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Rose Technic

April, 1962

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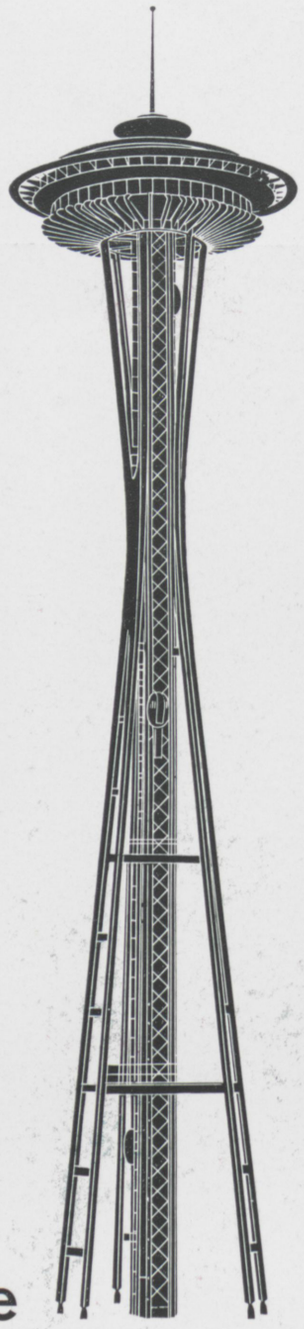
NOISE



revolution in space

This amazing structure symbolizes the outer space theme for this year's Century 21 International Exposition in Seattle, Washington. Called the Space Needle, it soars 600 feet into the air on three steel legs, tapers to a slim waist at the 373-ft. mark, then flares out slightly to the 500-ft. level, and is crowned by a mezzanine, observation deck, and a 260-seat restaurant that *revolves* slowly (one complete revolution an hour) while patrons enjoy their meals.

The Space Needle is a combination of sheer audacity and imagination with 3,500 tons of steel. Steel was chosen because it would be faster to erect, stronger per unit area, quickly available. A relatively new type of structural carbon steel called A36 was used because its greater strength (about 10%) permits higher design stresses, at the same time maintaining factors of safety, and because it could be easily welded. This is an example of the exciting materials and challenging projects engineers will find at United States Steel.

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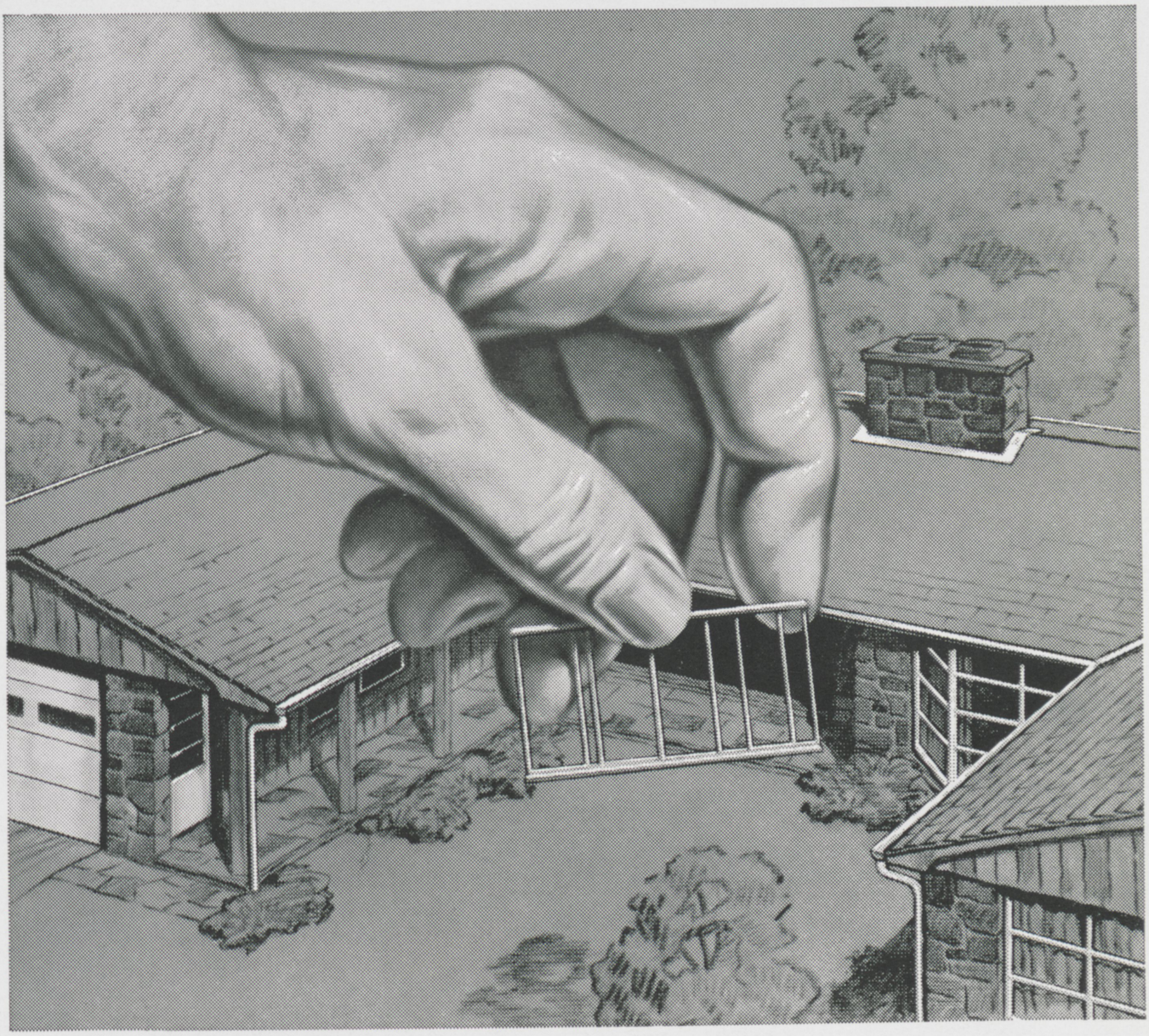

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Rose Technic

APRIL, 1962

AMERICA'S OLDEST ENGINEERING COLLEGE MAGAZINE IN CONTINUOUS PUBLICATION
1891-1962

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Cover Note

Our thanks to ASTRONAUTICS, a publication of the American Rocket Society, for this month's cover.

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editorial

In the February TECHNIC, President Moench wrote of the need for Rose men to exhibit a "spirit of liberal culture." While I agree that such a spirit is desirable, I would add that a student who maintains that spirit does so in spite of the Rose atmosphere, not because of it. For at Rose, and in science and engineering in general in this country, the "spirit of liberal culture" is being smothered by the "spirit of Sputnik." The mathematics, science, and engineering courses are being so intensified that the student who spends more than the minimum required time on humanities, extra-curricular interests, and other broadening influences is likely to find himself losing ground on the academic treadmill.

The only reason ever advanced for beefing up science and engineering courses seems to be that it is the only way to "beat the Russians". Unforunately, it is beginning to look more like the goal is to "beat the students".

Rose, which for years has been known as a tough school, is not only following the trend, but keeping a step ahead. Whereas the curriculum once remained fairly constant for a few years at a time, it now changes every year, with the only sure bet being that the new one will be stiffer than the old one. No one seems to be prepared to speculate where or if the screw-tightening process will stop.

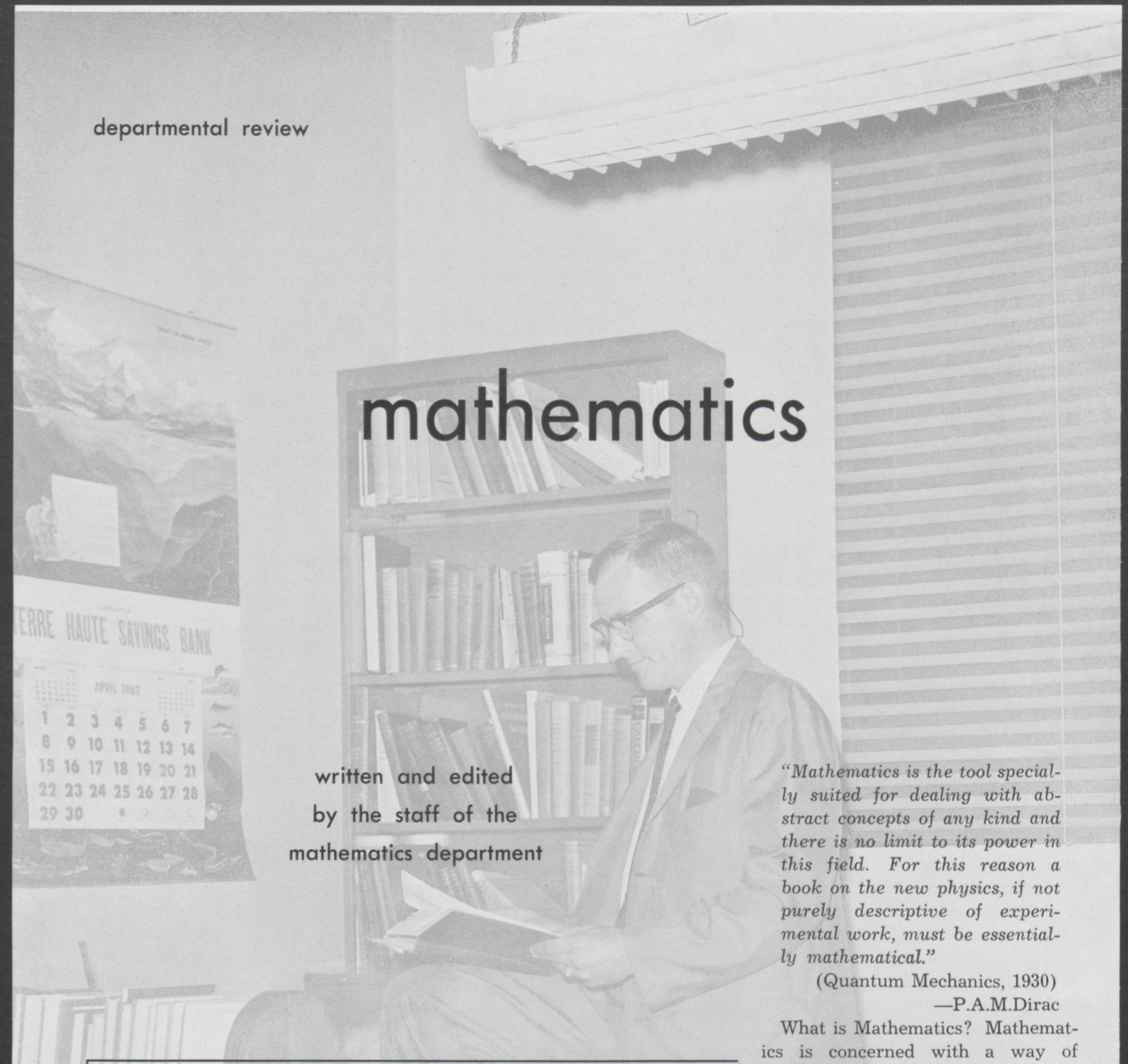
The result of the trend is not difficult to see. Each Freshman Class at Rose for the past few years has had higher College Board Exam scores and better high school records than the previous year's, yet the percentage who eventually graduate shows no sign of increasing.

Faculty and administration reaction to this problem is a little bewildering. We hear talk of increasing the percentage who graduate, but the methods of attack are questionable. For example, the Humanities Department, apparently theorizing that a number of students drop out because they desire a more liberal education, seems to be offering a solution to this phase of the problem. By giving lower grades, the student will be encouraged to study his humanities courses harder. It does little good to point out that unless the technical load is correspondingly lightened—this does more to create a spirit of cynicism than one of liberalism. Another phase of the problem is that the second semester is much more difficult for freshmen than the first, and this apparently causes many drop-outs. The obvious solution: physics will be taught to first semester freshmen next year. That way the first semester will be more like the second. Of course!

Lest I sound too cynical, let me hasten to point out that Rose offers so many advantages that I would not consider dropping out, nor would most other students. However, I think it is high time we started questioning the philosophy behind the "spirit of Sputnik". Under the present trend, success comes to the man who can work like a machine, continually grinding out laboratory reports and problem sets, and who can take hour exams every three weeks in four or five courses without cracking under the pressure. Is this really the best system to turn out top scientists? Is this the way to teach a method of thinking out problems, which, we are told, is the most important characteristic of an engineer?

If the answer to these questions is yes, then we should accept the system and stop crying about drop-outs. There are many students who, regardless of intelligence, simply cannot adjust to the "grind". I refer not to the lazy student, but to the man who is too high-strung to stand constant pressure, is too creative to work like a machine, or who finds the full time diet of technical courses too much for his appetite. To fit these men into the "grind" is not only difficult but possibly very harmful to them. If the system cannot be changed to accommodate these men, then we should let them go on their way and concentrate on those of us who are of suitable makeup to work like machines without, we hope, becoming machines.

M. G.



mathematics

written and edited
by the staff of the
mathematics department

"DEPARTMENTAL REVIEW" is a series of articles written by members of the faculty at Rose. Each month a different department will describe for you the nature of their curriculum, sofe history of their profession, and what a student in their department might expect after graduation.

Because satification during years of undergraduate study is so highly dependent on the proper choice of a curriculum, this series is designed to differentiate between the various fields of study at Rose and help the present and prospective student make his choice. Therefore it would be wise to consider the facts presented by these authors before making your selection of an undergraduate field of study.

"Mathematics is the tool specially suited for dealing with abstract concepts of any kind and there is no limit to its power in this field. For this reason a book on the new physics, if not purely descriptive of experimental work, must be essentially mathematical."

(Quantum Mechanics, 1930)
—P.A.M.Dirac

What is Mathematics? Mathematics is concerned with a way of thinking. Thinking mathematically is thinking logically. The logic involved may be more precisely formulated than the logic of the ordinary citizen but it is the same logic. Yet many ordinary citizens would be horrified if told they were thinking mathematically. In their youth, mathematics seemed to them a set of rules to be learned as a parrot might learn them, and all reasonable conections between the rules were to be overlooked. They memorized formulas and plugged into them hopefully, and if something went wrong it was the fault of the mathematics.

The danger of parrot-learning is

demonstrated by this quotation from a student test-paper: "The abdomen contains the stomach and the bowels, which are A, E, I, O, and U." To the student there was nothing more unreasonable or mysterious about this statement than about any other of the many "facts" he had "learned" in school. A mathematician is not content with second-hand hearsay knowledge, and he wants to understand the logical development.

"Mathematical ability and mathematical training are commodities in greatest demand today. Science is the new American frontier, and mathematics is the language of science . . . . . .

"It is fair to say that mathematics will play a central role in the American culture of tomorrow. We must train people to be able to attack and solve problems that did not even exist when they attended school, problems which require the ability to think mathematically."[1]

From the viewpoint of the industrially-employed mathematician who is a member of a research team, thinking mathematically means being "expert in analyzing relations, in distinguishing what is essential from what is superficial in the statement of these relations, and in formulating board and meaningful problems."[2]

What Is Mathematics?

Aside from the many descriptive phrases which have been offered, we are probably safe in saying that mathematics is the study of postulational systems, where such a system consists of a set of consistent assumption (regarded as mere hypotheses whose physical truth or falsity need not be of concern) and a logic to be followed in deriving further properties of the system from these assumptions.

Today, pure mathematics and applied mathematics are the same mathematics. The only difference is in a way of thinking. The pure mathematician is seeking a logical development without worrying there are many convenient ways to use it when developed. The applied mathematician already has opportunities for application in mind.

A mathematician becomes an adult analogue of the little child who continually asks "why". (And much of the distaste with which the general public views the mathematician's desire for a reasoned argument is similar to the distaste of a harrassed parent when challenged on a point for which he has no ready answer.) More than this, the mathematician is constantly seeking the minimum collection of postulates needed to describe a given system, and in this way develops the habit of separating the relevant from the irrelevant and of eleminating redundancy.

"Mathematics is a highly arbitrary creation of the human mind and is certainly not something dictated to us of necessity by the world in which we live."[3]

What Is a Mathematician?

A mathematician may be described as a practictioner of the art of mathematics. (Incidentally, mathematics is *not* a science!) He may be further described by the area of his prime interest as being a "pure mathematician" who is primarily interested in developing new or expanding existing postulational systems; or an "applied mathematician" who is primarily interested in a postulational system which already has an interpretation in some phase of the physical or social world; or perhaps as a valuable "renegade" who uses his mathematical training and habits of thought to advantage in another field (for example, the brilliant electrical engineer, C. P. Steinmetz, won his Ph.D. in Mathematics).

The Future of Mathematics

As one mathematician has said, mathematical activity—like all of Gaul—may be divided into three major areas: education, research, and applications.

Certainly, with the increased enrollments currently being experienced and predicted for the future, the future of mathematics in education is obvious. The recommended minimum mathematics needed in undergraduate education in the sciences and engineering in the future is as different from present-day curricula as the present offerings are from those of twenty years ago. This change will require vast increases in educational staffs in mathematics. In the area of research, there are many examples of physical design and developments which must await new mathematical progress, and industries are employing mathematicians to do research on just such problems. There will always be need for "pure" mathematicians just as there will be for "purists" in all other fields of endeavor, for without these activities the backlog of available mathematics waiting for an application will disappear and applied mathematics will be severally hampered.

In the area of "applications", the rapid growth of technological developments will present increasing need for industrially-employed mathematicians as members of research teams.

The Rose Mathematics Program

The Rose mathematics curriculum has been formulated with two main points in mind: 1) to provide an excellent mathematical training which is an adequate basis for graduate study in mathematics or science and 2) to provide the student with a salable product at the end of four years in the event he chooses to seek employment in industry rather than pursue graduate-study on a full-time basis. In order to implement the second goal, the curriculum is strong in the direction of analysis and applied mathematics, and much flexibility is provided by means of electives to enable a student to enroll in courses in physics, chemistry, and engineering, as his interests may direct. In order to implement the first goal, each student is required to take at least one course in each of the branches of mathematics so that he may, by electives if necessary, give later emphasis to that branch which

(*Continued on Page* 18)

(1) Summary Reports on "Recommendations for the Training of Teachers of Mathematics," Mathematical Assn. of Amer., Jan., 61.

(2) Fry, Thornton C. (Bell Tel. Labs), "Mathematics as a Profession Today in Industry", Amer. Math. Monthly, Feb., 56, p. 71.

(3) Encyclopedia Americana, 1961 Ed., "Mathematics"

In talking to twenty or twenty-five students regarding their opinion on an article about the computing center, John Rohr found that, without a single dissenting opinion, all agreed that only about ten percent of the students at Rose have used the Center. These same people agreed that the money invested in the computing center should be put to maximum use. Hence, the following article is designed to describe the history and operation of the Computing Center for those who have not yet peered out from inside of the big bay window.

waters computing center

John Rohr
Soph. Math

The addition of the Waters Computing Center in 1960 to the Rose campus was a significant advance in the educational facilities of the institute. In 1960, a committee was formed to investigate the feasibility of purchasing a digital computer. Professor Palmer headed the committee; other members were Professors Criss, Galginaitis, and Blake. After considerable research, they prepared a report recommending the Bendix G-15 and accessories.

During 1960, Rose used a G-15 computer from Bendix on a trial basis. Bendix personnel gave instruction to fifty-five students and faculty members. Mr. Maudlin gave additional instruction to interested groups of students. The computer was used to some extent by seven courses the first semester it was here (Spring, 1960).

In the fall of 1960 the computing center was finished, complete with air conditioning, data preparation room, and glass picture window. On October 15, 1960, the Edward Waters Computing Center was formally dedicated and opened for operation.

In the Spring of 1960 while the computer from Bendix was here, there were three people at the school who were familiar with computers: Dr. Criss had worked with computers while acquiring his doctorate, Mr. Maudlin, and Russell Archer, both of whom had worked with computers at Purdue and in industry.

Other faculty members who operate the computer besides Dr. Criss are Dean Moench, Dr. Reeds, Dr. Meeks, Prof. Palmer, Prof. Arthur, Prof. Derry, Prof. Guthrie, and Mr. K. Carr. There are four student operators-in-charge: John Walden, Jack Reilly, Mars Gralia, and John Rohr. These students give programming assistance and help students who desire to run programs on the computor. The center is open almost every period of every school day except during convocations and maintenance periods. Some time is reserved for special classes that need to use the computer such as the Computer Methods class.

Anyone desiring to run a problem other than one which is required must submit a problem application to the Computing Center Committee. A problem specification number is then assigned to the student for that problem. He may then reserve twenty-five minutes of computer time each day he needs to run his problem. If no one else wants to use the computer, he may take longer than this time.

There are a number of routine uses of the computer, the most common of which is calculating labs. Once a person has gained some programming experience, he can usually write a program in no more time than it would take to calculate the lab by hand. The advantage of the computer method is that if he ever

needs to calculate the results again, the program is available and considerable time can be saved.

There are a number of special purpose programs available in the center which are quite useful. Probably the one which is best known is the Class Scheduling Routine. This program was written by Russell Archer and revised this year by John Walden. Contrary to popular opinion, this program does not do any actual scheduling! There is not enough memory space available without magnetic tape to do this. The program will check teachers, classrooms, classes being taught, and conflicts. The actual scheduling must be done by the programmer. The computer checks the given schedule for conflicts. If there are too many, the programmer can rearrange classes and check again for conflicts.

There are two principles programs for fitting the best equation to a set of experimental data. Russell Archer wrote a program which uses the method of least squares to fit a set of data with a polynomial. The program is written so that the degree of the desired polynomial may be specified. The degree may be as high as twenty-nine so long as there is at least one more point than the degree. This program is written for double precision (twelve significant digits). There is also a program called FABLES (Fit Analysis By Least Squares) which works in single precision (five significant digits). This program uses the linear least squares method but is adapted to find the best equation among the following for a given set of data: linear, quadratic, logrithmic, or exponential.

Dr. Criss has written a traverse program which is used by the civil engineering students in surveying. This program will accept data from a field survey, make the necessary adjustments to the data, and calculate the required results.

There is a program in the center which, when given data for any previous time, will calculate the location of satellites so that they may be observed when they pass overhead. This program was used by the astronomy class last semester. This is one of the programs which can run all night because there are many calculations just to update the data by one day.

The members of the computing center staff are all currently working on programs which can eventually be added to the library and become available to all students. Jack Reilly and Mars Gralia have been working with the Intercom 500X Graph Plotter Subroutine. This routine is used to plot graphs on the plotter accessory for the computer. Eventually, there should be a program which will take a set of data, compute the best equation, plot the points and the equation and give the errors of each point. This would be a useful program for labs.

John Walden is working with a program which evaluates transfer functions and uses the graph plotter to give visual record of the results. This program could be of great help to senior Electricals.

John Rohr is working with programs to type out the stored commands. When a program is initially written, some things are indefinite. After running the program, some changes may have to be made. When the program is finally completed, it is convenient to have the commands listed neatly on programming sheets. The documenters which which John is preparing will do this for most of the programming systems available. Hence, once a program is completed, it will be easier to have a complete record of the program.

While the G-15 is the most expensive piece of equipment in the center, there is also other useful equipment. The differential analyzer (DA-1) is a sub-unit of the G-15. It is used to solve differential equations by the methods of numerical approximation. The graph plotter is another sub-unit of the G-15. It can be used by the DA-1 of by the main unit directly. To insure optimum use of the G-15, the data preprartion room is equipped with a Flexowriter. This can be used to prepare programs on punched tape. Only a short time is required for the computer to convert the information on these tapes to what it can use in its memory.

There is an analog computer in the center which is used to solve differential equations by employing a continually varying voltage. The output of this computer may be viewed on an oscilloscope giving a picture of a time-varying function.

The smallest, but perhaps the most used, piece of equipment in the center is a desk calculator. This is used for quick calculations which are not too involved. It is also used by many people with insufficient programming experience to write a G-15 program. When all else fails, the desk calculator is usually the final resort, short of the slide rule or brute force method.

At present, there are three methods of obtaining instruction on the G-15: the computer methods class, the freshman orientation instruction, and operators-in-charge. Dr. Criss is presently teaching a course in computer methods which includes the G-15. The course for the freshmen is taught near the end of the first semester. The operators-in-charge are always ready to answer questions which may be asked. The best way to learn to program for the computer is just to try it. The more programs you write. the more proficient you become.

The Waters Computing Center was established to help three groups: undergraduate students, graduate students, and faculty members. Dean Moench, Dr. Criss, Dr. Reeds, and other faculty members have used the computer for research. A limited amount of work has been done by graduate students on it. By far, the largest group using the computer has been the undergraduates. The number of students using it is increasing. If you have a need for any of the facilities in the computing center, or if you would like to find out more about the center or its equipment, come in to the other side of the big bay window.

automotive suspensions

Bob Finney
Soph. M.E.

Most people have no idea exactly what determines the underside of their car. The mysteries of the suspension system remain mysteries because it is seldom that anything goes wrong with it. The engineering that has gone into automotive suspensions is definitely original with the that industry and it is to the end of reviewing some of this engineering that this article is written.

BASIC REQUIREMENTS

A suspension system is designed for passenger comfort. This is the most important thing in today's suspension system. This is not always true of a suspension system however. In a race car, passenger comfort is less important than road-holding ability. Secondary advantages of a suspension in a passenger auto are roadability and reliability. Roadability is achieved by keeping the wheels in contact with the ground and to keep those wheels from sliding sideways across the ground. Reliability is achieved by keeping road shocks from directly affecting performance and the life of the car's componets.

To accomplish these aims the most natural mechanism to use would be a spring. The spring would tend to delay transmittal of the shock and perhaps completely damp out some of the smaller shocks. In actuality that is exactly what happens. The suspension systems of today's car depend on the properties of springs. The sketch of the most common suspension will give insight into the theory and practice of a suspension system.

CURRENT PRACTICE

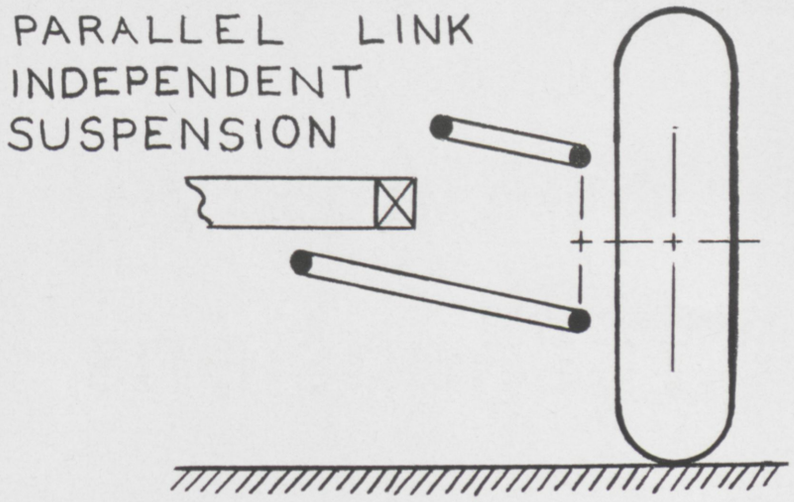
Generally speaking the usual system has independently sprung front wheels and a solid rear axle. Front wheel springs are coil and rear springs are leaf. What does this mean? First the front wheels do not have a direct connection between them. The most common front wheel arrangement is as shown in the figure. There are at least four other recognized types that are or were of significance. However, none of these other types are in great use in America at this time.

The type illustrated is called the parallel link system. The spring is placed between the lower link and the frame. Usually coil springs are used, however torsion bars and leaf springs have been used. The links themselves are of "A" construction. That is, they are built up from two members. These members are gathered together at the outer end and spread at the inner end. There is a reason for this construction and it is designed as such to take driving thrust and braking torque. Also important in this type is the lengths of the links. The lower link is usually made twice as long as the upper. This permits easy placement of radiator and suspension spring. Also, when used with parellel links, it provides a constant tread necessary for better tire wear. The proof of this will be left as an exercise for the reader.

This then is the form of front wheel suspension. One part that was not covered previously is the shock absorber. A moments experimentation with a spring will reveal that it will continue to vibrate for a some time once it has been set in motion. There are certain natural damping forces in all vibratory systems, however these are minimal when torsion bars or coil spring are used. Leaf springs have interleaf friction as a fair damping force. To promote passenger comfort then, a mechanism called the shock absorber but more properly named a spring damper is included in all suspension systems. There are two general types of shock absorber: friction and hydraulic. The friction is out-dated and was noted for its irregular characteristics. The hydraulic type comes in two forms, both of which force a fluid through a restricted passage. This results in a back-pressure which constitutes the damping force. The energy absorbed is converted into heat.

INDEPENDENT SUSPENSION

What are the advantages of this independent form of suspension? The advantages are twofold. This system reduces unsprung weight. Reduction of any unsprung weight will make any suspension system more effective and faster acting. The second and probably the more important of the two concernes the steering of the auto. Formerly the two front wheels had been connected together by a solid axle. The problems that had occurred in the steering are called tramp and shimmy. These are basically forms of wheel wobble about the steering geometry of the front end. Both tramp



and shimmy are gyroscopic affects. That is, the spinning wheels become large gyroscopes. Road irregularities force these gyroscopes to change their planes of rotation. The reader is surely aware of the results of such a maneuver. In solid axles, as was most commonly used on American road vehicles until the 1930's, the opposite wheel is affected equally as much as the wheel that hit the bump. This doubles the possibility of wheel wobble. Independent suspension allows the other wheel freedom from at least some of the effect and therefore lowers the tendency towards tramp and shimmy. Another benefit from independent front suspension is the chance to use softer springs and the inherent good ride from this.

REAR SUSPENSION

The rear wheels differ from the front wheels of the normal American automobile because they are mounted in a solid housing. They are therefore directly connected. Within this housing is the differential, the axle half-shafts, and at the ends, the hubs. This entire assembly is mounted to the frame by a semi-eliptic leaf spring on either side of the frame. Once again the suspension is damped by shock absorbers. This system is simple, inexpensive, and straight forward.

More exotic rear suspensions have been designed and are in use. The Corvair and Tempest use a swinging axle. This is a form of rear independent suspension. The axle is divided into two half shafts which pivot about a centrally fixed differential that is attached to the frame. This particular set-up is plagued with excessive tire wear due to the difference in tread under different load situations. This however has proven to be a problem only in the case of large trucks. In passenger car use, its better riding advantages probably reduce the importance of greater tire wear. This system is the most common form of independent suspension in passenger cars and is the only one commercially produced in numbers in this country. Other systems have been tried in Europe and some are in production. Independent suspension on all wheels has been a necessary part of a winning Grand Prix race car for the last twelve years. Its use in passenger cars is increasing and independent rear suspension shows promise of much better handling and ride.

IMPORTANT CONSIDERATIONS

All suspension systems demand certain things for success. The most important is a rigid frame. This is particularly true of the independent type. A non-rigid frame will be "whippy" and actually reinforce the vibrations of the springs. The next most important factor is development. This consists of proper matching of componets. The next time you ride in a car, consider the ride. Take into account that this is something the automotive engineers can take pride in developing themselves.

During this development, they did extensive research into just exactly what factors are important in passenger comfort. General Motors especially was active in this field. Here is what they found. We can definitely sense acceleration. We can also feel the acceleration of movement when our speeding car strikes a bump. We feel this acceleration in an up and down manner. However it is not the acceleration by rather the frequency of the vibration set-up that gives the most discomfort. The engineers were also able to determine by means of a "bouncing table" that the point at which discomfort appears is remarkably constant in most people. A formula was empirically determined and it is represented by

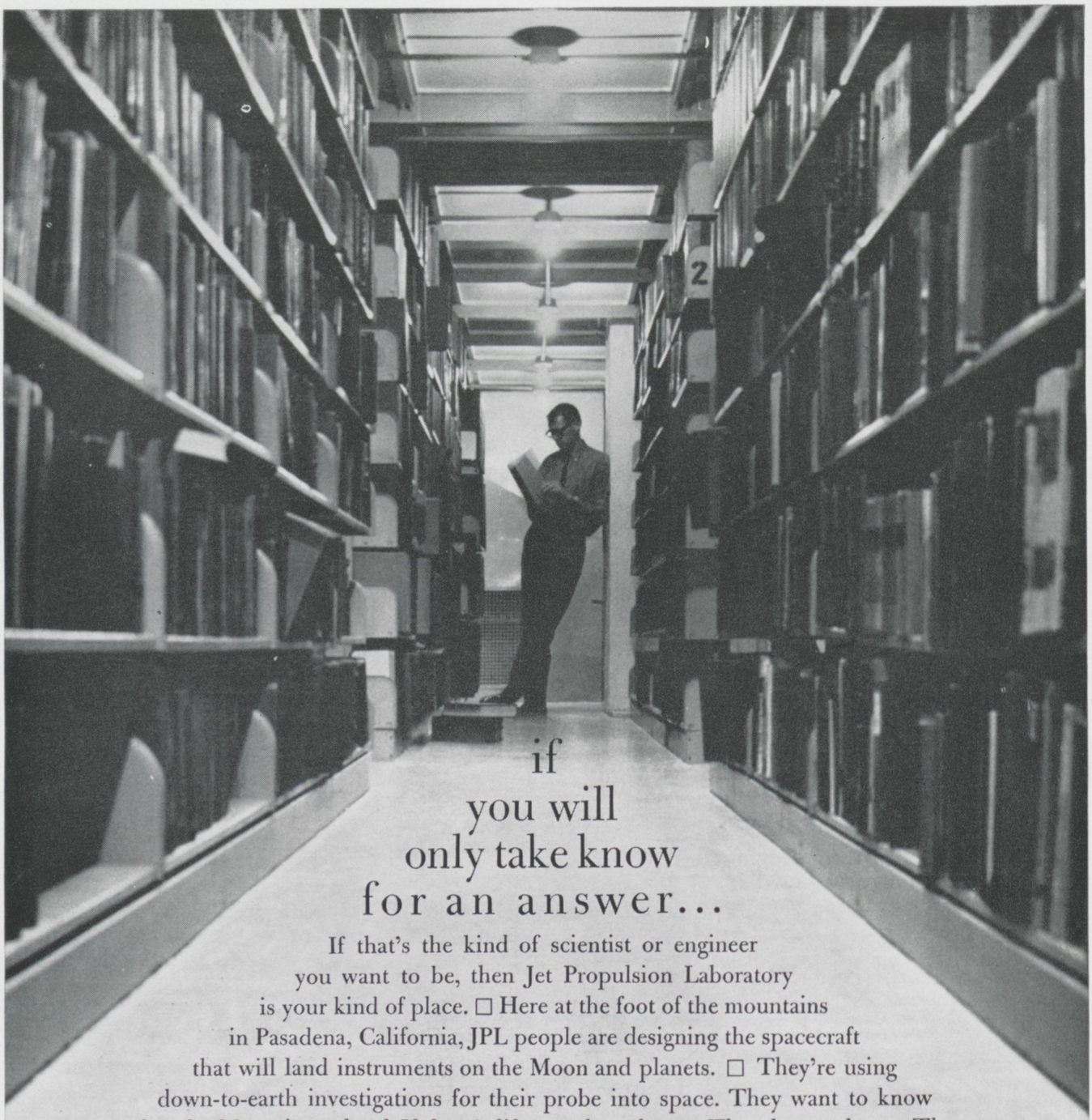
$$(aw)^{2.7} = 324{,}000.$$

where a is the amplitude of displacement in inches, and w the frequency in cycles per minute.

Another point of interest is the fact that front springs in most cars can be made much softer than rear springs and the difference in these spring rates introduces factors of pitch and bounce. Due to this, the advertised "level ride" is theoretically impossible.

NEW DEVELOPMENTS

At the present time there is one new suspension system in serious development. This is the rubber suspension. This was used during World War II in tanks with success, however these vehicles did not need a long life. A rubber suspension has been marked by the B. F. Goodrich Company with success. Its main usage has been in buses. The characteristics of the system have been subject to change both over long and short periods of time and these have been large enough to require major adjustments. An English firm has built a race car using rubber suspension and it was found unnecessary to use shock absorbers because of the natural damping affect of the rubber. This type of suspension is a long way from passenger car and will probably never be widely used due to do acceptability of the present systems.



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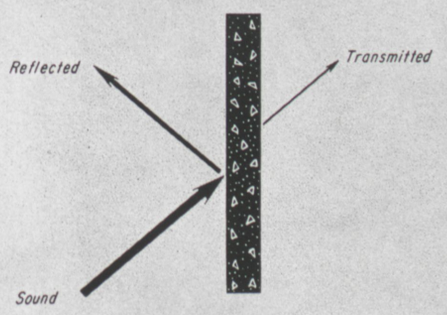
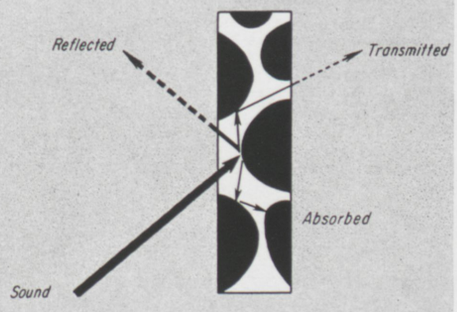
noise

Dave Rice
Soph. M.E.

Noise dissipates as heat of friction within porous structures



SOUND IS REFLECTED when it strikes an obstacle such as a concrete wall. But since no surface is completely impervious and rigid, some sound energy is absorbed; some is transmitted to the other side



SOUND IS ABSORBED by highly porous materials such as cellulose fiber. Almost all sound energy entering the pores is dissipated as heat of friction. A little is still reflected; remainder is transmitted

Noise, like air pollution, is getting more attention on a community and industry level.

In a broad and unprecise way, noise is simply unwanted sound. In excess amounts it prevents people from doing their best on the job, from fully enjoying their leisure. Living with incessant din, a person becomes less alert, hence less efficient, and more apt to be careless. One source estimates that U. S. industry faces an annual $2-million compensation bill for noise-related injuries. Last year the state of New York took a significant step by incorporating into their Workmen's Compensation Law a maximum critical-noise-exposure level.

Years back, both management and labor accepted as a fact of life that noisy surroundings went along with most industries. They simply learned to live with noise. However, the picture is changing sharply because today means and incentives are at hand to isolate vibration and control noise.

Noise in a crude sense is anything which can be heard. In engineering terms, however, it is waves of alternate compression and rarefaction in any elastic medium. Sound power is acoustic energy emitted per unit of time by a sound source. Suppose a source is radiating sound uniformly in all directions. Neglecting transmisison loses, all acoustic power will pass through a spherical surface completely enclosing the source. Sound intensity is a measure of the sound power per unit area at this surface. It equals total sound power divided by the total area of the

(*Continued on Page* 16)

miss technic for april

April showers the Technic with Miss Carla Lowry, a pretty blue-eyed blond from Indiana State. Carla, a freshman English major, is a press club pledge and works for the Terre Haute Tribune.

This 18 year old beauty is 5'6½" tall, weighs 118 pounds and has structural specifications: 350 picas - 300 elites - 2520 point type. Anyone care for a job printing.

NOISE

(*Continued from Page* 13)

total area of the spherical surface. As the diameter of the sphere increases, it is easy to see that the sound intensity will decrease. While sound intensity is difficult to measure directly, it can be obtained indirectly by measuring sound pressures.

The decibel is simply a logarithmic ratio between a measured quantity and a reference quantity. It began as an expression of the ratio between two amounts of power, but now its use in the field of acoustics includes ratios of sound power, sound intensity, and sound pressures.

The human ear responds to a tremendous range of intensities. The ratio of the loudest sound that a normal person can hear without pain to the power of the weakest sound he can detect is about 1,000,000,000,000:1.

All sound can be divided into three broad classes. It is important to keep this in mind since the type of instrument used to measure sound intensity and frequency depends somewhat on the category of the noise.

Pitched sounds fall in the first class. These are sounds whose frequency components are harmonically related. Basically, the characteristics of sounds in this class vary with the speed of the machine generating the noise.

Unpitched sounds make up the second class. This spectrum is is seldom clearly defined—it ranges widely over a broad band. This category includes such indeterminate noises as rattles, buzzes, and roars.

The third group is made up of impact sounds. They are caused by blasting and impact, such as punch presses and typewriters. This type of sound is characterized by extremely short-duration, transient, oscillating sound-pressure waves.

By now you may have realized that we are reckoning with a form of energy system, though an unwanted one—composed of a noise source, transmission path and receiver. Therefore, noise control is basically a systems problem. Since the problem is complex, the logical method of attack has three basic steps: 1) reduce noise at the source, 2) control noise along the transmission path, and 3) take protective measures at the receiver.

Stopping noise at the source, before it starts, makes good sense and is usually least expensive. This means all equipment should be properly adjusted and dynamically balanced. Machines should be mounted on resilient supports to reduce low-frequency noise and floor vibration. An alternative is to redesign the equipment for quieter operation and the last resort is to purchase new, less noisy machinery.

Noise control along the transmission path is the next step in an overall program to reduce the intensity of noise reaching the receiver. This can be done in many ways depending on the individual situation. The noisiest machines should be grouped in the same general area to segregate high noise levels from normal or quiet situations. If necessary, the noisy machines should be put in a separate room.

Only a small portion of sound goes straight to the listener. Most sound waves are reflected, bouncing back and forth from walls and other obstacles in the enclosed space, and at each bounce the sound wave gets weaker. The amount of time the sound bounces before it reaches one-millionth of its original energy—essentially dies away—is called the reverberation time. This varies depending on size and shaped of the room, how good the walls are as sound absorbers, and what other absorption may be in the room. Noise barriers, such as concrete walls, can be used to deflect sound away from quiet areas. Sound-absorbing materials on ceilings, walls, and even floors soak up sound energy to minimize reverberation.

Protective measures at the receiver come in when noise can not be reduced to an acceptable level. Personal protective equipment such as ear plugs, ear muffs, noise helmets or small isolation booths are then a must. Another approach limits exposure time for each worker.

Acoustical materials play a vital role in every noise-control program. Depending on the need this material acts either as a sound barrier or absorber. Sound is absorbed by highly porous materials such as cellulose fiber. Air inside the pores is set vibrating by incident sound waves. Friction of this motion against the walls of the pores generates heat. Therefore, part of the sound energy is removes as heat, while the remainder is reflected and transmitted. This ratio of absorbed energy is called the materials sound-absorption coefficient. This ranges from as little as 1% - 2% for concrete to more than 90% for some mineral-fiber compositions.

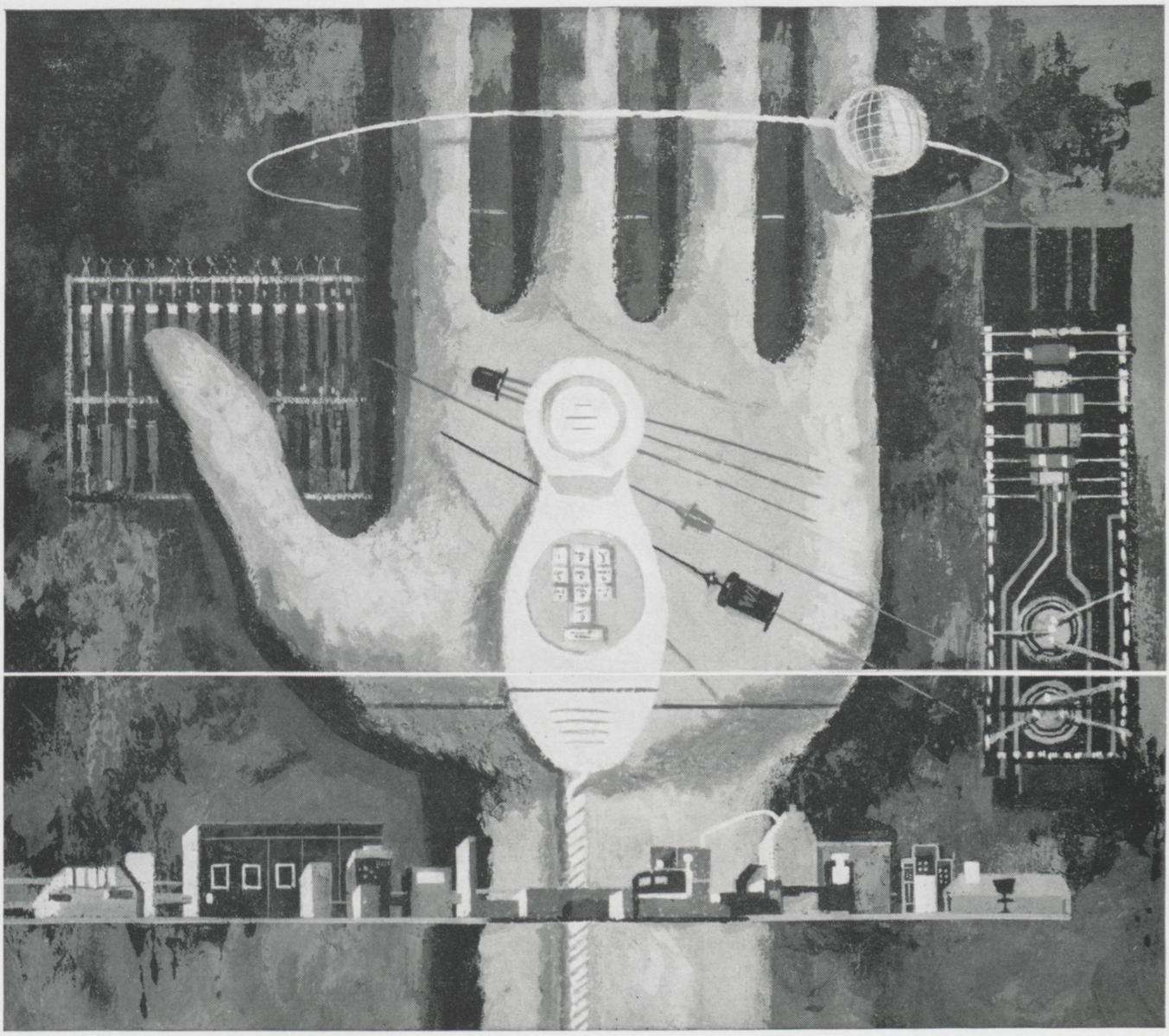
Absorption coefficient varies with thickness of material, size pores, ratio of pore volume to size of pores, ratio of pore volume to total volume, and frequency of the sound. Absorption capacity increases with thickness of the material at low frequencies, but at higher frequencies an increase in thickness has little or no effect.

The pores of the acoustical material must be interconnected with each other as well as with the surface of the material, since efficiency goes up with the degree of porosity. However, if the pores get too large the absorption capacity again decreases.

Acoustical materials also fall into three broad classifications: 1) prefabricated tiles, 2) assembled units, and 3) plastic compositions.

Prefabricated tiles, produced in large quantities, are popular because they have uniform absorption characteristics and pleasing appearance. Assembled units are combinations of basic sound absorbing elements. Typical assemblies include rock-wool and glass-wool blankets or pads in combination with facings such as asbestos board or metal. The thickness of the sound-absorbing element and spacing between element, wall, and facing can be varied to produce whatever absorption properties are specified for the combination.

(*Continued on Page* 26)



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DEPARTMENTAL REVIEW

(*Continued from Page 7*)

interests him most.

While some few schools may provide greater opportunity for a student to specialize during his undergraduate years, the program at Rose attempts to provide a broad, conservative education with a strong required minor in physics, an introduction to actual applications of all branches of mathematics to engineering problems (in the course in Engineering Analysis, and an opportunity—by way of a minimum of twelve hours of technical electives—to slant his education toward engineering or physics or chemistry, if he prefers. Indeed, a student may arrange his program to lean heavily in either of the following directions: pure mathematics, applied mathematics (either analysis or statistics and computers), physics, chemistry or engineering. This feature of the curriculum has been provided in the belief that students whose common ground is mathematics, may be interested in different applications and furthermore that a student should be free to change his emphasis as his interests are changed by becoming exposed to more courses and ideas.

The student of mathematics can go far in any of a great many directions and should be able to grow and develop in whatever direction his interests and his logic lead him. It is an excellent foundation for a full and productive life.

Summary

In spite of a history covering about six thousand years, the field of mathematics is now entering its most active period of development and application. So long as there is science, there will be a need for mathematics and mathematicians. Mathematics is, in every sense of the word, a discipline; and like most constructive discipline, mathematics is a highly rewarding and satisfying career.

The Rose mathematics curriculum, while considerably more demanding than that of many other schools, has been well received by both industry and graduate schools.

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With major research and engineering effort focused on the field of nuclear energy conversion, Allison has several nuclear projects currently in progress, including;

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We expect these programs now in the research phase to have broad applications in the power and propulsion systems of the next generation.

To this end, our atomic scientists and engineers draw upon such extensive, modern facilities as physical chemistry, solid-state physics, radio-isotope, infra-red, fluid dynamics, rocket propulsion and metallurgical laboratories; a vacuum chamber which simulates pressures at altitudes in excess of 200 miles; a liquid metal loop; analog and digital computers, and numerous other research tools. These efforts and facilities are further backed-up by every resource General Motors possesses.

As nuclear technology advances, Allison will continue probing new forms of energy conversion in the search for improved forms of propulsion and power.

In short, we take all energy sources to be our starting point, as reflected in our guiding theme:

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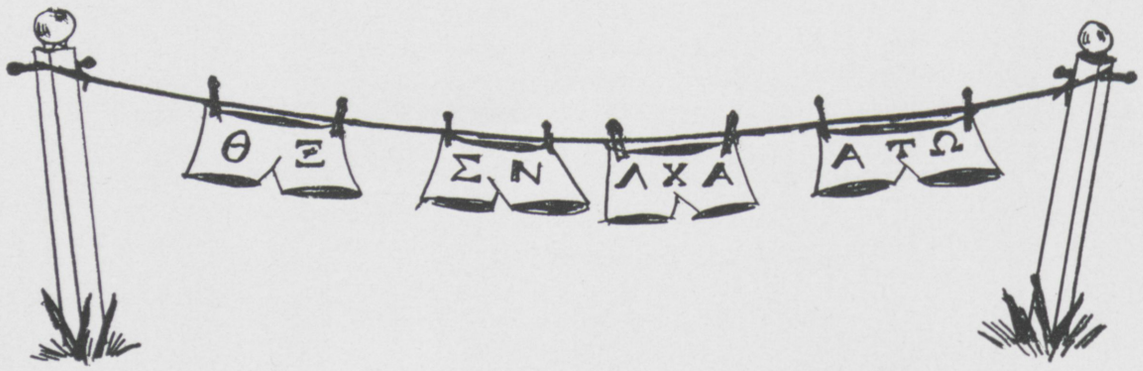
greek briefs



THETA XI

After a most traumatic Monday morning after Rush, it seems as Theta Xi has pulled through again. We are proud to say that our pledge class, although not large, is really a group of guys we are extremely proud of. A dozen is supposed to be a nice round number, so they tell me. For a while, our silverware seemed to have disappeared. It did not personally impair my habits of repast, because I had an extra pair of chopsticks, but eating supper with fingers got a little old after the first messy bite. We had 12 suspects. For some strange reason, they were: Pledges Bill Holt, Nick Bradley, Mike Donahue, Dave Nancrede, Dick Blakely, Ken Thompson, Dave Miller, Tom Evans, Tom Yoshida, Jim McCosky, Warren Foy, and Bouncing Bob Steder. Eternal Pledges "Dingles" Lucht and Sam "Fabian" Swan were named associates. By some strange coincidence, the silver ware turned up in Pledge Steder's car the weekend he came in to stay. Maybe he knew we were having spaghetti for supper. Pledge Blakely's panel truck looked awfully sinister, therefore the TV set is now chained to a good solid post. If it goes, so will the foundation of our house. (What have I done now?)

It seems since Friday nite, the popularity poll concerning Alpha Omicron Pi Sorority has taken a sharp X/O increase. It seems everyone (pledges included), was quite pleased about the mixer with the AO Pi's on Friday. Dave Miller and his guitar combo provided the sweet, rocking, and twisting strains (individually), to which we all danced. We are especially proud of our musical pledge.

Have you noticed how very shiny the shoes of both actives and pledges of TX are? Thanks should be attributed to the AOPi pledge class; may our shoes never be shined again.

LAMBDA CHI ALPHA

The past month has been completely filled with activities for the Brothers of Theta Kappa. The social season is in full swing at the chapter house. Friday evening, February 9, the women of Alpha Omicron Pi were the guests of Brothers at our St. Valentine's mixer. The decorations carried out the theme as all who were present enjoyed the evening. March 2 found the Brothers, and the new pledges, hosting the women of St. Mary's in their annual spring mixer. The theme for the mixer was from the now famous Peppermint Lounge. Twisting prevailed on the main floor while the admirers of the slower music gathered in the basement. The mixer showed our new pledge class to be real "movers." Let's go actives and keep a step ahead of them. The pledges also gave their first skit. A job well done! The following weekend many of the Brothers trekked to Indianapolis for our annual State Day. The Interstate competition in basketball and singing was keen, and the men of Theta Kappa truly enjoyed the festivities. The basketball team, evidently affected by the trip to Indianapolis at 6 o'clock in the morning, fell to defeat at the hands of the ISC Brothers, but played very well despite the loss of Brothers Hahn and Hobbs due to injuries. The Brothers sang well in the evening songfest to the Jon Hunt arrangement of "Swing Low, Sweet Chariot." The Indiana Alpha Omicron Chapter, fresh from victory in the I.U. Sing, took home top honors, but Theta Kappa was represented very well. Friday, March 16, the Brothers continued the social pace by entertaining the women of Zeta Tau Alpha at a Cowboy-Theme mixer. Gay spirits were the order of the evening and this was carried out well by all present.

Aside from all the social activities the Brothers have also been occupied in the I-F hardwood competition. The Lambda Chi's have not

fared too well on the hardwood this season. Having lost four games, three by a total of five points, and winning but two, Lambda Chi tied Theta Xi for third place in league competition. March 12 the two teams met with TX coming out on top. Congratulations to the Brothers who participated throughout the season. The spring weather is bringing the old softball gloves out of the closet corner as a few of the Brothers loosen up the throwing arm.

On the weekend of February 16, the active chapter of Theta Kappa initiated five new Brothers. Those initiated were: Bill Bergstrand, Don Miller, Vaughn Love, Jim Schulz, and Jim Watkins. Mr. E. Duane Elbert was also initiated as a faculty member of Lambda Chi Alpha Congratulations to the new Brothers.

The times just preceding and following the weekend of February 23, were the most hectic for the Brothers. This, the week-end of rush, resulted in many waking hours with very few being spent over the books. However, the efforts were not in vain, as Lambda Chi Alpha took the spring pledge class to continue the ideals and traditions of Lambda Chi Alpha.

Officers for Theta Kappa have been elected for the coming year and are as follows: Max Goodwin, President; Jon Hunt, Vice-President, Tom Holmes, Secretary; Dave Randolph, Treasurer; Dave Dumford, Rush Chairman; Bill Nicewanger, Pledge Trainer; Dan Little, Social Chairman; Ed Blahut, Ritualist; Bill Templin, House Manager; Wilford Stratten, Steward; Bruce Kopf, Asst. Treasurer; and Bob Valle, Asst. Ritualist. Congratulations are in order for these Brothers who have been chosen to lead our chapter.

March 7 the annual Spring Honors Convocation was held. Brothers who attained a 3.1 or better were on the Dean's List. The Brothers were: Jerry Badger, Steve Ban, Jerry Hahn, Fred Terry, and Rich Thompson, Seniors; Max Goodwin, Ken Miller, and Jim Young, Juniors; Tom Holmes, John Rohr, Tom Terry, Bob Valle, and Jim Watkins, Sophomores. Also on the Dean's List were pledges Mars Gralia, sophomore; Howard Alm, Steve Ames, Tobey King, and Norm Schuld, Freshmen.

Brothers Hobbs, Ken Miller, and Nicewanger were pledged to Blue Key National Honorary. Brother Ken Miller was also pledged to Tau Beta Pi, honorary engineering fraternity. Congratulations to all the Brothers who were honored at the convocation.

Brother Ron Johnson pinned Linda Kovach, a D.G. pledge at ISC, over semester break. Congratulations to Ron and Linda from all the Brothers! January 28 of this year Brother Al Story and Miss Linda Potter exchanged wedding vows in Danville, Illinois. Congratulations are also in order for Brother Story and his charming wife.

ALPHA TAU OMEGA

The past month found the ATO's engaged in a myriad of activities, but still with a resolution to keep those grades up. A mixer with St. Mary's and a date party at the house have highlighted the social activities for the past month.

Many Taus have been on the prowl as a remarkable number of pins and rings have changed hands lately. Don McNaly was pinned to Mary Streacker. Chuck Rose and Lowell (Shep) Shepler lost their pins to Cathy Mallot and Nancy Turner. Brother Kira was pinned under unusual circumstances to Ann Karanovich. Brothers Munro and and Ward tightened the noses around their necks as they became engaged to Stacy Luther and Karen Daly respectively. If you notice that not too many of the Taus are wearing their pins at school, realize that those pins are probably on better filled sweaters.

Alpha Tau Omega gave a hand to the Heart Fund on their annual Tag Day. The Rose ATO chapter and the Gamma Phi Beta sorority at Indiana State were in competition with the ATO colony at State and the junior class of St. Mary's to determine which group could collect the most money. The day resulted in $1100.00 for the Terre Haute Heart Fund, and a good time was had by all even though the weather could have been a little warmer.

We are especially proud of the new pledge class. The new pledges are: Bob Barr, Jim Copeland, Ron Chapman, John Stineman, Jack Cox, Grady Wallace, John Frischkorn, Mike Wadsworth, George Wagner, Richie Reeves, Ron Gesell, Bill Kuschel, Roger Long, Terry Fenimore, Hal Coon, Jim Howenstein, Dick Orosz, Evan Johnson, and Jim Doolittle. They have already started to show the spirit and unity that we in Alpha Tau Omega strive for.

Last month the new regime was installed to rule the house. The elections had the following results: Worthy Master—Nick Kira, Worthy Chaplain—Tom Bosworth, Worthy Keeper of the Exchecquer—Rick Rapson, Worthy Keeper of the Annals—Larry Shaffer, Worthy Scribe—Andy Breece, Worthy Sentinel—Chuck Rose, Worthy Usher—Dave Cripe, Fiscal Assitant—Lindley Ruddick, and Pledge Trainer—Dale Oexmann.

At ATO State Day at Purdue, the chapter was awarded two trophies: outstanding scholarship and attendance. These have found their place on either side of the school's Scholarship Trophy on our mantel.

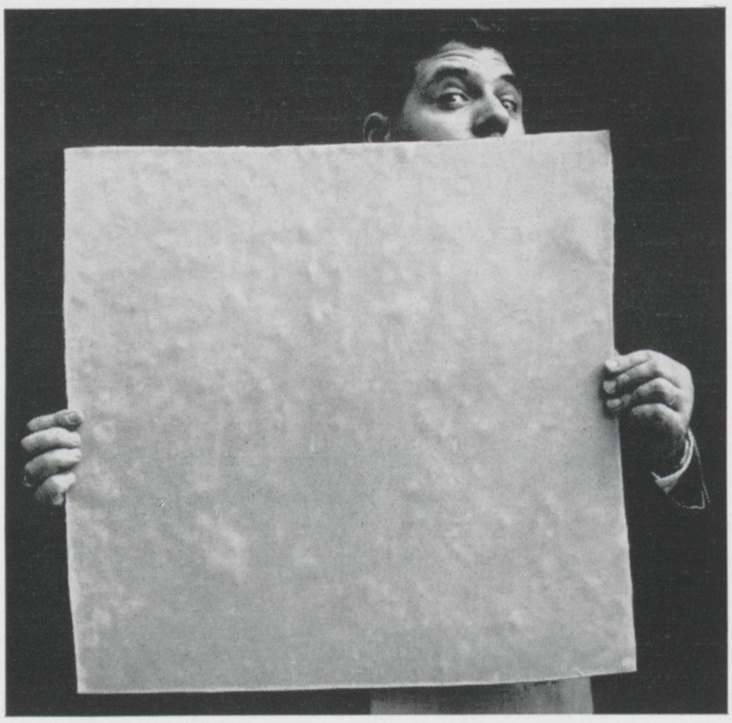
At ATO State Day at Purdue, the chapter was awarded two trophies: outstanding scholarship and attendance. These have found their place on either side of the school's Scholarship Trophy on our mantel.

Individually, the Taus have been gaining honors also. T. C. Copeland received the Thomas Arkle Clark Award for Province XVII of Alpha Tau Omega. This ranks him as the top ATO senior in the state and places him in national competition for recognition. Larry Shaffer and Rick Rapson deserve congratulations on being tapped for Blue Key.

Honors have been lauded on individual Taus for less serious purposes also. Brother Robertson was

(*Continued on Page* 25)

Our new plastic stops a 30-cal. bullet cold (he hopes)



That plastic sheet is a scant 5/8" thick. But it'll stop a bullet in its tracks. Splaaaat.

Our model is actually one of the inventors, John J. Aclin. He knows it's infallibly bulletproof (but still finds the concept a bit hard to believe). It does work. Really. And the plastic scales in at 1/7 the weight of steel.

In addition to our bullet-stopping plastic, we're working on quite a few other "unbelievable" projects.

Like converting common clay into alumina (already a laboratory reality, now in the pilot plant stage).

Like a shotgun barrel made by winding 500 miles of glass fiber around a thin steel liner (now bagging its share of game around the world).

Like developing more powerful liquid missile fuels (will Olin's hydrazine get us to the moon?).

And getting back to Earth, a chemical agent that arrests grass growth (a long range project that lawn owners are rooting for).

Because we're moving so rapidly, promising graduates enjoy unique career opportunities with Olin. Research gets a healthy budget and research people, a healthy climate.

Most of our research facilities are consolidated in the new Olin Research Center in New Haven, Conn. Where scientists, engineers and technicians work with the men, the equipment and the responsibilities that can bring them to full potential quickly.

For further information on career opportunities, the man to contact is Charles M. Forbes, College Relations Officer, Olin Mathieson Chemical Corporation, 460 Park Avenue, New York 22, New York.

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library notes

"Knowledge is of two kinds. We know a subject ourselves or we know where we can find information upon it."

James Boswell

by Carson Bennett
and Winifred Kitaoka

We list some of the books on report writing and manuals of style which may be an aid for those reports and term papers which will soon be due:

Writing a Technical Paper by Donald H. Menzel and others. The authors of this compact writing guide show you how to arrange the data, prepare the physical manuscript, and present the facts in clear, interesting prose.

Engineering Reports by Lisle A. Rose and others. This book is for the engineering student and the engineer on the job. It treats a set of problems that concern every technical man — problems of conveying facts and judgments to fellow engineers, industrialists, businesmen and laymen.

Reports for Science and Industry by Margaret D. Blickle and Kenneth W. Houp. This book has been written for those who have had experience in compiling reports, and for those who are dipping into the subject for the first time. The inclusion of extensive sample material serve an important need for both types of students.

Manual of Technical Writing by W. O. Sypherd and others. This manual reflects the growing importance of communication in business and industrial life. Correspondence and reports are fully treated and great emphasis has been placed on the preparation of company publications and technical articles.

How to write Scientific and Technical Papers by Sam F. Trelease. This manual is intended to meet the practical needs of students and research who are preparing illustrated papers or reports on scientific or technical subjects.

A Manual for Writers of Term Papers, These and Dissertations by Kate L. Turabian. A manual designed to serve as a guide to suitable style in the presentation of formal papers — term papers, reports, articles, theses, dissertations — both in scientific and non-scientific fields. In general, the style recommended is that of the University of Chicago Press as set for in their *A Manual of Style.*

Chemical Engineering Reports by Kenneth A. Kobe. An aid in "how to search the literature and prepare a report," for chemical engineering students.

Successful Technical Writing by Tyler G. Hicks. This is a practical book stressing the how-to aspects of technical writing; written for every engineer, scientist, technician, and technical writer needing help with his writing.

Style Guide for Chemists by Louis F. and Mary Fieser. The Fieser *Style Guide* considers problems facing the writer of a thesis, a report, or a journal paper and presents helpful suggestions for recognition and avoidance of errors.

* * *

Keep up with the world of sports in our current periodicals:

Athletic Journal
Scholastic Coach
Sports Illustrated

For those who keep up with the "Indianapolis 500" we have Floyd Clymer's *Indianapolis 500 Mile Race Yearbooks.*

From The New Bookshelf

In 1953 Sherman Adams became Assistant to the President and remained with the Eisenhower Administration in that capacity until 1958. Adams has attempted three things in this "view from the top" of the Eisenhower years: to give a vivid understanding of Eisenhower the man, to describe the inner workings of the Administration, and the activities of the top level men around the President, and to convey the atmosphere and circumstances in which the great decisions were taken. Everything from an informal gathering of those literally responsible for the existence of the second Eisenhower term is shown here as living history.

There are many surprises in this book concerning events and personalities, little known outside official Washington, which were of major importance to the Administration.

The Guns of August
by Barbara W. Tuchman

The shock of the opening clash in August, 1914, and the thirty days of battle which followed determined the future course of the First World War and the shape of nations in our time. Its tense drama is the subject of this magnificent history.

The German, French, English, and Russian General Staffs had had their plans for war completed as early as ten years before hostilities began. None of these plans allowed for the contingencies of the others, or recognized their own instrinsic errors. Yet, for perhaps five years before the war began, each General Staff knew what the other would do, all

(*Continued on Page* 26)

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GREEK BRIEFS

(*Continued from Page* 21)

elected to be our representative in St. Mary's Coed Style Show. This is an honor for which all members of the chapter competed rather vigorously. Also honored in the less serious vein was Ron (Guzzy) Gesell who was awarded a cigar at State Day by the editor of *The Palm*, Alpha Tau Omega's national magazine, for his meaningful (F=ma) interpretation of the Twist.

It is evident that the Taus have been rounding out their school work with enough extra-curricular activities to keep them constructively and happily busy but still not to ruin any grades. This is the life we have to enjoy while we are in school.

SIGMA NU

Along with Spring comes housecleaning, grass to cut, rain, wind, (warm type wind), and Spring Vacation—hooray for Spring Vacation. Weekends in spring offer much more than the winter weekends. Saturdays find the Sigma Nus in a variety of pursuits such as playing golf, softball, and hookey (from studies), on picnics; and riding around town with tops down. Saturdays are also good days for improving the looks of the old homestead at 831 South Center.

The Brothers have also been busy on the social scene. At our State Day festivities, held March 10, three of them bestowed their pins upon members of the fair sex. Brother Gib Robinson and Miss Bernie Ziol are pinned, Brother Don Pierce and and Miss Sharon Miller took the plunge, and Brother Don Pezavento's gave his pin to Miss Sue Stevens.

Trade parties and dances have been the order of the day for the past month. March 16 was the date of the second mixer this year with St. Mary's, a trade party with the Sigma Kappas was March 30, and Beta Upsilon was host to the Alpha Omicron Pi's on April 6. Division Conference will be held in Indianapolis April 29. Our annual pledge dance was held April 13.

Brothers Rich Daugherty and Steve O'Neil were recently initiated into Blue Key . . . congratulations, guys.

We have been busy polishing our songs for IF Sing. Our selections this year will be "White Rose of Sigma Nu" and "Fanny".

Morgan's Raiders (Sigma Nu hardwood type) are to be congratulated for their outstanding performance in adding the IF basketball trophy to our mantle. Led by the able guidance of Brother Fred Morgan, they managed to win a hard-fought playoff game with ATO after the regular season to cop the tittle. This "first", along with our football "first" puts us on top in contention for the All-Sports trophy. The final test is the softball competition, and the boys on the team are shaping up.

Elections are up and coming, and the results will be reported in the next issue of *The Technic* by a brand new reporter, with a brand new style . . . (about time.)

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LIBRARY NOTES

(*Continued from Page* 23)

was planned: the campaign, the number of divisions, the deployment of troops, the lines of transportation, the monstrous siege guns, the shine on cavalry sabers, everything down to the last button on the last infantryman's uniform.

The holocaust of August was the prelude to four bitter years of deadlocked war that cost a generation of European lives. Mrs. Tuchman has made her book doubly exciting in the revelation of the human reasons for the disaster of war.

All the Queen's Men
by Eve Stephens

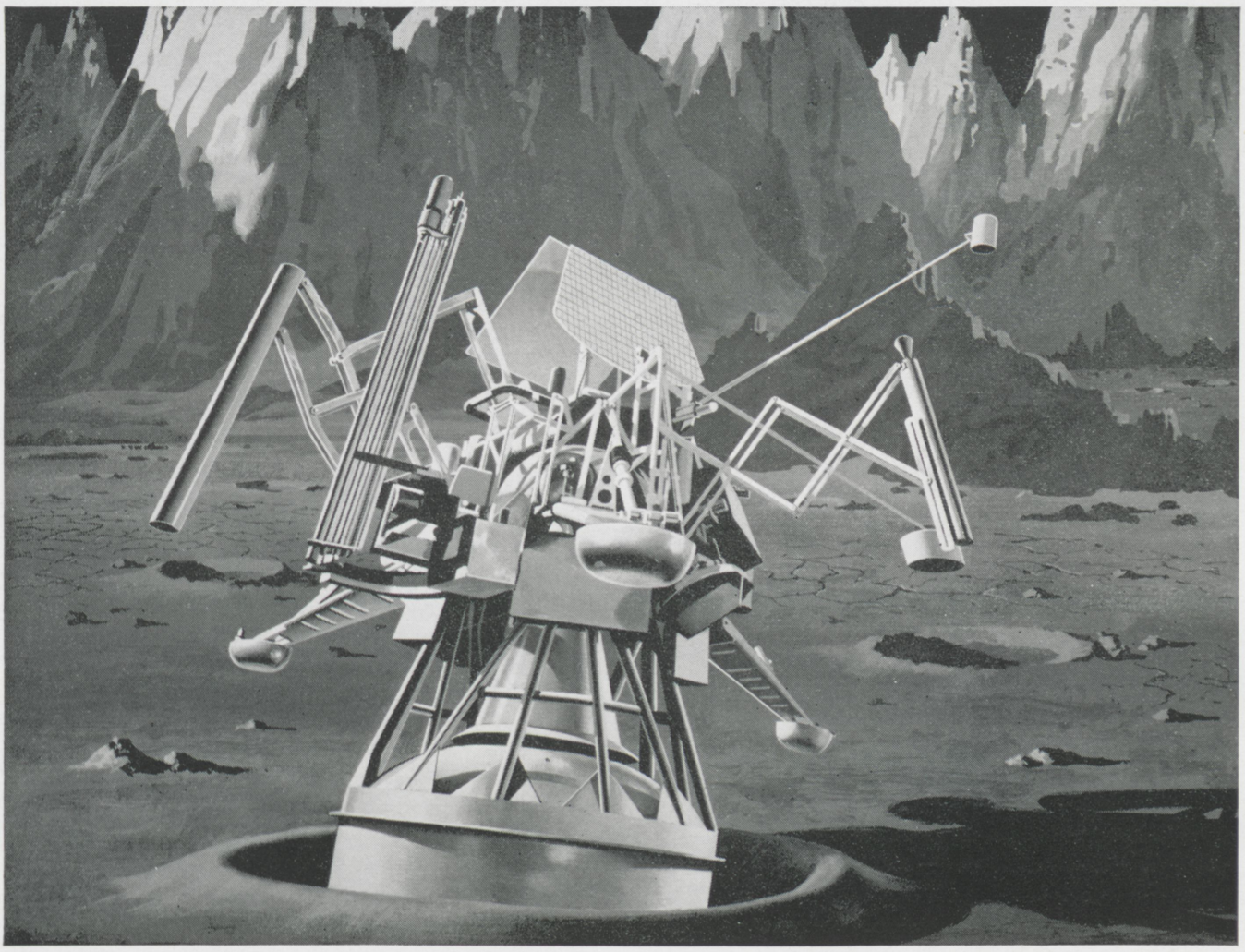
Eve Stephens whose pen name is is Evelyn Anthony presents the conflict between Elizabeth the monarch, surrounded with intrigue, and Elizabeth the woman, beset with her own doubts and passions. This historical novel presents the true story of the first thirty years of Elizabeth Tudor —the greatest of all the sovereigns of England.

NOISE

(*Continued from Page* 16)

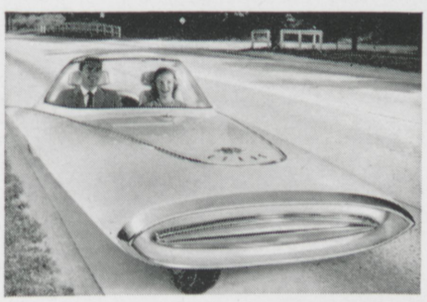
Plastic compositions include acoustical plasters and various types of sprayed-on materials characterized by a smooth, unbroken surface. Their limitation lies in indeterminate absorption characteristics of the installed material and difficult maintenance.

While acoustical materials are not cure-alls, they play a big part in quieting machinery, plants, and offices. In the future acoustical engineering will become increasingly important because the world is becoming increasingly small and there is no longer the ability to separate people from other noisy objects, as well as themselves. There is an increasing trend toward more leisure time and this is partly caused by the stress and strain which is encountered while at work. If at least some of this stress can be eliminated people will be able to work more efficiently while on the job as well as enjoy their free time in a more relaxed way.

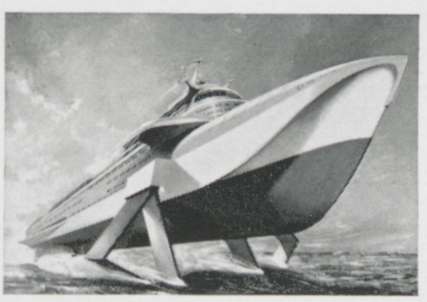


Moon crawler. Early next year, if everything goes according to plan, this spiderlike object — the "Surveyor" — is expected to land on the moon's surface, look at it, feel it, and bite into it. It will have electronic sight and touch more sensitive than a man's, and will transmit to earth direct information on what the moon looks like and what it is made of. What metal will this machine need to survive the moon's extreme cold without getting brittle? What metal can withstand the high temperatures that occur in flight? Engineers will most likely find the answer in Nickel-containing alloys. They offer tremendous resistance to crippling super-cold, stand up in blazing heat.

How Inco Nickel helps engineers make new designs possible and practical



Gyron—dream car that drives itself. A gyroscope would stabilize this two-wheeled vehicle of the future, which envisions automatic speed and steering control. A computer would let you "program" trips on a non-stop highway. For lasting beauty, trim areas would be coated with Nickel-Chrome plating, the bright, corrosion-resistant finish.



Hydrofoil ship—a new concept in seagoing design. Now under development, such vessels are planned to travel 100 m.p.h., skim over the tops of waves like flying fish—lifted aloft by a set of underwater foils, or wings. The metal for these all-important wings? Good bet is a nickel alloy for strength, resistance to corrosion and cavitation erosion.

Whatever his area of exploration, today's engineer knows that Nickel-containing metals can make many new designs perform better. For complex components of a moon surveyor, or the decorative plating of a gyroscopic car, Nickel, or one of its alloys, meets the demands of a wide range of service conditions—makes an excellent choice for products we use today, and for tomorrow's new designs.

You'll find Inco's List "A" helpful and informative. It has descriptions of 200 publications, covering applications and properties of Nickel and its alloys. Write: Educational Services,

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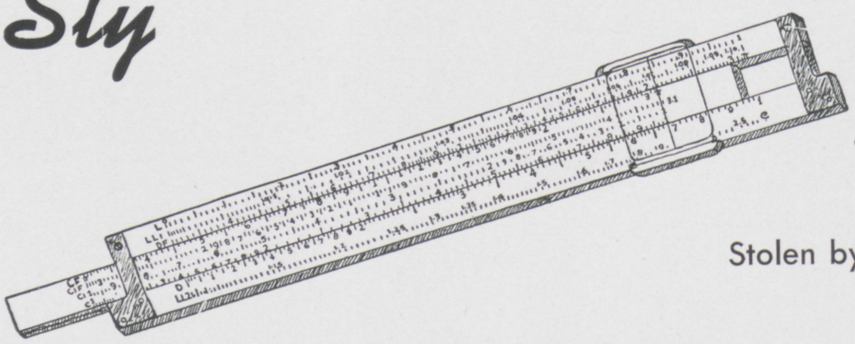
Sly Droolings



Stolen by Bill Sims & Jim Copeland

First drunk: "Shay, you don't open the door with that; it's a cigar butt."

Second drunk: "Good Heavens, I smoked my key!"

* * *

When teacher asked little Jackie how he enjoyed Easter Sunday, he came across with the following tale: "Pop and Mom painted some real pretty Easter eggs for Sis and me, and hid them in the hen house so we wouldn't find them. About that time our rooster came along and took one look, dashed over the fence into the next yard, and kicked the heck out of the peacock over there."

* * *

And then there was the freshman who thought a logarithm was a forester's song.

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

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

* * *

The dean of women at a large midwestern university recently began a speech to the student body with the memorable words. "The president of the university and I have decided to stop petting."

A student, drinking beer at a local health spa, felt the call, but worried about leaving his beer unattended. So that no one would drink it, he wrote "I spit in this beer" on a paper napkin and placed the two side-by-side. On returning, he was a little dismayed to see that someone had added: So did I."

* * *

Joan: "I ought to warn you that my father will be home in 15 minutes."

Bill: 'But I have done nothing I shouldn't."

Joan: "Well, I just wanted to warn you that if you're going to, you'd better hurry."

* * *

The little fellow sat up in his nursery crib and called to the baby in the adjoining crib: "Did you throw water into my crib?"

"Not me."

"Hmmm—must have been an inside job."

* * *

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

Passing a cemetery in the wee hours of the morning, a drunk noticed a sign which read, "Ring the bell for the caretaker." He did just that, and a sleepy-eyed man came to the door.

"What do you want?"

"I wanta know why you can't ring the damn bell yourself."

* * *

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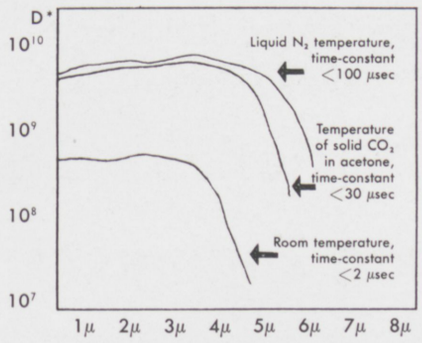
Kodak beyond the snapshot...

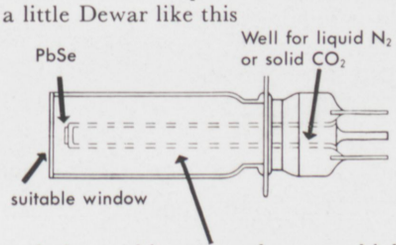
(random notes)

Cool, well-behaved PbSe



See what an improvement can be effected in D*, the normalized detectivity of a lead selenide photoconductive surface, by cooling it.

Therefore in catering to the infrared detector trade we put lead selenide into a little Dewar like this



and draw this space down to high vacuum for cooling efficiency.

But PbSe detectors are reputed to go quickly erratic in high vacuum.

Aha! We have learned how to lick that.

We expect no congratulations. Just orders.

Could you use a pamphlet on Kodak Ektron detectors? Free from our Apparatus and Optical Division. Might eventually lead to an order. We are patient.

Honest physical labor

Ranking a bunch of films for c-r tube photography is useful work, and it makes the time pass pleasantly between breakfast and supper. Here is what we find:

RELATIVE SPEED

to a 525-line raster, two interlaced fields lasting 1/30 sec over-all, measured at a net density of unity (Transit time of the electron beam past a given point of the phosphor = 5 x 10^{-8} sec)

Normal development: 4 minutes in Kodak developer D-19 at 68°F.

Phosphor	P11	P4	P15	P16	P24
FILM					
Kodak Photoflure, Blue Sensitive	2400	180	60	200	83
Kodak Cineflure Kodak Photoflure, Green Sensitive Kodak Linagraph Ortho	1800	500	250	130	240
Kodak Royal Ortho (sheet)	1000	250	130	80	130
Kodak Linagraph Pan Kodak Tri-X Negative	900	320	120	82	120
Kodak Linagraph Shellburst	500	180	60	48	73
Eastman High Speed Positive	360	51	25	45	28
Kodak Royal-X Pan Recording	320	150	65	23	47
Eastman Fine Grain Sound Recording	123	17	5.2	41	4
Eastman Television Recording	*100	11	5.2	7.5	5.2
Eastman Fine Grain Release Positive	35	4	2	6	2
Kodalith Ortho, Type 3	32	5	8	5	8
Kodak High Contrast Copy	20	12	6	4	5

*Arbitrary basis of scale.

Why they rank this way even provides something to think about.

Patterns in blood

Electrophoresis is a means for separating ionic components of a mixture by virtue of their differing mobilities in an electric field. The man who first worked it out wound up with a Nobel Prize for his pains. (We never had the pleasure of an employment application from him.) Subsequently other highly creative types—biochemists mostly—invented ways of doing electrophoresis in wet paper, starch blocks, and other media.

Recently two such chaps at The Mount Sinai Hospital in New York used polyacrylamide gels of two different pore sizes in combination. This speeded it up and permitted separation of blood serum proteins into many more components. It results in a visual pattern that represents an individual's body chemistry at a given moment.

We found out about this so-called disc electrophoresis by paying attention to what people tell us. Savants are always asking about Eastman Organic Chemicals that they hope we can make for them. Sometimes we find there will be no objection and some prospect of benefit to all parties if we will act as a broadcaster of technical information thus picked up.

This is happening right now with disc electrophoresis, which uses Eastman Organic Chemicals and about which we are offering far and wide a 69-page disquisition by the two New Yorkers.

In the name of corporate self-interest, much good dope gets cheaply spread.

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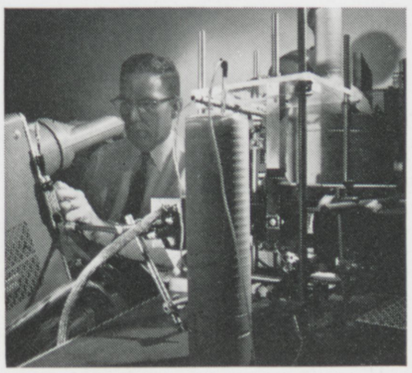

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TRADE MARK

One of a series*

Interview with General Electric's Charles F. Savage Consultant—Engineering Professional Relations

How Professional Societies Help Develop Young Engineers

Q. Mr. Savage, should young engineers join professional engineering societies?

A. By all means. Once engineers have graduated from college they are immediately "on the outside looking in," so to speak, of a new social circle to which they must earn their right to belong. Joining a professional or technical society represents a good entree.

Q. How do these societies help young engineers?

A. The members of these societies —mature, knowledgeable men— have an obligation to instruct those who follow after them. Engineers and scientists—as professional people—are custodians of a specialized body or fund of knowledge to which they have three definite responsibilities. The first is to *generate* new knowledge and add to this total fund. The second is to *utilize* this fund of knowledge in service to society. The third is to *teach* this knowledge to others, including young engineers.

Q. Specifically, what benefits accrue from belonging to these groups?

A. There are many. For the young engineer, affiliation serves the practical purpose of exposing his work to appraisal by other scientists and engineers. Most important, however, technical societies enable young engineers to learn of work crucial to their own. These organizations are a prime source of ideas — meeting colleagues and talking with them, reading reports, attending meetings and lectures. And, for the young engineer, recognition of his accomplishments by associates and organizations generally heads the list of his aspirations. He derives satisfaction from knowing that he has been identified in his field.

Q. What contribution is the young engineer expected to make as an active member of technical and professional societies?

A. First of all, he should become active in helping promote the objectives of a society by preparing and presenting timely, well-conceived technical papers. He should also become active in organizational administration. This is self-development at work, for such efforts can enhance the personal stature and reputation of the individual. And, I might add that professional development is a continuous process, starting prior to entering college and progressing beyond retirement. Professional aspirations may change but learning covers a person's entire life span. And, of course, there are dues to be paid. The amount is graduated in terms of professional stature gained and should always be considered as a personal investment in his future.

Q. How do you go about joining professional groups?

A. While still in school, join student chapters of societies right on campus. Once an engineer is out working in industry, he should contact local chapters of technical and professional societies, or find out about them from fellow engineers.

Q. Does General Electric encourage participation in technical and professional societies?

A. It certainly does. General Electric progress is built upon creative ideas and innovations. The Company goes to great lengths to establish a climate and incentive to yield these results. One way to get ideas is to encourage employees to join professional societies. Why? Because General Electric shares in recognition accorded any of its individual employees, as well as the common pool of knowledge that these engineers build up. It can't help but profit by encouraging such association, which sparks and stimulates contributions.

Right now, sizeable numbers of General Electric employees, at all levels in the Company, belong to engineering societies, hold responsible offices, serve on working committees and handle important assignments. Many are recognized for their outstanding contributions by honor and medal awards.

These general observations emphasize that General Electric does encourage participation. In indication of the importance of this view, the Company usually defrays a portion of the expense accrued by the men involved in supporting the activities of these various organizations. Remember, our goal is to see every man advance to the full limit of his capabilities. Encouraging him to join Professional Societies is one way to help him do so.

Mr. Savage has copies of the booklet "Your First 5 Years" published by the Engineers' Council for Professional Development which you may have for the asking. Simply write to Mr. C. F. Savage, Section 959-12, General Electric Co., Schenectady 5, N. Y.

***LOOK FOR** other interviews discussing: Salary • Why Companies have Training Programs • How to Get the Job You Want.

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