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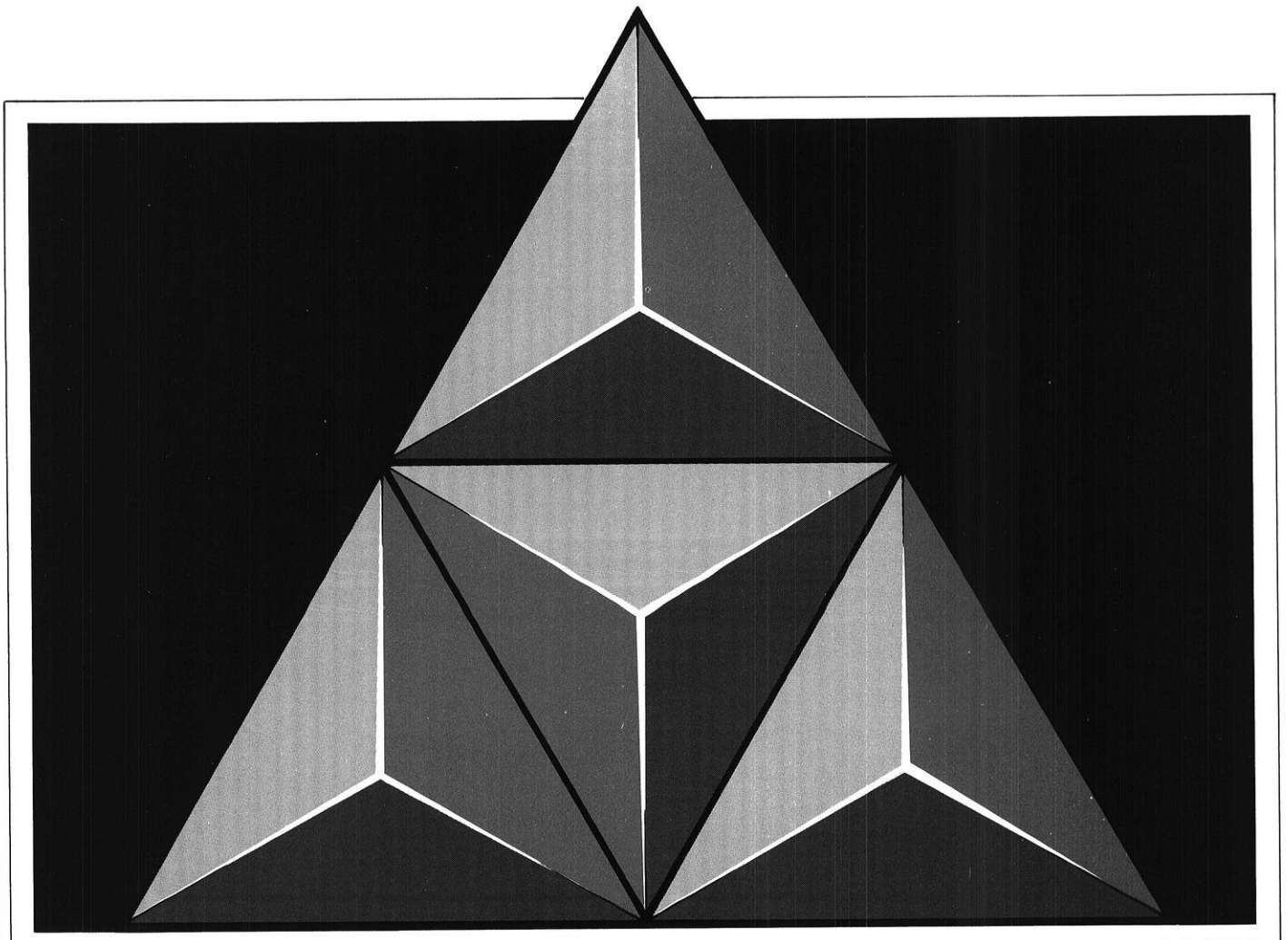
Volume 85, No. 3

Spring 1981

wisconsin engineer

SPECIAL EXPO ISSUE



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wisconsin engineer

PUBLISHED BY THE ENGINEERING STUDENTS OF THE UNIVERSITY OF WISCONSIN-MADISON, MARCH 1981

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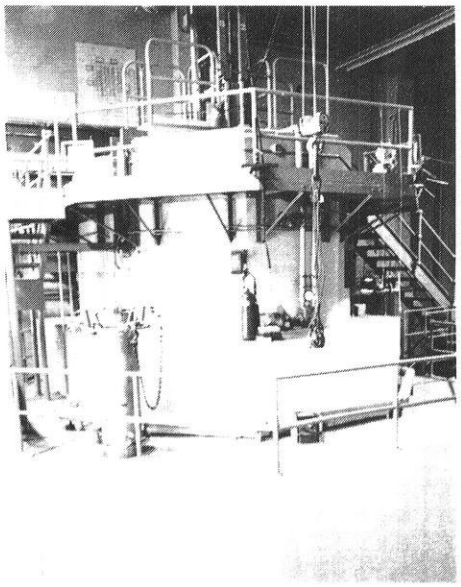

page 6

SPECIAL TOPICS

page 4

page 17

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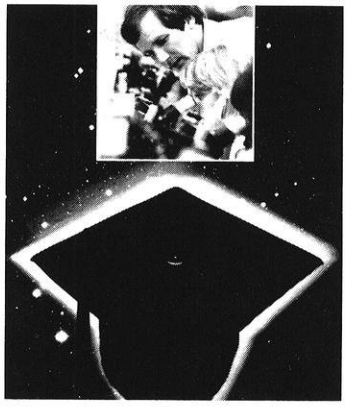

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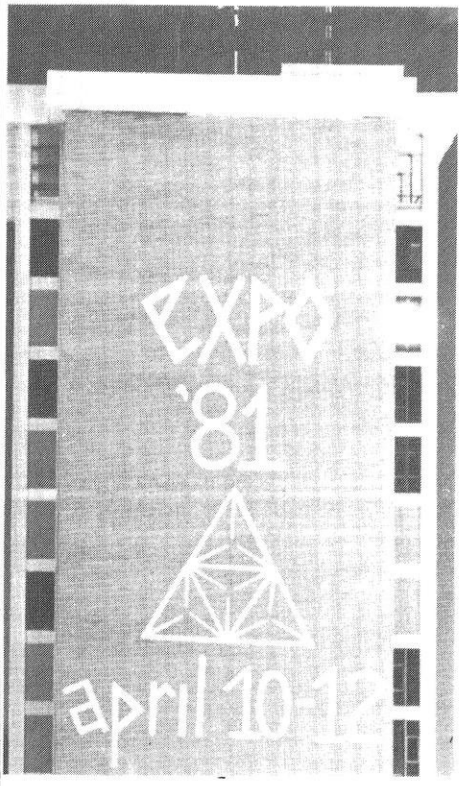

Editorial

by Will Kenlaw

"A tool is but the extension of a man's hand, and a machine is but a complex tool. And he that invents a machine augments the power of a man and the well-being of mankind."

—Henry Ward Beecher

Since the time of prehistoric man, innovation has been the life blood of society. It has been the sustenance of man; he has depended upon it. Innovation has carried man from the age of stone to the age of metals, and now to the age of computers. Man has transcended the natural and achieved the synthetic. New or novel ideas and concepts have enabled man to make great strides toward true innovation. Students of science, their mentors, and all practitioners, have been at the forefront of this movement.

Engineering students, in particular, are encouraged to be innovative, future-minded, and questioning. These students study proven concepts of the past to learn appropriate application of these concepts in the present and future. They strive to expand these concepts, and thereby shape the future. Ideas ranging from the farfetched to the revolutionary are taken from the conceptual stage to fruition. The opportunity to display these new ideas is provided by the university's engineering exposition—EXPO.

EXPO acts as a catalyst; it excites the energies contained within a diverse student body. It is the medium by which students are urged to extrapolate present trends and construct an image of the future. Investigation into the major concerns of our society is often the result. This year's exposition explores alternative and additional energy sources, future forms of transportation, computer technology, and a myriad of other areas.

The articles in this magazine highlight only a few of the exhibits presented in this year's exposition. They provide points of interest along the tour route for those who plan to attend the spring event. The magazine staff invites everyone to come and take part in another successful engineering exposition. □

Industrial foundations for EXPO '81

by Linda Periman

Industrial involvement in the engineering exposition is fundamental to overall success of the event. As a member of the EXPO executive committee, Linda Periman makes special note of this involvement. Linda is chairperson of General Publicity for EXPO and an Industrial Engineering junior.

Linda Periman, EXPO General Publicity Chairperson.

"Foundations for the Future" is the theme of this year's U.W. Engineering Exposition in Madison. EXPO '81, like past expositions, will display creative technology developed by students, industries, and government agencies that emphasizes plans for the future.

Industrial technology plays a role in all of our daily lives. If affects all of our actions from the time the alarm sounds in the morning to the time when we turn on the electric blanket at night. Thus we watch with interest the technology presented by industry and demanded by a growing, complex society.

The dependency on technology developed by industry is also felt at each engineering exposition. Without such dedicated participation by industry, the exposition would be lacking much of the excitement that it now generates. Industries bring in the most recent and revolutionary ideas. They provide opportunities for Wisconsin residents and students to view what is to come and to get involved in the latest advancements.

Many companies are appearing at EXPO '81. Among these are Onan, Republic Steel, Honeywell, Sperry-Univac, Square-D, and Dupont. Exhibit highlights include General Motors' X-car, Hewlett-Packard's graphic computer, Johnson Controls' electric car, and many more. Endless variety makes EXPO '81 exciting for all ages.

Governmental agencies also play an important role in every exposition and are certainly a most important aspect of EXPO '81. They bring in excellent examples of new technology that are presently being developed for the country. The Navy will bring a Nuclear Power Static display and present a slide series on their research for alternative energy sources. Exhibits are also being brought by the U.S. Army, Department of Energy, and the Geological Society.

The ensured success of EXPO '81 is a result of the efforts of the industries that help and participate. They allow open communication between themselves, the students, and the communities of Wisconsin. They are truly a most important aspect of the exposition! □

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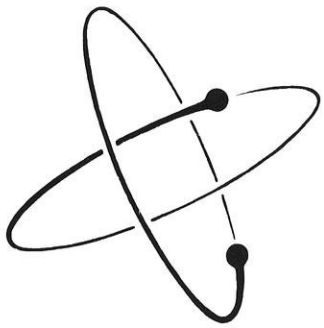

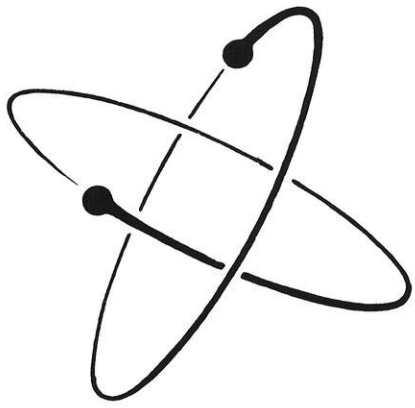

by Jeff Huckabee

Scientists and engineers, worldwide, continue to develop energy sources necessary to meet future world demands. Nuclear energy is one of these sources, and it remains very controversial. (The entire April 1979 issue was devoted to this subject.) Jeff Huckabee, a Nuclear Engineering graduate student, describes breeder reactor technology.

This country needs to be energy self-sufficient. The formula for energy independence is complicated and must include the use of many technologies. At this year's engineering EXPO, the student branch of the American Nuclear Society (ANS) is presenting a display on a technological development for the national energy equation, the Liquid Metal Fast Breeder Reactor (LMFBR). This exhibit is being furnished by the Breeder Reactor Corporation.

What is a breeder? It is a nuclear reactor which uses the heat generated from a nuclear fission process to drive an electrical generator, a process similar to the one used by the current light water reactors (LWR). But that is about the only similarity between the LMFBR and LWR. As the heat transfer medium, the LMFBR uses a "liquid metal" (Sodium) while water is used in the LWR. The LMFBR fission reaction involves a "fast" (high energy) neutron and a plutonium isotope (Pu-239), whereas the LWR uses a thermal (low energy) neutron and an uranium isotope (U-235). Finally, the Breeder Reactor produces more plutonium than it uses. Thus the acronym LMFBR—Liquid Metal Fast Breeder Reactor.

The big advantage that the breeder has over an LWR is that the LMFBRs increase the utilization of uranium. Less than 1% of the uranium in nature is U-235. LMFBRs fission the U-235 in the same manner as LWRs. In addition, the LMFBRs transmute the predominant uranium isotope (U-238) into plutonium (Pu-239) which also fissions, providing energy. Since the LMFBR initially contains more U-238 than Pu-239, more Pu-239 is produced than is used. In about ten years a breeder can produce enough plutonium to refuel itself plus another reactor of the same size. Thus, breeder reactors can greatly extend the energy extracted from a ton of uranium. To put this resource utilization into perspective, for a 1000 MWe only about one ton of uranium is required per year compared with about 150 tons of uranium for a like-size LWR and 3,000,000 tons of coal for a 1000 M We coal plant per year. The resource picture is even brighter. Approximately 250,000 tons of depleted uranium (residual U-238 from the enrichment processes) are currently being stored. Using breeder technology, the energy contained in that uranium is enough to provide this country with all of its electric requirements for over 500 years at the 1975 rate of electric consumption.

Breeder technology is not new. In fact, the first electricity generated by a nuclear reactor was from a breeder reactor. There has been a small breeder reactor operating in an electric grid in this country since 1964. Currently, there are prototype breeders operating in three countries: France, Britain, and the Soviet Union. France has made the strongest national commitment to the breeder program with the Phenix breeder, a 1200 MWe plant scheduled to begin operation in 1982. Ground has yet to be broken for America's prototype breeder, the 360 MWe Clinch River Breeder Reactor.

No panacea to the future energy requirements of the United States or the world is available. Therefore, development of all viable energy sources must continue. The breeder reactor is one such energy source. Everyone is urged to visit the ANS-sponsored breeder display at this year's EXPO. □.

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Dr. Doolittle's concept

by Dave Burdick

The interdisciplinary team approach is one of the most successful in engineering. Seven students from three engineering departments proved this point by joining forces and developing a new automotive concept. An interest in automobiles and a desire to develop organizational skills motivated Dave Burdick to join this team. One of two Industrial Engineering students on the team, Dave describes the purpose and design of the car.

The Pushme-Pullyou Car.

On a regular basis since 1953, the engineering campus sponsors EXPO, an event where exhibits from all fields of engineering are displayed. EXPO shows the most advanced thinking in all of these areas. One exhibit combined ideas from Electrical, Mechanical, and Industrial Engineering in the form of an automobile entitled Pushme-Pullyou Hybrid Car.

This hybrid was made from a 1953 and 1954 Saab auto, where each one was cut in half, and then reconnected at the rear portion of the front halves. This produced one car with engines and transmissions at both ends of the car (these Saabs contained front wheel drive). The rear engine was then taken out to allow room for the two 6hp electric motors. Seats were removed to install the control system and battery pack.

Due to the fact that the car's wheelbase length was extended 4 feet, yielding a turning radius of about 60 feet (which is much worse than even the 30 foot turning radius of a big car), the rear wheel steering capability was made comparable to that of the front.

The purpose of the hybrid car is to reduce the use of petroleum products needed (gasoline) to propel the car. Instead, it can use coal or nuclear fuel, which are abundant in the form of electricity. The interaction of the batteries with the gasoline engines, reduces the use of gasoline by 50%, thereby making it less expensive to operate the car. Unlike other strictly electrical vehicles, this car, because of it's 40hp gasoline engine has both good acceleration and long distance travel range. The gas motor is used for high speeds and also to assist the batteries. The batteries are used for startups and city driving. The car also takes advantage of reduced electrical rates offered during the night.

The interdisciplinary team members are: Dave Burdick, Tom Conway, Hoyt Halverson, Shawn Hover, Jeff Reece, Bob Sotirin, and Frank Voughan. Dr. Frank and Dr. Nadler, engineering professors, were consulted on the project. Until the exposition the hybrid car can be viewed in building T-24 – after EXPO, perhaps the Smithsonian Institute. □

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Space age Tonkas and neon lights

by Linda Periman

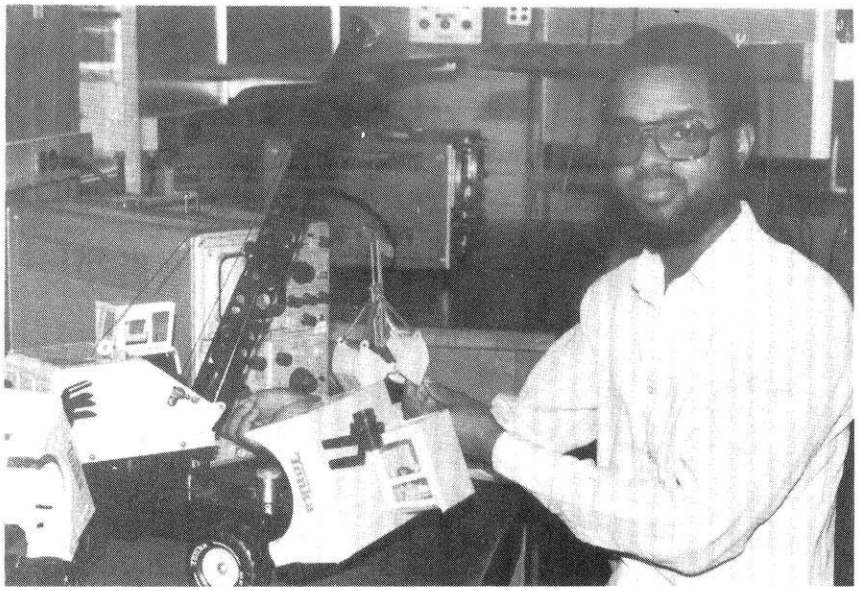
Hilton Augustine Jr. is a junior in electrical engineering. Originally from New Orleans, he found his way up to Wisconsin in the midst of lots of snow.

Hilton's interest in electronics started eleven years ago when he took apart a walkie-talkie to fix a broken antenna. Unfortunately he was unable to fix the antenna, but the funny-looking "things" he found inside the device sparked a curiosity in electronics that he has explored ever since.

Hilton has become involved with two projects through campus professional organizations. Both W.B.E.S.S. (Wisconsin Black Engineering Student Society) and I.E.E.E. (Institute of Electrical Engineers) participate in EXPO to give their members a chance to learn some of the practical aspects of engineering. Hilton's two projects utilize the speed and efficiency of computers to do jobs that are basically repetitious in nature.

The first project, done through W.B.E.S.S., consists of a model construction site. The model depicts a mining operation in which a conveyor belt is used to transport ore from deep within a mountain to the surface. A Tonka crane picks up the ore off a conveyor belt and unloads in into a Tonka dump truck. The object of the project is to use a simple computer to control the repetitive loading process. Originally, it was the crane operator's job to pick up material from the belt and put it in the dump truck; now it will be the computer's job.

So how does a computer "see" the material or the truck? It uses "electronic eyes". The computer is able to sense the presence of materials on the belt, move the belt until the material is within the reach of the crane, turn and lower the jaw of the crane to the exact spot, pick up the material, and finally take it to the dump truck. This cycle is repeated until no material is detected on the belt. An audio-video signal alerts the dump truck driver (the remote-control Tonka) to take the material away. The cycle starts over when the dump truck unloads the material back into the mountain. This project truly incorporates the best of electrical, mechanical and civil engineering.



Hilton Augustine demonstrates the W.B.E.S.S. project.

Hilton's second project, being done by I.E.E.E., takes advantage of only electrical engineering. Their first goal was to build a "working" computer—no kit, no plans, just hard work. After many sheets of computer paper, they finally came up with a working design.

When the project is completed, the computer will be used to run a billboard type message with 56 characters. The user will be able to type in the desired message, tell the computer how to display it (flash, roll up or down, left to right or vice versa), and watch it go. After the engineering expo, the computer will be used in the I.E.E.E. display window as a reminder to students about meetings, exam dates, and upcoming events. Future plans may call for a public access panel so that an observer can call for only the information he seeks.

Both projects show creativity and signs of changing times. It is clearly new technology that has as its purpose helping society through the field of engineering. □

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Pedal power-engine assist hybrid

by Gary H. Jacobs and Paul Fromm

Transportation is a category in this year's EXPO which will receive quite a bit of attention. Alternative forms of transportation are being investigated by national and international teams of scientists. Paul Fromm and Gary Jacobs are members of a seven-person team at the UW. Pedal power is part of the team's solution.

At the University of Wisconsin-Madison, construction is underway on a pedal power-engine assist hybrid vehicle. The vehicle is a car being built as a project for the upcoming Engineering Exposition. It is the result of three years of study in this field.

The vehicle is designed to provide an efficient form of commuter transportation that is relatively unaffected by the elements. It will be primarily used for trips of less than one hour.

An earlier prototype was built and displayed at the 1979 Engineering Exposition, where it won first place in the group competition category. This earlier car was also entered in the S.C.O.R.E. (Student Competition on Relevant Engineering) vehicle competition in Detroit during August of 1979 and received national recognition on televised news and in *Time* magazine.

Much was learned from this first prototype. That vehicle had three wheels and was steered by the single rear wheel. Although the vehicle had an extremely tight turning radius, it was difficult for an inexperienced operator to control it. Thus, the concept of rear wheel steering was rejected for the current vehicle.

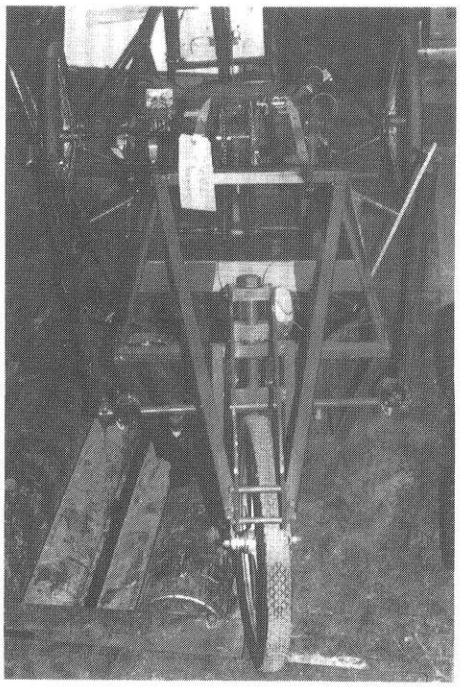
The first vehicle also proved that a typical 10-speed gearing system was inadequate for a vehicle of this size and weight. Chains and pedals were stressed well past their safe operating limits when the vehicle was pedalled uphill.

The present vehicle is driven by a unique linear pedalling system designed by student Paul Fromm. Linear pedalling motion is converted to rotational motion through a highly efficient ratchet mechanism.

The gear ratio is altered by changing the length of a lever arm attached to the pedals. This can be done while the driver is pedalling. The gear ratios are set up so that a driver pedalling at a speed of 60 strokes/minute will be able to go 5 mph in low gear and 25 mph in high gear. At speeds above 20 mph an engine will be used.

The engine in the vehicle is a 16 h.p. 4-stroke industrial engine donated by Briggs and Stratton Corporation. It has its own electric starter and lighting coil for running the vehicle's electrical system.

The vehicle's body is structurally based on two foam-filled aluminum beams, which run from the front to the back of the car, with the floor suspended between them. This is logically a monocoque type of construction, in that there is no actual frame. The floor and skin give the vehicle most of its lateral rigidity, while the two beams keep the vehicle from sagging.



The Pedal Power-Hybrid Vehicle.

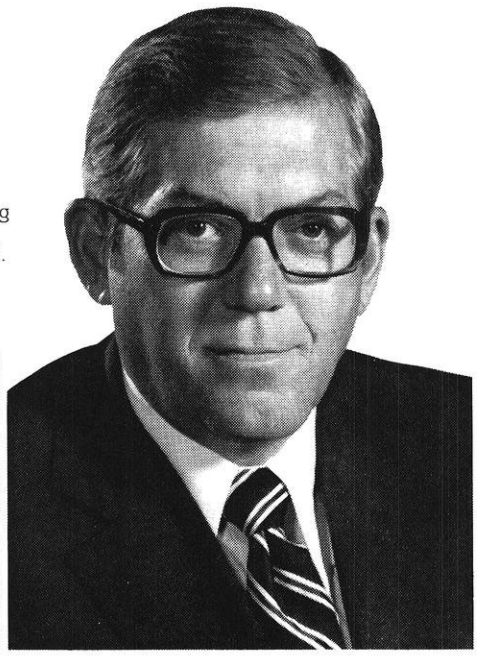
The vehicle weighs about 400 pounds, about the same as a mid-sized motorcycle. Although this figure may appear heavy for a bicycle, when one considers that a small sports car such as the Triumph Spitfire weighs almost 2000 pounds, the figure is rather light for a car. The light weight should contribute to the vehicle's potentially high gas mileage. Actual mileage won't be known until the vehicle can be tested.

The entire project is primarily funded and advised by Professor Ali Seirig of the Mechanical Engineering Department. It is being built by Tom Ebbot—structural calculations; Paul Fromm—design, construction; Gary Jacobs—business aspects, construction; Karl Kuehn—construction; Joe Malter—construction, design; Steve Neises—machining, drafting; and Greg Schwandt—construction. Generous assistance has been provided by the staff of the Mechanical Engineering Shop.

The vehicle will be on display at the 1981 Engineering Exposition on April 10-12. □.

"Will you find a rewarding career in the steel industry?

Charles Anderton
Penn State, 1976
B.S. Electrical Engineering
Electrical Engineer,
Sparrows Point Plant, Md.

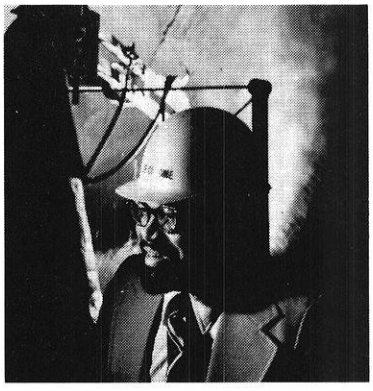


Pat Metheny
U. of West Virginia, 1974
B.S. Industrial Management
Mine Superintendent,
Marion Coal Division,
W. Va.

"I did–at Bethlehem. And so did these engineers."

Walt Williams, President and Chief Operating Officer Bethlehem Steel Corporation

Claire Van Matre
Duke, 1977
B.S. Mechanical Engineering
Staff Engineer,
Buffalo Tank Division, N.J.



Juan Giscombe
Polytechnic Institute of New York, 1976
B.S. Operations Research and Systems Analysis
Industrial Analyst,
Burns Harbor Plant, Ind.

"When I joined Bethlehem Steel's management training program back in 1951, I wanted challenges and I wanted opportunities. As a civil engineer in a company that was growing and modernizing, I was given my share of both.

"Today the challenges and opportunities at Bethlehem Steel have never been greater. Sure the steel industry has problems. But here at Bethlehem we're hard at work solving those problems. We're strong financially. We're strong in raw materials. We're strong competitively. We're strong technologically. And we're strong in people.

"But we always need more people. Good people. New graduates. Engineers who aren't afraid of hard work. Who aren't afraid to rock the boat. Who want an exciting, rewarding career in the profession they've chosen.

"I invite you to join us and grow with us. Pick up a copy of our Loop Course booklet at your Placement Office or ask us for one. See for yourself what we've got to offer you. Write: Director—College Relations, Bethlehem Steel Corporation, Bethlehem, PA 18016."

Mr. Williams joined Bethlehem Steel's management training program (The Loop Course) in 1951 upon graduation from the University of Delaware with a B.S. in Civil Engineering.

Bethlehem BETHLEHEM STEEL

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Dean's page

The engineering exposition 1981

Associate Dean Robert Ratner

It is my privilege to make some comments about the forthcoming Exposition. As faculty chairman EXPO since 1965, I have had the pleasure of working with many EXPO committees and of seeing the results of their efforts. Invariably after each EXPO I think "this is the best EXPO that has ever been presented," for they have all been outstanding. This has to be a tribute to the competence, dedication, and organizational skills of the EXPO Executive Committees and the hundreds of engineering students who were involved in the presentation of EXPO.

As you might guess, planning for EXPO begins a long time before EXPO is held. About one-and-a-half years ago Polygon Board selected Joe Velk, ECE-3, and Jean Oliva, CEE-3, to be General Co-Chairmen of the 1981 Engineering Exposition. After much searching and screening, Joe and Jean selected David Weissburg, IE-3, to be Chairman of Business Organization; Kevin Klein, ME-3, Chairman of Industrial Exhibits; Jon Hartfield, ME-4, Chairman of High School Public Relations; Linda Periman, IE-3, Chairman of General Publicity; Sarah Pope, ME-4, Chairman of Student Exhibits; and Lita Yutuc, CEE-3, Chairman of Personnel and Advance Publicity.

The theme chosen by this committee for EXPO '81 is "Foundations for the Future." The logo, which some of you may have seen already on the t-shirts that the EXPO committee is selling and on the sign that was projected on the side of ERB for a week, follows this theme by indicating that engineering forms the building blocks for the future. I think that you will agree that this is an exceptionally appropriate theme at this time because of the general need for understanding of technology by all citizens. I am certain that the theme "Foundations for the Future" will spark many interesting and worthwhile projects.

Because some may not know how EXPO got started, I am going to repeat some comments that I have made previously. The idea for EXPO was conceived in 1940 when engineering students saw a need for a constructive use of their talents after one of their annual feuds with law students over whether or not St. Patrick was an engineer got out of hand. On the occasion in question, a St. Patrick's Day parade, engineering students were pelted with rotten eggs and various other missiles. As a consequence EXPO was born, and the first exposition was presented in 1940 at about the time when a St. Patrick's Day Parade would have been held. The second exposition was held in 1941. World War II brought a temporary halt to the expositions, and it was not until 1953 that Polygon instituted the present tradition of expositions. EXPO was presented on a triennial basis from 1953 to 1965 and biennially from 1965 on; thus, the forthcoming EXPO will be the thirteenth. Some may be interested to know that Professor Bollinger was student chairman of one of the earlier expositions.

Let me emphasize that EXPO is a huge undertaking. To present a good EXPO much is required of everyone who is involved. Thousands of behind-the-scene tasks must be handled smoothly and at the appointed time; potential exhibitors must be contacted; exhibits must be set up; parking arrangements must be made; signs must be prepared and installed; routes must be laid out and maintained; tickets must be sold; brochures must be printed; refreshment stands manned; etc., etc., etc.

The EXPO Executive Committee.

Recognizing, then, that there is much work involved, why are so many engineering students willing to use their valuable time to participate actively in EXPO? To begin, I believe that engineering students in general are service oriented, that they have a feeling of concern about the community. I believe that they consider EXPO to be a very worthwhile event in the life of our college and that they feel, therefore, that it is important for them to participate.

Many students have told us that they chose engineering as a career after visiting EXPO as high school students. This is good, and we all should be pleased that EXPO had this positive influence upon their lives. Also, EXPO is viewed by thousands of other students on campus, parents, university administrators, legislators, and other state and municipal officials. All of these people have had their perceptions of engineering expanded as a result of seeing the exhibits. This is truly an event to which the people of Madison look forward as evidenced by the many inquiries about the dates of EXPO that the committee receives daily.

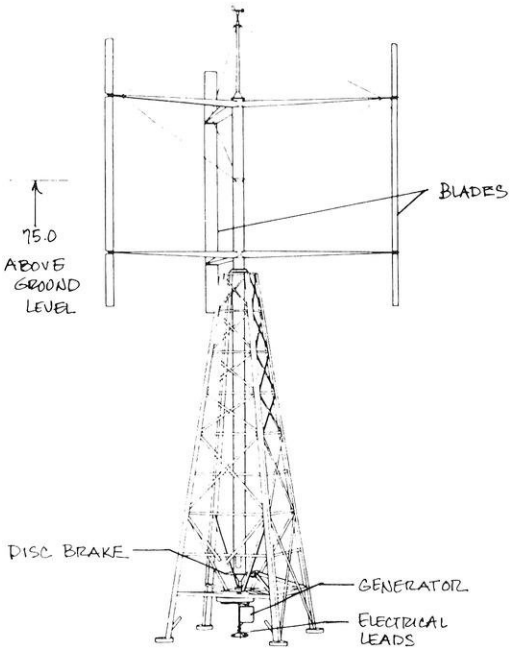
And at the end, after EXPO has been a success, for these students who put it on, there is a joy of accomplishment and a spirit of camaraderie that alone seems to have made all of the hard work that went into EXPO worthwhile. In the college's administration, we are looking forward to a super EXPO this April. We believe that the 1981 EXPO will be the biggest and best yet, for the EXPO committee has been outstanding in its preparations.

For all who may happen to read this column, don't be left out. If you have not yet become involved in EXPO, do so now; there is still time. There are lots of posters and exhibit entry blanks in the buildings to tell you how to get started. If you have not prepared or do not wish to prepare an exhibit, contact one of the committee chairmen and volunteer to help on a committee. Exhibits and people power are both needed. Give yourself a treat. Have some fun. Pitch in and discover the joy of being involved. You will find EXPO to have been an experience that you will remember the rest of your life! □

Wind turbine

by Steve Lucareli

Wind power is an attractive alternative energy source. Harnessing this power **efficiently** *is the major technical problem. Windmills have been used to harness power for hundreds of years, but their power extraction efficiency lies in the 40-60% range. A key to maximizing this efficiency lies in the design of windmill blades. Two Engineering Mechanics seniors have developed a promising design.*



A vertical axis windmill

For the past three years, the Vertical Axis Windturbine Project has been a practical outlet for much of the classroom theory studied by Engineering Mechanics students Steve Lucareli and Art Vawter. Working under the supervision of an Engineering Mechanics professor, Lucareli and Vawter are nearing the completion of a full-scale test stand that they hope to use to examine the life characteristics of a variety of blades.

As a variation on the conventional windmill configuration, vertical axis turbines (VAWTS) possess some unique characteristics which make them worthy of study from an engineering point of view. While in conventional propeller-type windmills the blades spin about a horizontal axis, in a VAWT the axis of spin is changed to the vertical. Horizontal axis turbine blades experience severe bending stresses from a variety of sources. The difficulty in overcoming the problems associated with these bending stresses is a primary reason for studying VAWTS. Because VAWTS accept wind from any direction, they also eliminate the tail vane used in horizontal configurations.

The VAWT idea is not a new one; it was the subject of a patent issued to 1930's French inventor G.M. Darrieus. Looking much like a single inverted egg beater, Darrieus' invention took advantage of lift forces experienced by an airfoil as it moves through a stream of air. To reduce bending stressed that result from centripetal forces, the blades were made in a catenary, a shape similar to the one a rope assumes when stretched between two points. Darrieus' design took advantage of this shape as a means of converting bending stresses into tensile stresses, which are better handled by most materials.

Lucareli and Vawter have made some minor improvements on the original Darrieus design and have gotten some surprising results in the process. A theoretical analysis of their design shows possible performance approaching the limiting Betts' coefficient. A German physicist during the 1930's, Betts calculated mathematically that the maximum power extractable from a column of air using a turbine-type device was 59% of the total. Modern prop-type windmills theoretically yield 42% maximum. However, Lucareli and Vawter have found their design may be capable of 57%.

Currently the two undergraduates have plans to submit a grant proposal to the state to get funding for a student staffed testing program. The Baker Manufacturing Company, Evansville, Wisconsin, has also expressed an interest in manufacturing blades of their design. According to Lucareli and Vawter, interested persons should keep watch for information on a possible student-designed blade contest in the future. □

Taking command of a plant trip

by Dale Hershfield

The graduating engineer is sometimes swept off his or her feet by on-campus recruiters. This literally translates into an invitation for a plant visit. As a part of a project for an engineering course, Dale Hershfield researched the areas of interviewing and plant trips. Articles on these subjects are published with great frequency, but rarely does one contain the student viewpoint. For this reason, Dale's article is important and timely. He is a graduating senior majoring in Industrial Engineering and has taken several plant trips.

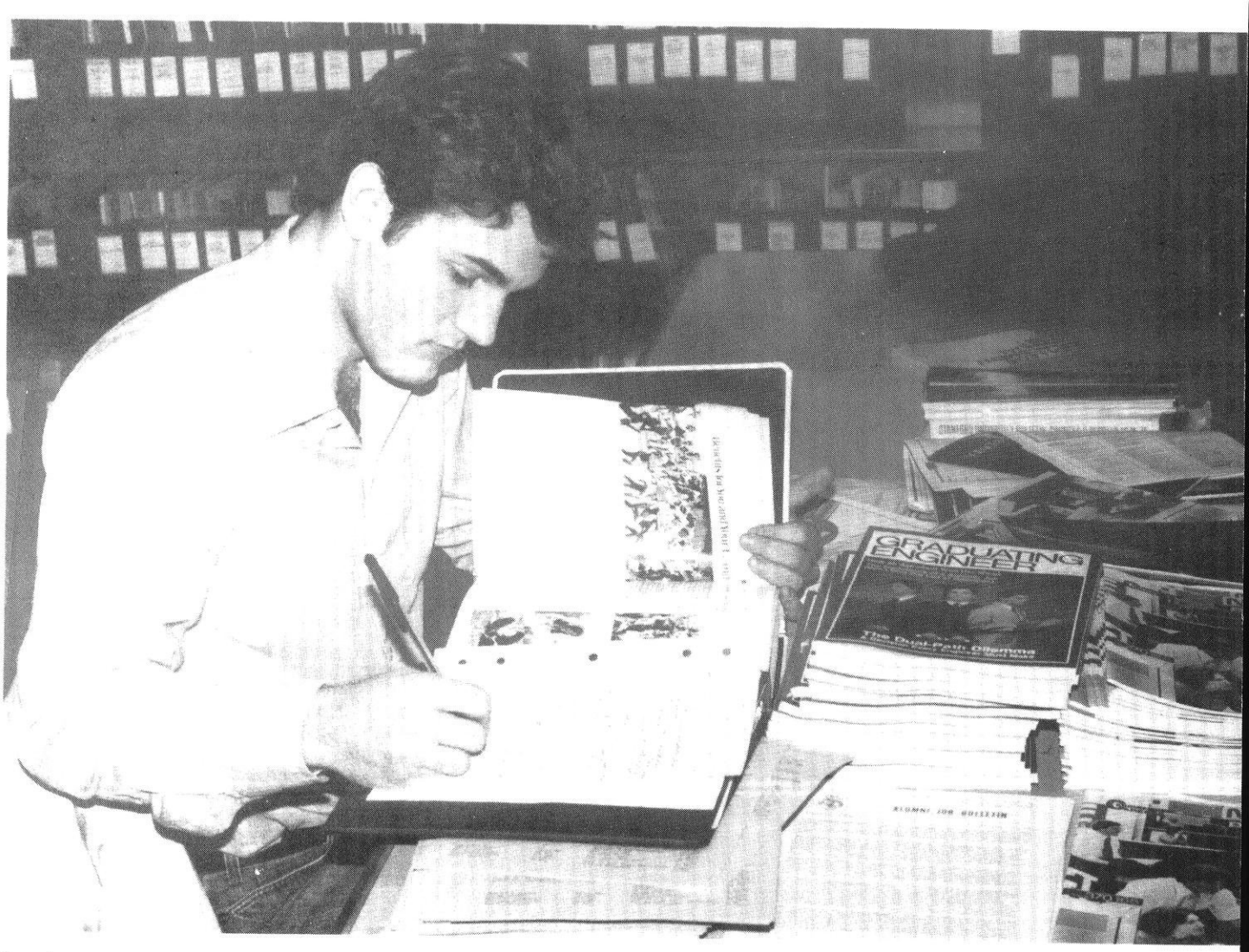
Flying to some far away place, taking in the sights, being entertained in nice restaurants, meeting interesting people – this is no vacation, you're interviewing for a job! Your plant trip should be enjoyable yet it is also serious. Both you and the company are making key decisions as you take your first steps into a rewarding career.

A successful plant trip topped off with a job offer is the common goal of most graduating seniors. Spending time planning for the trip can go a long way toward making the trip run smoothly. There are three rules to follow when planning for a plant trip: know yourself, know about the company, and have a strategy for showing the company your strong points.

Know Yourself

The job search necessarily begins with the question, "What kind of job do I want?" A candidate owes the recruiter an honest and clear answer to this querie. Formulating the response is not an easy task. It requires an ample dose of serious thinking. What do I most like to do? What kind of work have I done that I

Success hinges upon knowing one's self. One never gets a second chance to make a good first impression.



Graduating seniors do some important homework.

enjoyed? (Summer or co-op engineering exprience is a valuable aid here). What are my long term and short term priorities?

The question "What do I want to do?" is a well-worn cliche with many seniors; their pat response is, "I don't know." It must be emphasized that there is no substitute for an indepth personal analysis and statement of job-related goals. Satisfaction is a function of how well your job matches what you really like to do. Without identifying your goals it is not possible to find a job that can meet them.

I have found the "50 Questions Most Asked by Recruiters" to be very insightful. The questions, originally from the 1975 Endicott Report, are contained in Kirby Stanat's book, *Job Hunting Secrets and Tactics.* A more comprehensive book on career planning and self-evaluation is the excellent *What Color Is Your Parachute?,* by Richard Bolles.

Alternatives do exist, however, for the senior who cannot decide which door of opportunity to open. Employers recognize that college seniors have a difficult time deciding on their job intersts and many companies offer internship or engineering rotation programs. In these programs new employees are rotated through three or four different jobs in different functionial areas. After completing the program and learning about available opportunities, the person decides on a permanent placement within the company. If your statement of job interests is marked "undecided" such a program may be for you.

Know the Company

The crux of a plant trip is the exchange of information. You want to find out about the company and they want to learn about you. Knowing abut the company is the second rule for planning for a plant trip. This topic can be divided into the areas of general information about the firm and information about the specific job(s) being offered.

A basic knowledge of the firm

s the cornerstone of preparation or a plant trip (and the campus nterview!) The company's iterature in the Engineering Placement Office (1150 Engr. Bldg.) is a good place to start. The firm's annual report is also an excellent source. Most companies devote half of their report to a description of what they produce and the markets that they serve. The second half of the report contains the bulk of financial data. *Standard and Poors* business reference is another good source book. It contains a meaty one-page summary of the company's background, economic position and future outlook. You can find magazine articles about companies by using the *Business Reader's Guide to Periodical Literature.* This guide, *Standard and Poors,* and company annual reports can be found in the Business School Library (825A Bascom Hall).

Research has shown that most graduates go with a company because of the type of work offered. You'll want to get detailed information about the entry-level position(s) being offered. What will your job responsibilities be? What career paths are open to you? What sort of beginning assignments will you have? Likewise, the enthusiasm and attitude of the company's employees makes a significant statement about the personality and philosophy of the company. Specifics on fringe benefits and the cost of living and tax rate at the location are also noteworthy.

Show Your Strong Points

Professionalism best describes the attitude with which you should approach a plant trip. Your manner should be enthusiastic and confident yet personable and mature. A neat, clean and conservative appearance is recommended. John T. Malloy's *Dress for Success* books can be helpful here.

Your professional attitude is the basis for showing the company your strong points. Four main issues that a company will examine and that you should consider are: technical ability, people skills, communication ability, and motivation. Grades can be an indicator of technical ability, although employers are more interested in technical competence coupled with practical knowledge and common sense. On the issues of people skills and internal motivation your enthusiastic attitude and personable manner will speak well for you. Plain speaking and direct communication will link together the other three areas.

The concept of showing the company your strong points goes beyond these issues. If you want the job, tell your host that you do. Give him or her a sales pitch! The product you are selling is yourself, and the company will hire you only if it is convinced that the benefits you will bring outweigh your costs. With a knowledge of the company and a firm grip on youir career goals, you must take the initiative. Tell your host that you want to work for the company and, most critically, state *why* you want to work for them.

Presentation is the key. One of the most effective ways to get your message across is in a specially prepared speech. Your statement can begin with some positive comments about the company and the job. Then discuss some of the reasons you think you are especially qualified for the job. Other reasons why you want to work for the company can follow. Although you will probably make positive comments to all of the people you speak with, save your special sales pitch for a manager who will have a significant say in whether or not you will be hired.

Another profitable strategy for presenting your qualifications is to prepare a short agenda of topics that you want to cover during the day visit. This list should include significant work experience, personal strengths, and pertinent course work. By keeping the agenda in front of your mind, you will be sure to discuss your strong points during your interviews.

Enthusiastic presentation of your strong points, a clear statement of interest in the job, and a solid knowledge of the company all lead to a successful plant trip. But the trip doesn't end when you get on the plane to return to Madison. It is a courtesy to send a thank you letter to your host. You can make the letter work for you by restating your qualifications for and interest in the job. Sending the letter can make a difference in whether or not you will be offered a job. But send the letter promptly. Companies often make their decision in less than a week.

Relax, enjoy, have fun. But be prepared. Be professional. And good luck in finding the job that best matches your interests. □

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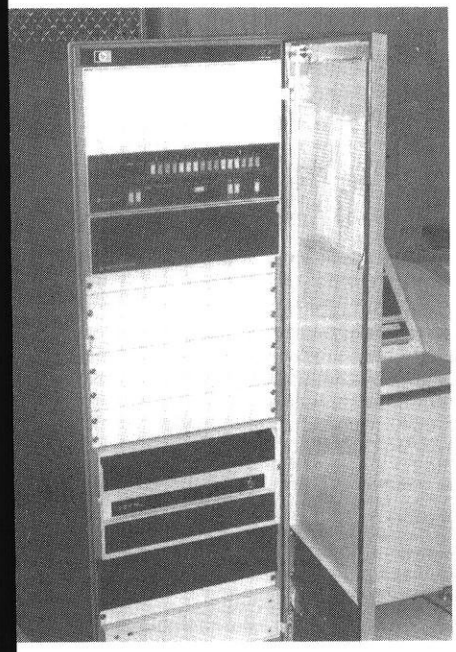
HP donates two computers to ECE department

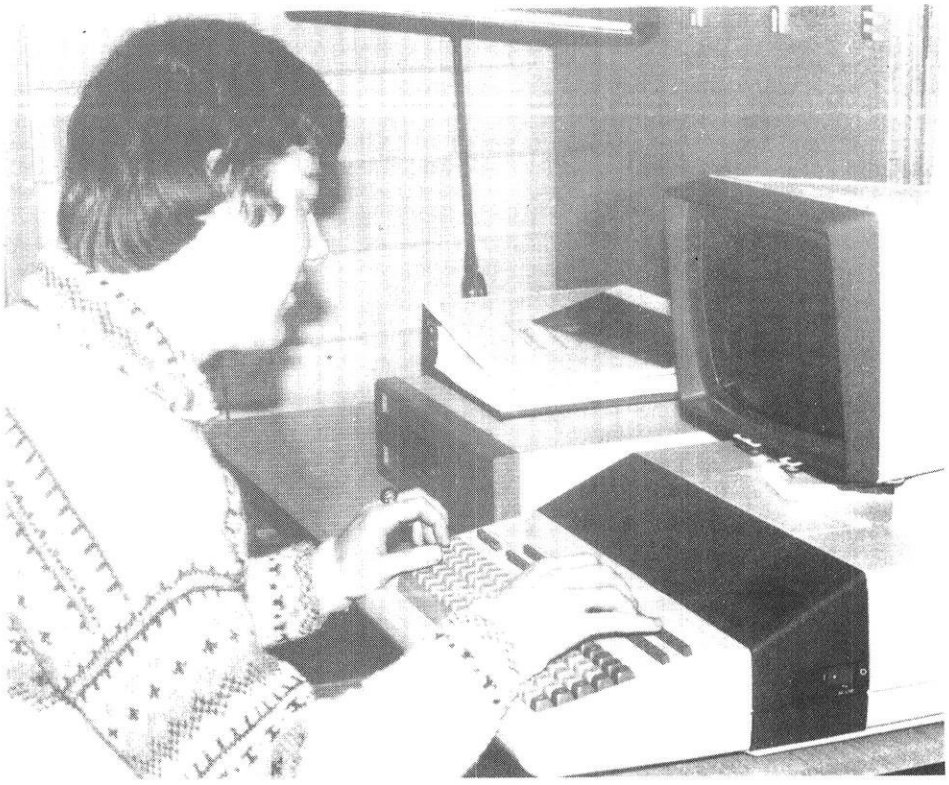
by Joseph Pairitz

State of the art equipment and facilities are part of the mainstay of the scientific community. This community includes engineering schools and colleges. Industrial contributions and donations continue to support scientific research and instruction at these institutions. Joseph Pairitz, a freshman in Electrical and Computer Engineering, provides a report on one such donation at the UW.

The Hewlett-Packard Company has donated two Series 9800 System 45 desktop computers to the Electrical and Computer Engineering Department, primarily for use in undergraduate class applications. The two computers, valued at $32,000 each, were accepted by ECE Department Chairman Professor Birkemeir on January 23, 1981. Last year HP donated an HP-1000 computing system to the department.



The HP-1000 computing system.



Jim Langan keys in a program on the HP-9845 desktop computer.

The HP-9845's are located on the third floor of the ECE building in the same room as the HP-1000. The great advantage of these computers is their portability. They are mounted on carts that can be wheeled into a classroom for a class demonstration. Capable of full graphics, the HP-9845 has 200 kilobytes of storage, 128 kilobytes of physical memory, which is the same capacity as the HP-1000, and a single side, single density disk drive. It has a printing accuracy of 13 digits with exponents up to the 99th power. Internally, it can work with exponents up the the 512th power. The HP-9845 also has six pages of screen memory and the capability for 100 kilobytes of storage through minicassettes. Finally, the HP-9845 can communicate with the HP-1000, thereby adding to the versatility of this computer.

The donation of these computers by HP came at a time when computers of this type were badly needed. They will be put to good use and will be greatly appreciated. □

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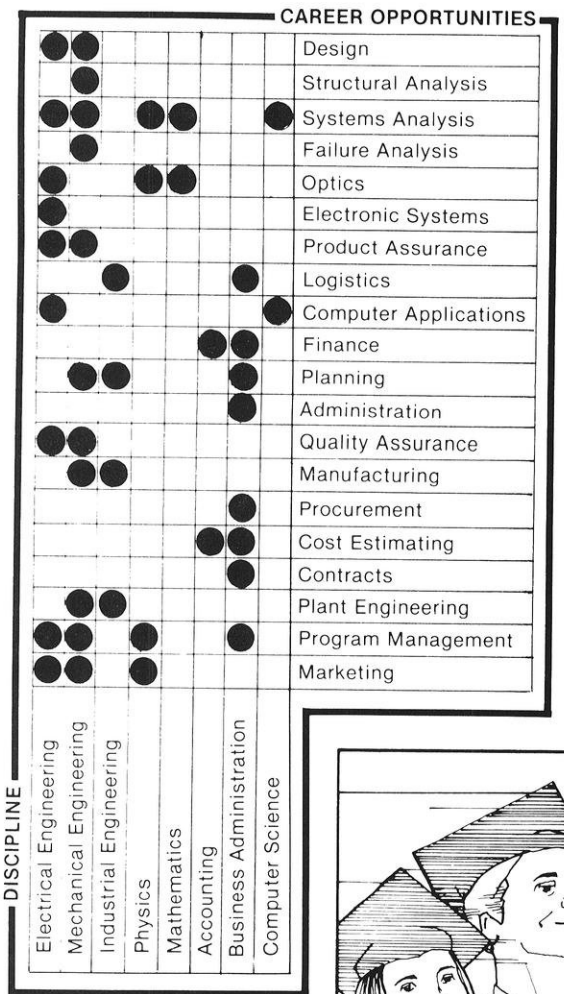

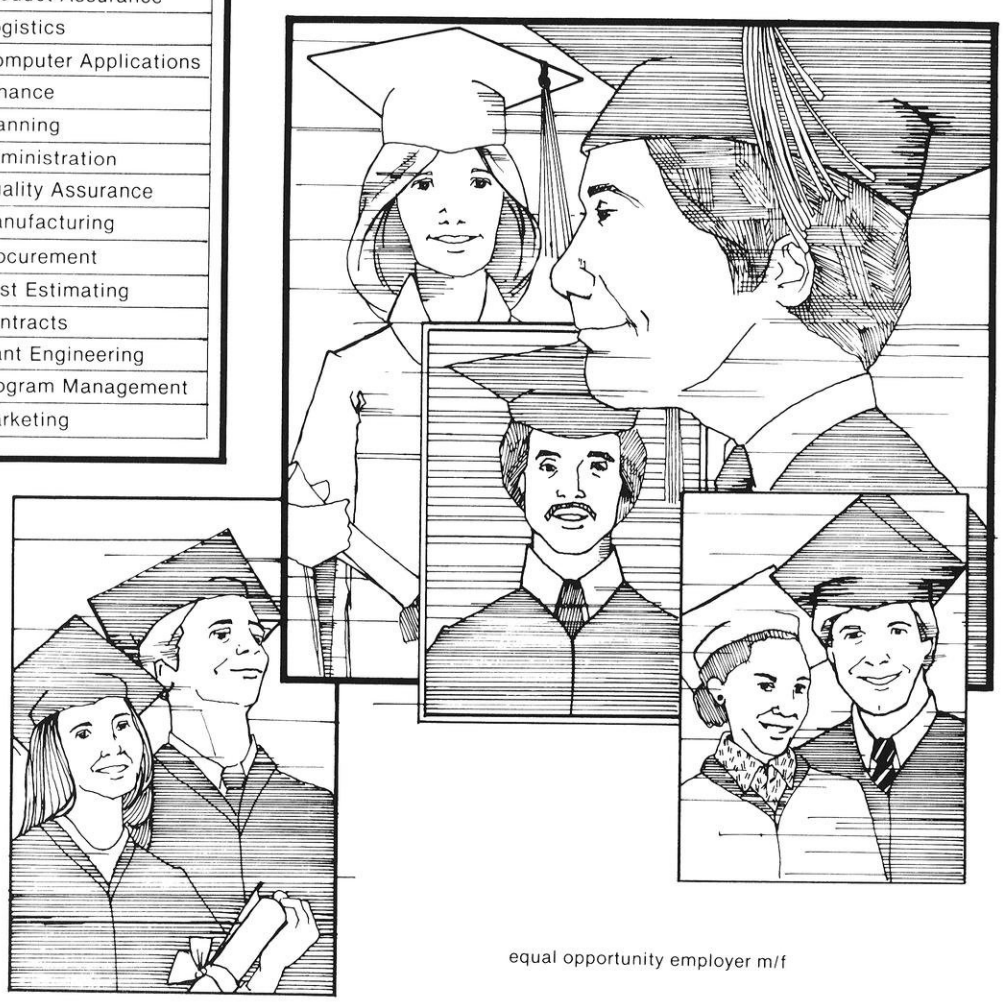

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The catcher in the rye

A review of "Ethics on Trial"

y Dave Barnas

Student chapters of professional ngineering societies continue to hrive at the UW. Over the past ew years membership in most hapters has remained steady if ot increased. A major reason is he variety of benefits membership ffers. These societies arrange in- lustrial field trips, engineering rojects, guest lectures, student arties, and several other events. The ASCE student chapter recent- y viewed a special film presenta- ion produced and provided by the rofessional, parent organization. Dave Barnas, a sophomore in Civil and Environmental Engineer- ng, provides the meeting's ighlights.

"Ethics on Trial" is a film of a mock trial conducted by the American Society of Civil Engineers (ASCE). The trial shown in the film is based on an actual case history. The film was shown recently to nearly fifty members of the student chapter of the ASCE.

The trial involved a little more than the average stress-strain problem. It demonstrated the pressures of extortion. The facts, as presented in the mock trial, appeared cut and dried. There was no question that an unethical act had been committed. The film provided ample opportunity for students to contemplate their own future concerns. It also showed how a professional society can exercise control over its members.

Background

When applying for membership to the ASCE, an engineer voluntarily agrees to adhere to the society's Code of Ethics. Furthermre, he agrees to enforce those ethics. Enforcement is a process requiring raw courage. It means having the steadfastness to step forward to say something is wrong. Can one recognize when a wrong or immoral act is taking place? Let's investigate your intuitive answers by examining the case history of one Marvin Camper — a fictitious name, but a real story.

The Case History

Marvin Camper, age 32, was a partner in an engineering firm that was just two years old. It was just one infant in a huge nursery full of firms. In order to build up his repertoire and establish business relations, he needed to acquire some new contracts or he would be forced to fire some of his employees.

Through a partner, Mr. Camper was introduced to Mr. Riley, the county engineer. Mr. Riley solicited a 25% cash kickback from Mr. Camper in exchange for granting the contract to Camper's firm. Under the advice of an older but not wiser counsel, Mr. Camper agreed to pay the kickback with the idea of improving his business. By the time the federal authorities made their investigation, Mr. Riley had received nearly $100,000 through fraudulent billing procedures.

The Trial

Mr. Camper discovered he was being investigated and stopped payment of the last kickback, nearly three years after the first payment. He cooperated fully with the federal attorney who was investigating the situation. He was issued a subpoena by a grand jury and subsequently was granted immunity by a federal judge. Camper was fully acquitted of any federal offense by cooperating and entering a plea of nonself-incrimination.

He then faced his peers on a professional level — the ASCE board, consisting of a president, secretary, and 29 officers, who conducted the trial.

Two fundamental principles, since rewritten and revised, were violated by Mr. Camper. One dealt with Camper's collaboration on extortion payments. The other concerned unethical conduct befitting an engineer. The prosecution presented, very eloquently, a succinct description of the scheme and extortion payments. It contended that Mr. Camper should be held in violation of the two principles. (Writer's Note: Stop now and review the Code of Ethics in conjunction with your major course of study.)

In his defense, Mr. Camper made no denial of the extortion payments. He made no plea for leniency by the board. However, he

walked a tight rope by arguing that he had not offered the kickback but had simply conformed to a request. Furthermore, he reasoned that although he was guilty of committing a moral offense, he was innocent of any wrongdoing. He listed his civic involvements as evidence of his good character. He pointed out his membership in the Society of Municipal Engineers, Transportation Engineerers, U.S. Army Corps of Engineers, and Chamber of Commerce. He used his family and church participation as the icing on the cake.

Should one hastily made decision in one's youth destroy a man for life? He claimed that the pressures of being in a management position caused him to make the wrong decision.

Insight During Questioning

The ASCE board badgered this man with penetrating questions. He revealed that busines had gone from 40 to 3 employees. He had not been awarded any government projects since the investigation. His capital losses amounted to nearly $400,000. He signed new contracts for extortion payments each year.

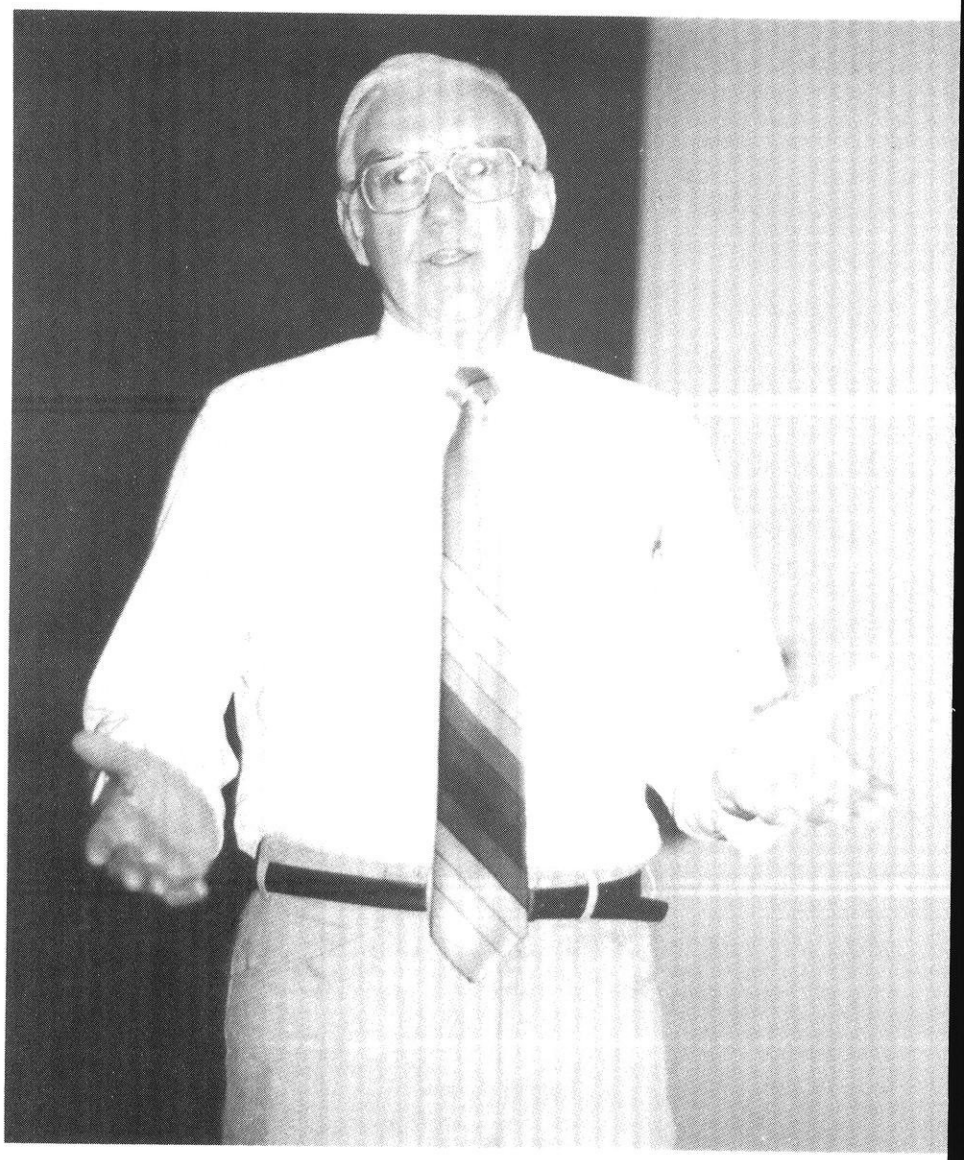
Camper admitted his wrongdoings, volunteered his time to help others, and requested non-expulsion from the ASCE. The board had three choices: reprimand, suspension, or expulsion.

Student Discussion

At this point, the film was stopped and the floor opened for discussion by the students at the ASCE meeting. Suggestions included lynching, making an example of Mr. Camper, and throwing the book at him. The student vote on the course of action was roughly: 15% for reprimand, 35% for suspension, and 50% for expulsion. Quite a bloodthirsty crowd was in attendance.

The board found Mr. Camper guilty of violating both principles and deliberated giving Camper a three year suspension. His statements concerning his basic misinterpretation of the ethics proved disastrous. He seemed to have learned his lesson through a financial loss, but this realization should have occurred before he put a black mark on the integrity of the profession.

The title "Catcher in the Rye" refers to the fact that in the film Marvin Camper was played by the actual offender, Mr. Kammerer. He encouraged engineers seeing the film to learn from his mistakes and to heed the Code of Ethcs.



A guest speaker addresses the ASCE student chapter.

He suggested approaching the proper authorities when faced with a similar dilemma. A confidential Ethical Society Service has been established through ASCE to help in such matters.

Mr. Kammerer was afforded the opportunity to resume his practice after a two year suspension. His suspension was reduced one year, in return for his participation in the film. Engineers are said to be wise men. For future wise men and women, this case history offers a special message — anyone can learn from experience. The wise man learns from someone else's experience. □

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With a projected range of 100 miles at a constant 45 mph, it's so much better than previous models that there's hardly any comparison.

What's made this big difference is electronics. A GE-designed microcomputer manages energy flow throughout the propulsion system, regulating power demand to extend the car's range.

The power-conditioning unit contains another major GE innovation: special high-power transistors.

They're the world's most efficient high-power transistors, capable of switching 400 volts and 350 amps on or off in less than a millionth of a second. Yet the silicon chip that contains them is less than half the size of a postage stamp!

These high-power transistors have three important functions.

They regulate the speed, torque and acceleration of the car's DC motor.

Their high-frequency characteristics also make them ideal as components for the car's overnight charging system.

Finally, the transistors play a big role in the car's regenerative braking system. They help change the motor automatically into a generator, supplying braking power to the wheels and producing current to partially recharge the batteries.

What's coming down the road after this advanced vehicle? GE engineers are developing one that's even more advanced. It's a hybrid that will burn far less fuel than an all-petroleum-powered car and have even greater range and power than the all-electric. It too will feature microelectronic controls...but of even greater sophistication.

Looking for new and practical solutions to transportation problems is just one example of research in progress at GE. We're constantly investigating new technologies, new materials and innovative applications for existing technologies — in such areas as energy sources, motors and drives, aerospace systems.

This takes talent — engineering talent — not just in research and development, but in design and manufacturing, application and sales.

If you are interested in engineering opportunities at GE, check your Placement Office or write to: Engineering, Bldg. 36, General Electric, Schenectady, New York 12345.

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