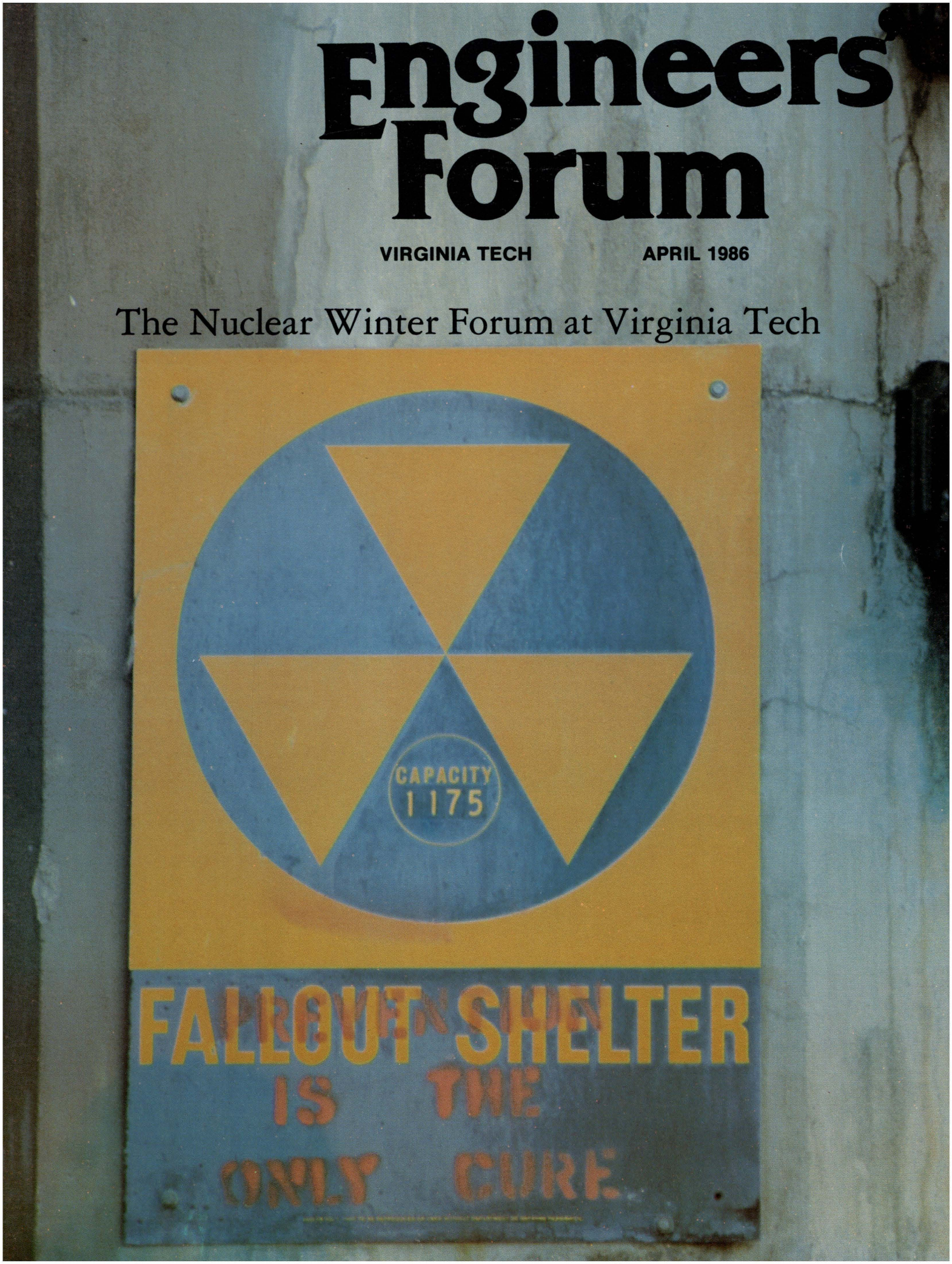
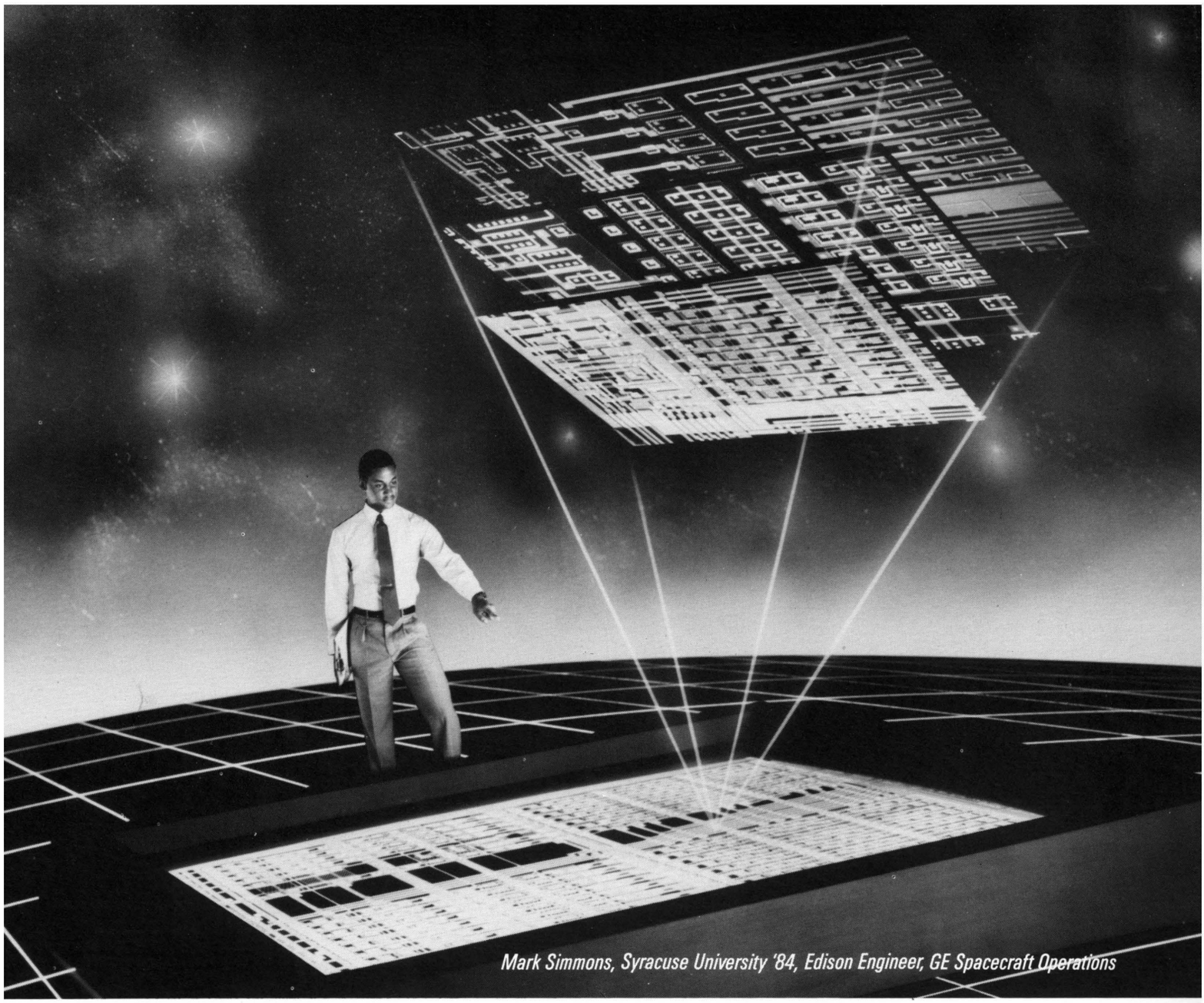
Engineers' Forum

VIRGINIA TECH APRIL 1986

The Nuclear Winter Forum at Virginia Tech





Design an Expanding Universe on the Ultimate Chip

At today's GE, young engineers like Mark Simmons are pushing microelectronics to the limit, and beyond. In design applications that take them from the ocean floor to the automated factory to outer space.

With each breakthrough, an amazing revolution takes place. As each new GE chip design multiplies microprocessor capacity, so grows our capacity to design more powerful, more accommodating chips.

Consider some recent GE developments. Our custom-designed Graphics Array Processor converts massive amounts of information into simulated 3-D images. With far less time and expense than conventional computers require.

Or GE's Advanced Very Large Scale Integrated Circuits. With feature sizes a hundred times smaller than a human hair.

What's our "electronic blueprint" for the future? Solar energy chips that power their own intelligence and pave the way for deep space exploration.

Fifth generation computers that build on the astonishing speed and capacity of chips taking shape today. Plus startling ideas still in the minds of our engineers.

If you're drawn to the challenges of microelectronic design, you should have designs on us. At GE locations throughout the USA, we design, manufacture, use and explore breakthrough applications in microelectronics.

Come contemplate the infinite universe. Flex your gray matter with the great minds at GE.

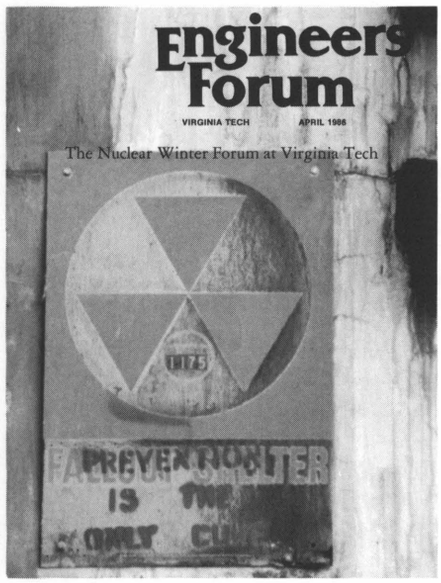
If you can dream it, you can do it.

General Electric is an equal opportunity employer.

A registered trademark of General Electric Company.

Engineers' Forum

Volume 4, Number 4
April, 1986



On the Cover:
This fallout shelter sign on Seitz Hall is an ominous reminder of our vulnerability in the event of nuclear war and nuclear winter.

Photograph by W.Bruce Robertson

Engineers' Forum is Virginia Tech's student engineering magazine. *Engineers' Forum* magazine is published four times during the academic year. Editorial and business office is located at 112 Femoyer Hall, Virginia Polytechnic Institute and State University, Blacksburg, VA 24061. Phone: (703) 961-7738. Advertising by Littel-Murray-Barnhill, Inc., 1328 Broadway, New York, NY 10001. Member Engineering College Magazine Associated, Carolee Stark, Chairperson.

Printed by University Press, Roanoke VA.

Editor's Page

Rewarding Creativity:

Grants for Graduate Engineers

Bored with doing problem after boring problem in your engineering classes? Are you convinced that you're another Thomas Edison, with the world's greatest invention fermenting inside your head? The National Science Foundation (NSF) may have found an outlet for your creativity.

Through a program called Creativity Awards in Graduate Engineering, grants would be awarded to prospective graduate students (including undergrads) based on the creativity and originality of ideas that they propose. You must be a US citizen and get accepted into any grad school in the country, but since the award is for creativity alone, your academic record is not even considered.

Now if you're like most engineering students, by the time you reach senior year you're so sick of classes that the very last thing you want to do is go take some more that are probably going to be even harder than the lot you've got now. Besides, there are all those great jobs and even greater salaries just waiting to be had out there.

Unfortunately, this attitude is having a detrimental effect on the quality of engineering education in this country. Since PhD candidates, who frequently join the faculty of a university, are few and far between in engineering these, more and more foreign professors, who sometimes have difficulty communicating the material, are being found in the classrooms. And you've probably noticed that you don't have very many young professors either.

Improving this situation is the second goal of the program. Not only does NSF want to produce creative engineers with advanced degrees, they want to change engineers' attitudes about grad school in order to attract more students into advanced programs. And not just to become professors either, although they are desparately needed (the NSF estimates that in 1983, 1570 engineering faculty positions went unfilled); they also want to provide highly trained people for industry, in order to maintain our nation's technical expertise.

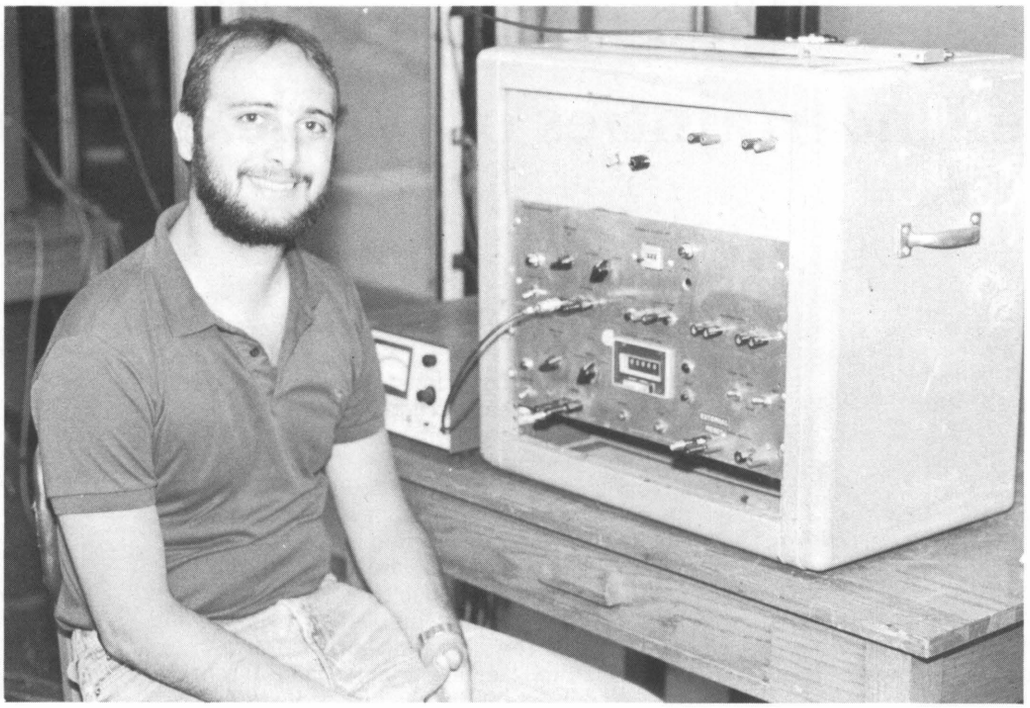
Now for the crucial question: just how much money is involved? How does $30,000 a year for up to three years sound? The money, incidentally, would be channeled through your project advisor at your grad school.

As of right now, Creativity Awards in Graduate Engineering are just a proposal; the funds have been requested in Congress for FY87. But if you are interested in grad school and you think you've got a few bright ideas that just might bear investigation, keep on the lookout for more information about the program.

Thanks to Dr. William S. Butcher of the National Science Foundation for providing the information for this editorial.

Karen Soos

Going International:



W.B. Robertson

Tech Grad Comes out of the Windtunnel

by Albert Moore

Imagine going to London. Think of all the things you could see and visit: Parliament, Westminster Abbey, the Tower of London, and maybe even Princess Di! There is so much to see that the average tourist is overwhelmed. However, imagine the added thrill of going there not only to see attractions but to be one yourself.

Well, if you are Carl G. Schaefer, Jr.,a 1985 graduate of Virginia Tech in Aerospace and Ocean Engineering (AOE), you'd be just that. Scheafer is jetting there in September not just to sightsee but to represent the United States in international competition.

It all started back in a metropolis called Blacksburg. There, in a windtunnel in the recesses of Randolph Hall, Scheafer did the research, under AOE Professor James F. Marchman III, for a paper entitled "Acoustic Effects on Stall Hysteresis for Low Reynolds Number Laminar Flow" that eventually earned him the trip.

Schaefer's paper explains how noise can effect the airflow over the wings of low speed aircraft. His research demonstrated that stall, a sometimes abrupt loss of lift which occurs when a airplane is at a high angle of attack relative to the wind is influenced by noise. The results of his research will aid the military in managing the type of stall that occurs in Remotely Piloted Vehicles (RPV).

The Navy uses these aircraft as decoys to electronically represent the fleet at sea. Since these aircraft fly relatively close to the water, they have very little room in which to recover from a stall. The problem is compounded by stall hysteresis in which the airplane has to lower its angle of attack twenty degrees below the stalling angle in order to recover. Schaefer's findings make it possible to eliminate stall hysteresis with noise from even a tuned exhaust port and thereby improve the performance of the RPV's.

After the initial research, the first step was attending the 1985 Southeast Regional Student Paper Competition of the American Institute of Aeronautics and Astronautics (AIAA) along with Dr. Marchman, the faculty adviser for the Virginia Tech AIAA Student Branch. Schaefer won first place, a $150 prize, in competition with 28 undergraduate papers from 14 universities in the Southeast including North Carolina State, Georgia Tech, and Auburn.

Next, there was the all expense trip to the AIAA's Aerospace Sciences Meeting held in Reno, Nevada, in January 1986. Competition at this event was even more intense as he faced the AIAA's six other regional conference winners. Schaefer again did well. This time he won a honorarium, a medal, and $500, in addition to the distinction of being one of two people to represent the United States at international competition in London this September.

Schaefer is presently employed by the Naval Air Test Center in Patuxent River, Maryland, in structures. Schaefer intends to return to school for a graduate degree, but for the time being is enjoying the notoriety and the ribbing of co-workers.

***Albert Moore** is a sophomore in Aerospace and Ocean Engineering.*

"This is not a test!"
The Uncertainties of Nuclear Winter

by Susan Talbot
and Albert Moore

Sometime in the Future:

The hustle and bustle of New York City is interrupted by a tremor. New Yorkers only a few stories up can see a radiance in the sky and wonder what astronomical event has taken place. But why wasn't it covered in the Times? Public information channels are tuned in, only to hear repeats of, "This is not a test."

The possibilty of a war taking place now with nuclear arms in the possesion of many countries seems small. But if it does happen, what can people expect?

They can expect fire and smoke initially, Dr. Paul Ehrlich said in a preliminary speech anticipating the forum on Nuclear Winter. What will happen after the fire and smoke is where the debate begins.

Scientists and diplomats were brought together by Morton Nadler, forum organizer and Virginia Tech Electrical Engineering Professor, "to think out loud" about what the survivors might expect after the mushroom clouds dissipate from a nuclear exchange. The possibility and severity of a "nuclear winter" are uncertain as reiterated by the scientists present at the "Nuclear Winter: Strategic and Diplomatic Implications" forum held March 6, here at Tech.

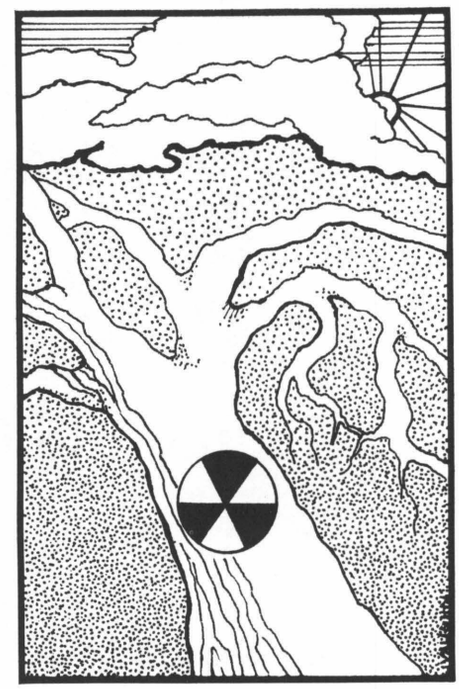
In order to simulate the effects of a nuclear attack, super-computers must be used because of the complex factors included. One of the main factors is the amount of smoke produced which is determined by the temperature of the explosion and fires, level of humidity, prevailing winds, and the proximity of the attack to cities and bodies of water.

The heat of the fires affects how high the smoke rises and into which atmoshperic layer it lodges itself. Particles are bound together in humid conditions, allowing dust particles a base to cling to, thus making a denser smog. Strong winds will speed up the spread of a smoke cloud. The carbons and other fuels that are abundant in cities will create a significantly more damaging and slower clearing smoke than materials in a non-urban area.

What will happen after a nuclear attack hinges upon the amount and type of smoke produced. The smoke will be damaging because it will reduce the amount of sunlight reaching the earth's surface, contaminate or prohibit precipitation, and eat away the protecting atmospheric layers. If the ozone layer has been damaged when the smoke clears, ultraviolet rays will filter through and damage life on Earth, both in plants and animals.

The most important component of the smoke damage, however, will be its reduction of sunlight. Scientists are most concerned about the ensuing temperature drop, but the level of that drop and its duration is uncertain. It was thought that the initial drop would be between 10 — 15 xC, but most of the scientists present at the forum agreed with George Rathjens, from Massachusetts Institute of Technology, that the range, using more recent data, will probably be closer to a 1 — 5 xC average drop. The range was revised because the initial studies included fuel estimates that were too high. The initial data was based on the amount of smoke produced by the destruction of 200 cities, each with the fuel capacity of Manhattan. Although 200 such cities do not exist, a global temperature drop of even 1 — 5 xC would have a tremendous impact on agriculture.

The bleakness of a nuclear explosion will not be confined to the direct target area or even the area covered by the smog. The interdependency of countries all over the world will be disrupted if a vital exporting country is destroyed. John Ahearne, from Resources for the Future, said that some of the noncombatant countries were not as concerned about the outcome of the conflict between the superpowers until they realized the impact of the destruction of trading partners.



Because the noncombatant countries are realizing what the direct consequences of destruction of the superpowers on the own economy will be, they can no longer avoid the issue of nuclear war, according to Thomas Malone, former Secretary-General of SCOPE. Malone said that noncombatant countries may work together in putting pressure on powerful countries like the United States and the Soviet Union.

Retired Admiral Noel Gaylor brought the focus back to the over-riding, grim issue. "The Soviets and the Americans have a common interest: not being blown up." He summed up the feelngs expressed by most of the diplomats present at the forum. The issue of giving the Soviets our computer testing technology was popular during the strategic and diplomatic session of the forum. The question of whether the United States would be the one who suffers from the lack of Soviet technology was raised.

Another uncertainty in dealing with the Soviets is how advanced their technology

---

Albert Moore *is a sophomore in Aerospace and Ocean Engineering.*

Susan Talbot *is a junior in Communi cations.*

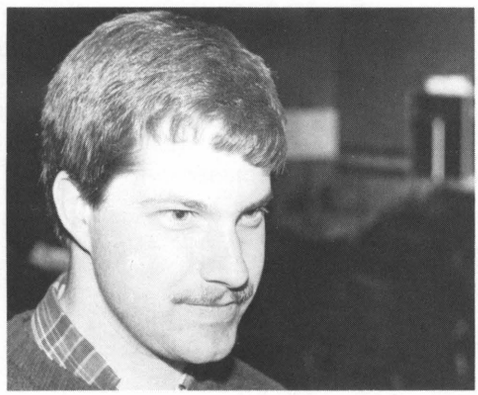
is. Several speakers, starting with Ehrlich, stated that the Soviet technology is far behind that of the United States. It was said that without the super-computers the United States has, the Soviets could not understand the effects of a nuclear war. Other scientists and diplomats, including Arthur Broyles, from Lawrence Livermore National Laboratory, and Robert Simmons, Deputy Division Chief, Theatre Affairs Division, Bureau of Strategic Policy, ACDA, argued that the Soviets are not behind the United States at all.

Gaylor also said that people today put too much emphasis on sheer numbers: the number of weapons each country has, the number of countries armed with nuclear weapons, and the number of the people an attack would kill. He said that the figures flood our brains and instead of clarifying uncertainites, create illusion. "I think we have to rid ourselves of illusion. I challenge anyone to show me a practical use for nuclear weapons in the military."

Simmons and Ahearne disagreed with unimportance of numbers. "Specific numbers do two things. They maintain a deterence and they help to reduce the level [of nuclear weapons]," Simmons said. One country, knowing the specific number of weapons of another country and their possible effect could deter that country from attacking. Publicizing calculations may reduce the number of weapons per country if the sheer numbers are high enough to scare the national leaders. Simmons reminded those who attended the forum, "Weapons by themselves don't cause war."

Several students at the forum were asked to respond to the following questions:

With the proliferation of nuclear weapons combined with current discussions about nuclear winter, do you think the chances of a nuclear war are increased or decreased? And what do you think the effects would be of turning over a video tape of the forum to the USSR?



Paul Harouff
Senior, EE

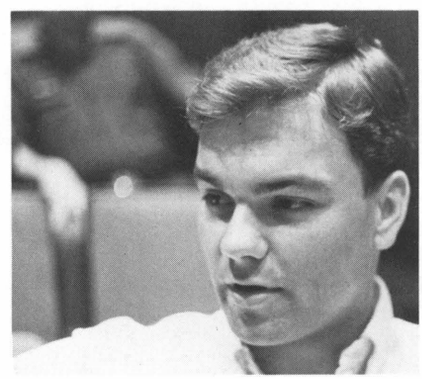
Because there's more talk about the effects of nuclear war, opinions are negative. There's no use for nuclear weapons except for deterrence and this is decreasing the chance of a nuclear exchange. I don't think [sending a videotape] could hurt. It could help, because they would know our views. But if they watched the tapes, they would think we were confused. We have no real answers.

Yasmine Khonsary
Senior, IS

Increases in knowledge should slow [the nuclear arms race] down but with more countries having nuclear weapons, the chance of an accident is increased. It would be good for the Soviets to see these debates. I'm all for sharing knowledge. Hopefully that will lead to some form of negotiation.

Lisa Derx
Junior, ENGL and PSCI

Learning more hopefully will decrease the possibilities of a nuclear war. So much uncertainty will contribute to not having one. At least we know that even the slightest effects are bad enough. But the more readily available the weapons are and the more personalities and opinions of the countries that need to be satisfied, the greater the chance of someone in the height of anger to start a nuclear exchange. Soviets would think this forum is good. They are also aware of nuclear winter. They are reacting the same way we are. If they think we are gung-ho about nuclear war, this would prove we are not.



Thomas James
Senior, PSCI

An increase in knowledge will decrease the possibility of a nuclear war. It is more apparent that it affects more people, more countries, such as Peru, and not just the US and the USSR. It would be good for the Soviets to see this on videotape if they look at it objectively, not [as] communists versus capitalists. It would show them that we are debating it and that we have legitimate concerns about the outcome.

Very Large Scale Integration:
Making the Bigger Smaller and Better

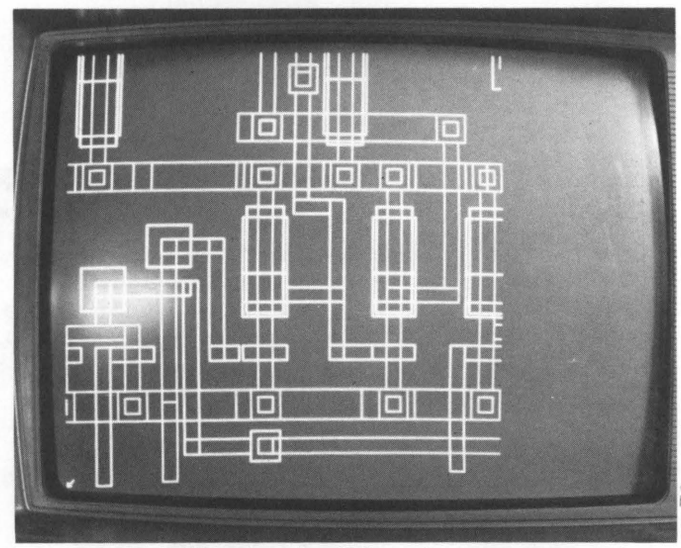
by Sean W. Gilmore

Practically everything today is computerized. No matter where you go or what you do, a computer affects your life. When you get up in the morning, a pre-programmed Mr. Coffee has your cup of coffee waiting. Your microwave oven has microprocessor controlled sensors to keep your danish hot while you get a shower. And your new car is equipped with an on-board computer to monitor your driving and talk to you about your habit of leaving the headlights on. This is progress.

What is behind these latest advances in technology that allows one dishwasher to clean your pots and pans more efficiently than others? It all began in 1948 when John Baradeen, Walter Brattain, and William Shockley kicked off the new Industrial Revolution with the invention of the transistor. No one then could ever dream of the impact this device would have on our society, primarily through the advent of integrated circuits. The integrated circuit has added a whole new dimension to the way we live by allowing science to make computers smaller, more powerful, and less expensive. Here at Virginia Tech, students in the Department of Electrical Engineering have the chance to gets their hands on the technology that has guided our lives by working with Very Large Scale Integration (VLSI) design.

You may ask, "What is VLSI, and what's so large about something that everyone promotes as being so small?" To begin with, VLSI circuits are just one type of integrated circuit (IC). An IC is a network of interconnected transistors laid out on a single semiconductor substrate, or chip. Jack Kilby of Texas Instruments first introduced this technique in 1958 to convert a dc signal to an ac signal. He combined the equivalent of ten discrete components onto a single substrate to form one device. This technology made possible the construction of fast, reliable, inexpensive computers [1].

Since then, the microelectronics industry has taken full advantage of the idea. By 1960, Small Scale Integration (SMI) was in full gear. Then, chips had less than 100 discrete components such as resistors and capacitors. By 1966, more than 100 components were placed on a chip and Medium Scale Integration (MSI) was born. In 1969, Large Scale Integration (LSI) took over with better than 1,000 elements to a chip. Very Large Scale Integration (VLSI) was realized in 1975 when chips could be made with more than 10,000 components [2]. By 1982, a microcomputer had been placed on a single silicon substrate that had 70,000 transistors, decoders, amplifiers and other circuitry. Its smallest device measured only 2.2 microns in length. Today, industry can produce a "computer on a chip" that contains about five times as many components and operates twice as quickly as the dinosaur of 1982, and researchers are currently working on chips that will have features smaller than 1 micron [1].



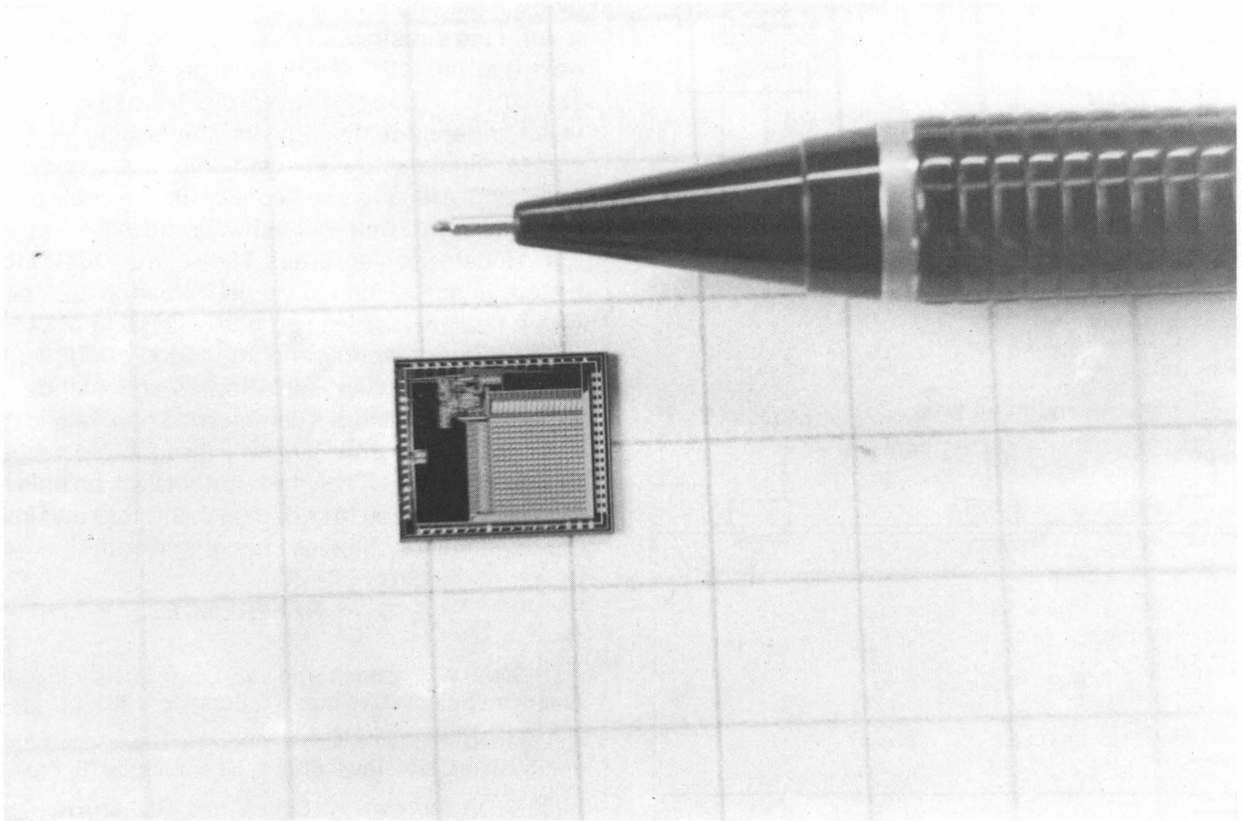
W.B. Robertson

Transient Fault Detector circuit for microprocessors being designed.

CAD tools greatly ease the design work by allowing students to concentrate on small areas of the circuit.

Keeping in step with industry and high technology, the Department of Electrical Engineering at Virginia Tech has set out to bring this type of hands-on experience into the classroom. Students have the opportunity to participate in a high technology project by designing, manufacturing, and testing VLSI circuits. The project involves a number of steps normally encountered in the production of a VLSI circuit and gives the students a taste of the industrial environment. They design their circuits in class and ship the plans to the University of Southern California's Information Institute for fabrication. Upon return of the prototype, the students test their circuits for proper operation and evaluate the design's

***Sean Gilmore** is a senior in Electrical Engineering.*



W.B. Robertson

(chip with pencil)
The finished product: A 1k associative memory chip using approximately 10,000 transistors designed by students at Virginia Tech.

performance. Organization of the project is similar to that of industry. The class is divided into groups of students, each with certain responsibilities: a circuit and logic simulation techniques group, a design rule checking group, a microscopic testing group, and a logic testing group. Students are also responsible for coordinating the project with USC and monitoring the job through the manufacturing process. Although the VLSI design and fabrication process can be costly, most of the work is funded by a grant from the National Science Foundation and the Defense Advanced Research Project to establish microelectronics courses at the university. Support like this illustrates industry's keen interest in getting students involved at an early stage in an area considered critical in the race for technology.

The project begins in the classroom with "Implementation of Digital System Design," a senior level elective that offers the basic knowledge needed by the student to undertake VLSI design. This course was initiated by Associate Professor of Electrical Engineering Joseph Tront during the 1984-1985 academic year. Professor Tront joined the faculty at Virginia Tech in 1978 with a strong background in the research of VLSI design. Since then, the EE department has put together a program that undergraduates at many other schools do not get the chance to participate in. Together, their expertise has earned the EE Department a $400,000 grant from Data General and a $200,000 grant from Hewlett-Packard to build a VLSI design lab.

The VLSI design lab, located on the new fourth floor of Whittemore Hall, revolves around a computer aided design (CAD) system. CAD tools have revolutionized IC design and students get an opportunity to use the same tools used by industry today. This system includes simulation, VLSI circuit design layout and development, and general graphics programs, as well as a number of language environments to choose from. In terms of hardware, the lab houses a Data General MV10000 mini-computer that supports a number of graphic terminals, IBM PC's , HP 36C work-stations, and microprocessor development stations. Support is also provided by the Microelectronics Lab for testing of the fabricated ICs.

Designing a VLSI circuit is a tedious process even with CAD tools, and the students must put in long hours in the design stage of the project. Using the CAD system, colored shapes on a graphics terminal represent the layout of a VLSI circuit: red for polysilicon, green for diffusion, blue for metal, yellow for ion doping regions, and black for various contact cuts. This may not seem too difficult, but as the design becomes more integrated, the job gets more complicated. Small rectangles on a graphics screen represent the topology of the diffusion layers. Where the rectangles cross indicate the formation of transistors, and 70,000 transistors might be contained in a seven millimeter square region (see figure 1) [3]. During the last few weeks of the quarter, it is not uncommon to find students camped out by the terminals.

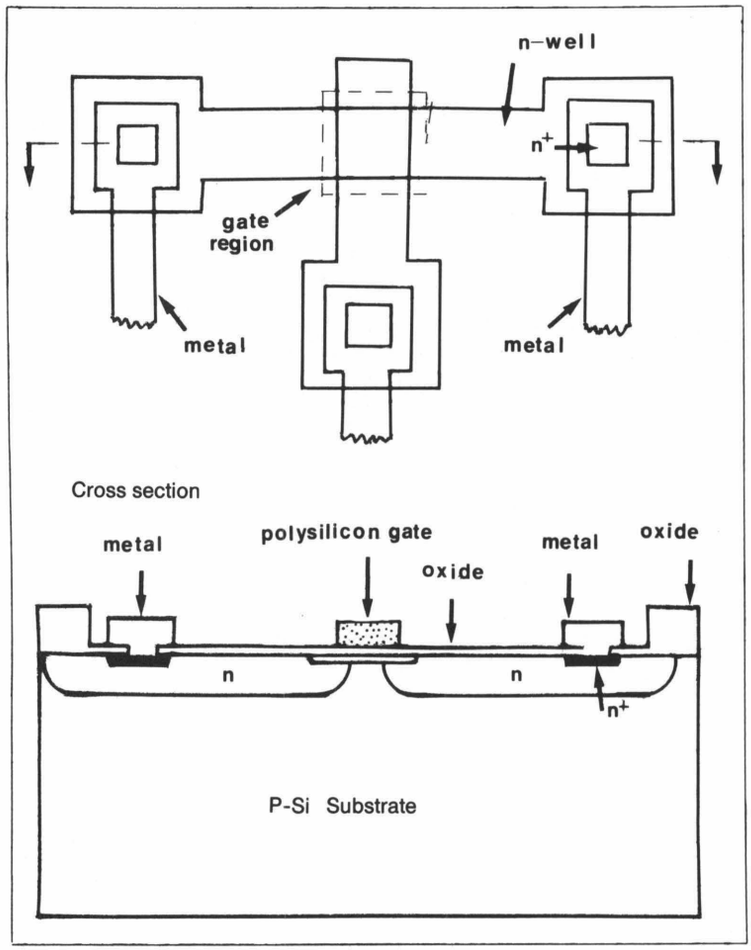


Figure 1. Crossing Rectangles Represent Transistors

Once designed, the plans are sent to the California laboratory where the ICs are fabricated by the process of multilithography. The designs call for an n-channel metal oxide semiconductor device (NMOS) so this material is used to form the substrate of the chip. Four to six weeks into the next quarter, USC returns ten prototypes of each design submitted. To complete the project, the students must enroll in an independent study for the testing and evaluation stages. Signals are injected into the circuits and logic analyzers are used to monitor the output. If necessary, students use the microelectronics lab to test and probe their ICs to locate problem areas. They can evaluate their designs based on actual measured performance and leave the lab with a healthy respect and understanding of VLSI design.

The microcomputer and integrated circuit have become part of our everyday life. With this acceptance comes the expectation that life will continue to improve and technology will continue to grow. It is only through programs like VLSI design at Virginia Tech that students will be able to develop the skills they need to accomplish this task and keep up with the demands of our ever changing world.

REFERENCES

[1] Glenn W. Preston, "The Very Large Scale Integrated Circuit," American Scientist, volume 71, Sept-Oct 1983, pp. pp. 466-472.

[2] Jacob Millman, Microelectronics: Digital and Analog Circuits and Systems, McGraw-Hill,Inc., New York, 1979, Prologue.

[3] D. V. Morgan, K. Board, and Richard H. Cockrum, An Introduction to Microelectronic Technology, John Wiley & Sons, New York, 1985, p. 148.

In Memory of Dr. David Wallis

by James Lisk

Dr. David Wallis of the chemical engineering department died February 21 of complications resulting from injuries received in an automobile accident. Dr. Wallis, known as Dave to the students and faculty, is tremendously missed by the chemical engineering department. As one undergraduate put it "we need Dave; I need Dave."

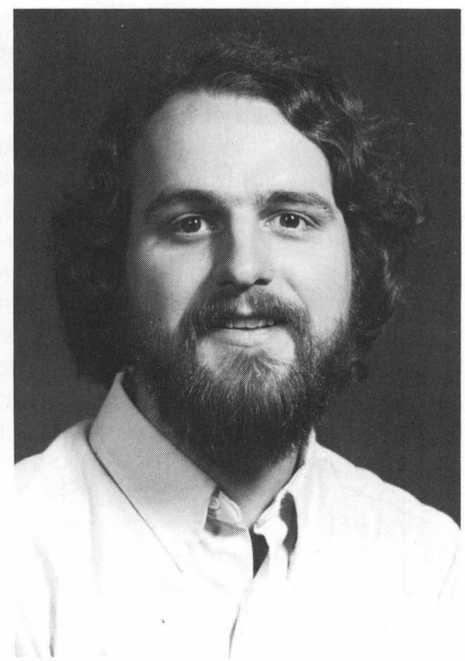
"He was a buffer between us and the politics of the department," was another student's view. Dr. Wallis was the only professor in the department who received an undergraduate degree in chemical engineering at Virginia Tech. Many students felt that he was the only professor who understood the pressures of this major. We all knew that he cared.

His philosophy of enjoying work and life, of mixing work and pleasure, was not always well accepted by the faculty, but the students loved him for this. He associated easily with the students, and we know that he knew how to enjoy a party. Many of the seniors who attended the "End of Unit Operations Lab Party" this summer will attest to this fact.

Dr. Wallis always tried to make undergraduate students become a part of the department. There were more undergraduate researchers in his biochemical engineering lab than in any other department lab. The research ranged from penicillin production to sewage treatment.

The loss of his expertise in biochemical engineering leaves a gap in the technological foundation of our department. The loss of his experience and understanding of students' pressures is another setback. And, of course, his death is a great loss for his one year old daughter, Jessica, and his wife Linda.

Dave, we thank you for all that you stood for and all that you did.



***James Lisk** is a senior in Chemical Engineering.*

GRADUATES UNIVERSITY MOTORS HAS YOUR

PRE-APPROVED CREDIT FROM FORD CREDIT

PLUS $400 TOWARD THE PURCHASE OF A NEW mercury

It's Easy To Qualify

- You must receive at least a bachelor's degree or a state RN license between October 1, 1985 and September 30, 1986.
- You must have verifiable employment that begins within 120 days of your qualifying vehicle purchase at a salary sufficient to cover ordinary living expenses and your vehicle payment.
- Your credit record, if you have one, must indicate payment made as agreed.

These Vehicles Are Included In The Plan

Mercury: Lynx, Topaz, Capri, Cougar

The amount of your pre-approved credit is determined by the qualifying vehicle you buy, and you are eligible for the $400 directly from Ford even if you don't finance your purchase. Make your best deal and you can use the $400 toward your down payment or get a check from Ford after the purchase or lease.

Hurry. If a vehicle is not in dealer stock it must be ordered by June 1, 1986, and delivery of all vehicles must be taken by August 31, 1986. See your participating dealer for complete program details.

FORD COLLEGE GRADUATE PURCHASE PROGRAM

Ford

UNIVERSITY MOTORS
US RT. 460 S.
BLACKSBURG, VA

Phone 552-4140
or 389-3970
DL# 7842

Ford Motor Credit Company

Ford

Ford MERCURY LINCOLN

Bridging the Gap Between Military and Civilian Engineering

by James S. Houston

Students in the Corps of Cadets are frequently trying to improve their image with civilians and the University. One organization whose main purpose is to develop beneficial relations between the engineering profession in civilian life and that in the military service is the Society of American Military Engineers. S.A.M.E. is a non-profit, corporate, professional engineer association and has a membership of about 25,000 throughout the world, including 57 student posts at engineering colleges and universities. The society was founded after World War I to provide a permanent association between civilian engineers and engineering officers in the military. S.A.M.E. is now one of the most motivated and dynamic engineering societies on campus.

The Virginia Tech student post is presently only open to cadets, although that may change in the future. It is an honorary organization and membership is by invitation only. Prospective members must complete a tap period, during which they build model castles (similar in function to pledge paddles of fraternities), take tests, and complete interviews. The pledges build their castles on a standard size backing, with the only requirements of it being painted red, the letters S.A.M.E. on the front, and a place for signatures on the back. The remainder is left to the imagination of the builder; many people construct intricate, detailed model castles. These must be carried everywhere, including classes — so now you know why those cadets were carrying those odd-looking structures! The pledges have interviews with all active members, sometimes bribing them with candy for their signatures. The pledges then take a knowledge test and their castles are judged, with a monetary incentive for the winner. The winner of this year's tough competition was senior Kevin Dye.

S.A.M.E. has been very active this year, sponsoring events, speakers, and parties as well as participating in many university functions. Two successful programs are the scholarship and job placement plans. The faculty advisor, Major James McEvoy, was instrumental in securing a $750 scholarship from the parent post to be awarded to an outstanding student member. Kord

S.A.M.E. actively participated in Engineer's Week, and held an open competition. The Society sponsored a catapult launch contest, which was organized by Maury Barker and Rodney Teal. The contest was a success, with the first place prize of $50 going to Daniel Krause. Many members entered the E-Week contests, participating in the truss building and eggdrop competitions. Paul Begansky placed second in the airplane contest, donating the prize to the society. The team of Hesham Oubari, Steve Smith, Paul Begansky, Dave Golden, and Dean Worley also won the Society Feud. Due to such active participation and attendence, S.A.M.E. won the Society Competion in Division II (smaller than 100 members). With membership presently at 25, the net winnings of $200 from E-Week is incredible for the organization's size. The winter quarter party will now certainly be a blast.

The purpose of S.A.M.E., to improve

W.B. Robertson

Daniel Krause won first place in the S.A.M.E.'s catapult launch during E-Week. Tom Roberts won second place in the S.A.M.E.'s catapult launch during E-Week.

***James Houston** is sophomore in Electrical Engineering.*

relations between civilian and military engineers, is becoming successful on campus. Hopefully, the stereotypes of cadets, and especially engineering cadets, is being replaced with truthful knowledge of the Corps of Cadets. S.A.M.E. is a collection of outstanding students who work together to make one of the most motivated engineering societies on campus.

Wissmann, the society's president, coordinated a job placement program with the national organization to give students summer jobs with engineering firms. Wissmann is also on Dean's Committee, bringing information and experience from the College of Engineering to his leadership of S.A.M.E. Many members were active during EXPO '85, with this writer leading the project to provide much needed reliable assistance. A fun project was the painting of Corps organizational plaques, to be presented to the Commandant. S.A.M.E. also helps the Student Engineers' Council, with events such as running the promotion and execution of the Order of the Engineer program, to promote professionalism among engineers. The society is not all work, however. Quarterly parties are held for members in places such as Bogen's and Morgan's, with the organization picking up the tab.

The society sponsored a speaker, Bruce Zimmerman, on March 5, which was open to the public. Zimmerman is chief of the Intelligent Systems Group at the U.S. Army Engineer Topographic Laboratories, Fort Belvoir, Virginia. He is responsible for developing terrain navigation subsystems for the Army Robotic Vehicle Program. A registered professional engineer, he holds a master's degree in applied mathematics from Harvard University and bachelor's and master's degrees in mechanical engineering from Virginia Polytechnic Institute. He spoke on artificial intelligence and autonomous land vechicles, and held stimulating discussions during the presentation.

REMEMBER:

ENTRIES FOR THE THIRD ANNUAL

ENGINEERS' FORUM

TECHNICAL WRITING CONTEST

ARE DUE MAY 21 IN 112 FEMOYER

STOP BY FEMOYER OR CALL US AT 961-7738 FOR MORE INFORMATION

Creativity Highlights Engineers' Week

by Amy Halloran, Alex Derr, and Karen Soos

Who says engineers are a bunch of dull bookworms, lacking in creativity and the ability to have fun? Not the members of the Student Engineers' Council, as this year's Engineers' Week illustrated. Held every year during the week of George Washington's birthday, E-Week celebrates the engineering profession and America's first engineer with a series of activities that include a speaker, convocation, various contests and a party. The motto of E-Week is "Turning Ideas into Reality," and various engineering societies did just that with several new E-Week activities that were both creative and a lot of fun.

Turning Ideans Into ... $$$!

On the Monday afternoon of E-Week, Dr. Bruce Vorhauer, the inventor of the Today's Contraceptive Sponge, spoke to students and professors about his experiences in the entrepreneurial world. As a Virginia Tech alumni, his talk was of special interest to the students who attended.

Vorhauer detailed the steps that he followed in developing and marketing his product, which currently holds 25% of the reversible contraceptive market, and the problems that he encountered along the way. Vorhauer kept the discussion lively with numerous jokes, even though before his talk he was unsure about their appropriateness in such a "conservative" school.

Vorhauer's main points for any future entrepreneurs in the audience seemed to be perseverance and the proverbial "don't judge a book by its cover." His perseverance was evident throughout his descriptions of the research and development process and seemed to be what sustained him even when his savings dwindled to $3.50. The judgment came into play when he decided to share his wine with an older man in a sauna. The man turned out to be the Treasurer of the World Bank, and was a key figure in gaining support for Vorhauer's product from the National Institute of Health.

Although Vorhauer's talk was not especially well attended considering the number of engineering students here at Tech, the hundred or so who were present were given a good insight into what goes on in developing a product, and particularly the legal difficulties in developing one for medical use.

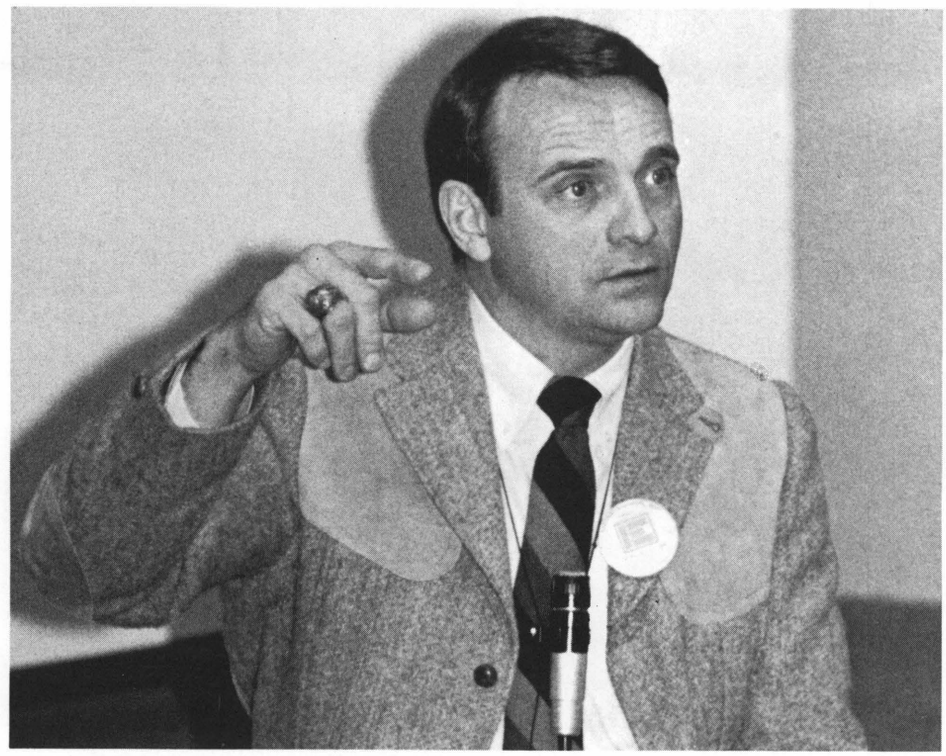
The $70,000 Dinner

Tying in with their preoccupation with money, Virginia Tech's chapter of the Institute of Industrial Engineers (IIE) did their share for E-Week by running Monte Carlo Night.

The modest sum of four real dollars could be exchanged at the door for $7000 of funny money. These bogus bills were legal tender all night for playing craps, blackjack, roulette poker, hi-low....

In the midst of multiple thousand dollar bets, the unofficial winner of the Mr. High Roller award was Lee Edson, whose most common wager was a whopping 20 (twenty) dollars. Edson came to Tech this year to be the College of Engineering's Writer-in-Residence. It may take him a while to become accustomed to our customs.

At the close of the evening, gamblers squandered their new-found wealth on prizes auctioned off by IIE president Kevin McCoy. These goodies included a per-



W.B. Robertson

Dr. Bruce Vorhauer explains the intracacies of being an entre peneur and how he made his ideas pay off.

***Amy Halloran** is a senior in Chemical Engineering.*

***Alex Derr** is a junior in Mechanical Engineering.*

***Karen Soos** is a junior in Humanities, Science, and Technology.*

sonal stereo, a disk camera, and, for 70 grand, a dinner at the Farmhouse restaurant.

IIE vice-president Dawn Korman confirmed that the evening was a great success, but wishes more people had shown up. "All the tables were full, but a few more people would have greatly increased the competition," she said. At the end of the gambling, some people had made a killing and some had busted. But that's life in Monte Carlo.

A Touch of Class

The SEC also sponsored a new event, the First Annual Faculty Talent Show. Open to all engineering societies, each group was required to involve at least one faculty member on stage in its act. While many of the societies seemed unable to coerce a professor into an evening of potential humiliation, those groups that did provided the audience with a truly enjoyable and very amusing evening of entertainment.

The SEC led off the show with an act entitled "Is it Time Yet?" which starred SEC officers and featured Dean Paul E. Torgersen. Dean Torgersen was also the emcee for the evening and treated the audience to some...interesting jokes.

The American Institute of Chemical Engineers (AIChE) displayed their idea of "Advanced Engineering," with a parody of the David Letterman Show. Students in the society showed off their pet "Stupid Professor Tricks." Those students lucky enough to attend the show were regaled with the sight of Dr. William Conger doing a splendid imitation of both a tree and a lawnmower (not at the same time, of course).

The AIChE also presented "A Touch of Class," the only act all night which truly had any class to speak of. Dr. Arthur Squires performed on the harpsichord, and also displayed his operatic talents by singing a piece while accompanying himself on the harpsichord.

The American Society of Mechanical Engineers (ASME) managed to enlist not only a crowd of student members, but also a crowd of faculty for their "ASME Shuffle." Both students and professors revealed in rap their true feelings about engineering.

The ASME's final act was the "Candy Shop," familiar to many of the audience from their Scouting days. Not satisfied with forcing their own professors to perform, the ASME conned faculty members in the audience to help out in this one, including Dean Torgersen who played a cash register.

When the show ended, monetary prizes were given to the winners who were chosen by a judging committee of three: Lynn Nystrom, faculty advisor for the SEC, Dr. Donald Drapeau, Professor of Theater Arts, and Tom Truitt, a freshman engineer. The ASME won first prize for their Shuffle, and received $50; the AIChE won second and third places ($25 and $10) for their two acts.

E-Week also featured traditional events such as the Paper Airplane Contest, the Egg Nationals and the famous Egg Drop. But once again the engineering students of Virginia Tech have shown that they are not dull bookworms, but creative, fun-loving students just like everyone else. Furthermore, they have displayed a trait that will be important throughout their professional careers: the ability to turn their ideas into reality.

Trivia Quiz

Can you identify the inventors of the following? Give yourself extra credit for dates and additional trivia.

1. Ball point pen.
2. Vulcanization process for rubber.
3. Pneumatic tires.
4. Contact Lenses.
5. The Flying Wing.
6. Dynamite.

Answers

1. Lazlo Biro invented one for handwriting in 1944. You get credit for guessing John H. Loud, 1888, although his pen was for marking rough surfaces.

2. Charles Goodyear, 1839. He died a pauper.

3. Robert W. Thompson had the idea first, in 1845, but it was John B. Dunlop, in 1888, who made the major breakthroughs. Dunlop's first creations were for bicycles.

4. A. E. Fick, 1887. Contacts didn't become "practical" until the 1930's. Glass lenses gave way to plastic ones in 1937, but it wasn't until the 70's that soft, porous (hydrophilic) lenses became a reality.

5. Developed by Jack Northrop (1895-1981). The first one flew in 1929. Although the Air Force cancelled the contract in 1949, the government has recently renewed its interest in flying wings due to their radar evading capabilities. The Stealth bomber is assumed to one of this configuration.

6. Invented by Swedish chemist Alfred Nobel in 1867. He combined nitroglycerin with an inert filler to greatly improve the safety of explosives. Being a pacifist, the potential uses of his invention bothered him. This prompted him to set up a fund to provide annual, Nobel Prizes, in the sciences, literature, and the promotion of international peace.

Intercollegiate Mud Racing

by Alex Derr

Trivia question: What has four wheel drive, independent suspension, an outboard propeller, an oversized lawnmower engine, and is made mostly of aluminum? Bonus question: Who designed it?

If you guessed Chitty Chitty Bang Bang or Ian Fleming, you get a big score of zero points. The "raft with a roll cage" is Virginia Tech's entry in this year's intercollegiate Mini Baja competition. Designed by a small group of Tech students led by James Downs, Mark LeBel, and Chris Chesnakas, the vehicle will soon be on its way to the Ft. Belvoir testing grounds and, hopefully, to fame and glory.

The Mini Baja competition is an annual contest between mechanical engineering student groups from schools all over the country. The basic rules are simple: The vehicle entered must be safe to operate, it must be manufacturable for less than $1500, and it must be powered by the stock 8 hp Briggs & Stratton engine supplied. Beyond these requirements, it is up to the designers to dream up and create a vehicle capable of travelling through rough terrain, mud, and deep water.

The three day competition, which will be held June 3-5, starts off with a static judging and a rigorous safety check. Then the fun begins. The vehicles compete in land maneuverability, deep water maneuverability, hill climbing, and a head-to-head drag race. Yes, a drag race. These monsters really move. On only eight horsepower, they move faster in the water than one might expect them to move across a wheeled vehicle's natural element.

On the third day, the competition culminates in an all out, go for broke, two hour endurance race over rough terrain, hills, woods, open fields, mud, and deep water. This is where a vehicle's true mettle shows. Slight flaws in design can be greatly amplified by dousing them in dirt, water, dirt, mud, dirt, more dirt, and then subjecting them to rigors of racing.

Virginia Tech entered the competition for the first time last year and rolled away with first place trophies for the hill climb and chain pull competitions. Placing 22nd out of 50 in the endurance race was not too shabby an accomplishment, either.

This year's design is significantly more sophisticated than last year's, with its propeller for the deep water sections and aluminum construction for light weight. What improvements can we expect for next year? There are rumors that the '87 model will be able to fly....

If you would like to join Tech's mini baja team, contact Dr. Hurst, the faculty sponsor.

C. J. Hurst

Tech's tank tears up the track. Sponsors get advertising space on the body of the vehicle.

***Alex Derr** is a junior in Mechanical Engineering.*

Sixty Years Ago

Ed. Note:
The following editorial appeared in the March 1926 issue of the Virginia Tech Engineer.

The Engineer of the Future

The influence of the engineer in public life is daily becoming greater. Several of the most progressive cities of the country have secured members of this profession to act as city managers. The office of city manager is compartively recent, and is indicative of the growing public sentiment in favor of the engineer. The general public is beginning to realize that the technically trained man can fill a definite place in public enterprises. More and more the advice of a competent engineer will be sought as today the advice of our family physician is sought. Truly, those of us who are just beginning our professional career have a wonderful future before us. It is our duty to meet the tasks that will be given to us in a manner that will be fitting and credible to the title we bear. We have the ability to meet these tasks, and we certainly have the opportunity to secure a firm foundation in college, but yet we lack the prime requisite; namely, long years of hard work, ever endeavoring to do our best. It is up to us.

The following editorial appeared in the May 1926 issue.

An Engineering Student Should Study English as a Major Subject

Let us consider the immediate value of English. A technical student is constantly being examined on the subjects that he is taking, and, in addition to this, he must write reports on the work that he does in the laboratory. Certainly, ability to write clearly and effectively is of importance here. If the ideas that the student wishes to express are not set forth concisely and intelligently, the instructor grading the scholar's report unconsciously prejudges the paper; this attitude of the instructor is detrimental to the pupil. Most of us will admit these statements since we can see their actual working out in our life here in college.

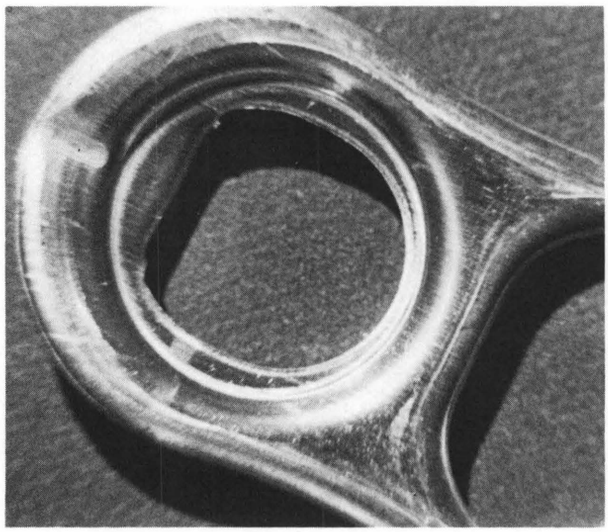
Now, concerning the future; most of us are occupied simply with the present since life is full and bubbles over with interest. Yet, a little serious thought will show us that our future success is going to be largely limited by the use that we make of those effervescent abilities which bless our youth. Look around and consider the attributes of the men that are successful in any walk of life where the ability to make others see some great truth or principle as they see it is essential. You will find that all these men are capable of writing and talking clearly and effectively. Surely, we can profit by their example and determine to acquire the same ability to put our ideas on paper or present them to others so that we can convince them....

W.B. Robertson

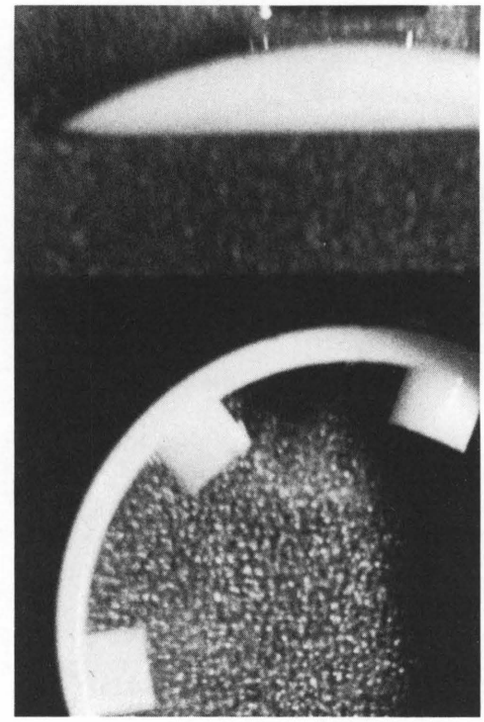
This photo from Volume 1, Number 4 (1926) shows S.R. Pritchard, Dean of Engineering and Chairman of the Faculty Advisors for the Virginia Tech Engineer.

Picture Quiz

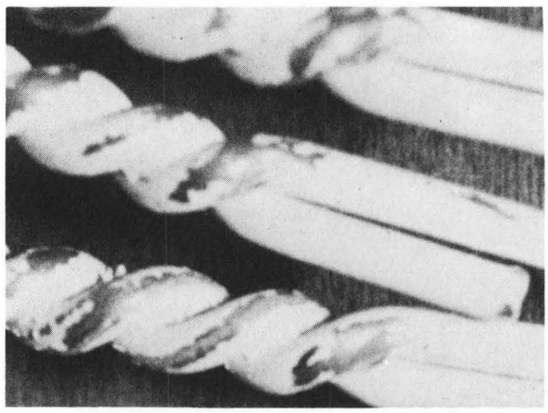
Can you identify these familiar objects?



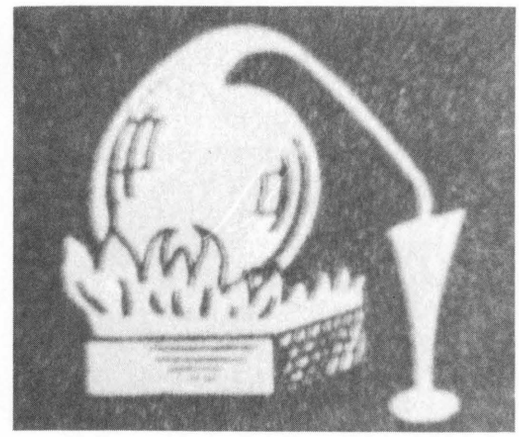
1



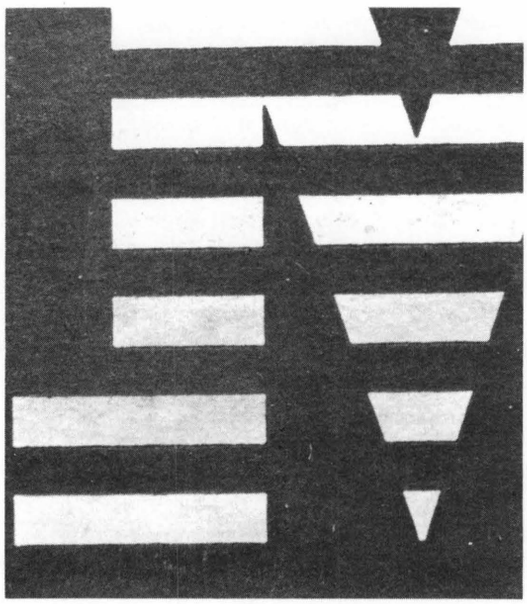
2



3



4



5

by W.B. Robertson

ANSWERS:

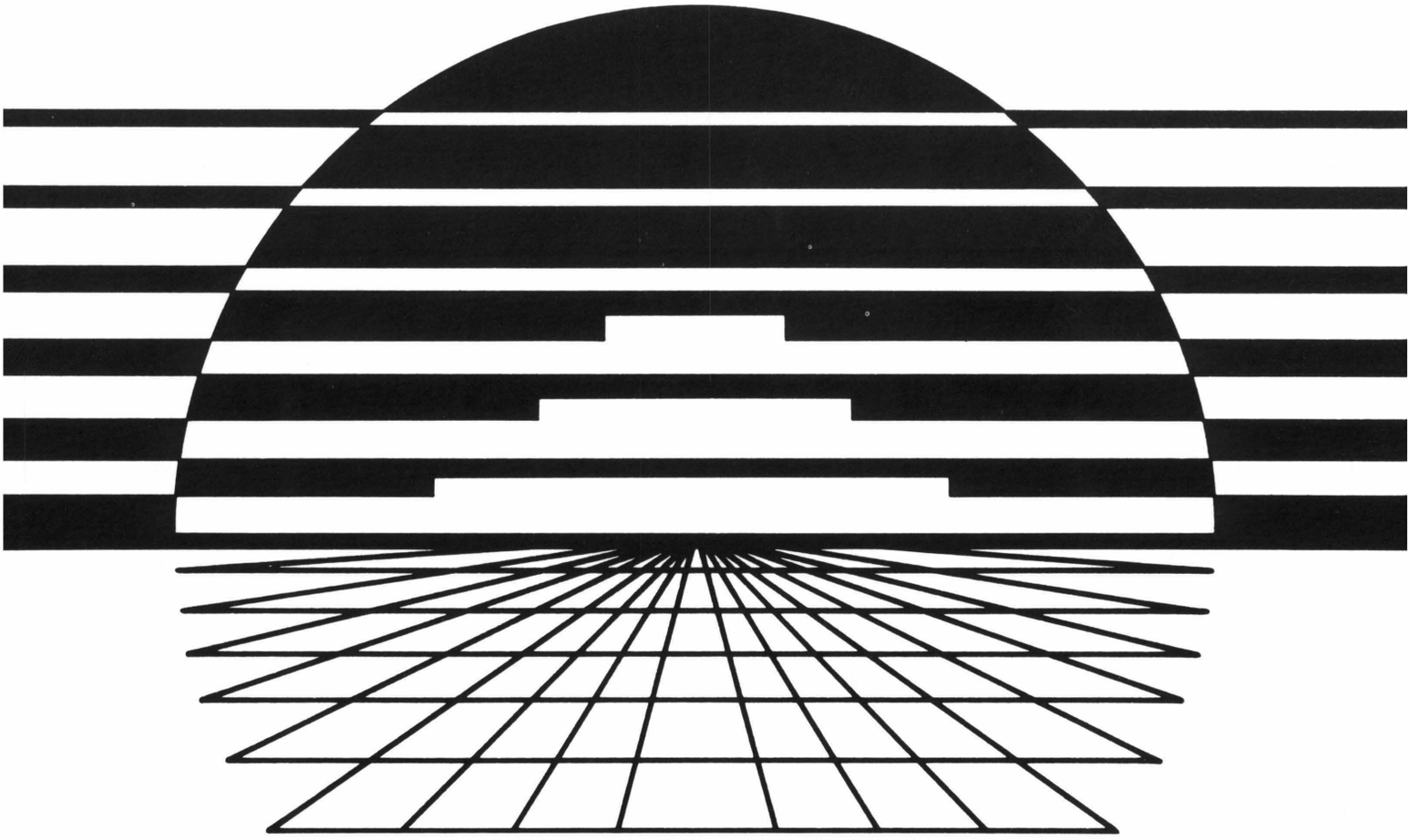
1) Can pull tab
2) Cassette hub
3) Hangers
4) Tech seal symbol
5) "M" of IBM

Explore The Future In Good Company

Saginaw Division is a
dynamic place to put your strong
technical skills to work.

Saginaw

Saginaw Division, General Motors Corporation

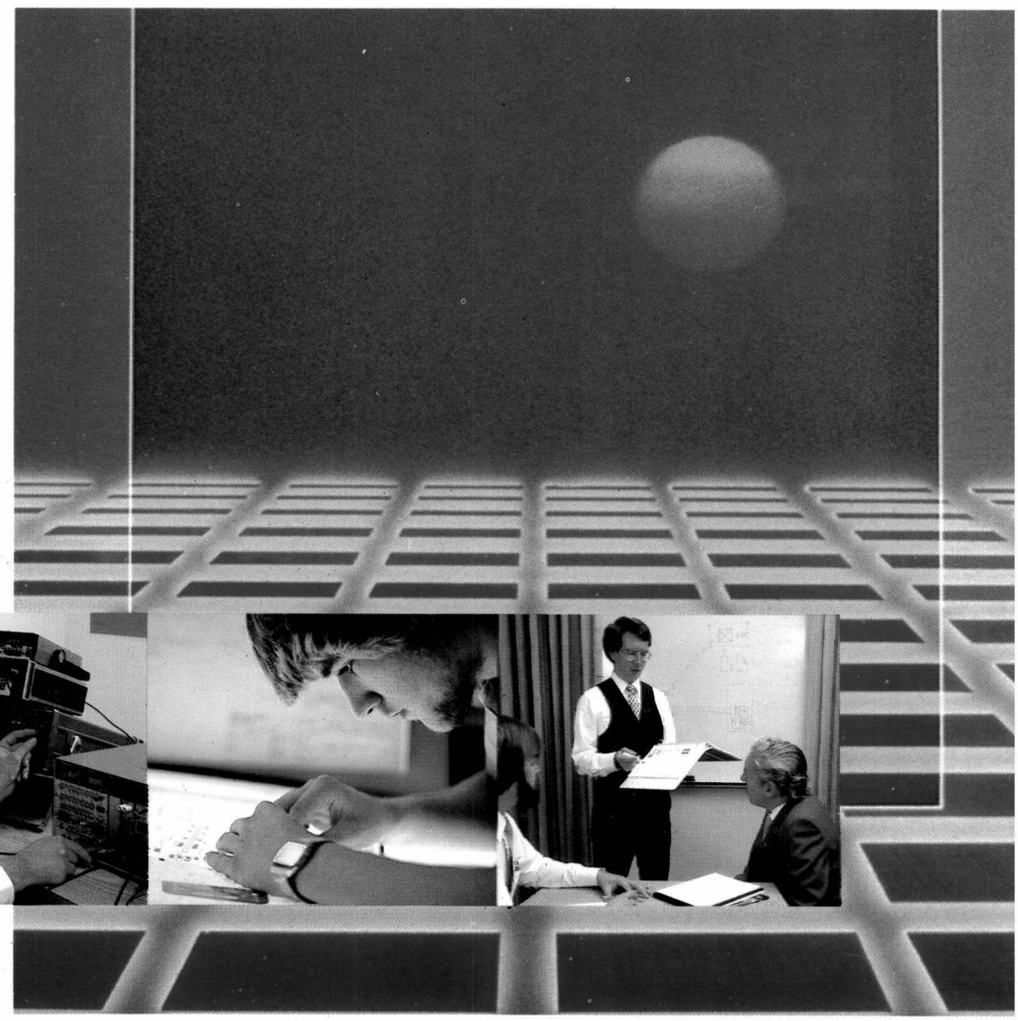


Visit our booth at Expo '85 on October 16 & 17, 1985
and sign up to see our on-campus recruiters December 5, 1985

YOUR FUTURE IS AS LIMITLESS AS YOUR IMAGINATION

As the innovator in telecommunications testing systems, Hekimian Laboratories, Inc. (HLI) is seeking Communications Engineers and Computer Scientists who would like to put their talents to the test. Join us and be involved in hands-on approaches in research, development, design and manufacturing.

Since the AT&T divestiture, the need for quality telecommunications testing has increased at AT&T, the Other Common Carriers, and the Fortune 500 companies. Our professionals are meeting this challenge. We are maintaining a tradition of consistent innovation that has pioneered the industry for more than 16 years.



Members of the Hardware Design Engineering Team may be involved with:

- **Development of new measurement techniques**
- **Design of analog and digital filters**
- **Interfacing analog and digital measurement techniques with microprocessors**
- **Design of microprocessor systems and test fixtures**
- **Development of electrical and mechanical design considerations for manufacturability**

As a member of the Software Engineering Group, you may be involved in:

- **Integrating equipment into a complete access and test system**
- **Implementing instrument control software**
- **Measurement control and data manipulation within test instruments**
- **Test fixture programming**
- **Algorithm design**

At Hekimian Laboratories, it isn't enough for your ideas to look good on paper; they have to be put to the test. You will work side-by-side with other professionals who are committed to being the best in their area of specialization, and follow a project through from inception to production.

HLI offers excellent salaries, a comprehensive benefits package and a superb location in the Washington, D.C. area, adjacent to the I-270 corridor in what is now called "Little Silicon Valley."

If you would like to meet the testing requirements of today . . . and tomorrow . . . while building a challenging career, we invite your inquiry. For more information about a career with Hekimian Laboratories, contact Tom Kruzic, Hekimian Laboratories, Inc., 9298 Gaither Road, Gaithersburg, MD 20877 (301) 840-1217. An equal opportunity employer.

HLI®

Hekimian Laboratories, Inc.