Education in general gradually shifted its weight during that century from the humanities to science. History, philosophy, and literature developed scientific foundations. Today even these "humanities" are pursued by scientific methods. Our universities increasingly copied the German institutions where research is the primary concern.

Instead of getting at least one foot down on the solid ground of reality through the discoveries of science, it is clear that both our feet are still firmly planted in midair. Aside from its utilitarian value, which is great, science too is still a matter of faith in suppositions. It is clear that the miracles of science such as human flight, television, and the curing of disease are the fruits of a system which is built on unproved assumptions—a faith, a creed like the one we confess in church, only the creed of science is implicit, not confessed.

Not only are the laws of science based on suppositions, but the outstanding findings of science repeatedly violate its own basic articles of faith. Let us be specific: For centuries Newton's laws governing time and space were accepted as physical fact, basic and immutable. Then Einstein modified Newton's laws. Today, time and space are no longer absolute quantities, but varying and uncertain things.

Again, the law of the constancy of energy was changeless "fundamental fact." It too was one of the "ultimate truths" of science. We brought all our discoveries to this law to test them. Then the atom bomb exploded and proved that new energy could be created out of mass, (E = mc²). Today this so-called fundamental fact of the constancy of energy admits of exceptions. These are not corollaries of science, they are its "basic articles of faith."

We conclude that neither scientific methods nor scientific discoveries have freed man from reliance on faith. The scientists are quite frank in their admission. We had fondly hoped that science would make us self-sufficient, that the worship of Divinity would become unnecessary. But science can't do this. Thus science supports the position of faith. It denies the absolutism of Dialectical Materialism. Let us see how this admission must change our teaching of Science.

In Western civilization this admission actually revives our trust in the democratic way of life. Like science democracy, too, is based on faith, on belief in the objective existence of truth and justice. The belief in objective justice, and man's obligation to practice it, are matters of faith, not proof.

These are parts of our basic faith. Thus the "miracles of science" achieved in the laboratory such as flight, radio, and disease control are paralleled by the "miracles of democracy" achieved in society, such as freedom, human decency, and prosperity. Both science and democracy are the fruits of faith. Knowledge and proof trail along afterward. Instead of a delusion, faith turns out to be the keystone of our Western system, both in science and in democracy. President Eisenhower, in his inaugural address, endorsed this position by his personal example. We may not prefer a world founded on faith, but if that is the reality we ought to face it squarely and objectively as this country has in the past, with very great profit. Certainly it is better than a world founded on fear as is the Communist world. After decades of doubting democracy and envying the rigid logic of totalitarianisms we suddenly discover that our own system makes much better sense, that science, democracy, and religion, all three founded on faith and therefore all under the Supreme Being, are compatible elements of the Western tradition. This is the meaning of the motto on our coins: "In God we trust."

A free society, such as ours, is not an open society where everyone can do as he pleases. It is one strictly dedicated to transcendent ideals. If we lose faith in objective justice, charity and personal integrity, as the Marxists have done, then both our material prosperity and our freedom (free enterprise, academic freedom, religious freedom, and political freedom) must disappear as they did in Germany and Russia. These beliefs have survived in America more because of their practice in industry, in the home, and on the farm, and because of the influence of the church, rather than as a result of intellectual leadership or college teaching. We could use a little more intellectual leadership at this point! Ethical behavior is a miracle of democracy, just as the flight of a heavy airplane is a miracle of science. Both are "unnatural." America is still wedded to faith. This union, joined in Washington's and Jefferson's day, is still unbroken. It has borne the marvelous fruit anticipated. We ought to acknowledge our faith with pride; teach it openly and make no exception for science.

There is some evidence that the colleges are beginning to integrate science with democracy and religion, the other major areas of Western faith. If this integration is achieved, then the university again can become the backbone of our civilization. Science will contribute richly to truth without in the least discrediting the other major areas of faith. For us as individuals the need to choose between science and faith as a guide in our personal lives has disappeared. Both are faith.

By Dr. Gilbert E. Doan
The Bent of Tau Beta Pi—April 1955
What is an AGE engineer?

Wheeling, West Virginia — SUBSTATION ENGINEER Wilbur L. Kelvington outlines plans for service extensions to new customers.

New York City — NUCLEAR POWER ENGINEER Robert Hunter looks to the future in nuclear power research and development work.

Roanoke, Virginia — ELECTRONICS ENGINEER Curtis Bondurant finds electronics fascinating and in widespread use on the AGE System.

Pikeville, Kentucky — DISTRICT SUPERVISING ENGINEER James R. Burdsal and Line Foreman discuss a power line maintenance problem.

New York City — CIVIL ENGINEER Francis P. Keane helps design power plants and auxiliary facilities.

New York City — MECHANICAL ENGINEER John Tillinghast confers with manufacturer and colleagues on supercritical steam pressure unit.

Roanoke, Virginia — COMMERCIAL MANAGER John W. Vaughan directs the promotion and sale of electric power to customers.

Fort Wayne, Indiana — SUBSTATION ENGINEER Allen Wilson supervises installation of 345,000-volt oil circuit breaker.

Lima, Ohio — INDUSTRIAL POWER ENGINEER Cal Carlini tackles a difficult engineering problem posed by a major customer.

New York City — MECHANICAL ENGINEER Alfred J. Banks with a model of a new AGE generating unit.

Butler, Indiana — DISTRICT MANAGER William R. Nimmo supervises the restoration of service during a storm.

Columbus, Ohio — SYSTEM OPERATION ENGINEER William G. Omsbach helps plan economical operation of world’s largest private power system.

New York City — SYSTEM PLANNING ENGINEERS Conrad F. DeSieno and Anthony F. Gabrielle plan the AGE System of the future with a network analyzer.

Philo, Ohio — MECHANICAL ENGINEER Alan G. Lloyd helps supervise installation of world’s first super-critical pressure generating unit.

Canton, Ohio — SYSTEM OPERATION ENGINEER Richard P. Eales helps to coordinate load scheduling and the exchange of power with other electric utilities.

He’s a man with a future. He may be any of the eighteen engineers pictured above who daily solve problems of energy conversion, power application, transmission and distribution. Or he may be one of our nearly 800 other engineers who work in eight states solving many stimulating and challenging problems faced by the AGE Electric Power System. Find out about career opportunities for YOU at AGE. Read our new 24-page brochure “Join the Company that Makes the News!” It’s at your local placement office ... or write for your own copy to any of the addresses listed below, attention: Employee Relations Department.

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Appalachian Electric Power Company, 40 Franklin Road, Roanoke 9, Virginia

AMERICAN GAS AND ELECTRIC SYSTEM

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DU PONT SIZE, GROWTH PRESENT VARIED CHOICE OF JOB LOCATIONS TO QUALIFIED TECHNICAL MEN

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Engineers and scientists of all kinds work in 75 Du Pont plants and 98 laboratories scattered over 26 states. Where you’re assigned depends on your qualifications and the openings in the kind of work you want.

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Right now, most of the Du Pont units are located east of the Mississippi, but there are plants in Texas, Colorado and on the Pacific Coast, too. And new building is under way in Kansas, Tennessee, Virginia and North Carolina.

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A Boon or Bane?

By William Perkins, soph., c.e.

The America of the mid-twentieth century might well be described as “America-on-wheels.” In Indiana alone there were one million, eight hundred fifty thousand vehicles registered in 1955. Across the country there were nearly eighty million—an amazingly high ratio of almost one vehicle to every two Americans. This is not the maximum figure; R. E. Royall, chief of research reports branch of the Bureau of Public Roads, estimates that in ten to fifteen years there will be one hundred million vehicles on our roads.

These millions of vehicles necessitate a tremendous system of highways—county, state, and national; inter-city, inter-state, and transcontinental; gravel roads and four-, six, and eight-lane superhighways.

The United States doesn’t have that system of highways; the highway system of the United States was laid out for horse-and-buggy and Model T travel and, with few exceptions, has remained that way. It is entirely inadequate for the traffic, particularly on the interstate and transcontinental level. The congestion on our major arteries of travel, the many thousands of traffic deaths because of unsafe roads, the slowness of automobile travel today—these factors have finally begun to wake up the American people to the gigantic highway problem.

That the problem has been recognized is a step in the right direction. But much planning must be done, much money and much effort must be expended to build the highway system the United States needs. The first and most important question to be answered is: How can this highway system be built? That is, who will pay for it?

Many road-building experts, engineers and financiers alike, answer, “Toll roads: let private enterprise pay for and build our highways.” Albert J. Wedeking, Executive Director of the Indiana Toll Road Commission, expresses the opinions of many professional road-builders when he lists six main advantages of toll highways:

1. They are safer—death rate per miles traveled is less than the national average. The death rate per one-hundred million passenger-miles is 3.08 on the New York Thruway, Pennsylvania Turnpike, and New Jersey Turnpike. The national rate is 6.5.

2. They can be built without expenditure of tax funds.

3. The ones who use the high-
way pay for it.
4. Toll roads keep traffic off tax-supported roads.
5. Toll roads eliminate bottlenecks.
6. Most important, toll financing will give us adequate highways now, when we need them, instead of some future date.

Are toll roads the answer? Is the financing and building of the highways by private business the answer? A look at history shows us that, on a limited scale, they have been in the past.

The toll road dates back to 1663. The parliament passed a Toll Road Act in that year to try to remove their highway congestion problem by financing highways with private capital. As a result of this bill, directly or indirectly, a tremendous system of two thousand three hundred toll roads was built in Britain.

Toll roads came to America in 1792—in that year, when Washington became President, the Philadelphia-Lancaster Turnpike was completed. The name “turnpike” came from this road. Long poles armed with sharp spikes stopped the traveler at the toll station. The poles were turned aside after the toll was paid. From this came the name “turnpike.”

Toll roads in America were not very popular, but soon after their introduction they had grown until the money people had invested in them almost equaled the country’s revolutionary debt. A network of private toll roads covered the East by shortly after 1800.

Then the federal government started aiding the states with their road-building, and toll roads were forgotten until 1940. In that year the famous Pennsylvania Turnpike, the “granddaddy of our toll road system,” was completed. And many an offspring had it bad, nearly five thousand miles of toll roads are in use or under construction.

The war prohibited further turnpike building for a while, but after the war toll roads began to roll. The first toll road built after World War II was the Maine Turnpike. Then in 1950 things really began—two hundred million dollars in bonds were sold to finance the New Jersey Turnpike, the Denver-Boulder Road in Colorado, and Oklahoma’s Turner Turnpike. After a lull in 1951, toll roads came back in 1952. That year four hundred ninety-four million dollars in bonds were sold to finance roads in Ohio, West Virginia, Pennsylvania, and Oklahoma. The trend toward toll roads kept rolling as more than one billion dollars in bonds were floated in 1953, and one billion five hundred million dollars in 1954. In 1955 the trend was reversed with only seven hundred fifty million dollars in bonds being sold. Again in 1956 toll road bonds were up—nearly two billion five hundred million dollars in bonds were floated.

This history of toll roads supports the theory that they are at least part of the answer to our highway problem. The idea of toll roads showed its worth in the systems in England and early America. Then, when this idea was applied to modern situations, it worked. The majority of toll roads in the United States are decidedly in the black financially.

As the trend toward toll roads gained impetus, progress of special interest was made in one phase of toll road operation—collecting fees. This interesting sidelight deals with the development of numerous devices to prevent motorists from cheating toll roads out of their authorized fare. Taller and Cooper, Inc., who have designed and built most of the collection equipment for all the major toll highways, developed ticket-issuing machines and their counterpart exiting devices which compute the proper toll and check the time for the trip, making sure no illegal maneuvers have been used; recorders for transactions; and automatic cameras which photograph each vehicle as it passes.

Even though history has indicated toll roads to be part of the answer to the highway problem, events of the past two years seem to point out that they may not be the complete answer. The success of the Pennsylvania Turnpike, opened in 1940, seemed to indicate to engineers a new pattern for superhighways. Until the last year nothing has happened to prove any-

(Continued on page 30)
Fraternity Notes

THETA XI

Here the summer has come and gone, and it's once again time to start hitting the books. For myself and all the brothers, I would like to take this opportunity to welcome everyone back from three months of sleep, fun, and money-making.

The TX Tigers are on the prowl again! The first inter-fraternity football game saw ATO fall victim to a score of 13 to 6. Lambda Chi Alpha lost to the Tigers in the hard-fought second game to the tune of 13 to 12. The Tigers definitely have plans to keep that trophy on the Theta Xi mantle again this year.

It seems many wonderful events took place over the summer. Congratulations are in order to Brothers Brummett and Bailey, both of whom became bridegrooms. Newly pinned are Brothers Hollingsworth, Irvin, Olson, Scholle, and Tate.

Theta Xi is proud to announce that three new men have been pledged. Congratulations to Dallas Cummings, Ed Goheen, and Tony Whalen. We’re glad to have you, men!

We’re also glad to welcome back Bill Bock. It’s sure nice to once again have someone to return Brother Spoonamore’s wisecracks.

It seems there will very soon be no more leaks when it rains on the big house at 902 S. Sixth Street. Theta Xi is having a new roof put on. The contract is being handled thru our advisor, Bill Berling, a Kappa graduate of '49.

A small stag party was held in the Rec room last Saturday night. Many Brothers were in attendance. Refreshments were served. The most popular entertainment proved to be cards. Music for appreciative listening was provided by Brother Scholle’s recording of Homer & Jethro singing “Oh, I Never See Maggie Alone!”.

Plans for the Homecoming display are progressing nicely at Theta Xi. I’m sorry I can’t tell exactly what the theme will be, but all the Brothers think it is of trophy-winnin’ caliber.

It seems that’s all the news for now, so I’ll see you in the next Technic.

Eugene Amick

ALPHA TAU OMEGA

Homecoming is upon us. As usual the returning alumni will find that during the past year many changes have taken place at 1454 South Center. Gone are all the shapeless old bushes that once drooped over our front walk, and replacing them is a complete new set of shrubbery, which is a great improvement. Our parking problems are pretty well licked with a new parking lot at the rear of the house. After Brother Mike Munro, C.E., divides the new lot into lanes using his specially calibrated eyeball, it should hold six cars. Furthermore, we have completely redecorated the first floor of the house.

Many of our brothers deserve a lot of recognition for the long hours they have spent on these projects. Also many thanks are due our alumni for financing the new guttering.

Work is well under way on the homecoming display, and we are hoping for the best—which means that we are out to keep that trophy.

Our “Confirmed Batchelor” list shrank considerably over the summer. Congratulations are in order to Tom Reese, who became engaged to Nancy Waymeir. Four men lost their pins. Ernie Knoy pinned Nancy Hengstler, Jack Fenoglio pinned Margo Pesavento, Bill Perkins pinned Phyllis Swinford, and Jim “Bama” Godwin pinned Janice Scobee. And by the way, we also understand that Jim Weir is going steady. How about that, Jim?

Robert Hall

LAMBDA CHI ALPHA

This fall finds a repainting program underway at the chapter house. A professional painter has been hired to take care of the upper window frames and trim. Inside, the fellows are getting in on the painting business first hand by doing their own rooms. Some complications have arisen over loosened paper, but putty knives and scrapers seem to have the situation under control.

An election was held September 10 to fill certain vacancies which developed over the summer. At that time the following officers were elected: Dan Mook, president; Don Johnson, secretary; John Kennedy, treasurer; Terry Hallcom, social chairman; and Barlow Brooks, house manager. Congratulations to these men and may they have success in the performance of their duties.

At the time of this writing Lambda Chi is tied for second place with ATO in the IF football league, having a record of one and one. After downing Sigma Nu 19-6, Theta Kappa was edged out by Theta Xi 13-12. Although hard hit by graduation, we still entertain hopes of re-

(Continued on page 42)

THE ROSE TECHNIC
In front of the Main Building on the campus of Rose Polytechnic Institute stands, once again, the Senior Bench. The Senior Bench was originally erected by the Class of 1926, and ever since then it has been the traditional throne of the Senior Class.

Four years have elapsed since the Bench was last seen in its proper location, and during those four years much blood has been shed over its possession.

The last class to sit on the Bench was the Class of 1954. Sometimes during that year the Juniors removed the Bench and hid it in Lost Creek, planning to replace it the following year, when they would be Seniors.

This started off a chain of battles, with each class endeavoring to obtain possession of the Senior Bench. In the fall of 1954, just before Homecoming, the Seniors decided that the time was ripe to replace the Bench. One night they assembled at the creek, and dragged the Bench out of the water and up on to the bank. However, the Bench proved too heavy to carry up the hill, and the men left to get a truck.

This turned out to be a disastrous decision, for no sooner had the Seniors left, than the Juniors, who had been waiting patiently in the shadows with a truck, seized the Bench and carted it off the campus.

The next morning, which was the day of the Homecoming Game, the gentlemen of the Maintenance Department somehow decided that the Bench would hamper the proper playing of the game, and hauled it off to a place unknown to the entire student body. Mr. Herman Moeller, then the Superintendent of Buildings and Grounds, was heard to make the following remark about the Bench: “I hid that . . . . (censored) . . . . thing where they’ll never find it!”

Fortunately, Mr. Moeller was wrong. True, the Bench did stay hidden for a period of almost three years. But in the fall of 1956, a Junior, known as “Bones” Denney, found the legs of the Bench in Lost Creek, and on Monday afternoon in May, 1957, another member of the Illustrious Class of 1958, by the name of Del-Potz, was walking through the woods behind the site of the Bonfire when he stumbled over a large concrete slab. Upon closer inspection, the mysterious slab turned out to be none other than the long-lost Senior Bench.

The Juniors decided that the Bench was not in a safe-enough place, and the following night nine members of the Class of 1958 moved the Bench out to a spot near the railroad tracks and buried it. Unfortunately, this move was detected by a couple of freshmen (who will remain anonymous), and later that night the Bench was again moved, this time of the freshmen, to the bottom of the creek, under the bridge.

The freshmen (who at that time didn’t even realize the full significance of the traditional Bench) thought that they had been exceptionally clever in outwitting the Class of 1958. However, the Juniors, operating on the theory that “he who laughs last, laughs best”, observed the freshmen’s removal of the Bench and assembled on the campus the following night. Storming en masse down the hill, the Juniors hauled the Bench out of the creek, hoisted it on to “Pappy” Pierson’s waiting truck, and took it to Sullivan, Indiana, where it remained until this fall.

Shortly before Homecoming this year, the Class of 1958 permanently installed the Senior Bench in its traditional place. Two holes, three feet deep, were dug for the foundation, and concrete was poured around the ends, with steel reinforcing rods being added for strength. The total weight of the Bench and its foundation is approximately 5460 pounds. It is believed that nothing short of nitroglycerin will move the Senior Bench from its present location.

October, 1957
The purpose of this article is to counteract certain bourgeois propaganda spawned in the capitalistic palaces of the western world. The gross inefficiencies of the capitalistic system are best illustrated by their wasteful campaigns, diabolically calculated to lure the unwary engineering graduate into the green scum of greed. Hundreds of sweatshops, each shouting the blessings it can offer, battle among themselves to obtain engineers. Each of these monarchies claims to be a betterarchy than any of the others. This obviously cannot be so. By contrast, the simple beauty of proletarian dictatorship leaves little doubt.

Soviet education, long sustained by the bloodstained cause of the common people (Lenin-1921), is characterized by an aroma of urgent efficiency. Unlike the decadent American system, Communist scholastic training contains no such loathsome facets as compulsory bathing.

Our students (and we are well qualified to say this) have opportunities unparalled elsewhere in technical education. The U.S.S.R. is the only place in the world where a student can pursue full military duty and technical training simultaneously. The practicalness of this military training is best exemplified on the firing range. Serious Russian students are amazed that their bourgeois counterparts take time to dissipate their energies in useless projects so that they do not arrive home to their barracks until early in the morning.

Diversified curriculum may be had by all; Soviet electives are now obtainable in solidification, magnetization, mobilization, and liquidation.

A Russian Engineer lives in this Government provided housing development.

Fascinated students find it difficult to tear away from their studies.
Professors teaching the latter are well qualified and have profound experience.

Graduation reveals a whole new world. A strong sense of duty enchants the new graduate so that he embarks upon the technical sea with an ever increasing loyalty to the party of the people. Before long the embryonic engineer becomes stimulated to conform to the high ideals of Bolshevism. Party membership follows almost automatically. Within the party he is well content to perform his assigned tasks. He becomes increasingly aware that a communist must be prepared to make every sacrifice for the ideals of the November revolution and must maintain constant vigilance against fascist counter-revolutionaries who gnaw like jackals on the party's behindside.

Unlike frustrated American engineers, many of whom must watch their wily comrades advance above them, the Soviet engineers are not faced with this problem. The American engineer, who can be fired at the whim of his overlord, suffers a continuous feeling of insecurity. On this side of the wall engineers are not fired so easily—a special group of nine men are required to pass final judgment. This very seldom happens due to the astonishing success with which the Russian engineer meets his projects.

In the U.S.S.R. equality is a byword. The quiet serenity prevalent in the Soviet Union is not disturbed by citizenry seeking equal rights. Certain recent disturbances in the U.S., which were quelled by the use of troops, indicate that the U.S. lacks equal education. Russian newspapers have never carried such stories. Throughout all of the motherland even women are allowed to undertake industrial pursuits on the same basis as men. In our growing economy, brought about by limitless employment opportunities for the entire family, laziness has been virtually eliminated.

Russian engineers, often considered the cream of Soviet society, receive wages amounting to three times that of the worker, who realizing the necessity for Soviet technological advancement harbor no ill feelings. This results in an extremely high standard of living for engineers.

Herewith are a few of the many testimonials from successful engineers. We should like to thank the NKVD for their cooperation in collecting this material.

"I have spent a long and useful life in scientific pursuits. Forty years of thrift have enabled me to purchase a Volkswagen to enjoy in my old age."

Olaf Strumsknov

"During thirty years of teaching, I have reaped great blessing from Article 35 of the Soviet Constitution—the right to smoke. The good-tasting Siberian chalk and sturdy chairs have also added to my enjoyment."

Dr. Alexander Phiphinov

"My family has enjoyed great benefit from my substantial engineering income, only occasionally do I have to supplement my income by chopping wood commercially."

Georgi Bunyonich

"A strict engineering education has enabled me to concentrate on

the technical aspects of dashhound raising. I hope shortly to produce a new breed, two feet high and six feet long for the glory of communism. I hope that eventually this work will fulfill the requirements of my doctor's thesis.

Anonymous.

Comrade engineers! We must beware of the smutty propaganda put out by fly-by-night electronic gypsies touring eastern Europe. These trained puppets claim that we cannot think freely. This obviously is a lie. Why in engineering the intellectual horizon is limitless. This kind of thinking successfully launched the first earth satellite, Comrades! Just recently, Kikhail Blabberor, who was one of our foremost engineers, voiced his opinion on the world situation.

Fellow engineers, we have accomplished much, but we must work on at an even greater rate until the smear of capitalism is wiped from the face of the earth. Today, communism's battles are fought in the laboratory rather than on the battlefield. We are now Russia's front-line troops. If we can continue our growing list of scientific "firsts", the future of Communism is assured.
Another school year seems to have rolled around and the campus is buzzing with activity after a summer's recuperation. Several changes and improvements were made during the summer to provide additional facilities and change obsolete ones. The parking lot behind BSB Hall has been enlarged and resurfaced to provide plenty of good parking area for residents. The new surface should prevent a recurrence of last year's mass evacuation (What a mess—remember?). The south shore of the large lake has a somewhat bare look since the last of the familiar temporary barracks were removed over the summer. Directly below the former location of the barracks, a new sand beach has been built. This will doubtless become popular next Spring when swimming can be enjoyed. We have a new road through a scenic, but seldom seen portion of our campus; it turns off the field house road just before the bridge, follows the creek through the woods for about a mile or so, climbs the hill behind the lakes and come out alongside BSB Hall. (No drives recommended within a few days after a hard rain). So much for new developments and on with some activities.

The Campus Club sponsored a mixer on Friday night, September 13, in the student center; we entertained the nurses from Union and St. Anthony hospitals. Music for dancing, and refreshments were provided and the pep band played a group of selections. It was a very enjoyable evening except that too many fellows didn't get the urge to dance and some of the guests sat out most of the night. They are just shy, girls.

The Campus Club recently completed its annual organization and membership campaign to obtain funds for the year's social program. This year's officers are President, Paul Cella; Vice President, Bruce McDowell; Secretary, Flav Reising; Treasurer, Dallas Cummings. Tony Whalen is our social chairman and has numerous events scheduled. The Executive council and student court are both organized and will have freshmen members added at a later date.

A recent swimming party sponsored by the sophomore class, welcoming the incoming freshmen. The party was held on the larger lake and everyone enjoyed the water! The question, is hazing to continue or to be dropped entirely here at Rose.

Dr. Wilkinson, Professor Palmer and Dr. Bankoff shown here with Louis Fischer following a lecture entitled "A New Era in World Affairs." Mr. Fischer is well traveled and has written several books on Russia and India. His view that world wars are now out of the question was reassuring.
VARSLY FOOTBALL
The 1957 Rose Fighting Engineers are starting what promises to be one of the better football teams in recent years. They have already put two wins and one defeat under their belts. The Conference record so far stands at one win and no defeats.

The team is composed, as usual, of mainly freshmen. Upplassmen include Ned Kurtz, Capt. "Rocky" Herakovich, Max White, Terry Hallcom, Johnny Kirk, Gary Anderson, Gene Blythe in the backfield. The line includes Bill Kuchar, Jack Fenoglio, Don Scott, Bart Gronberg, "Woody" Stroupe, Bob Jackson, John Davis, and Bob Mewhinney.

The strength of the squad is bolstered by many freshmen who are providing Coach Brown with the promise of even greater teams in the next couple of years. These freshmen include Darrell Longfellonw, a halfback from Hoopeston, Ill. who has a great potential and is realizing that potential more and more each game. Also in the backfield is Bob Michaels from Cleveland, Ohio. Bob is looking more each day like the charging fullback that coaches dream of.

Bolstering the line are Ed Kostra and Don Ireland. They put fear into the meanest opposing linemen and are helping put the backs across the goal line.

The next two games ae conference games away from Rose and the next home game is Homecoming against Franklin.

VARSITY BASKETBALL
The gleaming new finish on the Rose basketball court has attracted many men who unofficially try out for the basketball team. Basketball games are in progress at all hours of the day and one can get a preview of what might be the Rose basketball team by visiting the fieldhouse.

Coach Jim Carr is looking forward to a good year with the return of a terrific number of sophomore.

INTRAMURAL FOOTBALL
Rose's new intramural athletic director has lost no time in getting the intramural program into full swing. The football league has many fine teams entered and should provide some terrific competition among the students in their spare time.

Mr. Kidd has started the ball rolling early this year and is getting the enthusiastic backing of the majority of the students.

The Interfraternity football league is red hot this year. Theta Xi leads the league with a 3-0 record. Alpha Tau Omega is in second place with a 2-1 tally. Lambda Chi and Sigma Nu are very close behind with 1-2 and 0-3 records, respectively.

CROSS COUNTRY
With the new intramural director comes a new sport to the already lengthy list of sports in which the Rose man can participate. Cross country running has been added to the program and should provide some of the fun of running without the hard, everyday training schedules needed for the shorter track events. The first big cross country meet is scheduled for the half-time of the Homecoming football game.

TENNIS AND HORSESHOES
For those who like the game of tennis, the intramural setup has once again incorporated both doubles as well as singles competition. The horseshoe courts have been set up just south of the fieldhouse. Both singles and doubles have been scheduled to determine the champion horseshoe pitcher of Rose.

ALL-INTRAMURAL TROPHY
A new incentive has been added to the intramural activities. This is a large trophy which will be awarded to the section, housing unit, or class that has the greatest number of intramural points at the end of the year. This is indeed a handsome trophy and should bring out the Rose men to the intramural fields in droves.

By John C. Fenoglio, jr., ch.e.
How Free The Piston?

By Larry Logue, jr., m.e.

The automotive industry today is busily seeking a replacement for the standard piston and crankshaft engines which are in use now. The most publicized approach is the gas turbine, but the free-piston engine is receiving as much attention from the large manufacturers.

What is a free-piston engine? Is the piston really free? The pistons of such an engine are not directly connected to the output shaft, but they transfer their work through a fluid system to the output shaft. The diagram shown here traces the path of the working fluid through the engine.

We see from the diagram that there are actually two pistons operating in the same cylinder. This brings up the problem of piston "freedom". If the pistons were not linked together they would become out of phase with each other and the engine would not function. Several means of synchronizing the pistons have been tried by various manufacturers. The most satisfactory solution is to attach a rack to each piston with a pinion, which has a fixed axis, engaging both racks.

One of the biggest problems in making the engine practical is finding a convenient method of starting it. Since turning the output shaft will not move the pistons, some other way must be found to force the pistons together. Present methods range from the use of springs to the introduction of compressed air into the bounce chambers. The English Pescara-Muntz engine uses a long coil spring which is compressed by 28 turns of a large hand crank. If the engine fails to fire the first time, the entire process must be repeated. The use of compressed air is probably the best method in use now.

As in most two-stroke diesel applications, direct fuel injection is preferred to the use of carburetors. In ordinary engines the injection pump is driven by the crankshaft. In the free-piston engine the pump is usually driven by the synchronizing rack. Injection should occur near the point where the pistons are farthest apart. Since the rack has no motion at this point, unusually long injection pipes must be used to provide a time lag so that the pump can act slightly before injection is desired.

Ignition is another factor which shares some of the problems of fuel injection. Engines have been built, however, which seem to operate as well with either spark or compression ignition. The latest Ford experimental engine is started on spark ignition and then run on compression ignition.

Another big engineering headache is provided by the fact that with changing load conditions the length of the piston stroke changes. If the engine is run for a long period of time at light loads, combustion deposits build up on the exposed cylinder wall. If the load is then increased, the stroke increases and scrapes the piston rings across the deposits. This causes an excessive amount of ring clogging and breakage.

To compare the piston motion characteristics of these engines to piston-crank engines, Ford ran a series of tests using high speed photographs to study the motion. Photographs were taken at the rate of one frame per 0.000333 seconds. The results of these tests are shown on the graphs which follow. The simple harmonic motions of the piston-crank engine are included for comparison.
In the April issue of the TECH-NIC we reported that the Rose Library had received a grant from the United States Steel Foundation. The purpose of the grant was to improve our twentieth century literature. With the exception of a few dollars the entire grant has been spent, and it is with pleasure that we announce the authors and titles of the books purchased from this generous gift.

Axelrod, George. Seven Year Itch.
Brooks, Van Wyck. Days of the Phoenix.
Benet, Stephen Vincent. Twenty-five Short Stories.
Bierce, Ambrose. Collected writings.
Cather, Willa. My Mortal Enemy, O' Pioneers, Professor's House, Song of the Lark, Willa Cather in Europe.
Clarke, Arthur C. The Deep Range.
Cummings, Edward E. Collected Poems and Enormous Room.
Dos Passos, John R. Three Soldiers and U.S.A.
Druon, Maurice. The Strangled Queen.
Elder, Donald. Ring Lardner.
 Eliot, Thomas S. Complete Poems and Plays, Confidential Clerk, and Essays on Elizabethan Drama.
Farrell, James T. Short Stories and Studs Lonigan.
Fitzgerald, F. S. K. Beautiful and Damned, Crack-up, and This Side of Paradise.
Green, Gerald. The Last Angry Man.
Haycraft, Howard. Treasury of Great Mysteries.
Hemingway, Ernest. Fiesta, Men at War, Men without Women, Winner Take Nothing.
Henriques, Robert. A Hundred Hours to Suez.
Horn, Francis H. Literary Masterpieces of the Western World.
James, Henry. Short Stories.
Jeffers, Robinson. Roan Stallion and Other Poems.
Lawrence, David H. Complete Short Stories, Lady Chatterley's Lover, Sons and Lovers.
Lewis, Sinclair. Selected Short Stories.
Kruth, Joseph Wood. American Drama Since 1918 and Modern Temper.
Marquis, Don. The Lives and Times of Archy and Mehitabel.
Mencenk, Henry. American Language.
Miller, Arthur. Crucible and View from the Bridge.
Morgan, Charles. Challenge to Venus.
Myrer, Anton. The Big War.
Nemerov, Howard. The Homecoming Game.
Nicoll, Allardyce. The Elizabethans.
Norris, Frank C. Tower in the West.
Odets, Clifford. Six Plays.
O'Faolain, Sean. Finest Stories.
O'Neill, Eugene G. Ah, Wilderness and Moon for the Misbegotten.
Patrick, J. Teahouse of the August Moon.
Porter, Katherine A. Flowering Judas and Pale Horse, Pale Rider.
Ronan, Tom. Rogue Yates.
Rose, Reginald. Six Television Plays.
Runyon, Damon. Runyon from First to Last.
Shaw, George Bernard. Selected Plays.
Stein, Gertrude. Selected Writings.
Steinback, John. Short Reign of Pippin IV.
Synge, John M. Plays, Poems and Prose.
Thomas, Dylan. Adventures in the Skin Trade, Child's Christmas in Wales, Collected Poems, and Prospect of the Sea.
Thurber, James. Wonderful O. Troy, Una. We Are Seven.
Tucker, Samuel M. Twenty-five Modern Plays.
Van Doren, Mark. Home with Hazel and Other Stories.
Warren, Robert Penn. All the King's Men and Brother to Dragons.
White, William Allen. Autobiography and Forty Years on Main Street.
Williams, Tennessee. Baby Doll and Streetcar Named Desire.
Wolfe, Thomas. From Death to Morning.
Here Comes The Omar Man!

By Noble Huff, soph. ch.e.

Olaf and Dean Strum (from left to right).

One of the most colorful people on the Rose campus, by virtue of his miniature yellow bus if nothing else, is Robert D. Strum. As his automotive tastes indicate, he is a sort of modified non-conformist. He believes that it is unwise for people to behave like sheep, and that prudent independence is the mark of manhood. His motto is that of another famous person, Satchel Paige. It is "Never look back, something may be gaining on you!"

Professor Strum was born in La-Crosse, Wisconsin, and when he was quite young his family moved to Terre Haute and his father became athletic director at Indiana State Teachers College. However, he is still a Badger at heart, and claims Wisconsin as his home. He graduated from Wiley High School in 1942, after having been president of his senior class and captain of the basketball team. He then attended Rose for one year.

The war interrupted his college career and he spent three years in the Navy. Two of these years were spent in engineering training under the wartime V-12 program. The third was spent as engineering officer on a destroyer in the Atlantic. After the war Professor Strum returned to Rose to complete work on his B.S. degree.

From 1946 to 1948 he worked for the Electromotive Division of General Motors. In 1948 he was called back to Terre Haute by the illness of his mother. One day he came out to the Institute just for "old times sake" and Dean Moench asked him to be an instructor for nine months. He has been here ever since. He started as an instructor in the Mechanical Engineering Department, and he claims that he had to get up at 4:00 A.M. each morning and study in order to understand what he was teaching that day.

In the summer of 1954, he didn't have a summer job, and "having nothing else to do", he married Miss Ione C. Thornton. Miss Thornton was at the time teaching English at Crawfordsville High School. Earlier she had received her education at Indiana State.

Professor Strum has traveled in all 48 states. He has spent the past two years working on his masters degree at Stanford University, and he finds the San Francisco area very impressive. He feels that both the climate and the intellectual atmosphere are quite stimulating, and he hopes some day to live there. He enjoys traveling and believes that on long trips, camping along the way is the most economical and enjoyable way to go.

He has rather diversified hobbies. He enjoys reading since he subscribes to 14 magazines and can't stand to see them go to waste. As the son of an athletic director, he enjoys all active sports except bowling, and especially tennis and swimming. He also enjoys entertaining Olaf, his 90 pound Labrador Retriever; who frequently takes him for walks. Another of his athletic hobbies is writing Controversial Corner for this magazine. He has not yet been infected by either the hi-fi or amateur radio bug.

He is now Assistant Professor of Electrical Engineering, Dean of Freshmen, and co-ordinator of the Engineering Computations program. He is also a member of the American Institute of Electrical Engineers, American Society for Engineering Education, American Association of University Professors, Tau Beta Pi, honorary fraternity, and Blue Key.

He has derived great satisfaction from his career at Rose, and he feels that the Institute has done and is doing an excellent job of making engineers, and that its standards of proficiency must never be lowered. He feels that the honor system should be adopted here, and since the Institute exists for the students, they should have more voice in running its affairs.
How to write a success story

STANLEY NELSON, automotive engineer, is typical of many young men we like to tell about in the Standard Oil organization. He keeps proving to be the right man in the right job as he advances with us.

Stan likes engineering, of course. He graduated from the University of Minnesota with a B.S. degree in Mechanical Engineering in 1950.

He likes people. He especially likes to get into business problems with them where he and his company can help. Truck maintenance, lubrication, and fuel consumption are big items to fleet operators, large and small, who have found that help from Stan pays off—for them.

And he likes selling. He functions frequently as a key man for the sales department. His intelligent analysis of a problem in his field may either improve our service to a valued customer or help us to secure a new one.

He likes to keep moving, too, and he’s done that. He held several sales positions in Minnesota and attended Standard’s intensive Sales Engineering School in Chicago before being promoted to his present position in which he works out of the Mason City, Iowa, division office.

As men like Stanley Nelson earn their way upward in our organization we have frequent openings for ambitious college men to follow them. You might find a career in engineering, research or sales with this stable and progressive company rewarding, too.
What’s doing...

One indication of accomplishment in the combustion field: the J-57 engine, augmented by afterburner, provided the thrust which made supersonic flight practical for the first time.

This special periscope gives Pratt & Whitney Aircraft engineer a close-up view of combustion process actually taking place within the afterburner of an advanced jet engine on test. What the engineer observes is simultaneously recorded by a high-speed motion picture camera.
at Pratt & Whitney Aircraft
in the field of Combustion

Historically, the process of combustion has excited man's insatiable hunger for knowledge. Since his most primitive attempts to make use of this phenomenon, he has found tremendous fascination in its potentials.

Perhaps at no time in history has that fascination been greater than it is today with respect to the use of combustion principles in the modern aircraft engine.

At Pratt & Whitney Aircraft, theorems of many sciences are being applied to the design and development of high heat release rate devices. In spite of the apparent simplicity of a combustion system, the bringing together of fuel and air in proper proportions, the ignition of the mixture, and the rapid mixing of burned and unburned gases involves a most complex series of interrelated events — events occurring simultaneously in time and space.

Although the combustion engineer draws on many fields of science (including thermodynamics, aerodynamics, fluid mechanics, heat transfer, applied mechanics, metallurgy and chemistry), the design of combustion systems has not yet been reduced to really scientific principles. Therefore, the highly successful performance of engines like the J-57, J-75 and others stands as a tribute to the vision, imagination and pioneering efforts of those at Pratt & Whitney Aircraft engaged in combustion work.

While combustion assignments, themselves, involve a diversity of engineering talent, the field is only one of a broadly diversified engineering program at Pratt & Whitney Aircraft. That program—with other far-reaching activities in the fields of instrumentation, materials problems, mechanical design and aerodynamics — spells out a gratifying future for many of today's engineering students.

Mounting an afterburner in a special high-altitude test chamber in P&W's Willgoos Turbine Laboratory permits study of a variety of combustion problems which may be encountered during later development stages.

Microflash photo illustrates one continuing problem: design and development of fuel injection systems which properly atomize and distribute under all flight conditions.

Pratt & Whitney Aircraft engineer manipulates probe in exit of two-dimensional research diffuser. Diffuser design for advanced power plants is one of many air flow problems that exist in combustion work.
George R. Armstrong, ch.e., was recently elected president of the Louisville Gas and Electric Company. After graduation from Rose, Mr. Armstrong worked briefly for a cotton ginning company in Oklahoma. In 1922, he was employed by the gas company as an hourly rated employee and also taught mathematics in Louisville Male High School. In 1929, Mr. Armstrong was appointed Superintendent of Construction, and in 1939 was made Assistant General Superintendent of the Operating Department. In this capacity, he supervised the operations and construction work of the company until 1946, when he was elected a director of the company. Mr. Armstrong became Executive Vice President of the company in 1948.

Granville P. Brosman, e.e., was selected to head a new division as Division Engineering Manager for Illinois Bell Telephone Co. Mr. Brosan was formerly General Traffic Supervisor for the same company.

For the information of their fellow classmates, the underclassmen and other alumni of Rose, here is a partial list of the Class of 1957 and the companies for which they went to work.

Robert E. Burtner, ch.e., Graduate Student, Purdue University.
Howard L. Chambers, m.e., Remington Arms Co.
Charles D. Corbin, e.e., B.A. DePauw, ’57, Collins Radio
John D. Cordill, ch.e., Allison Division, GMC.
Carl E. Cunningham, ch.e., Olin Mathieson
John H. Derry, e.e., Instructor at Rose Poly.
Jimmie K. Dyer, ch.e., Procter & Gamble Co.
David C. Flock, e.e., Interstate Electronics Corp.
Jack L. Foltz, ch.e., U. S. Patent Office
James S. Freers, m.e., Ford Motor Co.
Ronald D. Freiberger, m.e., A.R.F. Products, Inc.
Clyde R. Frump, ch.e., Goodrich-Gulf Chemicals, Inc.
Fred W. Goetsch, e.e., Indiana Bell Telephone Co.
Harvey A. Greene, c.e., Indiana State Board of Health
James L. Griffith, e.e., General Electric Co.
Paul R. Harder, e.e., U.S. Patent Office.
Richard E. Hirst, m.e., 2/Lt. Army Engineers.
John F. Hornung, e.e., Interstate Electronics Corp.
Velmar E. Howard, e.e., Delco Products.
Joseph P. Innis, e.e., Pennsylvania R.R.
Henry E. Jackel, m.e., Graduate Student, Purdue.
John H. King, Jr., e.e., General Electric Co.
Floyd A. Koontz, e.e., Wilcox Electric.
Peter B. Lanham, III, m.e., U. S. Patent Office.
Robert M. Letsinger, e.e., International Harvester Co.
Paul H. Lewis, e.e., Interstate Electronics Corp.
Jack L. McDonald, m.e., Ohio Oil Co.
Harry E. McGuire, e.e., Bendix Products Division—Missiles.
Jerry R. Marlow, m.e., Cummins Engine Co., Inc.
James L. Martin, m.e., Indianapolis Power and Light.
David J. Moeller, m.e., Kimberly-Clark Corp.
Gene L. Mrava, m.e., Thompson Products.
Robert A. Newgent, ch.e., Firestone Tire & Rubber Co.
Robert L. Overpeck, e.e., Minneapolis Honeywell Ordnance.
James T. Peabworth, ch.e., Monsanto Chemical Co.
Thomas L. Pfeffer, e.e., General Electric Co.
Gerald E. Pruitt, e.e., Honeywell Aero Div.
Earl T. Reichert, m.e., McDonnell Aircraft Corp.
James J. Roach, m.e., Douglas Aircraft Co.
Gerald C. Rose, e.e., Interstate Electronics Corp.
Fred H. Sauerteig, e.e., Indianapolis Power and Light.
Kent P. Sharp, e.e., Hazeltine Electronics Corp.
William E. Shaw, c.e., Geo. L. Mesker Steel Corp.
Jack D. Shumate, ch.e., Procter & Gamble Co.
L. Donald Simpson, ch.e., Cities Service.
Tests on Asphaltic Materials

The suitability of an Asphaltic material for highway or other use depends upon characteristics which can be determined by a series of tests. Four of the principal tests are:

**PENETRATION TEST** (Fig. 1) indicates the consistency or hardness of Asphalt cements (which are semi-solids) used in hot-mix Asphalt pavements. The softer the product, the greater its number of penetration units. On the basis of consistency...denoted by penetration ranges...Asphalt cements are classified into grades. Those paving grades now recommended by The Asphalt Institute are:

**PENETRATION GRADES**
- 60-70
- 85-100
- 120-150
- 200-300

(a 40-50 penetration grade is recommended for special and industrial uses.)

**VISCOSITY TEST** (Fig. 2) indicates the fluidity of liquid Asphalts. Viscosity measures the consistency of these products just as the penetration test measures the consistency of semi-solid products. Those liquids flowing too slowly for accurate measurements by the viscometer at 77°F are tested at higher temperatures—usually at 122°F, 140°F, or 180°F.

**FLASH POINT** (Fig. 3) indicates the temperature at which vapor ignition may occur when heating and manipulating Asphaltic materials.

**DISTILLATION TEST** (Fig. 4) indicates the amount of Asphaltic residue to expect in liquid Asphalts after lighter constituents volatilize under manipulation and use. It indicates, too, the relative rapidity at which these lighter constituents “cure” out of the Asphalt.
thing to the contrary — the New Jersey Turnpike, opened in 1952, was a gigantic success. But now two new roads—the Ohio Turnpike, which stretches two hundred forty-one miles across northern Ohio, and the eighty-eight-mile Charleston-Princeton Turnpike in West Virginia—are in financial trouble.

Traffic and revenue on the Ohio superhighway has amounted to only one-half the estimate. The main deficit is in truck travel—only one-third of the estimated amount of truck traffic has made use of the road. Truckers give two reasons: 1. The fares are too high—the cost is 7.2 cents per mile for the average truck—this compares with 3.6 cents on the New Jersey Turnpike and 4.2 cents on the Pennsylvania Turnpike. 2. When automobile traffic switched to the toll road, free United States highways were left relatively clear for trucks. Ohio Turnpike men are trying to bargain with truckers on rates.

The Ohio road is not the only turnpike having trouble with truckers. In Pennsylvania the turnpike commission is trying to effect a 20 per cent reduction in truck rates “in an effort to draw the commercial traffic that is the meat and potatoes of any toll diet.” A 41 per cent increase in passenger car rates would be coupled with this reduction to offset any resulting loss. All in all, the turnpike commission figures the rate changes will bring in four million dollars more a year. Although in Pennsylvania the original road has been consistently paying out, it is the new additions that are not meeting with expectations of engineers.

In West Virginia the reason for financial trouble is in question. George W. Burpee, senior partner of Coverdale & Colpitts, the engineering firm that estimated the West Virginia roads’ tolls, says, “West Virginia suffered an economic decline last year, and this was the principal reason for the fall-off in truck traffic.” He feels sure the turnpike will be in good financial shape in a few years.

On the other hand, many engineers feel that the road is failing because there was no good reason for building the road. The location was bad, as they say traffic has shown. They think one of the biggest reasons for the financial trouble of this road is that engineers have not considered one primary point dealing with a toll road: it will pay out only under certain conditions. The New Jersey and Pennsylvania Turnpikes are products of these conditions—the one a product of concentrated traffic, the other of rough country. Many of the turnpikes under consideration do not have any such conditions— and as such they cannot but fail, as the West Virginia road. “Most traffic engineers now think that the majority of toll roads in existence and under construction will survive, but they are not optimistic about new routes. In Washington, Bureau of Public Roads officials say that there are few places left in the United States where toll roads would be financially practical.”

These Bureau of Public Roads officials could easily start an argument with many engineers who still feel that toll roads are the answer to our problem. Whether they are the answer or not, whether there are more desirable locations for turnpikes are not, the United States may never find out. For, after voting against three different highway bills in 1955 because of a squabble over the method of financing, Congress finally passed the Federal Interstate Bill of 1956.

This new national highway law eliminates much of the need for toll roads. Under this new program, the federal government will finance most superhighways to the extent of 90 per cent. This cuts down the need for toll roads, since their chief attraction is funds now, when they are needed. Under the new federal program toll roads in use will continue as toll roads, and construction of presently-planned toll roads will proceed. However, plans for more have been or will be “junked.”

In 1958 Congress will consider the possibility of including present toll roads in federal “free” systems. Should they decide to include these roads, Congress would reimburse state and/or private investors for their costs and return on their investment.

Already repercussions as a result of the federal aid bill have been heard. Abandoned toll road plans now include Ohio's two hundred sixty-two-mile North-South Turnpike, the Dallas-Houston Turnpike in Texas, and a North-South Toll Road in Oklahoma.

Toll road plans in Florida for a road from Port Pierce to Jacksonville and in Michigan are moving along. In both cases officials claim the federal aid system will not be quick enough to solve the traffic problem. But these plans are the exceptions; almost everywhere in the country toll road plans are being forgotten as the state and municipal officials make plans to get in step with the federal interstate system, free from tolls.

The toll road situation, at the time the Federal Interstate Bill was passed, is very concisely stated by U. S. News & World Report:

<table>
<thead>
<tr>
<th>Miles</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>1,854</td>
<td>$2.4 billion</td>
</tr>
<tr>
<td>1,375</td>
<td>2.5 billion (estimate)</td>
</tr>
<tr>
<td>4,874</td>
<td>5.6 billion (estimate)</td>
</tr>
</tbody>
</table>

"But, in the future,
1. Free roads can be built by states with up to 90 per cent of cost borne by federal government under the new highway plan.
2. Toll roads lost most of their appeal, as a result, and the $5.6 billion of projects that are not yet started may never be built."

Even a more startling repercussion of the Federal Interstate Bill (Continued on page 38)
Yes, we want engineers,

...we don't want just any engineer. We want engineers with ideas, engineers with drive, engineers who can stick with a job and work with other people to get it done. Scientists, business and liberal arts graduates, too.

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BAKELITE COMPANY  Plastics, including polyethylene, epoxy, fluoroethylene, vinyl, phenolic, and polystyrene. J. C. Older, River Road, Bound Brook, N. J.

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HAYNES STELLITE COMPANY  Special alloys to resist heat, abrasion, and corrosion; cast and wrought. L. E. Denny, 725 South Lindsay Street, Kokomo, Ind.

LINDE COMPANY  Industrial gases, metal-working and treating equipment, synthetic gems, molecular sieve adsorbents. P. I. Ench, 30 East 42nd Street, New York 17, N. Y.

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UNION CARBIDE NUCLEAR COMPANY  Operates Atomic Energy Commission facilities at Oak Ridge, Tenn., and Paducah, Ky. W. V. Hamilton, P. O. Box "P", Oak Ridge, Tenn.

VISKING COMPANY  A pioneer in packaging—producer of synthetic food casings and polyethylene film. Dr. A. L. Strand, 6733 West 65th Street, Chicago, Ill.

Research and Development

By John Kassebaum, sr., e.e. and Robert Hall, jr., m.e.

STICKINESS

A new refractory cement which will hold metal to metal, glass, or ceramics, despite temperatures between -420 and 1000 degrees Farenheit has been developed. This cement, CA-9, is di-electric and highly shock-resistant throughout its temperature range, the upper limit of which can be extended to 1500 degrees by modifying the composition.

This material remains slightly malleable after drying. Thus it will not crack, craze or check even if used on a constantly flexing surface or to join materials with widely different thermal expansion coefficients.

A joint of CA-9 between two pieces of metal will resist 80 psi of shear force at temperatures up to 900 degrees Farenheit. It is unaffected by 15 minutes of 45G vibration through a one-inch double amplitude at 1500 cycles per second. Wires embedded in the cement are not shorted by complete submersion in water.

The surfaces to be joined need not be cleaned mechanically but only with chloroform or trichlorethylene. Ordinarily, the cement is air-dried for six hours at at least 60 degrees Farenheit, then cured at 300 degrees for two hours; but various compositions are available offering different cure times at different temperatures, with or without air-drying.

POCKET PH METER

A new aid in determining PH has been developed by Beckman Instruments, Inc. This instrument, measuring only 6 inches long, 2 inches deep, and weighing 2 pounds, as its size indicates, can be a valuable asset to the engineer in the field as well as the laboratory chemist. It has one very unique feature. Attached to the meter is a small combination glass and reference electrode which is on a 36-inch lead. This lead enables the sensitive electrode to be used either clamped to the instruments side or moved freely about. The electrode consolidated with apparatus within the meter has the ability to measure PH's with a possible readability of 0.1 PH. The seldom encountered lower PH values can also be measured by making a simple adjustment.

This mighty mite has encased in its tough, acid resistance plastic case only six standard batteries. These batteries supply all the power necessary for the operation of the meter.

(Continued on page 48)
WORLD'S LARGEST ELECTRONIC BRAIN

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In almost the twinkling of an eye, electronics handles calculations that would take any person days of work.

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you can learn more
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Glenn Seidel, Vice President in Charge of Engineering, BME, Minnesota, '36

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Dr. Finn Larsen, PhD, Iowa State, 1948
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E. H. Olson, BA, U. of Minnesota, 1937
Director of Aero Engineering

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Clyde A. Parton, BSEE, U. of Alabama, 1940
Director of Ordnance

"Here at Honeywell Ordnance we're putting all our experience and imagination into maintaining America's technological lead. We work in such new fields as infrared sensors, missiles, servo mechanisms, new types of turret control systems. We've developed proximity and mechanical fuzes, antiaircraft fire control systems, underwater warfare equipment and other products in widely diversified fields. Our more advanced products, naturally, are still classified, but they offer outstanding challenges and opportunities."

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THE ROSE TECHNIC

Page 36
sides of Honeywell

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George J. Schwartz, MIT, '42
Vice President
and General Manager

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MICRO SWITCH DIVISION
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R. W. Paubly, BSEE,
U. of Illinois, 1932
Director of Product Research

"Products of our Micro Switch Division help giant aircraft land safely, interlock machine tool operations, feed instructions into electronic computers. These are just a few of their applications—applications which are growing year after year. The development of these precision switches requires high engineering skill, puts a premium on your imagination, offers you tremendous opportunities for advancement and recognition."

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MINNEAPOLIS, MINNESOTA

H. T. Sparrow, BSEE,
U. of Minnesota, 1930
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C. L. Peterson, BSEE,
U. of California, 1924
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S. A. Keller, BS,
U. of Pennsylvania, 1941
General Manager

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R. L. Michelson, Dept. TC29C
Personnel Administrator
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Minneapolis 8, Minnesota

Honeywell

October, 1957

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was the drop in price of the bonds for existing toll roads. Some of the toll road bonds are backed by the state governments, but most are backed only by the revenue from the road. With the new federal aid program, investors are inclined to doubt the stability of toll road bonds, feeling the freeway system will take traffic away from the turnpikes. Thus the price of bonds took a sharp dive in early fall, 1956.

Many of the bonds dropped as much as twenty dollars per one hundred of face value in market value. The bonds, which qualify as tax-exempt securities, are therefore paying extremely high interest rates. For example, the bonds for the Indiana Turnpike (which pay 3.5 per cent interest on face value and mature in 1994) have fallen to a recent market price of eighty-five dollars and twenty-five cents per one hundred dollars of par value. This means that their actual yield is 4.30 per cent.

The West Virginia Turnpike, which has had financial trouble since it was opened late in 1954, has the lowest price bonds, recently selling at fifty-four dollars for one hundred dollars of par value. This gives a yield of 7.56 per cent (based on the normal 3.25 per cent interest). These bonds are backed solely by tolls and concessions. Here, investors might well get in "hot water" unless revenues raise.

The federal-aid-to-highways program cannot help but kill toll roads. States and cities won't depend on private enterprise when they can get 90 per cent aid from the United States: no new toll roads will be built. The present roads will eventually be taken into the fold as United States interstate highways. Bond issues will fail if they aren't; toll roads can't compete with freeways. There are no other alternatives: the Federal Interstate Bill spells death for toll roads.

As an individualist and a prospective engineer, I believe the federal government took the wrong turn in the road when it chose the Federal Interstate Bill. It turned down the road marked "federal control" and "socialism" instead of continuing down the road marked "toll roads" and "private enterprise." Congress couldn't see where it was going down the "toll road," so it turned. It didn't realize that all the "toll road" needed was some road signs—some road signs reading "federal planning and coordination."

It would be hard to turn back now; the choice has been made. The taxpayer will pay for our new roads, whether he uses them or not. In this age when the trend is toward socialism, private enterprise could have answered our highway problem. Federal planning and coordination of a coast-to-coast toll road network could have given us the highways we needed, now, and could have placed the cost where it belonged, on the user of the road.

Are toll roads the answer to our highway problem? They might have been. We will never know.
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October, 1957  Page 39
"Your future has already started"

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"So, my advice is that you start thinking about the aircraft industry. It offers the greatest opportunities... opportunity to use your training, to advance, to make a comfortable living. It's still a young industry and it thrives on and encourages young ideas."

Scenes like this are taking place on campuses all over the country. Engineering professors must keep up with scientific advances. They realize that these advances mean added opportunity for soon-to-graduate students. Research in the aircraft industry has uncovered so many areas for further study that young men are urgently needed to solve these problems. Long a pioneer in new facets of aviation, Northrop is one of the companies that wants such aggressive young men.

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Products are only as good as the engineers behind them and good engineers require good surroundings. In line with this thinking, Northrop has built a multi-million-dollar Engineering and Science Center in Hawthorne, California, that is as modern as any in the industry. Here, you will be working with leading engineers who respect your individuality, initiative and engineering abilities. In addition, at Northrop you will receive added benefits that are among the finest in the industry.

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OCTOBER, 1957

Page 41
FRATERNITY NOTES
(Continued from page 16)
gaining the title, so beware.

Lambda Chi is proud to announce the pledging of two new men. They are Don Weidner, senior, and Conrad McGinnis, sophomore. We feel these men will make fine members and wish them well during their pledge training.

The summer of 1957 will be marked down as one of the more active summers in the romantic department, for four members lost their pins during that period. John Davis pinned Miss Janet Bridgewater of North Vernon, Indiana; Bart Gronberg lost his to Miss Marilyn Tope of Riverside, Illinois; and Miss Linda Link of Paris, Illinois, now, wears Noble Huff's. Finally I took the step and pinned Miss Shirley King of Brazil. It is rumored by reliable sources that Brother Hildenbrand is considering a depletion in his jewelry supply soon.

Jim Barrick

SIGMA NU
The first order of business for Beta Upsilon this year was the formal initiation of our pledge class. The new additions to the chapter are: Gary Anderson, Jim Bauch, Ken Brown, Kirk Brownell, Johnny Kirk, Ozzie Levene, Harold Miller, Jim Onnen, Fred Ryker, Don Scott, Lanny Snapp, and Joe Waldbeiser. Harold Miller was awarded the outstanding pledge trophy and Gary Anderson was awarded the trophy for the highest scholarship in the pledge class. Congratulations on having completed a successful pledgship, fellows, and welcome to the chapter.

Brothers Anderson, Jackson, Kirk, Kurtz, and Scott are representing Sigma Nu on the varsity football team this year. The serpents lost their first two games in IF football to the Lambda Chi's and the Tau's. Now that the other teams are overconfident, the situation looks like we will go on to lose the rest.

At a recent meeting, Louie LaPosa was elected Recorder and Jack Gaughan reelected to the office of treasurer. Also, Bob Crisp has been reelected House Manager.

Brother Crisp has been working the boys quite hard lately and the house should really be shipshape for Homecoming.

Speaking of shipshape and Homecoming, Light Peter is really steamed up over the Homecoming Display and vows we will finish no lower than fourth this year. Last year someone had Rose's biggest Rosie, this year will probably be Rose's biggest bomb. Must be why L. P. has been shooting off his mouth.

I might also mention in passing that brother Anderson has had a date this year, however, he has been roundly booed and jeered and it probably won't happen again.

Well, Whitefoot friends of mine, hard as I know this will be for you to take, these will undoubtedly be the last Sigma Nu notes I'll write for the Technic, so I'll bid you a fond farewell, goodbye, adios, arivederci, hasta manana, la cucaracha, guten tag, and last but certainly least, good grief!!

Charlie Brown?

Jack Gaughan

Detroit Edison Co.

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TUESDAY, FEBRUARY 28

Will Also Interview Sophomores and Juniors Interested in Summer Employment

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RESERVATIONS
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RESTAURANT NEAR BY

The Rose Technic

Page 42
Inco mine engineers construct a 3-dimensional "picture" that shows where new, untapped ore bodies lie.

This 3-D model of an ore body shows where future supplies of Inco Nickel will be mined

How do Inco engineers keep a mine "alive"? For one thing, they try to learn as much as possible about the location of ore for the future.

New levels—new exploring
As soon as they open up new levels, the engineers start up exploratory drilling, to probe and "feel" in many directions.

Their hollow-shafted drills bring out specimen cores that show where there is worthwhile ore and where only worthless rock.

Hundreds and hundreds of ore samples
These ore samples enable International Nickel engineers to build small models of their mines' ore bodies. So they know where each ore body lies, how large it is, and of what grade.

They know, as well, how to get that ore out of the ground in the safest, most sensible, most economical way possible—know what shafts may have to be sunk, what tunnels and drifts to drive. Know, in a word, how to reach and mine every possible ton of usable ore. And, having mined it, how to extract every possible pound of useful metal.

Reserves—at new highs
Today Inco has larger reserves than ever before—although some of this ore lies a mile or deeper underground. And the Company also reports another fact: its multi-million dollar "mine-more" program makes possible today’s high output of Inco Nickel. And looking to the future—in 1961, Inco Canada's Nickel output should be 385 million pounds a year. A hundred million more than in 1956!

"Mining for Nickel," color film, is loaned to technical societies, universities, industry. The International Nickel Company, Inc., Dept. 143f, New York 5, N. Y.

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Now you can see why only leads & pencils give you perfectly

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CLAY LIKE THIS

MAKES THIS LEAD STRUCTURE

100% "ELECTRONIC" GRAPHITE

SUPERFINE CLAY

MAKES THIS LEAD STRUCTURE

YOU ALWAYS GET PROVEN QUALITY FROM TURQUOISE DRAWING LEADS AND PENCILS

PROVEN GRADING—17 different formulae make sure you get exactly the line you expect—
from every pencil, every time.

PROVEN DURABILITY—Because compact lead structure gives off no chunks of useless "dust"
to blow away, Turquoise wears down more slowly.

PROVEN NEEDLE-POINT STRENGTH—as electron photomicrograph shows, Turquoise lead struc-
ture is finer—and therefore stronger. It holds a needle point under
drawing pressures for long lines of unchanging width.

EAGLE PENCIL COMPANY • NEW YORK • LONDON • TORONTO • MEXICO • SYDNEY • BOGOTA
This Electron Microscope takes perfect pictures 7,500 times actual size — lets you see the startling difference between Eagle's "Electronic" Turquoise Lead and the lead in the usual quality drafting pencil.

Photographs courtesy of Ladd Research Industries, Inc.

Relatively large, irregular particles of graphite make a rough-edged line. Drawings will be inferior.

...AND MARKS LIKE THIS

Tiny, more uniform particles deposit as a clean-edged, solid line. Drawings will be perfectly sharp, clearly defined.

...AND MARKS LIKE THIS

WRITE FOR FREE SAMPLE DEMONSTRATION KIT (including Turquoise wood pencil, Turquoise lead, and Turquoise "skeleton" lead) naming this magazine: Eagle Pencil Company, 703 East 13th Street, New York, N. Y.

EAGLE TURQUOISE

PENCILS AND LEADS are the largest-selling in the United States!

October, 1957
"When You Say It
With Flowers
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...and grow with 3 growth industries

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Electronics
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Structural Design
Metallurgy
Nucleonics
High Voltage Phenomenon
Analog and Digital Computers
Fluid Dynamics
Basic Research

You can grow faster in a company that supplies the basic needs of growth! Power, construction and manufacturing must grow to supply the needs of our population which is increasing at the rate of 50,000 per week. Allis-Chalmers is a major supplier of equipment in these basic industries.

But there's another factor of equal importance: Allis-Chalmers Graduate Training Course offers unusual opportunities for the young engineer to:

• Find the type of work he likes best
• Develop engineering skill
• Choose from a wide range of career possibilities

Allis-Chalmers graduate training course has been a model for industry since 1904. You have access to many fields of engineering: electric power, hydraulics, atomic energy, ore processing.

There are many kinds of work to try: design engineering, application, research, manufacturing, sales. Over 90 training stations are available, with expert guidance when you want it. Your future is as big as your ability can make it.

Or, if you have decided your field of interest and are well qualified, opportunities exist for direct assignments on our engineering staff.

In any case—learn more about Allis-Chalmers. Ask the A-C manager in your territory, or write Allis-Chalmers, Graduate Training Section, Milwaukee 1, Wisconsin.
Research & Development

(Continued from page 32)

ing different cure times at different temperatures with or without air-drying.

The manufacturer, Charles Englehard, Ind., which specializes in custom development of instruments and electrical equipment, engineered the new adhesive to attach surface-temperature transducers, strain gauges, and lead wires to the skins of guided missiles. Englehard is inviting other possible users to submit problems for research. One potential application may be the repair of small electric furnaces.

OXYGEN DETECTOR

A supersensitive indicator which can measure as little as two parts of up to three percent carbon monoxide, has been developed by Baker & Company, one of the Englehard Industries.

Producers of nitrogen, helium, and other inert gases use supersensitive oxygen indicators for quality control. Manufacturers of ammonia employ them because oxygen can poison their catalysts. Producers of liquefied-hydrogen jet fuel must guard against explosions caused by the presence of oxygen.

Manufacturers of electronic tubes and lamps, producers of synthetic fibers, metalworkers engaged in annealing, heat treating, or galvanizing, and other users of nitrogen also must check their gas supplies for the presence of oxygen.

In Baker & Co.'s indicators, the gas being tested is measured continuously over a catalyst which causes any oxygen present to combine with hydrogen. The increase in temperature caused by this reaction is measured by an extremely sensitive thermopile. The thermopile's output EMF is indicated and recorded by a potentiometer or can be fed into an automatic controller if desired.

The gas being tested is measured continuously by a rotameter and passed through a coil in a liquid bath to stabilize its temperature. If it does not contain enough hydrogen for test purposes, a small amount is generated by an electrolytic cell built into the indicator, and automatically mixed in.

Earlier supersensitive indicators could not be used if the tested gas contained any carbon monoxide, because it deactivated the catalyst. Baker & Co. recently discovered, however, that this could be overcome by heating the gas with a steam unit, the indicator being recalibrated accordingly. The firm announced that its new Model SSS Super Sensitive Deoxo Indicator, incorporating the steam unit, can be used to test for oxygen or hydrogen in gases containing up to three percent carbon monoxide.

RADIOISOTOPE CAPSULES SEALED BY REMOTE CONTROL

The handling of radioactive substances has always been a ticklish problem. Imagine sealing highly radioactive materials such as cobalt-60 or iridium-192 in stainless steel containers. Numerous requests for radioactive sources to be used in high temperature operations or in corrosive solutions necessitated the use of Heliarc welded stainless steel jackets which would stand up under these conditions.

Union Carbide Nuclear Company working in co-operation with the U.S. Atomic Energy Commission recently placed into operation at Oak Ridge National Laboratory a remote control welding apparatus designed and fabricated for his purpose.

This apparatus superseded conventional sealing methods which included soldering and gasketing. The welding equipment consists of two portable units: a power supply unit and a remotely-operated assembly. The power supply unit is of conventional design and includes a welding machine, control panel, and motorized current control. The remotely-operated portion of the welding device, which is placed in a shielded cell equipped with mechanical manipulators, consists of a two-piece stainless steel frame, and motor-driven positioners for both the torch and containers. Controls for the motors are located outside the cell near a viewing window.

(Continued on page 50)
Engineered English

**Airframe:** Ambiguous terminology. May mean either a frame constructed around a body of air, or a body of air surrounding something.

**Alelad:** Entirely clothed.

**Astronomical:** The boss's salary.

**Base Metal:** A term used by makers of aluminum products in referring to stainless steel, or vice-versa.

**Brazier:** A garment used to minimize the effect of flutter and vibration.

**Bulkhead:** A derogatory expression usually applied to persons of questionable intelligence.

**Chief Engineer:** A person totally devoid of all engineering knowledge who married the boss' daughter.

**Fahrenheit:** A system of measuring vertical distance above the earth’s surface. One Fahrenheit equals 0.53959 nautical miles.

**Fahrnad:** A high official in the Egyptian government.

**Fitting Factor:** A process utilized in structural analysis whereby a factor is manipulated so as to fit a particular requirement.

**German Silver:** A type of silver containing any metal except silver.

**Heterodyne Reception:** A private gathering attended by a motley assortment of people.

**Hydrogen:** An alcoholic beverage consisting of water and gin.

**Lightning Holes:** The process of removing stuff from empty holes in order to restore the weight thereof.

**Lock Washer:** One who washes locks.

**Mating Jig:** An animal husbandry accessory.

**Maxwell’s Theorem:** States that coffee is “good to the last drop.”

**Microfarad:** A small official in the Egyptian government.

**Ohmmeter:** One who eats ohms.

**Pylon:** All aboard.

**Race Rotation:** Practiced by totalitarian governments. Similar to crop rotation, but more fun.

**Reynolds Number:** Lackawana 6-5972.

**Stable Air:** An atmosphere tinged with the odor of fertilizer.

**Staff Engineer:** The chief engineer’s brother-in-law.

**Stationary Front:** The result of constructing an ideal truss around a set of characteristic curves.

**Stress Analysis:** The art of manipulating figures in such a way as to prove that a deficient structure is twice as strong as it is supposed to be.

**Thermocouple:** Newlyweds.

**Trajectory:** A sad event.

**Uniform Load:** The weight of one uniform.

**Vacuum Pump:** A pump used to pump nothing into a vacuum.

—Michigan Technic.
Sealing radioactive sources by remote welding is considered to be an important development in the radioisotope program. Specifically, this technique will be used in sealing the large sources which will be produced in the nearly-completed Fission Product Pilot Plant at Oak Ridge. These sources will be used in medical and industrial applications. Also, radioactive materials for which there is no apparent immediate use will be sealed in multiple-walled, remotely weld-sealed metal containers for long-term safe storage.

**ATOMIC HONEYCOMB**

General Electric reported recently that the first atomic reactor ever operated in the northeastern United States has been started and shut down a record 10,000 times for experimental purposes. This reactor is believed to have produced more information about a larger variety of reactors than any other assembly. So far, several completely different types of reactor design have been simulated in the pioneer assembly. Scientists and engineers have designed and constructed reactors for the prototype power plant for the submarine Seawolf and the actual Seawolf power plant. Currently they are designing the Submarine Advanced Reactor for use in the world’s largest submarine, the Triton, now under construction.

PPA, Preliminary Pile Assembly, which can be shut down and restarted in 15 minutes to facilitate rearrangement of fuel elements, has simulated the performance of a large variety of reactors. This has been accomplished through the relatively simple design modification of the fuel elements in one or both of the hexagonal reactor tube bundles.

On the basis of calculation or previous experiments, an appropriate number of uranium-aluminum fuel discs are loaded into fuel rod subassemblies which are then inserted into the two vertical faces of the reactor tube bundles. In addition to the fuel discs, the fuel rods contain discs of other materials which simulate the structural materials, coolant and moderator which are proposed in the reactor design. For ease of handling, these discs are held together by tie rods which extend through central holes in the discs.

When the fuel rods have been loaded into the proper geometric pattern, the two halves are moved together by remote controls which are located in a separate room behind a four-foot thick concrete wall. After the halves have been brought together, control rods are moved into positions which cause the reactor to become chainreacting.

Quick access to the reactor cell following an experiment and changeover of fuel elements are possible since the PPA is operated at only about one-watt power, which limits the induced radioactivity to a minimum value.

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**HIGGINS ACETATE BLACK**

for plastic film and water-repellent drafting surfaces

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**HIGGINS SUPER BLACK**

for artwork with brush and pen

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**HIGGINS INK CO., INC., BROOKLYN, N. Y.**
How to lick a mixing problem

In designing the bearing mounting for the drum axle of this heavy-duty mixer, the engineers had to consider the punishing radial and thrust loads as the drum rotates at an angle. And heavy shock loads from the impact of driving on rough roads had to be considered, too. To handle these loads simultaneously, keep the drum shaft aligned, the engineers specified Timken® tapered roller bearings. Result—free rolling, longer life, less maintenance.

Tapered design lets Timken® bearings take both radial and thrust loads

The taper enables Timken bearings to take radial and thrust loads in any combination. And full line contact between their rollers and races gives Timken bearings extra capacity for the toughest loads.

Want to learn more about bearings or job opportunities?
You’ll probably face some bearing problems after graduation. Why not learn about them now with our free 270-page General Information Manual on Timken bearings? And for job information write for “Career Opportunities at the Timken Company”. The Timken Roller Bearing Company, Canton 6, Ohio.
Stolen by Bill Johnson, soph. e.e., and Ron Reeves sr., e.e.

A fish out of water must feel like a moth in a nudist colony.

A plunging neckline is something you can approve of and look down on at the same time.

Sign at AF base: Notice. Absolutely no flying permitted over nudist camp exactly 8.35 miles from this base on a true course of 190 degrees.

Last night I held a little hand, So dainty and so sweet. I thought my heart would surely break, So wildly did it beat. No other hand in all this world, Can greater solace bring, Than that sweet hand I held last night.

Four aces and a king.

Did you hear about the cannibal's son who liked the gals best when they were stewed?

The squad of recruits had been out to the rifle range for their first try at marksmanship. They knelt at 250 yards and fired. Not a hit. They moved up to 200 yards. Not a hit. They tried at 100 yards. Not a hit.

"Tenshun!" the sergeant drawled. "Fix bayonets! Charge! It's your only chance."

"I've just got a bottle of gin for my wife."

"Well, that seems like a reasonable swap."

"Dearest Annabelle," wrote a love-sick swain, "I could swim the mighty ocean for a glance from your lovely eyes. I could walk through a wall of flame for one touch of your little hand. I would leap the widest stream for a word from your warm lips.—As always, Your Own Oscar.

"P.S. - I'll be over to see you Sunday night, if it doesn't rain."

The engineer returned home one night at a late hour, and finding difficulty with his equilibrium, made considerable noise in the hallway. Suddenly there was a sound of crashing glass which awakened his wife.

"John," she called, "What's the matter?"

From downstairs came a low mumble, "I'll teach those goldfish to snap at me."

"Ethics," The man told his son, "is vital to everyday living. For example, today an old friend paid me back a loan with a new hundred-dollar bill. As he was leaving I discovered he'd given me two bills stuck together. Immediately a question of ethics arose: Should I tell your mother?"

Father to daughter: "Your young man approached me and asked for your hand, and I consented."

Daughter: "But father, I don't wish to leave mother."

Father: "Such feeling displayed by a child is admirable. Take your mother with you."

Women wear girdles from instinct—a natural desire to be squeezed.

Mixed emotions: A man watching his mother-in-law back over a cliff in his brand new Cadillac.

Frosh: "A woman's greatest attraction is her hair."

Soph: "I say it's her eyes."

Jr.: "It's unquestionably her teeth."

Sr.: "What's the use of sitting around lying to each other?"

Small boy to his father: "Can I go outside and play football with the boys, Pop?"

Father: "Shut up and deal"

Then there was the M. E. who stepped up to the bar very optimistically, and two hours later went away very misty optically.

Father: "What do you mean by bringing my daughter home at this hour of the morning?"

Engineer: "Have to be in class by 7:30."

Page 52
Sturdy sea legs for Radar eyes

One of America's offshore radar warning towers—Texas Tower III—built by Walsh Holyoke Division, Continental Copper and Steel Industries, Inc.

—with every seam proved sound on X-ray film

In record time, Continental Copper and Steel Industries, Inc. built and launched "Texas Tower III" and every weld was checked by radiography.

Here is a steel island 110 miles at sea—2700 tons of 2-deck platform setting on staunch and stalwart caisson legs 272 feet long. It is destined to stand against the hammering of giant seas and howling hurricane gales.

No place here for the tiniest flaw in a single weld! So the magic of radiography was called on to make sure. Two and a half miles of x-ray film hold positive proof that every seam has showed itself flaw-free and secure.

Everyday radiography is working like this for welders, large and small—for foundries interested in making sound castings—for any manufacturer who must know internal conditions of a product without destroying it. It is one example of the many ways photographic processes work for business and industry—how it helps make better products and improve manufacturing procedures.

EASTMAN KODAK COMPANY
Rochester 4, N. Y.
The Next Four Years: Your Most Important

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.

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. Do you mean, then, that I could just stay on a job if I like it?

A. That's right. Our programs are both to train you and help you find your place. If you find it somewhere along the way, to your satisfaction and ours, fine.

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.

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