Wisconsin engineer. Vol. 71, No. 4 January 1967

Madison, Wisconsin: Wisconsin Engineering Journal Association, [s.d.]

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L. 71, NO. 4
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JANUARY 1967

wisconsin engineer

The Wisconsin Engineering Campus

New Directions for 1967

GO WESTINGHOUSE, YOUNG MAN! Where a world-full of projects abound

There was once a college senior named Al Addin who yearned for his place in the sun.

However, at graduation time so many companies offered him a job, Al didn't know which one to accept.

Then he met a Mr. Greeley, the recruiter from Westinghouse. Mr. Greeley was a kindly man with a warm smile. He described to Al how at Westinghouse young men have their choice of six operating groups* and work in friendly, tight-knit little teams on the world's most exciting projects.

"Go Westinghouse, young man," Mr. Greeley urged.

And Al Addin did. He wanted to be part of Westinghouse efforts to help the nation rebuild cities, so he joined the corporation's Construction Group — supplier of the world's widest range of products for the construction market.

One day, while Al was polishing a Westinghouse lamp, a Jeanie appeared. This pretty, warmhearted, intelligent Jeanie was an engineer with the Elevator Division. (Women are welcome at Westinghouse, an equal opportunity employer.) As the daughter of one of the richest men in America, Jeanie was in a position to grant Al Addin three wishes.

Al's first wish — to help Westinghouse build a municipal complex of apartments, offices, stores and parks within an established metropolitan area.

Al's contribution to the project was to help develop a *computerized environmental analysis technique* — an ingenious system for precalculating the heating and cooling needs of all the buildings in the complex. Grateful architects and consulting engineers voted Al the year's most calculating supplier.

Al's second wish — to help develop a total transportation system for a new housing area being built.

Transportation for the new project would consist not only of a remote-controlled mass transit system, taking commuters to and from their places of business . . . but it would also include sophisticated elevator and electric stairway systems to be installed within the project's terminal and living areas.

Al's third and last wish — to marry Jeanie.

She consented on the condition that he let her join him on other major projects and urban systems assignments undertaken by Westinghouse throughout the world.

Al Addin agreed . . . and they lived happily ever after.

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For further information, contact the Mr. Greeley from Westinghouse who will be visiting your campus during the next few weeks or write: L. H. Noggle, Westinghouse Educational Center, Pittsburgh, Pennsylvania 15221.

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wisconsin engineer

MEMBER OF ENGINEERING COLLEGE MAGAZINES ASSOCIATED

Chairman: PROF. HOWARD J. SCHWEBKE, Dept. of Engineering Graphics, University of Wisconsin, Madison, Wisconsin 53706.

Publishers Representatives: LITTELL–MURRAY–BARNHILL, INC., 369 Lexington Avenue, New York, New York 10017.

Second Class Postage Paid at Madison, Wisconsin, under the Act of March 3, 1879. Acceptance for mailing at a special rate of postage provided for in Section 1103, Act. of Oct. 3, 1917, authorized Oct. 21, 1918.

Published monthly from October to May inclusive by the Wisconsin Engineering Journal Association, 333 Mechanical Engineering Building, Madison, Wisconsin 53705. Editorial Office Hours 11:00–12:00 Monday, Wednesday and Friday. Office Phone (608) 262–3494.

EDITORIAL

What about your non-technical electives this semester?

Will you be looking for a "mickey-mouse" course, like First Aid, or Ice Cream (390–421–6) for those extra three credits you need?

Are we turning out men as engineers, or zombies—small, computer-like people who go into ecstasy over differential equation.

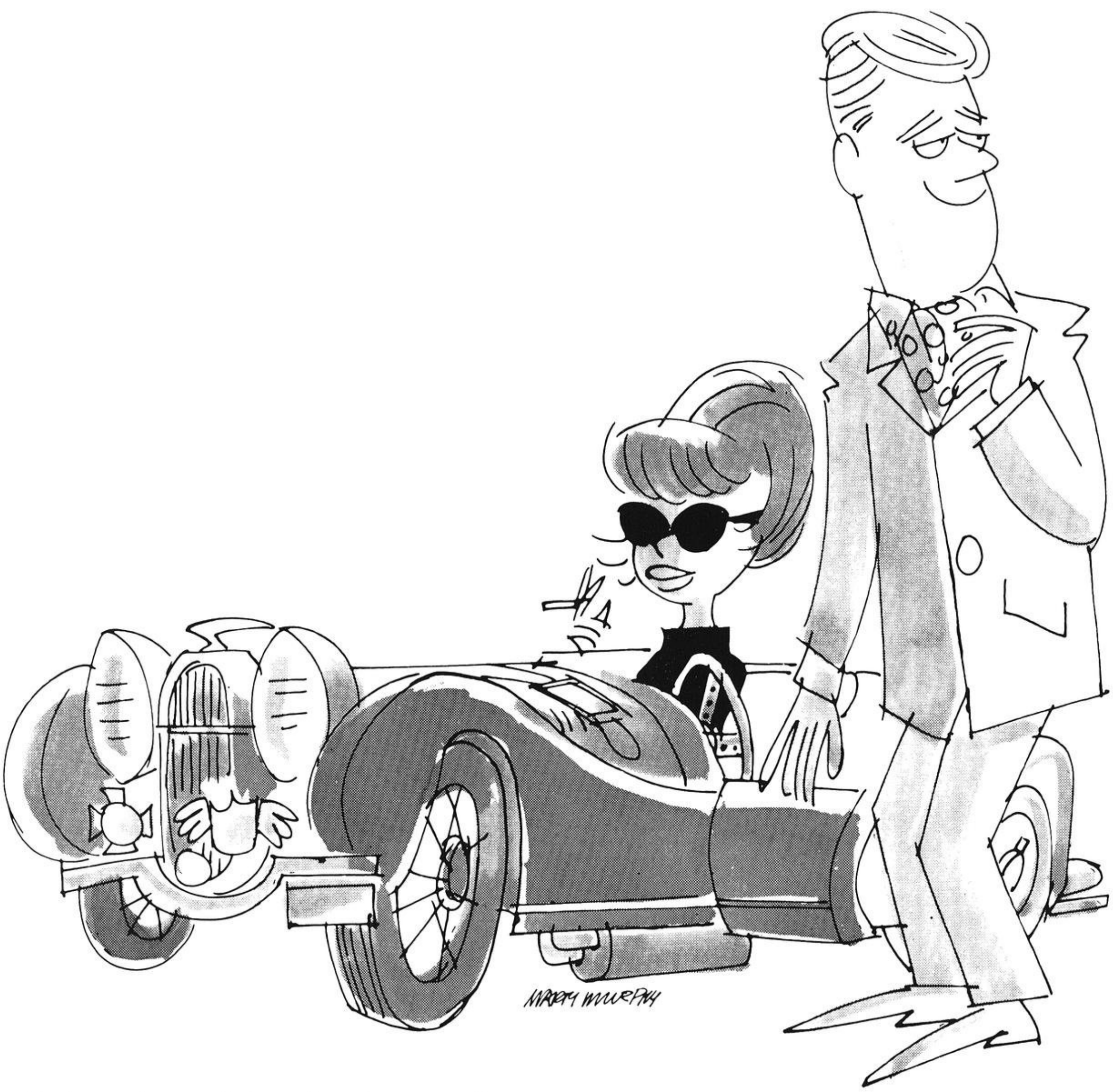
Of course I agree with you when you say our engineering courses are harder than the average "hill" student's courses. Why shouldn't I when I have to take them and suffer like the rest of you? But I also think that we are missing the point when we scrounge through our four-plus years looking for an easy way out of our non-techs.

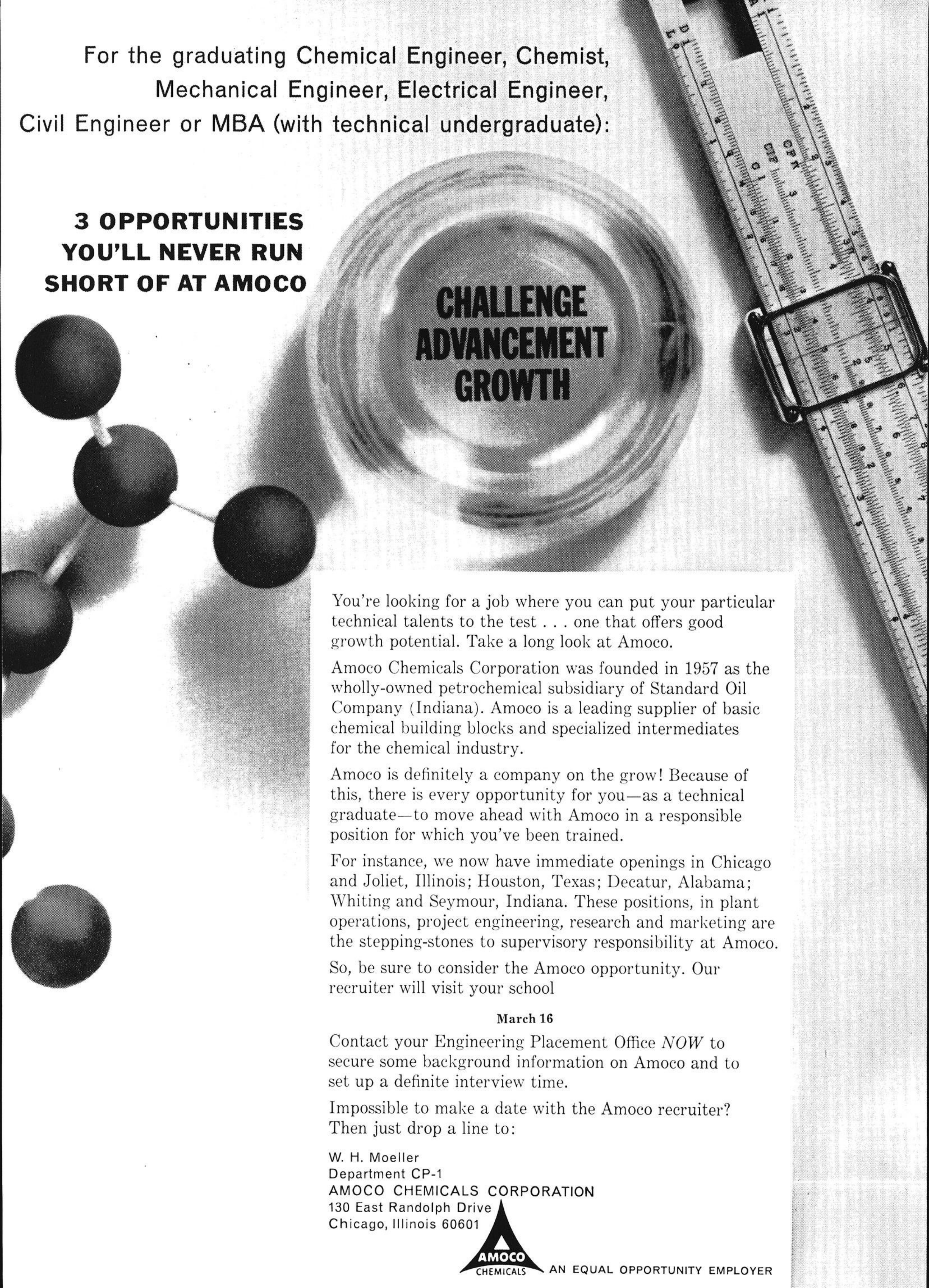
College isn't very long when you consider the time you will spend on the job for the rest of your life. And college tends to make one feel that all there is to life are books and exams and problems, when actually that is only half the story.

Leaving college, you will sooner or later be called on to be a responsible part of some community. You will have to vote intelligently for the people who control your future. You will have to be able to sell yourself and your ideas to your boss, or to the public. You will socially be required to discuss something besides how packed the B.T. was last night, or the movie at the Orpheum. Many of you will, in the future, have to decide how you feel about Viet Nam and shooting your fellow man.

All this requires something more than thermodynamics and Calculus, yet how many of us will be prepared for this half of our lives.

Mary E. Ingeman





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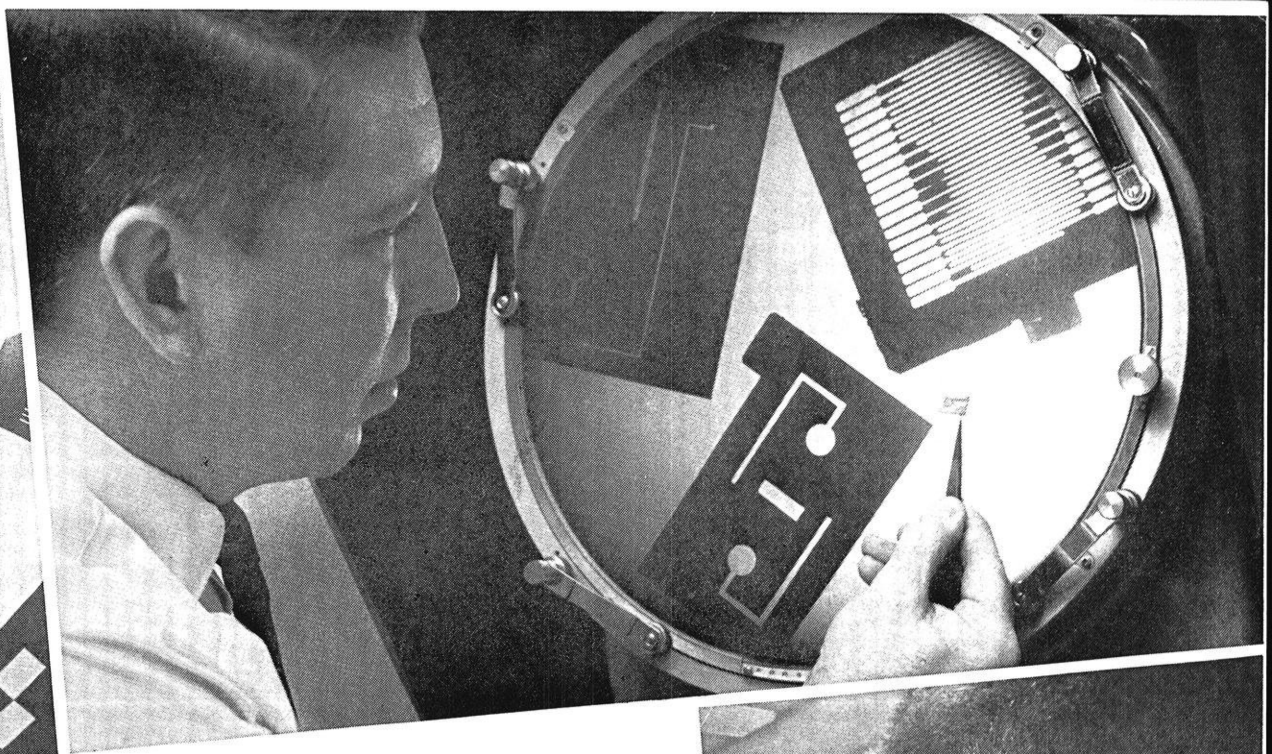

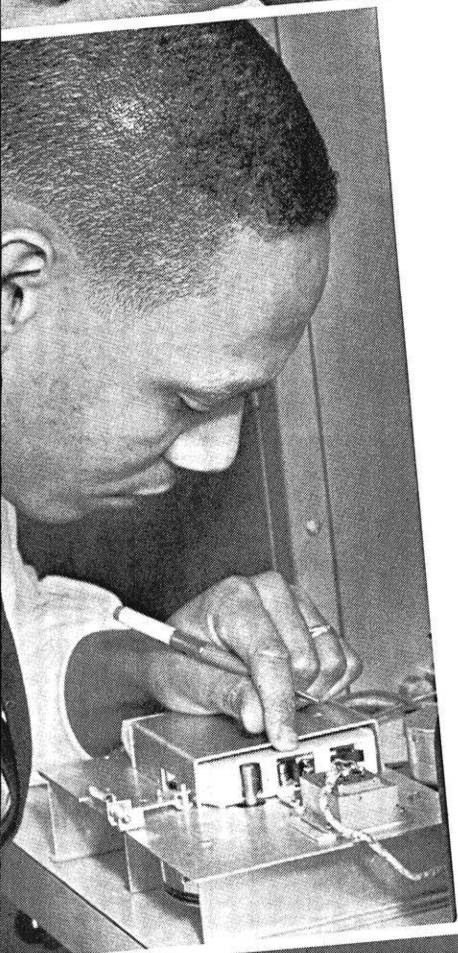

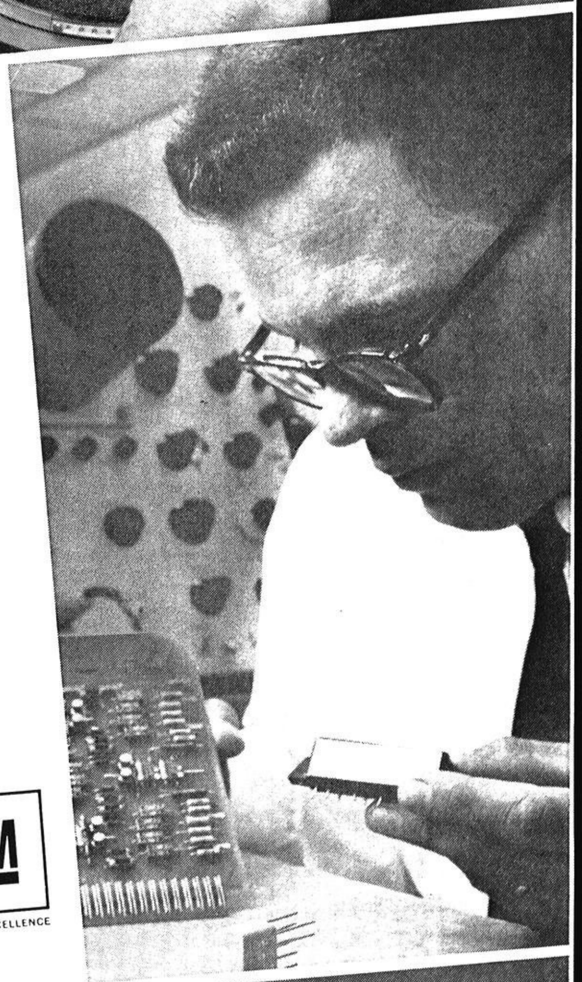

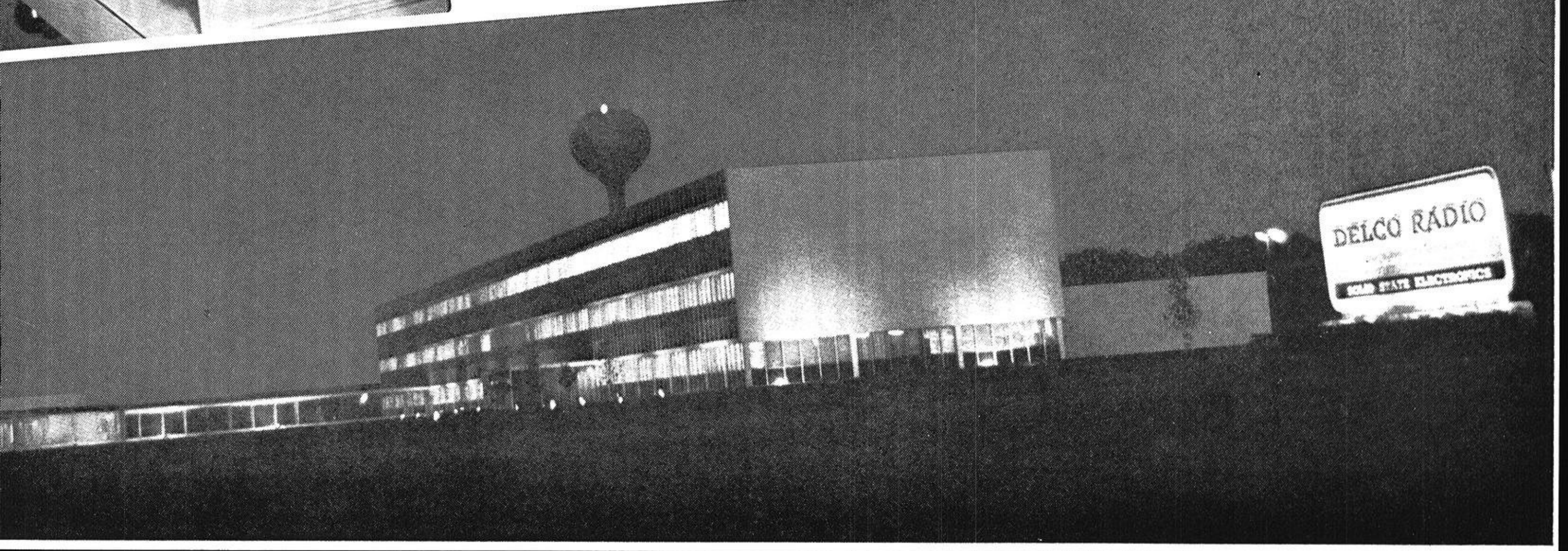

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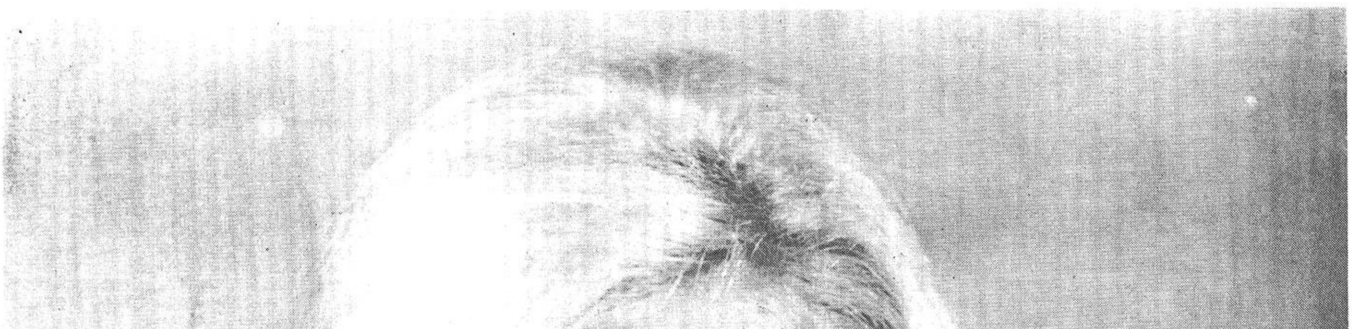

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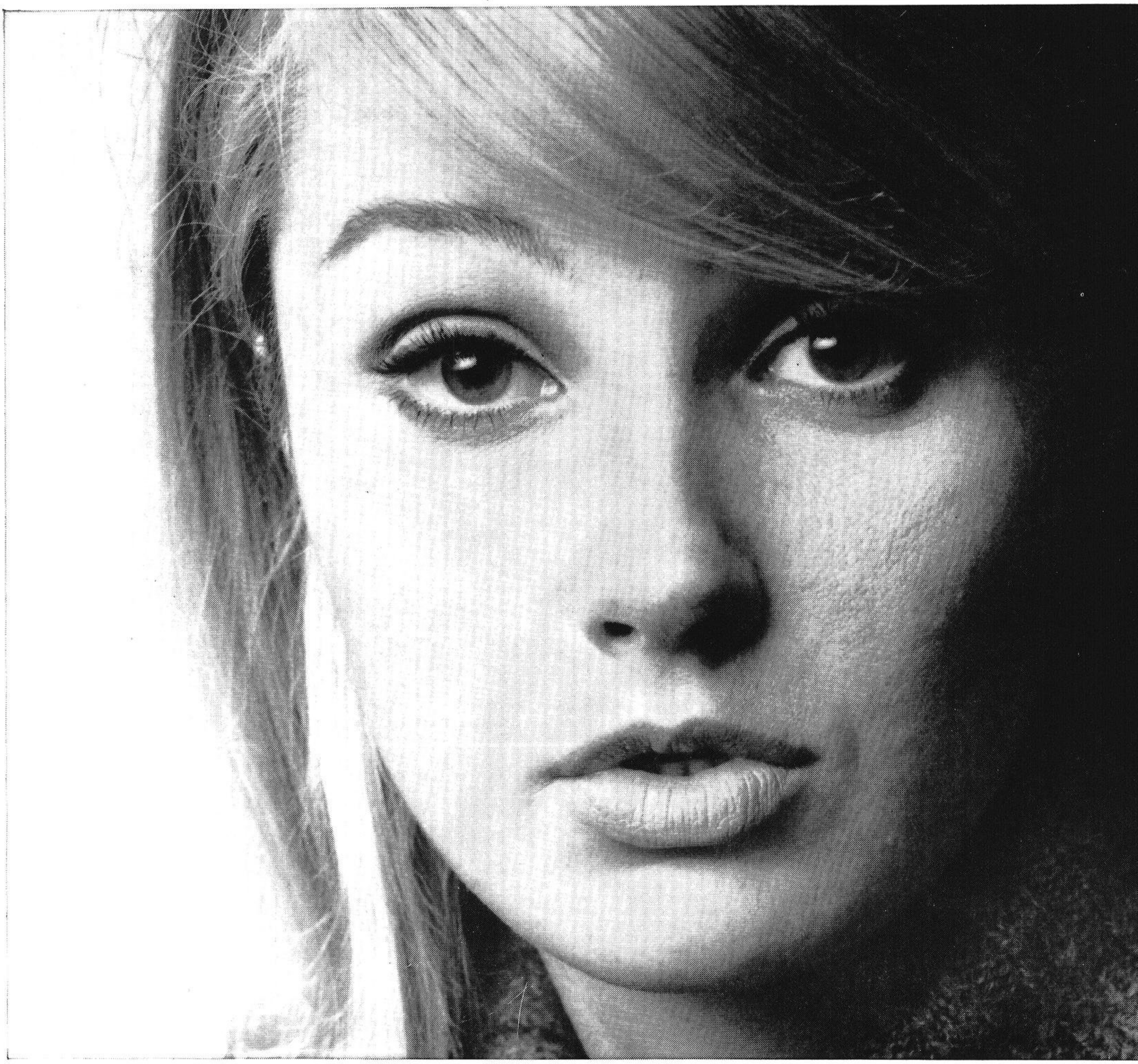

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SPECIAL REPORT

WISCONSIN

Nuclear Excavation

By GARY R. BOCK

IN THE years since the dawn of the atomic age in 1945, scientists and engineers have pondered over methods by which the power of the atom might be put to peaceful uses. In 1963, the United States Atomic Energy commission detonated an atomic blast in the Nevada desert to determine the feasibility of using atomic energy as an excavating tool. As a result of the success of this blast, numerous proposals have been brought forth concerning the possible engineering applications of nuclear energy, the most notable of which is the construction of a new Panama Canal using nuclear explosives as the prime excavating tool.

Engineering Properties of Craters

The basic problem in nuclear cratering is designing an explosion or explosions so that the crater produced will fit the requirements of the project. Here nuclear explosives, which hold great promise, cannot be used as freely as might be expected. They will replace conventional earth-moving methods only where there is a cost advantage and where safety requirements can be met.

A single charge forms a crater which is shaped roughly like a paraboloid. The size of the crater which is produced depends on the yield of the explosive and the emplacement conditions, such as the type of the rock or earth which is excavated and the depth at which the charge is buried. A row of the charges produces a ditch that is roughly parabolic in cross-section. If the distance between successive charges is approximately equal to the radius of the crater produced by a single charge, a smooth channel will be produced; but if the charges are too greatly spaced, the channel will be cusped.

Craters formed by nuclear explosives are similar in shape to craters formed by chemical explosives. It is therefore feasible to extrapolate the results of chemical explosive tests in a certain material to determine the crater size of a nuclear explosion in that material. Crater dimensions will agree with predicted values to within ten per cent for most materials. Table 1 shows the predicted and actual crater dimensions for the Atomic Energy Commission test shot "Project Sedan" in dry desert alluvium. The predicted and actual values agree quite closely in most areas,

Table 1. "Project Sedan"

Crater Dimensions	Predicted	Actual
Depth ft.	310	320
Radius	735	600
Volume yd.^{3}	9,700,000	6,700,000
Cloud height ft.	4,000	15,000
% fallout in crater	6%	slightly more

but are considerably in error in others. Most notably, the expected volume was much greater than the actual volume. Although there was good agreement between predicted and actual values in this and other tests, large test shots will be needed in hard rock and soft saturated material to determine the effects.

Although much research remains to be done before any practical nuclear excavation project can be attempted, the major technical problems apparently have been solved. The biggest problem confronting researchers today is the safety factor. If adequate safety cannot be provided to the residents of a region to be blasted, nuclear excavation will find uses only in sparsely populated regions.

Applications of Nuclear Explosives

In many areas of the world, water, which residents of Wisconsin often take for granted, is in critically short supply. Ground water levels are sinking rapidly in many parts of the United States. It is necessary in many localities to dig wells hundreds of feet deeper now than were sunk only a few years ago.

The only practical method for raising the water level in an area is to build a basin for the recharge of water into the ground. It is theorized that a crater formed by nuclear excavation would make an excellent structure for the recharge of ground water.

A nuclear crater would be allowed to fill with water from a nearby surface source. This water would then infiltrate into the ground, raising the water table in the vicinity of the crater.

If water is maintained in a crater, a ground water mound will be superimposed on the water table. This "mound" is the path from the crater for water flowing from the bottom of the crater to the water table. After the crater has been in use for some time, a mass balance will be achieved between the crater and the water level in the surrounding area. In other words, if pumping in the vicinity of the crater causes a fluctuation in the water table, water extracted from the ground will equal water recharged from the crater's ground water mound.

It has been found that in relatively impervious rock strata, a nuclear explosion will actually increase permeability by shattering the heavy rock masses of the strata.

Craters for ground water recharge hold promise for stopping the rapid depletion of ground water supplies. Craters for recharge have been extensively studied and found to be economically feasible, especially if the crater has a volume of more than six thousand acre-feet.

Water Reservoirs

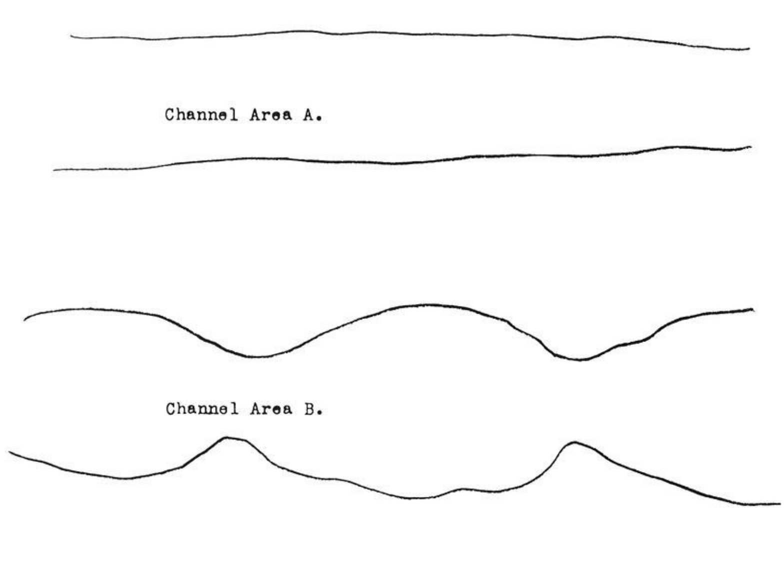
Surface water storage is another need where nuclear explosives have important potential. Craters could be developed to store water as alternatives to reservoirs created by dams. Nuclear craters have a great locational flexibility; they do not require the select topographic and geologic conditions which are essential in building dams. This flexibility of location would permit construction of water storage reservoirs in relatively open country, such as the San Joaquin Valley in California or the Great Plains of our middle western states. If permeable strata are present where the crater is to be constructed, seepage can be limited by lining the crater with clay.

Nuclear craters have one glaring disadvantage as water storage areas: water must be pumped from them instead of draining by gravity feed as in dams. This problem can be minimized by pumping during off-peak hours, by locating craters in uphill areas, by constructing shallow craters, and by maintaining high water levels in the craters.

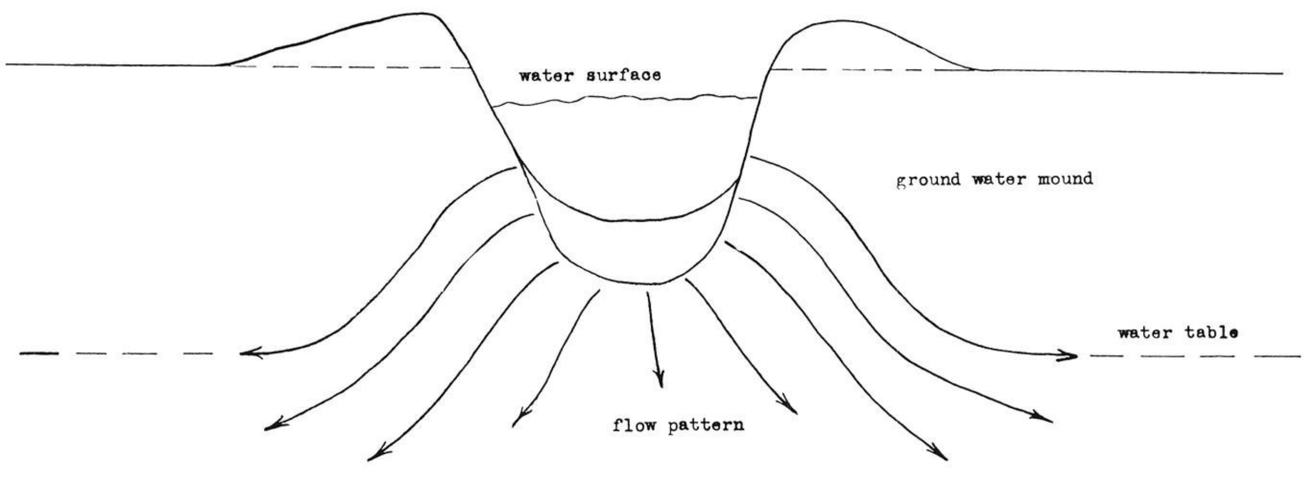
Curves have been developed that compare costs of craters to costs of conventionally built reservoirs, assuming a cost of land at $5000 per acre. These curves show the costs to be closely comparable, and for volumes over two thousand acre-feet, craters have been shown to be more economical. Greatest economy occurs for craters with volumes in excess of five thousand acre-feet.

Flooding

Floods yearly ravage many areas of the world, causing billions of dollars of damage and heavy loss of life. It has been suggested that nuclear excavation might hold the answer to eliminating many disastrous floods. To handle flood flows above a discharge which would cause damage downstream, a crater could be constructed off the main channel with a side channel overflow wier to be used to divert the peak flows into the crater. Often, by taking the peak off from flood flows so the remaining flow can be handled by the downstream



Channels due to properly placed and poorly placed charges.



Use of crater to raise water table.

channel, much flood damage can be prevented.

Water entering the crater might be used for artificial recharge, or it could be allowed to flow back into the stream during dry periods.

Adequate drainage of surface water is often a problem near large cities and major transportation lines. A nuclear crater could be used to impound runoff from these areas. Water accumulated in the crater would be allowed to infiltrate and evaporate.

"Consider for example a drainage area of 10 square miles in Southern California having a mean annual precipitation of 15 inches and a mean annual runoff of 3 inches. This would produce an average volume of 1600 acre-feet per year. If this total flow were intercepted by a 5000 acre-foot crater, adequate storage would be available for occasional years of above average precipitation. With an infiltration rate of 4 inches or more per day, the water would be entirely recharged underground. Emergency releases could handle infrequent years of excessive runoff."

The water standing in a crater developed for drainage purposes would be somewhat dirty, but it could be used for limited recreational purposes. A major problem with construction of a crater near a large metropolitan area would be the safety factor.

Waste Disposal

Nuclear craters may find usage in industry for the disposal of concentrated wastes which cannot be discharged in streams, and for which treatment would not be economical. The streams of this country are rapidly becoming nothing more than open sewers because of industrial pollution, and nuclear excavation may help end this sad state of affairs. Some wastes which might be stored in craters are: oil field brines, natural salt springs, radio-active wastes, and industrial and chemical wastes.

Mining operations of the future may make use of nuclear excavation to literally move mountains or to strip hundreds of feet of earth from the top of a rich deposit of ore.

Increasing urbanization in the United States has created an unprecedented need for recreational facilities near centers of large urban population. The United States is enjoying record prosperity along with a very high standard of living and short work week. It is essential that residents of our large metropolitan areas have places where they may spend their leisure hours.

Since many recreational activities take place near bodies of water, it has been suggested that nuclear explosives be used to create lakes for recreational purposes. The lakes would be created by blasting, and the surrounding land would be developed as parks.

New Panama Canal

The brightest prospective use of nuclear explosives in the near future seems to be for use in building a new sea level canal across the Isthmus of Panama.

"Nuclear excavation of a sea level canal is feasible and could be done for one-third the cost of converting the present Panama Canal to sea level by conventional means".

In 1947 a major study considered thirty different routes ranging from the Isthmus of Tehauntepec in Mexico on the north to the Atrato and San Juan Rivers in Columbia on the south. This 1947 study considered only conventional earth-moving methods and concluded that conversion of the original Panama Canal to a sea level route was by far the most economical solution. In 1959 and 1960 the 1947 data were reviewed for potential routes for nuclear excavation of a new canal. Five of these routes were selected for further study. Table 2, shows the estimated construction costs of the five routes selected for nuclear excavation and the estimated cost of converting the present Panama Canal to sea level by conventional means.

The final route for the new canal will depend on the economy of

construction and the remoteness from densely populated regions. This last consideration precludes nuclear excavation along the route of the present canal, as this area is heavily populated. Two routes seem to be most promising from the standpoint of economy and remoteness: They are route 17 in the Darien region of Panama about one hundred and twenty miles south of the present canal and route 25 along the Atrato and Truando rivers in northwestern Columbia. Even though these routes have been only roughly surveyed, they seem to be the best routes available and are being used in studies of the project. When good maps are made, a variety of alignments can be selected in the general area, and the best one of these chosen for the final route.

Nuclear excavation is not all there is to building a sea level canal and a great deal of general construction by conventional methods must be done to gain access to remote sites and to make the canal fully operational after the nuclear excavation is completed. Construction site access for either route 17 or 25 should involve building several hundred miles of all-weather roads through dense jungle and camps for four thousand construction workers. There would be conventional earthmoving for flood control works and approach channels. After everything else is completed, navigation aids will be installed and facilities provided for an operating force of six hundred people, as compared to the fourteen thousand workers required to run the present canal.

The building of a sea level canal is a project which will involve three phases. Site selection and feasibility surveys will be completed during the first phase. These surveys will provide data needed to make the final route selection. Upon completion of the first phase, which is expected to take three years, the second phase concerned with engineering surveys and final design of the project will begin. The engineering surveys of phase two will provide data for the detailed design of the project, and should take about a year to complete. While the design is in its final stages, contracts will be let

Table 2. Sea-Level Canal Routes

Route and Number	Excavation	Cost Est. in Millions
MEXICO:		
1. Tehuantepec	Nuclear	$2,270
NICARAGUA–COSTA RICA:		
8. Greytown–Salinas Bay	Nuclear	$1,850
PANAMA:		
14. Panama Canal Sealevel Conversion	Conventional	$2,286
16. San Blas	Nuclear	$ 620
17. Sasardi-Morti	Nuclear	$ 770
COLOMBIA:		
25. Atrato–Truando	Nuclear	$1,210

for the building of access areas, and the main construction force will be assembled in the United States. Construction of the access areas, of camps, and of the canal itself will occur in the third phase and will take either six or nine years, depending on whether the Panamanian or the Colombian route is chosen.

The nuclear detonations for excavating the channel are to be set off in two series. The first series will excavate alternate sections along the canal alignment, and the second would blast out the sections between the excavations made on the first series. General construction would resume around the completed cut within a month after the last detonation.

Cost Studies

Cost studies have been made to provide a basis for comparing nuclear excavation of a new canal against conversion of the old canal to sea level by conventional means. These studies were made assuming a channel one thousand feet wide and sixty feet deep. It was learned in recent estimates that it would cost $1,800,000,000 to convert the present canal to sea level by conventional means. By comparison, the estimated cost of route 25, developed by nuclear means, would be $1,260,000,000, and the cost of route 17, $650,000,000.

These cost comparisons show several important facts about nuclear excavation: it often requires a drastic revision of the project concept; conventional and nuclear solutions must be compared on the basis of the total project cost; and the cost of moving rock by nuclear means is so low that solutions involving great yardage can be considered and still show savings over conventional methods.

Difficulties Encountered in Using Nuclear Explosives

Radioactivity has always been an undesirable by-product of nuclear explosions, whether for military or peaceful purposes. In the design and execution of a nuclear excavation project, care must be taken to insure that radioactivity does not reach human beings in harmful amounts.

Underground nuclear explosions of the type used for excavation produce radiation in several ways: there is radioactive debris from the material in the bomb itself, and the large numbers of neutrons emitted during the explosion induce radioactivity in the surrounding rocks.

When an underground explosion first occurs, a cavity filled with gases at extremely high temperature and pressure is formed. This extreme pressure causes the cavity to expand upward until some of the gas is vented through the surface of the earth. Some of the material overlying the explosion is thrown out of the crater and some falls back in. The material which falls back into the crater effectively traps ninety per cent of the radioactivity under tons of rock. The radioactivity that escapes through venting is entrained in a dust cloud. Part of this cloud forms a high column, and part of it rolls outward in a doughnut-shaped base surge. Fallout from the cloud begins almost immediately as the dust particles settle under the force of gravity. Most of the dust will settle within a few tens of miles of the explosion site.

Air blast is another potentially dangerous phenomenon associated with nuclear explosives. Although a deeply buried charge causes much less blast than a surface charge, there will still be close-in damage from direct blast and possibly minor long range damage due

to the focusing of refracted waves in the upper atmosphere. This type of damage is possible as far away as three hundred miles. Focusing can occur if there is a layer of air up to two hundred thousand feet high, where wind or temperature causes a higher sound velocity than can occur at the surface. The danger of long-range air-blast damage can be minimized by studying high-altitude wind patterns and obtaining reliable forecasts for the area to be blasted.

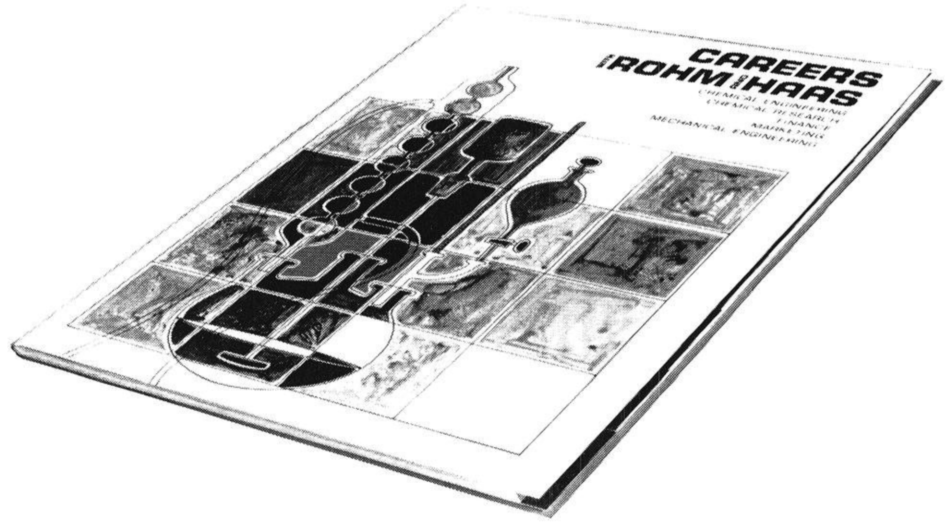
Ground shock from a nuclear explosion consists of a shock wave which is transmitted through the ground much like the shock waves of an earthquake. The extent of damage from ground shock depends on a number of factors: the size of the explosion, the coupling of the explosive energy to the earth, the wave propagation characteristics of the local geology, and the response of structures to the waves.

It would seem that the only way to eliminate the problem of ground shock is to keep the blasting a considerable distance from built-up areas.

Conclusion

The nuclear test ban treaty has caused a postponement of plans to put nuclear explosives to practical use, but undoubtedly nuclear explosives will be instrumental in many projects in the not too distant future. This is strongly indicated in a statement by G. W. Johnson, made in an article in *Physics Today*. "Whether the Plowshare excavation program can be carried out must necessarily depend on the national policy with respect to nuclear explosions for peaceful purposes. There is little doubt that the present state of the art makes possible many projects, but as development, experiment, and demonstration proceed, many additional projects can be seriously considered. In my opinion, this program, adequately supported and actively pursued, could in the near future begin to repay the American people for their investment in nuclear energy for peaceful purposes and could make important contributions to peace and international cooperation."

Attention: Chemical Engineers, Mechanical Engineers, Electrical Engineers, Civil Engineers . . .



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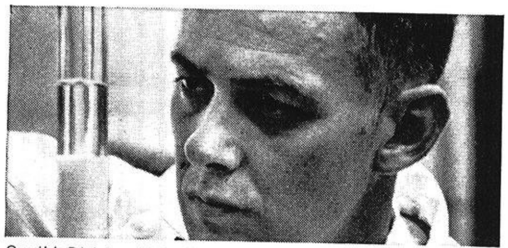
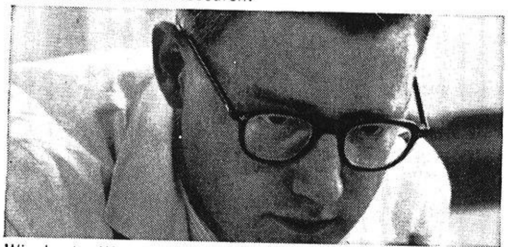
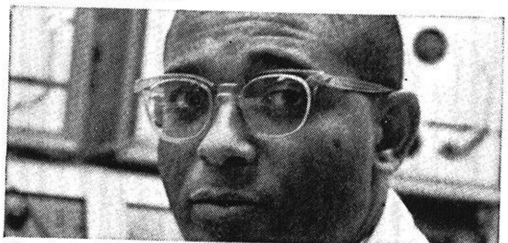


Squibb Division: Malcolm H. Von Salza (Ph.D., U. of Wisconsin) is a Senior Research Scientist at the Squibb Institute for Medical Research.

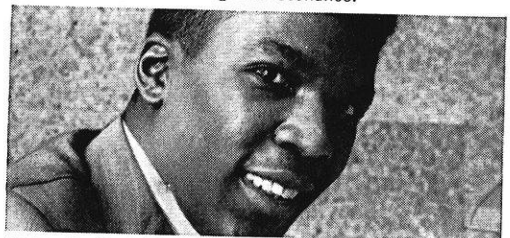


Winchester-Western Division: James P. Silver (B.S.M.E., Washington U.), a Senior Machine Designer at the East Alton, Ill., plant, is designing ammunition manufacturing equipment.

Metals Division: Larry Dix (Met. E., U. of Missouri) is a Senior Laboratory Metallurgist at the Brass Operations plant in East Alton, Ill.



Chemicals Division: George D. Vickers (Hampton Institute), research analyst at the Research Laboratories in New Haven, Conn. is studying the structure of organic compounds by nuclear magnetic resonance.



Corporate: Errold D. Collymore, Jr. (Michigan State) is a personnel staff assistant. He selects, screens, tests, evaluates and interviews professional job candidates.

Ecusta Paper Division: Richard Seiler (Chemical Engineering, Louisiana Poly.) is a Senior Chemical Engineer at the Research and Development laboratory in Pisgah Forest, N.C.

Olin

"An Equal Opportunity Employer."

SPECIAL ISSUE: LOOK AHEAD TO ENGINEERING

in the beginning...

The College of Engineering of the University of Wisconsin has a long history of progress. We present, in the words and pictures that follow, a survey of how our College began, its development over the past century to what it is today, and a glimpse into the future.

A great deal of the information was obtained from University records and publications, the Wisconsin Engineer, and the Daily Cardinal. Our other sources were people on campus today, as well as stories and legends passed down from professor to student to professor, ad infinitum.

THE HUMBLE BEGINNINGS

Technische Hochschule in Berlin, founded in 1799, is credited as being the first engineering school in the world. In the United States, Rensselaer Polytechnic Institute in Troy, N.Y., was founded in 1824.

There is some disagreement, probably due to semantic interpretation of records, as to when engineering began at Wisconsin. In 1857 Thomas B. Coryell was listed on the faculty roll as an instructor in surveying and civil engineering (at that time civil engineering was all of engineering that wasn't connected with military engineering). An agricultural and engineering college was formally established in 1868, under the provisions of the Morrill Land Grant Act of 1862. It was also in 1868 that Army Col. W. R. Pease came to our struggling little school on the hill above Lake Mendota and began instructing students in surveying and military science.

When the enrollment neared 200 in 1890, the administration felt that the fledgling College of Engineering and Mechanics should be separated from the agricultural school. The first Dean of Engineering was J. B. Johnson.

Classes met in a few rooms in Science Hall until the turn of the century when a growing enrollment forced construction of the buildings we know today as 600 North Park Street and "Old Journalism."

Chemical Engineering occupied the former, Electrical Engineering the latter. Today's Education Building was erected in 1905 and occupied by various engineering departments for many years. Mute evidence of this fact is found by examining the facade of the building, which to this day carries the names of such scientific greats as Kelvin, Pasteur, Boyle, etc. Shortly after the move into the new building, the engineering curriculum was lengthened to five years to allow students to take more liberal arts electives and participate in "work–study" or "co-op" programs.

COURSES STILL TAUGHT

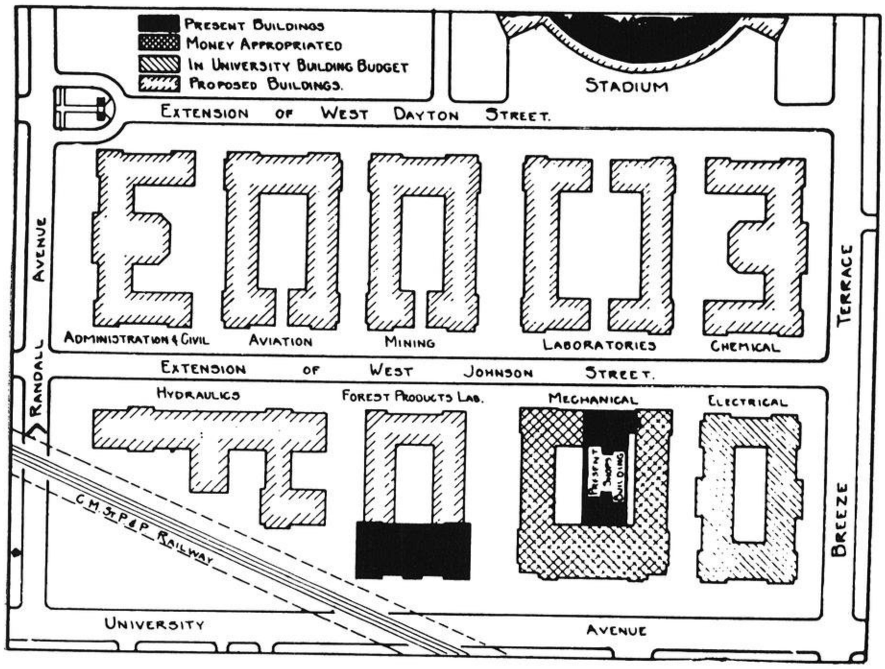
Two facts of the early engineering curriculum are still in force today. Civil engineering students first began obtaining their practical experience in surveying in 1896 when they attended a two week camp on Picnic Point (immediately after graduation, no less!) In 1910 they boarded a train for Devils Lake, where the camp was held annually until 1956

when it moved to the vacated Northwestern University camp at Taylor Lake, near Grandview. It might be noted that the length increased to four and then six weeks. In these early years Chemical Engineering was called Electro-Chemical Engineering, and also had its practical summer training as it does today. In both instances, the basic purpose and subjects are much the same, but, needless to say, the techniques are vastly different.

Frederick Eugene Turneaure assumed the duties of Dean in 1902. This was a post he would hold for nearly 40 years—40 years of progress.

A NATION AT WAR

While the Spanish–American War had only a limited effect on the College, World War I was another story. Students and faculty alike served in uniform, many of them in the burgeoning Signal and Engineers Corps. Then, as now, students had to make acceptable academic progress to delay conscription. To accommodate special technical classes for soldiers, regular students began their classroom day at 5:30, a time that certainly makes our dreaded 7:45's of today seem like mid-morning in comparison.



In April of 1918 the Wisconsin Engineer, which began publishing in 1896, ran its first high school issue—a 64-page number printed at less than one-tenth of the cost of the issue which you are now reading. One of the many advertisements which seem novel today was that of Otis Elevators, announcing the fact that the firm had recently installed two new push-button elevators in the Kremlin, Moscow.

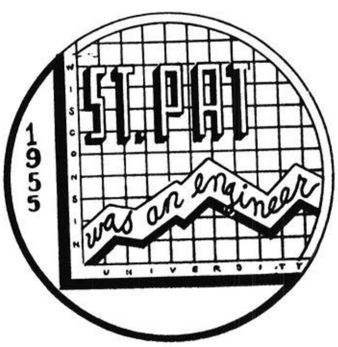
Enrollment doubled as the war ended, with some 100 students pursuing engineering studies in 1919. It was in this year, too, that the engineering campus we know today was first developed. The present core of the Mechanical Engineering Building, identified by its zig-zag roof, was constructed to house the mechanical shops. A master plan was created for the ultimate development of the engineering campus in the "marsh across the tracks." Prior to this date only the present Minerals and Metals Building, then the Forest Products Laboratory, occupied a place in Camp Randall.

To enable the College to show the rest of the campus and the public just what the boys were doing, an Engineering Exposition was staged in 1915.

St. Pat.

Paramount to all engineering tradition is St. Patrick. Apparently he became prominent after a rebirth in Missouri about 1903. Spreading across the nation, St. Pat became a big name at UW around 1915. There was the "Blarney Stone," stored in a vault except during the annual parades and ceremonies, when it was guarded by one or more field artillery pieces.

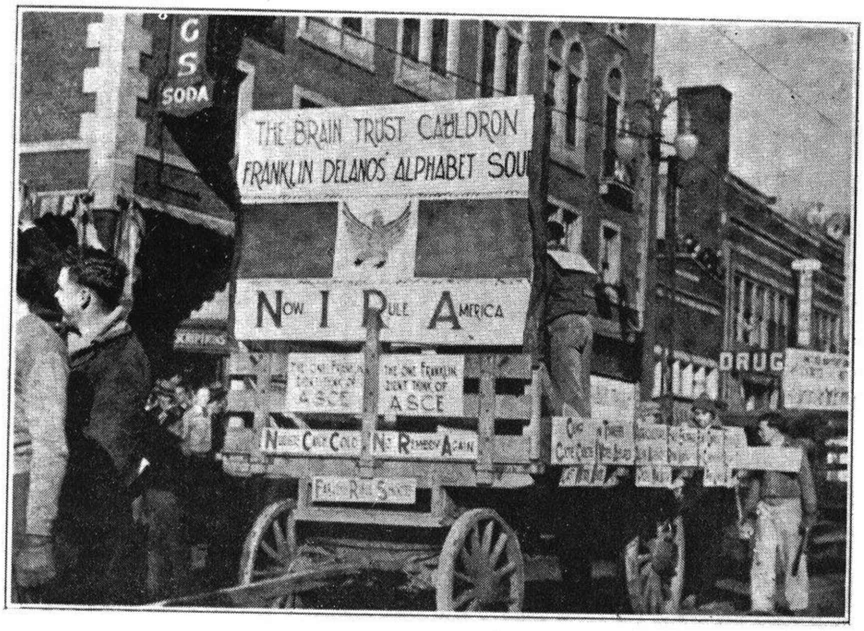
We have it from a very good authority (who probably wishes to remain anonymous in the interest of retaining his professorship) that St. Pat's Day, 1935, was "one helluva good time." Fierce rivalry existed between the students of the



professions, the engineers and the lawyers, each occupying opposing buildings halfway up the Hill. If the pranks of 30 years ago were repeated today, the Dane County Jail would be filled in an hour.

Until a year of no snow on March 17th, it was traditional for the lawyers and engineers to pelt each other with snowballs on St. Pat's Day. Being resourceful, the engineers discovered that rotten eggs were dandy substitutes for snowballs. The first use of them was limited, however, because of the lack of a large supply in the immediate Madison area. Advance preparations were made in succeeding years to avert any shortages. For a paltry sum (shipping charges only) it was possible to have a freight car of non-saleable henfruit shipped up from the Chicago markets. Much of the fruit was nearly hatched upon arrival—this is to say that St. Pat's Day classes in both engineering and law were well permeated with the telltale odor of H_2S after the early morning forays.

But, the biggest coup d'etat was one executed by the engineers. In the still and darkness of one early March 17 they invaded the Law Building, cut off the heat, and hoisted a green "St. Patrick Was An Engineer" pennant up the flag pole. Drain oil, obtained from local garages during the preceding months, was spread on the tile roof, thus insuring many days of waving for the flag. As a crowning touch, they locked all the doors with chains from the inside, save the main front door, which was secured with a chain and over-sized padlock (to which they kept the key). It goes without



saying that the lawyers were subject to an ambush from egg-throwing engineers the following morning.

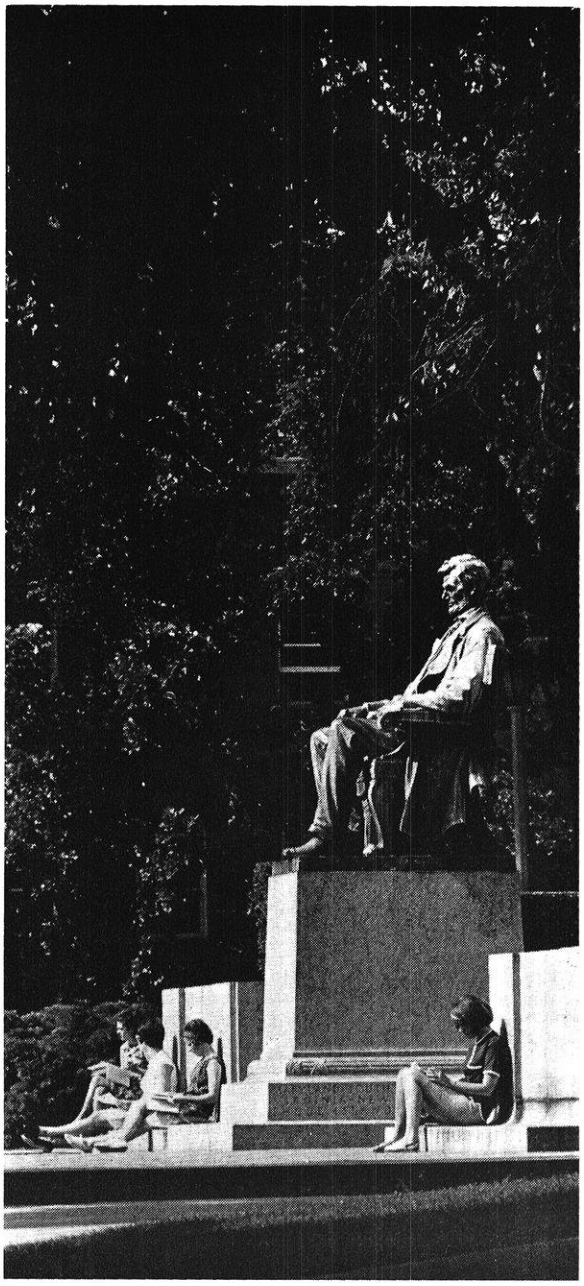
When the Dean of the Law School arrived, even he could not figure out how to open the door. Then the engineers dispatched one of their number to assist—a husky athlete who had been clued in on the one lead link in the chain. With several grunts and groans, he opened the door and walked back across the hill as the great legal minds looked on in awe.

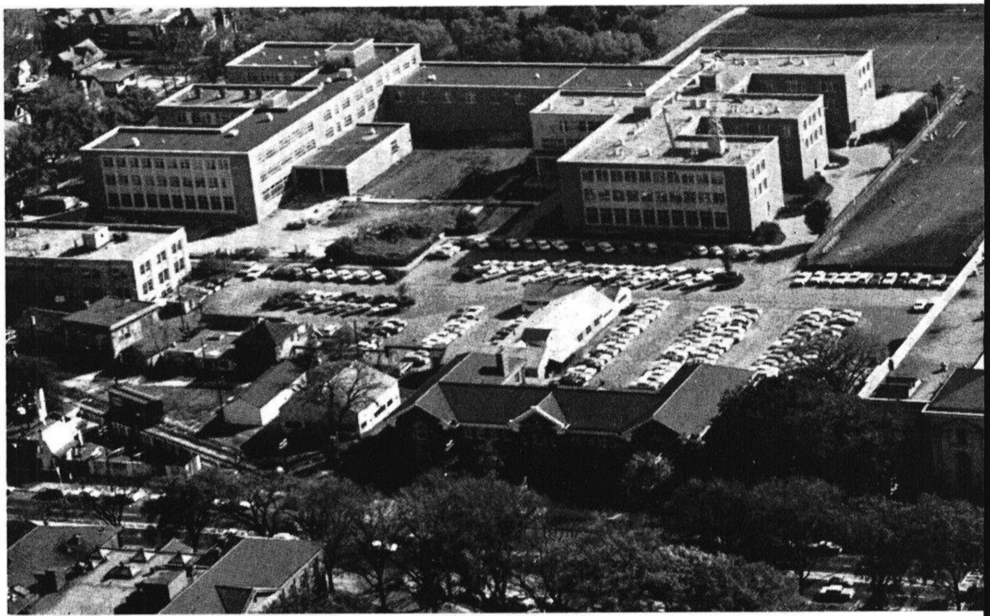
During the weekend parades (traditional then), the lawyers lurked on the roof-tops along State and Langdon Street, waiting to pelt the engineers. Not ones to be caught unprepared, the engineers slyly built their floats with adequate cargo space for defensive missiles.

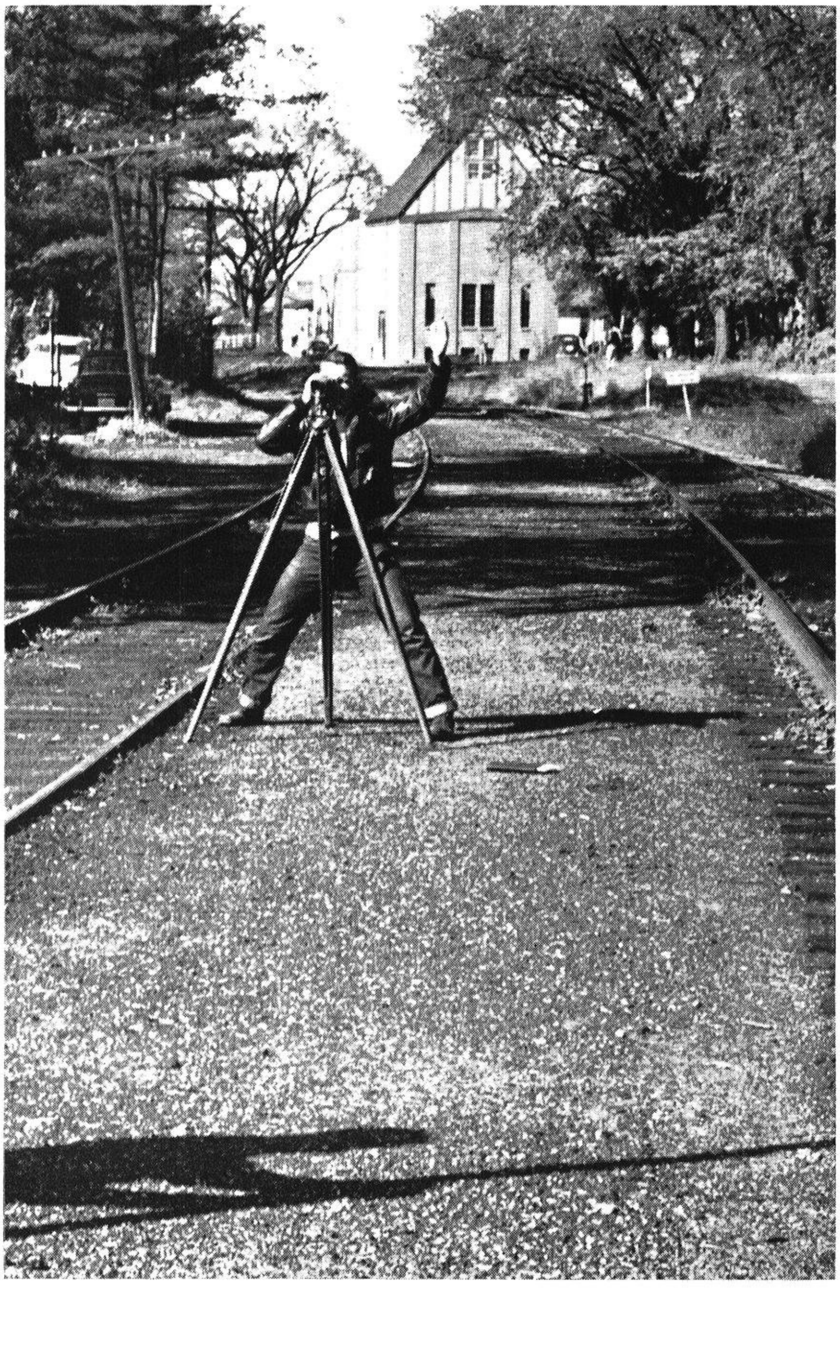
St. Patrick himself was chosen by election, with each school or club sponsoring a candidate. Votes were 1¢ per hundred, or if a "billy club" were purchased, 2500 votes went to the candidate of the militant purchaser's choice.

By the time most of the parades reached the Square, both sides were out of ammunition and the rivalry rapidly degenerated into hand-to-hand combat. Madison police were virtually helpless against the warring armies. An Associate Professor of Law, N. P. Feinsinger, was called to mediate in the affair, and, as a direct result, the two Deans made a pact prohibiting rotten eggs, tear gas, and barbed wire.

wisconsin







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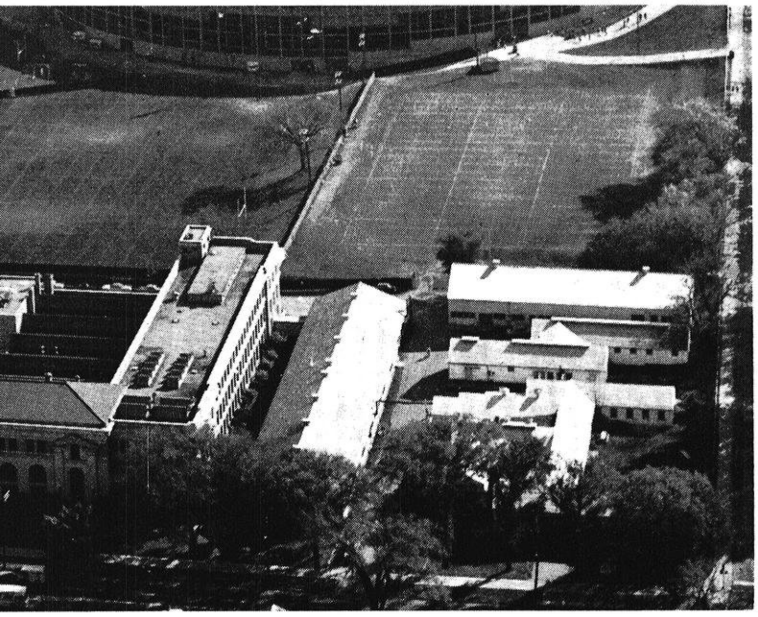

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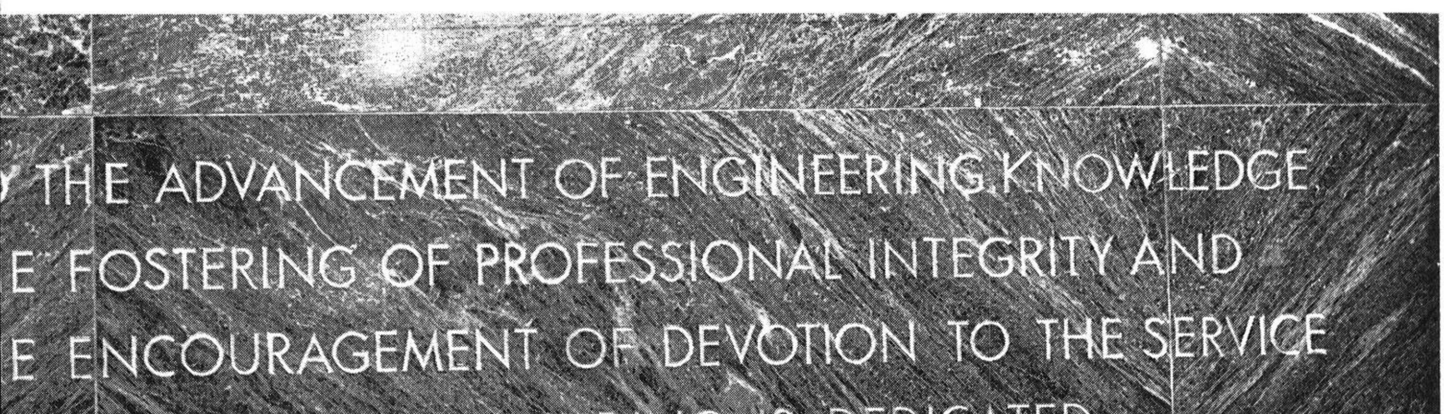
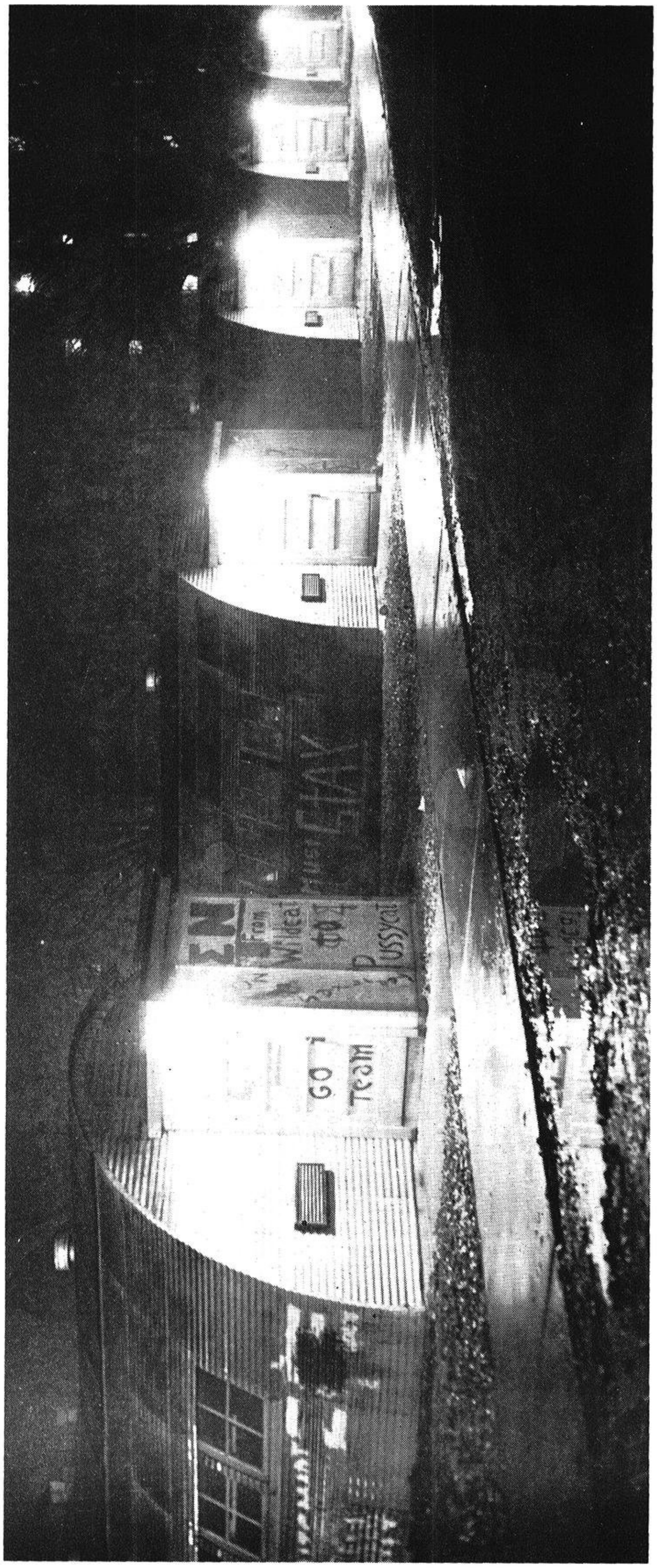


THE ADVANCEMENT OF ENGINEERING KNOWLEDGE
E FOSTERING OF PROFESSIONAL INTEGRITY AND
E ENCOURAGEMENT OF DEVOTION TO THE SERVICE
F MANKIND, THIS BUILDING IS DEDICATED.



the roaring twenties . . .

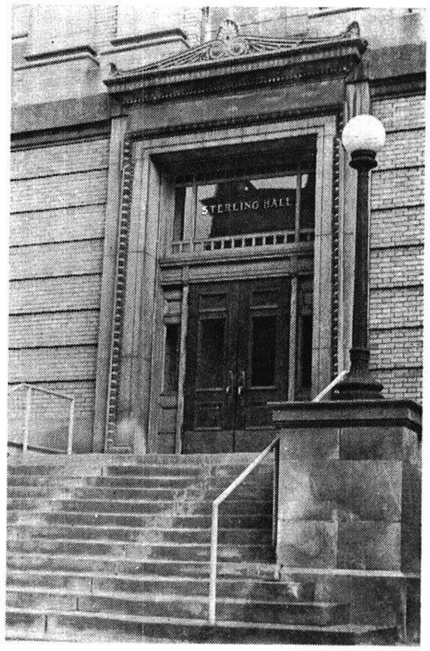
In 1922 a young ME by the name of Harley was working in a small shed near the campus, developing the first of thousands of Harley–Davidson motorcycles. Full professors were drawing $100 per month in salary during these roaring twenties, but then, it must also be remembered that T-Bone Steak dinners were going for 45¢ at all but the most exclusive of the many campus beaneries.

Our present Mechanical Engineering Building was occupied in 1930—its cost was $527,000. The early thirties were troubled years for the college, with graduating engineers unable to find employment and enrollments dropping. Even "St. Pat" died for 4 years, but this is another story.

↑ Wisconsin-engineered Harley cycles—the Hondas of yesteryear.

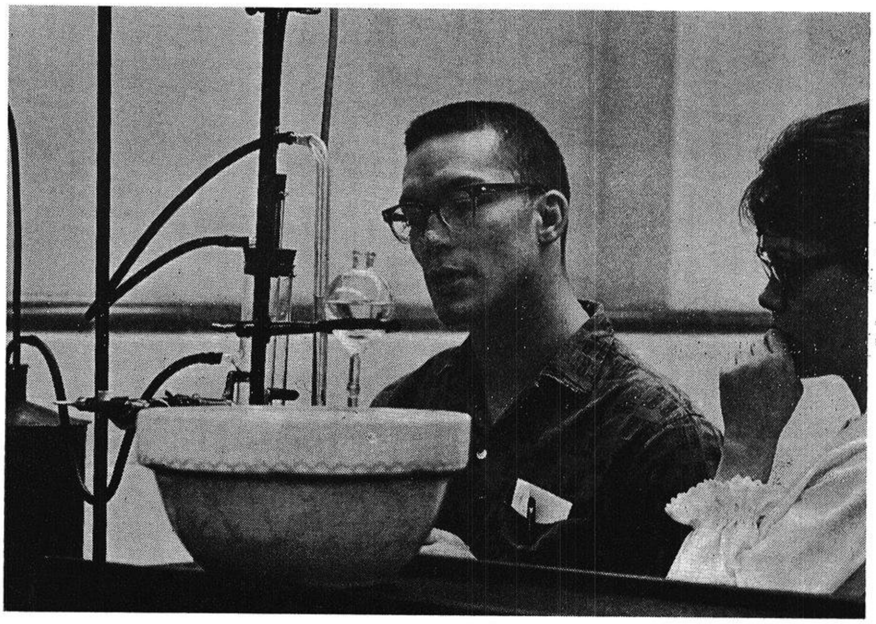
Post-WW II enrollment boom saw quonset huts on the Library Mall. ←

then came the thirties . . .



Much of the nostalgia for the days of yesteryear stems from recalling the high-jinx that were so commonplace then.

For example, several Norwegian students, longing for their native sport and perhaps with time on their hands, built a ski scaffold behind the Engineering Building on Muir Knoll.



Many graduates in the mid-thirties found employment with FDR's public-works programs. Most of the engineering classes, as well as the library, were moved to the Mechanical Engineering Building. A. V. Millar was named acting Dean in 1937, and F. E. Johnson became retired Dean Turneaure's permanent replacement in 1938.

On the eve of World War II 1500 students were enrolled in engineering. When the war broke out, the state and university began producing for victory. Submarines were built at Manitowoc, and experiments in aeronautics and elementary atomic theory were being conducted at UW.

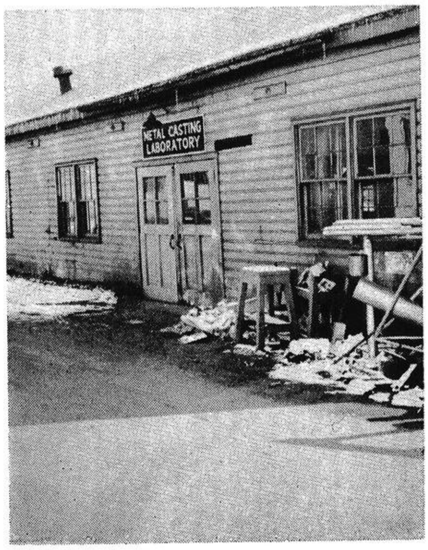
Again students joined the war effort, some voluntarily, some through the Selective Service, for a 2.5 GPA was needed to escape the draft.

With the cessation of hostilities and subsequent return of thousands of veterans, the University was seemingly caught with its guard down. A tremendous number of returning servicemen chose to use the GI Bill to get a college education. Classes were held 12 months a year (three semesters), and temporary quarters for teaching and living were hastily constructed. The Camp Randall–Monroe Park area was turned into a huge trailer camp. There were 205 trailers in all—two and three room units rented by the university for between $25 and $35 per month. This unique village within a city even had its own government.

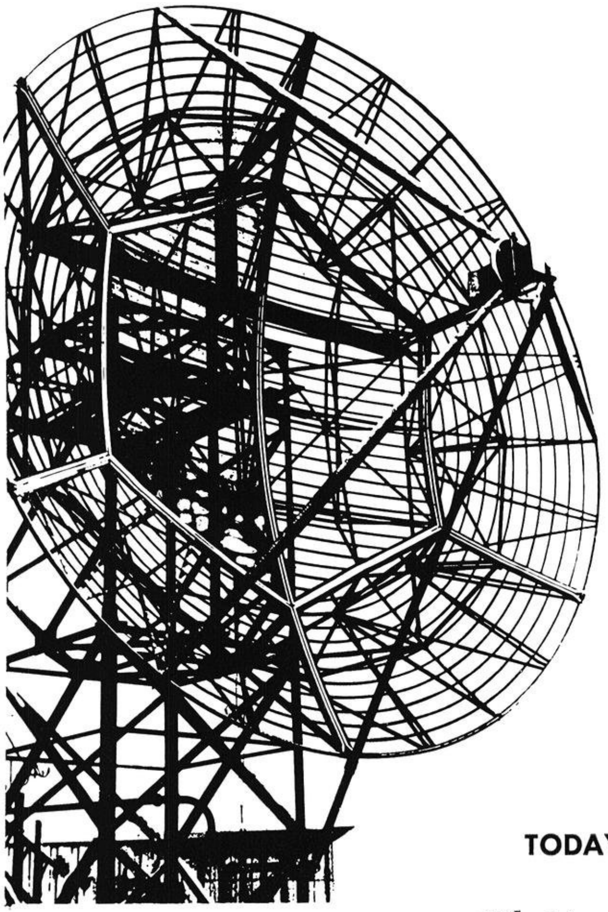
Gone today are the trailers, but many of the shabby gray temporary (T) buildings are still with us, and serving admirably. A circa 1948 photo taken in the Breese Terrace Cafeteria reveals that the physical equipment then is nearly the same as it is today. Some of our staff colleagues argue that the food is that old too.

Shortly after M. O. Withey became Dean in 1946, plans were formulated for a new engineering building, consolidating several departments under one roof, thus scrapping the earlier plans for several buildings.

First to be built (in 1952) was the Engineering Mechanics and Electrical Engineering Wing, with extensive modern laboratory facilities. A Chemical Engineering laboratory section was completed shortly thereafter. In 1964 a new classroom and lab wing housing Civil Engineering was completed. A host of classrooms and many new laboratories were included. Still to be constructed is the final part of the building, an auditorium-library complex nestled between and above the back-to-back "E's."



—LOOK Photo by Phil Harrington



1967

TODAY

TODAY: AN ACTIVE ROLE IN THE SPACE AGE

What is engineering at Wisconsin today? To the student, it is four or five years of hard work, each year consisting of many long, long days. The curricula are generally broken up into a year or two of courses to provide tools for the future, such as calculus, chemistry, physics, drawing, and English. Then come the basic engineering science courses—mechanics, materials, engineering writing, and learning how to use a computer. Finally, there are courses common to the student's chosen branch of engineering, and further specialization within the branch. Accompanying all of this is a selection of non-technical courses to better round out the student's education. (It's nice to get up on the Hill too, due to the critical shortage of girls in engineering.)

Our purpose here is not to explain the various courses of study offered at UW. The Bulletin of the College of Engineering, containing this information, is available from the University News & Publications Service, 19 Bascom Hall, Madison 53706.

That Wisconsin is an excellent engineering school is widely recognized. The Chemical Engineering Department is the finest in the entire nation, and all other departments are highly rated, in terms of faculty, facilities, and accomplishments. Most advanced classes have a small student-faculty ratio. Laboratory periods provide students with the opportunity to solidify classroom concepts.

Every branch of engineering in which courses are taught at UW has a student chapter of the parent-professional society, thus promoting out-of-class interest in the profession and informal contact with the faculty. Several Engineering fraternities are active, and three have their own houses near the campus. Many honorary societies give recognition to the superior scholars. Each of these organizations is represented on Polygon Board, the student governing board of the College of Engineering, which in turn is represented on the all-University Student Senate.

Much of the academic strength of the UW College of Engineering comes from the many inter-disciplinary projects and courses of study. For example, you may have read "One Heart or Two?" in the October 1966 *Wisconsin Engineer*, the story of mechanical and chemical engineers working with physicians to perfect the artificial heart.

Assistant Dean F. U. Leidel counseling prospective engineers during summer pre-registration.

At present the full-time Engineering Faculty numbers nearly 200. Baccalaureate degrees are granted in the field of Civil, Chemical, Mechanical, Electrical, Minerals and Metals, Nuclear Engineering, and Engineering Mechanics. Graduate work is offered in all of the above fields as well as Space Science, Water Resources Management, Bio-medical, and Industrial Engineering; the latter will grant a B.S. degree in the near future.

THE FUTURE: PROGRESS THROUGH RESEARCH

It would be folly to attempt to say what the years to come hold for our college. We can see, however, nothing but progress in sight, and after that, more progress. To quantitatively cite the work in progress, we cite the following data from the 1964–65 annual report of the Engineering Experiment Station: There were 523 projects in progress, the Experiment Station's Budget was in the neighborhood of $2,700,000, and over 100 publications were credited to the Station's staff.

A word is in order here about the Engineering Experiment Station, which is not a separate entity but, rather an administrative unit of the College of Engineering, consisting of the faculty members engaged in research. In another two years an Engineering Research Building will be erected on the engineering campus, thus uniting under one roof the projects which are now spread out across the campus. It is very evident that research will continue to play a bigger and bigger role in the College.

Education still has the front seat. Emphasis on quality instruction is being increased annually, and the varied research programs steadily bring a wealth of new materials into the classroom and laboratory.

Compiled and written by R. J. Smith
Photos courtesy Robert Foss, U. W. News Service

BUT DON'T FORGET THE PAST

FRATERNITY NEWS

RUSH!

KHK

Kappa Eta Kappa will again have a busy and well organized social calendar including beer suppers and parties. The highlight for the spring semester will be a Founder's Day Banquet and Spring Dance. In addition to social functions, we can offer the electrical engineer a good professional atmosphere. Speakers from industry are invited to speak at meetings. Also, some of the members are now working on a project for the Engineering Exposition in April.

Though we have close to fifty active members at the end of this semester, there are a large number of seniors graduating in January and June. For this reason, KHK invites all electrical engineers to their rushing smokers on February 6 and at 7:30 P.M. The chapter house is at 114 N. Orchard.

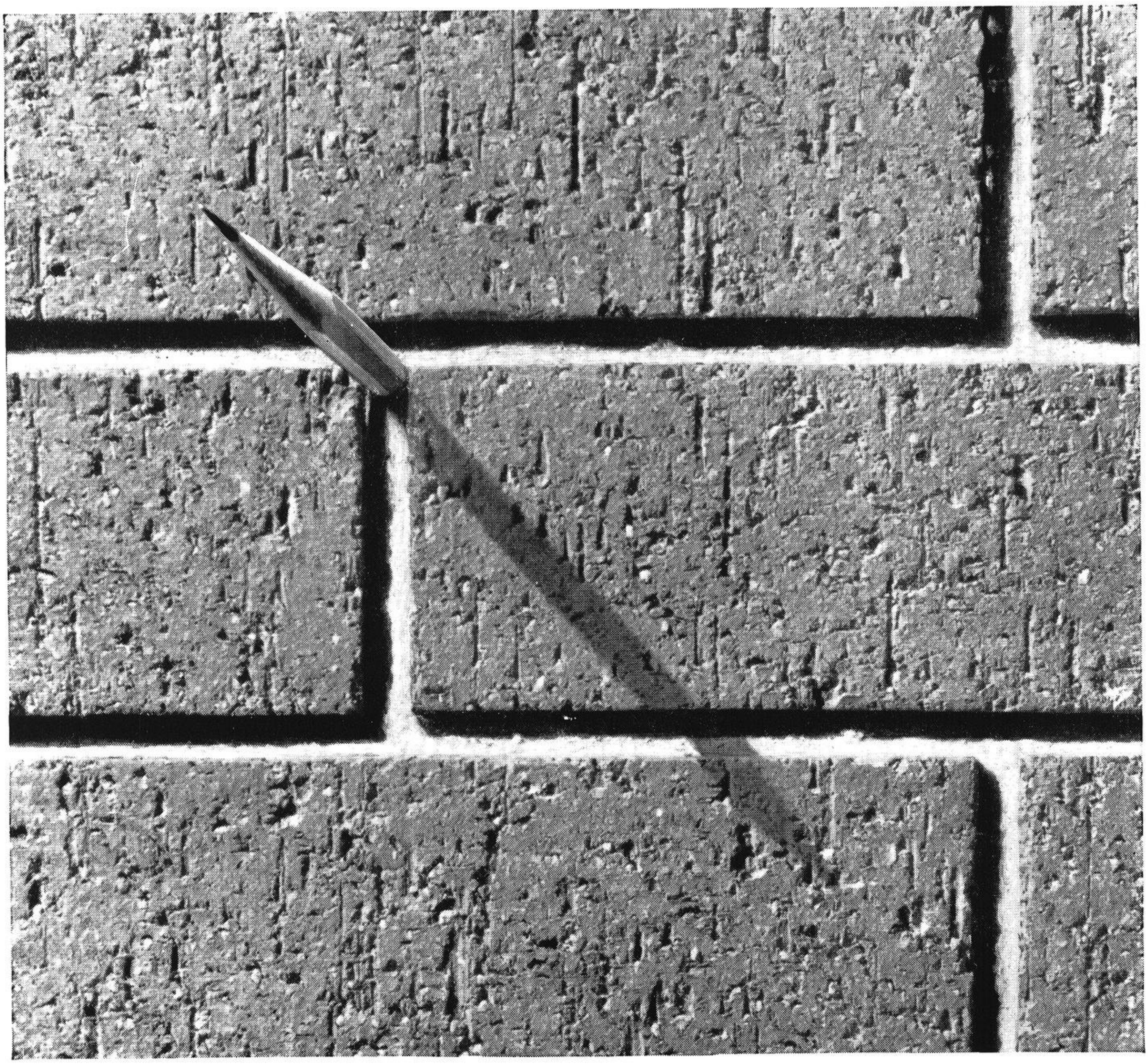
TRIANGLE

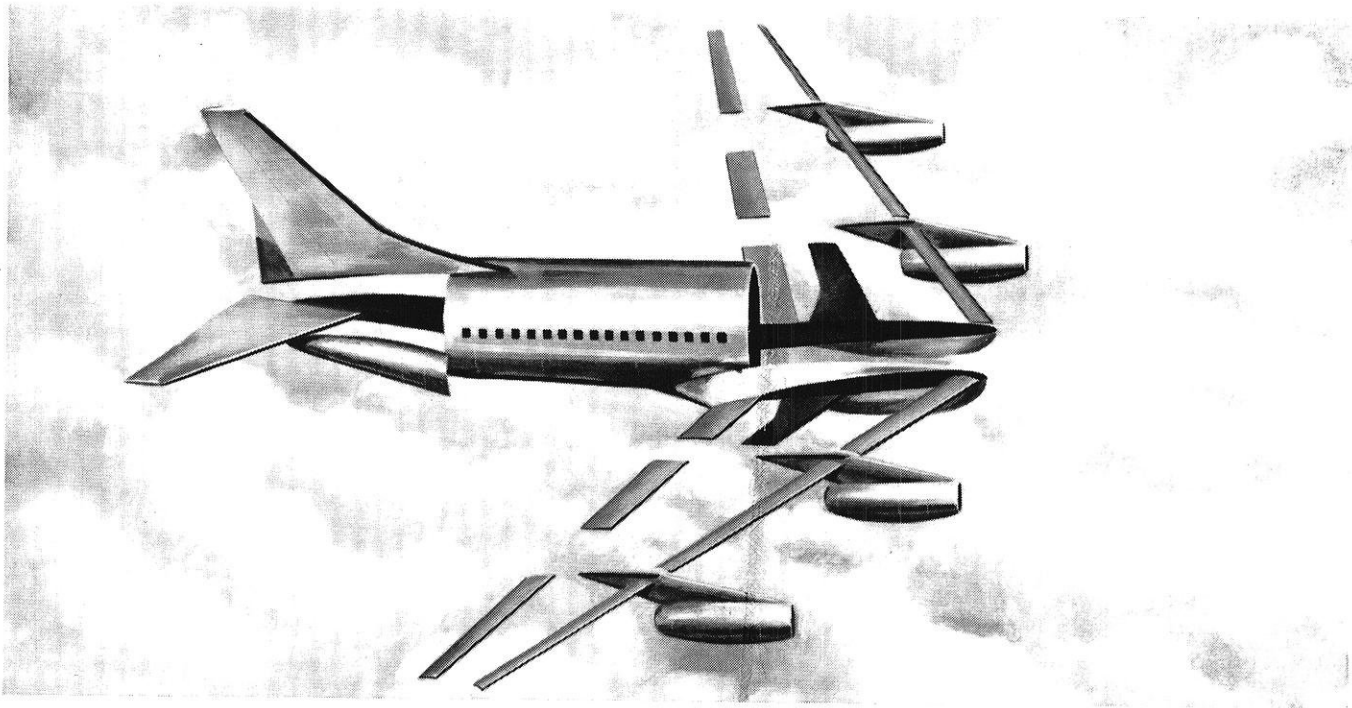
This spring, Triangle will have a balanced social and academic program for the active engineer. In addition to the usual fantastic parties and beer suppers, Triangle will have wild St. Pat's Day (St. Pat WAS an engineer!), celebrate Triangle's 60th anniversary, participate in the Engineering Exposition and compete in the Triangle National basketball tournament. If this sounds interesting to you, they suggest that you stop in during their open rush February 1, 2 and 7 at 8 P.M., 148 Breese Terrace.

ALPHA CHI SIGMA

Spring rush for Alpha Chi Sigma will begin on February 2 at 7 P.M. Rush will continue on the seventh and ninth and will feature a speaker talking on the relation between Alpha Chi Sigma and their professional lives. The purpose of rush is to give the chemical, metallurgical, or nuclear engineer an opportunity to see their house (621 N. Lake) find out about their activities and to answer any question the engineers may have about Alpha Chi Sigma. Beer and chips will be served.

NEWS for 1966 1967 ENGINEERING GRADUATES





The only company in the world that almost builds airplanes

(and that's precisely how we planned it)

We manufacture fuselage sections, stabilizers, engine pods and struts, thrust reversers, elevators, wing leading edges, ailerons, landing gear pods and doors, cargo doors, wing-to-body fairings, flight and ground spoilers, wing joint fittings and flap tracks.

We manufacture them for America's leading builders of jet transports. And we manufacture them precisely, on schedule, at lowest cost. Because we have specialized in the field for years ... designed and built the special machines — developed the special techniques — acquired the special talent.

Almost building airplanes is our basic business. It's getting bigger all the time. In addition, the fabrication of large steerable antennas and major missile components has grown fast here, too . . . making a healthy contribution to Rohr's current backlog of orders of over $433 million.

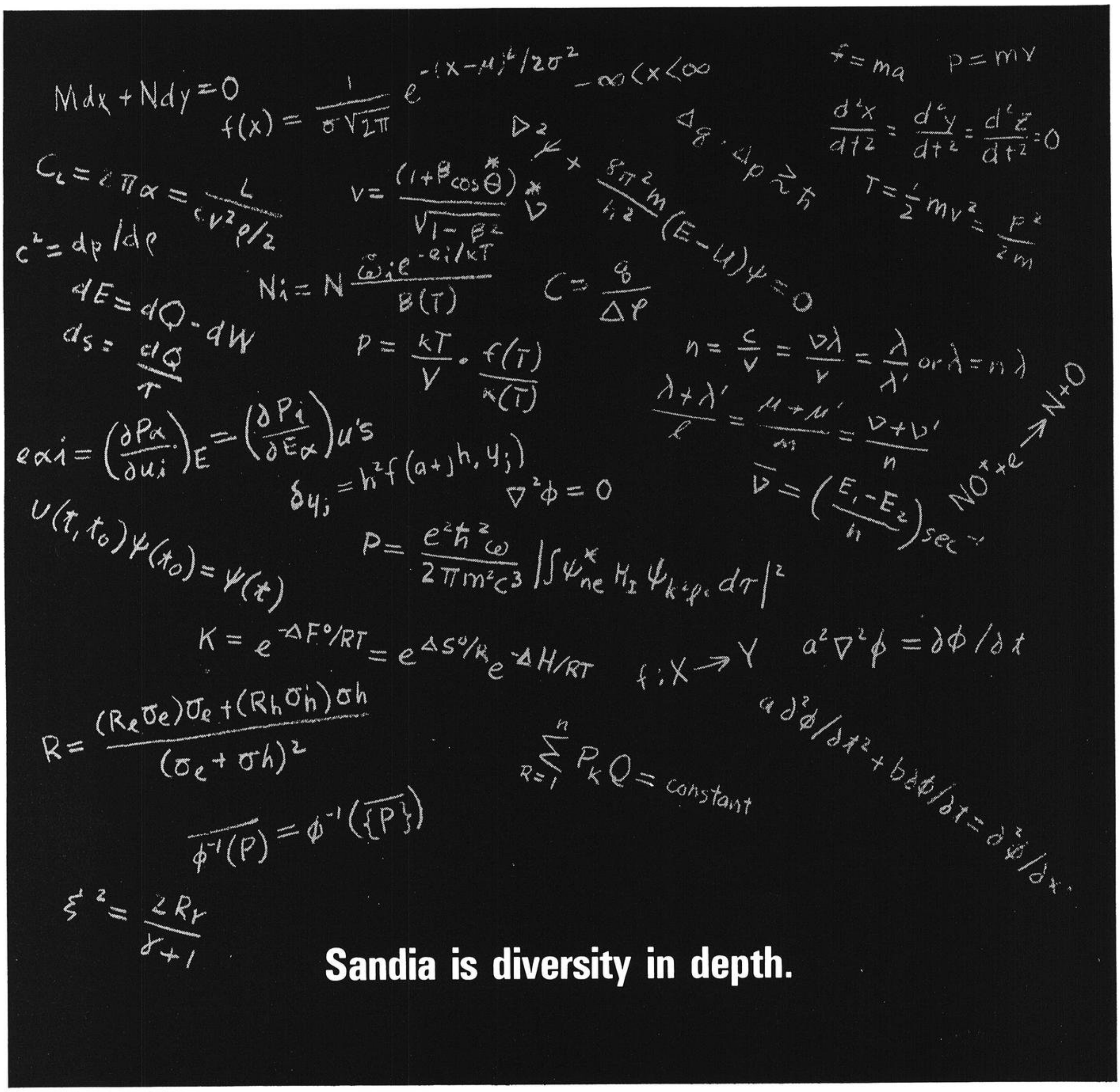
MECHANICAL ENGINEERS: Aircraft Design, Thermodynamics Design, Plant Engineering, Machine Design. **ENGINEERING MECHANICS:** Liaison Engineering, Machine Design, Manufacturing Engineering. **CIVIL ENGINEERS:** Structures Analysis, Plant Engineering—Structures, Antenna Design.

CAMPUS INTERVIEWS
February 2

SEE YOUR PLACEMENT DIRECTOR FOR YOUR INTERVIEW APPOINTMENT

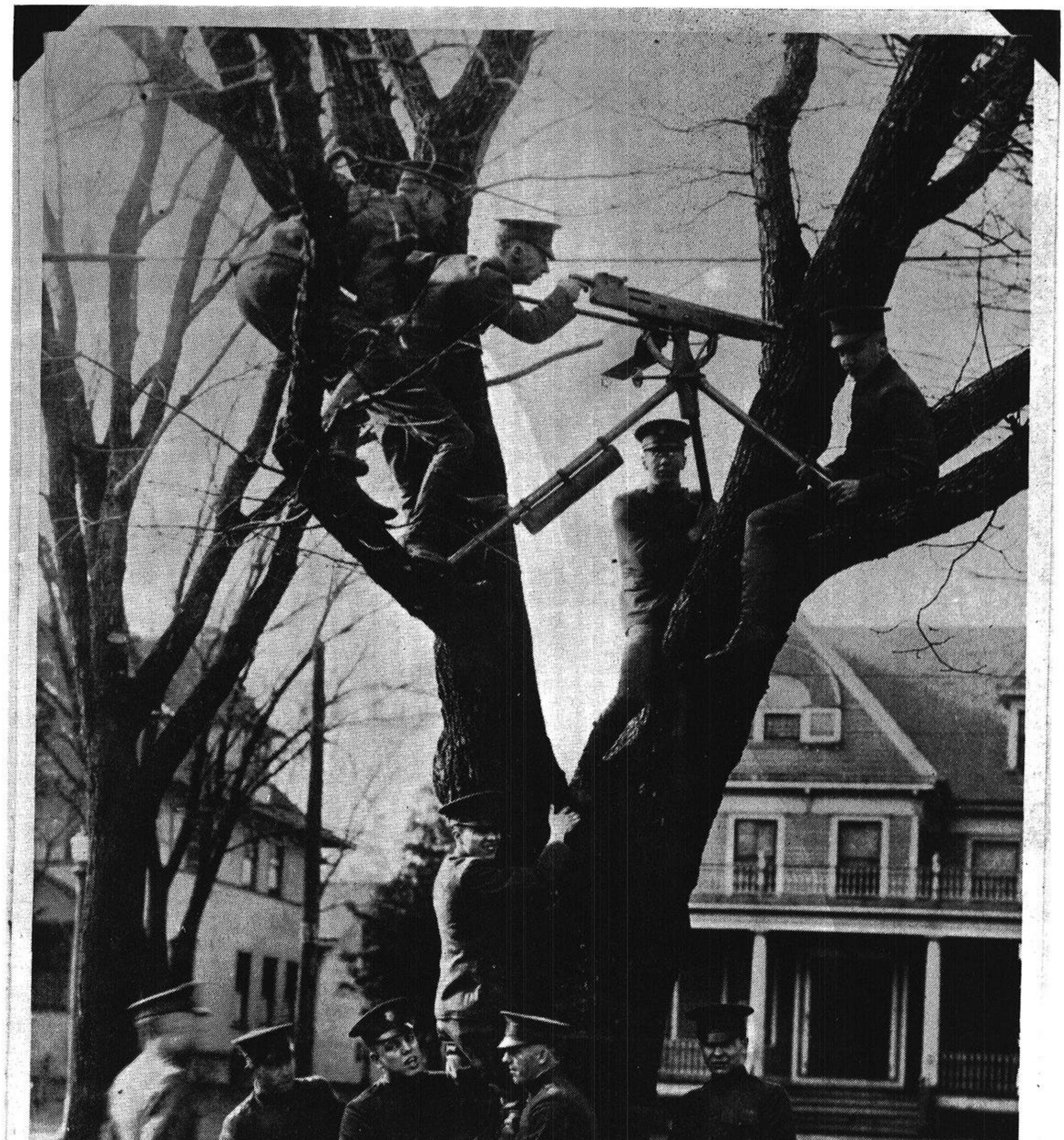
MAIN PLANT HEADQUARTERS: CHULA VISTA, CALIF.; PLANT: RIVERSIDE, CALIF.; ASSEMBLY PLANTS: WINDER, GA.; AUBURN, WASH.

ROHR CORPORATION


Sandia is diversity in depth.

wisconsin's album

PICTORIAL:



BEARD at two o'clock!

. . . in Chemical Engineering . . . Electrical Engineering
. . . Mechanical Engineering . . . Ceramic Engineering
. . . Metallurgical Engineering . . . Civil Engineering.

If you will be graduating in 1967 with a degree in any of the fields listed above, let us ask you this:

WOULD YOU BE INTERESTED IN TALKING ABOUT A POSITION WITH A COMPANY . . .

that puts a premium on ideas? (For just one example, we're expanding all our research by building a brand-new research center in Pleasanton, California . . . to open next year.)

that can offer you a chance to do a job on your own and in your own way? (We don't match you to a job description, we tailor the job description to fit you!)

that thinks ahead and thinks young? (What else could have put us in the billion-dollar class in only 20 years . . . with our greatest growth to come? Chances are we're no older than you are!)

IF YOU LIKE THE IDEA, WE'D LIKE TO TALK TO YOU!

See your placement officer to arrange an interview on:

February 9

KAISER
ALUMINUM & CHEMICAL CORPORATION

TEASERS:

Exercise

THE BYRD

B.S. '69

ur Bird

First of all, how many of you were able to determine the two locations in the world where it is possible to walk one mile south, one mile east, and one mile north and arrive at the same place from which you started? The Byrd hopes you did not neglect the North Pole, which is one solution. The other is from any point 2.19 miles north of the South Pole. It will be found that after walking a mile towards the Pole, travelling a mile east will lead you in a circle, the circumference of which is one mile. All that is left is to retrace your steps by walking a mile north to the origin.

* * *

G. R. Pieterzohn was right. That fence around the earth at the equator that was ten feet too long wouldn't hold rabbits for long, since it would be about 19 inches off the ground. Use $C = 2\pi\gamma$ as the formula for the true radius and circumference of the earth. Let $C + E = 2$ $(\gamma + d)$ be the formula applying to "Wild Bill's" fence, when set up. By the second equation $\frac{C}{2\pi} + \frac{E}{2\pi} = \gamma \pm d$. By the first: $\frac{C}{2\pi} = \gamma$. Dropping equals from both sides leaves $\frac{E}{2\pi} = d$. Therefore if $E = 10$ feet, $d = \frac{10}{22}$ or 1.59 feet or about 19 inches.

* * *

A metal bar weighing 40 pounds is to be cut into four pieces so that, equipped with a balance scale, any object weighing an integral number of pounds between one and forty can be weighed. What are the weights of the four pieces into which the bar must be cut?

* * *

Two tourists, travelling on foot, set out from the same place in the same direction. A walks at a uniform rate of 18 miles a day and after nine days he turns back and goes as far as B has travelled in those nine days. A then turns once more and overtakes B in exactly 22½ days from the time they first set out. What is B's rate of speed, assuming it to be uniform.

* * *

Yesterday morning as the Byrd stopped in at a State Street bar and grill at 5 A.M. for breakfast, he noticed two fellow engineers, Abe Jentilson and P. R. Ofholt, sitting at the far end of the bar. As he made his way across the room to join them, a score of whimpering hill students, filled with horror at the sight of three engineers in the same room with them, picked up their poached eggs and yogurt in their withered hands, and fled into the street. The Byrd ordered his usual breakfast, four fingers of bourbon, and greeted his friends; whereupon he was presented with a problem.

It seems that Jentilson and Ofholt had invested some money in a small grove of box elder trees and were now having some trouble among themselves. Abe Jentilson, who, by the way, was once a forester, planted the 25 box elders as shown:

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At first P. R. Ofholt agreed to water and care for them. But now Jentilson and Ofholt had agreed to divide them as follows: Jentilson would have 8 trees; P. R. would have 5; and they would use 12 trees as a refuge for homeless box elder bugs. This would have been easy enough but P. R. Ofholt wanted his five trees in the shape of a perfect cross, so that he could pretend they were a set of coordinate axes and run up and down them while doing velocity and acceleration problems. (P. R. is a bit eccentric.) He also demanded that a fence be placed completely around his trees and the fence not touch any of his five box elders. Abe Jentilson, of course, didn't want the fence touching any of his eight trees, either. It looked like a knotty problem but the Byrd solved it with ease. Can you?

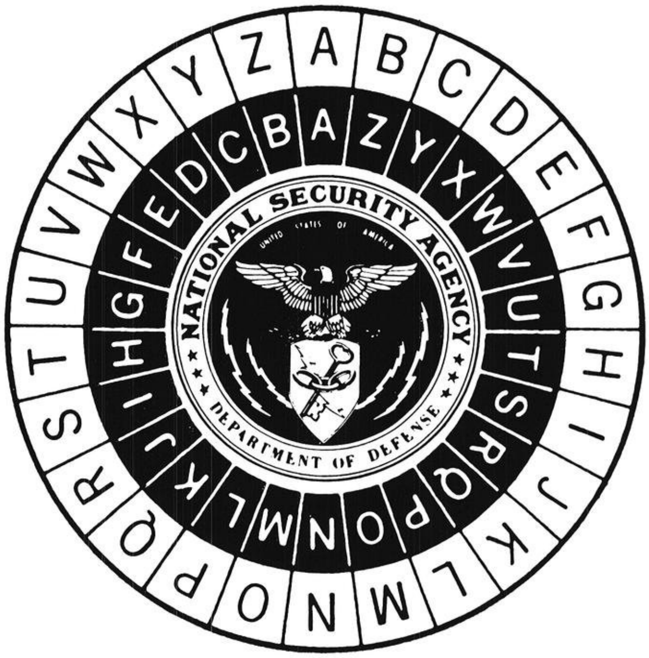
* * *

Well, the Big Break has come and gone. For those of you who have managed to survive, the Byrd presents some problems to see if you are worthy of this great school. (?)

Engineers

Go Beyond Technical Frontiers

. . . at nsa



The "Cipher Disk" . . . NSA symbol and one of the oldest and most effective cryptographic devices known.

In all that the National Security Agency does, there is seldom any precedent. For only NSA creates "secure" communications systems and equipment on so broad a scale.

A major research arm within the defense establishment, there is no other organization like it . . . no other organization doing the same important work, or offering the same wealth of opportunity for imaginative graduates in the engineering sciences.

An agency of national prominence, NSA has a critical requirement for engineers to carry out basic and applied research, design, development, testing and evaluation on large-scale crypto communications and EDP systems. You may also participate in related studies of electromagnetic propagation, upper atmosphere phenomena, super-conductivity and cryogenics using the latest equipment for advanced research within NSA's fully instrumented laboratories.

Career programs are designed to develop the professional engineer's fullest capabilities in research or technical management, depending on individual talents and interests.

NSA employees enjoy the benefits of Federal employment without the necessity of Civil Service certification. *The Agency's generous graduate study program permits you to pursue two semesters of full-time graduate study at full salary with academic costs borne by NSA.* Participation in professional associations is also encouraged, and NSA assists you to attend national meetings, seminars and conferences.

Located between Washington and Baltimore, NSA is also near the Chesapeake Bay, ocean beaches and other summer and winter recreation areas. The location permits your choice of city, suburban or country living.

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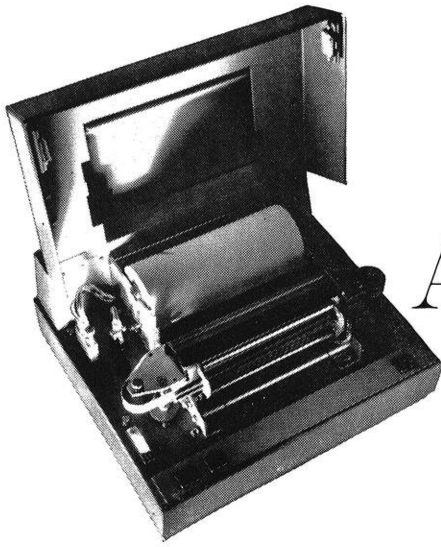
national security agency

. . . where imagination is the essential qualification

CONSUMER PRODUCTS ★ COMMUNICATIONS ★ SEMICONDUCTOR PRODUCTS ★ GOVERNMENT ELECTRONICS ★ AUTOMOTIVE PRODUCTS ★ CONTROL SYSTEMS

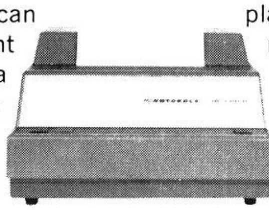


THIS MACHINE CAN DO ABSOLUTELY NOTHING...

ALONE. But plug it into a data processing system . . . and duck!

Motorola calls it a teleprinter—the TP-4000. It can spew out three-and-a-half feet of lettersize copy in just 60 seconds. That's probably as much as 50 secretaries could handle—a neat clip of some 3000 words a minute—or 300 characters **a second.**

The teleprinter hasn't got a brain in its head—but lash it up with a mind — like a computer's core storage memory bank and it can play back data at **real time,** virtually instant recall. For example, it can give you a copy readout of the entire payroll from Denver headquarters while you're running a plant in Vermont. Instantly. Or tell you precisely how much fuel you have, now, in your Texas storage tanks while you're in Albany signing a contract. Airlines can use them, banks, railroads, or even hospitals for just about anything from data retrieval to inventory count and traffic control.



Uncle Sam, too. For a machine with no mind of its own, the mighty teleprinter can immediately verify the computer programmed signal sent to a space craft. And give a visual analysis before the signal has a chance to be executed — an instant check for accuracy. It will be used, for instance, at far flung tracking stations as a precautionary check factor during the Apollo moon mission.

Dumb-Dumb machine? Maybe. Or maybe just lonesome. But once it gets together with a system . . . look out!

TRUST THIS EMBLEM WHEREVER YOU FIND IT

MOTOROLA

INDEX OF ADVERTISERS

If you still think glass is just glass,

ask New York Central.

Now tiny glass devices can do what complex electromechanical systems can't. Control the power of a locomotive without the use of moving parts. And without breakdowns due to short circuits, wear, heat deterioration and shock. Ask New York Central.

These devices channel a small volume of fluid (air, gas or liquid) under low pressure so that it activates a much more powerful jet of fluid. This in turn helps control the massive equipment which regulates the locomotive's speed and power.

Fluid devices are finding increasing use as machine and process controls and in computer logic sections. Corning produces fluidic devices from its unique FOTOCERAM® photosensitive glass-ceramic, which allows extremely accurate chemical machining.

Today, glass can be made six times stronger than steel. Or as soft as silk. It can bend or not bend. Break or not break. Melt or not melt. It can be molded, cast, machined, drawn and pressed. It possesses more capabilities than any other material.

For solutions to their materials problems, industry and government are coming to Corning. Because Corning is *the* glassmaster. It's a broad, international company, with one of the most daring, expert and imaginative research and engineering staffs in the world. Plus a marketing principle that commits them to developing products only in areas where a need exists and no product does.

Young engineers seeking challenge, opportunity and advancement are invited to write to Career Development Manager, Corning Glass Works, Corning, New York.

CORNING
CORNING GLASS WORKS
AN EQUAL-OPPORTUNITY EMPLOYER

HUMOR:

FILEABLES CONTINUED . . .

The National Bureau of Standards, which scientifically analyzes everything it gets its hands on, has just composed a tonge-in-cheek reference file card on woman:

Symbol: Wo. Atomic weight: 120. Occurrences: Found wherever a man is found, seldom in a free state.

Physical properties: Generally rounded in form. Boils at nothing and may freeze at any minute. Melts when treated properly. Very bitter if not used well.

Chemical properties: Very active. Possesses great affinity for gold, silver, platinum, and precious stones. Violent reactions when left alone. Able to absorb great amounts of food. Turns green when placed beside a better-looking specimen. Ages rapidly.

Uses: Highly ornamental. Useful as a tonic in acceleration of low spirits, etc. Equalizes the distribution of wealth. Is probably the most powerful income-reducing agent known.

Caution: Highly explosive when in inexperienced hands.

* * *

Hungry tourist: "Boy, am I hungry! What do you have to eat?"

Waitress: "How about today's special—broiled cow's tongue?"

Tourist: "I'll be damned if I'm going to eat anything out of a dirty old cow's mouth—just give me a couple eggs over easy."

* * *

Freshman: "Why do janitors wear uniforms?"

Senior: "So we can tell them from the administration."

Then there was the ill-humored civil engineer who always built crossroads.

* * *

An engineer is a person who measures with a micrometer, marks with a piece of chalk, and cuts with a dull ax.

* * *

The teacher was quizzing the class.

"Now who can tell me who gave us our nice schoolhouse?"

"President Johnson, teacher."

"That's right, Tommy. Who knows who gave us our beautiful parks?"

"President Johnson, teacher."

"That's right, Mary. And who gave us the birds and the bees and the flowers and the trees.

"God did, teacher."

Voice from the back of the room. "Throw that Republican out of here."

* * *

"So you want to be a lifeguard here, eh? How tall are you?"

"Six feet, eight inches, sir."

"Can you swim?"

"No, but I can wade to beat hell."

* * *

Student Nurse: "Isn't it funny that the length of a man's arm is just equal to the circumference of a girl's waist?"

E.E.: "Let's get a piece of string and find out."

There once was a man named Round
While cutting his lawn he drowned.
'Twas dark and he fell down the shaft of a well.
Couldn't tell his grass from a hole in the ground!

* * *

Employer: "Look here, what did you mean by telling me you had five years' experience when you've never had a job before?"

Young man: "Well, you advertised for a man with imagination, didn't you?"

* * *

Three little children were sitting around talking one day about the most ferocious animals in the whole world. The first said "the most ferocious animal in the world is the alligator because he can bite you to little pieces." The second said "The hippo is the most ferocious animal in the world because he can mash you into little pieces." The third was the smartest of the bunch and he said, "No, you are both wrong, the meanest animal in the world is the hippigator because he has an alligator head on one end that can bite you into little pieces and a hippo head on the other end that can mash you into little pieces." The second then thought for a minute and asked, "If he has heads on both ends, how does he go to the bathroom?" To this the third answered, "He doesn't, that's why he is so mean."

M.E. Student to Prof.: "Doctor, are you performing some important calculations with that slide rule?"

Prof.: "No, I'm killing flies with it."

M.E.: "But doesn't that effect its accuracy?"

Prof.: "No, I've already killed 20 flies with it and it kills just as well as when I started."

* * *

It was while they were crushed together in a passionate embrace that Harry decided the psychological moment was at hand to tell Marge.

"Honey," he whispered, "I want you to know that I think you're a wonderful person, and that I certainly appreciate your—uh—company, but as far as I'm concerned, wedlock is nowhere."

In reply, Marge uttered only a small sigh of pleasure.

"I mean," Harry went on doggedly, "you're more like a sister to me."

At that, Marge's lovely eyes opened, and her lips parted in surprise.

"My God," she murmured, "what a home life you must have!"

* * *

We'd have less trouble in this country if the Indians had had stricter immigration laws.

* * *

Barber: "Haven't I shaved you before, sir?"

Sailor: "No, I got that scar in World War II."

* * *

Let's hear it for the engineers who build bridges and for the girls who come across.

* * *

A drunk fell on his pocket flask and smashed it, naturally lacerating his rear end. Upon arriving home, he was afraid to awaken his wife, so he procured band-aids and mirror and proceeded to apply first aid. Came dawn, and his wife shook him and shouted: "Were you drunk last night?"

"Why, no!" reassured her soggy spouse.

"Oh, yeah?" yelled the wife. "Then what are the band-aids doing on the mirror?"

DEFINITIONS

Bridge game: One place where a wife is always eager to do her husband's bidding.

Conference: A meeting of the bored.

Golf: A long walk punctuated with disappointments.

Happiness: Good health and a poor memory.

Kiss: What the child gets free, the young man steals, and the old man buys.

Pessimist: A person who looks both ways before crossing a one-way street.

Optimist: A person who tells you to cheer up when things are going his way.

Politician: One who shakes your hand before election and your confidence after.

Small business: A business that never has been investigated by a congressional committee.

Stork: The bird that gets all the blame and none of the fun.

Voluptuous woman: One who has curves in places where some girls don't even have places.

* * *

You haven't had a real hangover until you can't stand the noise made by Bromo Seltzer.

* * *

A drunk got into a cab outside Howie's Restaurant and said to the driver, "Take me to Howie's."

The disgusted hackie opened the door and yelled to the lush, "Buddy, you're in front of the place."

The guy looked at the club, turned to the driver and screamed, "Okay, but next time, don't drive so fast!"

* * *

Maybe if we young people can holler loud enough at the graft and corruption in the world today, there might be some left when we take over.

* * *

One lecturer on this campus is so boring that last month two empty seats got up and walked out.

Real estate man: "Now here's a house without a flaw."

Southern belle: "Reahlly? What do you-all walk on?"

* * *

E.E.: "Who spilled the mustard on my waffle?"

Wife: "Oh John! How could you? This is lemon pie."

* * *

The boy was like any boy. He liked to do his share of the pranks on Halloween. During their rounds, he and his friends turned over a small house in his back yard. The house was the kind having a crescent-moon-shaped opening on the door.

The next morning the boy's father was furious over what had happened the night before. The following conversation ensued:

Father: "I just wish that I knew who turned the house over last night."

Son: "I cannot tell a lie, Father. I did it."

Son (after a very painful trip to the woodshed): "Father, you shouldn't have whipped me. George Washington was truthful when he cut down the cherry tree, and his father didn't punish him."

Father: "Yes, but George Washington's father wasn't in the cherry tree."

* * *

"You say that I am the first model you ever kissed?"

"Yes."

"And how many models have you had before me?"

"Four: An apple, two oranges, and a vase of flowers."

* * *

Overheard in EE lab: Take hold of that wire."

"This one? Okay?"

"Feel anything?"

"Nope."

"Then don't touch the other one. It's carrying 5,000 volts."