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MAN MADE MOON
ENGINEERS IN POLITICS
A 60 HOUR WORK WEEK ISN’T ILLEGAL
Frederic F. Berman, class of '46, speaks from experience when he says...

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Graduating with a B.S. in Mechanical Engineering in 1946, Mr. Berman first entered the employ of U. S. Steel's National Tube Division's National Works on April 10, 1950, in the estimating division of the Maintenance Department.

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Cover

Clay residues of gold ores in this South African mountain and many other places of the world are being used as sources of sparsely distributed uranium. Courtesy of the Rohm & Hass Co.

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EDITORIAL:

Incentive and Initiative

With the changing of the TECHNIC staffs, there is no better time than now to speak of incentive and initiative. Many people talk of the apathetic atmosphere that surrounds Rose. To a certain extent this must be true—for there always seems to be a lack of willing hands in student activities. We all recognize that this is true, to some extent, and the majority of us wish to correct the situation. The engineer, who is in industry, is the “creator of tomorrow” and the “builder of today.” Surely he can show no apathy if he is to get ahead in the cold business world. He must show incentive and initiative if he is to better himself, get that promotion or raise his salary.

The true engineer of today is the theory of incentive and initiative in practice. Rose men have always made their place in industry and society and are prepared for this challenge as well as, if not better than, the next graduate engineer. If they are successful, or even mildly so, then they have accepted initiative and incentive as their byword and have proceeded to display their talents in whatever line of endeavor they might choose.

If it is necessary to accept these traits to get ahead, why should we wait until going into business to use them? Why not call on incentive and initiative now and develop them so that they will be ready to work for us when we really need them? Be two steps ahead of the next man; exert ourselves to the fullest; show what we are capable of doing on our own. By putting ourselves, our very being, behind our school and its activities, we will dispell this idea of disinterest that surrounds Rose. At the same time we will be doing ourselves a big favor. It is not so much doing just what you are told to do, but more important, going ahead and doing more than you need to. In short, finding work to be done and then doing it. Find a job that suits you and your talents and that needs to be done, then give your whole self to it until you think you can give it no more, then do just a little more. If you can successfully do this, you have learned the secret to initiative and incentive and can use them the rest of your life—they are yours.

R.L.T.

STARFIGHTER UNWRAPPED—Here is the unrestricted photo of the newest and fastest weapon in the U.S. Air Force jet age arsenal, Lockheed's F-104A Starfighter. Featuring stubby, knife-thin wings and a high, T-shaped tail to provide optimum performance at high mach numbers, the Starfighter can zoom to the attack as fast as it flies straight and level. It flies so high so fast that pilots seem to be running out of flying room, compared to experience with other planes. From nose to tail the lance-like Starfighter measures 54 feet, 9 inches. Its height is 13 feet, 6 inches. From wingtip to wingtip the span is only 21 feet, 11 inches.
Man-Made Moon

By Bill Perkins, fr.

There are many places on the earth about which man knows little or nothing. Antarctica is a white continent shrouded with mystery; many parts of Africa and Asia are unexplored and uncharted. There are many things about himself which man doesn't know. The working of man's brain is an unexplained mystery; his heart cannot be duplicated by modern science. There are many things about his environment which man doesn't know. The process of photosynthesis by plants is not completely understood; the weather has many unpredictable and uncontrollable features. Even though man lacks much knowledge about his planet, himself, and his environment, he is restless. Like Daniel Boone in Stephen Vincent Benet's poem, he wants "elbowroom." So, although much knowledge on earth remains to be discovered, man has set his sights on the stars.

But before man can walk, he must crawl. Before man can reach the stars or even the planets, he must learn much more about space travel. The first major objective of space flight will be our natural satellite, the moon. Man is capable of building rockets at the present time which will carry him to the moon. But before even this venture is attempted, man has much to learn. Scientists' answer to this problem is simple; man must establish a small, artificial satellite on an orbit just outside the earth's atmosphere. This "man-made moon" would give us much valuable data on cosmic and solar radiation, air density and velocity, and other scientific aspects outside the immediate atmosphere of the earth.

The idea of the artificial satellite has grown slowly, even though its total age is not much over a generation. A manned rocketship in an orbit around the earth was first mentioned by Professor Hermann Oberth in THE ROCKET INTO INTERPLANETARY SPACE in 1923 as an interesting research project. Oberth also said that a very large rocketship might be left in such an orbit while the pilot returned to the ground by means of a smaller landing rocket. On the basis of his suggestion the concept of the manned space station has been developed through the years, resulting in Wernher von Braun's space station project, which was published for the first time several years ago.

Strangely enough, not until the last three or four years has anyone thought of sending up an unmanned satellite. But this fact is easily explained. Until then, the only method of returning the data gathered to the earth was by piloting the rocket back to earth. This would have necessitated having a man aboard. Now, however, an unmanned satellite has been made feasible by the process known as telemetering. In principle, telemetering consists of

Artists conception of the proposed rocket and earth satellite entering its orbit around the earth.
hooking up the instruments in the space station with an automatic radio transmitter so that the instrument readings are broadcast and received and recorded on the ground while the satellite is circling the earth.

Since the principle of telemetering was developed, many suggestions have been offered in regard to a space satellite. These have ranged from the unorthodox to the reasonable. In May, 1954, Professor Oberth proposed building a space mirror. He said the mirror should be about one hundred miles in diameter and revolve in an orbit thousands of miles from the earth. Made of shiny metal reinforced with wire, the mirror would be kept expanded by centrifugal force. The mirror would float outside of the earth's shadow and shorten the night by lighting the dark side. Cold countries would have their climates warmed. If a war were started, the mirror could be made concave to concentrate the beam and incinerate the country not in control of the mirror.

Along a more sensible and practical line was the proposal presented by Professor Fred S. Singer of the University of Maryland. Singer's proposed satellite was the MOUSE (Minimum Orbital Unmanned Satellite of the Earth). He described the MOUSE as "...a logical extension of the high-altitude research which we have been conducting in rockets over the past eight years." His satellite would be a one-hundred pound sphere packed with instruments and sent into the upper atmosphere by a three-stage rocket. Singer would use a modified V-2 as the bottom stage of the rocket, and other existing rockets would easily be compatible for the top two stages. The third stage would enter an orbit one hundred ninety miles up, and then the propulsive parts would fall away and leave the sphere. At this height the MOUSE would circumnavigate the globe every ninety minutes. What little air there is at one hundred ninety miles would slow the sphere down by its friction until, sinking into the denser air, it is burnt by the tremendous friction. All the information the MOUSE collects would be telemetered back to the earth. Singer's idea is that the MOUSE's orbit pass over both poles. Airplanes would be stationed at each pole, and as the MOUSE passes over a pole every forty-five minutes the airplanes would interview it. A magnetic tape would be activated by a signal from the airplane, and information about the pole-to-pole trip would be telemetered in thirty seconds. These short transmission periods would be necessary because the MOUSE would probably have to carry its own limited electrical supply. There is a possibility, however, that the sphere might have unlimited electricity through the use of solar batteries. Singer estimated the cost of the MOUSE at one million dollars. In comparison, a B-47 bomber costs two and one-half million dollars.

At the White House press conference in early August, 1956, Press Secretary James Hagerty made a startling announcement. "...the President has approved plans...for the launching of small, unmanned earth-circling satellites." The first one is to be sent into space during the International Geophysical Year, July, 1957, to December, 1958. When the press announcement was made, scientists vaguely described the satellite to be launched but its specifications correspond closely with those of Singer's MOUSE.

According to some sources this satellite would not be the first sent out into space. As a widely accepted story goes, a rocket was sent into space, probably from the Banana River rocket range, some time before May, 1955. The rocket is supposedly rotating in an orbit eight hundred miles out, traveling at sixteen thousand miles per hour. Several private astronomers reported the satellite, but the government remained quiet. When questioned, government officials neither denied nor confirmed the presence of such a satellite. In October, 1955, the satellite was unofficially reported still to be circling the earth, but its

(Appended on Page 34)
The TECHNIC would like to encourage both students and faculty members to present their views on similar thought-provoking issues for future publication in the “CONTROVERSIAL CORNER.”

—The Editors

Gentlemen:

The majority of the men now in school will eventually become professional men, predominantly engineers. If you think that a professional man spends no more than 40 hours per week on the job, FORGET IT! A carefully conducted survey of four moderately successful professional engineers disclosed an average work week of 72.3 hours. These men, although burdened with many duties and responsibilities, are not in the top executive echelon as was the late Leroy Wilson, ’22, former president of the American Telephone and Telegraph Company. Mr. Wilson, while president of A.T.&T., made essentially the following remarks to a meeting of the New York Rose Tech Club. “The time spent on the job certainly doesn’t decrease as an individual rises to higher positions in any organization. The days of the top executive who spends six months per week on the job, FORGET IT! is not at all uncommon!” The point is this. Most professional men think, predominantly engineers? When asked to list your occupation, “student” is usually indicated. You’re not professional televisioners, nor professional movie critics, nor professional sack hounds, nor professional Casanovas, you’re professional students. Most of your time, therefore should be spent as a student. After all, each school year costs an average of $5,000 in take home pay. Rose isn’t exactly a rich man’s school or a country club, and it doesn’t seem likely that many of the students have that kind of money to toss about.

Next bit of mind reading! “Going to school is just like playing house. I’ll have different habits when I get out into REAL LIFE.” Not so, claims Strum. Personal habits and habits of work are not normally changed by receiving, on a humid June morning, a piece of bond paper bearing your name and the signatures of the principal officers of the Institute. Many students actually believe that from 11:30 A.M. of that Saturday morning on, they will be more efficient, more industrious, more carefully organized, better informed on current and past affairs, more active participants in the affairs of the community, and in general will lead much more complete and satisfying lives. Again, not so. The manner in which you carried out the items listed above while in school will be similar to what you will do in REAL LIFE.

This all leads to the obvious idea that the life you lead while going to school is not much different from the living you’ll be doing for fifty years after graduation. Many of you have experienced a very “good” feeling after leaving a four-hour final knowing that you have done a decent, competent job. (Perhaps good enough to pass the course.) Professional engineers have the same good “used-up” feeling after working long and hard to meet a necessary deadline. This may sound ridiculous, but that tired, used-up feeling that both the student and the engineer experienced, is one of the genuine satisfactions in life.

The time to develop the 60-hour work week habit is now. If you find it hard to stay interested in engineering matters for that length of time, it might be time to consider transferring to animal husbandry school or something similar. Sixty hours are only 35 per cent of the hours available in a week. What is a reasonable division of time for an RPI student of average ability? How close do you come to spending your time as listed below? This division guarantees a well-balanced individual. (Also, off probation)

Class work, labs and study 60 hours
Sleep 56 hours
Eating 11 hours
Grooming 4 hours
Physical activity (athletics, intramurals, walking the dog, etc.) 7 hours
Work, church, commuting, etc.) 9 hours
Keeping informed on current affairs 3 hours
Self-indulgence, (socializing, reading, cinema, TV, TGIF meetings, etc.) 18 hours

Total 168 hours

(Continued on Page 40)
A dramatic demonstration of the fineness of the copper wire used in the motor of the world’s first electronic watch. Three strands of the wire, 0.0006 inch in diameter are shown strung through a hole bored in a human hair. This picture is magnified 300 times.

After ten years of research, the Hamilton Watch Company has perfected an electrically operated watch for consumer use. The electric watch is radically different because of the elimination of the main spring. This is the biggest change in watch construction since the invention of the portable time-keeping device in 1480 in Nuernburg, Germany.

Uses Small Energizer

The watch operates on the chemical energy stored in a small replaceable energizer the size of a shirt button. This energy is converted into electrical energy as it releases a stream of electrons through a coil of extremely fine wire fixed on a balance wheel. The balance wheel oscillates because of interaction of the field set up by the coil and a permanent magnetic field. This oscillation is the mechanical energy which runs the watch.

The energizer now available will run the watch for a minimum of twelve months. In this twelve months, it must open and close the circuit 75 million times and cause the balance wheel to oscillate 150 million times. This means careful low power control. This is accomplished by having the energizing coil fixed on the balance wheel. By doing this, the balance wheel furnishes its own power, so to speak, as well as controlling it. This careful power control results in keeping extremely accurate hand speed. The manufacturers claim an accuracy of 99.995%. Calculations show that the electric watch could run for 20 years on the energy needed to light a 100 watt light bulb for a minute.

Revolutionary Components

To set up the permanent magnetic field needed for interaction with the energy coil, a very small, potent magnet was needed. After careful research, a small cylindrical magnet was developed that weighs only 0.0056 ounce but will support 215 times its own weight. Its composition is 77 percent platinum and 23 percent cobalt. It has the highest energy content of any magnet in the world.

The energy coil is made of copper wire 0.0006 of an inch in diameter. This makes it about one fifth as thick as a human hair. Enough of this wire for 1000 watches would weigh only two ounces but would stretch from Dover all the way across the English Channel and well into France.

By using the energizer to supply the mechanical energy, the electric watch has been made more efficient, space-wise speaking, than the common mainspring watch. In fact, the energizer can store more than 400 times the energy than can be stored in a mainspring. Because of this, the electric watch has only two-thirds the number of components needed in a modern automatic watch.

Opens New Era

The electric watch will no doubt usher in a new era in timekeeping. It is already recognized that it has many consumer and industrial uses. This was expressed by Hamilton’s president, Arthur B. Sinkler. He says, “Instruments used in America today are becoming more and more complex. As a result, industry today is beginning to demand greater miniaturization of all types to continue its technical advancement. This demand for smaller instruments makes it important to combine and miniaturize mechanical, electrical, and electronic mechanisms. Because of this, a new technical revolution is in progress, and the electric watch, with its miniaturized electric power plant and time-keeping assembly, is a major step in opening the frontiers of this era.”
EDITORS NOTE

Each pledge of Tau Beta Pi is required to write an essay of approximately five hundred words on a worthwhile, non-technical topic. This essay must evidence serious thinking on the part of the pledge and be worthy of a Tau Beta Pi member. The best of the essays written by members of each pledge class is selected to represent the Rose chapter in national competition. Of the essays submitted by the fall pledge class, the following one written by Mr. Davidson was selected as the most outstanding and was entered in the nationwide contest.

One of the most alarming trends in American government is the steadily decreasing quality of candidates for office in many local elections. Although the salaries paid by these offices are in general so low that a person too ethical to accept graft could not afford to be entirely dependent upon the office for his livelihood, the nature of the work is such that a well-trained administrator could hold most civil offices in addition to a full-time job. Indeed, most industries are so concerned with local government that they are glad for their officials and engineers to hold office in it.

There are essentially three reasons why most engineers do not participate in politics — ignorance, false pride, and apathy. Engineers, like most other people, do not know how to get started in politics. Nor do they know exactly what duties they would have if elected to an office. However, if local offices are not completely controlled by a political machine, an interested person need only offer his assistance to the precinct committeeman of his party to quickly learn of the many jobs to be done.

Strictly interpreted, the second section of the canon of ethics of the Engineers' Council for Professional Development would prevent any engineer from running for a political office by forbidding advertising of work or merit in a self-laudatory manner or injuring the dignity and honor of his profession. Although this section was probably not meant to be understood in this way, many engineers seem to have the attitude that it is below their dignity to get involved in the bragging, lies, and mud-slinging of most political campaigns, especially since they might not get elected even after submitting to these insults. This is, of course, a false dignity which places the personal feelings of the individual above service to his community.

While ignorance and pride may be understood, the amazing lack of interest in politics shown by most educated people is beyond explanation and completely inexcusable. It is impossible to conceive of any reason for a well educated person to ignore local politics while an uneducated, inefficient, greedy member of a local political machine gets elected to office. Yet in many communities voters must choose among men, none of whom are worthy of election, because the worthy people are either too busy or too uninterested to hold an office.

The solutions to these problems are, of course, not simple. However, much improvement could be made if more emphasis were placed on the subject by colleges, engineering societies, and other organizations in a position to influence the thinking of engineers. Colleges, for example, could include in some of their liberal arts courses information on why an engineer should participate in politics, how he can get started in politics, and what type of work he would be expected to perform in various offices. Engineering societies, honor associations, and other organizations which publish magazines and journals read by engineers could print articles emphasizing the importance of an engineer's participation in politics. Also, industry could place more emphasis on their employees' interest in community activities.

Perhaps in this manner engineers may be jarred out of their present inactivity into participation in politics both as candidates and as party leaders, for it is not enough for any educated man merely to vote when his services are needed by his community.
we're in Milwaukee so we ought to know!

An AC* ENGINEER TELLS HIS STORY

Working at AC, THE ELECTRONICS DIVISION OF GENERAL MOTORS is exciting... challenges every inch of my engineering ingenuity, currently I am working on a phase of the Inertial Guidance System Program. A month or two ago I was equally absorbed in our Jet Engine Fuel Control Program. I am certainly growing ENGINEERING "KNOW-HOW-WISE" and my salary checks reflect it. I started at a good salary... have had regular increases in salary and position... gosh, I like it here.

AND, I enjoy AC's MASTER'S DEGREE PROGRAM, University of Wisconsin—Milwaukee. I attend evening classes and AC is paying my tuition and with no strings attached.

My family enjoys Milwaukee too. Here in cool, southern Wisconsin we have endless miles of swimming beaches, parks, playgrounds that are ours for the asking. We have the cultural and shopping advantages of the big city in a community long known for its small town hospitality.

P.S. AC's Permanent Expanding Electronic Program provides openings for more Mechanical, Electrical Engineers and Engineering Technicians. Even "square pegs" are provided "square holes" at AC.

Write today in strictest confidence to my friend, Mr. J. F. Heffinger, Supervisor of Salaried Personnel.

AC THE ELECTRONICS DIVISION
GENERAL MOTORS CORPORATION

Milwaukee 2, Wisconsin • Flint 2, Michigan

February, 1957
Meet The Faculty
By Joe Bronnert, soph. e.e.

Back among the crashing test tubes and beakers, a man of dynamic personality is keeping the future chemists of tomorrow from being blown to bits, today. Professor Oran M. Knudsen is a man that takes his job very seriously, yet has a wonderful sense of humor as some of his comments that he puts on tests papers prove. I, myself, am a victim of circumstance. One day after the first chemistry test, a comment appeared on one of my answers that I tried to bluff my way through. "Si, Si, Senor do you speaka the French." And from that day forward I found that professors are human.

Professor Knudsen was born in God’s country at Provo, Utah, on the 14th day of November, 1909. As a boy he did not get settled in one place long enough to find where all the good fishing holes were, for his father would pull up stakes and set off for a better teaching position. During this time "Doc" traveled all over the western United States, attending schools in Utah, Idaho, Iowa, and Wisconsin. When it came time for a college education, Professor Knudsen returned to the Middle West where he got his B.S. in Chemistry at the University of Wisconsin in 1933.

Times were not so good when "Doc" graduated from college, so he went to the "big city" to try his luck. There he started teaching on a fellowship at New York University in order that he would be able to obtain his Ph.D. in Physical Chemistry. But during this time "lady luck" had designed his destiny for something out of the educational field. It seems to me that "Doc’s" buddy had a good looking girl friend. Then one day his pal got sick, and he received a phone call, inviting him to a tea and dance at the Waldorf-Astoria. Since he had not been to the Waldorf before and he hadn’t any plans for that evening, he accepted. Well, that was the last time his friend got near his former girl, because one year and three months later, in 1936, Miss Marie Eccles was the wife of Professor Knudsen. "Doc" made one stipulation before they were married though. "Marie," he said, "we must agree that I settle all major issues, and you settle all minor issues." But now he adds, "there has yet to be a major issue."

After Professor Knudsen received his Ph.D. in 1938, he taught school at Alfred University, and Michigan State University before coming to Rose in 1946. In 1952, he assumed his present position as head of the Chemistry Department.

The last decade has been very profitable for Professor Knudsen with the addition of two daughters; Dorothy, eleven; and Margaret, eight, to his family. He has also become a member of the American Chemical Society; American Association for the Advancement of Science; American Association of University Professors; Society for Engineering Educators; Sigma Xi, Phi Lambda Upsilon; Alpha Chi Sigma; and Lambda Chi Alpha. Even though he is a man of many interests, he spends a great deal of his time in church activities, where he is the Branch President of the Mormon Church in this area.

As each summer draws near, Professor Knudsen and his wife get the urge to travel, for they know it is a good idea to get away from the books. Traveling is a hobby with them, for when they start out for a destination, their “trail” may lead elsewhere before the end is in sight. Take for example, the day they were going to Salt Lake City and with only 150 miles to go, when suddenly “Doc” decided to turn North into Idaho. From there he went into Wyoming for a look at the scenery. On the way back, they went over the mountains, back into Utah by means of a sheep trail. Altogether that little journey was prolonged for 2½ days instead of a three hour drive.

We at Rose Poly have thoroughly enjoyed having “Doc” as a Professor and we hope that his humor and intellectual influence will continue to pervade the minds of the men who enter these halls for many more years.
Modern and advanced engines log up hundreds of test hours daily in Standard’s automotive laboratory at Whiting. Radioactive carbon traces deposits in the guarded engine (foreground).

Would you like to work on the same team as this man?

LAMONT ELTINGE is a group leader in the Automotive Research Division of Standard Oil’s great Research and Engineering Laboratories at Whiting, Indiana. He and his group dig freely and fruitfully into just about every area you can think of in diesel, automotive, gas turbine, and jet fuels. Current studies range from air pollution problems arising from diesel smoke to laboratory use of radioactive carbon tracers for the basic study of deposits in gasoline engines.

Mr. Eltinge earned his B.S. in mechanical engineering at Purdue in 1947. He is a member of SAE, Tau Beta Pi, Sigma Tau, and Pi Tau Sigma. Along with the important contributions he makes to Standard as a regular member of our team, he finds time to attend Illinois Institute of Technology where he recently received his M.S., and takes an active interest in church work.

Lamont Eltinge and hundreds of young men like him are going places and doing things at Standard Oil. Each concentrates on his own special field of interest and experience, but none is limited to it. Chemists, metallurgists, engineers, physicists and others maintain a continuous relationship for the broad exchange of ideas. Perhaps you, too, would enjoy membership on Standard’s team of engineers and scientists.

Standard Oil Company

910 South Michigan Avenue, Chicago, 80 Illinois

FEBRUARY, 1957
Thermodynamics and Aircraft Design

By John R. Williams, jr. m.e.

Thermodynamics, a field once limited in scope to the area of power plant design, is one of the primary considerations of the airplane manufacturers in designing new jet aircraft. Prior to the coming of the jet age with its high speed and great extremes in operating conditions, little attention was paid to thermodynamics in aircraft design. New problems have arisen which makes thermodynamic studies of the conditions present necessary in order to assure proper operation under all possible operational conditions.

Thermodynamics applies directly to airframe design, fuel systems, pressurizing and air-conditioning systems, accessory power supplies, engine cooling systems and other design questions.

The cabin or cockpit of the aircraft must be provided with a means of cooling or heating as required. This air-conditioning must be completely automatic and have adjustment controls for individual pilot comfort. Air temperature, air pressure, humidity, heat input from outside the cockpit, heat input from equipment inside the cockpit and provisions for de-fogging and de-icing must all be considered in planning an air-conditioning system for aircraft. It is the job of the thermodynamicist to determine the conditions that these outside elements will produce. The design of this equipment is carried out by engineers working closely with the thermodynamicist to assure that all possible conditions can be corrected for by the system.

In addition to cockpit conditioning, certain critical equipment cannot function properly if it is subjected to the extremes of temperature and pressure which modern airplanes may encounter. Navigational equipment, radar fire control installations, communication and identification units and the motors and generators associated with this equipment must be protected. The same problems are encountered here as in cockpit conditioning. If possible, such equipment may be included in the cockpit to be conditioned by that system. However, certain parts cannot be moved to the cockpit. In this event, individual systems are developed. Thermodynamic considerations apply here just as in the other cases.

In the fuel system, hose sizes, pump sizes, pressure drops and temperatures throughout the entire system must be calculated by using thermodynamic principles. Vent systems, automatic fuel regulating equipment, air-to-air refueling equipment and equipment to assure proper balance control between fuel tanks all require thermodynamic study in their design. The fuel flow may be used to provide cooling for engine oil. Heat exchangers and similar apparatus must be developed for this purpose.

Thermodynamics applies to the field of structural cooling of the aircraft in the vicinity of the engine. Heat effects from rocket armaments or auxiliary rocket power equipment must be studied and analyzed. A transient heat transfer analysis is required to determine the proper structural design. Thermodynamicists are called upon to predict the heat effects from high speed air flow over the surfaces of the aircraft.

The air induction system for providing air for combustion to the engine requires considerable effort to assure that inlet conditions match outlet conditions. Air venting over the engine and surrounding airframe must be planned. Cooling systems must be devised for parts which cannot be cooled by this air flow. As aircraft speeds increase, the temperature of the incoming air increases, rendering it useless for cooling purposes. Thermodynamicists are trying to find a means of cooling the entire after section of the plane to replace the air flow method.

Still another application of thermodynamics is in the design of systems to “bleed” air from the compressor stage of the turbine power plant. This bleed is used to power auxiliary items such as compressors, or pumps. This usage of engine power, affects the installed performance of the engine. This gives rise to many more thermodynamic considerations in the design of the airframe.

In a relatively short period of time the need by an aircraft manufacturer for the skilled services of thermodynamicists has grown rapidly. Each new plane creates an entirely new set of problems to be solved before the plane can go into production. For every foot of altitude gained or every increment of speed attained, new challenges are presented to the thermodynamicist.
There’s satisfaction in meeting a challenge

For engineers worth their salt, challenge is stimulating. We live in such an atmosphere at Detroit Edison, a company internationally known for its bold, imaginative engineering. But let’s be specific.

Soon it’s going to be sound economics for us to transmit energy at 345 kv. There’s not much precedent to draw on; much remains to be clarified about system design, operation, radio interference, line losses, relays, system integration, lightning performance. Where does the challenge stop?

Or take the problem of heat exchange. We’re deep in atomic power plant design, where sodium is the primary coolant. Efficient heat exchange is essential! There’s the same problem with respect to gas turbines and critical-pressure boilers, too.

We also plan to use our digital computers, and like equipment, in new, untried ways. Applying them to engineering and management problems, for example. But it will take time AND talent to do some creative engineering first.

If these challenges—a few at random—suggest a career that appeals to you . . . well, you appeal to us. Stop at your Placement Office and arrange an early interview.

DETROIT EDISON

February, 1957
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plus expanding facilities and
assignments speed recognition
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FTL offers unlimited, interesting,
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place to work and grow, is "in the
country"—yet only minutes away
from New York City's unique ad-
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Wire Transmission Systems

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building also available at FTL's West Coast
Laboratory...with openings in Digital
Computers, Inertial Navigation Systems and
Infra Red Systems. Write to: 15191 Bledsoe
St., San Fernando, Cal.

'02 Frederick R. Fishback, ee,
died in Cleveland on December
15, 1956 while visiting friends.
He was 76 years old and had lived
in Santa Barbara, California since
he retired 8 years ago.

He was employed in 1905 by the
Electric and Controller Manu-
facturing Company and served for
43 years. In 1925, he was elected
president and, in 1943, chairman
of the board.

Mr. Fishback was a past secre-
tary of the Electrical Manu-
facturers Club, and was still an
honorary member at the time of
his death.

'05 Herbert G. Kiefer, me, died
on December 14, 1956. He
lived in Baltimore and was re-
tired. This was the fourth death
among members of the class of
1905 within the past 5 months.

'27 Warren E. Ferris, ee, has ac-
cepted a position as pro-
fessor of electrical engineering in
the School of Engineering at the
University of South Carolina.

Previous to this appointment,
he was research engineer at the
Naval Research Laboratory. He al-
so has worked as a research engi-
neer with General Electric and
RCA. Dr. Ferris holds the M.S.
Degree in E.E. from Union Col-
lege, Schenectady, N.Y., and the
Doctor of Electrical Engineering
Degree from the Polytechnic Insti-
tute of Brooklyn.

Dr. Ferris has published a num-number of papers and holds six patents
in electronics and one in chemis-
try. He is currently engaged in
research on radio astronomy and
instrumentation.

'30 Glenn J. Sampson, me, is
now superintendent of the
Bayshore Plant of the Toledo Edi-
son Company. He was promoted to
this position from his previous job
of engineer in charge of construc-
tion.

'43 John W. Withers, ee, has
been named assistant head
of the design integration depart-
ment of the weapons system de-
development laboratories of Hughes
Aircraft Company.

With Hughes since 1950, Mr.
Withers previously held positions
with Douglas Aircraft Company,
Southern California Edison Com-
pany, Northrop Aircraft, Inc. and
the Atomic Energy Commission.
He also holds the B.S. degree in
mechanical engineering from Uni-
versity of Southern California.

'47 Carl R. Wodicka, ee, has ac-
cepted a position with Ameri-
can Telephone and Telegraph Com-
pany in New York. He was former-
ly district plant manager with
Indiana Bell Telephone Company.

'52 Clarence B. Randall, Presi-
dent and Chairman of the
Board of Inland Steel Company,
has written a book entitled "Over
My Shoulder" published by Little,
Brown, & Company. Mr. Randall
is remembered from his commencemen-
taddress to Rose graduates in
1952, when he received an honor-
ary Doctor of Engineering degree.
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They can...if you start your Douglas career now!

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C. C. LaVene, 3000 Ocean Park Boulevard, Santa Monica, California

DOUGLAS
First in Aviation

February, 1957
ASTRONOMY
A rather unique and interesting convocation was presented on Thursday, January 10th, by the noted woman astronomer, Cecilia Payne-Gaposchkin.

“New Horizons in Astronomy,” as the lecture was titled, obviously was geared down by the well-read, Harvard scientist. Mrs. Payne-Gaposchkin, in no way handicapped by her all-male audience, proceeded in a manner which became her nimble personality as well as her intelligence.

In her talk she explained such things as star life and temperatures and gave theories, including one of her own, on why galaxies behaved and appeared as they did. Aided by slide pictures and her superlative power of explanation, she pointed out a strange phenomenon in which the luminosity of stars was related to their temperature by a hyperbolic function.

The convocation was certainly one of the typically good ones presented this year.

MIXER
Rumors have it that the mixer sponsored by the Junior class with St. Mary’s-of-the-Woods was successful enough to merit the tentative planning for a big-name band for the Junior Prom.

In addition to giving the Juniors a financial boost, the mixer proved to be a very enjoyable evening. Many opinions have been expressed in favor of a repeat performance sometime in the future.

POLAR BEARS
The zero and sub-zero weather recently seems to have brought about the annual ice skating fever. Ability of the skaters varies considerably but spirit runs high even for the novice. Maybe we should start a polar bear club?

It is good to see that our lakes are appreciated for something more than the soaking of green caps.

YEARLY OCCURRENCE
Who says Sophomores don’t know all of the answers? Recently it was proved that even though they may be on the short end of “grey matter” at times, they can use deductive reasoning.

In a Metal Processing class not long ago, the question was asked, “How are toothpaste tubes made?”

This was apparently too much for 10 A.M. because the answers given were real gems. They ranged from rolling metal around a stick of paste to the dipping of a frozen Pepsodent bar into molten aluminum. Who says Sophs. can’t improvise?

Incidentally, how are toothpaste tubes made?

PARTIES
The annual Fraternity-Freshman “get acquainted” parties were held this year on December 13th. Spending an hour at each of the four fraternities, the interested freshmen got a chance to look over the ways of life of the Fraternity man. Refreshments, although somewhat unneeded at the latter parties, were exceptional and the parties were both entertaining and informative.

OUR MR. SUN
Without a doubt one of the most interesting and entertaining convocations this year was the film “OUR MR. SUN.” Produced for the Bell Telephone Companies by UPA Studios, the technicolor film combined high level entertainment with a thorough and balanced picture of scientific studies. Feel sorry for yourself if you missed this one.
It’s bad news—but pretty soon we may be deprived of our age-old sport of taunting the weatherman for his mistakes.

Reason? A giant electronic computer is squeezing the error out of weather prediction by making numerical weather forecasting possible. Now at work at the Joint Numerical Weather Prediction Unit, Suitland, Maryland, an IBM 701 computer digests thousands of weather-influencing facts daily and computes them at almost incomprehensible speeds.

Making 16,000 additions or 2,000 multiplications every second, the computer forecasts the daily weather with an accuracy that would have required some 64,000 mathematicians thirty years ago. In addition, it encourages meteorologists to tackle problems that once discouraged them because of the staggering mathematics involved.

Forecasting YOUR future

Weather prediction is one more example of how IBM computers—in business, science, government and education—are revolutionizing our way of doing things. These mathematical marvels are destined to play an increasingly important part in the careers of engineering graduates. Digital computers rank in importance with nucleonics and automation in our new industrial revolution. If you are working toward an E.E. or an M.E. degree, or, if you are majoring in physics or mathematics, you’ll find that IBM, as a leader in the electronic computer field, offers you the opportunities you need for a successful engineering career.

For further information about opportunities at IBM, see your Placement Director or write to R. A. Whitehorse, Mgr. of Engineering Recruitment, Dept. 3302, International Business Machines Corporation, 590 Madison Avenue, New York 22, N. Y.
Vacuum melting has opened up new horizons for development of alloys. Here, a Pratt & Whitney Aircraft metallurgist is shown as he supervises preparation of an experimental high-strength nickel-base alloy, melted and cast under high vacuum.

Induction melted heat of high-temperature alloy being poured in P & W A’s experimental foundry. Molten metal is strained into large water tank, forming metal shot which is remelted and cast into test specimens and experimental parts. Development and evaluation of improved high-temperature alloys for advanced jet engines is one of the challenges facing metallurgists at P & W A.
The development of more advanced, far more powerful aircraft engines depends to a high degree on the development of new and improved materials and methods of processing them. Such materials and methods, of course, are particularly important in the nuclear field.

At Pratt & Whitney Aircraft, the physical, metallurgical, chemical and mechanical properties of each new material are studied in minute detail, compared with properties of known materials, then carefully analyzed and evaluated according to their potential usefulness in aircraft engine application.

The nuclear physics of reactor materials as well as penetration and effects of radiation on matter are important aspects of the nuclear reactor program now under way at P & W A. Stress analysis by strain gage and X-ray diffraction is another notable phase of investigation.

In the metallurgical field, materials work involves studies of corrosion resistance, high-temperature mechanical and physical properties of metals and alloys, and fabrication techniques.

Mechanical-testing work delves into design and supervision of test equipment to evaluate fatigue, wear, and elevated-temperature strength of materials. It also involves determination of the influence of part design on these properties.

In the field of chemistry, investigations are made of fuels, high-temperature lubricants, elastomeric compounds, electro-chemical and organic coatings. Inorganic substances, too, must be prepared and their properties determined.

While materials engineering assignments, themselves, involve different types 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 mechanical design, aerodynamics, combustion and instrumentation — spells out a gratifying future for many of today's engineering students.
SIGMA NU

Since finals and the vacation have passed, the brothers have returned to start another enjoyable (?) semester at school.

The chapter has returned to find that we are still in first place in the Interfraternity Basketball League and are on our way to winning the trophy. Just before the vacation, we beat TX 50-46 to extend our lead to 1 1/2 games.

Over the vacation, an alumnus of ours, Brother Jim Tatooles, Class of '55, stopped in and told us of his interesting experiences in Europe. Jim, who has served 1 1/2 years of his two year obligation in Germany, is now on his way to Ft. Campbell to pick up his 1st lieutenant bars and finish his time. Brother Tatooles gave the seniors a very interesting lecture in MS&T class on some of his experiences while overseas.

Brother John Bradshaw, who graduated last year, stopped in the other day and told us that he had been released from employment with DuPont at Dana, Ind. because they are putting the plant in mothballs. He is undecided where he is going to take up further employment.

Our social calendar is highlighted during the month of February with Sigma Nu State Day which is being held this year at Butler University. General discussions will be held in the afternoon of Feb. 23, with a dinner and dance following that night.

Congratulations to brothers Jim Freers, who married the former Miss Pat Nemeth; George South, who became engaged to Miss Cora May Archung; Don Carrell, who pinned Miss Linda Swinney; and Dave Moeller, who pinned Miss Pat Rimshas.

THETA XI

Well, here it is almost finals time again. All the guys are studying hard for the ordeal forthcoming. Lots of luck guys, we'll all need it. The doors of Theta Xi opened for the freshman for the first time a few weeks ago. The agenda for the night included: first, meeting all the members; second, free eats (the members ate more than the guests!); third, a tour of the house; fourth, entertainment in the rec room, courtesy of Prof. Wagner. He was up to his usual par, including in his lecture such items as a broom, a pair of altered pants, study aids, and prizes for lucky guests. Thank you, Prof., it was most interesting.

Congratulations to Brother Stafford, who tied the knot over Christmas vacation. You're a lucky man, Bill. Congratulations also to Brother Boodt, who recently became engaged. Formal initiation was held on Jan. 13 for our pledges. The new members are; John Stearly, Don Lucas, and Bob Manning. Glad to have you, men. We have pledged a new man since the last Technic article.

Congratulations to Dave "pappy" Pierson. The T.X. Tigers began the New Year with two losses in basketball. They were the first losses for our hard fighting ball club. We hope to avenge the defeats soon. There is a mixer planned in the near future with Alpha Omicron Pi Sorority of State. It should be fun. On April 27th, Theta Xi will celebrate a combined function of 50th Anniversary of Kappa Chapter in the Terre Haute House Mayflower Room. We are expecting delegates from all the surrounding chapters to help in the festivities.

The Civil War was reenacted in the Halls of Theta Xi last week. The leader for the Union forces was General Bock. Admiral Mrava led the Rebels in brave and daring attacks on the Union entrenchments. We never did decide who won, but it all was lots of fun. Well, it seems as that's all the news for now. See you in the next Technic?

Ken Hollingsworth &
Gene Amick

ALPHA TAU OMEGA

On February ninth the chapter house jumped and bounced to an after the basketball game house party. Music, dancing and snacks were the main bill of fare. ATO members of this year's varsity basketball team were honored. This year's roundballers included Co-Captain Gary Giffel, Jack Fenoglio, Bob Dinning, Larry Grimes, and last but not least, manager Bob Sutton. Everyone had a very enjoyable evening climaxing an exciting basketball game. Major house wrecking and mayhem took place between semesters. Two new showers and a bathroom sink were installed in the main bathroom. Although we're studying to be engineers, we certainly don't qualify as plumbers. Work moved along slowly, but finally the job was finished. To complete the modernization plan, every bath had tile laid on the floors and wall tile placed around the wall. It wasn't too unusual to see the tile layers walking around with tile paste from head to toe with their fingers stuck together. Needless to say, no one will ever admit a desire to lay wall tile or floor tile again. Sensing the lack of interest on laying tile, the chapter contacted the professionals who came and tiled the dining room floor in one day. The bathroom tile layers almost quit. They kept muttering to themselves about being sick.

Congratulations are due to Wilbur Steele and Larry Grimes who are the chapter's newest actives.

Valentines Day has special meaning this time for many of the Taus. Many Taus became engaged or pinned. Next month's column will contain their names and the girl's name.

(Continued on Page 44)

The Rose Technic
Meet Bill Hancock

Western Electric development engineer

Bill Hancock is a graduate of Pennsylvania State University where he majored in industrial engineering. Bill joined Western Electric as a planning engineer in November, 1951, at the Kearny Works in New Jersey. Later, he was assigned to the new Merrimack Valley Works in North Andover, Massachusetts, as a development engineer. Here Bill is shown leaving his attractive New England home for his office while his wife, Barbara, and their daughter, Blair, watch.

Bill is an engineer with a wide variety of interesting, creative opportunities. It makes no difference what your field of specialization is. You can fit — now — into our operation as the manufacturing and supply unit of the Bell System... or into our defense job. A free booklet — "Your Opportunity at Western Electric"— outlines company operations and specific job opportunities in detail. Send for it. Write to: College Relations Department, Room 1030, Western Electric Company, 195 Broadway, New York 7, N. Y.
Statistics

We are happy to report that the Library's monthly book circulation has steadily increased from 242 books with a daily average of 13.44 for September to 475 and a daily average of 25 for December. For the most part the increase has been in the books borrowed by students rather than the faculty. Fellows, keep up the good work!

Stop Thinking, Start Reading

"You have just sat down to read. Your eyes and mind are bright and clear. Your vocabulary is in smooth working order. Your motivation for reading is strong. You want to read, and yet you are making a mess of the job. You don't know quite what you are reading about.

"Why not? Because you can't concentrate, and concentrating is essential to the art of reading.

"Everything which affects us emotionally or psychologically may affect the way we read. Most of us — 97.5 per cent — are confronted with some sort of reading matter every day. Yet how many people know how to read well? Surprisingly few.

"It has been found that rapid readers are more attentive than slower readers. Their minds seek ideas in print, not isolated words. Therefore, one of the ways to improve your reading ability is to step up your process. Assuming the material you are to read is moderately simple, make up your mind to read it faster. Deliberately push yourself forward at a rate too fast for comfort. Set yourself a time limit; strive to complete the reading task within your own imposed limit, even if it means skipping and skimming. In this method of accelerated concentration you will seek out only the importance of what you are reading; time will not be wasted on the unimportant."

—Executives' Digest

FROM THE NEW BOOK SHELF
Satellite! by Erik Bergaust and William Beller

Man's exploration of space is about to begin. Since the United States made its startling announcement that tiny basketball-sized objects are to be launched into space, everyone has wanted to know: What are those objects? How will they work? What will they do? And how will they affect my life?

In this highly informative book the authors give all the answers. Satellite! contains more complete and accurate information on what is about to take place above us than is available anywhere else, even in technical journals. Yet it is written clearly and simply and you will be able to understand the facts and share the excitement that Mr. Bergaust and Mr. Beller themselves feel about this daring project.

The authors, who are highly qualified to write about the satellite program, outline in detail some of the things these first satellites will tell us: the facts that may be learned about the moon, the near planets, and the sun; the possibility of predicting future weather accurately (thereby revolutionizing farming); the knowledge that may be gained about atmosphere: new information about the mysterious cosmic rays and how they affect our lives.

Mr. Bergaust and Mr. Beller also give the background of the present rocket and satellite program, from an explanation of rocket motors and launching programs to the difficulties of getting even a small object into an orbit. And they present an exciting account of how the basic knowledge of the world and the universe may be changed and broadened by the new information collected by the tiny circling satellites.

The authors explain how the satellite program may answer many of the old questions concerning life on Mars and Venus and what is on the other side of the moon. And they feel that the project will force the asking of new questions. Man will be exposed to a frontier he has never before been able to penetrate — and man has always looked to the sky and wondered what lay beyond.

The Compact History of the United States Army, by R. Ernest Dupuy

This is not a book which attempts to tell the story of American military strategy and tactics, skirmishes and battles, or the logistics of war and peace. Instead, here — for the first time — is the story of the United States Army itself: how it began; what it has been; and what it is today. It is the story, too, of American soldiers (and their women and children); of how they lived the Army life; of what they thought and why; of what they did to the Army; and what the Army did to them.

In these fascinating pages, a great tradition passes in review — the Colonials who taught the British how to fight Indians; the tattered units of the Revolution who became an Army; the soldiers, Blue and Gray, of the war that divided our country;

(Continued on Page 36)
RCA High Fidelity Tape Recorders

make it easy as taking a snapshot
to record "New Sensations in Sound"

CLICK! You press a button and the sound is yours forever exactly as you hear it today.
Why "exactly"?
Because this is an RCA Victor New Orthophonic High Fidelity Tape Recorder. It features the most advanced achievements of the world's finest sound engineers.

You can record at 2 speeds—one for music, one for voice. You can locate any part of any recording. Just look through a "window" to a numbered counterwheel. Push a button and you control "Rewind," "Playback," "Forward," "Recording," "Stop." There's ever a provision for remote control.

And wait till you hear the playback. On RCA Victor's Panoramic three-speaker sound system you really sound like you! Equally important, the price of these superb examples of RCA engineering now runs as low as $159.95.

In every sense these achievements in tape recorders typify all the work of the David Sarnoff Research Center in Princeton, New Jersey. For here RCA scientists and engineers are finding most practical and dramatic answers in their day-to-day search for ever-better "Electronics for Living."

Where to, Mr. Engineer?

RCA offers careers in research, development, design and manufacturing for engineers with Bachelor or advanced degrees in E.E., M.E. or Physics. For full information, write to: Mr. Robert Haklisch, Manager, College Relations, Radio Corporation of America, Camden 2, N. J.

RADIO CORPORATION OF AMERICA
Electronics for Living

February, 1957
INTRAMURAL BASKETBALL

The end of the fall semester held a bit of brightness which served to subdue, somewhat, the gloom inherently bestowed by finals, on RPI dwellers.

The end of the first basketball league came to a sizzling existence with the Senior Civil-Chemicals bagging the top position. Their record was perfect with 10 victories scarred by not that first defeat.

It was a contest to behold until the last minute of the last game was ticked off. The final battle was necessary to determine a league winner.

The “almost won” contenders, otherwise known as the Junior Electricals, staged a brilliant battle only to be deprived of top glory by a score of 47-42, administered by the successful Senior C-C crew.

FINAL STANDINGS

1st Basketball League

<table>
<thead>
<tr>
<th>Team</th>
<th>Won</th>
<th>Lost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Senior Civil-Chem</td>
<td>10</td>
<td>0</td>
</tr>
<tr>
<td>Junior Electricals</td>
<td>9</td>
<td>1</td>
</tr>
<tr>
<td>Freshman B</td>
<td>6</td>
<td>3</td>
</tr>
<tr>
<td>Freshman D</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>Freshman E</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Freshman F</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Sophomore Mechanicals</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Freshman C</td>
<td>4</td>
<td>6</td>
</tr>
<tr>
<td>Freshman A</td>
<td>1</td>
<td>9</td>
</tr>
</tbody>
</table>

There were some outstanding “guns” whose accomplishments should not go unheralded. The top scorer during the first league was Bock who dropped in 161 points during the total of 10 games.

Butcher came through with 120 for second honors. Also among the top five “basketeers” for the league, were Sawyers, (117); Elythe, (100); and King with 98 tallies.

The second league is now well under way with the nets swishing again after their “breather” between semesters.

At the present torrid rate of the 2nd league, it is surmised that the competition between hoop crews has grown even sharper than was witnessed during the first round of the season.

FRATERNITY BASKETBALL

The boys from the Sig Nu house are reaping a good harvest of wins on the Inter-Fraternity Basketball loop. They are leading the Rose foursome, followed by T.X.

More and more competitive rivalry is arising among the fraternities from their exploitations on the hardwood. Some real thrillers have been evidenced.

The 3rd and 4th positions in the won-lost column are being held by Lambda Chi and ATO, respectively.

INTRAMURAL VOLLEYBALL

Another type of net must also be “rumored” of. However, this is the kind of net which the offense does not rejoice at the sound of.

The volleyball race is a hot one, with the three top teams each having lost only one game while winning 7, 6, and 5. The top teams are the ones with the top team designation numbers, with the exception of Team 8. They have had the misfortune of landing in a relatively lower position in the standings bracket.

And so goes the athletic life of the “everyday Rose Man” in his brilliant attempt to gain release from the “bogging-down effects of education.”

VARSITY SPORTS

The basketball engineers are really going places this season. Thus far they have won 6 out of 8 tilts and seem to be improving with every game. Some statistics on the team as a whole show that they are hitting from the floor at a .382 clip. Looking at the top man’s percentage of .420, you can see that the scoring is pretty well rounded. At the charity line the team has sunk 64.5% of their attempts.

Oakes is the “big shot” with 139 points and a shooting percentage of .420. Bright is next with 98 points and a .390 average. Following close behind are Giffel with 91 and .405, Smith with 77 and a .375, and Brown with 75 tallies, shooting .400. On rebounds, Bright is up in the air most with 104 repossessions. Smith has snagged 81, and Oakes, 69. The whole team has taken the ball off the boards 351 times.

In the Marian game at Rose, we topped them 69 to 61. Sherm Smith, the freshman star, was high man with 18 scores. Bright, Oakes, and

(Continued on Page 44)
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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.

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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.
NEW MICROSCOPE

A new microscope for use by machinists and toolmakers in the inspection and measurement of tools, drill jigs, templates and finished parts has been developed by the Bausch & Lomb Optical Company, Rochester, New York.

It is called a Toolmaker's Measuring Microscope, and offers significant improvements over the existing shop microscopes. According to the manufacturer, it provides versatility, convenience, sturdiness and accuracy previously unavailable in its price bracket.

The major advance is in a unique illuminating system. The illuminating source is built-in and the beam of light is directed down through the microscope objective, giving true vertical illumination. A collective mirror under the stage plate reflects the light back into the body tube. As a result, both the surface and the contour of parts may be viewed simultaneously.

The instrument is designed for precision measurement in two coordinates. The cross slide stage has a maximum possible range of two inches while the vertical slide stage has a range of one inch. The stage rests on ball bearings and it motion is controlled by two micrometer screws.

The standard magnification is 35X. However, other magnifications may be obtained using different objective and eyepiece combinations. A 7 1/2X protractor eyepiece, and centers which can be aligned with the eyepiece cross-hair are available for increasing the versatility of the instrument.

The reasonable prices of the equipment make it a practical instrument.

XP 500

The combination of free piston engine and gas turbine will become

(Continued on Page 39)
Careers Grow—Through Science

FROM THE ELEMENTS OF NATURE—a limitless frontier—scientists develop new products and processes that benefit everyone. To the college graduate, these new things mean career opportunities that did not exist before.

The scientists of Union Carbide have introduced an average of one new product per month for over 25 years. They are now introducing them at the rate of two a month.

Today, more than one-third of the work of the people of Union Carbide all over the country is in providing products and processes that did not exist in commercial quantities 15 years ago.

Nearly 3,000 scientists, in 23 Union Carbide laboratories, devote full time to research.

For more information about opportunities with Union Carbide, see your placement director, or write to Mr. V. O. Davis, Co-ordinator of College Recruiting.

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February, 1957
orbit was said to slowly be becoming an ellipse because of the pull of the moon.

Whether or not a satellite has been launched at this time, it is positive one will be soon. Many problems must be solved before a new, "man-made moon" appears in the heavens. A rocket combination must be developed which will place the satellite in its proper orbit approximately two hundred miles above the earth, the minimum height needed to travel around the globe without being pulled back by gravity. As Singer suggested, a three-stage rocket would best do the "trick." The first rocket would shoot the missile twelve to fifteen miles above the earth, imparting to it a velocity of seven thousand two hundred miles per hour. The second stage would take it most of the way and boost its speed to twelve thousand two hundred miles per hour. The third rocket would give it a side-wise "shove" to start the satellite into its orbit around the earth and give it its final speed of seventeen thousand two hundred eighty miles per hour, the speed necessary to maintain an orbital position about the earth at two hundred miles. This speed can be calculated by applying the equation gravitational acceleration equals the satellite's velocity squared over the radius of its orbit.

There is no problem about getting rockets powerful enough to raise the satellite to its desired height of two hundred miles. Already multiple-stage experimental rockets have been fired by the United States at White Sands, New Mexico, that have reached altitudes of two hundred fifty miles above the earth's surface.

As was mentioned in regard to the MOUSE, the satellite would not be able to circle the earth indefinitely. There are enough traces of the atmosphere at two hundred miles to create friction to slow the satellite's speed down below the critical seventeen thousand two hundred eighty mile per hour mark. Therefore, between seven and ten days after its launching the satellite would slow down appreciably and gravity will begin to pull it towards the earth. The satellite will circle the earth only so long as its centrifugal force created by its speed equals the pull of gravity. When the satellite starts falling, the friction it encounters will cause it to burn completely like a meteorite or "shooting star."

Equipment in the satellite would probably include a Geiger counter and instruments for measuring light radiations, magnetic fields, and meteorites, as well as telemetering equipment. A few of the things the space station could investigate are air-density measurements, cosmic rays, the earth's magnetic fields, ultraviolet light, X-rays from the sun, electrification of the upper atmosphere, the bombardments of the earth by meteorites and other particles, the contents of space, and solar radiation. Some other things scientists hope to learn are: the precise shape of the earth, the density of hydrogen atoms in outer space, the density of microscopic particles in a meteor stream, information about the streams of solar particles that produce auroras.

A more practical reason than any of the above for sending the satellite aloft is the increased knowledge of meteorology — weather forecasting. Each country has done some work in weather observation but it is very spotty. There are areas around the globe such as Antarctica where no information is available, and events occurring in these places may affect the weather all over the world. Until weathermen get better reports from everywhere, forecasting cannot be improved. The satellites would notify weathermen of impending conditions, and weather forecasting on a long-term scale would be probable.
How to break records rolling plate

High steel plate production calls for high rolling mill speeds. And this means friction must be reduced to the minimum, so that roll acceleration will be easy. Low friction minimizes skidding and scuffing between rolls to maintain gauge. Engineers who designed this huge, continuous plate mill met the problems by specifying Timken tapered roller bearings for the work rolls and back-up rolls. Result: The mill has set new production records. Since their installation, Timken bearings have rolled over 9 million tons of steel.

True rolling motion of TIMKEN® bearings practically eliminates friction

All lines drawn coincident with the working surfaces of the rollers and races of Timken bearings meet at a common point on the bearing axis. This means Timken bearings are designed according to geometrical law to have true rolling motion. And they're manufactured with microscopic accuracy to live up to their design. Result: Timken bearings virtually eliminate friction, give longer bearing life, keep equipment rolling smoothly.

Want to learn more about bearings or job opportunities?

Many of the engineering problems you'll face after graduation will involve bearing applications. For help in learning more about bearings, write for the 270-page General Information Manual on Timken bearings. And for information about the excellent job opportunities at the Timken Company write for a copy of "Career Opportunities at the Timken Company". The Timken Roller Bearing Company, Canton 6, Ohio.
and other Americans on the Western frontier, in Cuba and the Philippines, in Mexico, in Europe in two wars, in the Pacific islands and, most recently, in Korea. Colonel Dupuy brings alive this proud heritage with astonishing skill.

The Compact History of the United States Army is the story of a great and important institution in our democracy and of the people who compose it. Valuable to any student of American history, it is even more useful as an introduction to Army life and tradition for both the newly-commissioned officer and the young draftee. Those already in the Service or those who have served in the Army at any time will find in this book a vivid and memorable picture of an important part of their lives. Wives and families, too, will find it enjoyable and instructive reading.

What Man May Be, By George Russell Harrison

In the short span of fifty years science has literally transformed the world we live in — so that, within living memory, a seemingly known and ordered world has given way to one both new and strange; a world in which the person without specific scientific orientation finds himself—even while he enjoys the material comforts science provides — confused and confounded in respect to the deeper issues of human life and destiny: Does modern mechanized life subject the human organism to stresses it is not equipped to stand? Has science made religion obsolete? With nuclear energy, is man playing with the ultimate fire that will destroy him?

It is to such profound questions as these that Dr. Harrison addresses himself in this distinguished book. He attacks them with the objectivity of the seasoned scientist, the eloquence of an able writer, the fervor of an idealistic thinker.

His first weapon is information, and here he deploys the whole body of modern science before the reader — from psychology to astronomy, from biology to nuclear physics. The facts are many and individually fascinating, ranging from the complex articulation of the human hand to the structure of the atom, and always the facts are presented in lucid layman's language. In this respect alone, as an introduction to the discoveries of modern science, the book is a constant delight.

But underlying the facts, interwoven with them, shoring them up are the cogent observations of a mature mind, and a lifetime philosophy — the firm conviction that science and religion are compatible; the clear demonstration that change is the essence of life and its progress is always upward, that man's opportunities are unlimited. "Man has seen the gods," says Dr. Harrison, "and knows within his heart that by following his inner fire, learning how to control himself and the ever-increasing reaches of his universe, he can become like them."

It is hard to believe that any read-

(Continued from Page 28)

(Continued on Page 40)
"let's sum it up this way...

"Only the aircraft industry combines all of our most advanced engineering sciences. It involves such fields as electronics, communications, propulsion systems, hydraulics and pneumatics, thermodynamics and scores of others — each a field which your training will soon qualify you to enter. Those of you who want to specialize can have a lifelong career in any one of them; or you can easily move from one field to another — still within the aircraft industry — with equal opportunity.

"And here's another point... it's a relatively young industry and the outer limits have yet to be reached. Supersonic flight and automatic guidance systems are opening new fields for research that were unheard of yesterday, but may be vitally needed tomorrow.

"In the aircraft industry your rewards will be high, both in the satisfaction of achievement and compensation. So, in summing this up, by all means turn to the aircraft industry if you want to make your college training bring you the greatest returns."

These words are echoing daily in classrooms throughout America. The reasons are plain to see — military and civil aircraft and their support equipment are the most complex systems ever devised for the movement of men and materials. Piercing the barriers and solving the problems confronting the industry present unlimited challenges for creative engineering.

At Northrop, you can take an active part in speeding the development of both piloted and pilotless aircraft, intercontinental bombers, missiles and entire weapon systems... by applying your engineering training in the specialized fields of your choice.

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Be ahead of time by writing us, now. Tell us where your interests lie... ask us questions... we believe we can help in your career selection. Write to Mgr. of Engineering Industrial Relations, Northrop Aircraft, Inc., 1019 East Broadway, Hawthorne, California.
MAN-MADE MOON

(Continued from Page 34)

The research carried on by means of the satellite could shed some light on radio transmitting problems. Interruptions to transatlantic radio communications are caused quite directly by radiations from the sun that disrupt the ionosphere — the electrified upper layer of the atmosphere. Therefore the sun has direct influence on communication to any point on the globe. The whole radio-communication industry is based on the use of the atmosphere. Long-distance communication is possible because the ionosphere has the property of reflecting radio waves. This provides communication beyond the horizon because the radio waves bounce back to the earth instead of escaping into space. When the reflecting layer is disrupted — when it is rough — then long-distance communications won’t work. The satellite would investigate the ionosphere and discoveries made about its atomic make-up might lead to more uninterrupted radio communication.

The Special Committee for the International Geophysical Year, at whose request the United States government is sending up the satellite, has this to say about the purpose of the space station:

"The atmosphere of the earth acts as a huge shield against many of the types of radiation and objects that are found in outer space. It protects the earth from things which are known to be or might be harmful to human life, such as excessive ultraviolet radiation, cosmic rays, and those solid particles known as meteorites. At the same time, however, it deprives man of the opportunity to observe many of the things that could contribute to a better understanding of the universe. In order to acquire data that are presently unobtainable, it is most important that scientists be able to place instruments outside the earth's atmosphere in such a way that they can make continuing records of the various properties about which information is desired. In the past, vertical rocket flights to extreme altitudes have provided some of the desired information, but such flights are limited to very short periods of time. Only by the use of a satellite can sustained observations in both space and time be achieved. Such observations will also indicate the conditions that would have to be met and the difficulties that would have to be overcome, if the day comes when man goes beyond the earth's atmosphere in his travels.

"The satellite itself will orbit around the earth for a period of days, gradually circling back into the upper atmosphere where it will eventually disintegrate harmlessly."

Painted white, possibly with luminous paint, the satellite should be a little brighter in the sky than the faintest star visible to the naked eye. It will move so quickly that it will probably have to be observed through binoculars aimed in advance at points where it is expected to appear. It will be easiest to see when it is illuminated by the slanting rays of the sun two to fifteen degrees below the horizon.

Undoubtedly when the first satellite is sighted circling the heavens, it will inspire immediate discussion of manned space stations and manned space flights. But these are possibilities only for the far-distant future. All of the problems noted for the satellite would increase a thousand-fold in building a manned space station. Professor Harry Godd of the University of Michigan estimated that a manned space station would cost a prohibitive forty billion dollars and take ten years to build. A missile large enough to carry a man would require some means of propulsion other than those which are now available.

Still, the earth satellite would be a small, preliminary step to the conquest of the stars. It would represent the first outreaching of man beyond his own confining atmosphere. Necessary information would be gathered for man to attempt a large-scale invasion of space. This "man-made moon" would be the first stepping stone to the stars.
a serious contender for powering automotive vehicles according to the General Motors Research Staff.

General Motor's latest experimental automobile, the XP-500, has a free piston gasifier under its hood that compresses and pumps air through a 3 1/2-inch pipe to a gas turbine at the rear. Power from the revolving turbine is transmitted to the car's wheels.

The gasifier unit is 40 inches long, 34 inches wide, 18 inches high. It has a pair of parallel power cylinders, similar to two-cycle Diesel cylinders, each four inches in diameter. Its four air compressor pistons, which bounce back and forth in the two cylinders, each are 11 inches in diameter with a stroke of approximately 5 inches.

Because the free piston-turbine combination has no crankshaft, connecting rods or propeller shaft, power for such items as power steering, engine cooling and other accessories was a special problem.

The XP-500 has no rotating shaft for driving an engine fan, water pump, generator or other accessories usually driven by a fan belt in a conventional automobile. Instead, a high pressure hydraulic pump is operated from the car's rear-end transmission unit.

Hydraulic tubes lead to a location under the car's hood where a hydraulic motor turns the radiator fan and water pump.

In comparing the XP-500 with today's automobiles, General Motors listed some of the major features the new combination of a free piston engine and rear-end turbine would have.

1. Free piston engines are insensitive to fuels, regardless of whether they're burning kerosene, No. 2 Diesel oil or bunker "C," the cheapest petroleum fuel on the market. They also operate satisfactorily on gasolines up to 1000 octane.

2. Efficiency of the free piston-turbine combination is the product of the gas efficiency of the free piston gasifier and the turbine. The gasifier or "air pump" section can operate at compression ratios ranging from 30-to-1 up to 50-to-1.

3. Free piston engines are inherently balanced. Engineers need only to be sure their major moving parts have exactly the same weight. Otherwise, no special engine mounts are needed to eliminate vibration or so-called torsional movement from spinning wheels and crankshafts.

4. The free piston-turbine arrangement has good torque in the low-speed range where most of today's driving is done. Thus, it appears that only a simple two-speed transmission would be needed for this combination to match the performance of today's engines with their automatic transmissions and torque converters.

5. The free piston gasifier under the XP-500's hood pumps low tem-
LIBRARY NOTES
(Continued from Page 36)

er could come away from this book without inspiration and comfort — a greater sense of direction in his own life and in the life of the changing world about him.

*Roosevelt: The Lion and the Fox,* by James MacGregor Burns

Politics is America’s most fascinating game, and possibly its greatest player was Franklin Delano Roosevelt, the only man in history to win election to a third and a fourth term as President of the United States. In this human, dramatic — and frankly analytical — book, James MacGregor Burns has written the first political biography of F.D.R., one of this country’s best-loved and most-hated leaders.

*Roosevelt: The Lion and the Fox* presents answers to many of the most tantalizing riddles about this complex personality. How could this aristocrat, whose greatest youthful tragedy was a snub from an exclusive Harvard club, become the idol of the poor and the hope of the average man — yet the image of infamy for the rich and powerful who thought he ate “grilled millionaire” for breakfast? How could this crippled President, who painfully crawled around the floor at Hyde Park in an attempt to exercise his paralyzed muscles, become the symbol of strength and power for a nation? Was he really a radical or essentially a conservative, determined to save old-fashioned democracy and the free-enterprise system in spite of itself?

Here is a boldly honest political portrait that assesses Roosevelt’s failings and pays tribute to his acts of genius — from his vanquishing of a nation’s fears in days of depression to his catalyzing of a nation’s righteous anger in days of war. It will be exciting reading for those who voted for or against Roosevelt, and for those too young to have done either. Mr. Burns pierces the legend to reveal man and politician, the Lion and the Fox. His new perspective gives the reader a front-row seat to history in the making.

A 60-HOUR WORK WEEK ISN’T ILLEGAL
(Continued from Page 12)

The sixty hours scheduled for academic activities actually are very typical as far as the general philosophy of credit hours in most college curricula are concerned. Each recitation hour calls for two hours of preparation and the laboratory periods supposedly require none. Let’s consider a Rose student taking 19 credits, 15 recitation hours and four, 3-hour labs

<table>
<thead>
<tr>
<th>In class Preparation Total</th>
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<tbody>
<tr>
<td>Recitations 15 30 45</td>
</tr>
<tr>
<td>Lab. periods 12 0 12</td>
</tr>
<tr>
<td>Total 27 30 57</td>
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Dividing this 57-hour total by an efficiency factor of 0.940 (coffee breaks, phone calls, daydreaming, actual sleeping while studying, etc.) gives the realistic 60-hour total. This means that putting in six 10-hour days each week will make it possible to take an entire day off for ice-skating or many games of snooker.

So far, we have discussed the desirability of a 60-hour work week as far as your own professional development and personal satisfaction are concerned. You are probably aware of the shortage of engineers in this country. Making certain that all professional engineers work longer hours would make it more probable that the United States would stay abreast of the technological developments so important in the world today. (Russian engineers certainly spend more than 40 hours per week on the job.)

Students of Rose—try a 60-hour work week. It’s a marvelous check on yourself to see how you’ll like REAL LIFE in industry. You could conceivably find yourself enjoying engineering studies. Give this plan a month’s fair trial. We also include a money-back guarantee that your grades will improve. If they don’t, drop around to the office. Your card will be punched without question.

You may turn on the late movie now. Thanks for listening.

Sincerely, B.S.

Page 40
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It takes a sharp drawing to sell a sharp idea—and you're halfway there when you pick up an EAGLE TURQUOISE drawing pencil. For one thing, no pencil on the market can match TURQUOISE for smoothness and consistency—thanks to Eagle's exclusive "Electronic" graphite. What's more, every TURQUOISE has a strong needle point that just won't crumble—and stays sharp for line after long line of unchanging width. Tops for uniform grading, it's also perfect for reproduction—mistakes erase without a trace, leave nary a "ghost line." Makes your drawings look sharp—and you, too!

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temperature exhaust to the power turbine at the rear of the car, and this results in a number of real and definite advantages.

First, the turbine can be made of non-critical materials at moderate cost. Another advantage is the ease with which the free piston gasifier can be connected with the turbine since it is not necessary to have a propeller shaft and other mechanical connections between the engine itself and the final drive.

6. Throttle response is highly desirable, and the free piston gasifier makes its power available quickly to the rear wheels. The gasifier rapidly increases its gas output to the turbine, whereas in a gasoline or Diesel engine a period of time is needed to "rev up" the engine.

7. There is also the possibility of placing an afterburner in the XP-500's power package. This could be placed between the gasifier, and additional fuel could be burned to supply more power to the turbine, making additional power available instantaneously.

The free piston engine offers engineers a basic "building block" for a whole family of engines with virtually the same components, starting with a single cylinder design. Next would be a siamesed or two-cylinder design. Higher horsepower would be developed by two or more... units feeding into a common header to the power turbine.

LARGEST INERTIA DYNAMOMETER

The world's largest inertia dynamometer for laboratory testing of full-scale railroad wheels is now in operation at U.S. Steel's Applied Research Laboratory. The Scientists at the Center were responsible for the functional design of the new machine, on which standard railroad wheels from 30 to 48 inches in diameter can be tested under normal or exaggerated conditions simulating factors of loading, braking and tracking encountered in actual service.
IMPORTANT ON-CAMPUS INTERVIEWS FOR POSITIONS AT

NORTH AMERICAN'S COLUMBUS DIVISION

North American Aviation, foremost in the design and production of military aircraft, has an established engineering team at its Columbus Division with prime responsibility for complete design and development of Navy aircraft.

The New FJ-4—Navy's latest and fastest FURY JET—is the most recent achievement at Columbus. Other, even more advanced designs are now being developed from initial concept to actual flight...creating top opportunities for virtually all types of graduate engineers.

Contact your Placement Office for an appointment with North American representatives.

Or write: Engineering Personnel Office, Dept. COL, North American Aviation, Columbus 16, Ohio.

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February, 1957
Giffel followed in that order with 16, 13, and 11 respectively.

At Eureka, the Red and White trounced the Red Devils, 72 to 59. Oakes gunned in 24 points, which is the highest individual score this season. Brown contributed 16 markers and Giffel got 12.

A trip to Greenville brought the first defeat to Rose, 76 to 59. Oakes' 21 points and Brights' 19 weren't enough to offset the big lead Greenville got on us.

Back at home we took on Huntington and showed them who was master by a score of 77 to 62. Bob Bright was tops with 20 points, followed by Oakes with 17 and Giffel with 15.

Blackburn was the next team to fall under the driving engineers. In a real close one we snuffed them out 66 to 63. Oakes hit for 17; Smith was second with 13; Brown came in with 12 and Giffel, 11.

Then we took on Marian for the second time and showed them we still had their number by nosing them out 72 to 69. Gary Giffel came through with 19 to lead the scoring while Oakes, Brown, and Bright followed with 17, 14, and 12.

After a long Christmas vacation, we battled McKendree and held them to a two point lead in the first half. But in the second period the Rose netsters couldn't find the hole and as a result, McKendree pushed ahead and won 82 to 56.

Several freshmen have been playing in almost every game and are developing into good roundballers. Among them are Ron Jennings, Larry Berger, Jim Sargent, and Larry Cunningham. Keep up the good work, guys, and incidentally the grades; you're doing fine.

Congratulations go this month to three seniors: Don Simpson who pinned Miss Judy Giffel of Terre Haute before Christmas; and two who will always have to remember this Christmas, Bob Bright who pinned Miss Shirley Swinney of St. Joseph, Mo. and John Bizal who pinned Miss Nancy Findley, a student at DePauw University. As all three are roommates, the fourth roommate, Bill "I knew a girl once" Payne is expected to be the next to go.

LAMBDA CHI ALPHA
Changes are really being made down this way. Our kitchen has been completely remodeled with new plaster, paint, sink and wall to wall cabinets of knotty pine. In the basement the pipes were raised, a wall torn out and a ceiling of acousto-tile installed. The side paneling was also refinished in knotty pine. This between semester project by the brothers really increased the size and beauty of the basement.

Co-captain Bright with the assistance of LXA starters Brown and Oakes are doing a fine job toward helpin Rose in the race for the Prairie oCnference. Coach Frank Molinaro has also led the infrafraternity team into a tie for second place after losses to Sigma Nu but coming back to defeat Alpha Tau Omega and Theta Xi.

In the house improvement section, I forgot to mention that a new sink is being installed upstairs also. It seems that two juniors, Kirts and Oakes, decided that they didn't need to shave for a week so the seniors convinced them with a dull blade, cold snow, and alcohol. In the tussel, however, hair was not the only thing flying—a sink hit the dust also with the cascade of water that followed stopping the ordeal but not before the juniors learned to shave regularly.

Tom Reese.
ALLISON ENGINES have accumulated an impressive record of flight time in many different types of turbo-jet and turbo-prop aircraft. Included in the wide variety of aircraft are single and multi-engine planes—both land based and water based—as well as expendable missiles.

TODAY, with this valuable accumulation of engineering experience—coupled with our vastly expanded engineering research and development facilities—we look to the future. And, what a future it promises to be in this era of supersonic speeds... nuclear energy application, and—well, the sky is the limit.

Opportunities at Allison are equally unlimited for engineering graduates, ambitious young men who recognize the advantages of being identified with an established leader in the design, development and production of high performance aircraft engines.

Write for information about your future career at Allison: Personnel Dept., College Relations, Allison Division, General Motors Corporation, Indianapolis 6, Indiana.

Our Engineers Work Here

This is our Administration Building, the hub of the new Allison Engineering Research and Development Center in Indianapolis.
How to ground a flying sorcerer

Even the most imaginative soothsayer would be brought to earth if he could peer into the minds of some of our Chrysler Corporation engineers!

Things he would never dream of in his soaring flights of fancy are turning over in the minds of the men whose job it is to plan and create future Chrysler Corporation cars. These engineers are stirred, but never stymied, by the "impossible." And from this "never-say-no" philosophy . . . from the farsighted imagination of Chrysler Corporation engineers down through the years have come many distinguished automotive firsts. Push-button driving . . . the first practical automotive gas turbine . . . and many, many others, all the way back to hydraulic brakes and all-steel body construction.

We're looking for engineers to join this team. If you'd like the excitement of creating new and different things . . . of pioneering beyond the automotive horizon in such dramatic fields as atomic power and solar energy . . . Chrysler Corporation, we think, is the place for you.

Good pay? Generous extra benefits? We offer all that, of course. But most important, unusual opportunity for advancement to make the most of your imagination, training and talents in the rewarding automotive industry. Write us direct. Address your letter to Mr. L. C. Bettega:

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Page 46 THE ROSE TECHNIC
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That's why we need forward-looking engineers. Stimulating assignments in the work you like best are only part of what we offer. We pay a premium for ability. You'll work with the finest research and laboratory facilities at your disposal... live in the most desirable areas in America — California, Arizona, the East Coast. Financial assistance and encouragement will help you continue your education in the graduate schools of fine neighboring universities.

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Nothing can vex
Like the opposite sex.

Three decrepit, gray-haired gentlemen were seated together in the park discussing their personal philosophies for achieving a ripe old age.

"I'm eighty-six," said the first, "and I wouldn't be here today if I hadn't scorned tobacco and alcohol in every form, avoided late hours and the sinful enticements of the opposite sex."

"I owe my ninety-three years to a strict diet of blackstrap molasses, wheat germ bread and mother's milk," said the second old man.

"When I was eighteen," the third man said, "my father told me that if I wanted to enjoy life as much as he had, I should smoke black cigars, drink nothing but hard liquor, and carouse with a different woman every night. And that's exactly what I've done."

"Incredible," said the first old man.

"Amazing," said the second, for their friend was obviously the grayest, most elderly appearing of the three. "Just how old are you?"

"Twenty-two."

"I gotta job."

"What doin'?"

"Pilot."

"Planes?"

"Naw, stables."

"How so?"

"Pilot here, an' pilot there."

"Gee, ya must be cleanin' up!"

Son: "Pop, I got into trouble at school today an' it's all your fault."

Pop: "How's that?"

Son: "Remember I asked you how much $50,000 was?"

Pop: "Yes, I remember."

Son: "Well, a 'Heckuva lot' ain't the right answer."

A hunter climbed into a tree so nobody would take him for a deer. It worked, too—he was shot by mistake for a bear.

"Wait a minute, sir!" the shocked nurse shouted at him. "You can't go in there now, with your clothes full of germs! You're not sterile!"

"You're telling me!" shouted the father.

"Tell me, friend, can you read that?"

"No," replied the other, "but if I had my flute I could play it."

"How did Brother Jones die?"

Mike: "He fell through a scaffold."

Pat: "What was he doing up there?"

Mike: "Being hanged."

The day after finals, a disheveled Ch.E. walked into a psychiatrist's office, tore open a cigarette, and stuffed the tobacco up his nose.

"I see that you need some help," remarked the startled doctor. "Yeah," agreed the student, "Do you have a match?"

"Will the governor's pardon reach Ronald in time? Will Geraldine, speeding through the night rain, see the washed-out bridge? These are things you'll never know . . . the sponsor has canceled the rest of the series."

Two engineering students were taking calculus for the first time, and while waiting for the instructor to arrive, they took a quick perusal through the book. One of them came across some formulas at the back of the book.

"Tell me, friend, can you read that?"

"No," replied the other, "but if I had my flute I could play it."

Pat: "How did Brother Jones die?"

Mike: "He fell through a scaffold."

Pat: "What was he doing up there?"

Mike: "Being hanged."

A certain Technic editor was having trouble with his small foreign sports car. A truck driver pulled up and inquired, "What's the trouble buddy, need a new flint?"
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