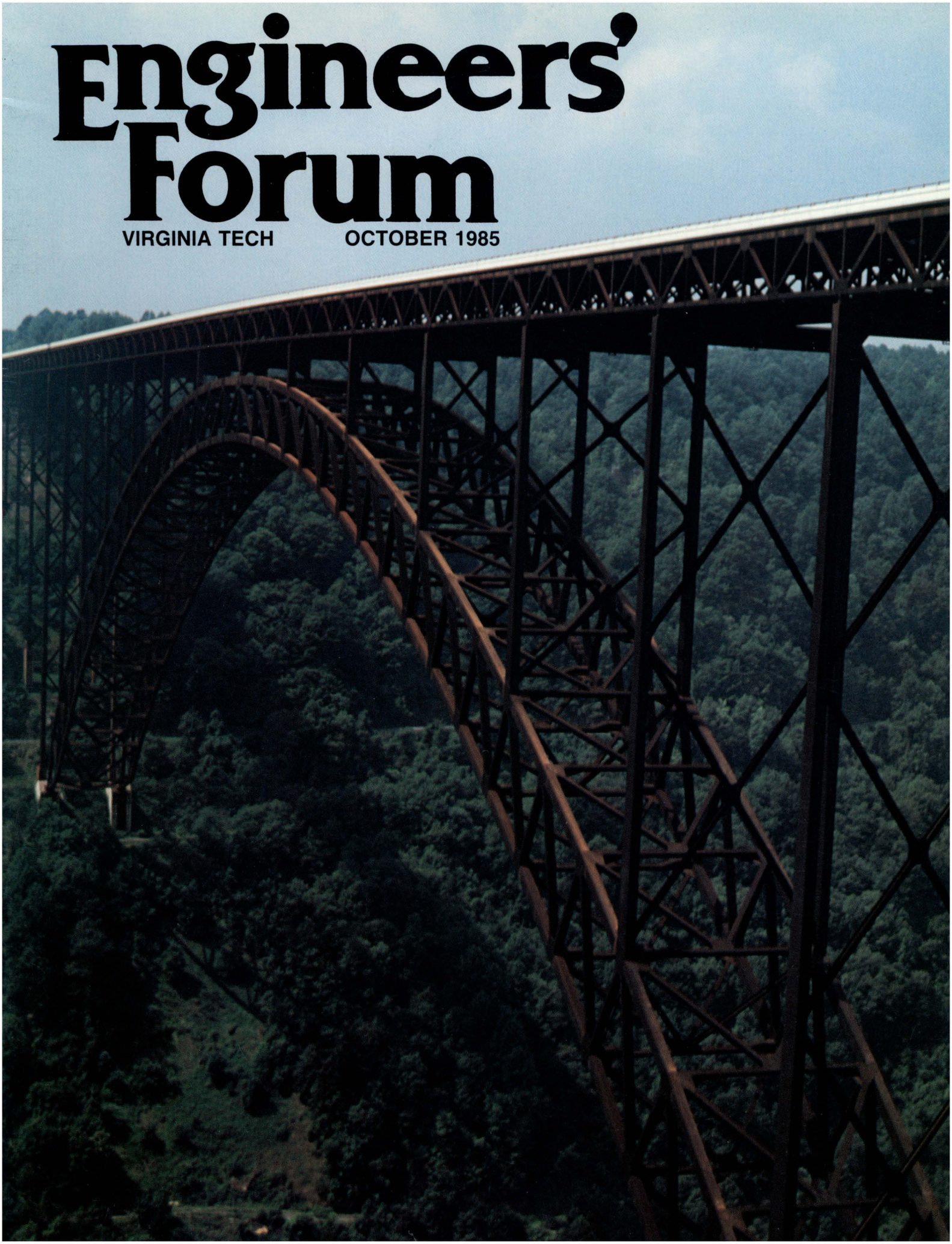
Engineers' Forum

VIRGINIA TECH OCTOBER 1985



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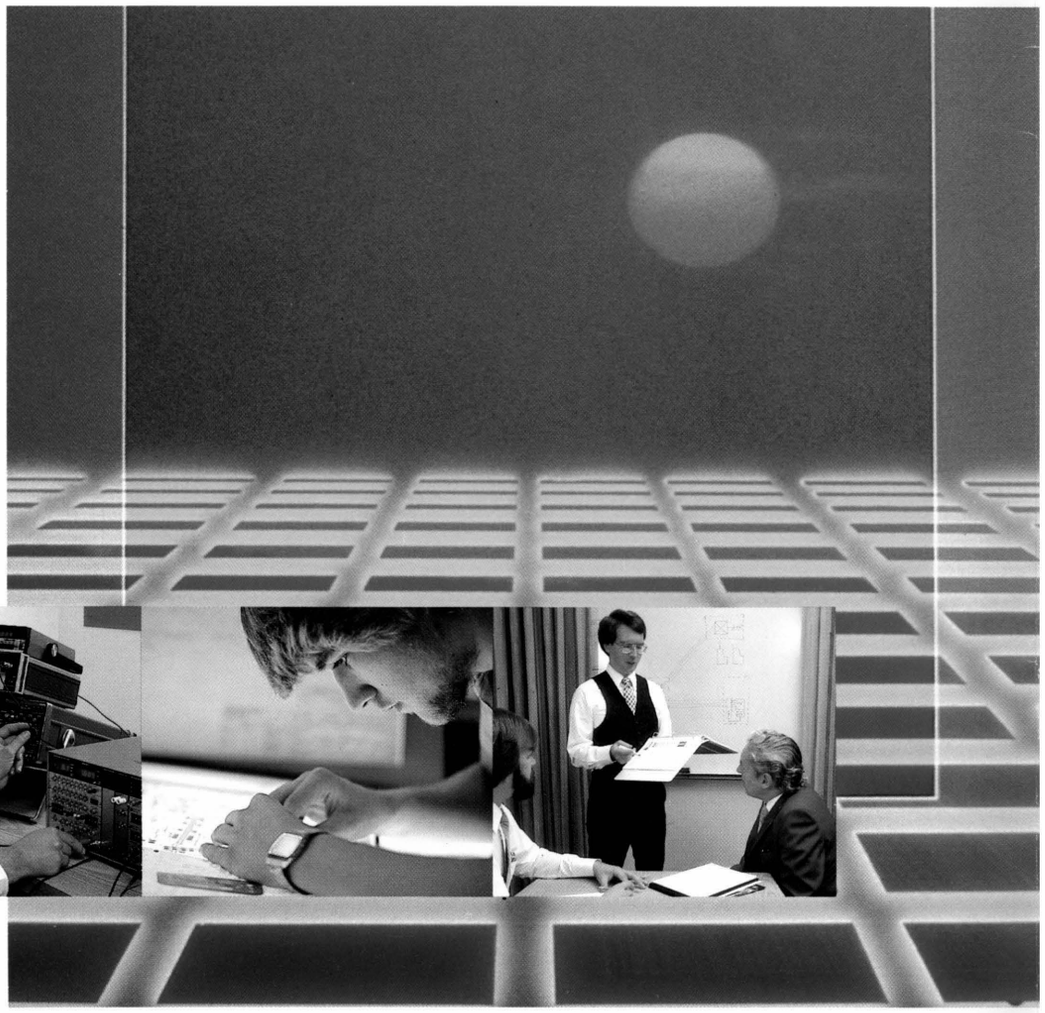

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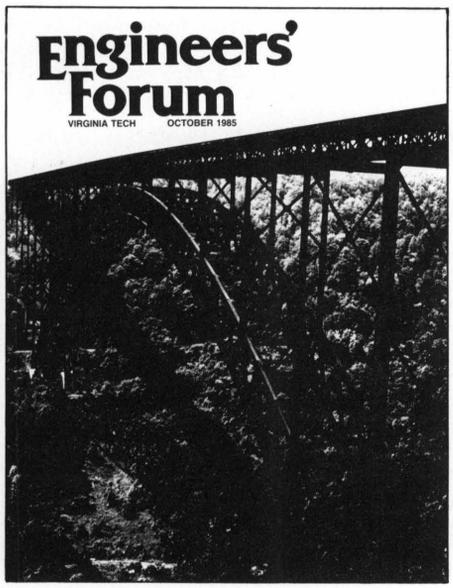

On the Cover:
Spanning 3030 feet, the New River Gorge Bridge in West Virginia is the world's longest single arch steel span.

Photograph by W. Bruce Robertson.

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Engineers' Forum

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Break the Stereotype

Have you ever asked yourself, "Am I an engineering geek?" Probably not, but then it's a rather incriminating question. Maybe I should explain what I mean by such a grossly stereotyped label. To me, an engineering geek is a person whose extracurricular life consists of eating, sleeping, playing video games and doing laundry—in short, of doing nothing worth talking about.

'But,' you cry, 'I'm taking twenty-one hours of ChE courses this quarter—how am I supposed to find time to do anything else but study?' Well, nobody says that you have to devote your life to an activity; any successful engineering student will tell you that it is quite possible to schedule sufficient time to do things other than study. So much for excuse number one.

Next you say, 'But I like doing laundry and playing video games.' OK, but is that all you're doing with your life? When you look back at your college days, say twenty years from now, will you be able to say that they were exciting and informative, or will they seem to be one gray haze of soap suds and Space Invaders?

Our four (five, six, ...) years at college offer a unique opportunity to try out different activities while we're still pretty much unburdened by the hassles faced by responsible adults—you know, the ones who have to hold down full-time jobs to feed themselves. You'll still be able to do laundry when you're forty, but you'll find it a sight harder to host your own radio show.

Furthermore, many employers are interested in more than just your QCA. They want to know how well you function with other people and handle responsibility. This experience is usually gained outside of classes. Whether you coach your dorm's softball team or sponsor a series of lectures, you will gain valuable insight on how to organize your time and resources, and how to deal effectively with other people.

So if you suspect that there is more to life than dirty socks, then why not explore the wide variety of opportunities that Virginia Tech offers. Get involved in the decision-making process of the College of Engineering or the University at large by checking out the Student Engineers' Coucil, the Student Government Association, the Residence Hall Federation, or the Judicial System. If you're artistially inclined, try out for one of the many music, acting or dance groups on campus. And if you've got the urge to communicate with your fellow human beings, talk to the folks at WUVT, the Collegiate Times, Silhouette, the Bugle, or your own student engineering magazine, the Engineers' Forum.

Interested people are always welcome on our staff and we encourage reader input; after all, we're producing this magazine for you. Got any ideas on articles you'd like to see, or other comments, questions, complaints? Just give us a call at 961-7738 or drop us a line at:

Letters to the Editor
Engineers' Forum
337 Norris Hall

Karen Soos

Letter to the Editor

The Physics Survey

This letter is in reference to the survey conducted during academic year 1983-4 among engineering students who were taking or had taken Physics 2171-2-3. The survey was conducted by students of the Student Engineers' Council (SEC). This letter also concerns the article about the SEC survey which appeared in the April 1985 issue of *Engineers' Forum*; this article inadequately (and sometimes incorrectly) represents the results of that survey, as I shall detail below.

First to the results of the survey: those of us in the Physics Department were not especially displeased with nor surprised by most of the responses obtained by the survey; on the other hand, we were not satisfied with those responses either. Recently we have been making changes in that sequence in an effort to get the best results possible in the limited course time that is available. We will continue to make changes, always aiming toward the best engineering education which can be provided.

One of the results of the survey showed that in general the instruction rated higher than the courses themselves. Also shown is an increase in student rating of the courses as they move through the sequence. Physics 2171 recieved the lowest rating, and we shall work toward closer coordination with the presentation of ESM 2000 and 2020 which should improve that situation. There are other changes we expect to introduce this year which are designed to provide more and different types of help for the students outside of the regularly scheduled class meetings.

I know that most of you have not seen and probably will not see the complete results from the survey; what you did have access to is the article entitled "The Results of the Engineering Physics Survey" which appeared in the April 1985 issue of this publication. Unfortunately that article has errors and creates inaccurate impressions concerning the results of the survey. There is the statement in the article that "the majority of the instructors received ratings between 'fair' and 'poor'...." This simply is not the case; the majority of instructors rated in the survey received ratings in the categories from "good" to " excellent." (I might also point out that of the instructors rated "fair" and lower, half are no longer in this department.)

Besides incorrect statements, the article quotes a number of student comments in a way that creates incorrect impressions. For example, the article says that "out of 27 written responses, only two claimed that Physics 2172 provided an adequate background for EE 3101." That certainly suggests that a strong vote of "no confidence" was given to Physics 2172. But in fact the 27 written responses had to do with the general subject of course duplication, with most of the comments making no reference at all to EE courses. It must be recognized that a very few comments out of hundreds can be quoted to create almost any impression one wishes.

But enough of my objections to that article. I wish primarily to emphasize our continuing interest in providing the very best physics course possible for all students who come to us, and for engineering majors in particular. Professor Sam Bowen has written an article detailing some of the plans and approaches which we are pursuing in our continuing efforts to give the very best sequence possible for engineering students. I commend it to your attention.

T.E. Gilmer, Jr.
Head, Department of Physics
Virginia Tech

Ed. We apologize to all concerned for any errors in interpretation or fact. Interested students were invited to view the complete survey when the article was published, and copies are still available for you to read at each of the following locations:

Engineers' Forum
112 Femoyer Hall

Student Engineers' Council
110 Femoyer Hall

Dean's Office
337 Norris Hall.

Are Our Bridges Safe?

by Richard Allen

At 5:00 PM on December 15, 1967, the structure of the Silver Bridge between Point Pleasant, West Virginia and Kanuga, Ohio collapsed. Thirty-five cars fell into the Ohio River, killing 46 people.

On the morning of May 9, 1980, the Sunshine Skyway Bridge in Tampa, Florida was rammed by a large freighter, the fourth time the bridge had been struck since 1977. As more than half of the bridge deck crumbled away, eight vehicles fell through, carrying 35 people to their deaths.

Because of the possibility for catastrophic failure and loss of life in the event of a bridge accident, it is vitally important that bridges be carefully designed and maintained. In actuality, though, the state of our nation's bridges is poor. According to a May 1984 report to Congress by the Federal Highway Administration (FHWA), more than 260,000 out of a total 571,000 spans in the U.S. are either structurally deficient or functionally obsolete. Almost 30% of the deficient bridges are on the federal aid highway system, the major roads and streets which carry 80% of the country's traffic. That works out to an average of one unsafe bridge for every 20 miles of federal highway. The total cost to repair these bridges has been estimated at close to $50 billion. In the five state region surrounding Virginia, including the District of Columbia, 54% of the bridges are deficient. In Virginia alone there are 4625 faulty bridges (37% of Virginia spans). [3]

There are a number of reasons for bridge problems. Some of the most common contributing factors are discussed below.

Age

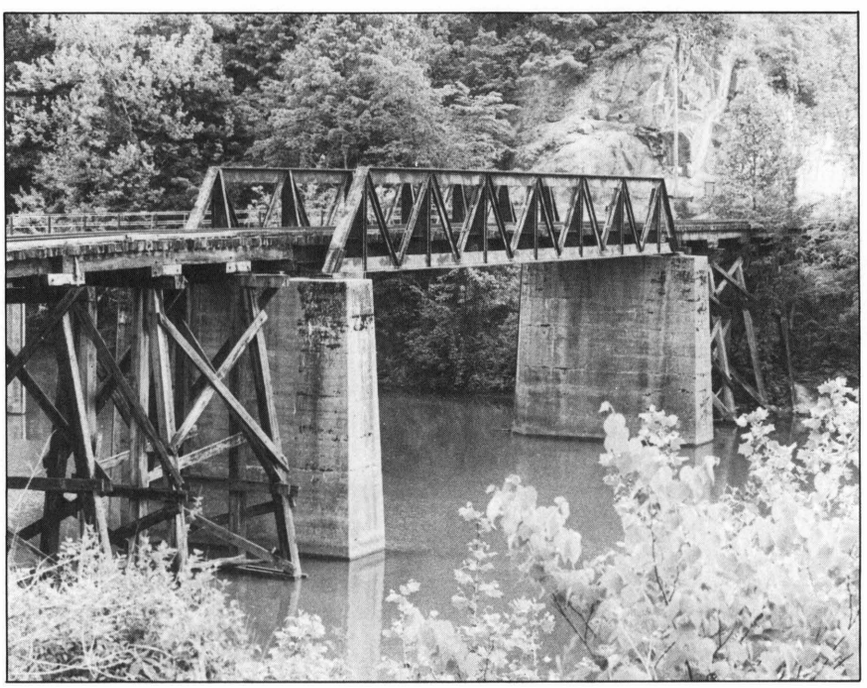
Most bridges have a useful lifespan of between 50 and 80 years. Yet three out of every four bridges in the U.S. are over 45 years old, and one out of 21 bridges still in use today was built before 1900. [4]

Heavier Traffic

Many of the bridges on the nation's highway system were not designed to carry the volumes and increased axle loads of today's traffic. Those predating the automobile era were intended to carry slower, lighter traffic. In fact, a large number of bridges on the primary road system were designed for 20 ton loads, about half of the legal requirement of many states for new spans. [2] According to TRIP (The Road Information Program), a highway research council in Washington, D.C., nearly one-third of the country's bridges are closed or posted for reduces rates.

Weathering and Erosion

Although the weathering process is expected to take some toll on a bridge over its lifespan, this erosion can be accelerated by a variety of substances. Heavy use of salt and other snow and ice-melting chemicals can cause corrosion of steel and



W.B. Robertson

Abandoned steel and concrete railroad bridge near Radford, VA

iron members and lead to spalling of concrete decks and adjoining roads. Certain types of fuel can also weaken and destroy asphalt surfaces. And acid rain and even pigeon droppings can contribute to the deterioration of spans.

Inadequate Geometry

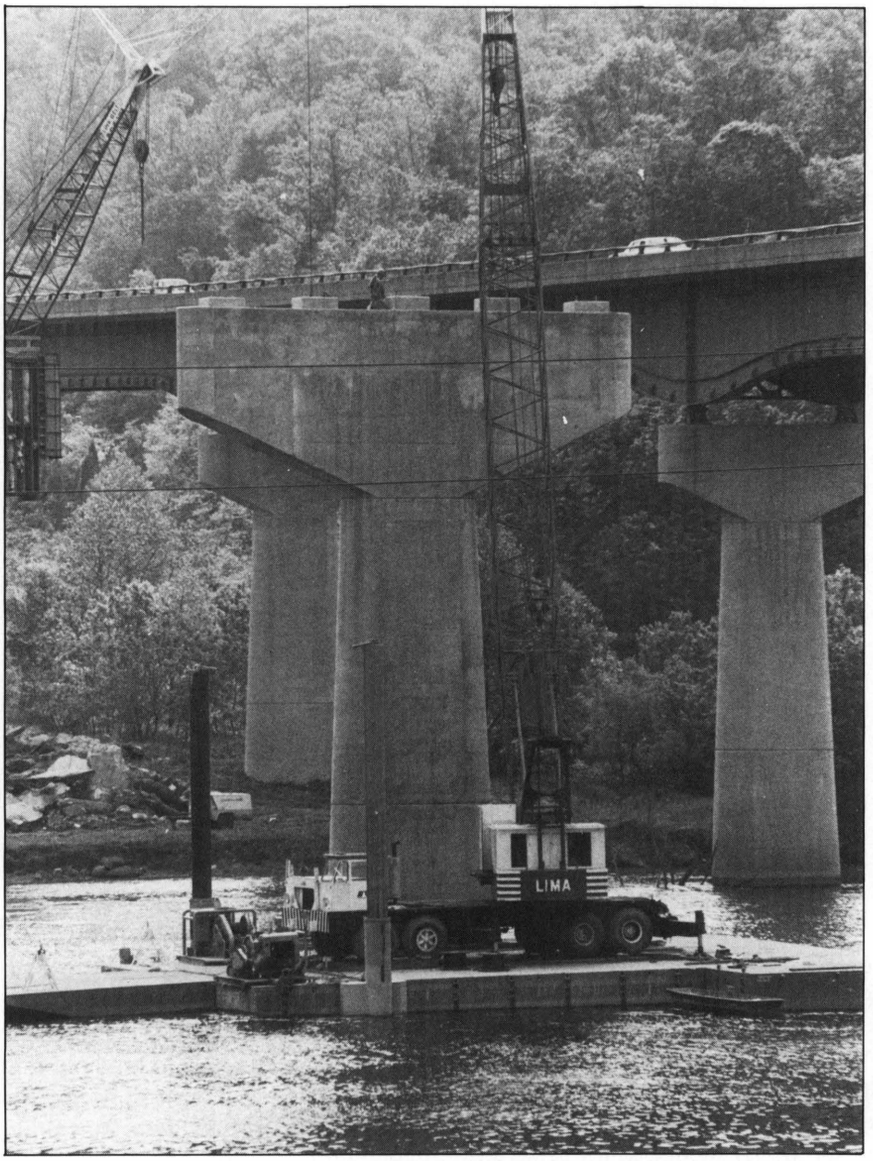
A great number of bridges are classified as deficient not because of structural weaknesses, but because of poor geometry. Geometric standards now available set waterway openings and clearance, grade and centerline location, pier placement and approach widths. Obviously, safety is influenced greatly by bridge geometry. M.H. Hilton of the University of Virginia and the Virginia Highway and Transportation Research Council has found that increasing a bridge's width from 23 feet to 40 feet can reduce accidents by yp to 95%. Still, the National Transportation Safety Board has charged that two-thirds of the country's bridges fail to meet recommended safety standards, resulting in over 1,300 traffic deaths from accidents with bridge barrier systems each year.

Infrequent Inspections

Because of the possibility for catastrophic failure, frequent and thorough bridge inspections are important. As recently as 1982, however, fewer than one-half of the counties in the U.S. had qualified staff personnel to inspect their bridges properly. Before it was closed in 1973 after a truck fell through its deck, New York's elevated West Side Highway had gone without an inspection for 20 years. [4]

Due to the size of the United States, one of the unfortunate facts of life is that it often requires a disaster to bring a serious problem to the nation's attention. In the case of our nation's bridges, it took the Silver Bridge failure in 1967 to bring about any real change in position regarding bridge replacement and rehabilitation programs. Some of the major changes in bridge rehabilitaion programs are chronicled below.

The Silver Bridge disaster prompted Congress to pass the Federal-Aid-Highway Act of 1968 (FHWA), which established what are known as the National Bridge Inspection Standards (NBIS). This act required states to establish and maintain a current inventory of all bridges on the Federal-aid highway system. The act was later extended to include off-system spans as well. The inventory consisted of a 90-point identification, inspection, and rating for each structure, but did not provide funds for the actual repair of bridges. [1]



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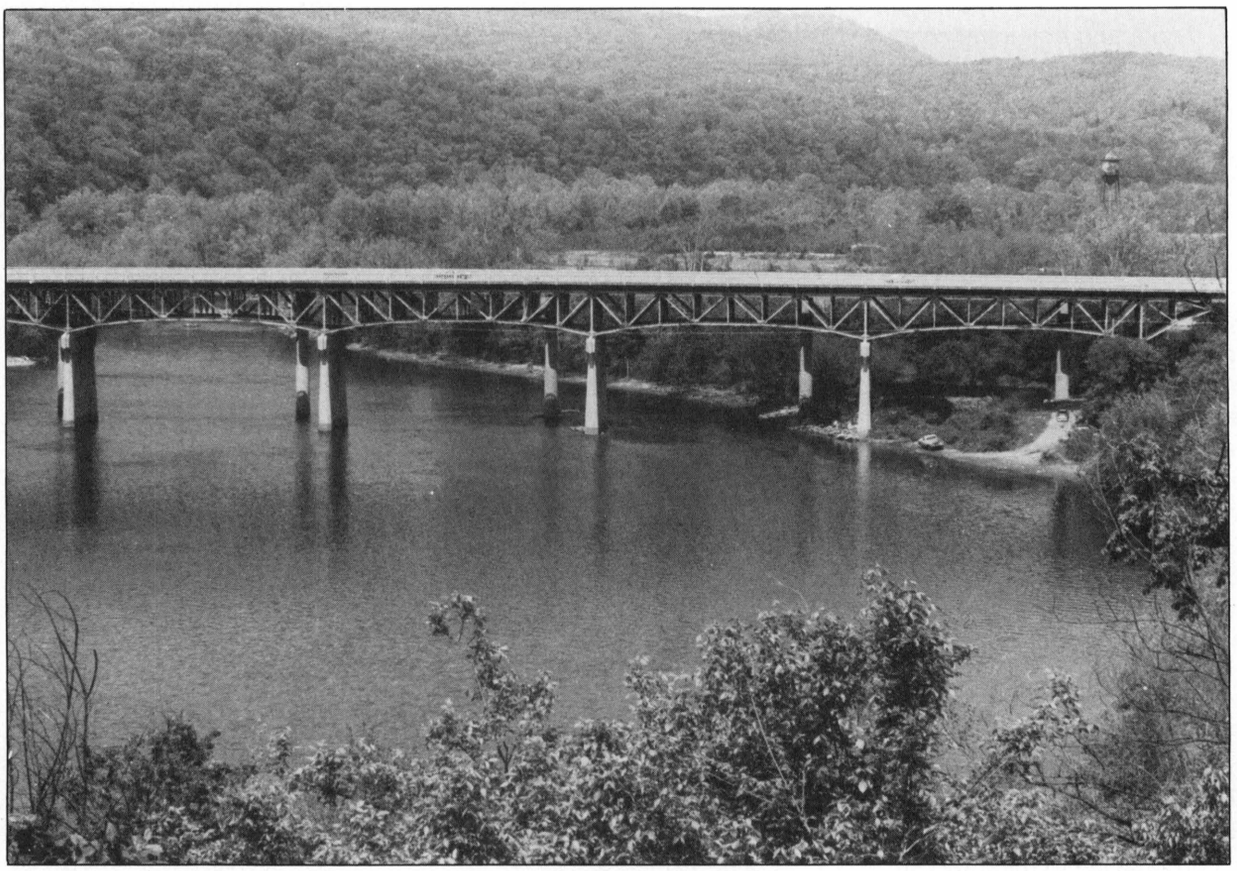
Construction of an Interstate 81 bridge near Radford, VA

The first Act to provide such funding came with the FHWA of 1970. Through the special bridge rehabilitation program, this Act authorized a total of $816 million between fiscal years 1970 and 1978 for the replacement of deficient Federal-aid system bridges on a 75-25 matching Federal-state funding ratio. Around 2100 projects were funded by this program. [1]

Bridge funding took a dramatic leap with the Surface Transportation Assistance Act of 1978 (STAA), and the establishing of the Highway Bridge Replacement and Rehabilitation Program (HBRRP). This program provided $4.2 billion for fiscal year 1979 through 1982. The Act was also the first to provide funding for off-system as well as Federal-aid system bridges. Several other changes to the FHWA of 1970 were added to make financing of bridge projects more feasible for state and local governments. About 4500 bridge projects had received funds from this program by 1983. The most recent bridge rehabilitation program was the STAA of 1982, otherwise known as the 5 cents a gallon gasoline tax. This Act extends the HBRRP through fiscal year 1986, and will



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US 460 bridge over the New River near Narrows, VA

provide an estimated $7.05 billion for the continued support of the nation's bridges. [3]

These programs by no means constitute an exhaustive list of available funding programs. Other regular Federal-aid funds available for programs are estimated at $2.0 billion in fiscal year 1983 to $2.5 billion in 1986. [3] An additional $1 billion per year is provided by state and local governments for off-system spans. The Interstate 4-R program (for resurfacing, rehabilitation, restoration and reconstruction) is another example, providing money for interstate bridge repair. In all, the total amount of funding earmarked for bridge rehabilitation stands at about $5 billion in 1983 to $6 billion in 1986. [3]

But what does the future hold for America's bridges? An enormous amount of money has been provided, but how much effect will this really have on the problem at hand? One estimate by the Federal Highway Administration states that it will require $26.7 billion to upgrade the 63,000 deficient bridges on the Federal-aid system and $22.2 billion for the 170,000 spans off the federal system. However, bridge rehabilitation is not a one-time cost. In 1983, over 7000 bridge projects were financed, while 1600 projects were actually completed. During that same period, over 6000 more bridges were classified as deficient. [3] Yet, some projects are not started at all because states or localities are unable to come up with the required matching funds, or because of lack of public or political support. Meanwhile, the list of problem spans keeps growing. If the 570,000 bridges across the country have useful lifespans of 80 years, then over 7000 spans will have to be replaced each year. Likewise, if each bridge requires rehabilitation once during its lifespan, then another 7000 bridge projects will be required each year. The point is that continued support will be required in order to rectify the current state of our bridges and to maintain their integrity.

Deterioration of our nation's bridges affects everyone. Consumers must pay higher prices because of higher fuel and labor costs imposed on the transportation industry by bridge closings and weight restrictions. Whole towns and cities can find their revenues drastically reduced by the closing of just one bridge. Our safety is threatened by poorly aligned and narrow crossings, and spans too weak to carry our children across a stream without sagging under the weight of a loaded school bus. Therefore, it is imperative that the United States continues, and hopefully escalates, its efforts to revitalize our nation's bridges and infrastructure. Our future depends on it.

References

[1] Karl S. Bowers, "Bridge Rehabilitation Programs," *Traffic Quarterly*, Apr. 1980, pp. 263-270.

[2] "Hope for Deteriorated Bridges," *Public Works*, Jan. 1982, p. 44.

[3] Walter D. Munn, "Bridge Market Grows as Ailing Spans Age," *Highway and Heavy Construction*, Sept. 1984, pp. 31-33.

[4] Jack Harrison Pollack, "Our Unsafe Bridges," *Parade*, Feb. 28, 1982, pp. 4-6.

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Squires Student Center

October 16, 12:00 noon to 5:00 pm

October 17, 9:00 am to 4:00 pm

by Scott Taylor and Scott Courtney

The student Engineers' Council invites you to attend EXPO '85, Virginia Tech's sixth annual engineering exposition. This year, EXPO features a new program for technical presentations by participating companies, as well as the company information display booths.

EXPO offers an excellent opportunity for informal student-industry interaction. Over 80 companies and government agencies representing a broad range of technical disciplines will participate in the two day event. Company representatives will be eager to discuss opportunities, current projects and research with any of the expected 5,000 students who will attend EXPO '85.

All ten of the engineering departments will be represented at EXPO. Their respective professional and honorary societies will set up booths and demonstrations to familiarize students with each of the engineering disciplines. In addition, the undergraduate and graduate Cooperative Education Program and the University Placement Services will be represented.

For the first time, companies will give thirty-minute technical presentations for the in-depth description of new products, technical advancements, or specialized research. The professionals at these presentations can explain, from an industrial viewpoint, just what certain fields actually involve after graduation. Also, with the aid of computers, models, products, and audio visuals, students will receive a glimpse of the current trends in industry.

The Student Engineers' Council invites all students to attend one of the largest fall events at Virginia Tech. You will find EXPO to be a rewarding experience whether you are a freshman, graduating senior or graduate student in any technical curriculum.

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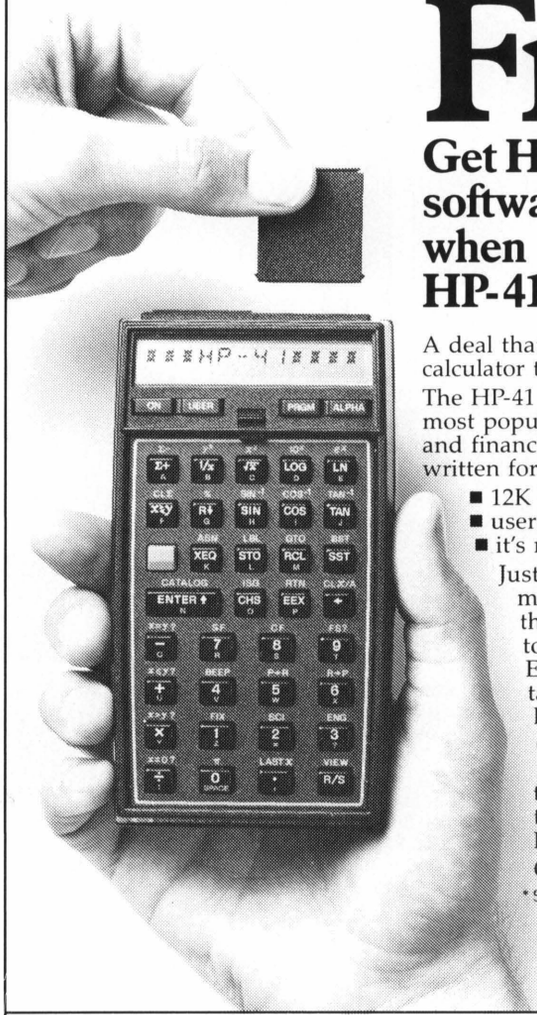

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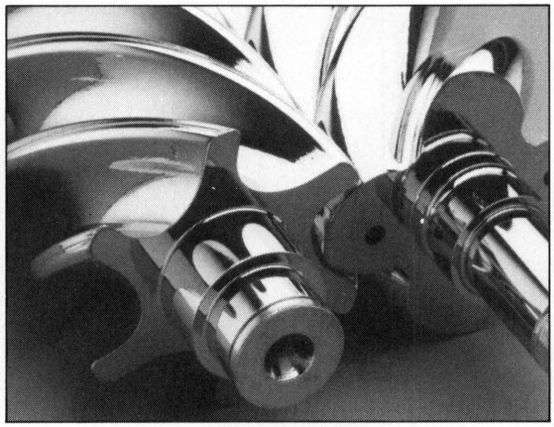

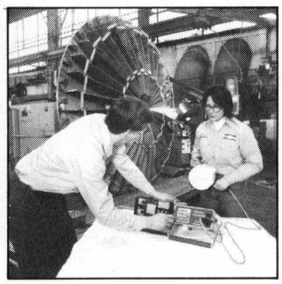

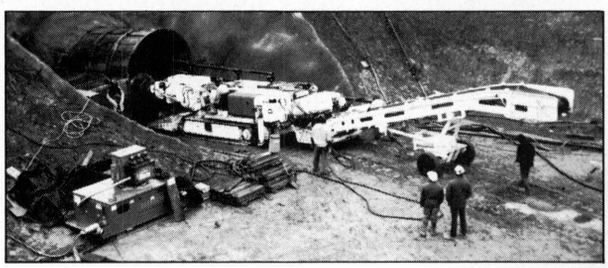

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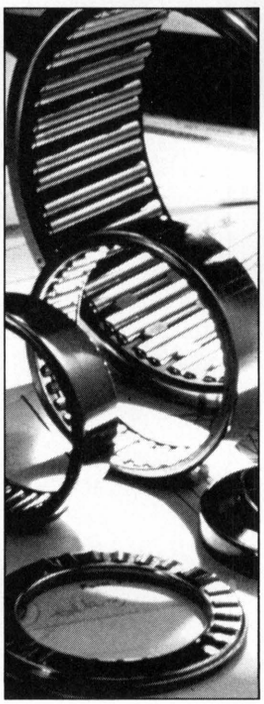

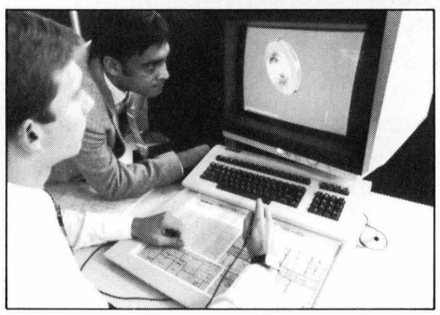

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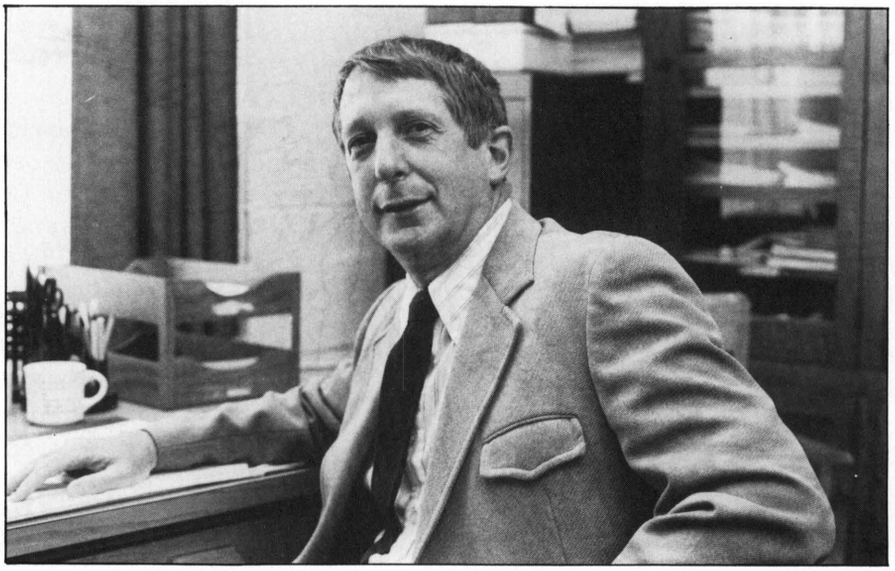

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Sporn Award 1985
Dr. McIntyre R. Louthan, Jr.

by Todd Kilbourne

Dr. McIntyre R. Louthan, Jr., Professor of Materials Engineering, has won the Sporn Award for the second time, having received the award previously in 1979. The award is for excellence in teaching in undergraduate engineering courses, and the winner is chosen by the undergraduate engineering students.

Dr. Louthan received his B.S. in 1960 and his M.S. in 1962, both from Virginia Tech in Metallurgical Engineering. In 1967, he received his PhD. from the University of Notre Dame; while he was there, he taught undergraduate engineering courses as an instructor. Dr. Louthan began teaching at Virginia Tech in September, 1975, while on leave from Du Pont's Savannah River Laboratory; he found that he enjoyed teaching at Tech and decided to stay. He believes that Tech has an excellent undergraduate engineering program because the college is dedicated to giving outstanding undergraduate instruction. He also likes the fact that so many professors at Tech teach.

Dr. Louthan's specialty is the effect of the environment on the behavior of materials. He is the author of over 100 papers, editor of three books, and the author of about 60 government reports. He also gives seminars regularly and teaches short courses for the American Society for Metals (ASM). How does someone so busy stay on top of things? A major factor, Louthan says, is his wife, Frances; she helps to organize the paperwork in his office and to keep his calendar up-to-date.

What Dr. Louthan enjoys most about teaching is that he can talk about things that he understands with those who have similar interests: "You can do that better in a university than in industry." He also enjoys fishing and basketball, but since all three of his children are involved in athletics, most of his sporting time is spent as a spectator. He is also very active in his family's church.

Dr. Louthan's most important goal for the future is to see his students win a couple of national awards in which they have recently placed second. If he were to give any advice to others wanting to be good teachers, it would be to always prepare the lecture well and to like the students and show it; "that sometimes means being hard on them when they need it," he says. He tries to practice what he preaches. He always leaves his door open to encourage students to come in and ask questions, because he believes that if the door were closed the students would think that he did not want to be disturbed. He likes to get close to his students and has outings with them occasionally, such as the picnic for Materials Engineering juniors in the spring of each year.

The Sporn Award means a great deal to Dr. Louthan. To him it shows that a group of students has gained something meaningful from his classes. Based on his popularity and the respect he draws as a teacher, it is not unlikely that Dr. Louthan will receive a third Sporn Award in the years to come.

Bulletin Board

*** College of Engineering ***

In 1885, Tech awarded its first baccalaureate degree in engineering; since that time, it has awarded over 27,000 degrees in engineering. On November 8, 1985, the College of Engineering will celebrate its 100-year anniversary with a dinner on the Tech campus. A number of Virginia legislators, including Governor Charles Robb, and many Tech alumni, will be in attendance.

*** EE ***

Dr. Arun G. Phadke has been appointed as the American Electric Power Professor in Electrical Engineering. He is recognized as one of the world's leading experts in the area of power system protection and real time simulation of protection systems.

The Center for Power Electronics will host the 3rd Power Electronics Seminar at the Continuing Education Center on October 23-24, 1985. This seminar provides a forum for engineers and researchers from industry, US Government agencies, and the University to exchange ideas and to encourage cooperative R & D programs in power electronics.

*** MatE ***

The Seventh Materials Engineering Alumni Conference at Virginia Tech is scheduled for November 1-2, 1985. This conference is held to bring together alumni, faculty, and students of the Materials Engineering Department to share expertise and work experience. A number of events are planned, including talks, lab tours, a banquet, and block seating at the Tech football game.

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*** ChE***

The Chemical Engineering Department is hosting the *Frank Vilbrandt Memorial Conference on Chemical Process and Plant Design*, on October 10-11 1985. It is scheduled in celebration of the 50th anniversary of the founding of the ChE Department at Virginia Tech by the late Prof. Vilbrandt. It begins at 9 am at the Continuing Education Center, and features eleven state-of-the-art-review lectures by nationally recognized speakers. There will also be an anniversary banquet.

*** SEC ***

EXPO '85, the Student Engineers' Council's 6th Annual Technology Showcase, will be held on October 16-17, 1985, in Squires ballrooms. Over 80 companies and government agencies will be in attendance, with displays and technical demonstrations to give students a glimpse of current engineering projects in industry. All Virginia Tech students are encouraged to attend.

*** Engineers' Forum ***

The second annual Special Edition will be distributed in mid-November. This issue contains the four prize-winning technical papers from our annual Technical Writing Contest.

Congratulations to Lynn A. Nystrom, advisor to the *Engineers' Forum,* on being elected Vice Chairperson of the Engineering College Magazine Associated. ECMA is a national association to which almost all of the student engineering magazines in the country belong.

Engineering departments or organizations wishing to advertise an upcoming event or other newsworthy item may drop bulletins off by 112 Femoyer Hall or call 961-7738.

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THE SKY WAS THE LIMIT.

AT&T has shattered the information barrier—with a beam of light.

Recently, AT&T Bell Laboratories set the world record for transmission capacity of a lightwave communications system—20 billion pulses of light per second. The equivalent of 300,000 conversations, sent 42 miles, on a hair-thin fiber of super-transparent glass. But that's really getting ahead of the story.

Actually, the 20-gigabit record is only one of a series of AT&T achievements in the technology of lightwave communications.

But what does that record mean?

The Light Solution To A Heavy Problem

All of us face a major problem in this Information Age: too much data and too little information. The 20-gigabit lightwave record means AT&T is helping to solve the problem.

For data to become useful information, it must first be quickly, accurately and securely moved to a data transformer—a computer, for instance. Getting there, however, hasn't always been half the fun.

Metallic pathways have a limited transmission speed, sensitivity to electrical interference and potential for interception—factors that reduce the effectiveness of today's powerful computers. Factors that are eliminated by lightwave communications technology.

Ten Goes Into One 20 Billion Times

Three primary components make up any lightwave communications system. On the transmitting end, a laser or light-emitting diode; on the receiving end, a highly sensitive photodetector; and in the middle, super-transparent glass fibers we call lightguides.

Installing these fibers is a major cost of a lightwave communications system. So, once installed they should stay put—increased capacity should come from fibers carrying more, rather than from more fibers.

Which brings us to the 20-billion bit-per-second story—about experimental technology that has the potential to upgrade installed fiber to meet any foreseeable capacity needs.

Using new, sophisticated lightwave system components, we multiplexed (combined) the outputs from 10 slightly different colored 2-billion bit-per-second laser beams into a single 20-billion bit-per-second data stream.

Playing Both Ends Against The Middle

But, let's start at the beginning—the 10 distributed feedback laser transmitters.

These powerful semiconductor lasers can be grown to produce light of different, but very precise, wavelengths. The lasers we used transmitted in the 1.55 micron (infrared) range, with only minuscule fractions of a micron between their wavelengths. The purity and stability of the beams let us pack their ten colors into the most efficient transmitting region of our single-mode, silica-core fiber.

To make the original 10 beams into one, a fiber from each laser was fed into a new lightwave multiplexer—a prism-like grating that exactly aimed each beam into the single transmission fiber. Over 42 miles later, a second grating fanned the beam back into its original 10 colors for delivery to 10 exceptionally sensitive avalanche photodetectors—receivers that convert the light pulses back into electrical signals and amplify them many times.

20-gigabit multiplexer

A similar avalanche photodetector was the receiver when AT&T Bell Laboratories set the world record for unboosted lightwave transmission—125 miles at 420 million bits per second.

From Sea To Shining Sea

System capacity is important. But system reliability is vital. Especially when the system is going under 10 thousand miles of water—and is expected to last for 25 years.

AT&T is going to build the first lightwave communications system under the Atlantic Ocean. A similar system is planned for the Pacific. In 1988, laser beams traveling through two pairs of glass fibers will carry the equivalent of 37,800 simultaneous conversations overseas, underwater, from the U.S. to Europe and the Far East.

AT&T has manufactured and installed lightwave systems—as large as the 780-mile Northeast Corridor and as small as single-office local area networks—containing enough fiber to stretch to the moon and back. And the capacity of each network is tailored to meet the unique needs of its users.

Systems being installed in 1985 will be able to grow from 6,000 up to 24,000 simultaneous conversations on a single pair of fibers.

AT&T is meeting today's needs with lightwave systems that are growable, flexible and ultra-reliable. And anticipating tomorrow's needs with a whole spectrum of leading-edge lightwave communications technologies.

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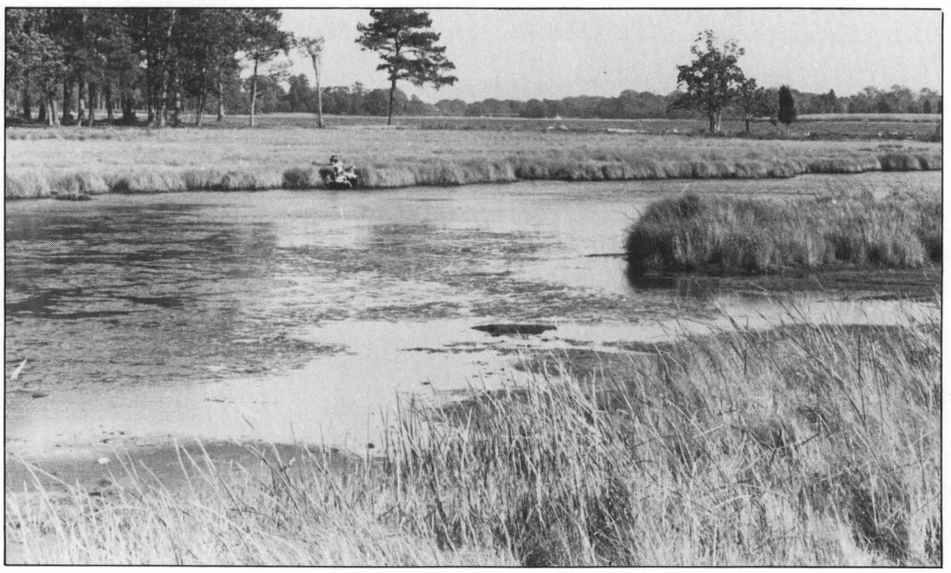
Working to Save the Bay

by Alex Derr



Chesapeake Bay Foundation

The Chesapeake Bay: clean water?

As an area of high seafood production and as a major shipping lane, the welfare of the Chesapeake Bay affects more people than just those who live on its shores. Likewise, it is not only the people near the bay who affect its condition. In fact, the bay's watershed, the land whose rivers empty into the bay, covers approximately 64,000 square miles shared by six states. The volume of pollutants collected by this runoff is tremendous and is increasing with the rapidly growing population in the area surrounding the Bay, from Baltimore through Washington D.C. and Northern Virginia, and down Virginia's coast. These pollutants have a myriad of origins, generally classified as point or nonpoint sources.

Point sources include many factories, power generating plants, sewage treatment facilities, and other sources whose output of noxious wastes can be readily measured. These are major contributors who are subjected to regulations with which they must comply. Nonpoint sources are more elusive, harder to measure, and harder to regulate. Agricultural nonpoint source pollution, pollution caused by runoff from fields and pastures, is under study here at Virginia Tech.

Chesapeake Bay Foundation

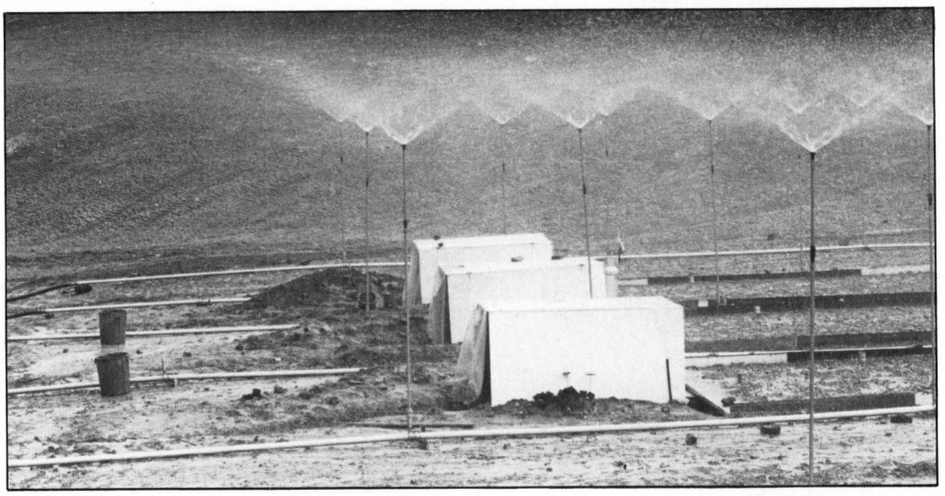
Dead perch from the Bay

A team of researchers, Drs. Dillaha, Mostaghimi, Ross, Shanholtz, Collins, Younos, and Byler, of the Agricultural Engineering Department, has been investigating methods of water quality monitoring to evaluate Best Management Practices (BMPs), which farmers are encouraged to employ.

BMPs are designed to conserve erodible soil and prevent excessive runoff of substances harmful to the waterways. This research involves the use of a rainfall simulator which can replicate an intense thunderstorm over an area of about an acre and a half.

One side of the separated field that it covers employs conventional practices of tilling and soil conservation, while the other side uses BMPs. The entire area is subjected to two inches of rain in one hour—the intensity of a storm which could be expected once in two years. Samples of water runoff are collected and analyzed to measure differences between the methods of land management.

One type of BMP under study is minimum-till farming. Under this practice, cropland is tilled only once in several years rather than every year, in order to minimize the amount of loose soil and make the land less vulnerable to erosion. Phosphorus, an important constituent of fertilizers and also a major pollutant of the Chesapeake Bay, clings to soil particles. In minimum-till farming, this phosphorus is concentrated in the upper half-inch of soil which is most susceptible to erosion. With conventional tillng, it is evenly distributed through the top ten to twelve inches. The conventionally tilled soil is eroded more quickly, but the concentration of phosphorus is



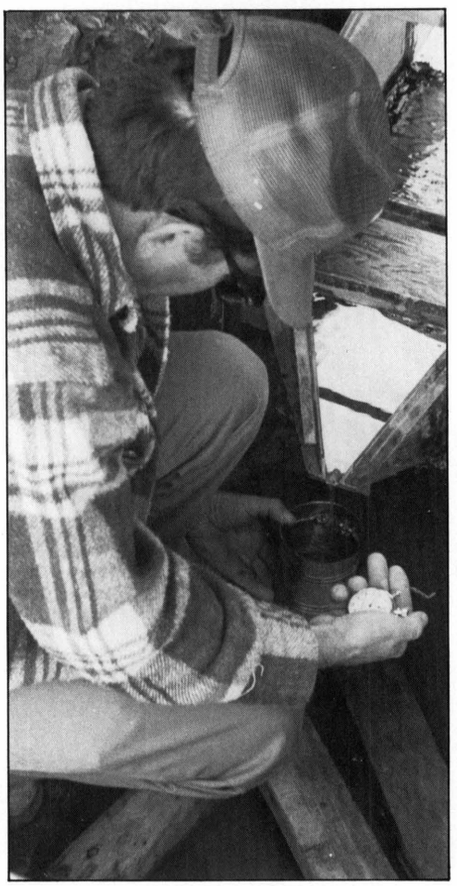
Conducting BMP tests using the rainfall simulator

lower.Hence, more phosphorus may actually be lost under minimum-till conditions which were designed to control fertilizer loss. Determining if this is true is one goal of the rainfall simulator project.

Another major goal of this project is to quantify the effectiveness of filter strips. These are grass buffer zones, averaging at least twenty feet wide, planted between streams or rivers and farmland. They anchor soil along the banks of the waterway and trap soil eroding from the farm, very effectively reducing the amount of sediment entering the water. They also reduce the concentrations of herbicides, pesticides, fertilizers, and microorganisms that might otherwise enter the waterways.

The Agricultural Engineering Department, under Dr. Shanholtz, is also developing a computer program called the Geographic Information System. Incorporating satellite and map data, it will identify fields whose drainage is likely to have a negative impact on Chesapeake Bay. Suspect areas will be investigated, and, if they are verified as critical, the farmer will be eligible for some financial backing from the state to incorporate BMPs.

Virginia's reform efforts will be noticed first only in the rivers leading to the bay. There are so many pollutants tied up in sediment at the bottom of the bay that it would take ten to fifteen years to flush them out with clean water. Presently, the concentrations of dissolved pollutants, which include nutrients, heavy metals, and organic chemicals, is in equilibrium with the pollutants sitting at the bottom, so the latter cannot be released to the water to be flushed out.



Dr. Shanholtz collecting run-off during a rainfall simulation.

In 1972, Congress passed the Clean Water Act declaring that the navigable waters of the United States would be clean enough to fish and swim in by 1985, and that by this time, no one would discharge pollutants into the waters of the United States. This goal has not yet been reached in the Chesapeake Bay.

At this point, it may be too much to ask to have the bay sparkling clean. The EPA is looking into the problem of agricultural nonpoint source pollution and may make some tentative regulations. In a 27 million dollar study conducted ten years ago, the EPA measured the total amount of pollution entering the bay, examined records of discharge kept by industries contributing to point source pollution, subtracted the two, and assumed all unaccounted for pollution to be from nonpoint sources. They did not ascertain, and it is still not precisely known, how much of this is due to agriculture. While farms may not be the largest contributor to bay pollution, it is widely accepted that agricultural sources are a large enough contributor to warrant being regulated.

Most farms are losing money already. The farms making money generally have the best soils, the least erosion, and the highest productivity. The smaller farms, often family farms, have poorer soils, steeper slopes, more erosion, and lower productivity. Dillaha, BMP Project Leader, notes, "if we apply any regulations across the board, say, 'you can only have a soil loss of 3 tons per acre per year,' it's going to hurt the little guys."

The technology being developed in our Agricultural Engineering Department will help solve two problems at once. The use of subsidized Best Management Practices will help keep small farms in business and will simultaneously ease a significant portion of the pollutant load on the Chesapeake Bay.

Closer to Home . . .

by Alex Derr

Virginia Tech's duckpond was built fifty years ago to be a stormwater detention base. Over the years, it has become a central landmark and a popular location for social gatherings. The duckpond is an asset to the town of Blacksburg, as well as to the University.

Whatever its primary function may be, however, the duckpond is fed by sediment-laden water. As this mixture enters the pond, it slows down and the sediment particles settle to the bottom. Records show that portions of the duckpond were dredged in 1969 to a depth of fifteen feet. These same areas now have a mean depth of only two and a half feet. The average depth of the entire pond is less than three feet.

One thing that makes the duckpond different from most small bodies of water is that its watershed includes urban and residential areas in addition to croplands and pastures. Because it collects water draining from a variety of areas, the sediment deposited contains a variety of pollutants.

On Saturday, April 20, 1985, initial measures for a duckpond cleanup were taken. Blacksburg had been in a dry spell for several weeks, making it a perfect time to gather baseline data.

The cleanup efforts were a collaboration of the Civil Engineering Department, the Department of Fisheries and Wildlife, and the Center for Environmental Studies. About twenty-five to thirty members of Gamma Beta Phi, an honor/service society, also participated by picking up visible trash around the perimeter of the pond. Civil Engineering undergraduate and graduate students, several of whom are members of the student chapter of the American Society of Civil Engineers, carried out the samplings and tests as a service project.

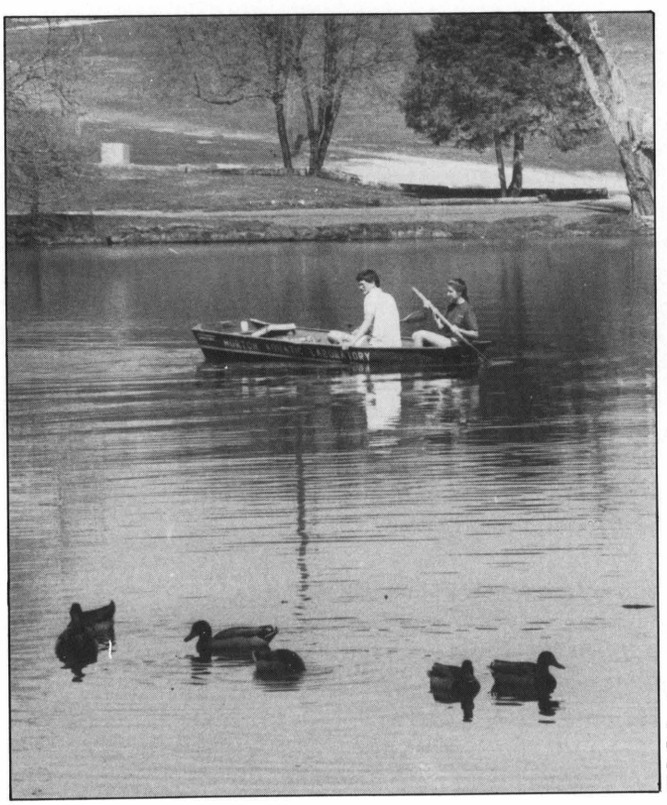
Samples of both water and sediment were taken and later tested in the labs for nitrogen, phosphorus, organic and sediment waste loads. Water samples were taken in the pond and also upstream in Upper and Lower Strouble's Creeks. The samples were also examined on the spot for temperature and conductivity, the latter being a measure of ion concentrations.

Tests for general toxicity were made to determine the concentrations of any heavy metals present. Material dredged from the pond will be considered sludge, and will have to be dealt with according to regulations concerning the disposal of such matter.

Fertilizer runoff contributes to the pond's algal overgrowth, which causes the water to become supersaturated with dissolved oxygen during the day. When the sun goes down, the concentration of dissolved oxygen may drop below acceptable levels. Euglena tests were performed to measure the population of photosynthetic protozoa which cause this phenomenon.

Ten days after the tests, Blacksburg had a significant rainfall. Eight Civil Engineering students, under the direction of Drs. William R. Knocke and Robert C. Hoehn, took periodic samples of runoff at different locations around town. These samples were also tested and then compared with the baseline data previously collected.

The data collected have been assessed and compiled for a report concerning the needs for a thorough cleanup and dredging. Recommendations for remedial actions which should improve the environmental conditions of the duckpond will be presented to the University administration and town officials for their consideration.



W.B. Robertson

Those Dreaded Physics Courses

By Professor Samuel Philip Bowen

Department of Physics

Virginia Tech

As every sophomore engineering student in the country knows, the physics courses that come in that second year are different from all of the other courses in his or her major, and most engineering students have some difficulty with the subject. Virginia Tech is no exception. Engineering students here, as at other universities in the country, often ask why these courses have been designed and what purpose they are to fulfill. As I will indicate below, there are lots of reasons that this type of course and content is part of the training of engineers. One of the main reasons over the decades for taking physics has been that these courses are a sort of first installment of an insurance policy against obsolescence—but I am getting ahead of my story.

The main reason for writing this article is to describe an important survey which was implemented two years ago by your student representatives on the Student Engineers' Council (SEC). This survey was given to over 1000 engineering sophomores, juniors and seniors, who had taken physics here at Virginia Tech. The survey was implemented by the SEC as a means of helping the Physics Department improve the benefit of the engineering physics courses. The Physics Department was very pleased to get the kind of detailed information that the survey contained and, as I will describe below, is working to make these important courses better serve their purpose in the engineering education. My purpose here is to describe part of the survey and what we in physics are doing about it.

The major conclusion of the survey was that the majority of the engineering students did not rate the courses 2171, 2172, 2173 favorably. The first course on mechanics (2171) was rated the worst, but the percentage rating the courses received favorably increased as students passed into electricity and magnetism (2172) and the third quarter (2173). By the third quarter, the ratings were about half and half, favorable and unfavorable. This is not too pleasing to those of us teaching these courses because we would like to have our courses appreciated.

What was more pleasing to our department was that your colleagues' evaluation of our faculty as instructors was overall more favorable than the course evaluation. As with any group of instructors on campus, there was a wide range of evaluations for different faculty members, but it was personally pleasing that on the average our instructors at least came out ahead of the courses we teach. Again, as you and your colleagues passed through the sequence, the approval rating of the instructors also improved as had the course rating.

A similar trend was found in the rating of the lectures in the courses . For the first course, the rating was moderately unfavorable, but as the sequence went along the ratings of the lectures also improved to slightly favorable.

These trends in the ratings have helped us to see part of the reason that students have such negative reactions to the first course. During the time that students are taking the mechanics course (2171), they are also taking the Engineering Science and Mechanics courses on much of the same material. This parallel treatment of much the same material is bound to be somewhat confusing, and we are taking steps to coordinate what engineering students will see in that first quarter. In the future, the faculty of these two departments will be working together to see that the topics and approaches compliment each other and come closer to achieving the aim of providing the strong foundation that can sustain your career in the future.

This coordination should help make the two courses much better for students. The survey showed that 46% of respondents thought that the duplication of 2171 with other courses was detrimental. For the second quarter this percentage had dropped to 29% and by the third quarter it had dropped to 17%. Clearly, if we can design the way physics contributes to your understanding of mechanics so that the overlap is positive, the courses will be much more useful. We are continuing to make that effort and hope to see good results soon.

Other ratings which were useful to us as we attempt to improve your experience with our subject were ratings of the homework relevance, the textbook, and the type of examina-

tions that were preferred. Homework was judged to be relevant by a majority. Surprisingly, the most relevant homework was reported to be in the first quarter during the study of mechanics. The textbook was judged to be good or better by a majority, but we are aware that a book with more examples of applications of physics would be of more interest to engineering students and a review of alternative texts is being carried out. Finally, your colleagues reported that the type of examination that was most beneficial to them was an exam made up of problems which were graded in detail, as opposed to multiple choice questions. Our department will be working to provide a mixture and uniformity of examinations that will give good collections of problems by which each of you can demonstrate what you have learned and get all of the credit you deserve.

A very important finding of the survey dealt with derivations of the laws and principles of physics which occur quite a bit in these three courses. Even though the ratings again became more favorable as students progressed through the sequence, the ratings of derivations were significantly unfavorable. This finding is very important because it points to something that we in the physics department can do to help our students, and it points to an important misunderstanding of one of the major goals of these courses toward a quality engineering education. Let us look at what the physics department can do first, and then let me try to address what I think is the proper role of our courses in your education as good engineers.

What we have learned from some of the comments and other feedback is that we need to give you and your colleagues more examples of how the principles and their relations are applied and where they are likely to reappear in later courses of your studies here at Virginia Tech and in your career. We also need to do more to give you some motivation as to the importance of various topics as we move through them.

On the other hand, it is important for students taking physics to understand that the courses are intended to be different from the rest of the engineering courses. We are going to be more concerned with where results come from, when they can be applied, and how they might change if certain conditions were to change. Our goal in teaching you about the fundamentals of physics is not only to help you to understand how to use these, but also to help you see how to change the application if the conditions change. This is one of the reasons we tend to spend time on some derivations and discuss the implications of some of the principles we show you in the courses.

I like to think about these courses as a small payment on insurance that can keep you from being obselete as your field moves ahead in the future. If you can learn to work with the principles of physics as we teach them in these three courses, you will find that the skills involved in analyzing the theories and their relationships to the assumptions will be very useful in your later career. Many generations of former students can testify to the usefulness of these analysis skills in those situations where the technology is quickly changing and new solutions are needed. We see our courses as not only teaching you principles and somewhat different approaches to problem solving from what you will encounter in your engineering courses, but we are attempting to give you practice with the system of principles and with determining solutions and relationships on your own. While our emphasis on principles and how they are related to each other may seem to many of you as not relevant to finding the answer to the problem at hand, our hope is that this kind of practice thinking with the principles will carry over into many other parts of your career and will serve you well in those situations where standard practices require some alteration.

We would hope that when you come to our course you will recognize that we will spend more time showing you where things come from and what some of their consequences are. We will try to show you more of their applications and will try to show you what we think are interesting applications.

We are also working hard to give you a chance to use your computers in our course. We are creating diskettes of programs which we hope will help you understand various concepts better. We have created a program that should make it easier to solve problems and to practice applying principles to a variety of problems. We expect to sponsor a contest during this year to reward the best demonstration program or other student-created computer program that will improve the way in which engineering students learn and use physics. The physics faculty is very interested in any ideas that you may have about how to use your computers to make the study of physics and engineering more interesting, exciting, and useful.

One of the best results of the SEC survey of student responses to physics was that your representatives on the council and the Physics department are now talking and working together to make the contribution of the physics courses to your education as positive and useful as possible. There will be a very direct way in which you can get your feedback to us and help in this process. There is a liaison committee of faculty between the College of Engineering and the Physics Department. For the first time this year, there will be two student representatives on this committee so that student concerns can be very directly communicated and considered. There will be an announcement of the student representatives this Fall. The faculty representatives of the Physics Department are Professors D.D. Long and R. Bowden. The representatives of the Engineering College are L. Burton of EE, E. Heneke of ESM, and J. Schetz of AOE.

Those of us in the Physics department who are and will be teaching many of you in your sophomore year are interested in doing the best we can to make your engineering education here at Virginia Tech the best in the country. We are deeply convinced that our subject can provide important content and a methodology of thinking that will build a firm foundation for your career. Besides, we think physics is fun!

On Computing: Structured Programming

by Geoff Moes

Many computer novices, and even veteran programers, are unaware of an improved methodology for creating better programs in less time. In this day of mass software production the procedure for creating software has become more and more sophisticated. Every time someone writes a program, even a small program , he/she is in a sense developing software. If some simple rules and guidelines are followed this process can be optimized so the programer can do more things on and off the computer.

Computer scientists have developed an entire methodology, called Software Engineering, to encapsulate the study of formalizing and improving the design process. Software engineering is concerned with the organized and efficient design of quality software products. While this may seem to be out of scope for the individual programer, it is not; the principles of software engineering can help even a novice programer improve both the final product and the process of production. Some of these general principles follow:

—Break the program down into small parts and write each part as a separate procedure, even if it will only be called once.

—Always pass as few parameters as possible to those procedures. If you must pass more than three of four parameters, the procedure could probably be simplified or split into two or more parts.

—Avoid global variables. If a variable can be changed anywhere in the program, it is difficult to monitor how and when that variable is changed. And that means you will spend more time debugging.

—Always try to make code reusable and portable; this could save you much work in the future.

Choosing a language for the particular program can also be important. FORTRAN and BASIC are frequently chosen for a variety of programing tasks, especially since many people know them. But both these languages lack the means to emphasize structure in programing, and this can become very frustrating, especially for novice users. FORTRAN is an old language with the strength to handle large numbers easily. Other languages now have this same capability, and the more formal structure they promote makes them more attractive for software production, as well as for educating programers. Two such structured languages are PASCAL and the C programing language. These languages, like most structured languages, contain constructs that aid the readabilty and organization of programs. "While-Do", "If-Then-Else", "Repeat-Until", and the "Case" statement are constructs that help develop structured programs that are easy to debug. Another mark of a structured language is the absence of the GOTO statement which has been known to cause FORTRAN users many problems.

If the availabilty of structured constructs was the only factor in choosing a programing language, then FORTRAN might not ever be used. But FORTRAN is used all the time, particularly in engineering applications. Because FORTRAN does not have built in tools to help its users generate structured programs, it is especially important for FORTRAN users to be aware of the difficulties that can develop from unstructured code. By following the principles of structured design, even the novice programer can spend less time writing better code.

Here are some references for those who are interested:

Using Structured Design
Wayne Stevens,1981

Elements of Style
Brian W. Kernighan, 1980

The C Programming Language
Brian W. Kernighan, 1978

Programing In Pascal
Peter Grogono, 1979

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Saginaw

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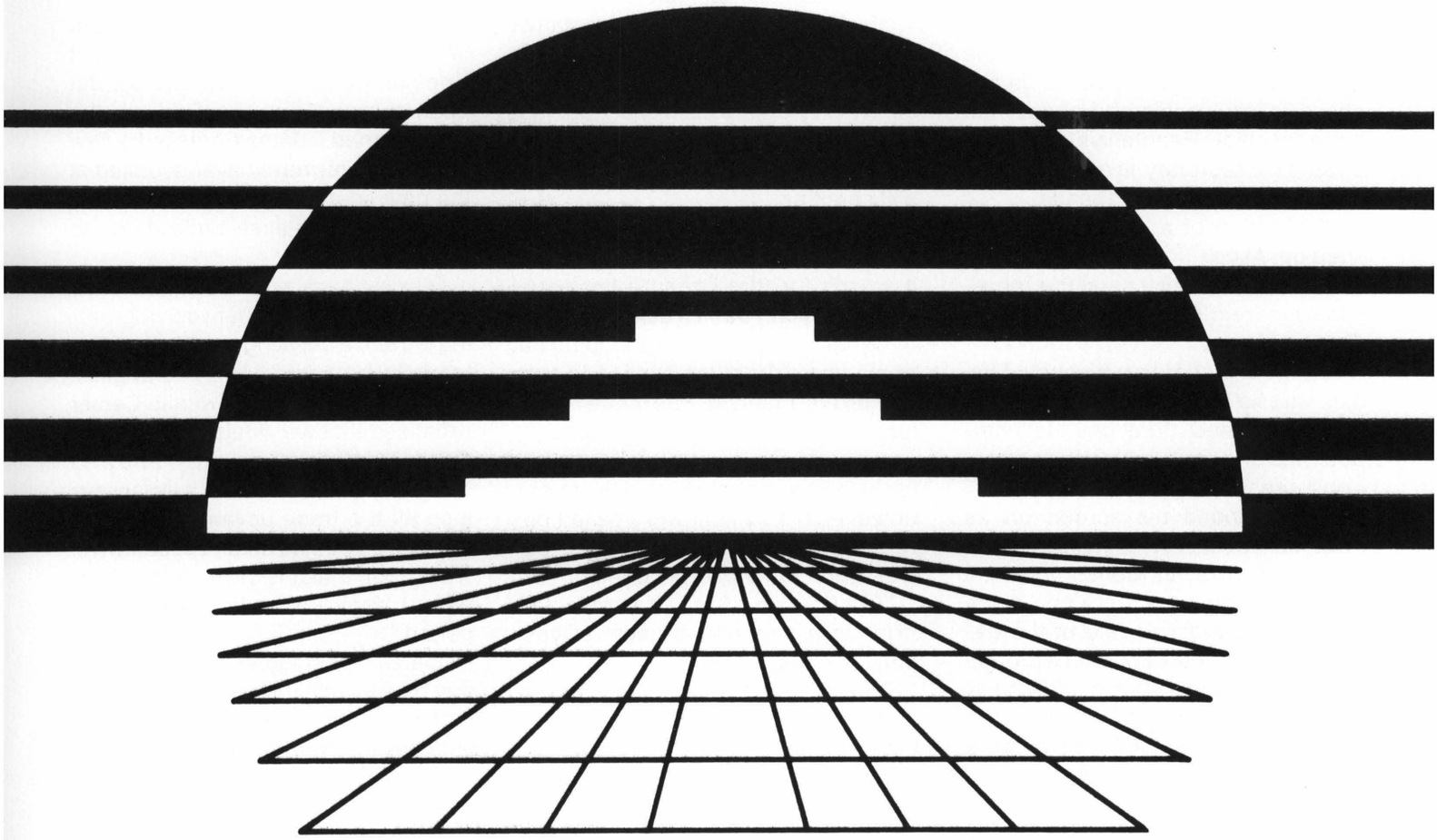

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Last Contact

by John Nizalowski

James Clifton, Undersecretary of State in charge of alien affairs, stepped through the front door of his office for another day's work. The outer office was nearly empty. Across from his secretary, in a cushioned seat in front of the methane tank, rested an alien that James had never seen before. It was about four feet high, and possessed a very wide bottom and four arms. Its forehead protruded over deep-set eyes, creating an expression of dullness. James didn't let that fool him. The representative from Birxoxi bore a strong resemblance to Walt Disney's Goofy, but was one of the craftiest aliens the Undersecretary had ever met.

James said good morning to his secretary, and nodded amiably to the alien. The alien glared back. James chose to ignore this and strode into his inner office. Reaching his desk, he buzzed his secretary. In a moment she stepped in, holding an agenda.

"What kind of a day do we have lined up, Alice?"

"Looks easy so far. Just the representative from Claxtow outside. First Contact."

"First Contact! He's a bit behind the ball, isn't he?"

Alice nodded. "I've got the computer file on Claxtow on your screen. You'll see why."

James flipped his screen on as Alice left. The file, compiled by Galactic Commonwealth Center, claimed that the Claxtowians were one of the most unobservant people of the galaxy. Slow to act, they bumbled around the stars in ships that could barely warp out, and frequently never made it to their destination. And yet they were obstinately proud. They refused to take any technical advice on how to upgrade their ships. Insisted on doing it themselves.

"Great," James thought to himself. "I guess the wide bottom is appropriate. I have the feeling this is going to botch up my whole day."

He buzzed Alice over the intercom, asking as evenly as possible to let the Claxtow representative in. The door opened, and the alien trundled through, with a walk that was a fat echo of Charlie Chaplin and a body odor like stale beer. James dialed a duplicate of the alien's chair from the outer office, and it rose up out of the floor, facing the desk.

James waited for the alien to seat himself, which was a rather awkward operation, and then smiled. "Very pleased to meet you, Mr. ...?"

"Olaz," the Claxtow representative boomed through his Galactic Commonwealth translator.

"Why in hell doesn't he turn that thing down?" James thought.

"Are you the Leader?" Olaz asked, still shouting.

"Well, no. The President is in a serious conference on inflation, but if it wasn't for that I'm sure he would have met you," James said, lying.

"What!" Olaz screamed, leaping out of his chair. Or at least trying to leap out of his chair. It was more like a lurch. "I demand to see the Leader!"

James spoke in a soothing tone. "As I said, he's very, very busy. I'm certain, however, if a summit were called between Earth and Claxtow, we would at least send the Vice President."

"But I am an alien," Olaz objected. "This is a supreme moment in your petty planetary history."

"I beg your pardon?" James asked.

"I am an alien! Are you blind? This is First Contact!"

James frowned in puzzlement. "Yes, of course, but ...."

Olaz impatiently pulled out a small blaster from within the folds of his brown cloak. "Witness my power!" he shouted, and pulled the trigger. A beam of blue-white energy darted out, smashing a foot-wide hole in the side of James's office. James sighed, realizing what the problem was.

"Now do I get to see the Leader?" Olaz asked menacingly.

"No," James answered.

Olaz's face became that of an enraged fat baby, and he pointed the blaster at James.

"Wait, wait," the Undersecretary said. "You don't understand. You see, you're not the first."

Olaz put down his blaster. "What?"

"You're not *the* First Contact. There have been others before you."

Olaz looked confused. He turned down the amplification on his translator. "Who?"

James settled back in his chair. "Well, the Vegans were the initial First Contact. Caused quite a turmoil. But once they opened the field up, the flood started." James pressed a few buttons on his terminal and looked at the new screen display. "Three hundred and twelve alien civilizations so far, to be exact."

Olaz sat back with a plop and made a sound like a cross between a grunting pig and a deflating tire. The translator didn't bother to turn it into English. "The Galactic Commonwealth Center promised that we would be your First Contact. Whenever they allowed things to run their course, we'd always lose all the trade advantages. When you were about to attain the stardrive, we figured that this once we'd ask for help. I don't understand what happened."

James made a guess. "Are you the first representative to leave Claxtow?"

"No," Olaz anwered. "We sent a succession of representatives. Our stardrive is a bit shaky. But we're working on it ...."

"Well, there's your answer. Obviously your first representatives never

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John Nizalowski is an Instructor of English here at Virginia Tech.

made it. Galactic Central became impatient and opened the field up. The Vegans then cut in on you."

"That sounds about right."

"But I'm sure we can find a basis for trade, even now."

"Of course," Olaz said, perking up. "Do you have immortality yet?"

"Well, yes, the Vegans ...."

"Planetary engineering?"

"Um, yes."

"Sub-atomic computer chips?"

"Yes."

"Time Viewers?"

"Got one right here."

"Damn," Olaz said. "There must be something."

"Oh, I'm sure there is," James assured Olaz. "Perhaps we can have an exchange of technicians. Yours can look around Earth and see what needs improvement, and ours can go to Claxtow and help you with something. For instance, your starships."

"Our what?" Olaz shouted, lurching up out of his seat again.

James realized he'd made a blunder, but didn't quite know how to get out of it. "Starships. But of course I just used that as an example; we don't need to ...."

"I did not come here to be insulted! To think an insignificant bunch like you Earth aliens could help *us* with our starships."

That was it for James. The diplomat in him became submerged.

"We are *not* insignificant. And I'm sure we could teach you a thing or two about stardrives."

"Teach us! Teach us!" Olaz raged.

"Yeah," James answered. "Teach you. Then maybe you wouldn't be three hundred and thirteenth on the next new world's list of alien contacts."

Olaz let out a steam whistle screech and yanked out his blaster, letting off a charge at James. James's blaster screen went up, deflecting the energy. Olaz kept on increasing the charge, hoping to break through James' shield. The office became filled with swirling blue flames. The portrait of the President disintegrated in a puff of oily black smoke. Olaz's chair burned. Finally there was a blinding flash, and the blaster fire stopped. The office was a pit of charred stone and ashes. Olaz

was a puddle of greenish-brown fluid on the floor.

James sat behind the shield, unharmed. Turning it off, he thought about the situation. He could send a message to Claxtow, saying they had met their representative, and then pretend Olaz had gotten lost in a warp jump back home. Judging from Galactic Central's computer entry on Claxtow, their attitude towards Olaz's people was disgruntled enough to allow James his harmless deception.

"Good," thought the Undersecretary. "That takes care of that. I'll have Alice draw up the message and then we can take the rest of the day off." James turned to buzz Alice when the door eased open, and the secretary walked in.

"Jesus Christ," she said, glancing at the office and the remains of Olaz on the floor. "What a mess! What happened?"

James told her the whole story and ended by pointing to the green splotch on the floor. Alice shook her head.

"Anyway," James went on, "I have a message to dictate to the government of Claxtow, and then I thought we'd call it a day."

"Sounds good," Alice returned. "But there's one problem. I've been babysitting with an unexpected visitor, and he's getting very impatient."

Alice nodded towards the door. James peeked out. Next to Alice's desk stood what looked like an enclosed shopping cart on hundreds of silver centipede legs, within which rested an enormous head of rotten cabbage.

"What is that?"

"The representative from Gildo. Another First Contact. And wait till you get a load of this one." Alice walked over to the desk and punched up the file on Gildo. James quickly scanned to the passage that read, "If possible, even more stubborn and ignorant than the people of Claxtow (see also—Claxtow)."

"Great," James muttered as he slid down into his seat. Alice smiled and left to usher in the representative from Gildo. James checked his shield to make sure it had returned to 100% potential. As the Gildonian slithered in, his cabbage interior smelling like an old dump, James made a mental note to ask for a transfer to the Department of the Interior.

For Your Entertainment

Trivia Quiz

1. If Lt. Montgomery Scott, *USS Enterprise,* weighs 12 stones, how many pounds does he weigh?

2. The velocipede car was an early form of rail transport; how many wheels did it have, and what powered its movement?

3. What are the Platonic solids?

4. Whose astronomical theory is based on the spheres formed from the Platonic solids?

5. In keeping with the greek theme, how did Aristotle die?

6. Ask a Virginia Tech Greek where you buy *aqua vitae* in Blacksburg and (s)he'll tell you what?

7. Ask a Hokie where beer was first brewed in America, and what will you be told?

8. How many gargoyles are there on the Tech campus?

9. If your English professor accuses you of being sesquipedalian, what is he or she implying?

10. What do LEM, BOD, SEM, CAT-scan, and MSG stand for?

Answers:

1. 168 pounds.

2. It had three wheels and was propelled by a hand lever.

3. Tetrahedron, hexahedron, octahedron, dodecahedron, icosahedron.

4. Johannes Kepler's astronomical system was based on concentric spheres capable of containing the Platonic solids.

5. Chronic indigestion rendered acute by overwork.

6. The local Alcoholic Beverage Commission store; aqua vitae translates into "the waters of life" and can usually be found bottled as whiskey or other strong drink.

7. In Sir Walter Raleigh's Roanoke Colony, in 1587.

8. 13.

9. No, your professor is not comparing you to a slimy creature that haunts the ocean floor, but is merely pointing out your tendency to use polysyllabic words.

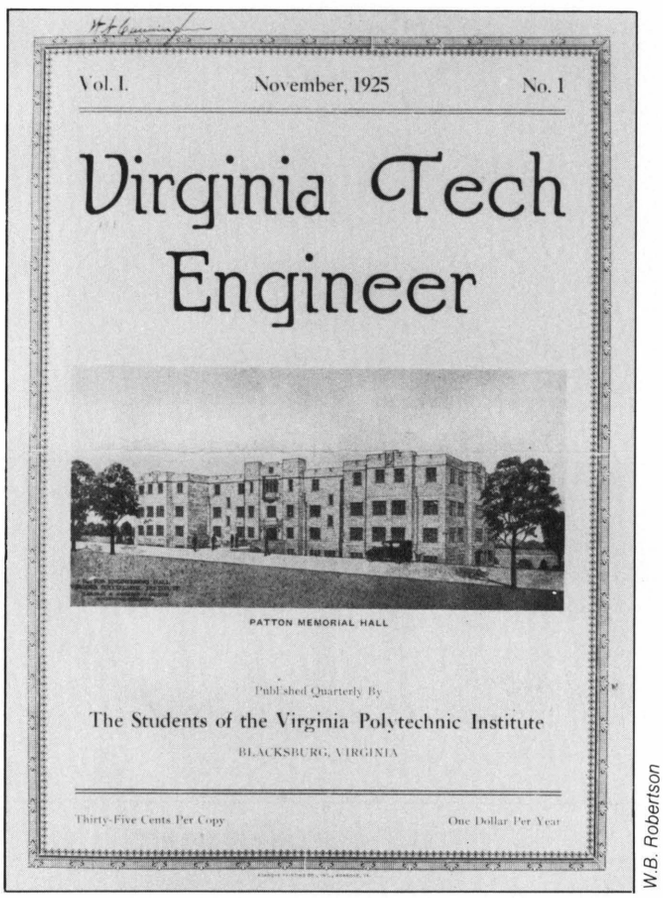
10. Lunar excursion module, biological oxygen demand, scanning electron microscopy, computerized axial tomography scan, and monosodium glutamate.

mish mish

204 Draper Road
Blacksburg, Virginia
703-552-1020

Sixty Years Ago

In November, 1925, the engineering students at Virginia Tech published the school's first student magazine, the "Virginia Tech Engineer." Funded solely by student and alumni subscriptions, the first issue was only sixteen pages long. Only two of the seven articles in the issue were written by students; faculty members produced the rest. The magazine, in fact, was "a permanent publication under faculty control," the faculty advisers being headed by Dean S.R. Pritchard. The student-written excerpts that follow are from the first issue of the "Virginia Tech Engineer," published sixty years ago.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Virginia Tech Engineer

PATTON MEMORIAL HALL

Published Quarterly By

The Students of the Virginia Polytechnic Institute

BLACKSBURG, VIRGINIA

Thirty-Five Cents Per Copy One Dollar Per Year

W.B. Robertson

The cover of Volume 1, Issue 1 of the "Virginia Tech Engineer."

Editorials

The "Virginia Tech Engineer" marks another step in the advancement of V.P.I. toward the front rank of the engineering colleges of the country. Not only has the enrollment at Tech increased remarkably in the last few years, but the physical plant has also undergone some remakable improvements, and V.P.I. is coming into its own as one of the leading colleges of the United States. The need of a technical journal has long been felt, but until the present time no publication of this nature has appeared.

During the present year several articles will be published dealing with the equipment and the possibilities of the engineering school at V.P.I. The Patton Memorial will rank as one of the best equipped buildings of this nature at any college. Many of the older graduates will be surprised at the remarkable strides the Agricultural Engineering Department is making.

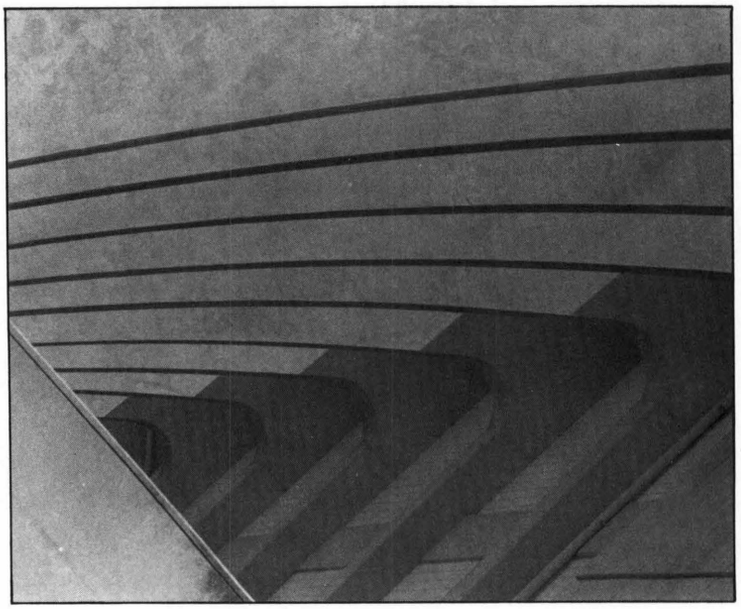
Alumni News

The cut on the front cover shows the new Patton Memorial Hall now under construction on the campus of V.P.I. The building was designed by Carneal and Johnson of Richmond, Virginia, and the picture of the perspective drawing was furnished by Mr. J. Ambler Johnson, an alumnus of this institution. The building is situated opposite the McBryde Building of Mechanics Arts, on the South side of Faculty Row. The structure is to be used for engineering laboratories and lecture rooms, thereby greatly relieving the congestion in the present Science Hall. The first floor of the building is now almost ready for occupancy, and the Department of Electrical Engineering is planning to transfer its laboratories to their new quarters at an early date. The structure is named in honor of Colonel William M. Patton, who was a professor of Civil Engineering at this institution for a number of years. Colonel Patton was also the father-in-law of Dean J. E. Williams.

The support of the alumni at the games of the BIG TEAM this fall has been very loyal. At every home game there has been a good showing of old Techmen and at the foreign games the alumni have helped to cheer the team on to victory. It brings to our attention the fact that the true courage and spirit of old V.P.I. never dies out. Good, loyal support always helps to encourage that old team to fight on and gain the necessary margin of victory. Cheering is indispensable to the success of the team. Stand behind the Gobblers of 1925, alumni! Give them your support. They deserve it. Come on V.M.I.!

Picture Quiz

Can you identify these familiar objects?



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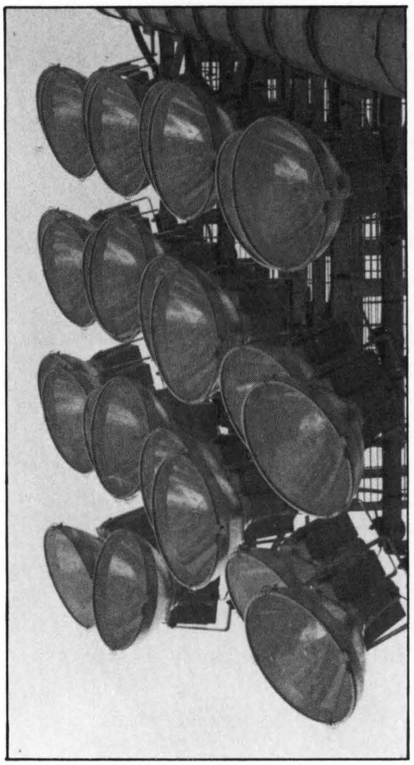

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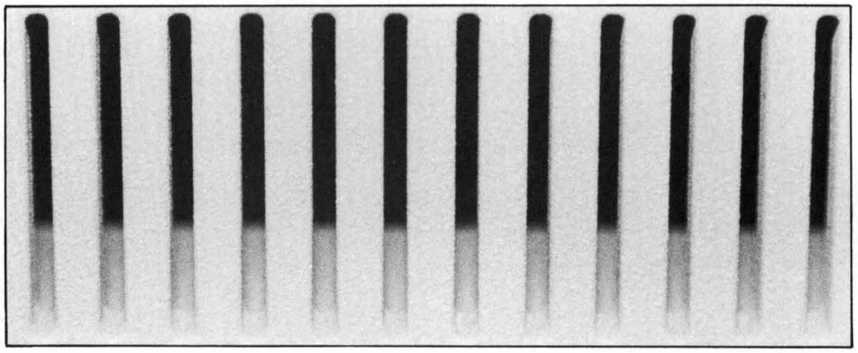

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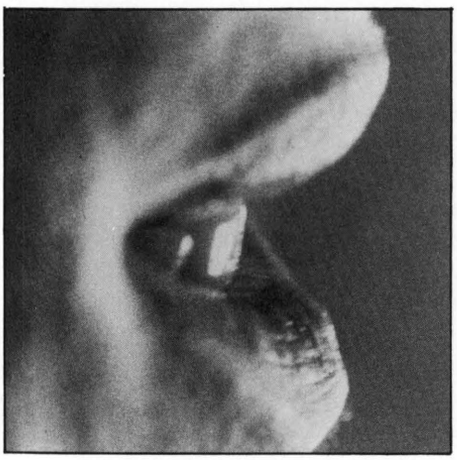

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ANSWERS:

1) Coliseum arches
2) Stadium lights
3) IBM PC speaker
4) Human lips
5) Stadium seats

by W.B. Robertson

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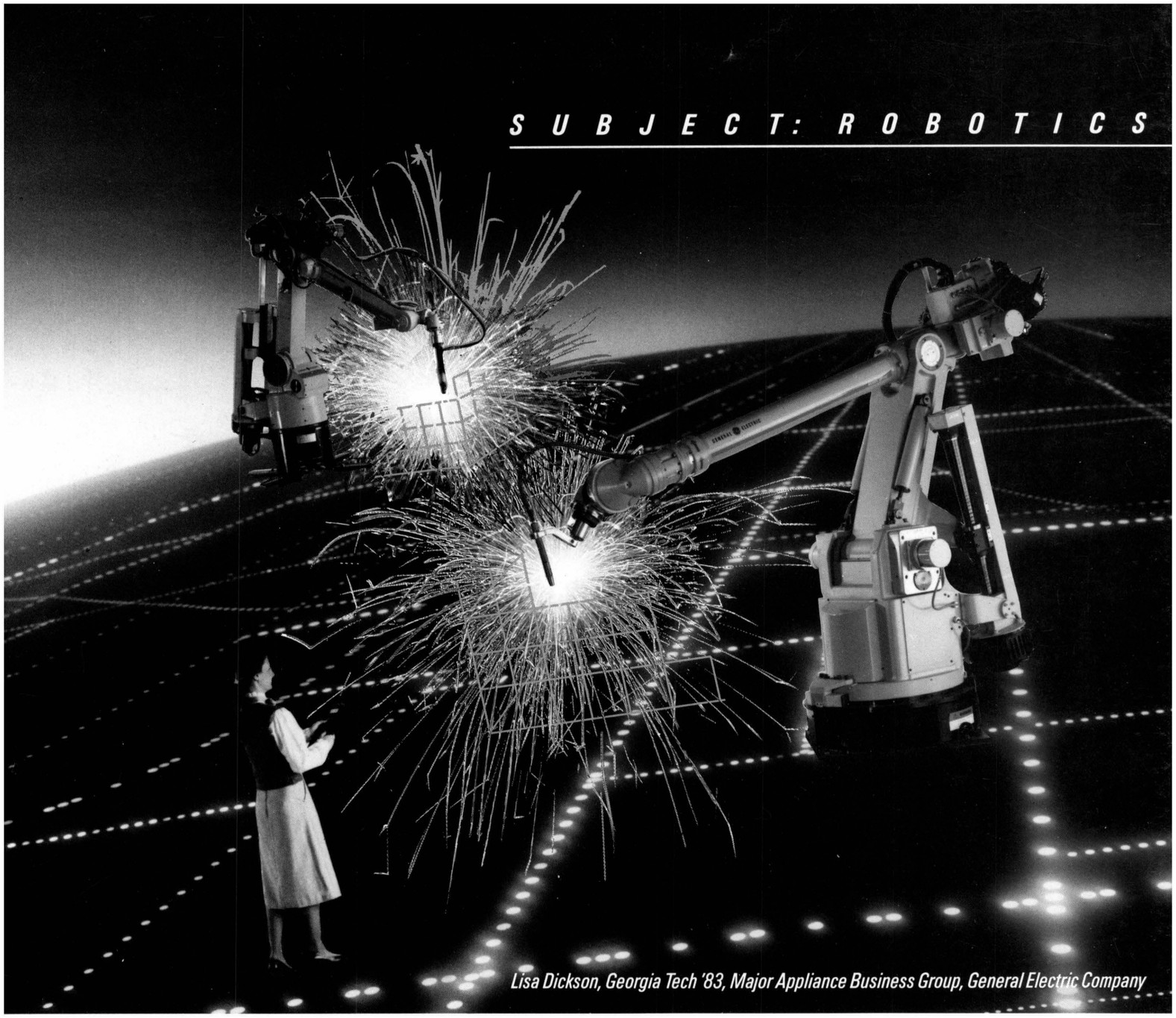

See Your Future Through the Eyes of a Robot

Lisa Dickson does! She's helping GE create tomorrow's robot systems. With "smart" robots that can actually see, touch, and sense heat or cold. "Adaptive" robots that can measure how well they're doing a job, or reprogram themselves in moments to take on new assignments.

Sound like sci fi? It's as close as your first career move. Because at GE, we're already using robots like these, for jobs that require decision as much as precision.

When GE adds vision capability to lasers and off line programming, robotics takes a giant leap forward. Just on the horizon are GE sight-equipped robots that guide themselves through intricate laser welding. What next? Tactile sensor pads to enhance GE robots with super-human dexterity. And computer brains for "trouble-shooting" robots whose thought processes come close to human intuition!

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