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wisconsin engineer

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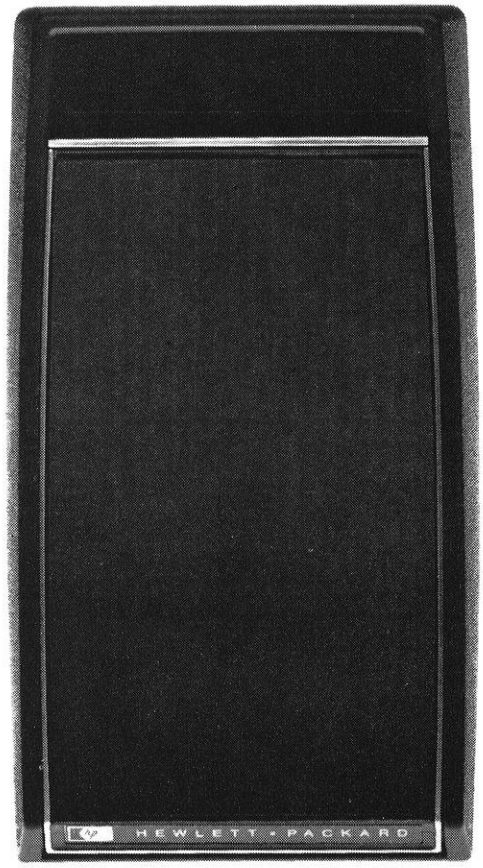

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Cover photo of U.W. Engineering Campus by William Lindsey.

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Dean's Page

THE ENGINEERING EXPOSITION 1975

I was pleased to be asked to write a column about Expo as preparation for it started in me a stream of memories of previous Expos. It has been my privilege to be faculty chairman of Expo since 1965 and in that time I have had the opportunity of meeting and working with scores of truly exceptional engineering students. At each Expo I am genuinely amazed at the quality of the exhibits, the smoothness of the organization and the dedication of the hundreds of students who are involved. And when it is over, I rejoice in their pleasure of a job well-done, of the new friendships that have been made and of the new skills and knowledge that they have gained.

You may not realize that the planning for this Expo began almost one and one-half years ago when Polygon Board selected John Dekker and Kevin Zentner to be co-chairmen of the event. They, in turn, selected an excellent committee to head-up the various functions and since that time the committee has been meeting regularly and working vigorously. In the event that you have not yet met the committee, they are: Robin Drout, High School Public Relations; Brad Vine, Publicity; Randy Bates, Student; Steve Whitsitt, Buildings & Organization; Dennis Kast, Student Exhibits; and, Brian Strasburg, Industrial Exhibits.

The theme chosen by the Committee for Expo 75 is: "Engineers Helping People", an excellent one I think in this period of concern about the impact of technology and the engineer upon the environment and mankind. Certainly, such a theme should spark many into thinking of interesting and worthwhile projects for exhibits.

Associate Dean Robert A. Ratner

Some may wonder how Expo got started and about the benefits that might accrue from it. The idea was conceived, initially, in 1940 when engineering students sought a constructive use of their talents after annual feuds with law students, over whether St. Patrick was an engineer, got out of hand. The first exposition was presented in 1940 and a second held in 1941. World War II brought a temporary halt to the expositions, and it was not until 1953 when Polygon Board began the present tradition of expositions. The present exposition will be the twelfth as they were presented on a triennial basis from 1953 to 1962 and biennial from 1965 on. Of interest to some might be the fact that Professor Bollinger was chairman of one of the earlier expositions.

To present an exposition, much is required of all who are involved. Thousands of behind-the-scenes tasks must be handled smoothly; exhibits must be set up and ready; parking arrangements must be made, signs made, routes laid out and maintained, tickets sold and taken, brochures printed, utilities located and provided, refreshment stands manned, etc., etc., etc.

Recognizing, then, that there is so much work involved, why do so many engineering students participate so actively in Expo?

To begin, I believe that they view it as being a very worthwhile event in the life of our College. I have talked with many students who chose engineering as a career and who are here on our campus because they came to an Expo when they were a high school student and liked what they saw. Also, Expo is viewed by thousands of on-campus students, parents, other interested adults, university administrators, legislators and other state and municipal officials. Expo is a time when engineering students show all who come what engineers can do when they try. At the end, when Expo is a success, there is a joy of accomplishment and a spirit of comaraderie that can't be found at other times and that, alone, seems to make all of the hard work worthwhile.

So I say to all who may happen to read this, 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 help you get started. If they do not interest you and you want to work on a specific committee, contact the appropriate chairman mentioned earlier in this article. Exhibits and manpower are still needed. Give yourself a treat. Have some fun. Pitch in and become involved. You will find it an experience that you will remember the rest of your life! WE

wisconsin engineer
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Industry at Expo '75

By Brian S. Strasburg
1975 Expo Executive Committee

EXPO '75 focuses on the tremendous technological progress that has occurred. Like past expositions here at the College of Engineering, EXPO '75 will demonstrate this through creative work being done by engineering students, exhibiting industries, and governmental agencies.

What does Expo tell us about now? Industrial technology touches all parts of our lives. Familiar products alone head an endless list. Hi-fi systems, microwave cookers, push-button telephones, pocket calculators, the automobile, and computers are just a few.

It is obvious that industry makes our lives seem leisurely and palatable. At the same time, it is not so obvious that industrial participation in EXPO '75 is essential. Without such dedicated participation by industry, Expositions could not exist. The devices and systems exhibited by private enterprise, as well as governmental agencies afford solutions to the present needs of society and more importantly, to the future needs of society. These devices and systems also give new ideas to our engineering students. But, the underlying reason for industrial participation is the omnipresent need for financial support. EXPO '75 will spend approximately $15,000, which must be paid for someway.

Myriad companies have been contacted to give of themselves for EXPO '75 in the form of exhibits and of financial support. Presently, Texaco along with Harnischfeger, Buehler, and Kimberly-Clark are among the financial contributors. EXPO '75 also has many exhibits from industry and government which will be on display for the "viewing-eyes". Wisconsin Telephone, Western Electric, and Bell Labs will be exhibiting on electonic telephone switching and will also present modern methods in thin film technology. International Harvester will be showing their hydrostatic transmission, titan gas turbine and other items. Eastman Kodak, Allen Bradley, Digital Equipment Corporation, and Meridian Laboratories will be here, with more to follow.

So, to greatly facilitate the success of EXPO '75, the industrial exhibitor plays a two-fold role. First, to open up and increase the channels of communication between industries and engineering students and the College of Engineering as a whole. Secondly, industries make our Exposition entirely feasible by financial support.

One may conclude that only engineering students together with private corporations comprise the "fuel" for EXPO '75. Not so. Government also has a share of "stock" in EXPO '75. The government does not only exhibit new products. They employ and exhibit the newest technology available. The Atomic Energy Commission will present an exhibit about the energy crisis and the research being done to assure the future availability of energy. There will also be two exhibits from the Army Corps of Engineers, one from the Federal Highway-Administration, and the U. S. Geological Survey.

WE

Let a computer diet Do It!

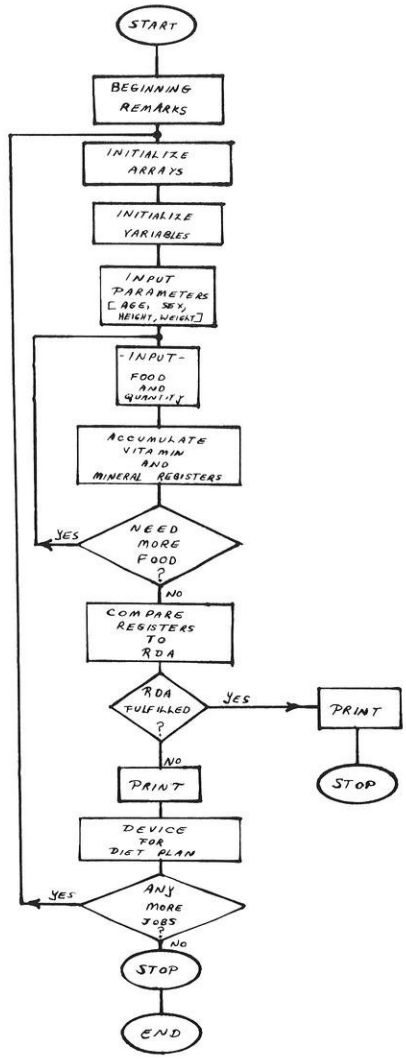
By Terri Houston
of the Engineer Staff

As everyone knows, nutrition is that well known process of incorporating into the body the substances necessary for growth, repair, and energy. Nutritional science determines the body's requirements for food nutrients and evaluates diets to satisfy these requirements. Longer lifespans, better health, and greater efficiency will result if these requirements are met in the daily diet.

Industrial engineering students Ken Bice and Alan Mast's primary purpose is to illustrate to the Expo audience the many different ways that industrial engineering fits into today's technology. Their detailed Expo presentation is just based on one particular facet of industrial engineering, health care. These two students have devised a computer diet planning program on the Univac 1110 computer.

Their computer diet program is constructed to compensate for differences in a person's age, weight, and height. For each category certain amount of vitamins, minerals, calories and protein are needed.

The language of the diet program is QRB (Quick Response Basic). It is similar to Basic (Beginner's All-Purpose Symbolic Instruction Code), the easily learned computer programming language developed at Dartmouth college. MACC's QRB includes over three hundred ready-to-run programs from the Dartmouth library. There are analytical, simulation, and tutorial programs for mathematics, science, statistics, languages, business, finance, and many other fields.[1]



General Flowchart for Recommended Daily Dietary Allowances

Bice and Mast use a teletype computer terminal in their Expo exhibit. Expo visitors will simply feed in the type and quantity of the foods he or she has ingested during the day. The program will then compute and display the total calories consumed, the quantity of each of the essential vitamins and minerals ingested, and the recommended dietary allowances for this person. In addition, it will suggest a dinner meal that will fulfill this person's recommended daily allowance for the day. Special notice will be made to the Expo visitor that the diet recommendations are applicable only to people on a general diet.[2]

The Bice and Mast exhibit will dramatically emphasize the correlation between basic computer techniques and specific dietary health problems. The computer's speed enables scientist to make ongoing diet corrections that can be utilized in maintaining an adequate diet. WE

[1]To obtain further details on QRB contact Al Roberts from the academic computing center, U.W.-Madison (MACC).

[2]A program very similar to this is being produced by Professor Nancy Johnson of the Nutritional Science Department.

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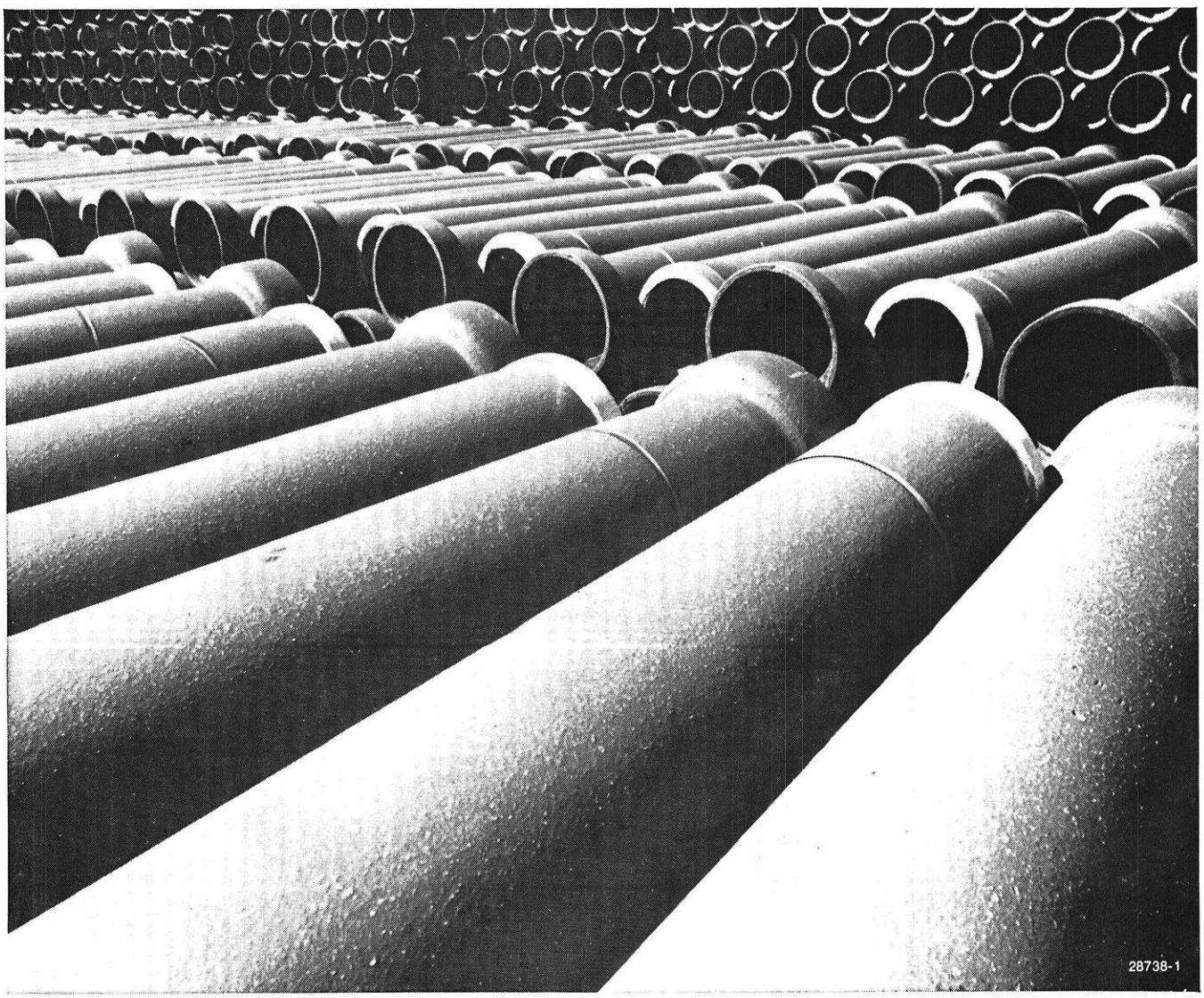
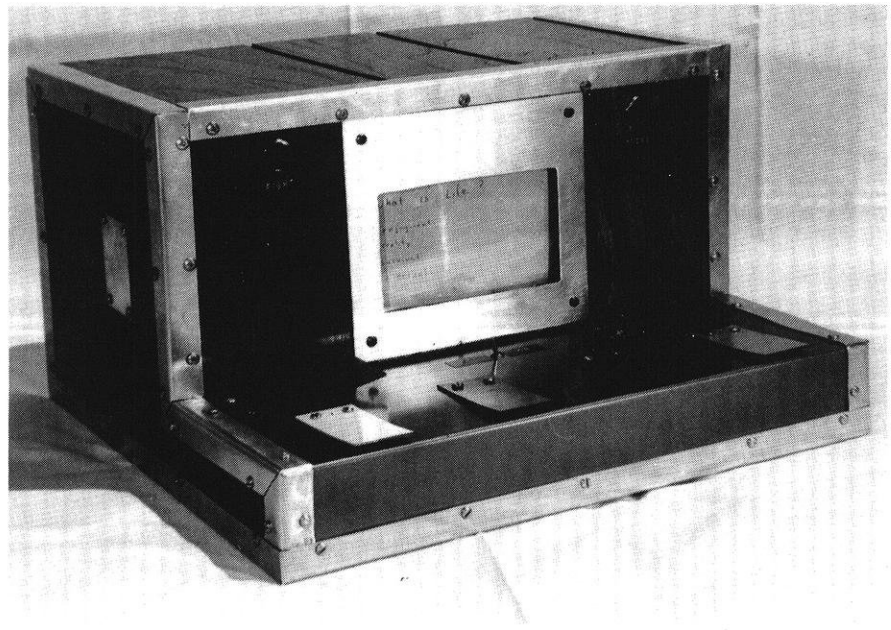


A box that teaches . . .

Learning by machine



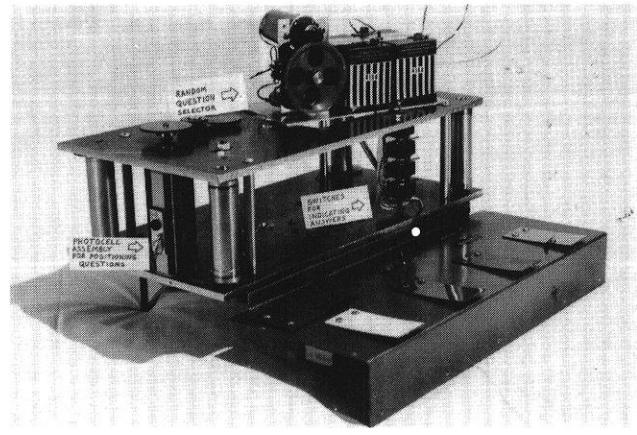
Gregg Keebaugh and Paul Fechners teaching machine.

By Peggy Lawrence
of the Engineer Staff

It began as a project for a mechanical engineering course and ended up being very good way to help in the education process of a handicapped child. Gregg Keebaugh (mechanical engineering) and Paul Fechner (electrical engineering) tried to find a way for this child to learn although he is unable to handle books like most people. The result — a teaching machine run by a system of levers that the handicapped can handle.

The teaching machine, Keebaugh says, is like an automatic flash card set. It holds ten question cards, at one time. The cards are placed on a belt rotated by a small motor. Each time a question comes into place behind the screen, the motor is disengaged with the use of a small electric eye that makes sure the card is in its correct place until the question has been answered and a new one is called for.

The questions are all multiple-choice. There are four different colored levers on the front of the machine representing each of the choices. When one of the levers is pushed, it triggers a small pin that touches the card. If the answer was correct, the pin goes through a small hole in the card, a bell rings and a light flashes on; if the answer was incorrect a buzzer sounds and a different light goes on. To move to the next question another lever is pushed to re-engage the motor, but this can only be done after the question has been answered correctly.



The machine can either show each question in its order, or it can be switched to random sequence to avoid memorization of the answers in their order. The cards can be changed at any time, making the machine useful in studying any subject and allowing the student to change to new, more difficult material as needed.

At this point, the teaching machine is in its final stages of construction. It will be on exhibit at the 1975 Engineering Expo then it will go to the person for whom it was designed. WE

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10^x	yes	yes
x^2	yes	yes
$\sqrt{x}$	yes	yes
$\sqrt[x]{y}$	yes	no
1/x	yes	yes
x!	yes	yes
Exchange x with y	yes	yes
Metric conversion constants	13	3
% and Δ%	yes	yes
Mean and standard deviation	yes	yes
Linear regression	yes	no
Trend line analysis	yes	no
Slope and intercept	yes	no
Store and recall	yes	yes
Σ to memory	yes	yes
Product to memory	yes	yes
Random number generator	yes	no
Automatic permutation	yes	no
Preprogrammed conversions	20	7
Digits accuracy	13	10
Algebraic notation (sum of products)	yes	no
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It All Starte

By Brad Vine

This year a tradition, part of the College of Engineering for over 35 years, is once again coming alive. The tradition is the Engineering Science Exposition.

The Exposition will acquaint the public with the rapidly expanding engineering field. The exposition, run entirely by engineering students, is non-profit. Any profits go into a scholarship fund.

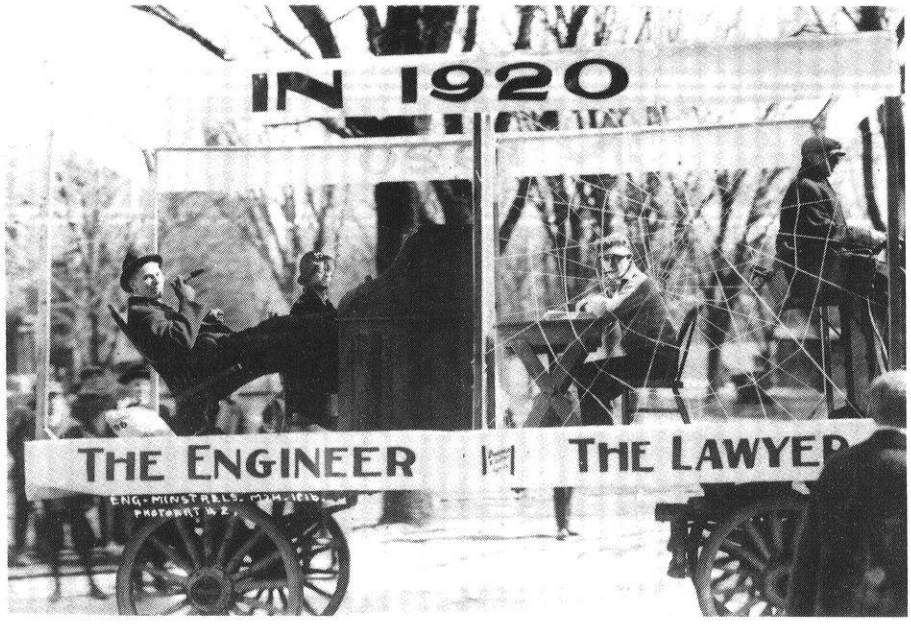
Before 1940, St. Patrick's Day never went by without a parade by the engineers in honor of their patron saint. Spring was also the time when the lawyer-engineer feud reached its peak. With each passing year, bickering became more spirited. On St. Patrick's Day, 1938, it burst into open warfare.

The lawyers bombarded paraders with uncooked eggs. Things went from uncooked to rotten. Engineers retaliated with every egg they could reach. It wasn't the first time a lawyer was seen with egg on his face.

These episodes marked the birth of The Engineering Exposition. With the help of the engineering faculty, engineers decided to celebrate St. Patrick's Day without a parade. They would focus attention on events of a more constructive nature— an Engineering Exposition.

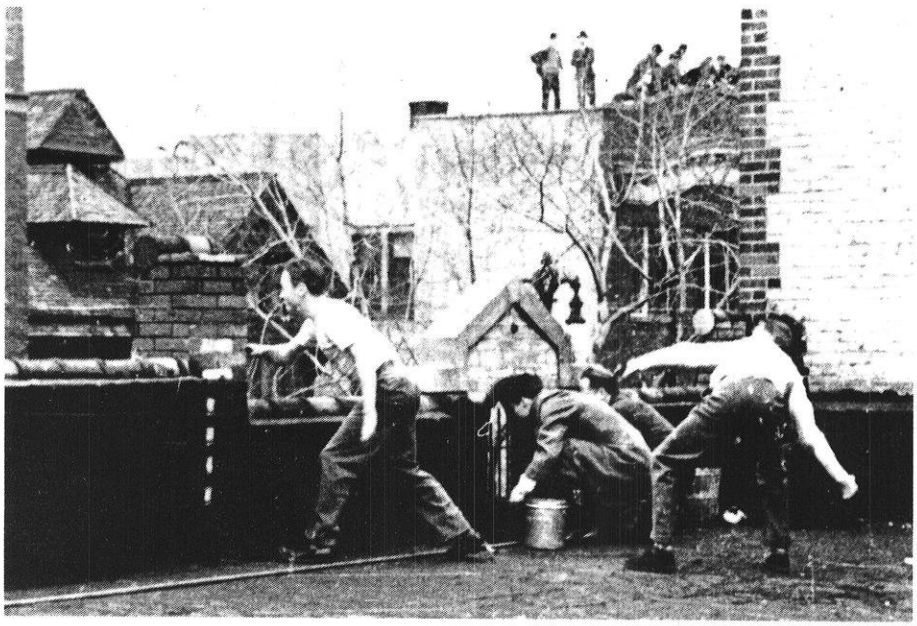
The unique feature of the Exposition is the policy of manning the exhibits with personnel who can explain and describe it. This provides the spectator with the opportunity not only to see exhibits, but to ask questions about them.

It is the engineers' sincere hope that you will not only attend, but enjoy Expo '75. WE



Engineers felt they were sitting pretty compared to lawyers enshrined among cobwebs. . .

With An Egg



Lawyers egg engineers from a rooftop during one of the fueds between the two professions in the past.

Engineers throw down the gauntlet at their archrivals- - - the lawyers.

Communicate by "Videoplace"

By Doug Janousek
of the Engineer Staff

As technology and art slowly evolve separately, we find that the Communication Environments Program is bridging this gap. One of its projects, "Videoplace", will be partially shown at Expo. The entire project will hopefully be exhibited at the Bicentennial. The project was designed by Dr. M. William Krueger and managed by Charles T. Hodle Jr.

Videoplace is an artistic event which defines a new kind of communication, provides artists from different fields with a tool for experimentation, and has important implications for video and cybernetic art.

It is based on the idea that the act of instantaneous two way communication creates a "place" consisting only of information available to both people simultaneously. Geographically remote individuals see their separate video images merged into a composite projected before them, creating the illusion that they exist together in the same place.

An artist can control a variety of modes and can develop them. First, the computer can automatically combine the actions of the participants through the video medium according to rules programmed by the artist.

Second, the artist can choose his position and become involved directly or guide the interaction of others.

Actors and dancers can develop improvisations and perform scripted pieces which exploit the Videoplace medium. Such works could be done before live audiences that have the choice of watching an isolated figure move somewhat inexplicably around the stage while his image interacts in a more meaningful way with the images of others on the "videoplace" screen.

In all uses, the computer will analyze the position and movements of each participant by digitizing the outline of his video image. It will then determine the interrelationship among these images and generate composite images. Images can be moved around the screen, shrunk, rotated, colored and mixed together in a variety of ways. (Thus all of the potential of video processing can be used to mediate the interaction and the usual laws of cause and effect can be replaced with alternatives composed by the author.)

Art in itself has expresses what we have learned about ourselves and our world. "Videoplace" makes some difficult concepts palpable. As the day approaches when computers will speak, understand speech and perceive us, it is important that the design of such intimate technology is an aesthetic problem as much as an engineering one. It is imperative that art and artists assume leadership in shaping our fine relationship with our machines.

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BURGLARS BEWARE!

By Bob Braun
of the Engineer Staff

Scott Woods, a fourth year Electrical Engineering student at the University of Wisconsin, is displaying one of his innovations at Expo '75. His "Remote Sensing Alarm System" has already proven to be effective in actual use and now he is using it to demonstrate that practical inventions do come out of engineering projects.

The alarm system operation centers around a diode that is implanted into the item to be protected. If the diode is disconnected or shorted out the system will alarm. Expo visitors will be able to test the alarm by simulating the theft of the protected item.

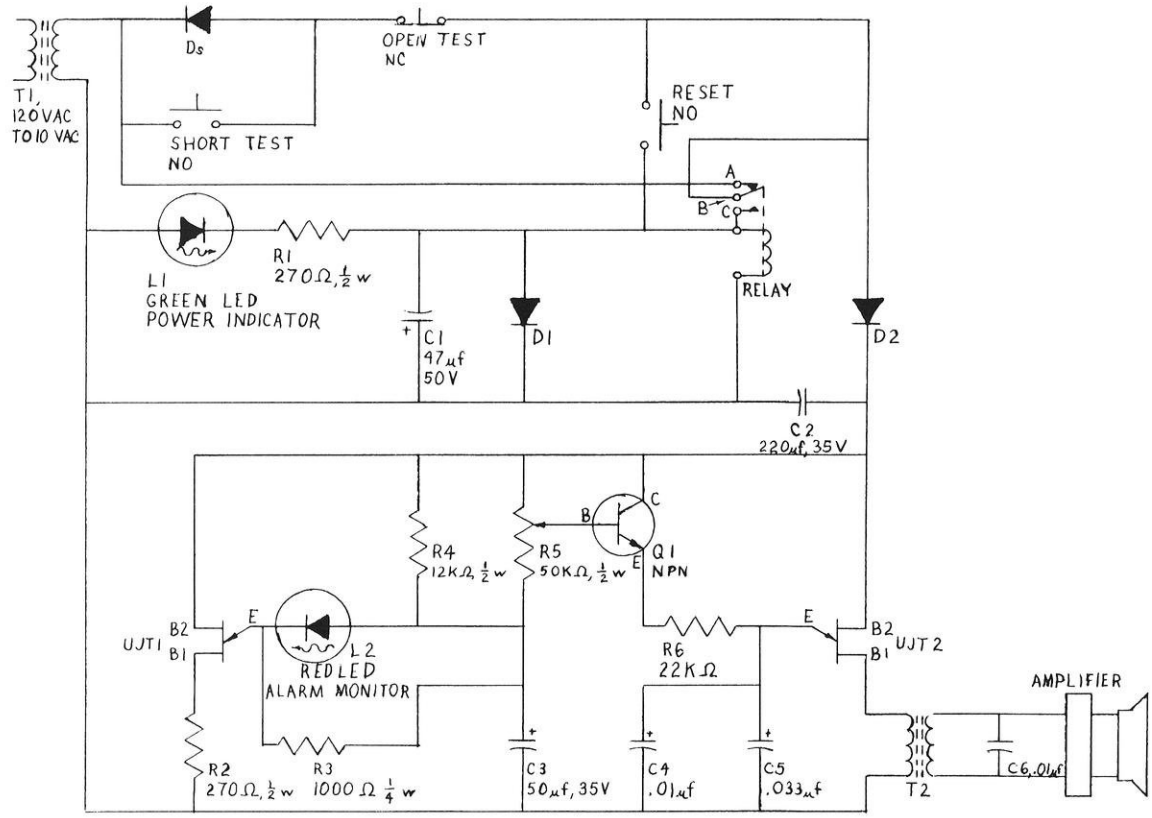
In the sensing circuit, Ds is the sensing diode that will be either shorted out or removed to create an open circuit. In either situation the relay moves to the off position and power is supplied to the alarm circuit. Cutting the wires also sets off an alarm. After initially applying power to the circuit and after each test the relay must be reset with the RESET switch.

The alarm circuit makes use of two unijunction transistors and a NPN transistor to get the desired audio signal. UJT1 is a low frequency relaxation oscilator and UJT2 is a high frequency osscillator. When an alarm is received the sound is similar to a submarine "dive" signal.

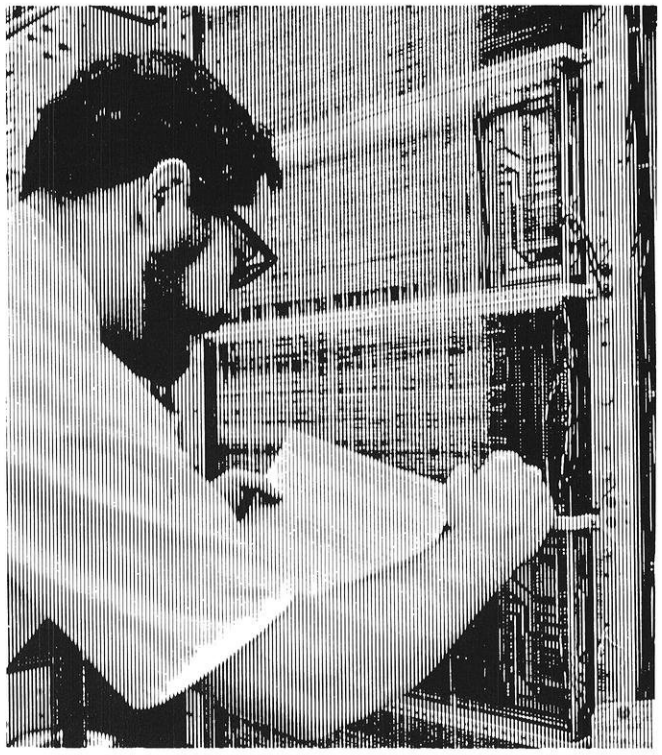
Transformer T2 matches the output impedance to the required value of the input amplifier. Additional relay contacts could be installed in the output circuit to switch off the output except when alarms are being given. This would allow the system to be used continuously without loading the amplifier and at the same time matching the system to an intercom, public address system or some other type of remote audio indicator.

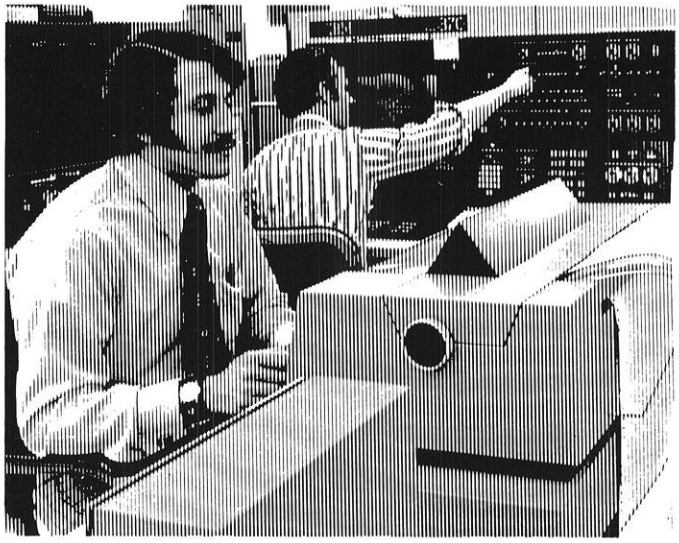
Originally designed by Scott to protect the sign in front of his house from vandalism, the system has proven very successful in actual use.

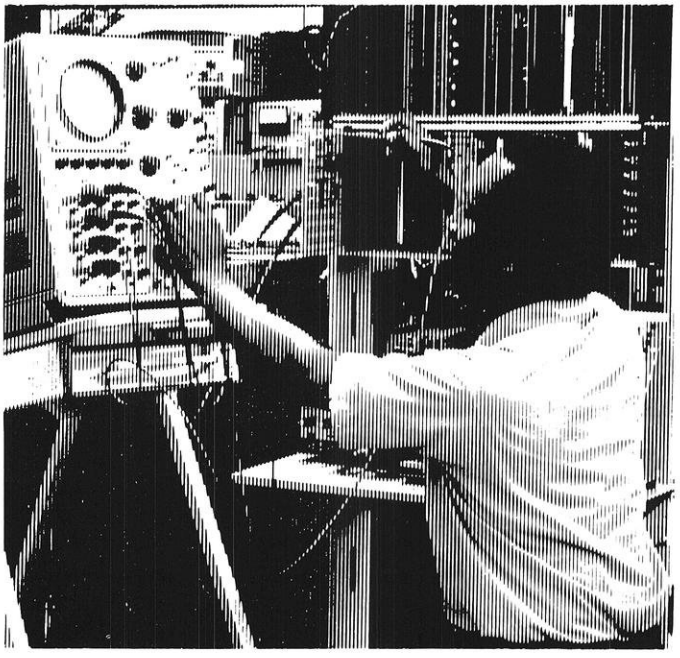
WE



Circuit diagram of alarm system







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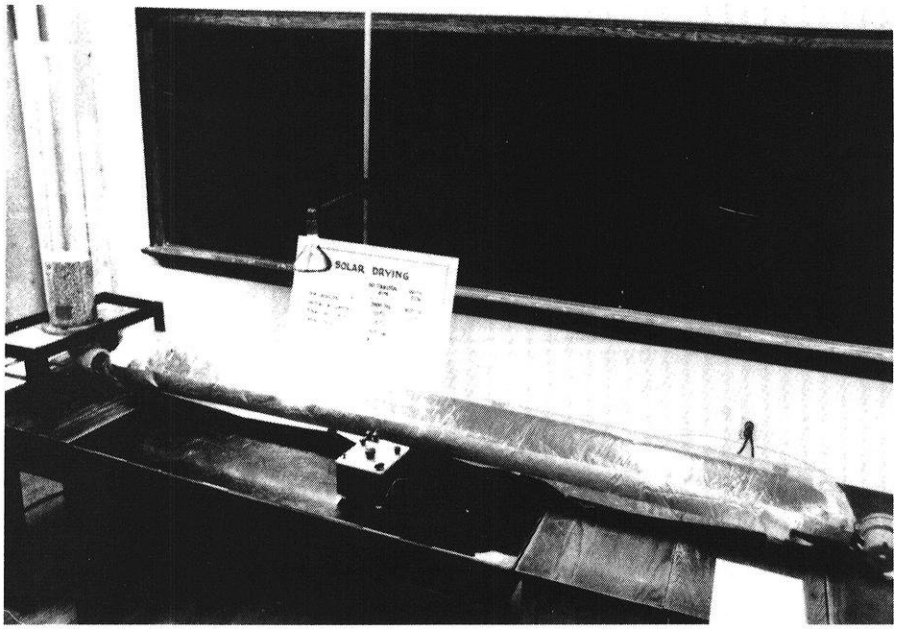
Solar Drying

By Wayne Hochrein
of the Engineer Staff



Blower at right directs air through a plastic tube where it is heated. Corn in the bin is dried by heated air filtering through. The 4° temperature difference is adequate for drying corn or other agricultural products.

Les Pagel and Richard Ambroziak setting up a solar drying model.

On display at the 1975 Engineering Expo will be a working model of a solar grain drying mechanism.

This Agriculture Engineering Department display is a replica of working units in South Dakota and Wisconsin.

The device blows air over a surface that is heated by light. The air which filters through the corn drys it. The device creates a temperature difference of about 4 degrees.

The solar device in operation in Wisconsin dried 3,825 bushels over a three month period. A regular drying machine could do the same job in a matter of days. Conventional units use much higher temperature for drying shelled corn, sometimes burning it in the process.

What happens if the sun doesn't shine for three months? In this case a backup system of electric heating elements could be used to heat the circulating air.

A drawback to the system is the area necessary to collect this solar energy. The Wisconsin unit got around this by incorporating the heat—collecting elements into the roof of a nearby shed. The South Dakota unit used a design of surrounding the storage bin itself with the heat collector.

However, as fuel costs rise the low fuel consumption of this system makes it increasingly attractive to potential users. It was estimated for the Wisconsin unit that it saved 468 gallons of fuel oil at a savings of $146.00. This is based on the assumption that both methods use blowers or air circulation.

This unit is commerically available and could pay for itself in approximately three years from fuel savings. WE

Séance Extraordinaire

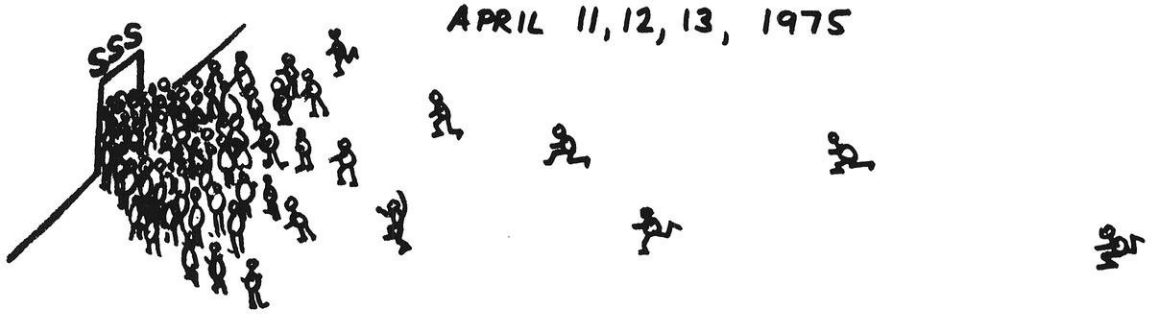
Some Mighty Famous Ghosts Are Coming into Town To Tell Their Stories... Wow! In the Super Spirits Show Of the Engineering Expo

YES, INDEED! SOME OF THE GREATEST SPIRITS IN HISTORY WILL REAPPEAR FOR THE FIRST TIME. THEY PROMISED TO TELL SOME OF THEIR INTIMATE STORIES. STORIES THAT HAVE NEVER BEEN TOLD BEFORE. STORIES THAT ARE OFTEN STRANGE, BUT ALWAYS TRUE... SO MUCH THAT ONCE YOU HEAR THEM YOU WILL KNOW THE VISITORS ARE THE REAL SPIRITS AND NOT IMPOSTORS. STORIES OF DISCOVERY AND INVENTION... OF HEROISM... OF GREAT SPORT... OF DRAMATIC TENSION... OF UNIQUE ART... OF AMAZING LEADERSHIP... OF TURNING DREAMS INTO REALITY.

ONCE YOU HAVE SEEN AND HEARD THE SUPER SPIRITS YOU WILL WANT TO SEE AND HEAR THEM AGAIN AND AGAIN. UNFORTUNATELY, SO WILL EVERYBODY ELSE. BUT, IF YOU CANNOT FIND A WAY TO AVOID THE WORST CROWDS, IT WILL STILL BE WORTH YOUR WHILE.

Hosts: Department of Engineering Mechanics

In the Engineering Building
April 11, 12, 13, 1975



FUEL CELL

By Wayne Hochrein
of the Engineer Staff

Following Expo's theme of engineers helping people, a device called a fuel cell will be exhibited. Ideally a fuel cell could provide clean, efficient low cost energy, solving our present energy situation. However, there are problems in making the actual model behave as the theoretical model predicts.

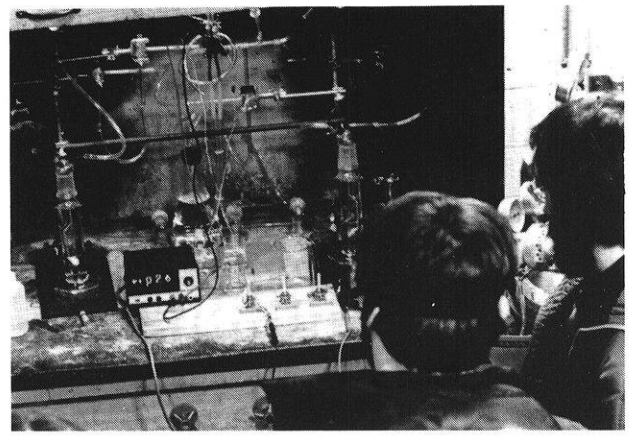
The operation of a fuel cell is comparable to a battery. The cell takes hydrogen and oxygen and with a platinum catalyst produces electrical power, the only by-product being water.

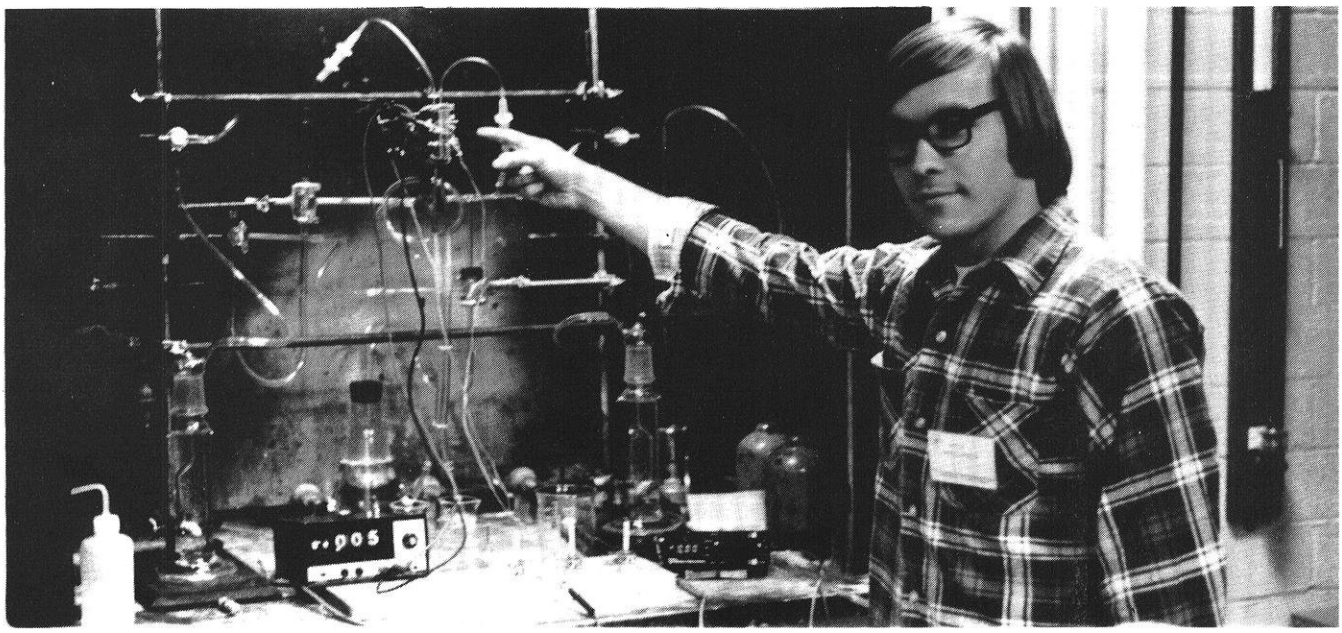
This method of power generation has been known since 1830, but it was not until the space projects of the 1960's that interest in the fuel cell was renewed.

Desirable properties of the cell are high power to weight ratio and is high degree of efficiency. Also quiet operation and its only exhaust being water make it environmentally safe.

As of today the only place the fuel cell has been used is in space shots, but the potential of the fuel cell as an energy source will certainly make it a part of tomorrow.

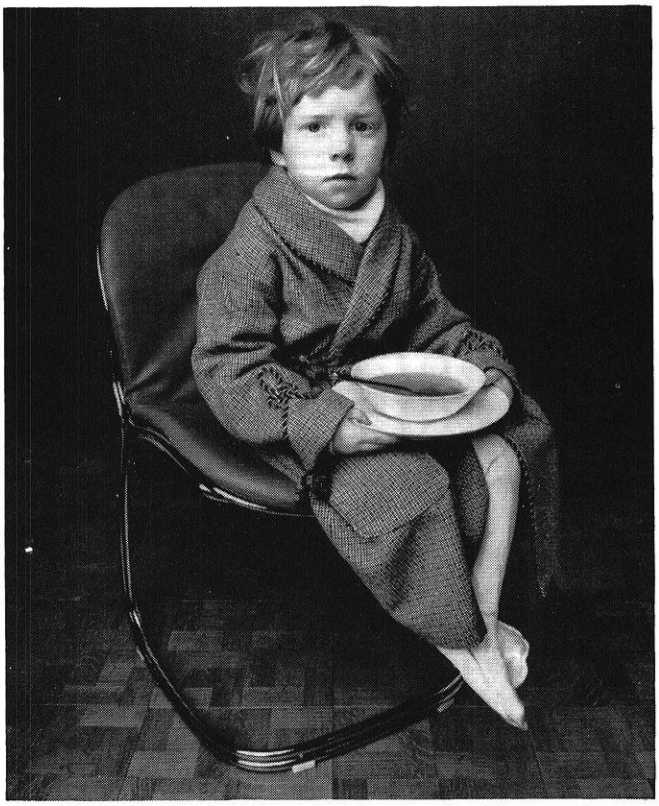
WE





Above: Fuel cell. Below: Randy Day demonstrating fuel cell.

What we're doing for your health is a lot more comforting than a bowl of chicken soup.



Little things at home relieve a lot of your misery. But we offer human solace too.

Many medicines you find at a drugstore are made with our chemicals.

Aspirin to bring down your burning fever, lozenges to soothe your poor sore throat, sedatives to let you fall asleep at last.

We're also involved in more serious things.

We make radioactive diagnostic materials that pinpoint cancer.

And plastic for heart valves human beings can live with.

We invented an Oxygen Walker. It helps people with emphysema move freely around again.

Our CentrifiChem® blood analyzer helps a hospital make more than 20 vital blood tests with up to 300 chemical analyses an hour.

Much of the life-saving oxygen in a hospital is ours.

And we constantly experiment.

We are 123,000 involved human beings who work all around the world on things and ideas for every basic need.

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And may even help save it.

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We're looking for engineers who think like Thomas Edison.

Ever since Thomas Edison helped start our business, GE has been known as an innovator.

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With so many problems today in areas like energy, the environment, and productivity, the challenges to technology have rarely been greater. And few companies can offer you more ways to help solve these problems than General Electric.

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Or maybe one day work on one of the developing energy technologies like the fast-breeder reactor. Coal gasification. Solar heating. Battery storage for peaking power. Laser applications for fusion and fuel enrichment.

Or you might help build better mass-transit systems. Pollution controls. Or cleaner, quieter jet engines.

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But a word about that word "big." Some people worry that General Electric might be too big for them. Actually we're not like some big companies. We're decentralized. Into strategic business units. Each with its own plans and business objectives.

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