Wisconsin engineer. Volume 83, No. 1 Fall 1978

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

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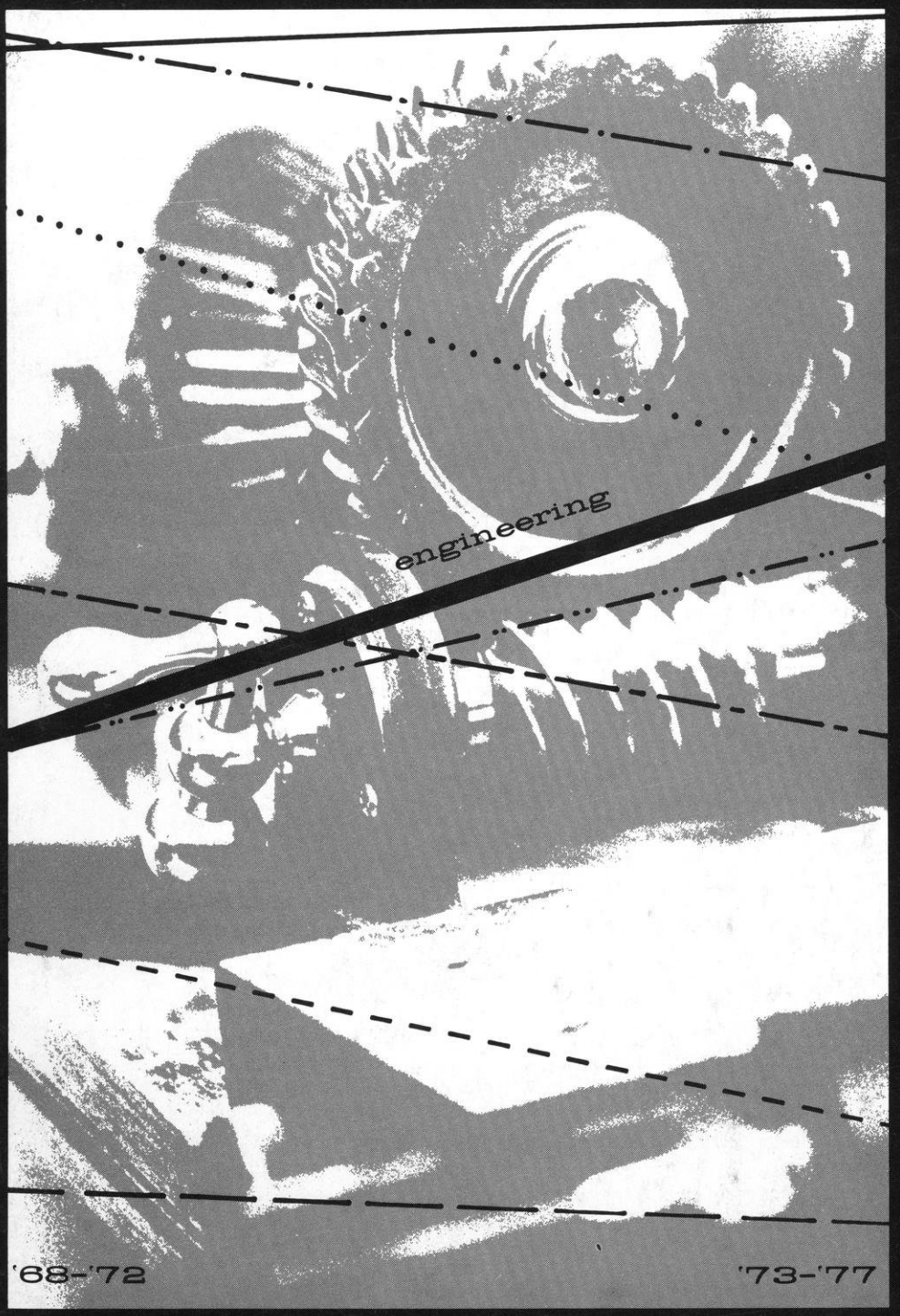
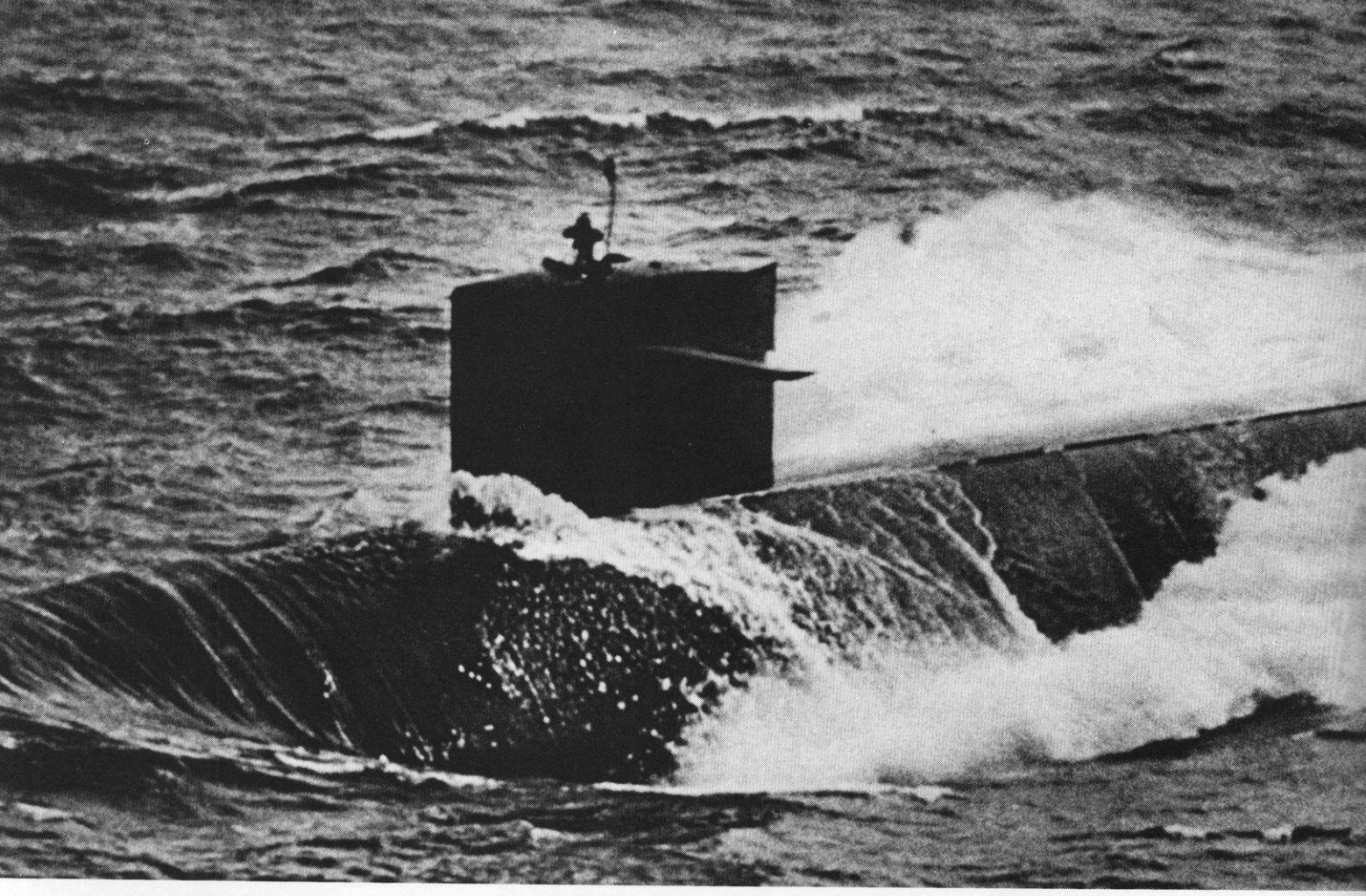
Volume 83, No. 1 Fall 1978

wisconsin engineer



engineers in business- on the rise



HERE'S ONE ENGINEERING OPPORTUNITY YOU WON'T GET IN PRIVATE INDUSTRY.

If you're thinking about a technical position after graduation, think about this.

How many companies can offer you a nuclear submarine to operate? The answer is none. Equipment like this is available only in one place – the Navy.

The Navy operates over half the nuclear reactors in America. So our training is the broadest and most comprehensive. We start by giving you a year of advanced technical education. In graduate school, this would cost you thousands, but in the Navy, we pay you.

Once you're a commissioned Nuclear Propulsion Officer, you'll earn a top salary. Over $24,000 a year after four years. And you'll be responsible for some of the most advanced equipment developed by man.

The Navy also has other opportunities in surface ships and aviation assignments. If you are majoring in engineering, math or the physical sciences, contact your placement office to find out when a Navy representative will be on campus. Or send your resume to: Navy Officer Programs, Code 312-B530, 4015 Wilson Blvd., Arlington, VA 22203.

The Navy. When it comes to nuclear training, no one can give you a better start.

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STEP INTO OUR FUTURE

Our future is now.

NCR means complete computer systems . . . Total systems designed to meet the ever-increasing data processing needs of today's world. We are involved in new and complex ideas. Innovative technologies, such as migration path engineering and distributed network architecture, have made NCR a leader in our field.

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At NCR we are dedicated to the kind of technical excellence that has made us a leader, and to the bold innovative thinking that will move us even further ahead in the future.

If you like this kind of work environment and believe you can contribute, let us hear from you. We are seeking men and women who can become the future leaders of our company.

Plan for your future . . . Step into ours.

William H. vonReichbauer, Corporate College Relations, Dept. K-34, NCR Corporation, Dayton, Ohio 45479

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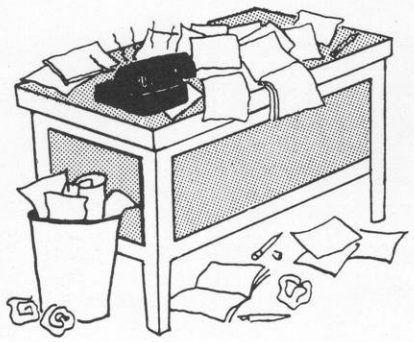
from the desk of the editor



Now that we are halfway through the fall semester, let's re-evaluate our goals.

Our educational goal is the major concern. But let's not forget all that education entails. It is more than merely books and classes. It is people, involvements, and real-life situations.

Let's keep up with those real-life situations.

And one of those is communication and awareness.

The *Wisconsin Engineer* is the only communication device published solely for you, the engineering student at the University of Wisconsin–Madison. As a matter of fact, *WE* are you.

So why not become involved with the *Wisconsin Engineer?* You don't have to be a writer to work on the staff. Positions are available for those of you interested in photography, artwork, business, layout, circulation, and much else. The only qualification is an interest.

If you don't like what we offer and what we consist of, offer suggestions for change. You can become a vital part of our 19-member team if you just possess a desire to help.

Those of you who don't have time because of other activities might want to suggest story ideas or other current matters happening on the College of Engineering campus. If there's something interesting happening in your department, in your group, let us know.

For *WE* represent you.

business cents

As the new Business Manager of the Wisconsin Engineer, I'd like to explain how the business end of the magazine operates.

Like everything else in the world, the *Wisconsin Engineer* needs money to survive and remain a high quality magazine. Our major expenses are printing, photography, postage, and office supplies. Our income consists of advertising, subscriptions, sales, and some financial support from the Office of the Dean.

To remain in the black, the money from the Dean's office and from advertising must cover the cost of publishing each issue. The money from sales and subscriptions is then available to cover our daily expenses.

By telling you all of this, I hope you realize that these funds are really very important to us. I would especially like to welcome all the new alumni subscribers to our magazine, and thank them for their support.

I hope you enjoy reading our magazine and its way for you to keep in contact with the College of Engineering. If you have any suggestions for improvement or additions to the *Wisconsin Engineer,* please feel free to let us know. We are always open to suggestions.

I would like to say that we have an open advertising policy. If you are interested in placing an ad, please contact Jeff Sokol, our advertising manager at 262-4009, or stop by at our new office in Room 460 Mechanical Engineering.

wisconsin engineer

PUBLISHED BY THE ENGINEERING STUDENTS of the UNIVERSITY OF WISCONSIN-MADISON Fall 1978

FEATURES

COLUMNS

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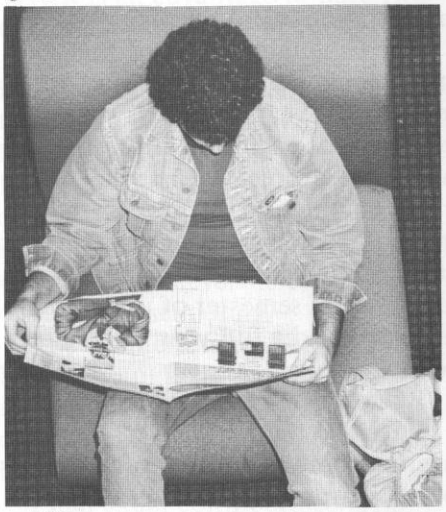

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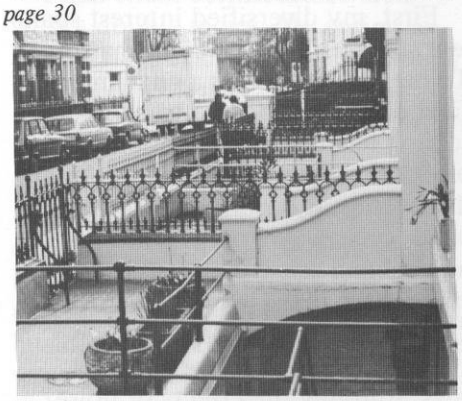

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Charter Member of Engineering College Magazines Associated. Chairman: John W. Marshall, University of Southern California, Los Angeles, CA 90007.

Publishers Representatives: Littel-Murray-Barnhill, Inc., 1328 Broadway, New York, NY, 10001 and 221 N. LaSalle St., Chicago, IL 60601.

Published five times a year: Oct., Dec., Feb., April, June by the Wisconsin Engineering Journal Assn. Subscriptions: one year—$2.00.

student follows business-engineering route

"It Allows Diversity"

by Jeff Sokol

Over 60 percent of all engineers end up in management positions, according to some industrial managers. More engineers than ever before are rising to become chief executive officers of major companies.

To ease the transition between engineering and management and to qualify for such positions, some engineering students are working towards a Masters of Business Administration (MBA) degree.

The Graduate School of Business, along with the College of Engineering have developed a special program for engineers interested in a business degree.

By completing the proper undergraduate electives, an engineering student can earn an MBA in as little as one extra semester of undergraduate study and a full year of graduate school.

But why two degrees?

I decided on the Business/Engineering combined major for a number of reasons.

First, my diversified interest span lent itself well to the combination. To me, engineering is a challenging field offering exposure to problem-solving techniques, new applications of existing processes, and continual discoveries. Business, on the other hand, gets away from the mathematical and scientific models and stresses the management-oriented, "people end" of an organization.

I look at memorizing contract laws, studying the effects of noise on employee production, and filling out balance sheets as a welcome break and interesting adjunct to engineering problem-solving.

My experiences as a cooperative education, mechanical engineer also influenced my double major decision. I obtained a first-hand "taste"

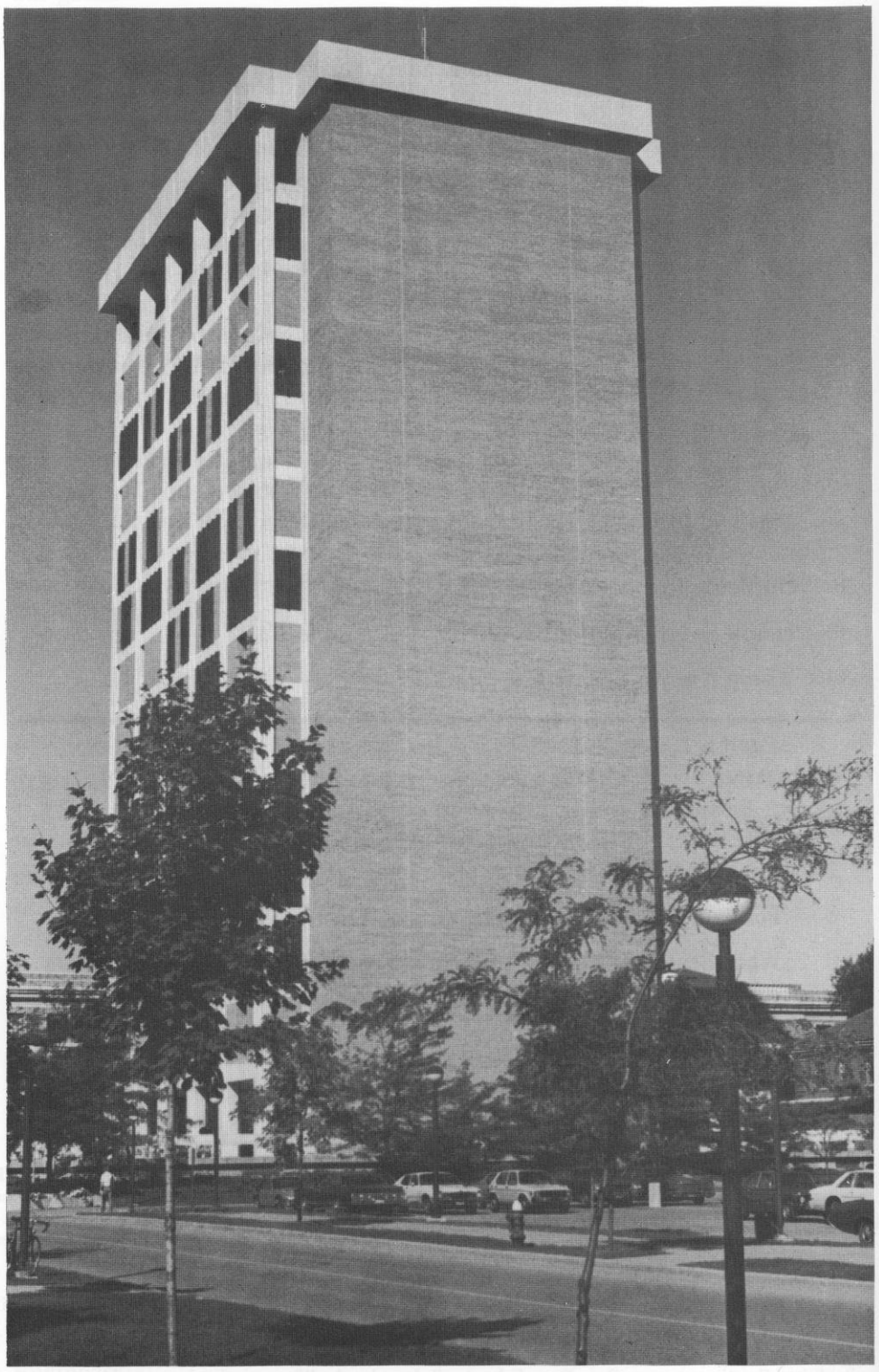


photo by Dennis Hilgendorf

of an engineer's day, his duties and responsibilities while at Snap-On Tools, Kenosha, for two summers.

I enjoyed many aspects of the engineering position. Yet, others seemed rather tedious. I could manage brief stays at the drawing board, but my mind began to wander after a sustained period of time.

While looking for the co-op position, I talked to numerous employers who were interested in business administration candidates with an engineering background. This, and some of the publicity the double major had merited in the last few years also influenced my choice.

Time magazine recently ran a feature story about combining the two backgrounds. They emphasized that the current trend for industrial concerns is to appeal to their "logically thinking" engineering departments when looking to fill executive positions. And statistics indicate that the number of engineers in these positions has risen in the last few years.

Currently, many practicing engineers attend night school to fulfill the requirements for the MBA. I found it more advantageous to combine the two curricula. This procedure carries both advantages and disadvantages.

The advantages are varied.

The combination of classes keeps me fresh while studying. It does not allow too much of one thing, be it applying Newton's principles or memorizing contract laws. As a result, my mind does not have a tendency to go stale.

In addition, my two degrees should take me into many different facets of organizations. I could qualify for jobs ranging from department manager to research engineer. I could virtually change my occupation every few years if I so desired.

The promotion potential also increases for candidates with the double background. Organizations generally carry more engineers than they do supervisors. This limits the promotion possibilities. And an employee with an engineering background alone may be kept in the technical end of the organization. Supervisory jobs, however, are available in different areas.

In addition, when a company hires an employee with two degrees, they generally are aware of his or her potential in the organization. Of course, a great deal depends on the individuals hired, their motivation, and how well they adapt to the company. But when promotion time comes, I believe it is an advantage to have two degrees in your back pocket.

The major disadvantage with the Business/Engineering combination is the length of time it takes to obtain both degrees. You can receive a Bachelor of Science in Engineering and an MBA with 188 credits. This is not excessively long for two degrees, but it's nevertheless six years of full-time schooling.

The frequent hikes between the business buildings and the engineering campus also might prove to be a disadvantage. A bicycle comes in handy.

Final exam conflicts also arise with a double major. My spring semester final exam schedule included four days with no exam, three exams within eight hours, another two days with no exams, and two more exams within four hours.

Times have changed since the days when engineers thought that those who couldn't make it in engineering became business majors, and business majors thought all engineers wore short pants, white socks and a slide rule.

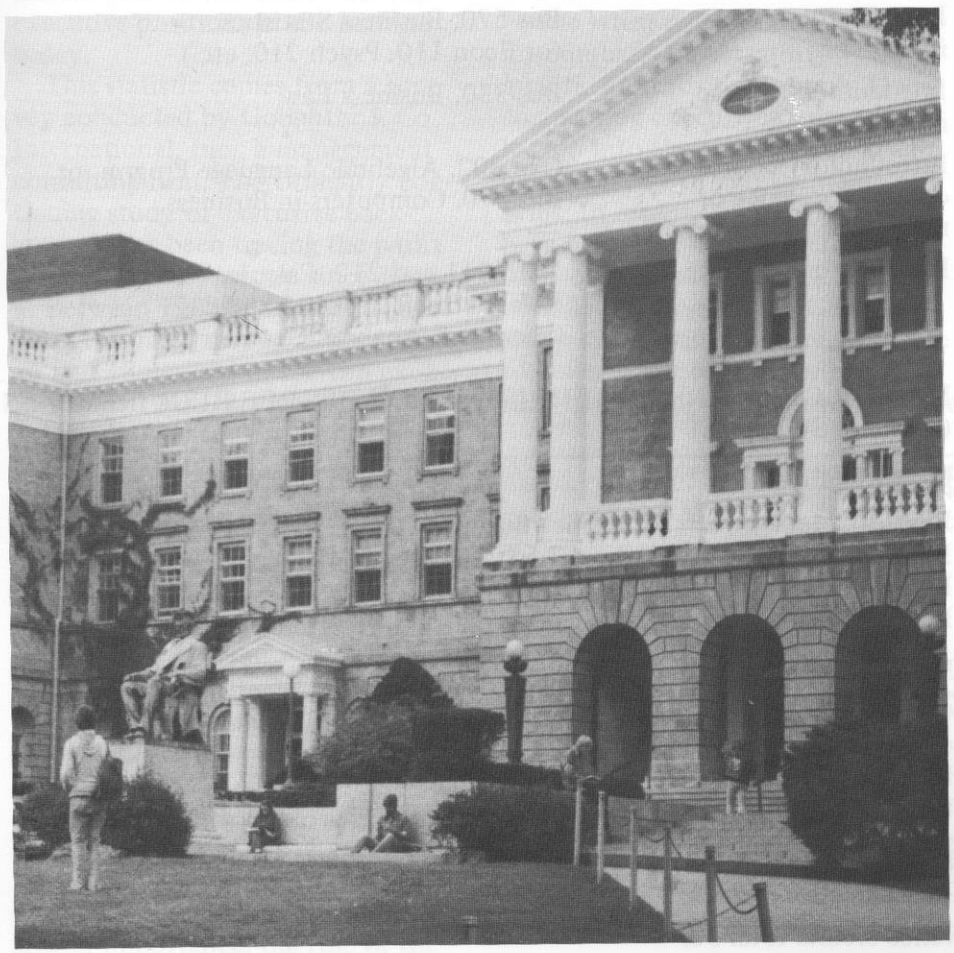


photo by Tony Dalnodar

–Jeff Sokol is a senior in Mechanical Engineering. Upon graduation, he plans to continue his pursuit of the Masters of Business Administration (MBA) degree. He hopes to pursue a career incorporating both fields.

Business & Engineering--
How to Combine Them

by Tom Locante

"An ideal type of educational experience" is the way Dean Blakely of the School of Business describes the combination of the engineering background with the Masters of Business Administration (MBA).

This background is helpful for those engineers who aspire to become part of the management phase of a business organization. Since an increasing number of firms are looking toward their engineering departments for management material, many students are taking the incentive and obtaining the background before they look for a job.

Blakely says that he knows of over a dozen students who are now pursuing this combined curriculum. He adds that there may be many more thinking about it or some in the process of taking business courses, but haven't come to the attention of Blakely yet.

Employment opportunities are better for those with the combined background, he said.

An organization that wants someone who can eventually take over a leadership position would probably hire someone who is familiar with what Blakely calls "the fundamental behavior characteristics that good management knows and uses."

Both the College of Engineering and the School of Business are growing, as well. The so-called "Business/Engineering boom" is continuing through the 1978 fall semester here at UW-Madison. Jobs are good for graduates in each of the fields since both fields attract corporate recruiters.

"All students are much more occupation-conscious," said Associate Engineering Dean Frederick Leidel. "They want to know if there is a job waiting for them."

A student wanting to pursue this

FOUNDATION COURSES FOR MBA

Requirement	UW-Madison Undergraduate Course Which Fulfills Requirement
One semester of economic principles	Econ 103, Principles of Macro Econ. or Econ 104, Principles of Micro Econ.
Three semesters of accounting—two principles & one managerial	Bus 200, Principles of Acctg. Bus 201, Principles of Acctg. Bus 502, Managerial Cost Acctg.
Introductory course in business finance	Bus 510, Corporation Finance
Introductory course in marketing	Bus 520, Marketing Management
Introductory course in management	Bus 530, Organizational Behavior
Introductory course in statistics	Bus 570, Business Statistics (or Econ 110, Psych 210, etc.)
Introductory course in business law	Bus 330, Business Law
Introductory course in computer science or management info systems	C.S. 302, Algebraic Language Progrm. or Bus 370, Computers in Business
Introductory calculus	Math 211 and 212, Calculus and Related Subjects, or Math 221 Calculus & Analytic Geometry

MASTER OF BUSINESS ADMINISTRATION DEGREE REQUIREMENTS
(Advance 30 credits)

Core Requirements	Credits
Bus 730, Management Problems—Business	2
Bus 741 or 742 or 777, Advanced Statistics	3
Bus 753, Operations Management	3
Bus 760, Managerial Economics	3

Major Field Requirements

Courses required by major field faculty in order fulfull degree requirements of the area. Any courses in excess of 6 credits taken in a school other than Business must be related to the major field and be counted as part of the 7 to 15 credits in the total 30 credit program.

Electives

The number of elective credits necessary in order that the complete advance credits total 30.

route would, in addition to his engineering requirements, take the "foundation courses" in the business school.

These include a course in economics, three semesters of accounting, introductory courses in finance, marketing, management, business law, computer science, statistics and calculus. This amounts to about 24 credits.

After the foundation courses, the student is required to take 30 more credits to obtain the MBA, according to Blakely.

He emphasized that the sooner a student can get his foundation courses out of the way, the sooner he will get out of graduate school.

On paper, it is possible to complete the requirements for the MBA in one calendar year if all 24 credits of foundation courses are taken on the undergraduate level. The students take 12 credits for two semesters and six credits during summer school. A university rule says that a graduate student may not carry more than 12 credits in one semester.

Accordingly, Dean Blakely offers this advice for engineers thinking of taking the MBA plunge:

"For anyone who wants to be successful in business, an MBA is one of the keys. The earlier in your educational career that you decide that business courses will be helpful to you, and begin taking the courses, the better."

—Tom Locante is a junior in the school of Journalism. He hopes to write for a newspaper in a major market upon graduation. He has been a **Wisconsin Engineer** *staff member for two years. And he is no longer afraid of people wearing calculators on their belts.*

Engineers Become Corporate Leaders

Engineers are in third place, behind financial and marketing executives, with 15 percent of the top executive positions in the nation today.

This statistic comes from a survey conducted by Golightly & Co. International, Inc., a management consulting firm. The Golightly continuing study of executive backgrounds has been tracing the paths to corporate leadership since 1948.

Between 1948 and 1963, engineers remained steady at between 15 and 18 percent of the top executives. In 1968-72, engineering dropped off to nine percent, according to the study.

Within the last five years, engineers steadily rose to the top to achieve third place behind finance and marketing.

The study notes that the rise in importance of engineering is matched by a decline in the percentage of production executives who are achieving the corporation president position.

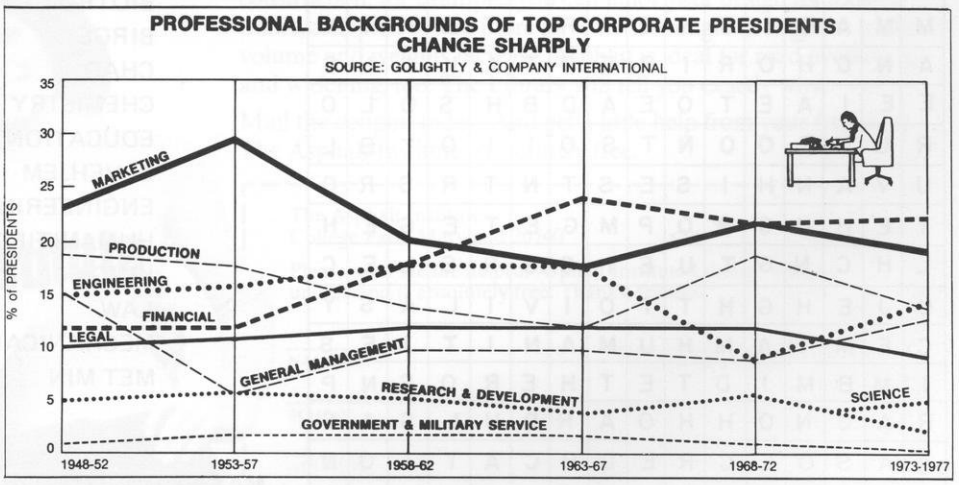
It is believed that this development grows out of the changing nature of the production process in industry. As technology assumes greater importance, the role of the engineer grows. The role of the traditional manufacturing executive declines.

The latest results show the growing emphasis on versatility as a qualification for the top job. Once engineering executives were too locked into their disciplines to acquire mastery of management skills. In recent years engineers have been broadening their range of effectiveness.

Other findings of the Golightly study show that nine percent of the top executives of top companies came from a legal background, while science and R & D accounted for seven percent. Managers from military and government service scored fewer than one percent.

In conducting the study, the Golightly research staff consulted *Standard and Poor's Register of Corporations, Directors and Executives* for the names of chief executives listed in the five-year period for the 100 companies leading the Fortune 500 list. The information was then augmented by direct contact with the chief executives themselves.

Reprinted from *Midwest Engineer*



polygon– Changing to Serve You Better

by Nikki Abramoff

Polygon is an active and vital force on the engineering campus.

We are a student engineering council that exists to serve engineering students.

In the last year, Polygon has undergone some major organizational changes. In an effort to make the council more efficient and more effective, committees were established to assume specialized responsibilities of the council. The new system is working well.

That was only part of the change, though.

In the past, the Polygon Council has consisted of 25 voting members –two delegates from each of the 12 student professional societies in engineering, and a chairman to preside over the meetings. The faculty advisor is Professor Jim Marks, head of Engineering Placement.

To make Polygon a more student-oriented rather than society-oriented organization, 12 new seats have been established on the council. These seats are for at-large, student body delegates.

With the change, six student body delegates will be elected each semester for a period of one year. They will have the same privileges and responsibilities as delegates from the societies. Any engineering student may apply for the position. The only requirement is a desire to serve.

Applications are now being taken.

Once elected to Polygon Council, each delegate serves on a committee, has the power to vote, and takes part in policy making. He or she is also eligible to be a committee chairman or to run for a major office.

In addition, the delegates organize and take charge of all Polygon-sponsored student events. A few of the events Polygon has scheduled for the fall semester are:

–The Polygon Engineering Book Co-op;

–The All-Engineers Fall Picnic; and

–The Fall Awards Banquet.

The Polygon Council exists to serve the engineering student body. If you have any suggestions or questions, please let us know. You can drop us a note in the Polygon mailbox in the Mechanical Engineering Lobby, stop in at the Polygon office, Room 23, General Engineering, or call our president, Joan Nielsen, 238-5373.

We'd appreciate any feedback we get.

We're here to serve you.

–Nikki Abramoff is a senior Metallurgical and Mineral Engineering student. She is vice president of the Polygon Engineering Council.

word search–campus buildings

S	M	U	I	R	O	T	A	T	A	N	S	G	G	O	M
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OGG
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RADIO
SOUTH
STADIUM
STERLING
UNION SOUTH
VAN HISE
VILAS
YMCA

MAY BE HORIZONTAL, VERTICAL, DIAGONAL – FORWARDS OR BACKWARDS. *Ans. on p. 33*

–Composed by Dan Zietlow

wind energy--

More Power For the Future

The ECE Department Wind Energy Conversion Station harnesses wind power and supplements the local AC electrical system.

(by Jeff Sokol)

It's 8 a.m. and the alarm clock rings–the start of another day. You slowly roll out of bed.

Starting towards the window, you note the great day–the sun is shining, windmills are turning briskly, and birds are singing. Too nice to go to classes.

Is this a Madison engineering student in Holland?

No. Both the student and the windmill are right here in Madison.

The windmill, referred to as an aeroturbine system by windpower enthusiasts, overlooks the engineering campus from the top of the 14-story Engineering Research Building. Promising research results indicate that windmills may someday become a small but important part of our total energy picture, dotting rooftops and hillsides across the country.

Why windpower?

"The winds across the United States contain billions of kilowatt-hours of potential energy," says Professor Daniel Reitan.

The electrical and computer engineer is currently investigating the possibilities of harnessing some of that energy. His objective is to study the feasibility of abstracting energy from the wind and converting it into useable electric current that can be fed into electric power lines.

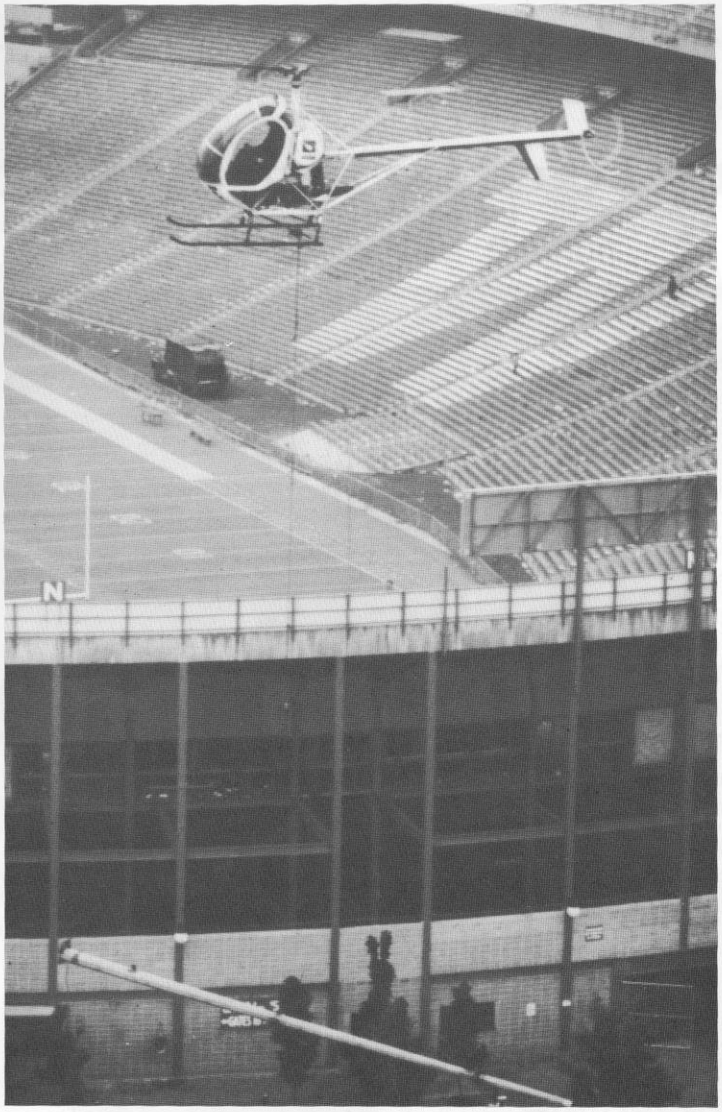
This is accomplished with an aeroturbine system consisting of a variable speed generator, a voltage inverter, and an aerogenerator control panel.

The velocity of the rotating blades in this system is controlled by the speed of the wind. Because of wind speed changes, a variable speed generator is attached to these blades. This generator produces power of different frequencies and must be changed to a constant frequency before being used. A voltage inverter accomplishes this, changing the variable frequency electricity into a constant 60 cycle alternating current.

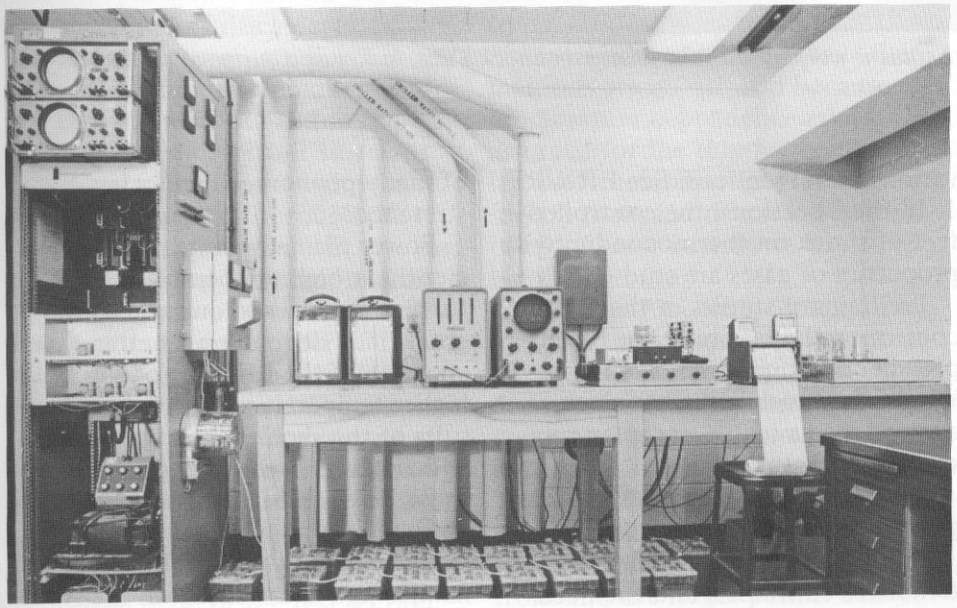
The aerogenerator control panel acts as the brain of the system. It receives the power from the wind generator and decides what to do with it. It can charge the storage battery system, run the system's test equipment, and channel all excess power into Madison Gas and Electric power lines. Thus the system produces 100% of the energy required to run itself.

Another advantage of Reitan's system is its increased efficiency over certain other wind energy systems.

Most systems utilize a wind generator rotating at a constant velocity, determined by an optimal wind speed. The current which is generated is easy to work with because of its constant frequency, but the system is inefficient in utilizing the available wind energy.



A helicopter lifted the aeroturbine system to the top of the Engineering Research Building.



Wind power and weather station instrumentation located inside the Engineering Research Building.

Reitan's system runs at various speeds according to the wind velocity, a more efficient method. The system operates optimally at all wind speeds.

What happens on a nonwindy day?

The storage batteries, charged by the aerogenerator control box with power obtained from the wind generator, are capable of supporting the system during windless periods.

Reitan's Wind Energy Conservation System (WECS) is a result of four years' work. His research is sponsored by the National Science Foundation, and the Wisconsin Power and Light Company. He is assisted by Ken Geisler, who is working toward a Masters degree in Electrical and Computer Engineering.

With proper engineering, Reitan believes that aeroturbines with 200-foot diameter blades (compared to 12-foot blades on his prototype model) are capable of producing up to five megawatts of power. With ten such aeroturbines per square mile and ideal wind conditions, these generators could yield 50 megawatts of power per square mile.

"Wind power could possibly be used in more forms than merely supplementing utilities," he said based on the magnitude of power available.

He believes wind generators could efficiently be used to split sea water into hydrogen and oxygen through electrolysis. Wind energy could be used to obtain hydrogen for fuel on windy days, and the unit could be shut down on mild days. Sea water desalinization and *product manufacture* are two additional areas where wind energy could be applied.

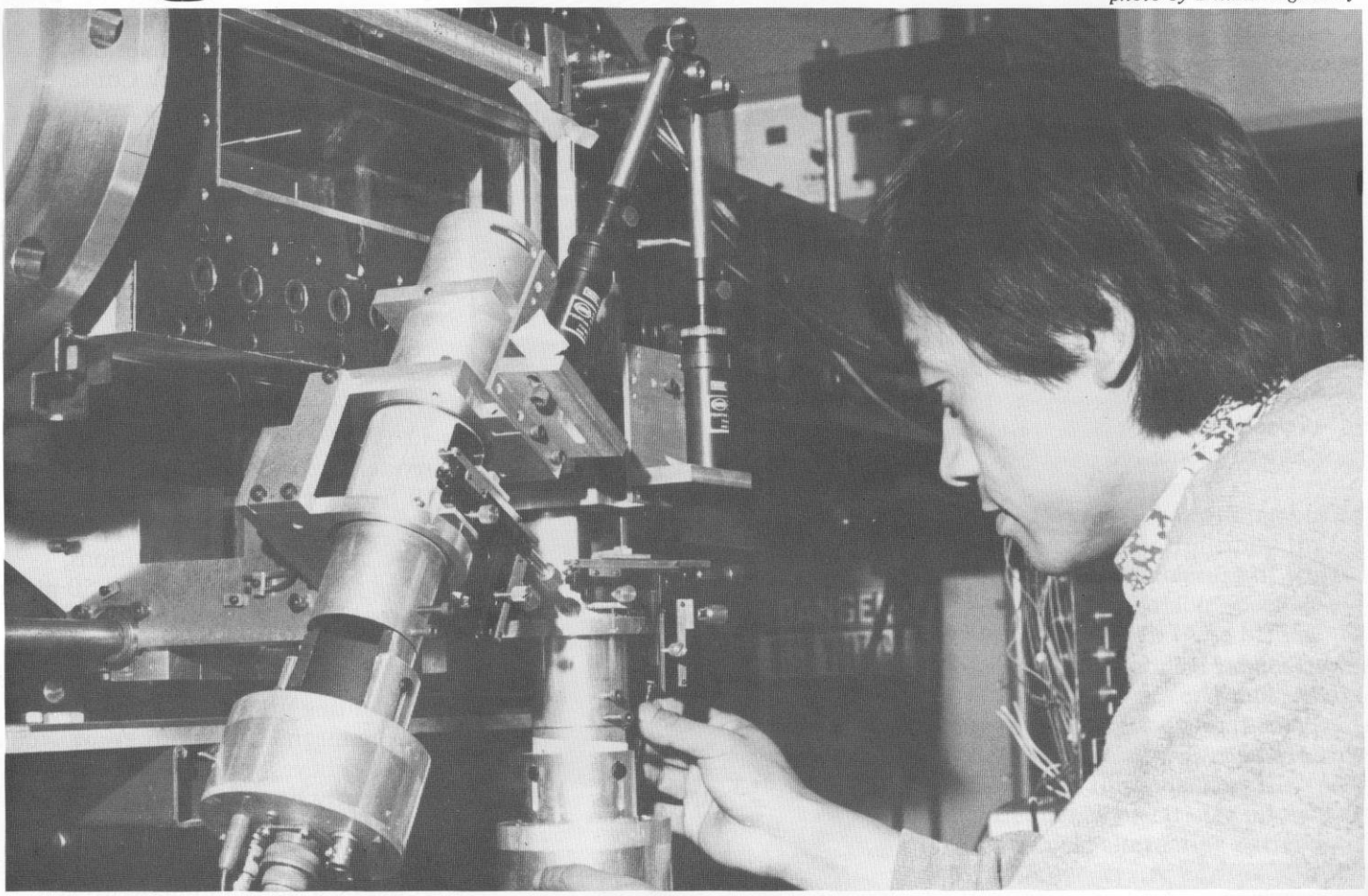
The potential for these ideas is a subject for the future. Although Reitan does not believe wind power will remotely compare with nuclear power, he does feel that the use of the wind may someday account for two percent of the nation's energy.

–Jeff Sokol is a senior in Mechanical Engineering. Upon graduation, he plans to continue his pursuit of the Masters of Business Administration (MBA) degree. He hopes to pursue a career incorporating both fields.

the wisconsin shock tube--

Thermoconductivity Studies Progress

photo by Dennis Hilgendorf



Sang Kwak, a Mechanical Engineering graduate student working with the Wisconsin Shock Tube, makes an adjustment on the Schlieren detection system.

by William Bridgers

The gas dynamics studies being conducted here in the College's Engineering Research Building are an important example of the kind of basic research which forms the foundation of the engineering profession.

Under the direction of mechanical engineering Professor Hugh Powell, studies on the transport properties (thermal conductivity and viscosity) of gases at high temperatures have been carried out since 1968.

Professor Powell conceived a unique method for measuring these properties by utilizing a shock tube.

A shock tube is a 30 foot long experimental apparatus consisting of various metal sections. See FIGURE 1. In these sections, the controlled effect of shock on thermoconductivity properties of gases are studied.

Preliminary studies in the 1960's confirmed the feasibility of the approach envisioned by Powell. The Wisconsin Shock Tube has since evolved into a highly complex research apparatus.

But why study the behavior of gases in the first place?

As the search for new energy alternatives continues, and the need for more efficient utilization of our present energy resources grows, the limits to our current understanding of many phenomena are being stretched.

Power plants operate more efficiently at high temperatures, and further advances in our space programs may depend on a better understanding of the behavior of gases in higher temperature ranges. The results of the shock tube experiments will aid future investigators both in these fields and in other areas not yet imagined.

The current work in the Gas Dynamics Lab has focused on the study of argon. Since argon is a gas for which experimental data is already available, results from the Wisconsin

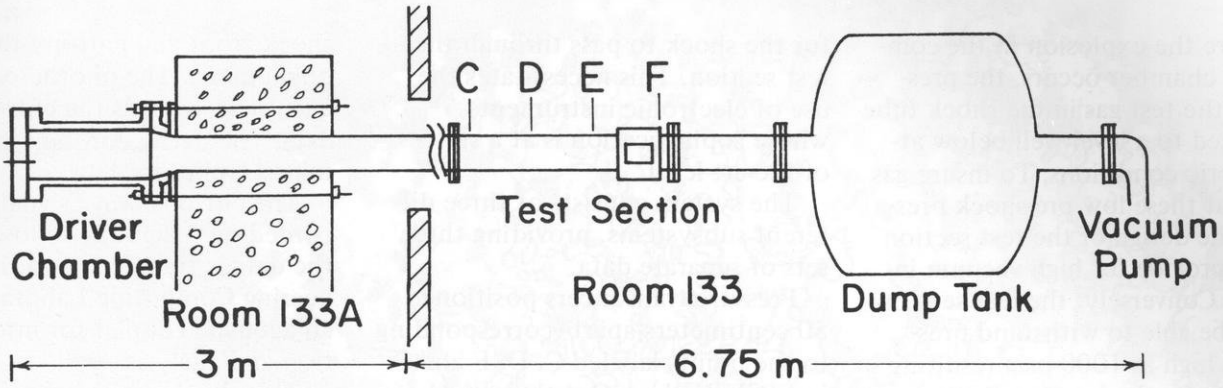


FIGURE 1 **Wisconsin Shock Tube**

Shock Tube method can be compared with the results of other testing methods.

Generating reliable information about the behavior of gases at high temperatures requires some very special equipment, as well as careful thought and preparation in the design of the testing methods.

The fundamental piece of equipment used in the research is the Wisconsin Shock Tube. FIGURE 1 shows a schematic of the apparatus.

The experiment begins with the combustion of a mixture of argon, hydrogen, and oxygen in a driver chamber connected to the shock tube. Initially, this combustion is isolated from the shock tube by a sheet metal diaphragm. When the pressure builds beyond a critical level, this diaphragm ruptures, sending a shock wave down through the low pressure test gas (argon) contained in the test section. This shock front travels at supersonic velocities (ranging from Mach 4 to Mach 12) through the shock tube, compressing the test gas behind it. During this compression, the temperature of the gas rises. Temperatures on the order of 2000 to 7000 K. can be obtained depending on the strength of the shock.

Within the high temperature gas, now traveling at supersonic speeds behind the shock front, perturbations are created by the interaction of the shock wave with small ridges cut into the bottom plate of the test section. These ridges produce "entropy waves" which will travel with the gas behind the shock front.

Through the use of highly sophisticated electric sensing and recording instruments, the decay of these "entropy waves" can be measured. The decay constant is a function of thermal conductivity and other independently measured parameters. Therefore, thermal conductivity values for the high temperature gas can be calculated from this data.

This method for measuring thermophysical properties has one clear advantage over other testing methods. In other experimental setups, the thermal conductivity of the gas is calculated from measurements of the heat transfer between the hot gas and the cold wall which contains the gas. The shock perturbation method just described does not involve such extreme temperature differences.

The results obtained from other methods are questioned because a temperature dependence relation is assumed for the thermal conductivity over a temperature gradient of several thousand degrees. The possibility of error in these results is very high.

With the Wisconsin Shock Tube method, there is no need for a temperature-dependent equation. An independent measurement of thermal conductivity is performed with the gas at a uniform high temperature. The small fluctuations in temperature (less than 50 K.) that result from the interaction of the shock front and the ridges permit a more accurate measurement of the transport properties being studied.

The simplified description of the shock tube experimental procedure belies the many obstacles that were encountered. In moving from the conceptual stage to the actual collection of acceptable data, there were a number of problems that had to be solved.

First, the development of a suitable mode of combustion has to be researched. Detonating a blasting cap in the combustion chamber produced a very violent shock which could not be easily studied or reproduced.

After about a year of investigation, a mode of combustion involving intense light and deep heat was achieved. That study was related to the development of an appropriate diaphragm for the combustion chamber. To allow for a controlled diaphragm rupture, its design had to satisfy several criteria: being thick enough to contain the explosion; having low enough mass to permit a complete and rapid opening; and consisting of a material that would not shatter during the opening, thereby damaging the polished windows and aerodynamic surfaces in the shock dust.

This solution of the combined combustion-diaphragm problem was an important step in the development of the shock tube. It is now possible to produce shock velocities within two percent of their predicted value using the techniques developed during the course of this research.

The design of the shock tube test section was another matter to be explored before actual experiments could begin.

Before the explosion in the combustion chamber occurs, the pressure of the test gas in the shock tube is reduced to a level well below atmospheric conditions. To insure gas purity at these low pre-shock pressures, the design of the test section had to provide for high vacuum integrity. Conversely, the test section had to be able to withstand pressures as high as 1000 psia resulting from the shock. As a result, the manufacture of this component demanded extreme care.

Finally, the most challenging problem presented by the shock perturbation method was the design of an instrumentation system capable of accurately recording the movement of the shock front.

It takes only 250 microseconds for the shock to pass through the test section. This necessitates the use of electronic instruments whose sophistication is at a state-of-the-art level.

The system consists of three different subsystems, providing three sets of separate data.

Pressure transducers positioned 50 centimeters apart (corresponding to the points labeled C, D, E and F in FIGURE 1) detect the arrival of the shock front and measure its speed. The signal from the pressure transducers activates several counters (with a resolution of 0.1 microseconds) in the timing console and serves as a trigger for the other recording devices.

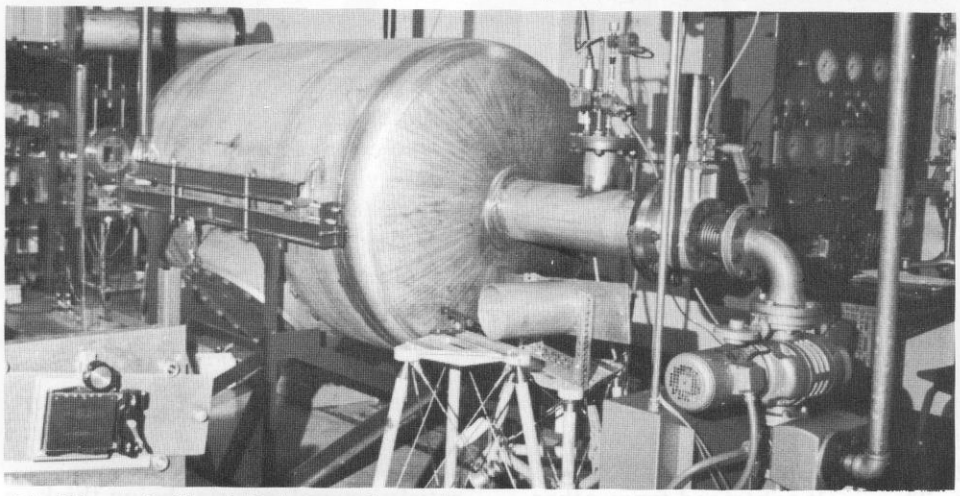
A laser schlieren photography system provides a visual record of the shock front and entropy-related phenomena. The photodiode schlieren system records the entropy wave data. The decay constant is obtained from this data.

The entropy wave signal is recorded on a digital oscilloscope and the data is transferred to the Engineering Computing Laboratory via an acoustic coupler for interpretation and analysis.

This shock perturbation method has proven to be a reliable means of obtaining information about the thermal conductivity of gases at high temperatures. The Wisconsin Shock Tube research has been the subject of three Master's theses and two doctoral works.

A. C. Chu's Ph.D. thesis demonstrated the feasibility of measuring thermal conductivity values from the decay of "entropy waves" behind a perturbed shock front. A second doctoral thesis completed in the spring, 1978, semester by Antonio Cavero provides the first concrete results of the shock perturbation method for measuring the thermal conductivity of argon at high temperatures. Using this as a base, further work in the analysis of more complicated gases such as oxygen, nitrogen and air may now proceed. Along with the dissertation of Kiyoung Chung on the viscosity of gases at high temperatures, which will be finished sometime this year, this research will constitute an important contribution to our understanding of the properties of gases.

The Wisconsin Shock Tube research adds to our understanding of the Kinetic Molecular Theory of Gases, yielding quantitative measure of thermal conductivity and viscosity in a temperature region for which theory is the only guide at present.

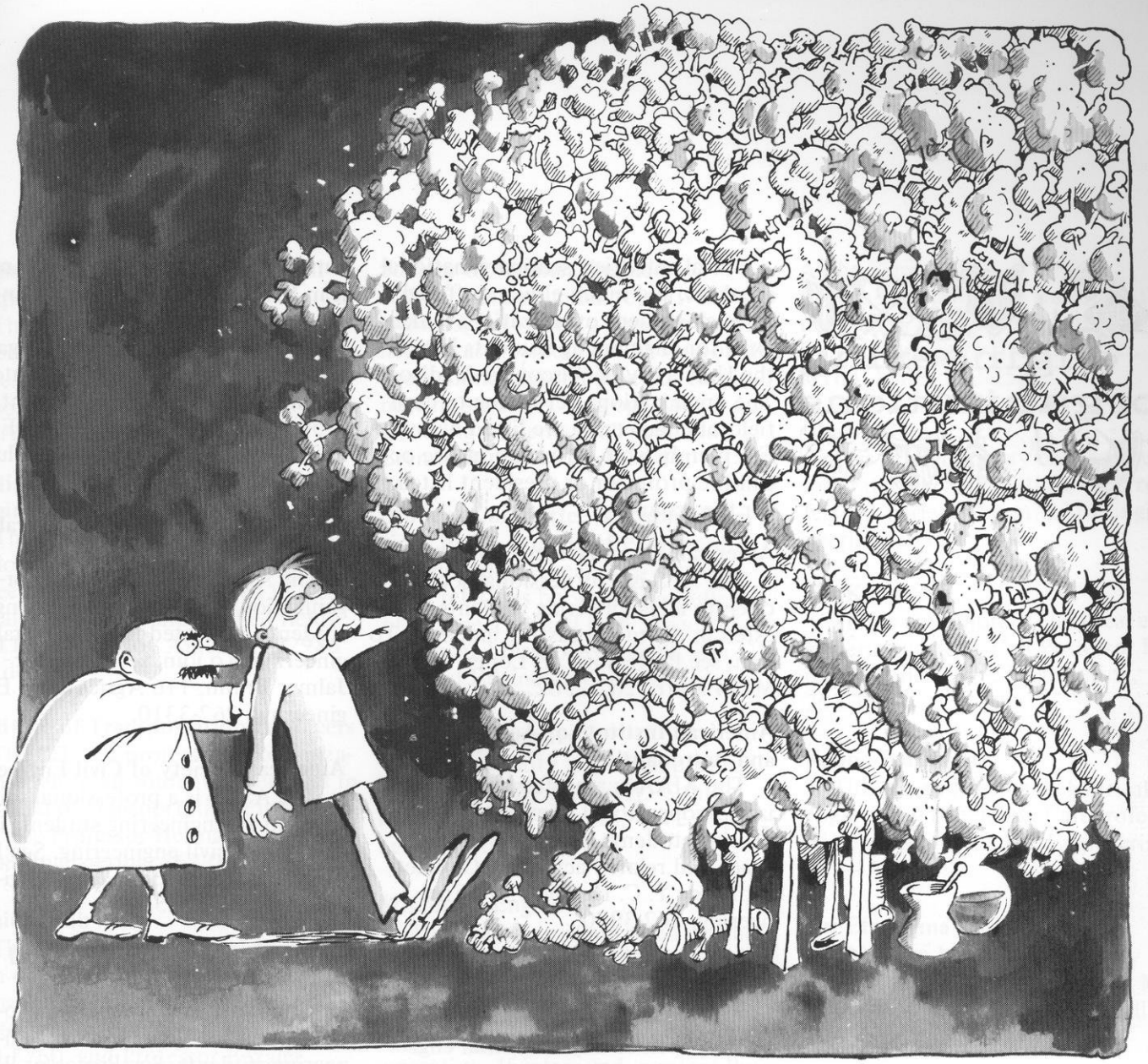


The Wisconsin Shock Tube experimental set-up.

photos by Dennis Hilgendorf

Professor Powell and Sang Kwak examine the cast concrete driver chamber. Hard hats are standard equipment when working with the forces of several hundred tons necessary to produce the shock waves.

—Bill Bridgers could not think of a simple way to summarize his life in two sentences. It is known, however, that after a varied college career, countless menial jobs, and travel on four continents, he is nearing completion of a Mechanical Engineering degree.



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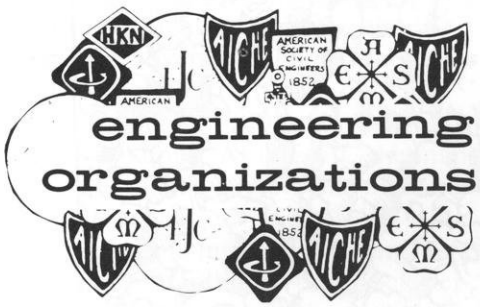


Social activities, seminars, national speakers, and much else are offered through student organizations which exist for engineering students here at the University of Wisconsin–Madison. The organizations pertaining to each field of engineering are listed below. For membership information, see or call the professor or president listed for the group.

American Foundrymen's Society

The AFS is a professional society open to all engineering students interested in the metal casting industry. To join, see Professor Carl Loper, Jr., M164 MME, 262-2562.

American Institute of Aeronautics and Astronautics

The AIAA is a professional organization open to all science and engineering students interested in aerospace and related activities. Contact Professor T. C. Huang, 3350 Engineering, 262-3990.

American Institute of Industrial Engineers

The AIIE is a professional organization open to any industrial enginering student. For details on membership, contact Professor Gordon Robinson, 455 Mechanical Engineering, 262-3768.

American Institute of Chemical Engineers

The AIChE is a professional organization open to any chemical engineering student. Contact Professor James Koutsky, 3016 Engineering, 262-1140.

American Nuclear Society

The ANS is a professional society open to all engineering and science students interested in nuclear energy and nuclear engineering. See Professor Gregory Moses, 433 ERB, 263-3368.

American Society for Metals–American Institute of Metallurgical Engineers

The ASM is a professional organization open to any undergraduate metallurgical engineering student. See Professor Frank Worzala, 1103 ERB, 263-2197, or Professor James Clum, 232 MME, 262-2562.

American Society of Agricultural Engineers

The ASAE is a professional organization open to all engineering students interested in agricultural engineering. To join, see Professor Jalmer Bruhn, 116 Agricultural Engineering, 262-3310.

American Society of Civil Engineers

The ASCE is a professional society open to all engineering students interested in civil engineering. See Professor Tuncer B. Edil, 2318 Engineering, 262-3225.

American Society of Mechanical Engineers

The ASME is a professional society open to all mechanical engineering students. See Professor William Feiereisen, 347 Mechanical Engineering, 262-7888.

Association of International Engineering Students

The AIES seeks to establish/improve communication between U.S. students and international students. It is open to any interested students. See Mrs. Bonnie Kienitz, 737 ERB, 263-4811.

Badger Amateur Radio Society

The BARS is open to students and faculty interested in amateur radio. The station is located in B314 Engineering, 262-1142. For further details, see Professor James Beyer, 3442 Engineering, 262-3890.

Engineers and Scientists for Social Responsibilities

The ESSR has been inactive for several years, but may be revived anytime. If you are interested, see Professor Alwyn C. Scott, 2440 Engineering, 262-3736.

Institute of Electrical and Electronics Engineers

The IEEE is a professional organization open to all undergraduate engineering students interested in electrical engineering and applied fields. Call President Roy Ames, 257-2986 for details.

Institute of Transportation Engineers

The ITE is a professional organization open to all students interested in the field of transportation engineering. See Professor Herman Kuhn, 2208 Engineering, 262-0907.

Mining Club

The MC is a professional organization open to any mineral engineering undergraduate student. Contact Professor Robert Heins, 246 MME, 262-5760, and Professor Bezalel Haimson, 256 MME, 262-2563.

Polygon Board

Polygon is a student engineering council that exists to serve engineering students. It consists of representatives from each of the student societies in the College of Engineering. This semester, student body delegates will also be elected to the council. Contact President Joan Nielsen, 238-5373, or Professor James Marks, 1150 Engineering, 263-3471.

Society of Automotive Engineers

The SAE is open to all engineering students interested in automotive engineering. See Professor Gary Borman, 121 ERB, 263-1616, for details.

Society of Women Engineers

SWE has two main objectives: to encourage women to consider engineering as a career; and to support the professional development of engineering students. It is open to all engineering students. Call President Brenda Bartz at 251-4384 for details.

Student Committee of Public Relations in the College of Engineering

This group is geared to provoke good relations between the College of Engineering and high schools. See Professor Lois B. Greenfield, Rm. 22, General Engineering, 262-3507.

Triangle Fraternity

This fraternity is a social-professional engineering society. Contact Professor John Hoopes, 1212 Engineering, 262-2471.

Wisconsin Engineer

This magazine is operated by and for the engineering students at the university. Any students may become involved in writing, layout, advertising, and other phases of magazine operation. If interested, contact Professor Howard Schwebke, Room 4, General Engineering, 262-2572, or Ann Bitter, 267 Mechanical Engineering, 263-4445.

Women in Engineering

WinE automatically enrolls all women engineering students, and aims to acquaint them with each other and with practicing women engineers. See Professor Lois B. Greenfield, Rm. 22, General Engineering, 262-3507.

Alpha Chi Sigma

The ACS is a professional society of chemical engineers and chemists. Call Professor Worth E. Vaughn, 3327 Chemistry, 262-7924.

Alpha Sigma Mu

This is an honorary fraternity for metallurgical engineering students. Contact Professor Carl R. Loper, Jr., M164, MME, 262-2562.

Chi Epsilon

This is an honorary civil engineering fraternity. For details, call Professor Charles Salmon, 2214 Engineering, 263-3491.

Eta Kappa Nu

This is an honorary electrical engineering society. Call Professor Ferrell Stremler, 2412 Engineering, 262-3840.

Kappa Eta Kappa

This is a professional electrical engineering fraternity. Call Professor Richard Greiner, 2422 Engineering, 262-4337.

Phi Eta Sigma

This is an honorary fraternity for freshmen. For information, call Mr. Roger Howard, 117 Bascom Hall, 263-5700.

Pi Tau Sigma

This is an honorary mechanical engineering fraternity. Contact Professor Bollinger, 240 Mechanical Engineering, 262-3543, for details.

Tau Beta Pi

This engineering honor fraternity covers all branches of engineering. Call Professor Otto Uyehara, 115 ERB, 263-1615 for information.

Theta Tau

This professional engineering fraternity is the only co-ed engineering fraternity at UW–Madison. For information, contact Jim McGeough, 256-6752.

faculty sketch

Gretchen Schoff

photo by Dennis Hilgendorf

by Sue Tyunaitis

A sparkle in her eye and a glimmer in her smile as she speaks of her favorite authors, her family, her teaching experiences, her studies.

You might picture her traversing the sunny slopes of Wales, discussing theology with the author of *Ecology of Faith,* relaxing as she teaches the intricacies of piano playing to her sons.

In an engineering classroom, too, she is quite at home.

One of three female professors in the UW-Madison College of Engineering, Gretchen Schoff has many activities–curricular, extracurricular, and personal.

In the classroom, she divides her time between three departments: General Engineering, Integrated Liberal Studies (ILS), and the Institute for Environmental Studies (IES).

A newcomer to General Engineering, Schoff initiated a new course when she joined the department last year.

"I was interested in strengthening the effect of technical writing and communications in the College of Engineering," she said.

General Engineering 690, Technical Communication, was then born.

She was also responsible for the formation of Industrial Engineering 469, Report Writing for Industrial Design Projects, at the same time.

Other courses she has taught include: ILS 141, 142, Approaches to Knowledge; ILS 244, Contemporary American Problems; Gen. Engr. 121, Technology, Man and Culture; Gen. Engr. 116, Literature and Technology; IES 113, Environmental Studies; and IES 101, Forum on the Environment.

In addition, she has been the associate chairman of the ILS Department since 1975.

Her 20-year teaching experience has been with writing at the high school and college level. As a result, she maintains an understanding expression while discussing the relationship between engineering and writing. And the glimmer doesn't disappear.

"By the time an engineer is a senior, the bulk of his language has consisted of things other than English–chemical symbols, mathematical formulas, and the like."

Although these "non-English" languages may seem to limit an engineer's writing and vocabulary skills, Schoff doesn't believe so.

"The charge that engineers can't write is overdrawn," she says. "An engineer responds to the type of assignment that makes sense to him. And he usually has very good motivation."

She explains that the engineering student generally needs help with structure, organization, and choosing an appropriate level of language.

"The basic distinction between an engineering student and any other student is interest, not ability," she concludes.

During her explanations, you are caught up with her train of thought. Her professional manner, perceptive tone, and pronounced gestures carry with them a dynamic personality. You imagine the pictures she paints with her descriptions. You feel the excitement she conveys.

With double major in Chemistry and English, Schoff obtained her Bachelor of Science degree from UW-Stevens Point in 1952. She then earned her Masters and Ph.D., both in English, from UW-Madison. In addition, she was a theological fellow at the University of Chicago and Lutheran Theological Seminary from 1973 to 1974.

Despite her advanced English background, Schoff is "very comfortable" in the engineering department.

"I find the technical world absolutely fascinating and vital," she says.

And her one-year association with

the General Engineering Department has been "a very happy one."

Her exposure to the technical world extends back to her undergraduate curriculum. As a Chemistry major, she followed the pre-med route.

In addition, her husband, Keith Schoff, is a chemical engineer and patent attorney.

As a result, she is exposed to and aware of continual advances in technology. You might even say it is a vital part of her highly diversified life.

Yet, her principal hobby is her family. It consists of her husband and three sons: Eric, twelve; Soren, nine; and Kell, two.

Music, creative writing, and poetry also rank at the top of her many interests. She taught piano to earn her way through college. She has won awards for her poetry and fiction. And she helped a "lovely, old Welshman living in Dylan Thomas' home publish a collection of Dylan Thomas' poetry."

When asked her favorite author, she replied, "That is like asking a fat person what his favorite food is."

Yet she admits Dylan Thomas, W. H. Auden, William Butler Yeats, and Shakespeare are tops.

How does she have time for her various interests?

"I am usually tired," she jokes.

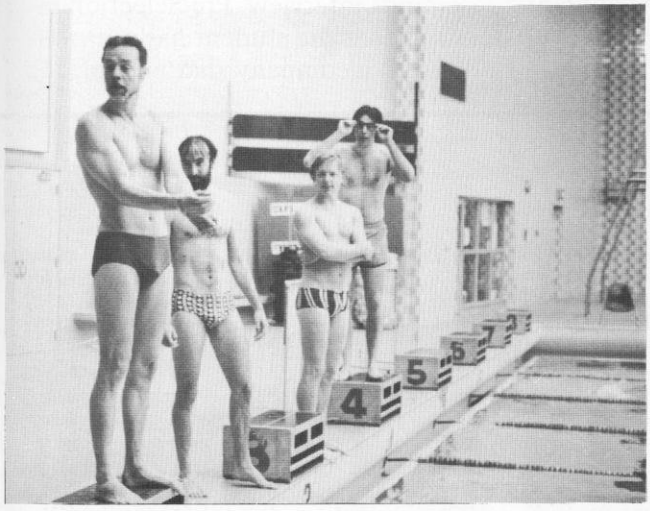
More seriously, she blames specialization to be one of the "bugaboos" of the educational world. This explains the lack of time for students to become exposed to other facets of life outside their field of study.

"We are simply forced to deal with a knowledge explosion."

And Gretchen Schoff is doing her best to keep up with it.

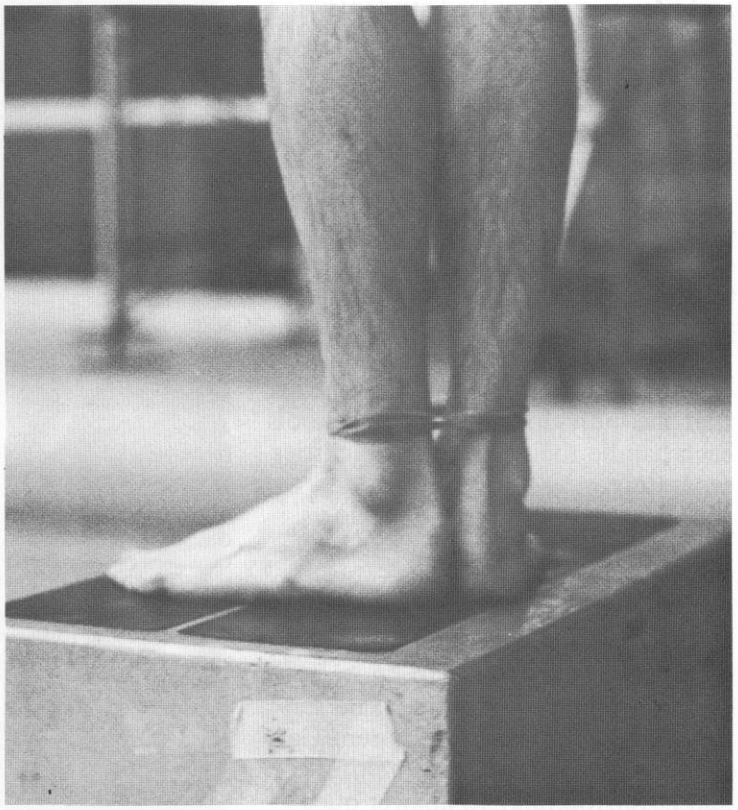
—Sue Tyunaitis is a senior in Engineering Mechanics. She is editor of the **Wisconsin Engineer**, *and she hopes to pursue a career involving engineering administration.*

Sandor Sinks



Professor Bela I. Sandor, Engineering Mechanics Department, challenged any engineering student to compete with him in two swimming races last Spring. These weren't ordinary races, though.

Sandor swam a 50-yard breast stroke with his hands tied together and a 50-yard freestyle with his ankles tied together. Students Ivan Arenson, Eric Jorden and Keith Loss competed against him. Sandor sunk. Arenson won the freestyle and Loss won the breast stroke. It was a close match.



photos by Bill Held

engineering placement--
First Step on the Road to Success

by Grant Dekker

It happens every spring and fall, a few weeks after the semester begins. The jeans come off, the suits and dresses go on in their place. Haircuts become popular; beards and mustaches are shaved or trimmed.

The interview season has begun. For most, the interview is the finale of four or five years of hard work, and it is the first step into the professional world.

To assist the graduating engineer with the interviewing process and to help him select his first professional position are the principal functions of the Engineering Placement Office.

Located in Room 1150 Engineering, the office acts as a meeting point for the several hundred companies which interview each semester and the several hundred students planning to graduate.

Directed by Professor James Marks, the UW-Madison Engineering Placement Office is ranked as one of the best in the nation.

"We've got better facilities and a better operation," said Marks. "The College of Engineering has been willing to spend the money for the staff and facilities."

The University of Wisconsin has de-centralized placement. This means that the individual colleges or schools each handle their placement facilities separately.

De-centralized placement allows the placement office to provide more personal, one-to-one counseling.

"The personnel in the placement office always try to get to know you and remember your name," said senior chemical engineering student Gary Gibson. "They are always helpful and never too busy to answer questions."

Interviews are held over a seven to nine week period in the interview rooms above the placement office.

Prior to the actual interviewing process, the graduating senior has become familiar with the Placement Office. This familiarity results from preparation of the student's Placement Office file, participation in the Pre-Selection program, and/or enrollment in the Professional Orientation class.

Preparation of the Placement Office file is most important. The file consists of the College Interview Form (a standardized resume) and a set of appraisals.

On the day a student has signed for an interview, the company receives a copy of the College Interview Form. A copy of the student's appraisals is given to the employer at the end of the interview day.

The Placement Office file can be referred to a company any time in the future when the student is applying for a new job. The file facilitates the use of the Alumni Placement Service which lists companies requesting experienced engineers.

Pre-Selection is another service offered by the Placement Office. A student must register for the Pre-Selection program during the spring of the year before graduation and complete a College Interview form. The office then makes reproductions of the forms, assembles them in packets of degree level and department, and sends them to interested employers. The employer then may review the forms, contact students who interest him, and invite them to a campus interview. Pre-Selection insures that the student has not overlooked a company that may offer a

SALARY & STATISTICAL SUMMARY
1977-78 BS Engineering Graduates

May '78 Graduates:	AgE	ChE	CE	EE	EM	IE	ME	MME	NE	Summary
Lowest Offer	1500	1300	1040	1235	*	1230	1050	1200	1275	1040/Mo.
Lowest Offer Accepted	1500	1450	1080	1265		1330	1200	1395	1275	1080
Median of Offers Received	1535	1525	1295	1370		1400	1400	1435	1420	1395
Median of Acceptances	1520	1500	1300	1375		1410	1405	1480	1440	1395
Highest Offer Accepted	1545	1600	1500	1500		1625	1745	1670	1745	1745
Highest Offer	1700	1600	1550	1500		1625	1745	1670	1745	1745
Number of Graduates	4	17	43	63	4	17	52	11	9	220
Accepted Employment	2	14	23	43	1	11	41	9	6	150
Percentage	50	82	54	68	25	64	79	82	67	68
Graduate School (Engr)	0	1(6)[1]	9(21)	10(16)	2(50)	4(24)	7(13)	1(9)	1(11)	35(16)
Other Further Education	0	0	1(2)	3(5)	0	1(6)	0	0	0	5(2)
Military Service	0	0	0	1(2)	0	1(6)	1(2)	1(9)	0	4(2)
Other Plans/No Interviews	2(50)	2(12)	7(16)	5(7)	1(25)	0	2(4)	0	1(11)	20(9)
Considering Offers	0	0	0	0	0	0	1(2)	0	0	1(1)
Without Offers	0	0	3(7)	1(2)	0	0	0	0	1(11)	5(2)
No. of Employer Requests[2]	14	98	56	151	59	91	202	51	17	739
No. of Requests/No. of Grads	3.5	5.8	1.3	2.4	14.8	5.4	3.9	4.6	1.9	3.4
TOTAL NO. OF 1977-78 GRADS	10	49	89	118	10	26	76	19	18	425

[1] ( ) Percentages of Numbers of Graduates in each category.
[2] From a compilation of employer specifications by type of degree based on the needs of employers who visited the campus during the semester.
*Insufficient data to tally.

photo by Dennis Hilgendorf

job matching his interests.

Professional Orientation is a one-credit course offered every spring on career planning and placement. The course offers various speakers from industry or academia who deal with topics ranging from "How to Interview" to "Advancement on the Job."

In addition to the other services already mentioned, the Placement Office offers a summer employment program sponsored by the Professional Engineering Council. Employers interested in hiring engineering students for summer work are posted with their interviewing dates. Interested students need only sign up for the interview at a particular time during the day.

The Placement Office's history has not gone unmarred. When student records were totally inaccessible and the office was under different management, there were many shady tactics used to hire a student.

"There was wining and dining of students and faculty," said Marks. "Everything was kept under a bushel basket, with rumors of money under the table for obtaining the 'right' students."

But the Placement Office has grown and matured with the times.

The market for engineers is now very good. Although this is dependent on the economy, the average salary for an engineer graduating with a BS degree was $1395 per month last semester.

For that first step to those future salaries—get involved with the placement office.

—Grant Dekker is a senior in Chemical Engineering. He hopes to attend graduate school and pursue a career in Biomedical Engineering.

Expo 79--

An Eye on the Future

by Pat Gureski

EXPO 79 is dynamic. It is engineering. It is people.

The biennial spring event on the engineering campus is scheduled to occur on April 27, 28, and 29, 1979.

What is EXPO?

EXPO is a student run event featuring over 150 student and industrial exhibits. New developments, engineering alternatives, and unique applications are featured. Exhibiting gives engineering students the opportunity to apply their "classroom knowledge" to practical "real life" problems.

Initiated as a constructive alternative to the annual feud between engineers and lawyers on St. Patrick's Day, the first UW–Madison College of Engineering Exposition was held in 1940. After a brief interlude during World War II, the EXPO was reestablished in 1953. It has taken place once every other year since that time.

With a three-day attendance of over 15,000 in 1977, EXPO is recognized as the largest student-run activity on the Madison campus.

You can be part of this event.

Whether you plan on exhibiting a project, assisting the Executive Committee, or working on one of the many various phases of the Exposition, you can begin preparing now.

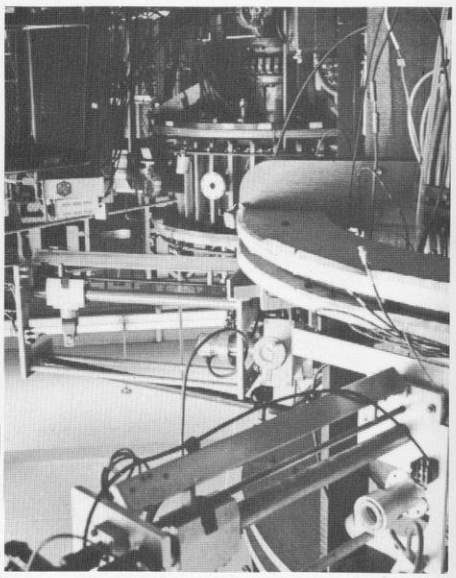
The opportunity to exhibit in EXPO is open to any student, group or organization in the University system. There are also exhibits managed by industries from around the state and nation.

Participation in the EXPO is not limited to exhibiting, though. There is plenty of preparation beforehand, and the Executive Committee is always willing to accept help.

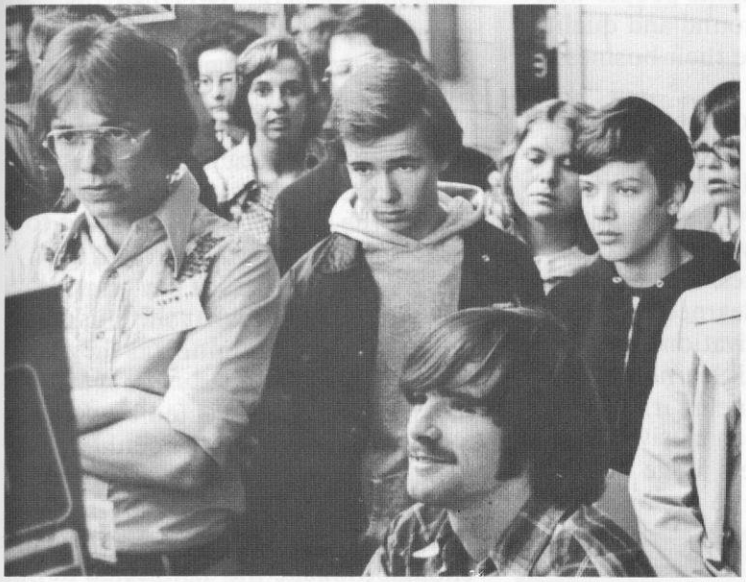
If you are interested in any facet of EXPO 79, stop by the EXPO office, Room 1142 Engineering. Office hours are set for 1 to 4 p.m., Monday through Friday. Contact can also be made through University mail or by calling Pat Gureski or Grant Dekker at 262-6842. If you have any questions, need assistance, or want to help, contact the EXPO office.

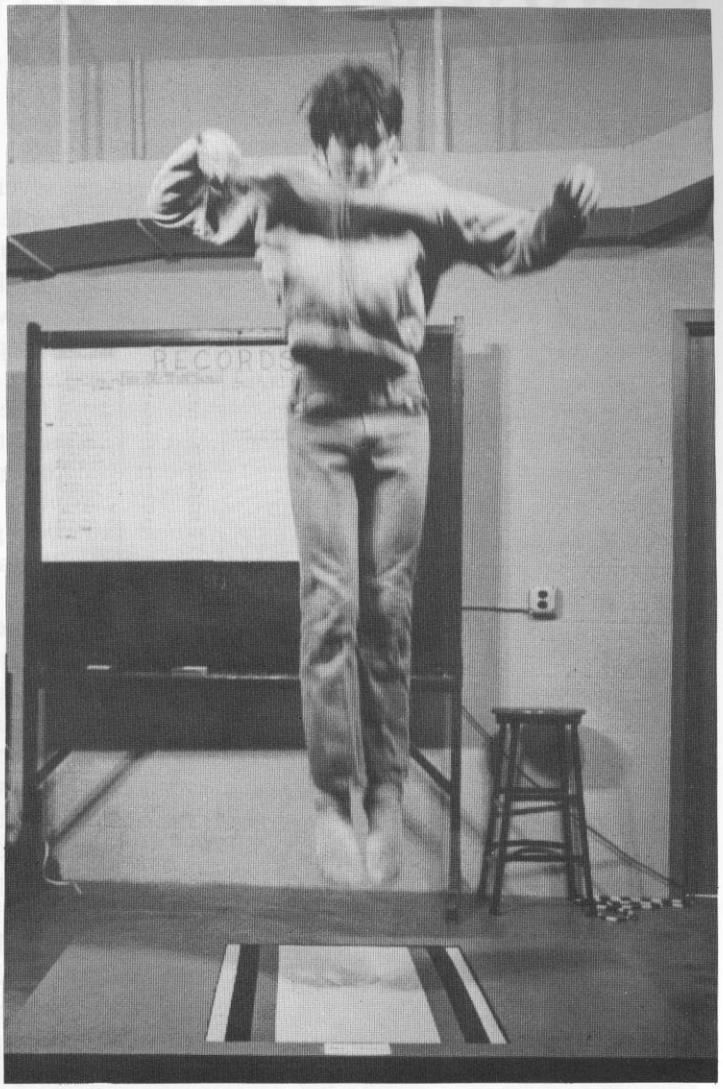
EXPO 79 wants you.

–Pat Gureski is a senior Mechanical Engineering student. He is co-chairman of the 1979 Engineering Exposition with Grant Dekker.



photos by Robin Drout and Tony Dalnodar





–BE A PART OF EXPO '79–

Yes, I am interested. I would like to contribute to Expo by:

–assisting the Executive Committee this semester in General Planning for Expo '79

–contributing during the Expo '79 week by selling tickets, putting up posters, etc.

–exhibiting (ideas are available).

Name _____

Address _____

Phone _____

Year & Major _____

I can be reached at _____ a.m., p.m.
(when?)

Student Activities Pay Off

by Raymond H. Eisemann

"Being involved in extracurricular activities takes away from my study time."

"Why should I bother? Everytime I suggest something no one agrees with me anyway. I don't need that frustration."

"Those organizations are just so much 'Mickey Mouse'. They don't accomplish anything."

"I'd rather spend my spare time doing something else—like drinking beer!"

These are all seemingly legitimate reasons for not becoming involved in extracurricular activities. But as a 1969 UW-Madison engineering graduate, I'd like to develop the case that involvement in extracurricular activities is important and will have a payoff for the student. The first payoff comes when the student interviews for a job. The second payoff is a long term one. The insights into leadership and interacting with people are benefits which will be realized for the rest of your life.

There are several reasons companies value people who have been involved in extracurricular activities. To understand them, we must consider the interview process from the company's viewpoint. During the interview process, a limited amount of information (the resume and the interview) is used to make a decision about who to hire.

The company wants people who possess the background and qualities they feel will make their business successful.

What are some of these qualities?

One, they want people who have demonstrated leadership ability.

Leadership is a very intangible quality and involves many complicated characteristics. It is not something that can be learned by reading textbooks on motivation and management. Leadership is learned predominately by experiencing it.

Since it is such an elusive quality, how do interviewers judge it? They are forced to look to the extracurricular activities in which the student has been involved.

I found that extracurricular leadership positions helped me once I stepped into the business world.

As an undergraduate mechanical engineer at UW-Madison in the late '60's, I served as president of my dormitory floor, president, social chairman and professional development chairman of Theta Tau, my fraternity, and special events chairman of the 1969 Engineering Exposition.

These activities were to benefit me in the long run because I was a "doer".

Yes, the interviewers also want to know whether the student was a "doer" or a "joiner". They want to know more about what the student did in the organization. Did they volunteer for a job nobody else wanted or was the student elected by peers because they thought he could do a good job? Finally, was the student simply a member of a group? The interviewers are certainly sophisticated enough to make the distinction between the "doers" and the "joiners".

Another quality that is highly valued by any business is the ability to be self starting. All companies have plenty of people who must be told what to do. Involvement in leadership of extracurricular activities certainly demonstrates a student's self starting capabilities. There is no one forcing the student to do the job. The person must define his own goals and objectives. The person must then take it upon himself to make sure that goals and objectives are achieved.

For this reason, self starters are highly regarded in industry. The interviewers look toward the extracurricular activities to find the self starters.

It is my opinion that a person who is involved in extracurricular activi-

ties will gain a better understanding of people. I find that I did. This basic understanding of characteristic personalities will be invaluable to you no matter what career you pursue. The characteristic personalities you encounter in one group will always repeat in any group at any time. People are people no matter where you encounter them. Involvement in extracurricular activities at the college level just accelerates your exposure and experience in dealing with them. Once in the field, I found many of my leadership experiences gave me an "inside awareness". I knew how to react in different situations, and what to expect of people.

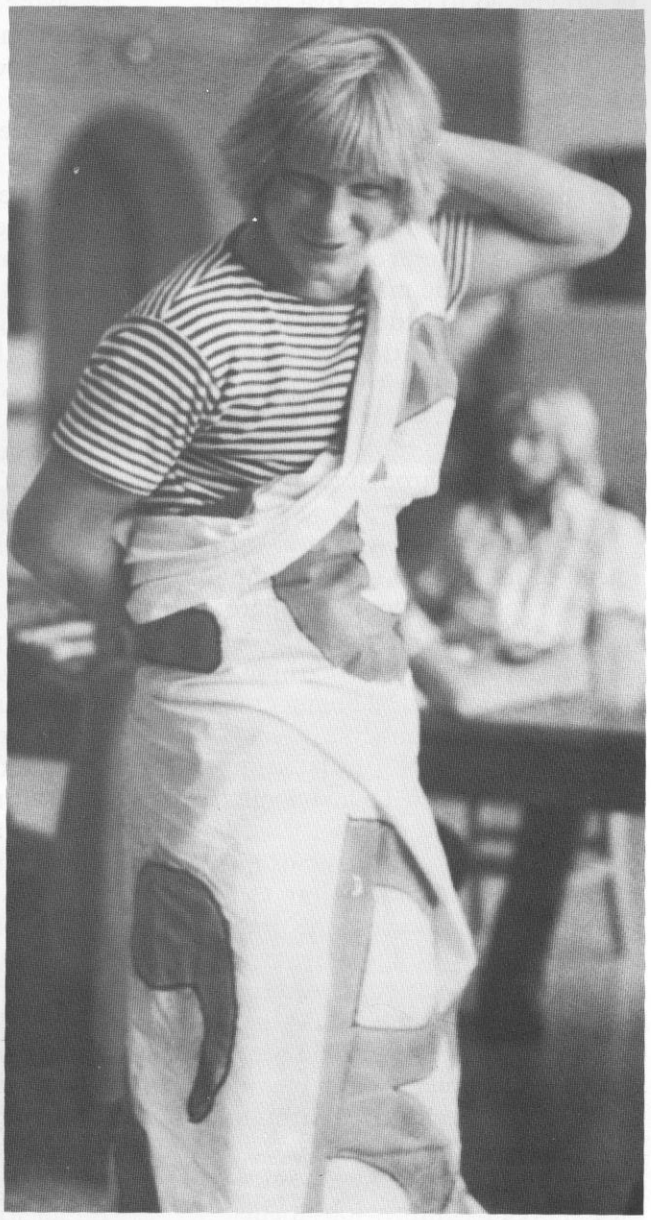
Finally, it is important to note that companies and their interviewers realize that not every student has the luxury of extra time. Married students and students working their way through school have other commitments on their time. These responsibilities are of primary importance. Not everyone has the advantage of being able to build an impressive record of leadership in extracurricular activities.

Therefore, being involved in extracurricular activities is one of the best things you can do for yourself. Involvement has an immediate reward during the interview process. It also has a life long payoff in the insights gained through group interaction.

–Raymond Eisemann is a 1969 graduate of UW–Madison. After obtaining his Mechanical Engineering degree, he accepted employment at Wisconsin Telephone Company. He is currently involved in long range planning.

Toga! Toga! Toga!

photo by Tony Dalnodar



Reliving a scene from the motion picture, *Animal House,* over 10,000 UW-Madison students congregated at Lot 60 on Saturday, September 30, adorned in togas made from bedsheets. They danced to the music of Blue Light Band, yelled Toga! Toga! Toga!, and tried to get the attention of the two national and several local television networks that attended. Funded with $2700 by the Wisconsin Student Association (WSA) and sponsored by the Sigma Alpha Mu fraternity, the event attracted much attention. Dean of Students Paul Ginsberg and Mayor Paul Soglin (sans togas) attended.

On Being Involved

by Donald H. Slavik

Do you go to classes five days a week, study most evenings, and socialize with a few friends on the weekends?

Maybe it's time to break the study-all-week, party-all-weekend routine.

Try joining a fraternity. Become an active member of a professional society. Compete in athletic competition. Play in the marching band. Get involved in student government. The list of possibilities is endless.

You may find that you enjoy these college days more, have more friends, and learn more. You may even find a job through your extracurricular activities.

Let me relate the true story of a friend of mine, Jeff, as an example.

When Jeff came to school here back in the fall semester of 1974, he was interested in only one thing—getting his mechanical engineering degree as soon as possible.

By the middle of his first semester, Jeff found that he had some free time on his hands, even with a 19-credit load. One of his friends in physics class encouraged him to go to a professional society meeting. Jeff began to go to meetings regularly. Here, he learned a lot more about his field in some areas than he gleaned from his classes. He was also able to attend society banquets and meet representatives from industry.

Through some of these contacts, he acquired a summer job in engineering after only one year in college.

Jeff was introduced to a professional engineering fraternity at this same time. Here, he met students from all engineering disciplines. They were interested in furthering their professional careers together, while enjoying many social activities as well.

Pre-game football warmups, parties and banquets provided Jeff with weekly opportunities for fun. And plant tours, speakers from industries, and increased contact with school faculty in a relaxed setting helped to further his educational and career opportunities.

In his junior year, Jeff was selected to represent his professional society on the Polygon board. Here, he assisted in making decisions affecting the engineering student body as a whole.

Simultaneously, he was elected president of his professional society and treasurer of his professional fraternity. These offices significantly increased his leadership roles and responsibilities.

By the time Jeff was a senior, he had also served on his department's student-faculty committee and had exhibited a project at the 1977 Engineering Exposition.

All this time, he had maintained a grade point average of greater than 3.25. Some people might argue that he could have done better scholastically if he had curtailed some of his extracurricular activities.

Jeff told me, though, that his high grades were a result of his involvement with engineering-related activities outside of class.

Through the activities, he said he was able to meet many more people. Some of these people were able to assist him with homework and studies. His fraternity provided a file of recent exams and quizzes for engineering classes.

By getting to know his professors on a more personal basis through his professional society and fraternity, he felt more at ease going to them for assistance.

Jeff got to know which were the best classes, who were the best instructors, and in general, how to get the most out of his college years.

He graduated last May, and now works for a firm in California. Besides his good grades, Jeff felt that his many extracurricular activities were most important in helping him to receive as many job offers as he did.

Jeff's case is by no means unusual. It is only one of many I could relate.

There are dozens of students in the College of Engineering right now that are as active or more active than Jeff was. I have found, for the most part, that they are better students for doing so. I know one student who is currently an officer in three different engineering organizations. He maintains a GPA of about 3.75.

The University and College of Engineering offer many opportunities for student involvement. A list of those organizations and societies which exist explicitly for engineering students appears on pages 16-17.

These include professional societies, professional fraternities, Polygon Council, the *Wisconsin Engineer,* Engineering Expo, and many more.

In addition, many departments have faculty-student committees. These are organized for the purpose of advising on curriculum changes, interviewing potential faculty, and improving relationships between faculty members and the students in the department.

Many engineers are also members of the UW Marching Band, the crew team, the fencing team, the cheerleaders squad, and other athletic organizations.

I cannot emphasize too much that the list of opportunities is almost endless. It covers almost every interest you may have. The most important thing is to become involved with *something.*

I have a few suggestions regarding getting involved:

First, do not wait. Start now, even if you are a freshman. By waiting, you miss opportunities that are available today. By getting involved early, you also make many more activities available to you in the future.

Second, choose activities that relate to the engineering fields and that involve engineering students. This way, you benefit from the company and experiences of people who have interests and ambitions similar to yours. They will be able to help you the most, both scholastically and professionally.

Third, join more than one group. You will find that each offers something different. Professional fraternities offer many things that professional societies do not, and vice versa.

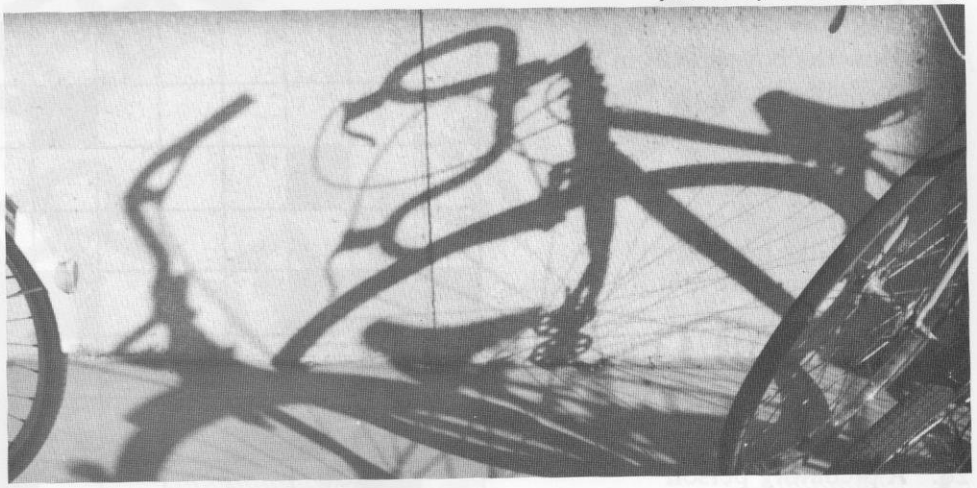
Finally and most important, do not sign up with a group and then be an inactive member. Having a long list of extracurricular activities on your interview form does not mean very much if you did not actively participate in any of them.

Attend the meetings, join in the activities, and even try to get elected to an office. This way, you will get the most out of your time, grow as a person, earn the respect of your classmates, and find opportunities opening up to you that you did not know existed.

A lot of this might sound like a pep talk. But for me, the past four years have been the most enjoyable of my life, because I have been "getting involved."

–Donald H. Slavik is currently enrolled in the College of Engineering and the Law School here at UW–Madison. He hopes to pursue a career combining his nuclear engineering and law backgrounds.

photo by Norm Lenburg



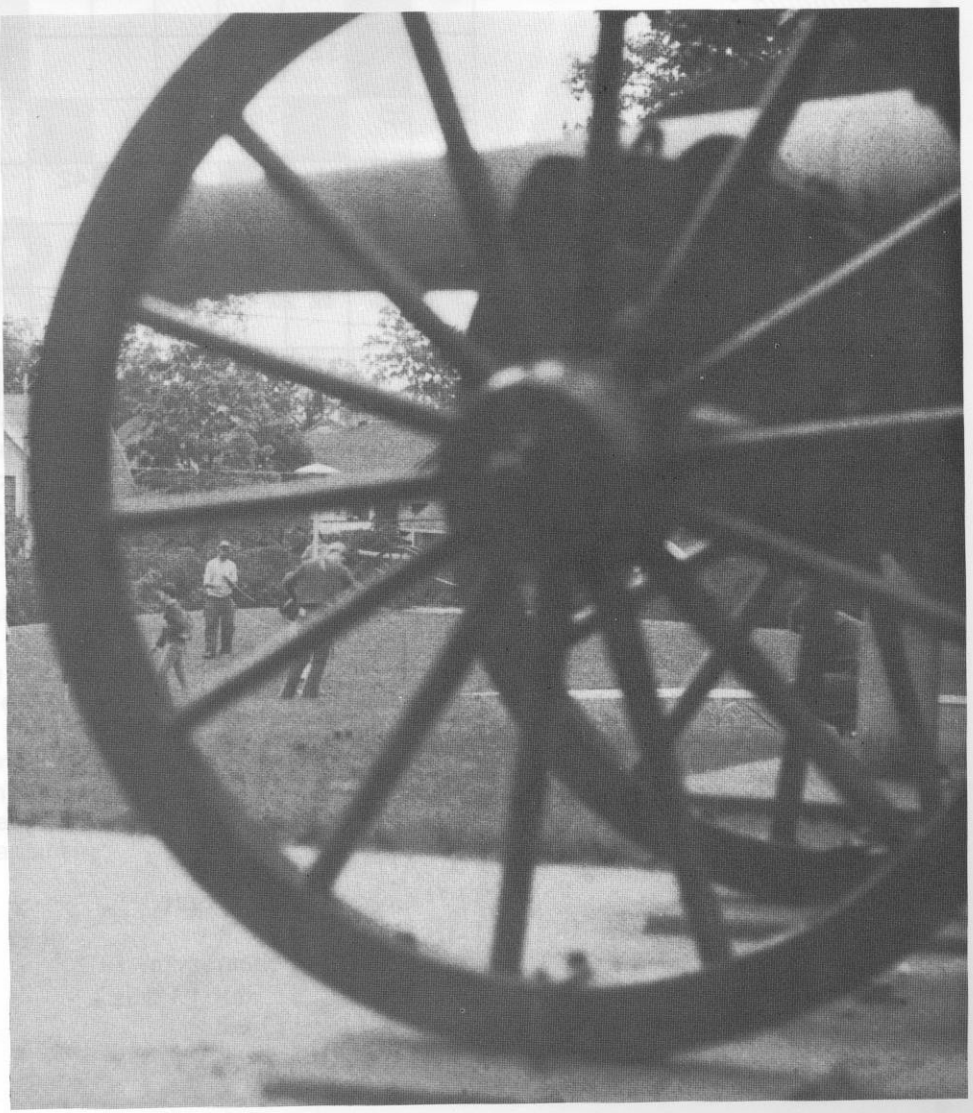
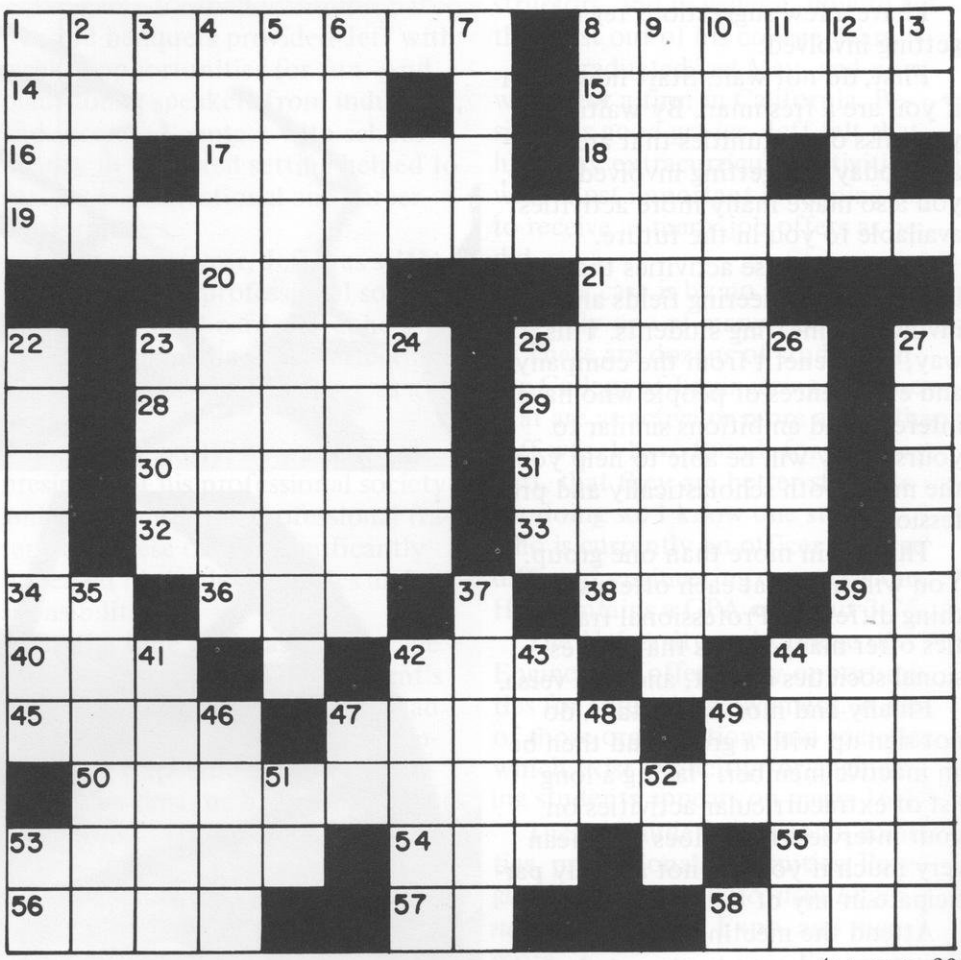


photo by Tony Dalnodar

engineer's crossword puzzle



Ans. on p. 33

ACROSS

1. How the boys got from Faber to Emily Dickinson
8. To receive
14. Respect
15. To toot a flute
16. Direction, abbrev.
17. Bristlelike process, pl.
18. Magnetomotive motor, abbrev.
19. Food purchasing (2 wds.)
20. 3 dashes, 3 dots, 3 dashes
21. Liquid colloidal dispersion
23. Humor
25. Overturn
28. A predatory person
29. Color
30. ___ Stevens
31. Boy's nickname
32. Part or unit
33. Constellation
34. Power ratio, abbrev.
36. Craft
38. Period of time
39. Aluminum; chem. sym.
40. Egypt, abbrev.
42. Weed
44. Audio Visual Instruction, abbrev.
45. Sausage
47. Has ___; ate
49. Inviting
50. Type of radiation
53. Daily sustenance, pl.
54. Terrorist group, abbrev.
55. To regret
56. Not there
57. Engineering major, abbrev.
58. engineer's sustaining elixer

DOWN

1. Sounded
2. Aroma
3. Signal, abbrev.
4. Dance craze
5. Dutch-elm cure
6. A review of past
7. Apple, blueberry, and cherry
8. Air
9. Make-up
10. Act of concluding
11. Elapsed time, abbrev.
12. Scheme
13. Tellurium; chem. sym.
22. ___ ___ ___ dub (3 wds.)
23. Roof type (2 wds.)
24. Itineration
25. U of W Post Office, abbrev.
26. Thirteen to nineteen
27. Type of politician
35. ___ doll
37. To spot or streak
39. Street
41. More raw
42. Out-of-date
43. Trillion; prefix
44. River in Venezuela
46. Tete-a-___
47. Einsteinium; chem. sym.
48. sodium; chem. sym.
49. Indicates alcohol or phenol
51. Female title, abbrev.
52. Pronoun
53. Non-fielder, abbrev.

—Crossword Puzzle designed and composed by Pat Gureski and Jerome Davis.

ENGINEERING CAREER OPPORTUNITIES

INTERVIEWS ON CAMPUS

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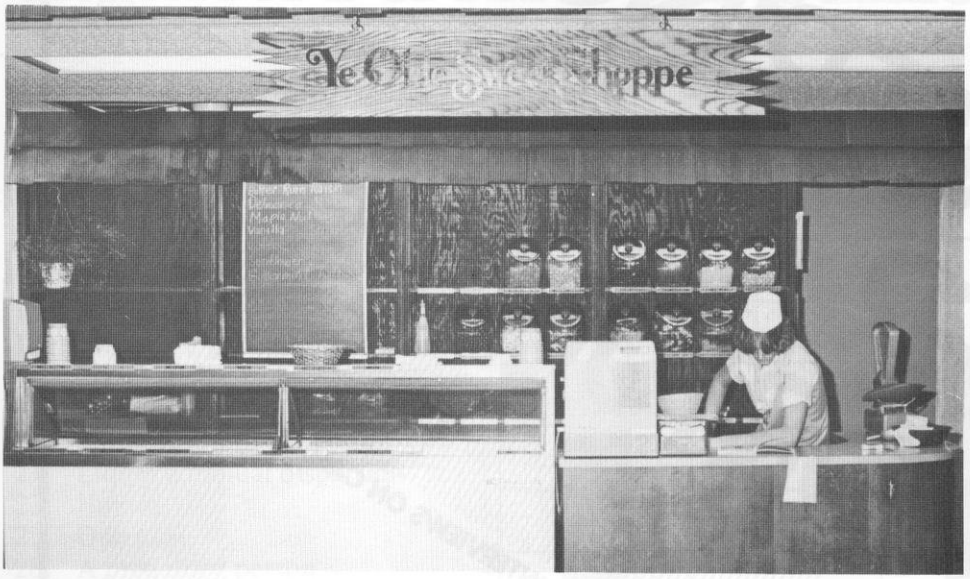
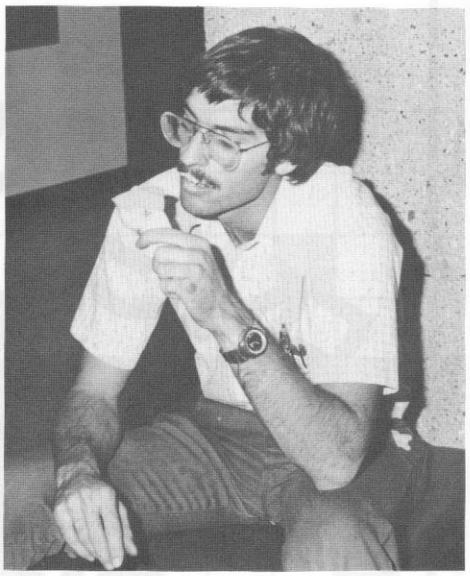




by Joanne M. Haas

Do you have time between classes? Need a place to study, to relax, or to catch some entertainment for a few hours?

Union South, on the corner of Randall Street and Johnson Drive, has offered a fine opportunity for a variety of student activities since its establishment in 1971.

The Union activities reflect the changing interests and needs of the campus. Yet, its basic philosophy—to provide a variety of social, cultural and recreational activities to complement classroom education—remains unchanged.

Union South is equipped with a wide range of facilities, programs and social services that students and university staff members can enjoy.

And if you need a place for breakfast, lunch or dinner, the Union offers three eating places: the Snack Bar, which offers a meal plan at a reasonable rate; the Red Oak Grill (ROG), which specializes in grilled steaks and sandwiches; and the Carousel Cafeteria, which is open for lunch.

For dessert or a snack between classes, the Sweet Shop offers 22 flavors of ice cream and many candies.

There is a wide range of recreational opportunities available at the Union as well. Downstairs, you can find eight bowling lanes, five table tennis tables, and ten billiard tables. And for frequent participants, the Union offers a program of leagues and tournaments. This includes bridge and chess.

The Corner Store, located on the first floor, sells school supplies, gifts, books and posters for a last minute gift or to replace something you left at home.

And overnight facilities are available at the Union. There are 14 twin guest rooms complete with a color TV at a cost of $16.50 for a single and $18.50 for a double. For reservations, call 263-2600.

In addition, 15 multi-purpose rooms are available for groups to meet in the Union. They accommodate between 8 and 300 people. Call 263-2543 for information.

There's also the Wisconsin Union Directorate. This is a group of students who are programming events and services for all students and other interested participants. Three of the committees within the Directorate work directly in Union South: Community Outreach Service, Campus Service and the Union South Social Committee.

The Campus Outreach Services sponsor family programs and one-to-one tutoring for elementary, middle and high school students. Those students who wish to be tutors have the opportunity to earn credits. For information, call 263-2432.

The Campus Service Committee sponsors programs like the blood donation program, Youngblood, and the Greater University Tutoring Service.

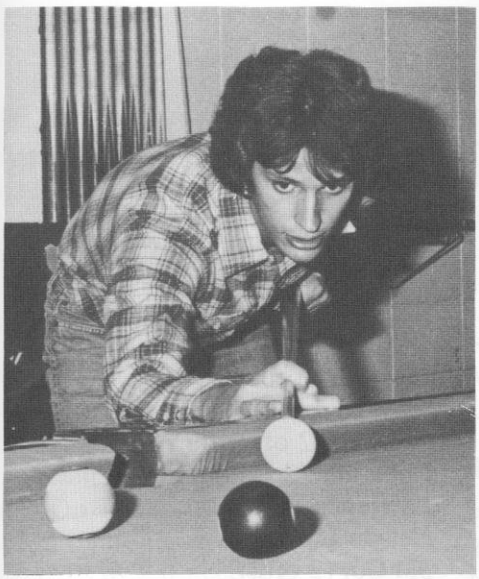
The Union South Social Service offers entertainment practically every day or evening.

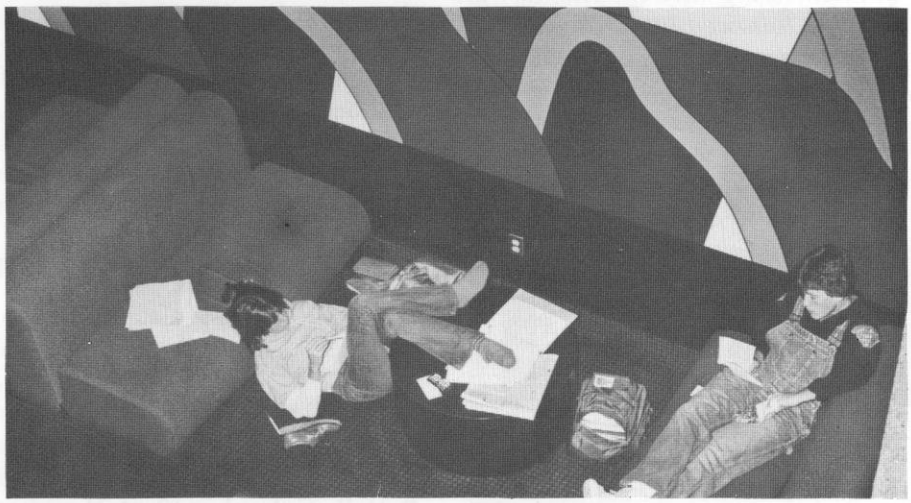
For example: Each Tuesday afternoon, there is a concert featuring folk or easy-listening music in the Copper Hearth Lounge from 1 to 3 p.m. Every Tuesday night, there is an "Open Mike" program from 9 to 11 p.m. where people from the audience perform in the snack bar.

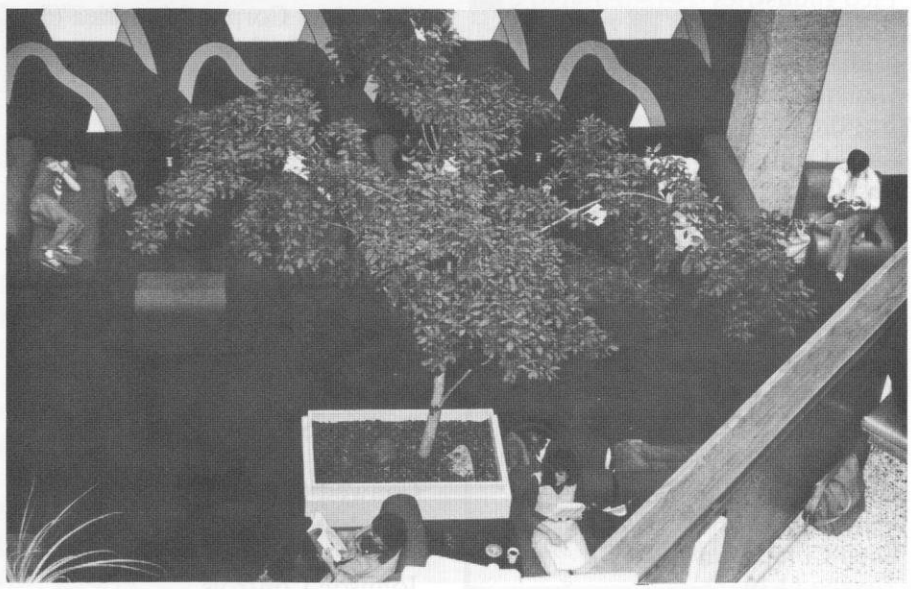
Every Wednesday, there is a noon demonstration series, "Sidewalk Showcase," in the lobby. This is an interesting event to attend for craft demonstrations or for unique hobbies.

And on Wednesday evenings, folk music is performed in the snack bar. "Folk folks" perform from 9 to 11 p.m.

On Thursdays at 8 p.m., you can







view a free movie in the Snack Bar. And after every home football game, there's a Badger Bash featuring Roy B. in the Snack Bar and Doc DeHaven in the Carousel Cafeteria. Both bands perform from 4 to 6 p.m.

In November, Milwaukee Folk Festival will be in the Union; and in December, an International Ice-Skating Party.

You might want to get into the habit of checking the "Today in the Union" announcement board, located on the wall across from the information desk. At the desk, you can buy magazines, papers, cookies and candies.

The Union also includes two spacious lounges, a music listening room and an art gallery.

Union South is definitely a place to keep in mind for leisure and study hours.

–Joanne Haas is a senior Journalism student. She is Fine Arts Editor for the Badger Herald. She also hopes to pursue a career in magazine writing.

photos by Dennis Hilgendorf

interview schedule

NOTE: This schedule is subject to change. Check Placement Office bulletin boards regularly for additions and deletions to interview schedules. During the interviewing season notices of interviews are posted daily **one week and two days in advance of an employer's visit. Students must sign by 4:30 one full day before the scheduled date.**

The dates listed below are the dates scheduled in Engineering only. (1 of 2 days) means that a company is on campus two days, but probably in Engineering only the first day unless it is followed by (2 of 2 days) which means there is a schedule in Engineering both days. If it is only (2 of 2 days) it is in Engineering the 2nd day of 2 days, but somewhere else on campus the first day. This may also apply to 3, 4 or 5 days but only in a few cases.

MONDAY, OCTOBER 30

DuPont (1 of 5)
Elco Industries
Ford Motor Co. (1 of 2)
GTE–Automatic Electric
General Telephone of Wisconsin
Raytheon Co.
Shell Companies (1 of 3)
U.S. DOT Federal Highway
U.S.A.F.

TUESDAY, OCTOBER 30

Albany International
American Appraisal (1 of 2)
DuPont (2 of 5)
Ford Motor Co. (2 of 2)
National Semiconductor
Owens Illinois
Penn Div., Johnson Controls
Shell Companies (2 of 3)
Texaco (1 of 2)

WEDNESDAY, NOVEMBER 1

Borg Warner Chemicals
DuPont (3 of 5)
Menasha (1 of 2)
PPG Industries (2 of 3)
Shell Companies (3 of 3)
Texaco (2 of 2)
Texas Instruments (1 of 2)–5 divisions
U.S. Navy (1 of 2)
National Security Agency

THURSDAY, NOVEMBER 2

American Can Co. (1 of 2)
Battelle-Columbus (2 of 3)
Container Corp. of America (2 of 3)
DuPont (4 of 5)
General Tire & Rubber
Menasha (2 of 2)
Mobil Oil Co. (2 of 2)
Wisconsin State Government
U.S. Public Health (1 of 2)
U.S. Navy (2 of 2)

FRIDAY, NOVEMBER 3

Louis Allis
American Can Co. (2 of 2)
Amsted Industries
Battelle-Columbus (3 of 3)
Container Corp. of America (3 of 3)
DuPont (5 of 5)
Inryco Inc.
Pillsbury
Sargent & Lundy
Walker Mfg. (Now Tenneco Automotive)
U.S. Public Health (2 of 2)

MONDAY, NOVEMBER 6

Allis Chalmers Mfg.
American Cast Iron Pipe
Boeing (Seattle & Wichita) (1 of 2)
Conwed Corp. (1 of 2)
Firestone Tire & Rubber (1 of 2)
Johnson Controls
Oxirane International
3M Co. (1 of 2) 2nd visit

TUESDAY, NOVEMBER 7

Boeing (Seattle & Wichita) (2 of 2)
Chrysler Corp.
Cleveland Cliffs
Conwed (2 of 2)
Firestone (2 of 2)
Lawrence Livermore Labs
Nelson Industries
3M Co. (2 of 2)

WEDNESDAY, NOVEMBER 8

Amer. Grad. Sch. Mgmt.–40 Science Hall
Archer Daniels
Baxter Travenol
Columbia Distribution Cos.
Control Data
B.F.Goodrich (2 of 2)
M.I.T.–Lincoln Labs
Occidental Research
Outboard Marine
Raychem
Stauffer Chemical (1 of 3)
Sundstrand Corp.
UCC–PhD's (1 of 2)
Unico
Zenith Radio

THURSDAY, NOVEMBER 9

Battelle-Northwest (1 of 2)
Battelle-Northwest (1 of 2) PhD's
Consumers Power
Donohue & Associates
Iowa DOT
McGraw Edison
Moorhead Machinery & Boiler
Reliance Electric
Republic Steel
UCC–(2 of 2)–PhD's
U.O.P.-Process Division (1 of 2)
Naval Ship Weapons
N.A.S.A.–Lewis Research Center

FRIDAY, NOVEMBER 10

Battelle Northwest (2 of 2)
Battelle Northwest (2 of 2) PhD's
Borg Warner-Roy C. Ingersoll Research
Dana Corp.–Front Drive Systems
Foseco
Giddings & Lewis
Northern States Power
Rockwell International
Snap On Tools
Union Camp (2 of 2)
U.P.P. (2 of 2 if needed)
N.O.A.A.

MONDAY, NOVEMBER 13

American Hospital Supply (1 of 2)
Analytic Sciences
Armour Dial (1 of 2)
Diana Mfg.
Energy Resources
Illinois Tool Works
Motorola-Automotive Products
Pratt & Whitney
Samsonite
Sperry Vickers
B.A.S.F. Wyandotte
Xerox Corp.
U.S.A.F.

TUESDAY, NOVEMBER 14

Beloit Corp.
American Hospital Supply (2 of 2)
Bucyrus Erie
Burlington Northern (1 of 2)
Celanese (1 of 3)
Gulf Oil
International Harvester (Chicago)
Marathon Pipe Line
McGraw Edison (Elgin)
Mead Corp.
Residual Mgmt. Technology
St. Regis Paper

WEDNESDAY, NOVEMBER 15

American Cyanamid (1 of 2)
Amoco Production–PhD's
Brunswick
Celanese (2 of 3)
FMC–Chemicals R&D–PhD's
Hercules Research–PhD's
George Hormel
Illinois Power
International Paper
Kemper Insurance
Monsanto (1 of 2)
U.S. Army Material

THURSDAY, NOVEMBER 16

Air Products
American Cyanamid (2 of 2)
Combustion Engineering (1 of 2)
Firestone (Decatur)
Monsanto (2 of 3)
Oak Ridge National Labs (1 of 2)
Polaroid
Schreiber Cheese
Shell Development–PhD's
Stanley Consultants

FRIDAY, NOVEMBER 17

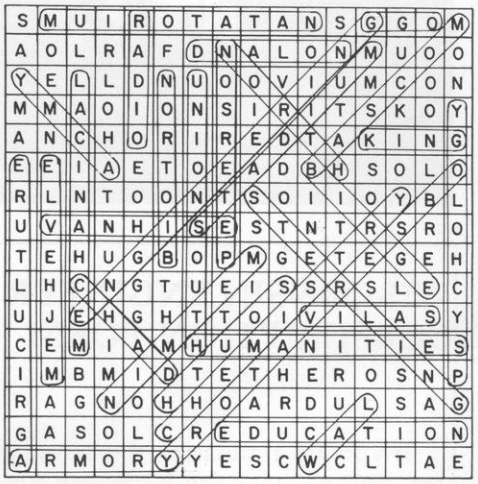
Amoco Chemicals (Std. Oil Ind.) Joliet
City of Milwaukee
Combustion Engineering (2 of 2)
Fermi National Labs
Fiat-Allis
Frito Lay
Gleason Works
National Starch & Chemicals
Peoples Gas Light & Coke
Prime Computer
Siemens-Allis Co.

MONDAY, NOVEMBER 20

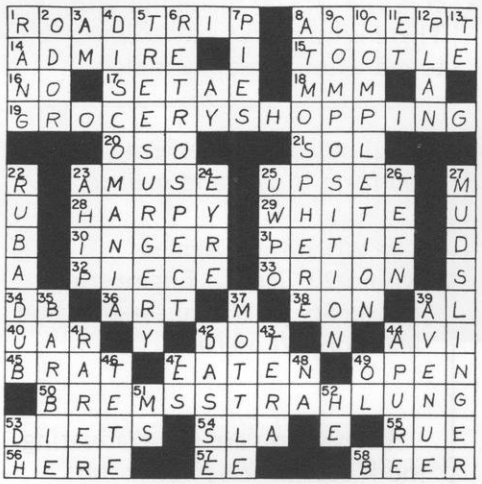
Cleveland El. Illuminating Co.
Holley Carburetor
Marquip Corp.
Moore Business Forms (Wi)
National Steel
Storage Technology Corp.
Western Gear
U.S. E.P.A.
Marquip Corp.

(THANKSGIVING RECESS–Nov. 23-27)

word search solution



crossword puzzle answer



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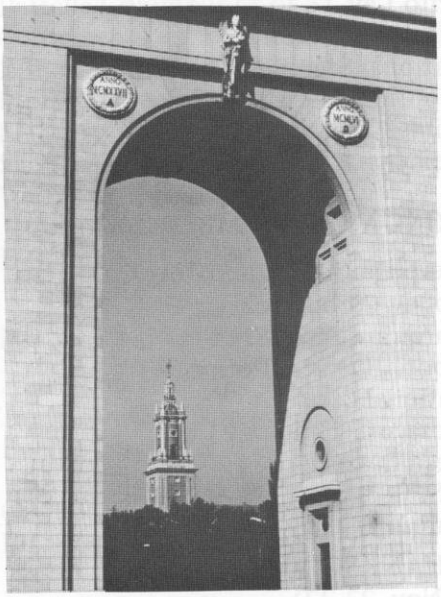

photos by Beth Kennedy

contest--

Where Are We Located?

A picture is worth a thousand words. That is what one of the *Wisconsin Engineer* photographers felt when she photographed these scenes. The question is the place. If you are the first to correctly identify the specific location where each of the photographs on this page was taken, the Wisconsin Engineer will award you $5 in cash. Give it a whirl.

At Du Pont I'm finding ways to squeeze more product out of fewer Btu's.

–Pam Tutwiler

"Every time I find a way to increase a yield by a fraction of a percent, or lower a reaction temperature by a few degrees, I can save literally thousands of Btu's of energy.

"I wanted a job where I could make a real contribution," says Pam. "Du Pont gave it to me."

With a BS in Chemical Engineering from Auburn University, Pam's first assignment was in an environmental control group. After two years she felt that process engineering would offer a greater challenge—so Du Pont changed her assignment.

Now she's working on methyl methacrylate during the day, and working on her MBA at night. She's attending Memphis State at Du Pont's expense.

Pam's story is the same as that of thousands of Chemical, Mechanical and Electrical Engineers who've chosen careers at Du Pont.

We place no limits on the progress our engineers can make. And we place no limits on the contributions they can make—to themselves, to the Company, or to society.

If this sounds like your kind of company, do what Pam Tutwiler did: talk to the Du Pont Representative who visits your campus. Or write direct to: Du Pont Company, Room 25240, Wilmington, DE 19898.

At Du Pont...there's a world of things YOU can do something about.

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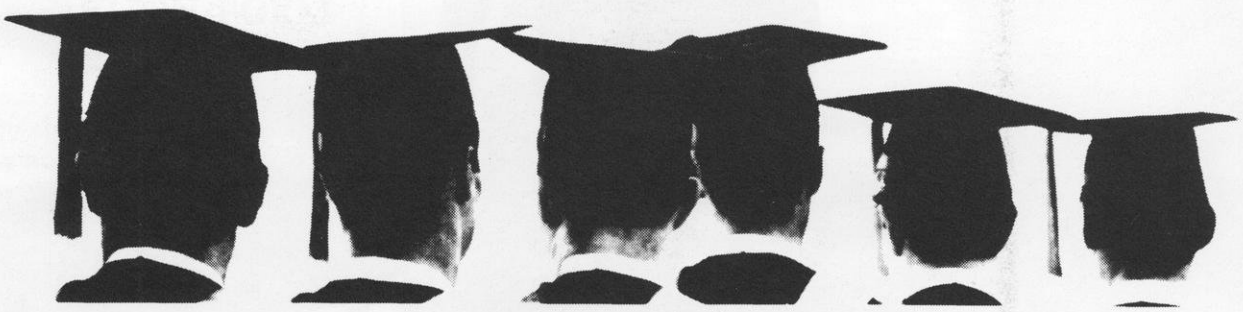
An Equal Opportunity Employer, M/F

If college has really taught you how to think, we've got the best place in the world for you to do it.



At GTE Automatic Electric Laboratories brand new facility in beautiful sunny Phoenix, you'll work with one of the finest research and development teams in the country, designing digital telecommunications equipment for today and for the future. You'll add your brains to some of the nation's most brilliant, and have the freedom you need to create and grow — both personally and professionally.

It's truly one of the best living/working combinations imaginable; and the best way to begin your professional career.

Currently we are seeking professionals educated in the following disciplines:

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APPLICATIONS SOFTWARE. Large scale development in telephone system real-time control.

Maintenance and fault recovery software, administrative software involving real-time data base administration, switch and network management software, as well as operating system/executive software.

SUPPORT SOFTWARE. Involved in compiler, assembler and simulator development, as well as system utilities and software development tools. Support effort is related to large IBM processors, micro-processors, and mini computers systems.

DATA BASE SOFTWARE. Responsible for logical and physical data base design and implementation related to telecommunications systems. Develop programs which automate the generation of data base contents for these systems.

SOFTWARE/HARDWARE DESIGN

Specify, design and test digital logic hardware and diagnostic software. Develop maintenance facilities to detect and correct present and latent hardware and software faults. Develop programs for common control diagnostics and recovery and diagnostic programs for peripheral equipment and maintenance support programs.

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Development and execution of comprehensive test plans to evaluate the performance of large stored program switching systems. Execute configuration management on all hardware, software, and documentation and maintain project control for all activities. System evaluation and test performed on both laboratory prototypes and initial field site locations.

We offer an excellent salary/benefit package (including hospitalization, major medical, dental, relocation assistance, disability and life insurance; pension and credit union) modern facilities and a climate conducive to personal and professional growth. If you possess a minimum of a BS, Electrical Engineering, Computer Science or any other appropriate engineering discipline, please send resume in confidence to:

Manager of Recruiting, Department ECM
GTE AUTOMATIC ELECTRIC LABORATORIES
11226 North 23rd Avenue, Phoenix, Arizona, 85029

GTE AUTOMATIC ELECTRIC LABORATORIES

We are an equal opportunity employer m/f.

Can you identify the chemical engineer in this group?

You're right if you said all of them. And you're right again if you conclude that Kodak offers a wide choice of career paths for individuals with strong technical skills. So it shouldn't be a surprise that our top management team is predominantly individuals with engineering backgrounds. At Kodak plants in Windsor, Colo.; Rochester, N.Y.; Kingsport, Tenn.; and Longview, Tex., you'll find chemical engineers in hard hats performing vital production staff functions and others deeply involved in design and development. Other chemical engineers are more often in business suits, calling on customers all over the country as Technical Sales Representatives. And some don't stray too far away from the satisfactions they find in the research labs. Incidentally, it would be very easy to find this kind of occupational variety among mechanical, industrial, or electrical engineers at Kodak.

Some of the members of this group found a bachelor's degree was all that was needed to prepare them for a challenging job. Other positions are better suited for someone who has completed a master's degree. If you prefer to work now and study later, the Kodak Educational Aid Program offers opportunities for full- or part-time learning. Those bent on a career in research usually apply to us with Ph.D in hand.

At Kodak, the emphasis is on technical innovation as a blueprint for keeping pace with our changing world. It's taken us—and it can take you—far from our photographic origins. For example, our basic expertise in photographic emulsion coating was the springboard to the development of a new clinical blood analysis system for health care. Our need for chemicals in photographic manufacturing led to the development of a multiplicity of products including fibers, textiles, and dyes for apparel and home furnishings. And our imaging abilities gave us an opportunity to make and market quality business equipment like microfilmers and copier-duplicators.

When a company is open to new directions, the people who work for it should expect changing horizons in their individual roles as well. Where the future can take you at Kodak depends on a lot of things—like personal preferences, performance on the job, and available openings. What we can promise is the opportunity to explore many conventional engineering choices plus a lot of other vital professional options.

Begin by contacting Business and Technical Personnel, Eastman Kodak Company, Rochester, N.Y. 14650.

Kodak

An equal-opportunity employer (f/m) manufacturing photographic products, fibers, plastics, and chemicals with plants in Rochester, N.Y.; Kingsport, Tenn.; Windsor, Colo.; Longview, Tex.; Columbia, S.C.; Batesville, Ark.; and sales offices throughout the U.S.A.

We're looking for engineers who can't wait to get to work.

We're looking for people who are looking for a real job. One that offers challenging work. Responsible work.

That's what you can expect at General Electric.

At GE, you'll be handed important assignments right from the start. You can do as much of the job as you're capable of doing. If you need help, it's there. If not, nobody butts in.

Here's the kind of thing we're talking about; some recent examples of jobs handled by new GE engineers:

1. *Charles P.* Aerospace systems manufacturing. Develop and document a direct numerical control system.
2. *Steve O.* Design engineering. Design test equipment for attitude control system of new communications satellite.
3. *Norma L.* Steam-turbine manufacturing. Investigate, analyze and obtain funds for solution of shop problems.
4. *Stephanie B.* Medical systems service engineering. Installation and test of new hospital radiographic and fluoroscopic x-ray system.
5. *Mel D.* Field engineering. Appraisal load testing of low and medium-voltage switchgear and power transformers for utility and industrial applications.

There's a good reason GE hands people like that—like you—real work assignments. It's the best way to develop the skills you will need throughout your career. You develop initiative and creativity. And responsibility. And GE also knows there's little to match the glow you feel when you make an important contribution.

You can make your contribution in just about any field of engineering at GE. We're that diversified in disciplines.

If you like the kind of challenge and responsibility that GE offers, we'd like to hear from you. Send for our free careers booklet. Just write: General Electric, Educational Communications, WID, Fairfield, Connecticut 06431.

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