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FEBRUARY, 1971

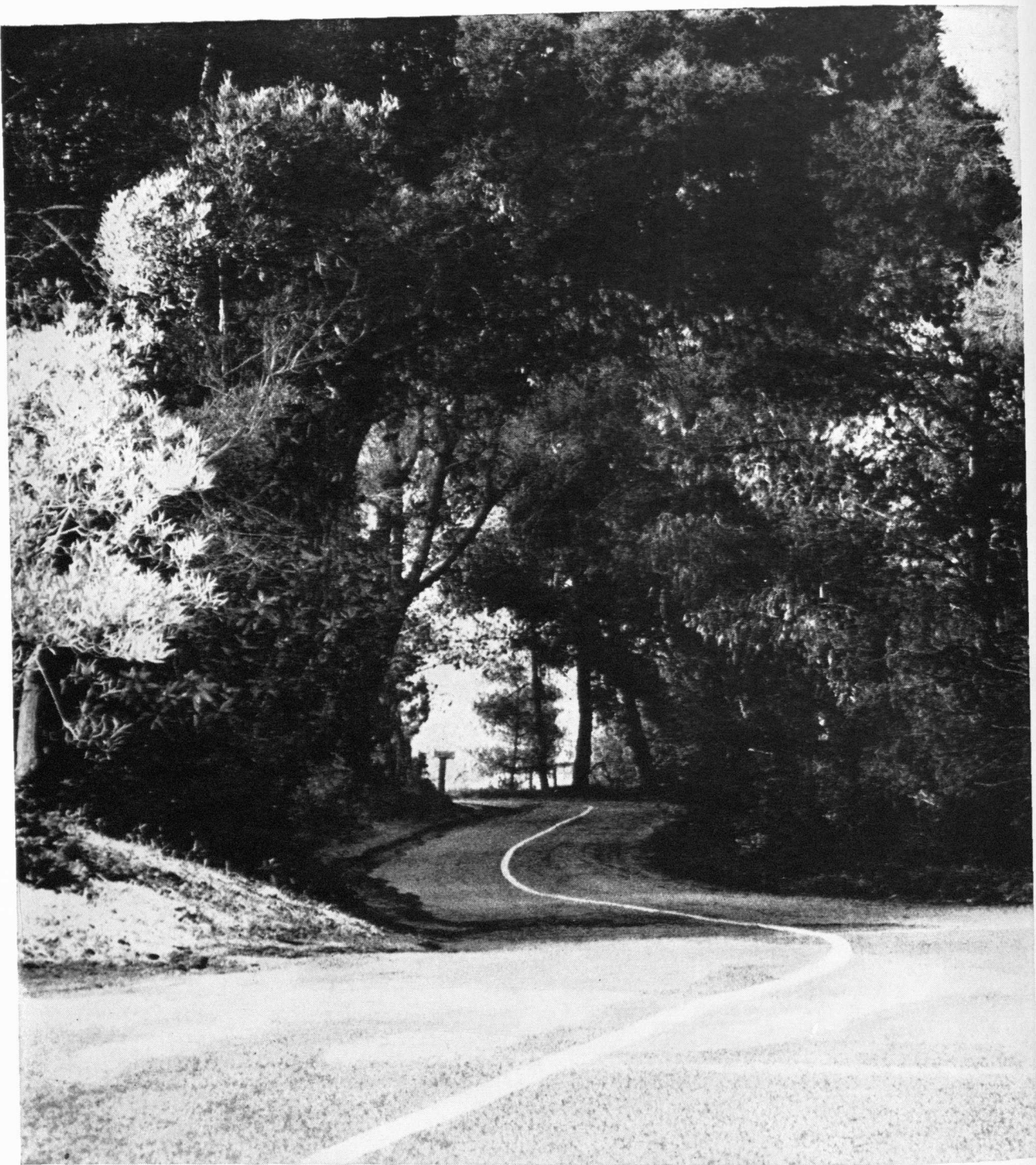


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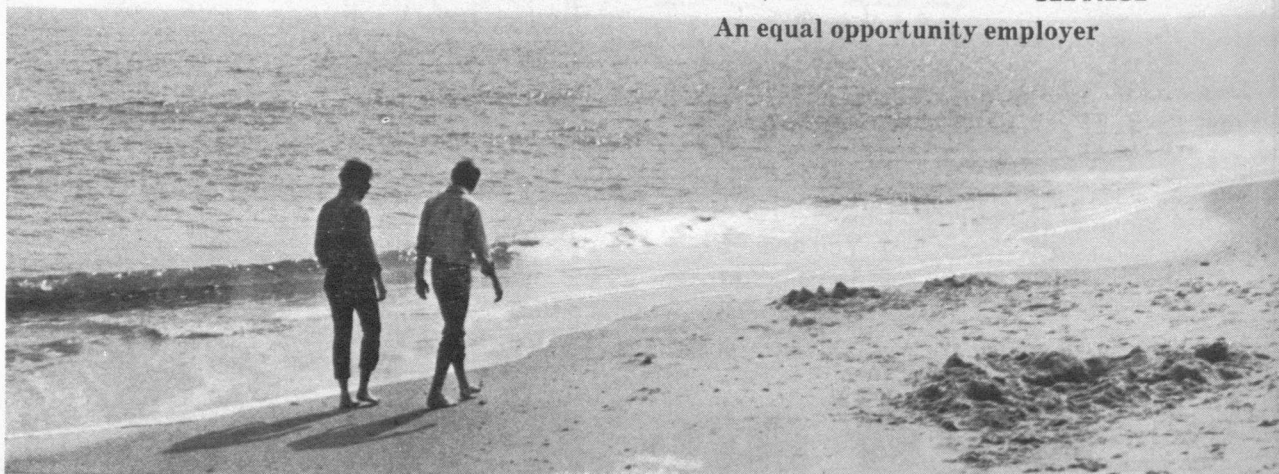
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The Scientific Ecologically Open Minded Magazine

This month's cover designed and photographed by William Hull, Instructor EIS, reflects our contemporary accumulation of knowledge and detachment of personal responsibility for the end products of that knowledge.

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STAFF	
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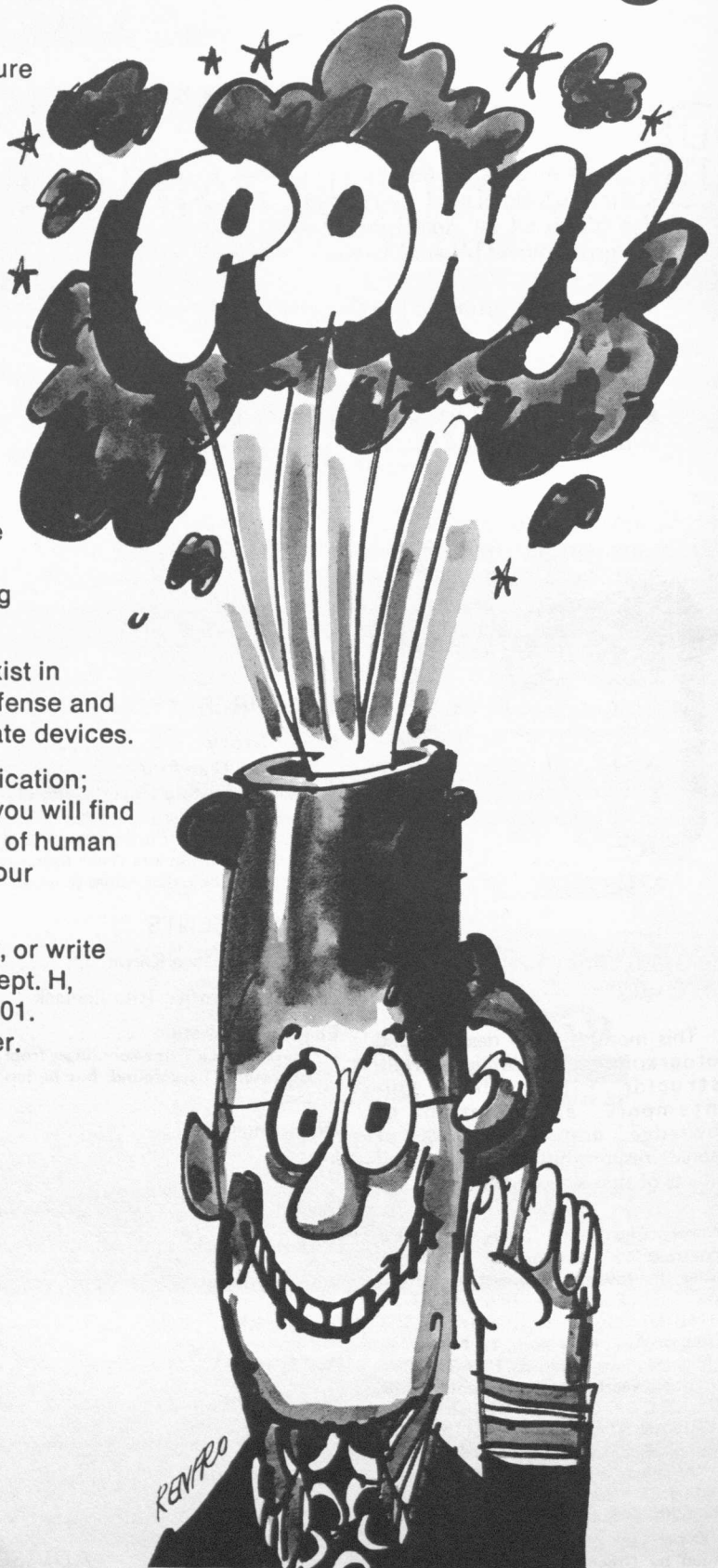
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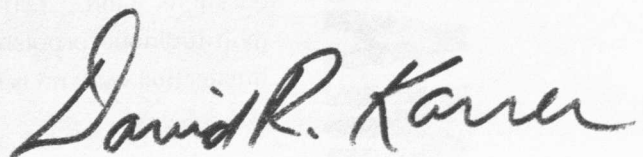
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editorial □ SIMPLY CONCERNED

Concern for the future of the Michigan State Spartan Engineer is wanting. The entire editorial staff are now seniors and there is a need for some new faces. Students either think they are not capable of assuming such a position as editor or any other post, or they become apathetic like when they are approached by some pesty insurance salesman. I believe that a position on a student magazine is a responsibility that returns great satisfaction but very little physical returns in the form of money or pats on the back for a job well done. However, the personal satisfaction and experience gained from working with others and learning as you go has done me worlds of good.

It seems to me that the best method for decent operation of an engineering student magazine is to have a well rounded staff from all the curriculum in engineering. Last year there were two electrical engineers and a mechanical engineer. This year the staff of three has expanded to five: three mechanical engineers, one chemical engineer, and a math major. I'm glad to see the M.E. representation (being one myself) but this magazine is an **engineering** magazine. Where are all the civil engineers and the electrical engineers? This magazine needs people from all majors to know what is going on in all majors. We want to give credit in print where credit is due. It's that simple.



THE MAN OF KNOWLEDGE WITHIN THE UNIVERSITY

by JACK O. CRAWFORD

knowledge occupies a status unprecedented in the history of mankind. One can read incessant statistics concerning the vast amount of accumulated knowledge now at men's disposal as opposed to the lesser bulk of knowledge gathered in the past. To be sure, these are impressive statistics and societies puff their chests with pride for being such an intimate cog in the world's knowledge gathering machine.

Inevitably, as is characteristic of most large scale enterprises, there is a need for organization within the structure, and the collection-analysis-dispersion process of knowledge is no exception. Without the facilities for such a process, knowledge becomes ineffective and the "knowledge for knowledge sake" syndrome becomes bogged in its own raw scores, empirical research, and uninterpretable rhetoric.

Where is there such a haven for those who desire to take a step back from society and view it with an objective eye? Where can one go to air his views and theories in an atmosphere of intellectual freedom? Where is the avenue for the dissemination of knowledge? Well, although it doesn't quite perfectly fit the model of the mecca of knowledge described above, the university comes as close as any institution today as an agent for the collection, analysis, and publication of knowledgeable research today.

With the advent of the American university, a curious and, in a sense, somewhat disheartening phenomena has occurred. And this is the great deal of reverence and respect paid by the general public to these men of knowledge, of whom many have integrated themselves into the university structure. Many, I presume, had migrated purposely for the opportunity to seriously formulate probing questions and, perhaps, answers regarding society and its multitudinous problems. I suspect, however, that such a breed of intellectual was and is in the minority on campus.

I mentioned disheartening before in reference to the respect and reverence paid to our American collegiate savants for this reason. When one studies precisely who in our universities today receives the applause of the public in regards to the formulation of knowledgeable material, it is mainly, if not entirely, the academicians who have certain precious initials added to their names. I, of course, refer to the initials "Ph.D" and sometimes "M.A.". Oftentimes the theories presented or the answers given by those other than a

"Ph.D.", or its equivalent, fall on deaf ears. I am not so sure that this is the fault of the high status faculty as it is so much the structure of the university, which emphasizes the importance of faculty publication while regarding all others (i.e. graduates or undergraduates) as unexperienced and unqualified novices.

Europe, in contrast, doesn't possess such a dilemma. Emphasis is placed upon the development of knowledge no matter who takes the leading role in its pursuit. The opinions and research of anyone interested in a particular facet of science will be heard and more importantly, published no matter what his status is in the university. Just as important is the way men from all echelons of the university meet in public houses to air their views. There an undergraduate is just as apt to discuss with a Nobel prize winner as he is with one of his peers.

This professionalization of the status of our "man of knowledge" in America has necessitated a specialization phenomenon within their rank. In order for a man to be recognized in both the academic and general communities, he must be introduced as an *expert* in his field. The implications are both detrimental and beneficial. I mention both good and bad in the same sense of mentioning the university as being a reasonably good but not a perfect facility for the oasis of the professional man of knowledge. The positive results of *expertisation*, if you will, are easily seen when one views the university as a tremendous catalogue of potential information. If one wants information concerning a particular branch of science, he can be relatively assured that his

information will be more readily believed if he gathers his information from the experts within that particular branch than from without. Also beneficial in the fragmentation of knowledge is the opportunity, as a result of this specialization, for the men of knowledge to devote the majority of their time analyzing and elucidating key problems within their field. As is sometimes a result, a particular expert accrues additional influence both within and outside the university structure. Additional influence draws the scholar in a vicious circle as it grants him more recognition, and so on until he becomes a good drawing card for those who wish to study under him.

Detrimental effects of this cult of expertise manifest themselves in a seriously negativistic way. For those who are not members of the cult, their work will tend to be regarded as something less than authoritative, regardless of the relative merit of their work.

Again, I have my suspicions that this may be the fault of the university's and community's somewhat distorted value orientation more than anything else.

It appears to me that the American university is actually a very paradoxical institution. With banners waving, it flies through the countryside proclaiming intellectual freedom and raises its ivy colored head with pride as it boasts of social involvement. For the young men and women still in high school, who are intent on pursuing still loftier academic heights, this is an impressive mass recruiting campaign while at the same time restoring their parents belief in the American educational system. Yet one becomes mildly shocked upon entry when he discovers that students are just as much bound by the restrictions

of *academic freedom* as their professors are limited by the departmental regime. The *publish or perish* monster materializes time and time again, leaving the undergraduates, who are probably the most openminded group on campus in respect to involvement and change, without yet another professor.

As contemporary society continually emphasizes post-graduate degrees as prerequisites for careers, the universities have reciprocated by focusing, it seems, upon graduate education, leaving the undergraduates, especially at the introductory level, where the groundwork is most vital, sitting in front of a television set or a graduate student who says "If I had my way, I'd give all of you 4.0's but . . ."

It is at this point where many students ask just what is the function of the university. At its most basic level, the university exists as a vehicle for anyone interested in obtaining a better than high school education. Theoretically, the university is a servant of its students. However, and this is especially true in larger universities, it's the students who sometimes become the servants and the college their master. There are times when the university appears to the student as a giant brainpower producing machine and that he has been reduced to a statistic. Granted, it's difficult for a large university to come across with an image of close, personal relationships between students and faculty when one is peering out over a sea of heads in a lecture room. But maybe universities are stressing the receiving of one's degree over what is relevant for the student of today. Relevancy is a much used word in the vocabularies of many students and they have good cause to cry out at times.

Continued on page 24



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Dr. Rita Zemack is the only woman professor in the Electrical Engineering and Systems Department. She is not an electrical engineer, however, but holds her Masters and Doctorate in Statistics both received here at Michigan State. Her Bachelors degree was received from Barnard College (Columbia University) in Government. Dr. Zemack teaches courses in Electrical Engineering in probability theory and random processes and spends much of her remaining spare time in health service planning at the new MSU medical school. As Chairman of the Committee Against Discrimination, Dr. Zemack receives occasional publicity in the state news when the subject being investigated is of a controversial nature as exemplified this last fall term when the Committee reviewed the status of women on campus. She is easy to talk to but wastes few words. Dr. Zemack is truly dedicated to her profession as she is also editor of International Statistical Activities for the American Statistician. Dr. Zemack has a son (age 21) and a daughter (age 19) both attending U. of M.



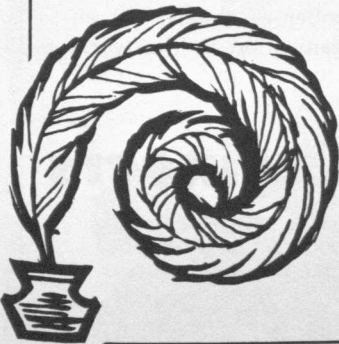
Professor's Profile

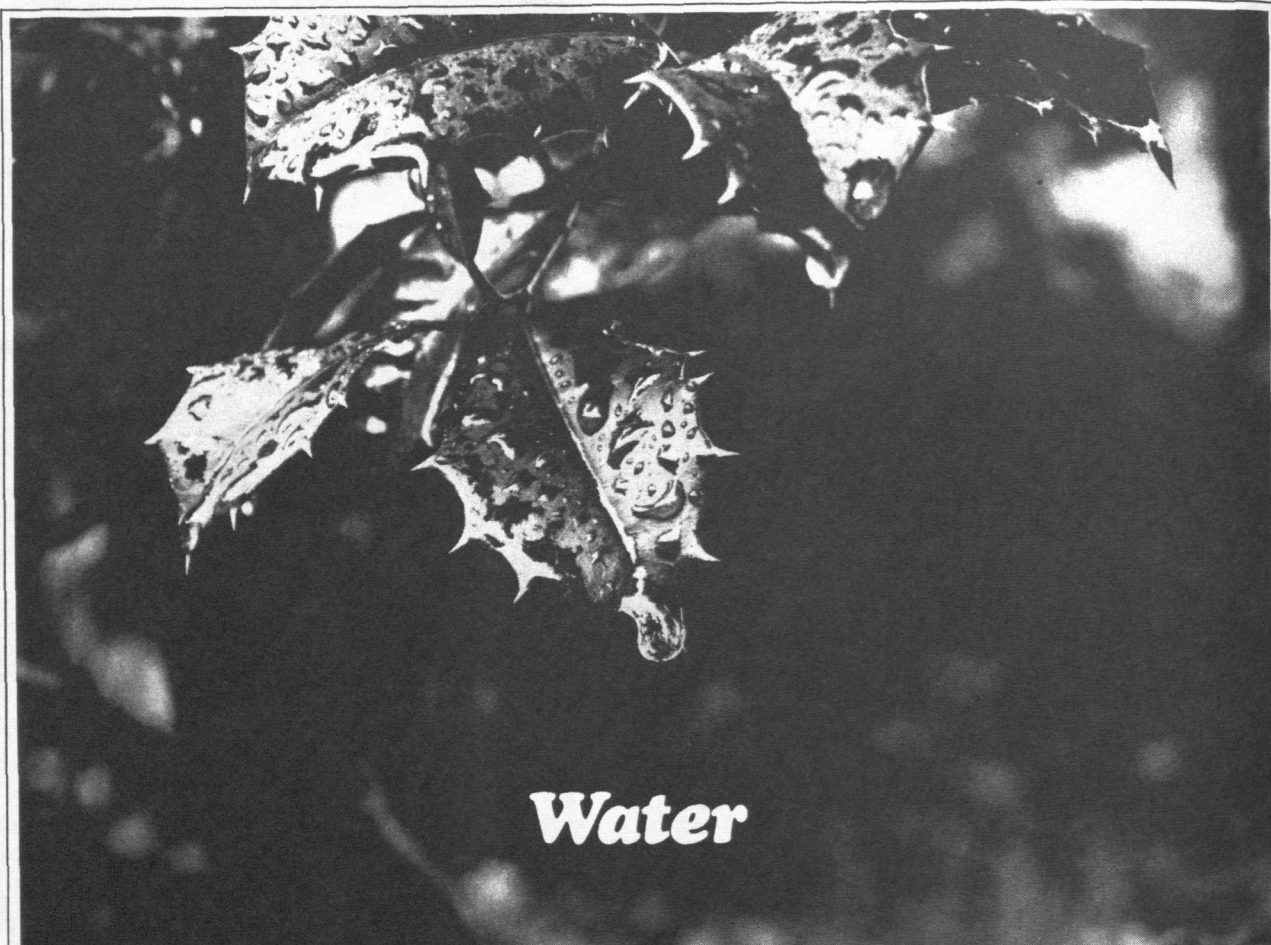
A Message

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ENGINEERS IN ACTION

AMERICAN INSTITUTE OF CHEMICAL ENGINEERS

The AIChE's winter activities started on February 4 with a well attended noon luncheon. Dr. Ryder presented a speech on his trip to U.S.S.R. dealing primarily with the present state of Russian technology during the luncheon. Next on the list of activities is a morning plant tour of Du Pont's Montique plant on February 26, to be followed with an afternoon of skiing. Again staying true to tradition, the AIChE plans another duel event in March with a plant tour of Park Davis' research center near Detroit to be followed with a Detroit Piston game. The AIChE is also working on methods for greater representation of the underclassmen within the organization's officers council. If you have any questions please call . . .

President David A. Smith 485-3187.

INSTITUTE OF ELECTRICAL AND ELECTRONIC ENGINEERS

IEEE's program for this term includes two field trips: the MSU cyclotron and a trip to the FM and AM transmitters, antennas, and the studio of WKAR. Our first meeting this term will include a talk by a past graduate of MSU in electrical engineering. Also this term we will begin a curriculum and faculty analysis with junior, senior and possible graduate students taking part. This undertaking is designed not only to help students but also the faculty and the Electrical Engineering Department as a whole.

Interest concerning some group project seems to be present among a number of our members. If anyone has suggestions for a group project or some other activity, don't hesitate to call . . .

President Bob Manion 351-5481.

SOCIETY OF AUTOMOTIVE ENGINEERS

The SAE student branch plans to hold its annual election of officers at the May meeting. A.G.M. library film, *The Body Builders* will be shown at this meeting. The W-31 Olds project is continuing and the car should be running at this time. The list of scheduled meetings is as follows: April 6 at 6:30 p.m. in room 146 EB, May 4 same place and time, and June 1 at 6:30 p.m. in room 146 EB. If you have any questions or are interested in the SAE activities call . . .

President Fred Bowen 355-9061 or Bob Dennis 332-0756.

AMATEUR RADIO CLUB

The Michigan State University A.R.C. meets every Thursday evening at 7:30 in the club station W8SH, room 339 EB. Beginners are welcome. For information contact . . .

President Al Francisco 355-6182.

AMERICAN SOCIETY FOR MECHANICAL ENGINEERS

For the 1970-71 school year the A.S.M.E. is embarking on a program of awareness of current social, economic, and industrial problems. The year speakers at the noon luncheons have included representatives from the air pollution section of the State Department of Public Health, Oldsmobile and the MSU Food Science Department. The noon luncheons are held once a month or whenever a speaker is available.

Future plans for the luncheons include speakers concerning war, auto safety, and politics. The purpose of these meetings is to acquaint the engineering student with current problems that he might not otherwise realize. The luncheons are not restricted to any class or major.

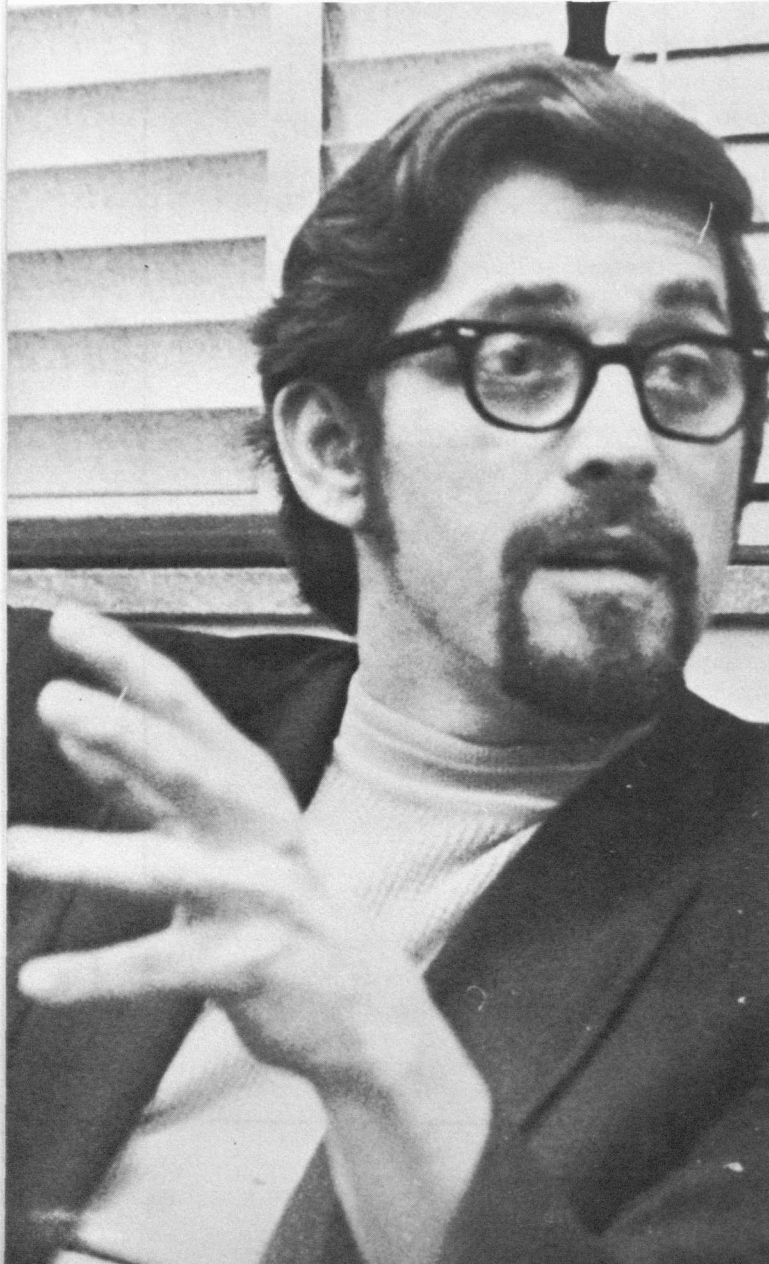
President John Medler 351-0358.



Editor's note: All engineering organizations are welcome to contribute to the Spartan Engineer. For further information contact Vince Rybicki 332-0814 or Al Hoffman, room 210 EB.

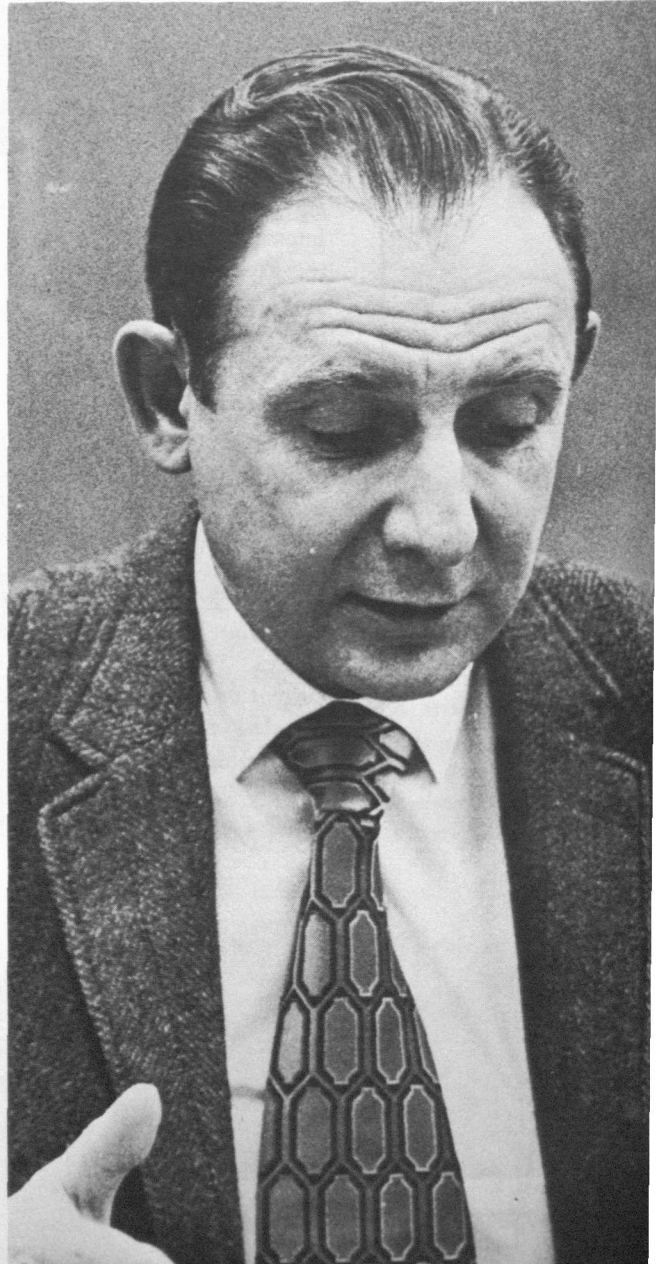
SPARTAN ENGINEER ENGINEERING PANEL DISCUSSION

POTTER: You cannot solve problems that society does not agree with you exist.



The AIAA Student Journal of October 3, 1970, carried an interesting article titled, Engineering Education and Engineering Practice in the Year 2000. It is this article that inspired what you are about to read. W. Scott Horton and I decided it would be interesting to have an informal discussion over coffee with some of the Mechanical Engineering Professors. The article, by J.W. Forrester, treats the subject of engineering in the future in a way that I think is...

ST. CLAIR: The engineer can build the SST . . . but it is exclusively his decision.



would make anyone considering engineering or in engineering for that matter, ponder seriously his role in our community ten or twenty years after graduation.

Each of the members of the panel were allowed to read the above mentioned article, which can be obtained in the Engineering Library, and were asked to keep the ideas of the article in mind. The discussion was taped and was two hours in length so what you read

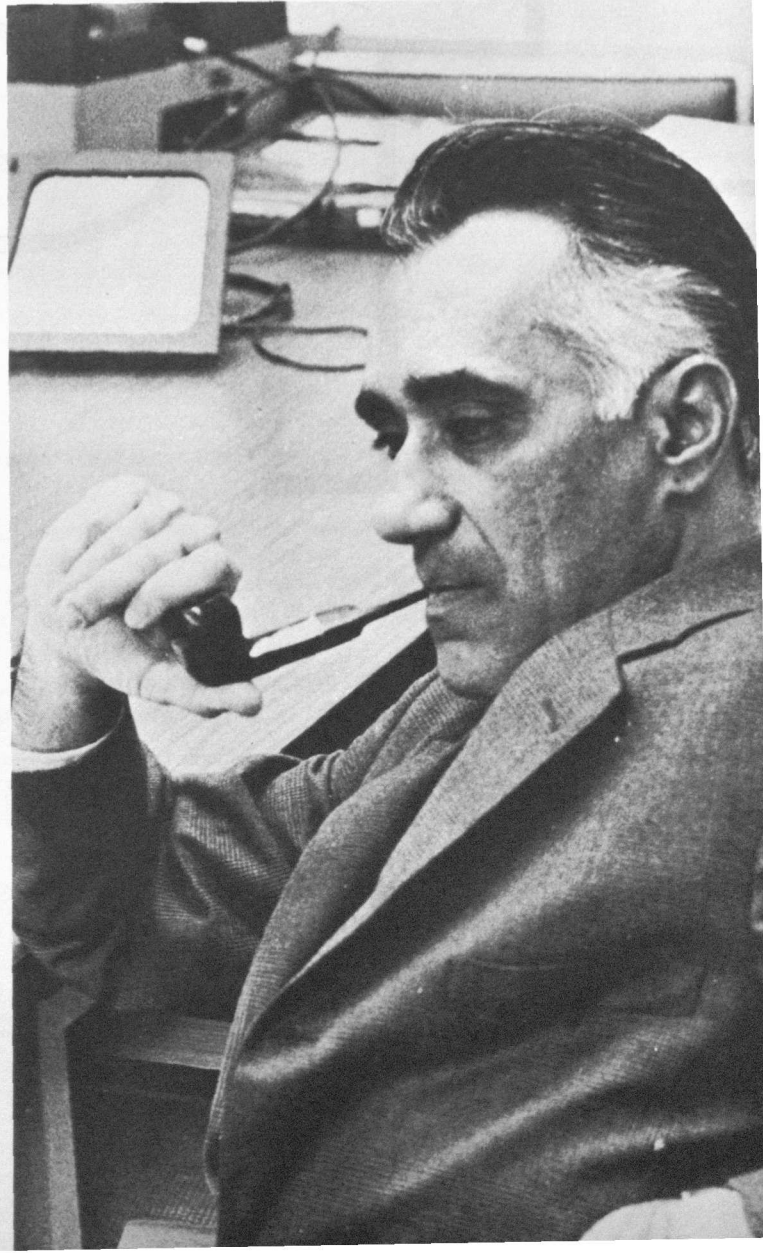
here is thoroughly condensed. The panelists were more or less allowed to ramble free unless the monitor (Horton) wished to steer the discussion in a direction of interest.

This is by no means the last word in discussions of this type. Therefore, an open invitation is hereby decreed whereby any group wishing to organize and conduct a similar meeting will receive all considerations by the staff of Spartan Engineer.

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HINKLE: The duty of the engineer is to devise new things to try to raise our standard of living.

DHANAK: Youth has questioned the elders for centuries and will continue to do so.

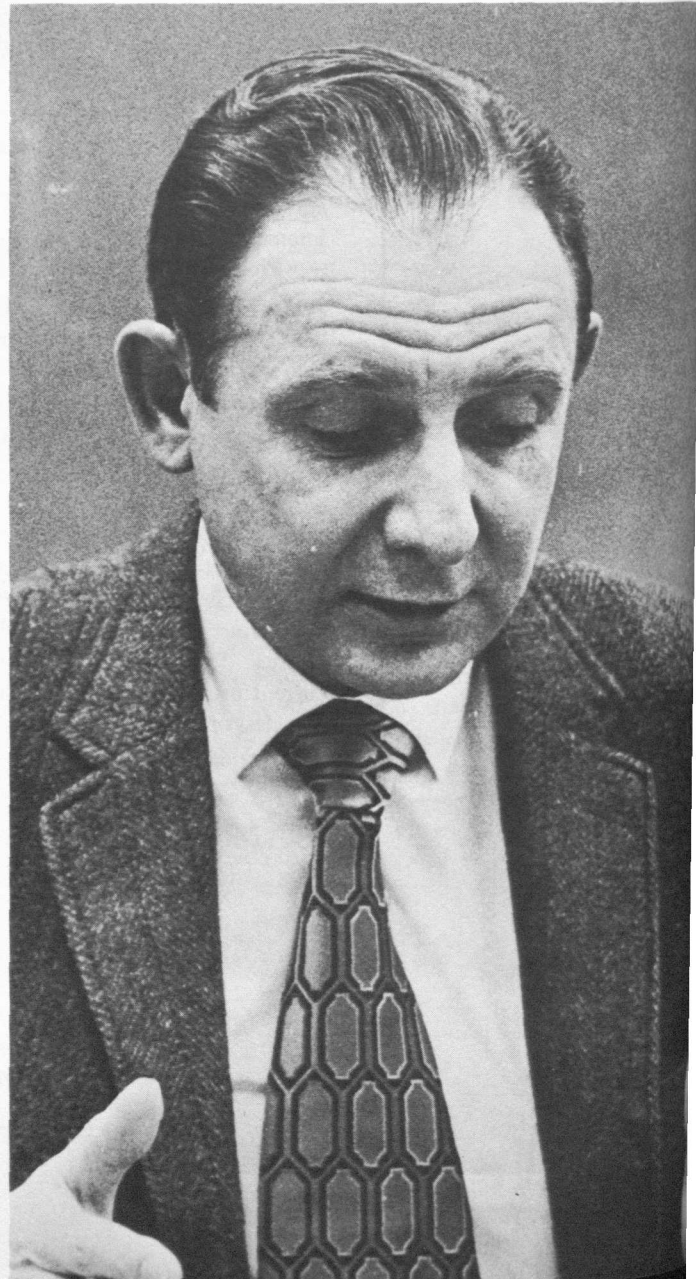
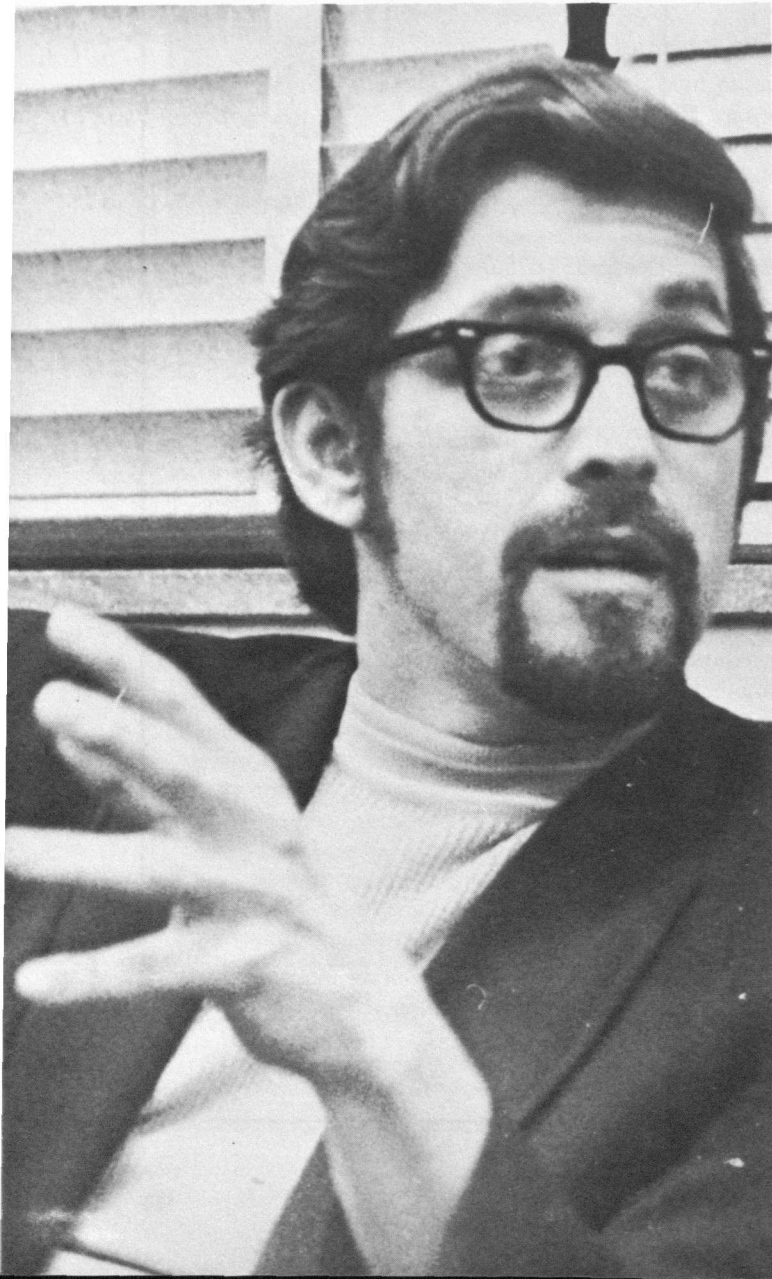


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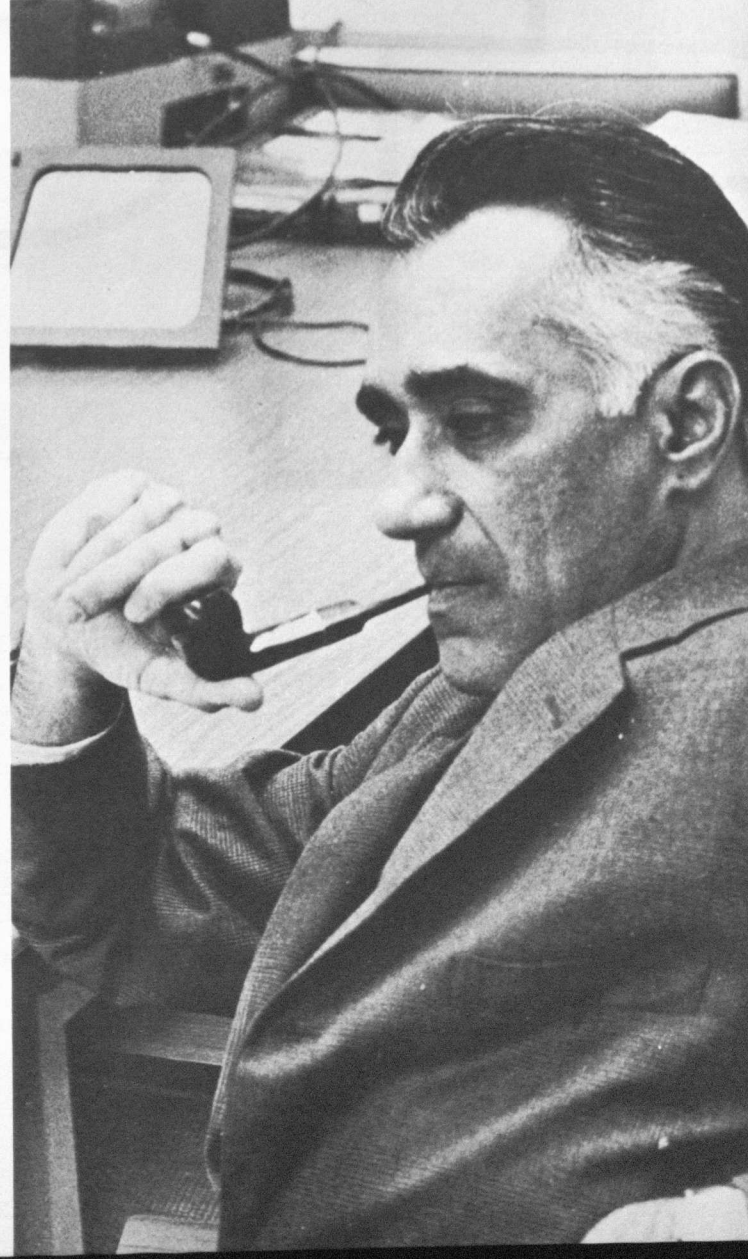
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DHANAK: Youth has questioned the elders for centuries and
will continue to do so.



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ST. CLAIR: The problems in society are the responsibility of the whole community and the whole community must decide, not just the engineer. Technology generally increases faster than the social understanding. It has outstripped the other Arts & Sciences. The author is an expert in management and sometimes he belittles the engineer but *he* should provide better management. The engineer **can** build the SST but will he build it? It is not exclusively his decision, and I wish to point out there are other criteria to be considered.

DHANAK: I think that it is debatable that science has outstripped the arts and letters because in the history of mankind back to Aristotle and before that to the Egyptians, etc. there have been *thinking* men and they have outstripped technology in their own way just as it surpassed them in its own way. I don't think you can compare engineering to social progress because they are so different. Let me address myself to the moral and ethical responsibilities of an engineer. The engineer developed ahead of society some things that society marvels at. But there comes a day when the society becomes subservient to the technology that the engineer produces. Look at some of the professional societies' journals and publications of the past twenty years. I looked out of curiosity and found that suddenly now they are all concerned about the pollution problems, etc. which they did not care to be concerned about ten years ago.

HORTON: Do you (Hinkle) think that this is because the

engineers today are trained to get the product out the back door to get the *buck*?

HINKLE: You can't survive and do good if you can't stay in business.

KARRER: We do this in our system only. What are we going to do as engineers to keep from inventing ourselves out of our own existence?

ST. CLAIR: I think I know what your question is asking and let us suppose that the engineer could solve the pollution problem in the next ten days (**THIS IS NOT A MISPRINT**) which means he would be responding to the needs of society. The complaint today is that the problem arose and the engineer let it happen. Well, he didn't really *let* it happen, he was responding to society and the problem that arose was a consequence of that response. The engineer by definition responds to the needs of society — but you can't hold him exclusively responsible because sometimes the request of society is a double edged sword.

HORTON: Would you say that the engineer would have built the automobile if the world was the size of this room? He builds only things that can get him a buck in return.

ST. CLAIR: That last statement is a little narrow. The engineer does that. But he doesn't do just that. He must make the dollar because of his needs. Look at Communism. They don't keep track of dollars but they have other non-free ways.

HINKLE: The dollar must be looked at as merely a way to keep track of transactions.

POTTER: I think we have developed some terrible weapons be-

cause of our quest for the buck and because society demanded them, but maybe these weapons are so terrible that they will never be used because of reasoning in man.

DHANAK: I'd like to make a point here if I may, and that is that it is a myth that the engineer responds to the *needs* of society. There were no loud cries for an automobile or an airplane. The way we are structured is the exploitation of resources by the enterpreneur to make money. The engineer is merely one of the components in this process. I don't think he works with the primary object of satisfying the needs of society.

POTTER: Who pays the engineer?

DHANAK: The **entrepreneur** pays him.

POTTER: Who pays the entrepreneur?

DHANAK: They want to exploit the resources and make goods and services available to those who will buy. The society doesn't cry out for these things.

POTTER: People don't buy Henry Fords' car because they don't want it.

DHANAK: But he did not consult them to see if they wanted it.

POTTER: But he had to consult them. He couldn't produce something that he couldn't sell.

DHANAK: He **created** a *demand* for his products.

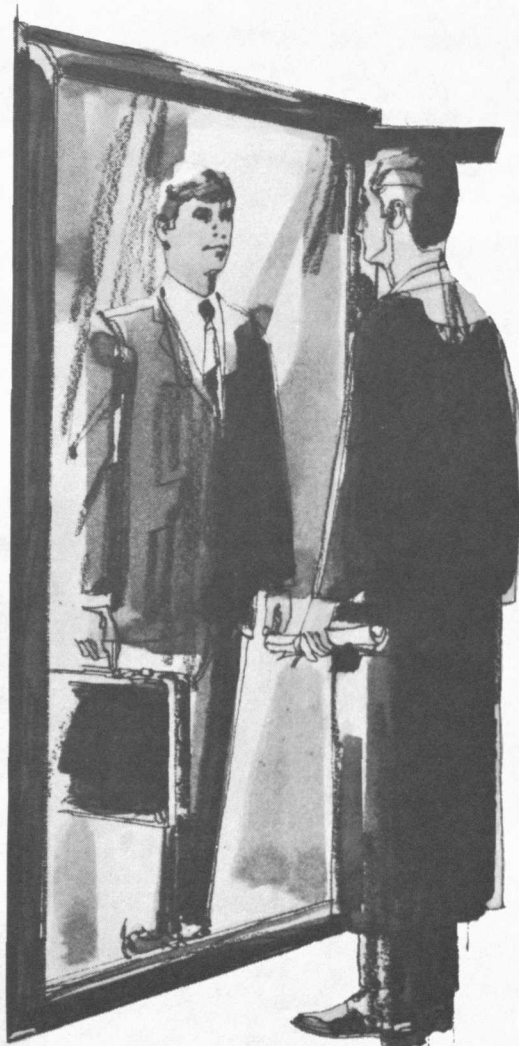
POTTER: He started driving it and he had so many orders that he couldn't fill them all.

DHANAK: If you build a *better* mouse trap and then create a

Continued on page 27

discover who you are

...and what you can do.



Explore your talents. Become one of the discoverers in the new Electronic Age. It can all happen at Automatic Electric Company.

Automatic Electric. Largest supplier to the Independent Telephone industry. We are manufacturers of communications products, simple to sophisticated. We sell to industry and to Government as well as to telephone companies here and abroad.

At Automatic Electric your creativity and individuality will receive quick, sure recognition in small project groups. Couple this with the unlimited opportunities that a large company can offer . . . and build a truly challenging future.

The communications industry is growing fast. Why not grow along with us?

We have positions for degreed candidates in these fields:

- Electrical Engineering ■ Computer Science ■ Mathematics
- Industrial Engineering ■ Electrical Engineering Technology ■ Mechanical Engineering

SEE YOUR PLACEMENT OFFICE for more information about Automatic Electric Company and Automatic Electric Laboratories. Or, write Mr. Robert J. Diana, Coordinator of College Relations, Automatic Electric Company, 400 North Wolf Road, Northlake, Illinois 60164.

AUTOMATIC ELECTRIC
GENERAL TELEPHONE & ELECTRONICS

An Equal Opportunity Employer

EX



TRA



International Nickel delivers more than nickel.

For 35 years, our people at the Francis L. LaQue Corrosion Laboratory have used the ocean waters at Wrightsville Beach, N.C., as a giant test tube.

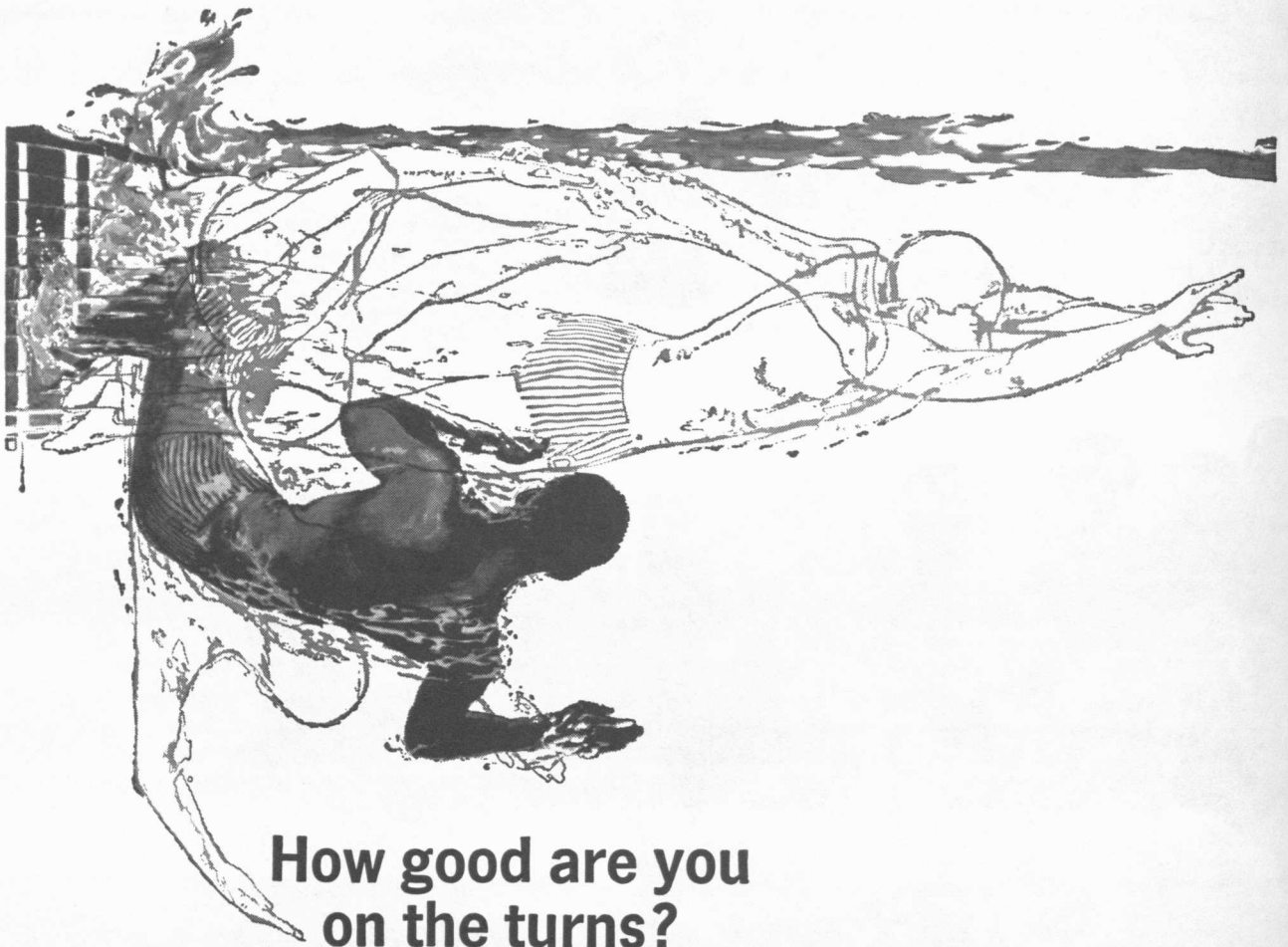
This accumulated know-how is now being put to very practical use in the form of stronger propellers, longer-lasting boilers and turbines, and barnacle-free hulls.

Marine corrosion costs taxpayers and businesses billions of dollars every year. International Nickel is doing its bit to reduce the bite.

We deliver more than nickel.

INTERNATIONAL NICKEL

The International Nickel Company, Inc., One New York Plaza, New York, N.Y. 10004. District Offices in Chicago, Cleveland, Dayton, Detroit, Hartford, Houston, Los Angeles, New York, Pittsburgh, Washington & Wilmington.



How good are you on the turns?

A strong stroke isn't enough to win in freestyle swimming.
Experts say: "Watch the turns."

"A champion won't touch with his hand," they tell us. "He begins his overhead tumble with a downward stab of his right arm, twists as his feet hit, then explodes forward with a powerful pushoff."

Their conclusion: "Experience and smart coaching develop a championship turn."

We believe it. That's why we've put together the most experienced and best-coached team of bearing and steel engineers in the world. And now we're putting \$221,000,000 into expansion and modernization for the future.

This coupled with promotion from within will mean increasing opportunities for you. If you want to grow with growing modern industry, join the team.

Write The Timken Company, Canton, Ohio 44706. Tell our Manager of College Relations that you'd like to talk it over.

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TIMKEN
REGISTERED TRADEMARK

THE TIMKEN COMPANY MANUFACTURES TAPERED ROLLER BEARINGS, FINE ALLOY STEEL AND REMOVABLE ROCK BITS.

ENJOY SUPER
ENGINEER'S
SUBTLE RETAL-
IATION TO A
COMMONLY RE-
CURRING BUT
OFTEN IRRITAT-
ING SITUATION
AT THE START
OF EVERY TERM...

SECOND DAY
OF CLASS

...TEACHER BITE
HIS TONGUE ON
YOUR NAME?...
ABOUT 50 TIMES
IN A ROW, EVEN
THOUGH YOU TOLD
HIM HOW TO SAY?!

S-M-I-T-H

AHEM... (COUGH) HECTOR B... B... BROWN? AHH, O.K. NOW,
BRUCE ... AHH, DAVEN... DAVENP... DAVENPORT? ER
HERE'S A DANG FUNNY ONE... MERL... MARLE...
MERRILL ESTER... ESTERBROOK?... AHHHH (COUGH-SNIF)
SSSP... AHH, FIN... FAN... MAN... FANNY MENSTRUA...
MANNY...

I WONDER WHERE THIS GUY
LEARNED TO READ? CHRIST'S SAKES!

MANNY FINSTERWAL? WHERE ARE
YOU? OH... AHH, THINK I'LL EAT A
BUG AN' CURL UP AN' DIE... GEORGE
P. GILES... GILESPI.. PIE
PEE... GEORGE GILESPI?

THAT DOES
IT!
LET ME
OUTTA
HERE!



X'ILL KERBER ;
HOUSEBREAK HER!

R. W. ZERENY BODY
IN HERE?

HUMBLE. ABODE

P. FANSON

WHAT
DID. LIVESAY ?

E. PANAYIRCISKI

GO SALTER CAR

R. YU IN THERE?

AND SO ON, UP AND DOWN
THE HALL HE FLEW...

A: I DAVIS RENTA-CAR

SHADE
E. GROVE

DON'T FORGET TO
~~S.G.~~ LENCHNER DOOR.

C. BROCKUS

A. KORN

LUCKILY, HE SATISFIED THIS
MAD FRUSTRATION ON THE
SECOND FLOOR! BUT, FIRST
AND THIRD FLOORS, LOOK
OUT!!

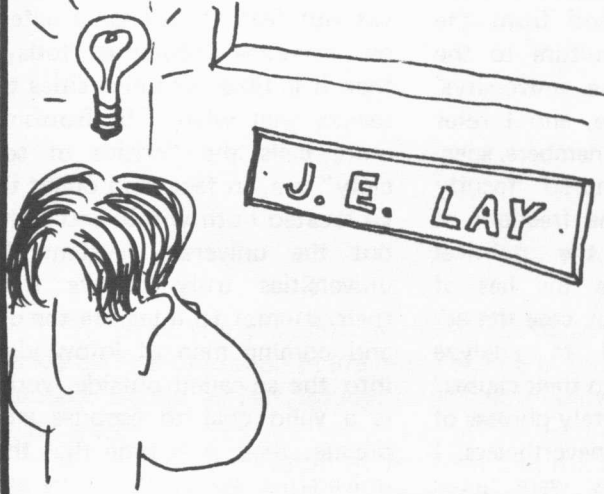
FREE
A. B. HOFFMAN

J. S. WAS FRAMED

T. I. MANETSCH,
WHATTA WINE!



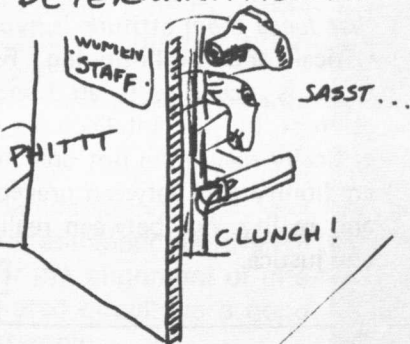
WHILE STROLLING
DOWN THE SECOND
FLOOR, HE ESPIES
A CURIOUS DOOR
NAMEPLATE ...



WITH THE QUICKNESS OF
MIND THAT WOULD SOME-
DAY ALLOW SUPER
ENGINEER TO INVENT
THE PUSH BUTTON
SLIDE RULE, MANNY
CRAFTILY CONVERTS THE
PLATE WITH HIS WHITE
ENGINEER'S PENCIL ...

*E.Z. LAY

THEN, WITH EVER-INCREASING
DETERMINATION ...



MIND AND PENCIL COMBINE
TO LEAVE THEIR MARK!

WHATTA YA'

SAY DAUDI ?

A. RAOF HOPE

HAY ^SXINGWE NOW

Many of the courses required for a degree in fact have nothing in common with the major a student is pursuing and its content is quite often forgotten as a student hands in his term end examination. This appears as a tremendous misallocation of the university's productive resources as the manpower and money expended to maintain such irrelevant dialogues could be better put to use in either establishing or improving upon relevant courses or to attract speakers to campus.

In discussing these various problems located within the American university, we should always bear in mind the role the man of knowledge plays as he is situated within the university itself.

Noam Chomsky wrote an article called *The Responsibility of Intellectuals*, and in it he quite clearly explains what opportunities materialize in the Western civilization for the intellectual to perform his role, as he also describes what that role is:

"With respect to the responsibility of intellectuals, there are still other, equally disturbing questions. Intellectuals are in a position to expose the lies of governments, to analyze actions according to their causes and motives and often hidden intentions. In the Western world, at least, they have the power that comes from political liberty, from access to information and freedom of expression. For a privileged minority, Western democracy provides the leisure, the facilities, and the training to seek the truth lying hidden behind the veil of distortion and misrepresentation, ideology and class interest, through which the events of current history are presented to us."

If now we define our man of knowledge, employed by the

American university, as such an intellectual described above, the tragic irony of the above quote actualizes. Note the key phrases "expose the lies of government . . . analyze actions according to their causes . . . political liberty . . . freedom of expression . . ." I find it curious, if not sad, that such phrases cannot, in fact, always be transposed from the general Western culture to the university. Do the university's men of knowledge, and I refer mainly to faculty members, specifically to untenured faculty members, have the freedom of expression and the political liberty to expose the lies of government (in this case the administration) and to analyze actions according to their causes? While these are merely phrases of a greater whole, nevertheless, I don't believe they were taken out of context. In my undergraduate career, I have, on two separate occasions, experienced untenured faculty members losing their jobs, not because of their qualifications as men of knowledge, but precisely as a result of their seizing the opportunity of the intellectual atmosphere described by Chomsky above. And I am confident that I have not been endeared to their side of the battle, as it were, as a result of any martyrdom on their part. Although these are only two

exceptions to Chomsky's permissive intellectual utopia apparently so prevalent in the Western world today, they are, however, two exceptions too many.

If the university of today is to live up to Chomsky's descriptions, and my idealistic sense of the potential for true expression without fear of reprisal situated on American campuses today, then it is time for universities to realize that what T.B. Bottommore calls the "critics of society" are, in fact, and ought to be located both within and without the university system. If universities truly believe that their attempt to integrate the up and coming men of knowledge into the so-called outside world is a valid goal to espouse and pursue, then it is time that the universities realize that they are just as susceptible to be analyzed and, if need be, exposed by their self-trained intellectuals as are any institutions in existence today. That the university views such an action by their men of knowledge with a *biting the hand that feeds them* attitude is hypocritical and disillusioning. For what is occurring is an honest attempt by the intellectuals to critically reevaluate not only the credibility gap between precepts and reality, but between reality and justice. □

THE WAR OF THE AGES

At four years it begins. A woman is suddenly 5½, the same age as her cousin. At 7 she is 9, at 11 she is 14, and at 15 she is 19. During her 20's there is little to conceal, but at 31 she's 28. At 37 she celebrates her 30th birthday. At 50 she is 39, at 60 she is 45, but at 70 she is 85—the longest living descendent in her family since the Revolt of the Colonies, and she'll reach 100 in another six years.

“They encourage us to look for original solutions to problems. This sparks inventiveness.”

Bill Greiner, Western Electric

Bill Greiner's problem: shaving 10-14 seconds off one operation in the manufacture of integrated circuits, while reducing error factor below .001 inch.

Bill is a staff member at Western Electric's Engineering Research Center, working primarily with the handling and testing of integrated circuits.

Bill came to Western Electric in 1968 after receiving his MS from MIT. He earned his BS in Mechanical Engineering at Yale.

“My work here has given me a better appreciation of the problems in manufacturing,” said Bill. His automatic TV system for the alignment of integrated circuits is a good example.

At one phase of the manufacturing process, operators must correct alignment of integrated circuits by hand—a job that took up to fifteen seconds, and was accurate to only .001 inch in x and y, and to one degree in rotary.

What Bill did, essentially, was design and build a small dedicated computer that completely automates the process. An operator can push a button to align the integrated circuits automatically. A TV camera enlarges the image in silhouette form,

scans the pattern, and feeds the voltage signal into Bill's computer. The computer calculates the position measurements and triggers a stepping table to correct the alignment.

The correction time is reduced to one second, the error factor to .00025 inch in x and y, and ½ degree in rotary.

Bill finds the challenge of electronics and logic design extremely stimulating. “We're not channeled: we have a chance to get

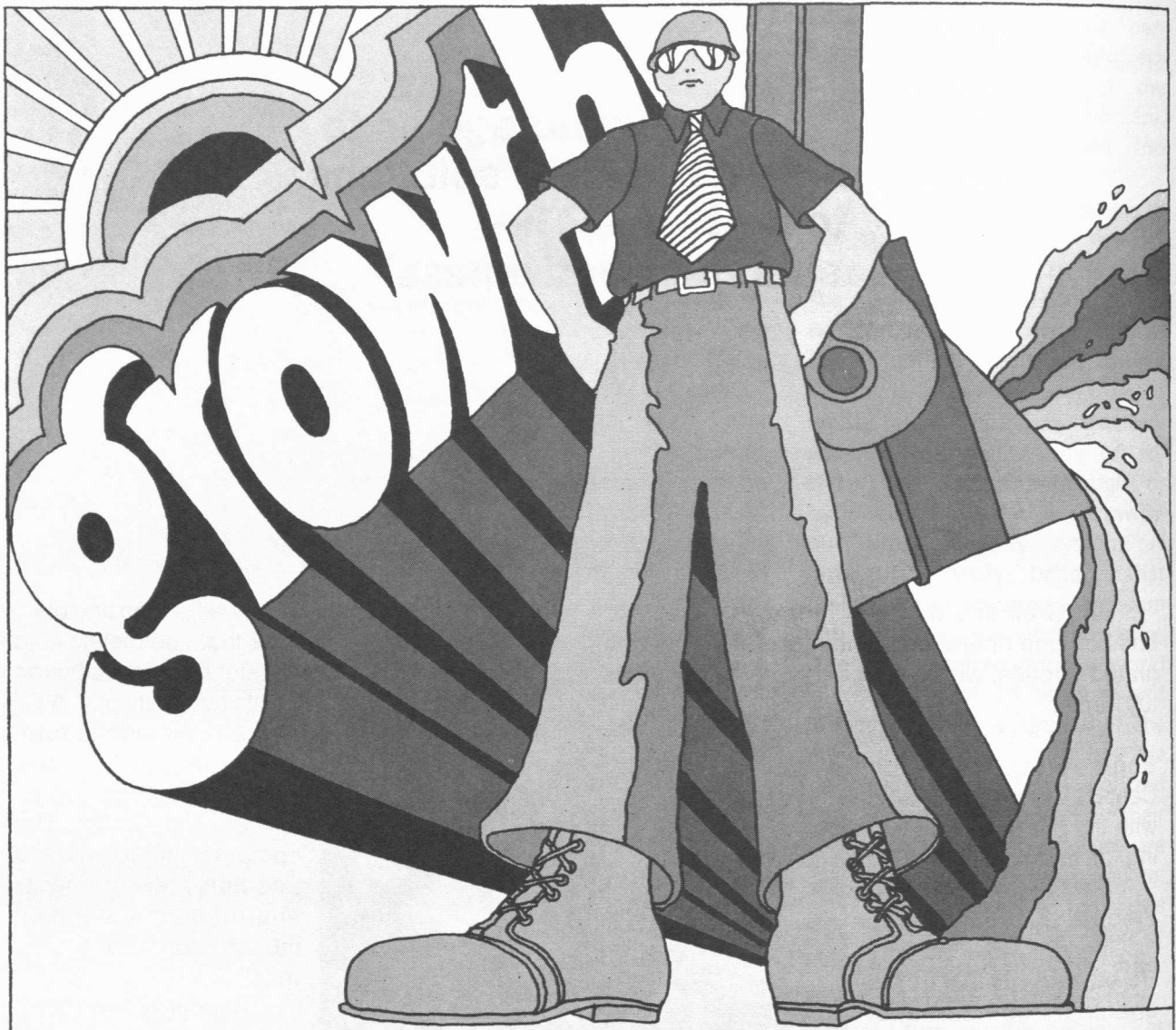
involved in a variety of fields.”

What does he find most satisfying about his job at Western Electric? “Well,” said Bill, “I look for an amount of responsibility. And here I'm encouraged to take it.”



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Bethlehem Steel is growing, upward and outward. We're advancing on all fronts. This is important to *you*, to all engineers who aim for a meaningful career.

We're deeply involved in new, worldwide mineral developments, plastics fabrication, and residential construction. And our diversification program has only begun.

We're breaking the barriers in steelmaking technology. We're the industry leader in basic

oxygen furnace production. We're leading the way in new techniques, new products and processes.

Manufactured products. Shipbuilding and ship repair. Ship design and engineering. Fabricated steel construction. Research and development. Environmental quality control. And, in everything we do, our goal is excellence.

Here's where engineering graduates can apply their

creativity, individuality, and energy. Here's where talent and dedication really count. Here's where you can choose the path of your own career—and go!

Sound good to you? Then read our booklet, "Bethlehem Steel's Loop Course." You can pick up a copy in your placement office. And be sure to have a talk with our representative when he visits your campus.

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market for it, it will sell, and transportation is no different.

POTTER: Ford built cars because it was a need and demand of society.

DHANAK: No, because he saw it as a need of society. Initially there was no outcry from the society for cars.

HINKLE: You (Dhanak) are saying that unless a large group of our society comes to us and says, 'we want something better', we can't build it.

DHANAK: I don't think I'm saying that at all.

HINKLE: I will only say that I think it's the duty of the engineer to devise new things to try to raise our standard of living.

HORTON: Dr. St. Clair, what effect do you think the SST will have on our society?

ST. CLAIR: I'm not sure we should have the SST; there are pros and cons, of course, and engineers should analyze these pros and cons so that others in our society could put a priority on it. We should by all means improve the standard of living in areas that need it, but it's going to take more than the engineer to do that, too.

HORTON: I'd like to ask another question in reference to this article. Do you (Potter) think that this system seems too idealized?

POTTER: I think that the article knocks all the things that society does, in a subtle way. We should set up goals for society, but to demand that these goals be a perfect model and then demand that people conform to them overnight is wrong. Sometimes young people do this and I think it's wrong.

DHANAK: I think that the youth has always been questioning the ways of the older folk for centuries and they will continue to do so. We agree that not very many young people do this sort of thing that you (Potter) mention. There is no place in any community for violence of any kind. Things take time and times change.

HORTON: Another question from the article. How do you feel about a *ceiling* on research and development? How far can this go?

POTTER: Your argument here is that we have quite enough research or just about enough. You're suggesting that we should take that knowledge that we have and apply it and slow down our pushing back of the frontiers. However, we have overpopulation and food shortages. We cannot solve these without research. We may end this century by solving the major problems of humanity.

KARRER: I agree with you (Potter). I can see certain amounts of research like a cure for cancer, but we should try to limit our research to things that will benefit all or a large percentage of our people.

HORTON: Let's look at the SST again and the question of economic tradeoffs.

HINKLE: That's a good way to put it.

HORTON: The question is the reaction between the American buck and the economic advantage of top secret research.

HINKLE: Again, when I say dollar, I mean a medium of exchange and that's all. The buck is not only stored in banks, but is

also used to pay medical bills and groceries. We all do that. I'd hate to see us spend millions and maybe billions on the SST when maybe many of our people will never benefit. It is the engineers' job to be in the forefront and say that we can clean our air and water by, say, 1995 and build pollution free power plants.

ST. CLAIR: It is the role of the engineer to take partial control and steer things in the proper direction. He must also look for support from the politicians and scientists too.

POTTER: When we are breathing our own air and have pollution free power plants the engineer will have allowed us to do this because he is responding to society. They give us money and we solve problems. You cannot solve problems that society does not agree with you exist. The problems that will be solved by highly specialized people, fluid mechanics, for example.

DHANAK: I came to engineering via the back door, so to speak, as my first degree was in Physics, but I now believe that the engineer has a better understanding of the applied systems. However, I also believe that theory is important. On the subject of societies and the engineers' relation to it, I think that any society that wants to flourish and create conditions of *happiness*, which is a debatable term, it must put in some effort in basic research because man is basically a questioning being. Students and young people are no different. I have great confidence in young people. I think a lot of them have a good attitude and are asking good questions.



ENGINEERS

The engineer was out with a flirt, and when his buddy left the table to buy a paper, she pursed her lips invitingly and leaned across the table toward her date and, putting her face against his whispered, "Now is your chance, darling." Glancing around hastily, the engineer muttered, "So it is!" and quickly leaned over and drank his buddy's beer.

SE

Two duck hunters were sitting behind the blind, one drinking from a thermos bottle of coffee, the other from a jug of whiskey. After some hours of sipping they spotted a lone duck winging through the sky. Taking aim, the coffee drinker rose, let fire, and missed. The whiskey drinker rose, let fire, and brought the duck down. His companion, properly amazed, complimented him on the shot. He replied, "Aw, it's nothing. I usually get five or six out of a flock like that."

SE

Co-ed: "Where did you learn to kiss like that?"
M.E.: "Siphoning gas."

SE

Patient (shortly after returning from the operating room): "Why are all the blinds drawn, Doctor?"

Doctor: "There's a big fire across the street, and I didn't want you to wake up and think the operation was a failure.."

Army doctor: "You have any physical defects?"

Draftee: "Yes sir, no guts."

SE

The father, while passing through his son's college town late one evening on a business trip, decided to pay his boy a surprise visit. Arriving at the lad's fraternity house, he rapped loudly on the door. After several minutes of the process, a sleepy voice drifted down from the second floor window. "What do you want, man?"

"Does John Jefferson live here?" inquired the father.

"Yeah," came the reply. "Dump him on the porch."

SE

The traveling salesman was talking: "I'll never forget the time this woman opened the door in her negligee . . . which was kind of an odd place to have a door."

SE

If you tell the truth, you don't have to remember anything.

SE

Why is it that men praise women for their virtue and dislike them so when they try to keep it?

Seven-year-old Michael, who had a reputation as a little terror, had just finished his first summer vacation at his grandparent's farm. Back in the city, one of the neighbors asked him about his holiday and especially about his grandfather.

"Oh, he's great," responded Michael. "We played a swell game every day. Late each afternoon he'd row me out to the middle of Claytor Lake, throw me over the side of the boat and let me swim ashore."

"Claytor Lake?" gasped the neighbor, "That's a big lake. Wasn't that a hard game for such a little fellow as you?"

"I'll say it was," said Michael. "But the hardest part was getting out of the sack."

SE

Not only is it proper to hold an engineer's hand in the dark, but it's usually necessary.

SE

The professor was telling his lecture class about some of his experiences in the army. On his first day in camp, he related he was issued a comb and then the company barber shaved off his hair. The second day he was presented with a toothbrush and then the dentist pulled out all his teeth. The third day after being issued an athletic supporter he went AWOL.

SE

You can make these jokes better next issue. Join the staff of the *Spartan Engineer*.

Kodak

The lively engineer and the fat-cat corporation

or

The recruiter's dilemma of 1971

As in any selection process, if you can afford the best and the best is available, you pick the best. "Best" here means the liveliest minds and personalities. And there comes the dilemma: pick them, or pick those who won't rock the boat? On today's engineering campuses there is a scarcity of bright people interested in nothing but engineering. The boat will have to rock a bit. Let her rock. Eastman Kodak Company, Business and Technical Personnel, Rochester, N. Y. 14650. An equal-opportunity employer.

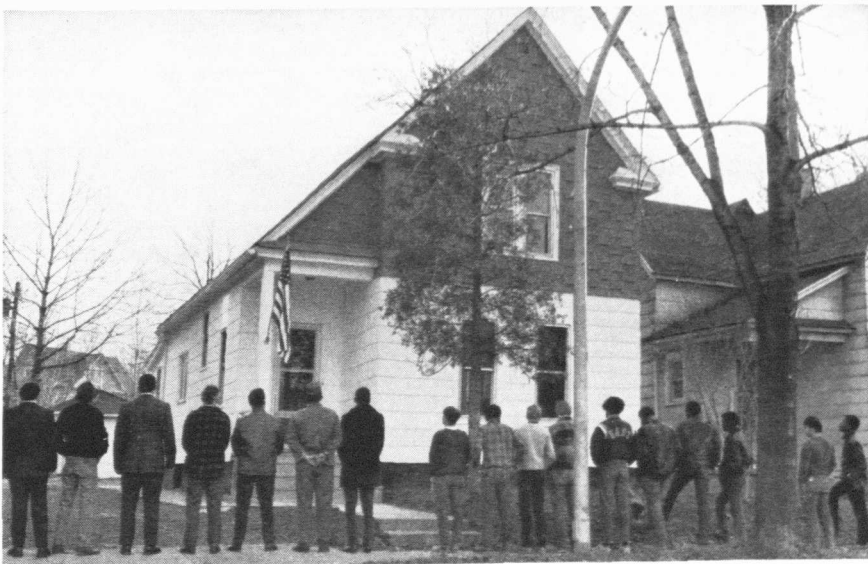
* * *

Dick Pignataro is a mechanical engineer from Georgia Tech. His job has to do with engineering, construction, maintenance, and utilities for the manufacture of film, paper, and chemicals by the most advanced methods available. The

office next to his was occupied by a 24-year-old personnel man named Bob Lee.

One night over a beer these two under-30 types were getting themselves worked up over the contrast between life as lived a mile or two outside the plant gates and the sleek technology inside those gates. Instead of letting it drop, they put together a proposal for rebuilding badly decayed houses. It called for high-grade Kodak talent, Kodak seed money, and faith in the premise that kids can hate school and yet take pride in doing a job right. Seemed like puddin'-headed humanitarianism unlikely to get very far up the chain of command.

Three weeks later, high aloft in a jet, their idea was being explained to the company president. He liked it.



Pignataro, Lee, Kodak construction supervisors, and young men of Rochester, N. Y., admire house the young men rebuilt. The first year several dozen such houses are being rebuilt by a work force of 100 part-time students. Since interest in the sonnets of Shakespeare is at present negligible among these students, their studies tend more toward figuring how many

boxes of tile to order for a 9' x 13' kitchen floor. Building-trades unions counsel. So do bankers, realtors, and schoolmen. The renovated homes are sold to poor people at prices they can afford. It is better to light a candle than to curse the darkness. If the candle is too dim, try a halogen-vapor lamp.

When you can hardly hear yourself think, it's time to think about noise.

Noise won't kill you. But before it leaves you deaf, it may drive you crazy.

Noise is pollution. And noise pollution is approaching dangerous levels in our cities today.

People are tired of living in the din of car horns and jackhammers. They're starting to scream about noise.

Screaming won't help matters any. But technology will. Technology and the engineers who can make it work.

Engineers at General Electric are already working to take some of the noise out of our environment. One area where they're making real progress is jet-aircraft engines.

Until our engineers went to work on the problem, cutting down on engine noise always meant cutting down on power. But no more.

GE has built a jet engine for airliners that's quieter than any other you've ever heard. A high-bypass turbofan. It's quieter, even though it's twice as powerful as the engines on the passenger planes of the Sixties.

And NASA has chosen General Electric to find ways of cutting engine noise even further.

It may take an engineer years of work before he can work out the solution to a problem like noise in jet engines. And it may be years before his solution has any impact on the environment.

But if you're the kind of engineer who's anxious to get started on problems like these and willing to give them the time they take, General Electric needs you.

Think about it in a quiet moment.

Or, better yet, a noisy one.

GENERAL  ELECTRIC

An equal opportunity employer