January, 1959

In This Issue

COMMON CAR COLD
FLYING FISH
INDUSTRY’S OUTLOOK
Want to see a pinhead—
47 feet wide?

The head of a pin would appear about 47 feet wide if examined under this instrument. It's an electron probe microanalyzer—the first to be used industrially in this country. U. S. Steel research teams use it to get a better look at the microstructure of new types of steel. In this way, they gather more information about the factors affecting steel quality and performance.

Research like this is typical of U. S. Steel's leadership in the production of better steels for the wonder products of tomorrow.

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For Peaceful Purposes and the Benefit of All Mankind The National Aeronautics and Space Administration Announces its Authorization by the Congress of the United States

To Direct and Implement U.S. Research Efforts In Aeronautics and the Exploration of Space

"The aeronautical and space activities of the United States shall be conducted so as to contribute materially to one or more of the following objectives:

(1) The expansion of human knowledge of phenomena in the atmosphere and space;
(2) The improvement of the usefulness, performance, speed, safety, and efficiency of aeronautical and space vehicles;
(3) The development and operation of vehicles capable of carrying instruments, equipment, supplies and living organisms through space;
(4) The establishment of long-range studies of the potential benefits to be gained from, the opportunities for, and the problems involved in the utilization of aeronautical and space activities for peaceful and scientific purposes;
(5) The preservation of the role of the United States as a leader in aeronautical and space science and technology and in the application thereof to the conduct of peaceful activities within and outside the atmosphere;
(6) The making available to agencies directly concerned with national defense of discoveries that have military value or significance, and the furnishing by such agencies, to the civilian agency established to direct and control nonmilitary aeronautical and space activities, of information as to discoveries which have value or significance to that agency;
(7) Cooperation by the United States with other nations and groups of nations in work done pursuant to this Act and in the peaceful application of the results thereof; and
(8) The most effective utilization of the scientific and engineering resources of the United States, with close cooperation among all interested agencies of the United States in order to avoid unnecessary duplication of effort, facilities, and equipment..."

The excitement, the importance, and the scope of the National Aeronautics and Space Administration are apparent, we believe, from our enabling act. Career opportunities at NASA are as unlimited as the scope of the organization itself.

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Ames Research Center, Mountain View, California
Lewis Research Center, Cleveland, Ohio
High-Speed Flight Station, Edwards, California

*Quoted from the National Aeronautics and Space Act of 1958.

(Positions are filled in accordance with Aeronautical Research Scientist Announcement 61B)
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Cover

A winter view of Rose Polytechnic Institute

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Westinghouse is the best place for talented engineers

Howard Zollinger joined Westinghouse in 1951—has since earned MSEE and two U.S. patents

At 28, Howard A. Zollinger, a 1951 BSEE graduate of Michigan College of Mining and Technology is doing “. . . exactly what I always wanted to do.” Now a systems design engineer, he specializes in the development of modern materials handling systems to support increasingly automated production techniques. Since completion of the Westinghouse Student Training Course in 1952, he has earned an enviable reputation as an expert in drive systems; and he has submitted fifteen patent disclosures, two of which are about to result in patents in his name.

Most important, Howard Zollinger is doing exactly what he wants to be doing. At the completion of his training course, he specifically asked that he be assigned to his present department. And, when he decided that additional graduate study would be helpful, the Westinghouse Graduate Study Program enabled him to combine this study with his regular job. After completing all required course work and his thesis last December, he was awarded his MSEE by the University of Pittsburgh in June.

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

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CBS TV MONDAYS

Page 4
Why diversification makes a better all-around man

DIVERSIFICATION of effort makes for versatility—and versatility pays off in business as well as on the athletic field. We've found that to be especially true here at Koppers.

Koppers is a widely diversified company—actively engaged in the research and production of a wide range of related and seemingly unrelated products, such as remarkable new plastics, jet-engine sound control, wood preservatives, steel mill processes, dyestuffs, electrostatic precipitators, coal tar chemicals, anti-oxidants and innumerable others.

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KOPPERS

JANUARY, 1959
Lubrication of enclosed parts can now be inspected without disassembly. Standard Oil scientists have developed the instrument system shown here which measures the presence or absence of the required lubricant on concealed parts by checking the ability of the entire assembly to cut down radiation passed through it.

How to "see" without looking

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

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

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

Such creative thinking is the product of the atmosphere in which Standard Oil scientists work. They have the time, the equipment and the opportunity to contribute to the progress of their industry and their country. That is why so many young scientists have chosen to build satisfying careers with Standard Oil.
The vortex tube is a refrigerating machine with no moving parts. Compressed air enters the vortex chamber pictured here and spins rapidly down an attached tube. Pressure and temperature differences build up, forcing cold air out one end and hot air out the other. Requiring no maintenance, a large vortex tube developed by AiResearch scientists and engineers can be permanently sealed in nuclear reactors, and has many uses in industries with spot cooling problems.

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

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

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January, 1959
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The next freshman class will be admitted
September 14, 1959

The Rose Technic
Engineer - - or Technician?

Do you know what engineering is? Are you aware of the type of work done by an engineer? Many of us never actually stop to think of the basic principles of engineering. According to Webster's New Collegiate Dictionary, "engineering is applied science concerned with utilizing inorganic products of earth, properties of matter, sources of power in nature, and physical forces for supplying human needs in the form of structures, machines, manufactured products, precision instruments, industrial organization, the means of lighting, heating, refrigeration, communication, transportation, sanitation, and public safety and other productive work." This list could be nearly infinite, but does it give the true picture? No!

Engineering is logical thinking—thinking directed toward making something easier, more comfortable, or cheaper, or stronger.

How many of us blindly stumble through Rose never really knowing what engineering is? How many of us "plug the formula," never knowing where it came from—or why—or even worse, not caring? Some of us had better realize before long that the problems seen here at Rose may never be ours in industry.

Only by asking ourselves why can we ever get past the stage of being anything but another technician. Only through cultivating a logical approach to problems can we ever rise to do our share—to carry our burden.

Will we be able to do our job without a handy formula or a set of tables? The future is bright for those willing to accept the challenge. Do you know how to think?

D.G.M.
CARBURETOR ICING

COMMON CAR COLD

By James Funk, soph., m.e.

Ever hear of a car catching a cold? Well, every year about this time, with the arrival of cold weather, a regular epidemic of car colds sweeps across the nation. The symptoms are easily recognized: stopped-up throttle plate, engine sneeze, that can't-get-out-of-the-garage-in-the-morning feeling. Sometimes, the car is laid up for quite a spell. To get the vehicle back on its wheels, M.D.'s (Motor Doctors) usually prescribe a healthy dose of a de-icer additive in the gas tank. This article will explain what those additives are, how they work, and how they are performance-tested in the laboratory.

As gasoline is sprayed from the carburetor jet it effectively vaporizes, abstracting its heat of vaporization from the carburetor body, thus producing a refrigerating effect on the carburetor assembly, particularly the intake manifold, the throttle plate, and the intake air. The loss of heat by the intake air can be sufficient to freeze any water vapor it contains, providing, of course, that the air’s initial temperature is reasonably low. Experiment shows that an ambient air temperature of about 40°F produces a maximum icing effect in the carburetor.

The undesirable feature of these minute ice particles is that they adhere to the throttle plate and the area of the intake manifold surrounding the throttle plate. When the throttle is only partially open, as during warm-up on a cold day, the build-up of ice particles on the outer edge of the throttle plate can actually hamper the flow of the air-fuel mixture to a point where the engine is starved and dies. This irritating phenomenon can also occur under road load conditions at slow speeds, and is especially bothersome to truck drivers when they drive under such conditions.

Several feasible solutions to the problem of carburetor icing exist. But conceiving a workable solution and selling that solution to the buying public are two entirely different matters. For instance, the possibility of designing the carburetor in such a position as to absorb heat from the engine itself has been ignored by car manufacturers. Manufacturers in the past have felt that the expense of such a design would not be worth the questionable benefits that might be derived if money were spent in advertising the feature. They question the benefits because they have no assurance that

**COMPONENTS OF CARBURETOR ICING TEST APPARATUS**

1. Hand operated throttle plate
2. Carburetor
3. Constant temperature air chamber
4. Wet & dry bulb thermometers
5. Evaporative humidifier
6. Temperature regulator
7. Ice tower
8. Single cylinder CFR test engine
9. Synchronous generator
the average consumer, 1.), is educated that the problem of carburetor icing exists and, 2.), would, upon education, be motivated to some extent to buy a new car because it offers icing protection. They, therefore, have dumped the problem squarely into the lap of the oil industry.

Oil companies have known for quite some time that blending an alcohol additive such as methanol or isopropanol in the gasoline would hamper the formation of ice in most cases by depressing the freezing point of the water. But the addition of alcohol is usually out of the question. An effective concentration of alcohol (up to about 1.5%) is quite expensive. Also, alcohol is only a single-purpose additive, a fact which makes it even more difficult to justify economically. The last bad feature of alcohol is an undesirable product of combustion.

The action of the surfactants, however, is quite different from that of the alcohols. The surfactant plates out on the throttle plate and intake manifold, producing a surface unattractive to any ice particles that chance to collide into it. The prime advantage of surfactants is the low concentrations required for effective icing protection. Also, some surfactant additives are multi-purpose, that is, besides offering icing protection, they prevent the formation of rust and/or clean up combustion chamber deposits.

Research teams for the various oil companies have developed several different methods of evaluating the performance of gasoline additives in the prevention of ice formation on the throttle plate. The apparatus and procedures of the test developed by the Pure Oil Co. Research & Development Center will be discussed in the remaining paragraphs.

The essentials of the apparatus, proceeding as they are numbered in Fig. 1 are first, the throttle plate (1), which may be placed in any desired position by hand. The throttle is housed in a long tubular manifold to insure uncomplicated stream-line flow. Surrounding the carburetor and manifold is an insulated air chamber (3) which serves to keep the carburetor and manifold cold, as they would be in a car in cold weather. A quick glance at the figure shows that the air supplied to the chamber by two blowers comes from the same source as that supplied to the carburetor. This intake air is first cooled to 32°F by passing through the ice tower (7) at which temperature it is saturated by the melting ice. As the air passes up the tube leading from the ice tower to the humidifier, its temperature rises to 40°F. An ultra-sensitive thermostatic device (6) coupled to a heater maintains this 40°C temperature to ± .1°F. Because icing severity increases with higher humidities, we are naturally interested in the effect of the higher ranges of humidity. The means to this end is an evaporative humidifier (5) which contains wood fibers continually soaked with water to resaturate the air. As the air flows past the wet-bulb and dry-bulb thermometers located between the humidifier and the insulated chamber, its relative humidity is about 98%. By the time it hits the throttle plate at a temperature of 40°F, a psychrometric chart shows its humidity to be around 93%. The relative humidity obtained contrasts with the 75-80% humidity range encountered without the use of the humidifier, and forms a basis from which conclusions concerning the effect of humidity may be drawn.

Continuing with the test apparatus, air flow through the system is maintained constant by the demands of a single-cylinder C.F.R. test engine which is maintained at a constant 1200 rpm level by a synchronous generator.

Before a run is made, carburetor chamber conditions are normalized to 40°F with the synchronous generator turning the test engine at the 1200 rpm. When normalization has been accomplished, fuel is introduced into the carburetor, the ignition is switched on, and a timer is started, initiating the test. As ice crystals form on the throttle plate, restricting air-fuel mixture flow, the manifold vacuum increases as indicated by a mercury manometer. Experience has shown that for best results, tests should be initiated with the throttle plate in such a position as to yield a manifold vacuum of 8 inches of mercury. When the vacuum level rises to 8.1 inches of mercury, it is arbitrarily considered that a critical quantity of ice has formed on the throttle plate; consequently, the 8.1 inches of mercury

(Continued on Page 29)
This article is to deal with a few of the engineering problems found in space travel. To understand what is to follow is to know how a satellite moves in space and the laws governing the motion. With this very elementary background we may better understand some of the problems of space flight guidance, stabilization, and attitude control.

The motion of satellites is nothing new to men. Long before the telescope was developed, the Greeks were attempting to measure and predict the position of the heavenly bodies. With the birth of Tycho Brohe also came the birth of celestial mechanics in 1546. His great contribution was in measuring over many years the positions of the planets as they revolved about the sun. It was these continuous measurements that started the development of celestial mechanics.

An able pupil of Tycho's was a German, Kepler. Kepler's contribution was to discard the ancient idea that the circle was the perfect curve, and he chose the simple ellipse. From studying the movements of Mars he verified his following three laws of planetary motion: "Each planet moves in an ellipse which has the sun at one of its foci. The radius factor of a planet passes over equal areas in equal intervals of time. The cubes of the mean distances of any two planets from the sun are to each other as the squares of the periods of evolution." All three of these laws govern the movements of the satellites that are traveling around the earth at the present time.

There are other effects that determine the path of a satellite around the earth. There is the precessional effect caused by the equatorial bulge and the rotation of the line of apsides (longer axis of the ellipse) resulting from the eccentricity of the orbit. The cause of these gravitational forces may be calculated and kept in a log.

Another effect is the rotation of the apsides caused by the spinning of the earth. Also the theory of relativity enters into the prediction of the position of a satellite in the following manner; the advance in the perihelion (shorter axis of the ellipse) of Mercury, the deflection of a ray of light by a gravitational field, and the shift of the red spectral lines because of an intense gravitational field.

From the above discussion the prediction of a satellite position is very involved and complicated. Though this prediction may be complicated, the motion of a satellite is governed only by the theories of elementary physics where the velocity of a satellite may be determined by equating the gravitational forces and the centrifugal forces. In this manner a proof of Einstein's General Theory of Relativity has been proven.

With the above information we now have to get the satellite into space. This leads to guidance systems and dynamic stabilization of large rockets.

What is guidance? Guidance is the process by which a vehicle follows a desired path with respect to selected reference points. There are several different methods of accomplishing the guiding systems: electromagnetic, sonic, radio, radar, and nonterrestrial reference. The problems of guidance involves nothing except the well known laws of mechanical inertia. The techniques in realizing these guiding systems are quite involved in control systems. Optical line-of-sight trackers, inertial-reference-member stabilization servos, highly accurate feedback computing units and other components have been demonstrated in practice. The need now is for the systems to be smaller and lighter and above all to be sufficiently reliable to give high assurance that space-flights will be practical. This is where the electrical engineer plays an indispensable role.

Closely related to, but not connected to, the guiding systems, is the dynamic stabilization of large rocket vehicles. This concerns the large high-thrust rockets that boost the space vehicles to where they are going. The main purpose of the control system "used to stabilize the rocket" is to maintain stability in spite of itself. This is in spite of all resonances and other phenomena which are not wanted but must be contended with to have successful space travel.
There are many more problems that will not be discussed but this is to show a few and the complexity of them. In a finless rocket of sixty feet to one hundred feet long, it is not uncommon to find the center of pressure ten to twenty feet in front of the center of gravity leading to an aerodynamically unstable rocket. The best solution to this problem is to add large tail fins. But you do not add such large fins because of their added weight penalty. Without the tail fins a high-gain control system is needed to stabilize the rocket.

Another problem is the sloshing of liquids used for fuels. The liquid tends to have a characteristic frequency, depending on the geometry, of .05 to 1 cycle per second. This will cause the vehicle to pitch first down and then up. This pitching has to be corrected by a low-gain electronic system or by changing the direction of the tail rocket by means of a ball and socket connection. If a low-gain system is used, the nonlinearity of the circuit elements will become very objectionable.

In repositioning the tail rockets it causes the structure of the rockets to bend. Some of the possible solutions are to strengthen the entire missile — an impossible solution even to contemplate; locate gyro's or other instruments favorably — it cannot eliminate the problem since the bending characteristics change with full loading and may cause other comprises to locate the instruments in a more favorable position; lower the gain and to provide filters to attenuate the unwanted frequencies — getting into the nonlinearity of the circuit elements.

To summarize the main consideration for the stability of the rocket comes from internal unwanted phenomenon and not from anything outside of the rocket.

The next problem to consider is the attitude control. What is the attitude of a rocket? The attitude of a rocket is the position of it with respect to what man is accustomed to. It is desirable for the following reasons: "To provide physical and mental comfort for passengers. To provide proper environment and positioning to allow instrumentation to function. To provide proper alignment for lift surfaces and thrust vectors." Man likes to have the force of gravity, centrifugal and inertial forces in line with his backbone and directed towards his tailbone when standing. In a space vehicle, where there are no external forces to cause friction for movements, action will have a like reaction throwing the ship away from the man instead of the man away from the ship. Even with artificial gravity produced by rotation this reaction would simply be superimposed upon it. There has been much speculation as to the psychological and physiological effects of a zero-g condition.

These effects will limit the individual that will be able to survive in space. This type of individual though "being limited by long reaction time, a slow data processing rate, and a rather long access time for the mentality stored information representing his total knowledge and experience, he still contains more ability and versatility than can be built into a substitute package of similar weight." Therefore it would be very worthwhile to have man in space even with all the problems connected.

From this article it may be seen that there are many problems that can use the engineers of today. They will have to have a broad background in engineering. This is why we are attending Rose.

Reference:
By the time this issue is read, finals will be upon us. This will be an exciting new experience for freshmen, since most of them have not taken three and four hour finals—at least not the Rose type of final exam. With this thought in mind, the old question of whether finals are worthwhile will again be asked by almost every student and possibly many professors, since the examinations mean as much or more work for the professors as the students.

Of course, some schools, such as Purdue, have no final exams. Some people argue that one might have a bad day when taking the final and really hurt the good grade he had before. On the other side, the argument is that the final is a good chance for one to really show what he got out of the course, and in some cases may be a last-ditch effort to make a passing grade.

Anyway, when one afternoon’s effort is going to determine one-third to one-half of a course grade, it is well worth concentrated preparation. If one can “crack” the final, the course is a success, even if things hadn’t been going so well before, and I think most of the professors feel this way when making out final course grades. Thus it appears that a little hard work is in order.

I guess the gloomy thoughts expressed above could be blamed on the zero degree weather. The cold weather does have its advantages, however, as the many skaters on the Rose lakes testify. That is, all skaters except one poor freshman, who, we understand, broke his collarbone on the ice. Also, when late for those 8:00 classes, a good excuse is that your cold car wouldn’t start.

Recently, instead of just having Campus Survey appear as a strict reporting of the facts, there has been an attempt to throw in a little “bull” and discussion about things happening around school. Whether this is good or not, I don’t know. The editors of the Technic would probably appreciate hearing any criticisms you have of this column.

ISTC CHOIR

On December 11, the ISTC Mixed Choir presented a program of mostly Christmas music in the Rose Poly auditorium. The music was very enlightening, and the Madrigal singing was especially well-received. After the convo, I heard, and agreed with several comments by different people, saying that they had been rather embarrassed by the conduct of the audience during the program. We’re not all perfect gentlemen, but let’s face the fact that during the convo is no time to eat your lunch, unwrapping sandwich papers with as much noise as possible. It would also be nice to have all of the money that’s dropped during the program. What some guys won’t do to try to impress girls! It’s almost as bad as displaying your interest in current events by reading newspapers during the program.

But the one thing that embarrasses me more than anything is the loud “judging” of any girls who might have a part in the program. Maybe you haven’t been so close to a real live girl for three weeks, but sometimes it sounds as if at least part of the audience is selecting girls for a harem. In my opinion, this is the height of discourtesy both to the people in the program and the rest of the audience. Remember, the guy in front of you may be dating the girl you’re talking about.

Engineering students have somehow picked up the reputation of being pretty “rough” as far as manners go. One does not have to read Emily Post, however, to be courteous and thoughtful of others.

FROSH-SOPH GAMES

A little color left the lives of every Rose student on Tuesday, November 24, as the freshmen beanies were retired, never to be worn again by the class of 1962. Per usual, the day of the annual Frosh-Soph games was a cold, wet day. Pre-game betting favored the sophomores in the football game and the freshmen in the tug-of-war.

The sophomores took an early lead in the basketball game, and at the end of three quarters, led 21-17. However, during the last quarter, a smooth freshman five completely outplayed the sophomores, and the freshmen came out on top, 29-26.

The sophomore football team,
composed almost entirely of varsity members, also took the lead in the football game in the third quarter. But a long freshman pass late in the quarter knotted the score at 6-6. The score remained tied until the end of the game on the extremely wet field. Due to the tie at the end of the game, each team was given four downs to compile as much yardage as possible. The sophomores came out on top with a 100-yard dash on the first play from scrimmage.

After losing the first tug-of-war, the sophomores used a bit of trickery to take the second tug. The effort was wasted, though, as the freshmen came through in the clutch to win the third tug, the games, and the right to get rid of their greencaps. This year's freshman class has been the best organized class this author has seen, and they proved it again in the games.

**ENGINEERS DAY**

On November 22, about 400 prospective Rose students visited the campus on the annual Engineers Day. The present Engineers Day is planned to show Rose as it actually is, not to give an engineering-type circus.

At a general assembly in the morning, Bart Gronberg, general chairman of Engineers Day, presented the following speakers and topics: Gustav Zader, "Admissions"; Dan Mook, "Student Life"; Carl Herakovich, "Intramural and Varsity Athletics"; and Dean Moench, "Engineering as a Career". Many Rose men spent a lot of time making the 1958 E-Day a success and deserve many "points" for a job well done.

**I-F COUNCIL**

The Inter-Fraternity Council is presently considering the necessity for limiting the time spent by fraternity members to help build the annual Homecoming displays. The general consensus of opinion seems to be that there needs to be some method of limiting the displays, but no good way of accomplishing this has received much support. Any constructive ideas will be greatly appreciated by the I-F Council.

**CAMPUS CLUB**

The campus club held a Christmas Dance on December 12, especially for all campus members and their dates. However, off-campus students were also welcomed for a slight cover charge. The "Cottonpickers" from DePauw furnished the music from 8-11 p.m. Although no report has been received, I presume a good time was had by all.

Before I forget, I would like to apologize for about half of the part of my last article on campus landscaping. Like many other students, I did not fully understand the situation and based my opinions on just part of the facts. Since I am still not sure of actual situation, no attempt will be made to present it. Any misleading information was presented on the part of this author and is not the fault of the Technic or its editors.
The Willgoos Turbine Engine Test Facility is the world's most extensive privately owned turbine development laboratory. Designed and built specifically to test full-scale experimental engines and components in environments simulating conditions at extreme altitudes and speeds, it is currently undergoing expansions that will greatly increase its capacity for development testing of the most advanced forms of air breathing systems.

In chambers like this at the Willgoos Turbine Engine Test Facility full-scale engines may be tested in environments which simulate conditions from sea level to 100,000 feet. Mach 3 conditions can also be simulated here.

In the new Fuel Systems Laboratory engineers can minutely analyze the effects of extreme environmental conditions on components of fuel systems — conditions such as those encountered in advanced types of flight vehicles operating at high Mach numbers and high altitudes. Fuel for these tests can be supplied at any temperature from $-65^\circ F$ to $+500^\circ F$. 

THE ROSE TECHNIC
Unmatched Engineering Facilities for Developing Advanced Flight Propulsion Systems

Operations at Pratt & Whitney Aircraft are essentially those of an engineering and development organization. As such, an engineering atmosphere dominates the work being done, much of which directly involves laboratory experimentation.

In the past three decades, expansion at Pratt & Whitney Aircraft has been almost tenfold. In recent years, greatest emphasis has been on extending engineering facilities to meet the needs of advanced research and development programs in flight propulsion.

Among the Connecticut P & WA facilities are many that are unequaled in the industry. Thus today, Pratt & Whitney Aircraft is better prepared than ever to continue development of the world's best aircraft powerplants . . . to probe the propulsion future . . . to build and test greatly advanced propulsion systems for coming generations of flight vehicles — in whatever form they take.

The Connecticut Aircraft Nuclear Engine Laboratory, operated by Pratt & Whitney Aircraft, is situated on a 1,200-acre tract near Middletown. The Laboratory was specially built for the development of nuclear flight propulsion systems.

For further information regarding an engineering career at Pratt & Whitney Aircraft, consult your college placement officer or write to Mr. R. P. Azinger, Engineering Department, Pratt & Whitney Aircraft, East Hartford 8, Connecticut.

January, 1959
One of the fundamental responsibilities of an engineer is keeping informed on new developments in his field. This is done through various media which include papers given at engineering functions and technical articles published in journals. All too many engineers take advantages of these sources but never contribute anything themselves. This situation brings up certain questions. How many engineers actually write? What is management's feeling toward writing? How are those who write rewarded? How can more engineers be encouraged to write?

These questions were asked in a recent survey by Machine Design and the results were tabulated. There were replies from 170 companies which employ a total of 2612 engineers. It is realized that the number can not give a true quantitative picture, but the qualitative value of the information is significant. Only 5.3 per cent of the engineers in this survey wrote articles. There was not an even distribution of articles, however. One company with 26 engineers produced 40 articles, while another with 700 engineers turned out only eight articles and two papers.

It can easily be concluded from this information that the attitude of the company has some effect on the output of written sorts by its engineers. Essentially, all of the companies were pleased if their engineers wrote, but the extent of their approval was varied. Writing is considered a regular responsibility by 24 percent of the companies. There are many companies, though not considering writing a responsibility, that encourage the practice. The vice president of a process instruments firm stated that writing is, "Not considered a responsibility, but is considered highly desirable, and our engineers have been so informed."

There are a number of reasons why companies are in favor of their engineers' writing efforts. The engineer's company benefits by any activity which develops his complementary skills which extend his professional capacity. Likewise, the transmission of technical information about new products is a vital factor in the sales of this product. Another benefit is that many customers buy products because of the engineering reputation of a company and this can be evidenced by the articles and papers of that company's engineers.

Recognizing the benefits of writing to the employer, what is the employer doing to encourage this effort? Only one-fifth of the companies interviewed did absolutely nothing to reward the author of an article or paper. Almost all the companies are happy to help the engineer-writer with stenography, "illustration", and editing once he has decided to write. Not so many of these companies, however, are willing to give time to the engineer to do this writing. There were 29% of the companies which allotted company time for this activity while 59 per cent left it to the engineer's discretion. Of those permitting company time, most expected some work to be done on the engineer's own time. The chief engineer of a carburetors and fuel injectors concern stated, "Company time is permitted, but homework will be required if the job is well done."

The methods of rewarding the author range from a handshake and the words "Well done" to a check for $600. Anyone concerned has his own ideas on the practice of rewarding the engineer. Some feel that writing is part of his job and should not be rewarded any more than another assigned task which is completed. Others believe that the fee paid by the magazine which might publish the article is adequate remuneration. Another segment believes that since writing is of great value to the company, it can be encouraged by generous payments since "money talks!" Still another group feels that the recognition the author receives is adequate payment. The chief engineer of a fuel burning equipment firm put it this way: "The recognition that the author receives as a result of the published article should suffice. Additional compensation would encourage neglect of the company's business."

(Continued on Page 26)
WILLIAM F. BLOOMFIELD, B.S.I.E., LEHIGH, '53, SAYS:

"Join me for a day at work?"

Bill is Plant Service Supervisor for New Jersey Bell Telephone Company at Dover. He joined the telephone company after graduation, has held many jobs to gain valuable experience. Now he has three foremen and 32 craft people working for him. "It's a challenging job and keeps me hopping," says Bill. "See for yourself."

"8:30 a.m. With my test bureau foreman, I plan work schedules for the coming week. Maintaining equitable schedules and being ready for emergencies is imperative for good morale and service."

"9:10 a.m. The State Police at Andover have reported trouble with a mobile radio telephone. I discuss it with the test deskman. Naturally, we send a repairman out pronto to take care of it."

"11:00 a.m. As soon as things are lined up at the office, I drive out to check on the mobile radio repair job. The repairman has found the trouble—and together we run a test on the equipment."

"1:30 p.m. After lunch, I look in on a PBX and room-phone installation at an out-of-town motel. The installation supervisor, foreman and I discuss plans for running cable in from the highway."

"2:45 p.m. Next, I drive over to the central office at Denville, which is cutting over 7000 local telephones to dial service tomorrow night. I go over final arrangements with the supervisor."

"4:00 p.m. When I get back to my office, I find there are several phone messages to answer. As soon as I get them out of the way, I'll check over tomorrow's work schedule—then call it a day."

"Well, that's my job. You can see there's nothing monotonous about it. I'm responsible for keeping 50,000 subscriber lines over a 260-square-mile area in A-1 operating order. It's a big responsibility—but I love it."

Bill Bloomfield is moving ahead, like many young engineers in supervisory positions in the Bell Telephone Companies. There may be opportunities for you, too. Talk with the Bell interviewer when he visits your campus and get the whole story.
Theta Xi

The Christmas vacation has come and gone and everyone is preparing for the final blast of the year. We hope everyone had a wonderful vacation and we want to wish everyone best of luck on the finals.

The Kappa chapter held its mid-year elections several weeks ago and the results are as follows:

President ........William Brummett
Vice President ..........Jim Tubby
Treasurer ........Bob "Red" Honegger
Senior House Mgr. Bob McCardle
Junior House Mgr  Bill Rose
Corr. Secretary  Dean Brown

Congratulations men, we know you will fill your positions well.

The sudden change of heart and gleaming face of Brother Bock can probably be attributed to the recent gift he received from Santa. (An all-leather basketball and after three years.)

The TX tigers took a defeat in their first game of the basketball season losing to Lambda Chi Alpha. The game was well played, but the tigers just could not seem to click. I'm sure that with players like Don Lanning, Larry Cunningham, Larry Gilbert, and Bob McCardle, the tigers will have no trouble in coming out on top at the end of the season. Remember that trophy, men!

Kappa chapter was honored to have as its guest for several days the national traveling secretary, Travis Hoskins. Travis gave us many helpful suggestions and welcomed compliments.

Many of the brothers are cutting their semester vacation short to do the planned work on the house. The kitchen will be retiled, the walls painted, and a new stove installed. We are all looking forward to a lot of good hard work and fraternity fellowship.

Well, until I again place my pen upon these hallowed pages, may I bid you adieu.

Alpha Tau Omega

The month of December included an overly-full calendar of events for Alpha Tau Omega. Starting on the 7th of December with a Christmas gift-wrapping party with the Delta Gamma sorority and extending through until Christmas, the Christmas spirit certainly prevailed at 1454 South Center Street.

In between the wrapping party and Christmas came a host of other events. On the 9th of December was a caroling practice with Alpha Omicron Pi sorority and on the 10th was the caroling party with the AOPi’s. Then on the 11th ATO, with the motherly (?) assistance of Delta Gamma sorority, played host to 20 orphans from Glenn Home. Santa Claus (Joe Vendel) payed a surprise visit to the party to the delight of the kids (all of us).

On Saturday evening, December 13, Sigma Nu and Alpha Tau Omega held our annual V.M.I. Dance. This dance is traditionally held on all campuses where both fraternities have chapters. All the Taus and Sigma Nuers had a grand time dancing to the music of Lynn Jonz.

More events are coming up on the Tau social calendar—Larry Grimes has made tentative plans for a beach party on January 9 in the house basement. This should prove interesting! Then on February 7 the first Interfraternity Party is scheduled for our house after the Principia basketball game.

Gamma Gamma welcomes two new active members to our ranks. On December 15 Ron Jennings and Ed Ayres became full-fledged Taus. Congratulations to Ron and Ed!

Five junior ATO’s were among the six men initiated into Blue Key National Honor Fraternity on Monday, December 1. ATO is proud to have Larry Berger, Ted Jaenke, Bill Perkins, Bob Schukai, and Woody Stroupe as new members of Blue Key. Senior Taus in Blue Key include Larry Grimes, president; Bill Kuchar, secretary-treasurer; Joe Bronnert, alumni secretary; and Bob Hall.

The varsity basketball team is off to a slow start, but they are looking better all of the time. Six Taus are playing fairly regularly: Captains Woody Stroupe and Larry Grimes, Ron Jennings, Jim Sargent, Herb Gormong, and Sherm Smith. Manager Scott Herrin is taking care of towels and tape.

The interfraternity basketball season is not yet underway, but Coach Louie Roehm has great expectations.
THE POLARIS PROGRAM

FLYING FISH

By Fred Wernicke, jr., e.e.

Every day we read of new advancements in the guided missile field. New ballistic missile programs such as the Army's Pluto anti-missile guided missile program and the Air Force's SM-62 Snark program are being undertaken by the armed services. It is, therefore, easy to pass off the Navy's Polaris program as just another attempt at developing a faster, more accurate, and more powerful missile similar to all of those currently being developed. But indeed, the Polaris program is more than just a missile. It is a development of an entirely new concept in weapon systems. And it represents a gamble. For it must be decided that if the naval concept of building super aircraft carrier task forces should be changed to make way for the new but untried Polaris program.

Physically, the Polaris missile is 28 feet long, weighs 28,000 pounds, and has two motors. The first stage motor is 53 inches in diameter and 110 inches in length, while the second stage motor is slightly smaller, being only 47 inches long. The second stage motor provides vernier and range control. These two motors together provide 130,000 pounds of thrust. The Polaris nose section is about 20 inches in diameter, three feet in length, and will hold a one megaton bomb. The Polaris missile is designed to be fired accurately 1500 miles.

Why is the Polaris program different? To quote Rear Admiral W. F. Raborn, Director, Special Projects Office, Bureau of Ordinance, "What many people do not realize, however, is that in the Polaris program we are talking not only of a missile . . . , but of a wholly new concept of weaponry, the dispatching of the "bird" from beneath the surface of the sea." Try to visualize what this means. Unnoticed under the edge of pack ice in the Arctic Ocean a submarine sits. It has traveled here unseen. No sonar units from cruising Russian naval units can detect it. The Russian radar units on the nearby shore will never have a chance to detect it; this nuclear submarine can quietly sit here for weeks, if necessary, without surfacing. Yet in one push of a button, the quiet sea can be transformed as a missile erupts from its depths. Where will this "Bird" of the deep go? It has many choices; Murmansk, one of Russia's few year-round ice-free ports and its large Russian naval base is only 400 miles away; Arkhangelsk, one of northern Russia's largest cities with its 281,100 population is 900 miles away; Leningrad is 1200 miles away; and Moscow, headquarters of the Russian military forces is just 1400 miles away. There are no strategic targets in Russia that are not within 1500 miles of either the Arctic, Indian, Pacific, or Eastern Mediterranean Oceans. And the range of the Polaris missile is 1500 miles.

But what sets the Polaris system apart from other ballistic missile weapons systems?

1) The Polaris missile is designed to meet the space and weight limitations of present submarine dimensions.

2) This weapon has the same thermo-nuclear capacity and 1500 mile range as the Air Force's Thor and the Army's Jupiter, yet the Polaris is small enough so that it is packed in lots of 16 in missile-launching submarines.

3) Polaris is solid-fueled, thus the tremendous work involved with handling and storing liquid fuels are eliminated.

There were two major problems that were overcome in designing the Polaris system.

1) Designing equipment to fire the missile from five to one hundred feet above sea level before ignition of engines, so that the submarine is protected from possible explosion of the solid fuel engines. The missile is launched by a compressed-air charge, which shoots it above water surface where the first-stage four nozzle booster ignites.

2) Finding an exact method of computing the submarines position, including both longitude and latitude, so that Polaris can be fired fifteen hundred miles accurately.

Lockheed Aircraft Company was assigned prime contractor and system manager of the missile. A geoballistic computer will plot and feed vessels the position and target lo-

(Continued on Page 26)
Although the Rose basketball team is not having a very good season, it seems as though the rest of the school could give them a little backing. It's a shame that the number of faculty members outnumber the students at the ball games. One of the players made the comment after the last game that he would rather play away from home because at least there is a crowd at the away games, even though they aren't yelling for you. This not only applies to basketball. Even when the football team was in the middle of the undefeated season, the student body then too, failed to back it. Why don't we, the student body, try setting aside perhaps one or two evenings a year, and, if for no other reason other than to try showing the opposing team that we engineers can (if we really set our minds to it) get a crowd in the field house that will be even larger than that of the opposing team (realize, of course, that this is home games). We could also attempt to show the opponents that we are proud of our school and any team that represents it . . . at least a couple of times a season. It's hard for a team to pull out of a slump when their own school mates don't have enough interest to know their team is even in a slump.

Rose opened its home season against Marian College Nov. 25. The Rose cagers started off very slow and could not seem to find the bucket. Marian steadily pulled ahead and led at half time, 36-22. The second half, an inspired Rose team pulled within 3 points, but hit another cold streak and fell behind again and trailed 70-58 as the final buzzer sounded. Although Rose outscored Marian from the field, they lost the game at the free throw line. Jim Sargent and Woody Stroupe led the Engineers with 13 and 12 points respectively.

A week later Rose met Eureka at Rose's court. The first half the Engineers looked as if they had fouled themselves and pulled ahead, 39-28. The second half was a different story as Rose could only get 11 points to salvage a 50-45 win. Sargent again led the Rose and White with 11.

December 6 Rose traveled to Elsa, Ill., to face the Principia Indians. Rose fell behind early in the game and could not close the gap. After trailing at the intermission, 35-24, the Rose squad closed the gap to five points and then hit the familiar cold streak and fell to a final score of 60-46.

Rose returned home Dec. 13 to face McKendree. Rose's defense held the high scoring visitors to 27 points the first half, but could only get 22 points themselves. The second half Rose came out fighting and tied the

(Continued on Page 30)
"Organizations do not make men—it is men who make organizations"

CRAWFORD H. GREENEWALT, PRESIDENT
E. I. DU PONT DE NEMOURS & CO. (INC.)

"It is what men bring with them in the way of character and adaptability and fresh ideas that enriches the organizational bloodstream and insures corporate longevity." This is the observation of Crawford H. Greenewalt, President of the Du Pont Company.

In a lecture given in the past year at Columbia University, Mr. Greenewalt outlined his views on the role of the individual in the organization. "The Du Pont Company's success over the last 150 years," he pointed out, "has come about in large part through devoted allegiance to two major themes . . .

"First, the realization that an enterprise will succeed only to the extent that all individuals associated with it can be encouraged to exercise their highest talents in their own particular way.

"Second, the provision of maximum incentives for achievement, particularly in associating the fortunes of the individual to that of the corporation.

"Men are not interchangeable parts, like pinion gears or carburetors. Individuals differ in approach and method, and, to perform to best advantage, they must never be fettered to approaches and methods not their own."

"Conformity" obviously takes a back seat here. As Mr. Greenewalt comments, "We conform as is necessary to good manners, good relationships and the highest use of individual talent. And bear in mind that these are strictures on behavior, not on creative thought."

If you find this kind of atmosphere challenging it will pay you to explore career opportunities with Du Pont.

BETTER THINGS FOR BETTER LIVING
. . . THROUGH CHEMISTRY
Man Can Now Run 35MPH

Development of a personal rocket belt can be credited with bringing the times in step with Buck Rogers.

The revolutionary belt, already successfully tested, is literally capable of propelling a man through the air over gullies, across streams, and over obstructions. The belt, project-named "Grasshopper," uses a chemical propellant rocket thrust to enable the wearer to cover ground-level distances at speeds up to 35 miles per hour. According to its developers, the belt weighs less than an infantry-man’s field-pack, is completely safe and simple to operate. It may be taken off or put on easily. The device has been shown through films and slides to ranking Ground Forces officers at Fort Benning, Georgia. It is expected personnel using it will need special training.

Estimates indicate that about two years will be needed before the belt meets required performance capabilities. Possibilities for the belt were first considered about 1940. Once perfected as a flying belt, it will allow troops to actually fly for short periods of time, and land safely. With complete control, the wearer can choose his altitude and change direction if he desires.

Besides its military purely application, the belt may find use in civilian areas such as police work, fire fighting, and short range transportation.

Probably the most interesting and speculative use for the device is propelling men in the reaches of outer-men who one day will assemble America’s first space stations, hundreds of miles above the earth. Such a method of small rocket propulsion may answer the problem of working in space.

For married men who wish to get rid of pesty mother-in-laws, we now have a method of firing them out of the house.

Sandwich-rolling Used for Metals of High-tensile Steels

Sandwich-rolling of sheets new Airsteel X-200 has been successful to the greatest width yet achieved—140 inches, the widest in the world. Inspecting the material rolled on the 160-inch mill at Homestead works District are, left and right, John C. Berrett and John H. Gerrett of the office of the Assistant Secretary of Defense — Research and Engineering. Explaining the material on the floor of No. 1 Conditioning Yard is Frank R. Romeo, Chief Development Metallurgist at the Homestead Plant.

Airsteel X-200 is a new air-hardening steel recently announced by U. S. Steel as an answer to the Government’s need for high-tensile steels for missiles. The great width achieved through sandwich rolling makes possible the reduction of over-all weight of missiles or aircraft by eliminating many of the joints and seems necessary when using narrower sheets.
14 Mr. Arthur N. Nehf has been nominated for a position on the 100th Anniversary College Baseball Team. The team is being named in a poll taken by the magazine "College Baseball". Mr. Nehf was a pitcher. Here at Rose, he received his B.S. in electrical engineering. Now retired, he was formerly in the insurance business.

'47 Jack R. Fehrenbach is now sales engineer with Webster Electric Company. He was previously Brank Sales Manager with Barksdale Company.

'49 Mr. Harold Joseph Born has received his M.S. in physics at Iowa State College. At Rose, he was graduated with a B.S. in mechanical engineering. Mr. Born was graduated with high honors.

'49 Mr. Norman F. Bell has taken a new position as head of the Purchasing Department of Motorola, Inc., in the Western Military Electronic Center. Mr. Bell was formerly employed by Columbia Veneer Company as Office Manager.

'51 Mr. Eugene N. Schroeder has been appointed Project Engineer, Manager of Advanced Component Development Department at the Owega plant of the International Business Machines Corporation. Mr. Schroeder joined I.B.M. in June, 1951, as a design engineer in development engineering. In June, 1953, he was assigned to the research department to study transistor circuits. Mr. Schroeder was transferred to transistor circuit development in 1954, and named an Associate Engineer in 1955. He was transferred to Applied Research and Advanced Development in 1956 and was appointed a staff engineer in 1957.

In addition to receiving a B.S. in electrical engineering at Rose, Mr. Schroeder has taken graduate work under the I.B.M.-Syracuse University program. He has completed courses in the I.B.M. school where he also taught a course in transistor circuits.

Mr. Schroeder is affiliated with the Electromechanical Society and Tau Beta Pi besides holding a senior membership in the Institute of Radio Engineers.
Experience is a great teacher but . . . you can learn more from books cheaper and faster. Order your books through Rose Polytechnic Book Store.

INDUSTRY’S OUTLOOK
(Continued from Page 18)
The engineer also has his view on the whole situation. He realizes that recognition by other members of his profession is very important. Many engineers, however, regard papers as a burden, and some of the finest engineers have no outstanding skill in writing. Another fact that discourages the engineers is the additional time required in his already crowded schedule.

Out of all of this information we can arrive at a few positive suggestions to encourage technical writing. (1) Recognize today’s increased need for universal participation in exchange of technical information and discard old ideas of professional isolation. (2) Realize that writing articles and papers is a professional rather than a personal activity. (3) Establish and state formally the firm belief that writing is part of the engineer’s job and will receive attention toward advanced status. (4) Let the engineer decide where to find time for writing articles on his own ideas, but allow company time for articles suggested by the firm. (5) Recognize the engineer-writer’s work. Compliment him and if consistent with company policy, establish a direct-compensation plan. (6) Encourage the use of technical information and an awareness of magazines and societies by strengthening the engineering library and circulating pertinent articles and papers by others.

If these suggestion are followed, there will arise a greater interest in technical writing, and the output of technical articles and papers will increase. American industry and the United States as a whole benefit from the exchange of technical information since the creative engineering process multiplies manyfold through pooling of ideas and costly, time-consuming duplication of effort is minimized.

Statistics show that Rose graduates have 2.9 children while St. Mary’s graduates have 3.4 children. Is this conclusive proof that women have more children than men?

FLYING FISH
(Continued from Page 21)
cation information to the fire computers. This data plus the submarine’s speed and relative motion is fed to the digital computer of the missile’s guidance system, which is housed in the second stage of the missile. After launching, the missile’s controlled by its inertial guidance system.

When the Polaris program was first suggested, there was a great deal of enthusiasm toward pushing its development. Certainly the Polaris program’s rapid development would seem to be of utmost importance. Yet, only three Polaris submarine keels have been laid, and those submarines will probably not be operational until 1960. What are the reasons for this lack of enthusiasm?

1) Many top-ranking naval admirals believe overwhelmingly in carrier air power. These men were forced to forego adding another Forrestal-type aircraft carrier to the fleet to allow money for the Polaris program.

2) The Navy feels that its primary task is to maintain command of the high seas. The Polaris program has nothing whatever to do with control of the seas.

3) The last time the Navy attempted to assume a strategic mission with the Air Force (1950), the Navy was given a severe mauling by the Defense Department for overstepping its boundaries.

4) The Polaris submarine is untested, and, even though, Admirals Raborn and Rickover have no doubts as to the Polaris program, they have not convinced top naval brass who feel that to start production of $90 million submarines that have not been tested is ridiculous.

This then is the Polaris program. Will it be successful? First testing results seem to suggest that it will be. Will it be allowed to grow? We can only wait and see, and hope that whatever decision is made is correct.

1 Vital Speeches, May 1, 1958, Page 429.
Although we talk in terms of classroom shortage, the common denominator of our educational system is still the school; and the schools are literally built around libraries. The library can be the hub of the students' world. Its materials can carry him as far beyond the confines of the reading room as the mind can reach, a span which is limited only by individual potential.

The following quotation by Clarence Day sums up this situation in his masterful way:

"The world of books is the most remarkable creation of man. Nothing else that he builds ever lasts. Monuments fall; nations perish; civilizations grow old and die out; and, after an era of darkness, new races build others. But in the world of books are volumes that have seen this happen again and again, and yet live on, still young, still as fresh as the day they were written, still telling men's hearts of the hearts of men centuries dead."

The next time you are in the Library looking for something to read, take a few minutes to glance at some of these titles which are representative of those described by Day.

Homer. The Iliad. The Odyssey
Aristotle. Works
Hippocrates. Works
Plutarch. The Lives of the Noble Grecians and Romans
Dante Alighieri. The Divine Comedy
Geoffrey Chaucer. The Canterbury Tales
Nicolo Machiavelli. The Prince
William Shakespeare. Plays
William Gilbert. On the Loadstone and Magnetic Bodies
Sir Francis Bacon. Advancement of Learning
Sir Isaac Newton. Mathematical Principles of Natural Philosophy
Jonathan Swift. Gulliver's Travels
Edward Gibbon. Decline and Fall of the Roman Empire
Immanuel Kant. Critique of Pure Reason
The Federalist
Antoine Laurent Lavoisier. Elements of Chemistry
Jean Baptiste Joseph Fourier. Analytical Theory of Heat
Michael Faraday. Experimental Researches in Electricity
Charles Darwin. Origin of the Species
Henry David Thoreau. Walden
Karl Marx. Manifesto of the Communist Party
Count Leo Tolstoy. War and Peace
Mark Twain. Works
Sigmund Freud. Works
Albert Einstein. Relativity
Kimball Young. Sociology.

NEW BOOKS
The Insolent Cariots, by John Keats
This is a book about what America and the automobile have done to each other.

Do you ever wonder why today's cars look the way they do, and why they cost so much? Is the public at the mercy of Detroit? Or vice-versa? Are the new highways drawing the nation together — or are they merely homogenizing it? What goes on behind the facade at your friendly dealer's, and when you buy a car do you know how to penetrate the Byzantine snarl of auto "financing"? Is our marriage to the automobile part of our greatness, or is it a disaster — and what can we do about it anyway?

Wielding a rapier tipped with wit, edged with anger and forged with the facts, John Keats slashes aside myth and chorme, to reveal the truth behind our fateful match. Whether you want to get a horse or settle for a horse laugh — you will never again look at your car, yourself, or your native land in quite the same way.

Some of My Best Friends are Professors, by George Williams
This book is dedicated to three and a half million college students and their parents. All of them should read this wise and penetrating reassessment of America's system of higher education. And so should every young person planning to go to college in the future, every parent expecting to send a child to college, every college professor, and every American taxpayer. Its combination of warm-hearted sympathy for students and ruthless honesty about professors will have a tremendous impact upon the ordinary American idea about the university.
Lambda Chi Alpha

With the holiday season over, finals are just around the corner. Everyone at the Lambda Chi house seemed to have enjoyed the vacation. The Theta Kappa house has been very quiet lately; it seems that finals require a little extra work.

Brother George Truster is now pinned. George is pinned to Mary Jane Meek, who is a student at Indiana State. Congratulations, George.

Our annual house-Christmas party was held on Thursday, December 18. The usual unique gift theme was again followed and included gold fish, cap guns, and rubber gloves.

Congratulations to Jim Coffenberg, Jim Funk, and Don Dekker. We are glad to welcome them as new members of Lambda Chi Alpha. Jim Coffenberg, Jim Funk, and Don Dekker were initiated on January 11.

Although the Lambda Chi basketball team lost their first game, coach Schaper said the future is looking much brighter. John Ray will be playing on the team, and John adds a little more height under the basket.

Recently there have been several major improvements planned for the Lambda Chi house. One of the larger improvements is the change in the basement. One wall is being set back in order to increase the size of the meeting room. This change will increase the floor area by about one third.

Another improvement is the addition of two new showers and a new water heater. The new heater will eliminate the shortage of hot water. Also, the new beds have been put into use. They have inter-spring mattresses and steel frames. It seems that everyone is sleeping later now.

That takes care of the news from Lambda Chi Alpha until the next issue. Until the next time I am at your service with the news.

Sigma Nu

We are now well into winter and it's cold outside—everyplace, except in Brother Tom Hormuth’s house. Since his marriage last Christmas Brother Tom seems to have become more and more contented everyday—you know, contented—like a cow. We also have some other news along a similar line.

Brother Rick Carter announced his pinning and shortly afterward, his engagement to Miss Nancy Lewis of Speedway, Indiana. If we keep up this rate of pinnings, pretty soon we will have to start over again at the top of the list. And then there is our Commander, Brother Anderson. He is not pinned right now, “but tune in tomorrow.”

The ol' serpents seem to be doing fine in the sports line. We haven't (cross your fingers) lost yet and are envisioning a roundball trophy on our mantle at the end of the season. Brother Ned Kurtz has been doing a bang up job coaching us and there seem to be plenty that want to play. We also have our bowling team??

Now that those dreaded “finals” are over, we are back in the social swing again. Three dances we have scheduled with sorority girls, girls, girls, and the State Day dance in Indianapolis is getting close. Rush is just around the corner, and the whole school is flunkin' out.

Our song committee chairman, Brother Bob Carter, and Brothers Dick Landenberger, Rick Carter, and Jim Onnen have been putting in quite a bit of time in our new songs. You are doing a good job—and you sing well too.

I got some good words from Brothers Bauch and Yochum that their little Brothers Jim Testa and Dan Kingery are really starting to get into the swing of things. Just keep your matches, books, pin, and wits handy Dan and Jim, and remember—“Sneptic Tallify.”

Best go now and continue this reporters work in the next issue. That will be in the Spring I believe. You know “Spring” when a young man's fancy turns to what the girls have been thinking about all winter.

Brain Ticklers

From Bent of Tou Beta Pi

Here are a few choice items to consider between writing lab reports and studying for tests. Everyone should get the first one, the second is a little tougher, and if you're feeling good, try the third.

1. Mary Ann Moore's father has a yacht and so has each of his four friends: Colonel Downing, Mr. Hall, Sir Barnacle Hood, and Dr. Parker. Each of the five has one daughter and each has named his yacht after a daughter of one of the others, with no duplications. Sir Barnacle's yacht is the Garbielle; Mr. Moore owns the Lorna; Mr. Hall the Rosalind. The Melissa, owned by Colonel Downing, is named after Sir Barnacle's daughter, Gabrielle's father owns the yacht which is named after Dr. Parker's daughter. Who is Lorna's father?

—From The Kansas State Engineer.

2. Find the digits represented by the letters in the following cryptic division if no two different letters represent the same digit.

\[
\begin{align*}
\text{EFM} & \div \text{AQG V FXNJG} \\
\text{XJM} & \\
\text{gxj} & \\
\text{aexg} & \\
\text{asmg} & \\
\text{aq} &
\end{align*}
\]

—Via The Michigan Technic, Jan. '55

* * *

Answers to December

1. Martians: 13 fingers

2. Hour glass: 30 hours

3. Flask: $2\frac{1}{2}$ miles per hour

The Rose Technic
vacuum level has been designated the Critical Icing Point. The time required for an additive to reach the Critical Icing Point serves as the basis for comparison against an alcohol response framework such as the one presented in Fig. 2.

Now to explain the alcohol response framework. Runs are made with concentrations of alcohol varying from 0.00% to 2.50% in increments of 0.25% from the 8 inches of mercury vacuum level to the 12 inch level. The alcohol response framework, as the lines of constant manifold vacuum are called (see Fig. 2), are trends determined by plotting horizontally from the various alcohol concentrations on the left the time required for a particular concentration to create specific vacuum levels. After this has been performed for each of the concentrations of alcohol, all the points for a particular vacuum level are connected with a curved line. Ten such lines constitute the alcohol framework shown.

To plot the performance of an additive, the time required for the additive to reach specific vacuum levels is plotted on the framework. To obtain an estimate of alcohol equivalence during that portion of the test when ice crystals are first beginning to restrict mixture flow, a line can be drawn from the intersection of the additive curve and the 8.1 inches of vacuum line (Critical Icing Point) to the alcohol equivalence scale on the left. In the interest of conservative judgment, ranges of alcohol equivalence are derived through statistical comparison.

In examining Fig. 3, you can see that if a line is drawn from the intersection of the additive curve and the 8.1 in. manifold vacuum line to the alcohol equivalence scale on the left, the alcohol equivalence is seen to be slightly greater than 1.00%. Statistical comparison shows that this particular additive yields the same degree of icing protection as 1.00 to 1.25% alcohol.

When the alcohol equivalence of an additive at high humidity is subtracted from the alcohol equivalence at moderate humidity, the absolute humidity effect, or humidity depreciation, is obtained. The ratio of the absolute humidity depreciation to the alcohol equivalence at low humidity times 100 gives the percentage humidity depreciation, which is the most useful basis of comparison of the relative effects of humidity differences on several additives.

In the above paragraphs, we have seen the methods used in solving a typical engineering problem in the research laboratory. The author wishes to extend a sincere expression of gratitude to the Pure Oil Co. Research & Development Center in Crystal Lake, Ill. for their permission to publish the above information.
score with one and one half minutes left. The last minute proved fatal to the engineers as the visitors hit for 5 points while Rose couldn’t find the mark. Jennings led the Engineers with 17 points.

Marian College played host to the Engineers for a return match. The Rose squad started off slow, falling behind 21-9 in the first 10 minutes. Led by Larry Grimes they found themselves and came up to be within three points of the opponents, 30-27, at halftime. The second half Rose could do no better than to pull within one point and then fell behind to 70-65 at the end of the game. Gormong, Sherm Smith and Grimes were high for Rose with 12, 14 and 14 points respectively.

December 18, Rose returned home to play Illinois College in a conference match. They battled on even terms the first period with I.C. holding a 31-29 edge. Again the second half Rose fell behind and then could get no closer than 3 points. The visitors pulled to an 8 point, 72-64, margin as the game ended. Sargent, Smith and Dekker were high for Rose with 13, 13, and 12.

Rose, with a 1-6 record, is not as bad as the record shows. Although short on height, Rose has continually out rebounded its opponents. When Carr’s boys get some experience under their belts, they could prove to be a very rough squad.

**Volley Ball Standings**

Volley ball season is just getting a good start, before vacation begins. There are two faculty teams, with one of them undefeated so far. Team members are Tinker, Baughman, Knudsen, Smith, Moench, Haist, Hegarty, Blake, Danner, Garver, and Smith.

College League Teams

<table>
<thead>
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**LOCKER RUMORS**

(Continued from Page 22)

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**BOWLING**

A new sport last year, bowling has attracted a great interest with 18 teams seeing action every week. The faculty has two very good bowling teams in the league.

<table>
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<tr>
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<td>Audell</td>
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<td>Ransford</td>
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<tr>
<td>Melellen</td>
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</table>

Sherm Smith drops in two points.

**BASKETBALL**

Basketball league has another record of 14 teams. There should be good race for the championship with 4 teams still undefeated.

**FRATERNITY BASKETBALL LEAGUE**

The four fraternity teams look about evenly matched according to scores so far. There has only been a 3 point difference in the score of any game. However, ΣN is off to a flying start with two victories.

**STANDINGS**

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</table>

For all-intramural championship, the point standings with two sports finished are:

Team | Points
--- | ---
Sophs. | 79
Seniors | 75
Bauer Hall B I | 65
Indpt. Fr. | 60
Deming Hall | 51
Bauer Hall | 51

The seniors won the I.M. football championship, and the, All-Star game. B. I took the Cross Country championship.
MEN of ROSE

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Professor: “A fool can ask more questions than a wise man can answer.”

Student: “No wonder so many students fail your exams.”

The only thing worse than a bachelor is being a bachelor’s son.

The little fellow sat up in his nursery crib and calls to the baby in the adjoining crib, “Did you throw water into my crib?”

“Not me.”

“Hummmmmm, must have been an inside job.”

“Daddy, if you will give me a dime I’ll tell you what the ice man said to Mamma.”

“All right, here’s your dime.”

“He said, ‘Any ice today lady?’”

“The fussy boss strolled down the aisle among the desks. He saw a cigarette butt lying on the floor. “Is this yours?” he growled at the meek man nearest him?”

“No, you can have it ... you saw it first.”

“It’s easy to write a play. First act, boy meets girl; second act, they hold hands; third act, they kiss ... .”

“That’s how I got arrested.”

“What do you mean?”

“I wrote a five-act play.”

Then there’s the one about the cross-eyed teacher who had no control over her pupils.

There was a young damsel named Carol
She liked to play stud for apparel.
Her opponent’s straight flush
Brought a maidenly blush
And a hasty trip home in a barrel.

Things men like to hear a girl say:
1. “No, I’ve never seen the golf course at night.”
2. “Why bother, there’s no one home here.”
3. “You don’t think this bathing suit is too tight do you?”
4. “Let’s go dutch!”
5. “Chaperone? What chaperone?”
6. “No, it really doesn’t make any difference whether I get back at all tonight.”
7. “My, but I’m cold!”
8. “Yes!”

An old southern colonel was making a trip through Turkey and one day hired a guide to take him on a trip through a Sultan’s harem. While wandering through the halls he recognized a burly black attendant as a former hand on his plantation.

“Well, Ben,” exclaimed the surprised colonel, “what on earth are you doing away over here?”

“Well, sub boss,” replied the grinning negro, “ah’ll tell you. Ah has de best job in de world. Every day ah sits heah in front of dis heah doorway. Ah has a bowl o’ water in mah han’ an’ when dat long line o’ beautiful gals wat belong to de Sultan passes by, ah dips mah fingers in de water an’ throws it on ‘em. When ah finds one dat sizzles, ah is done for de day.”

Senior Cadet: “What can be done to the ROTC program at Rose to make it more interesting to the underclassman?”

Sophomore Cadet: “Drop it!”

“If I came home and found a man in the apartment,” gasped a palpitating blonde in the chorus dressing room, “I wouldn’t know what to do.”

“You could give him forty-eight hours to get out,” suggested the girl in the other chair.

He kissed her in the garden
The moon was shining bright
She was a marble statue,
And he, a little tight.

Do you know the definition of a redhead—A communist out-house.

Wife: “This place is simply wonderful. It just leaves me speechless.”

Husband: “Let’s lease it for life ... .”

The woman who thinks she can hold her husband with just her cooking should remember that he wasn’t eating a sandwich when he proposed.
Nuclear reactor vessel for Shippingport, Pa. power plant designed by Westinghouse Electric Co. under contract with the A.E.C. for operation by Duquesne Light Company.

Where atoms turn into horsepower

Combustion Engineering designed and built this “couldn’t-be-done” reactor vessel for America’s first full-scale nuclear power station. And photography shared the job of testing metals, revealing stresses and proving soundness.

Countless unusual—even unique—problems faced Combustion Engineering in creating this nuclear reactor vessel. Nine feet in diameter with walls 8½ in. thick, it is 235 tons of steel that had to be flawless, seam ed with welds that had to be perfect. And the inner, ultrasmooth surface was machined to dimension with tolerances that vie with those in modern aircraft engines.

As in all its construction, Combustion Engineering made use of photography all along the way. Photography saved time in the drafting rooms. It revealed where stresses and strains would be concentrated. It checked the molecular structure of the steel, showed its chemical make-up. And with gamma rays it probed for flaws in the metal, imperfections in the welds.

Any business, large or small, can use photography in many ways to save time and money. It can go to work in every department—design, research, production, personnel, sales, and accounting.

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

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Teaching—
A Career Opportunity
For the Engineer

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

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

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

Q. What steps have been taken to make education a more attractive field to engineering students?
A. Steps are being taken in all areas. For example, we have seen a great deal in the newspapers relating educators’ salaries to the importance of the job they are doing. Indications are that these efforts are beginning to bear fruit. Greater professional stature is being associated with the position, and lack of knowledge and understanding on the part of the college student of the advantages and rewards teaching as a career can afford.

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

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

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

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

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