

spartan

The Scientific Ecologically Open Minded Magazine

engineer

Member of the Engineering College Magazines Associated

MICHIGAN
STATE
UNIVERSITY
VOLUME 24
NUMBER 4
APRIL, 1971

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**Westinghouse the teacher?
the medic?
the builder?
the crime fighter?
the urban planner?
the ecologist?**

Westinghouse Learning Corporation has launched a computerized teaching system that lets each child learn at his own rate.

Our studies for the Defense Department will lead to the "hospital of the '70s," and a level of efficiency and economy unknown today.

Houses? We're not talking about the thousands of units completed or under construction. We're talking about the new plant we're building to mass-produce modular houses.

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We've developed waste-disposal units for neigh-

borhoods, sewage treatment plants for cities, a smokeless refuse plant that reclaims rather than destroys.

We're transforming 16 square miles of Florida into a new city. It's the bellwether for hundreds of thousands of acres, bought or leased, here and abroad.

The list goes on. Everything electrical, of course—from nuclear power plants to light bulbs. And aerospace, oceanography, broadcasting, rapid transit.

It all means that Westinghouse has openings for skilled engineers—electrical, mechanical, chemical, industrial. And we also offer job training for the unskilled as another step toward increasing productive employment for the disadvantaged people of our country. An equal opportunity employer.

You can be sure...if it's Westinghouse





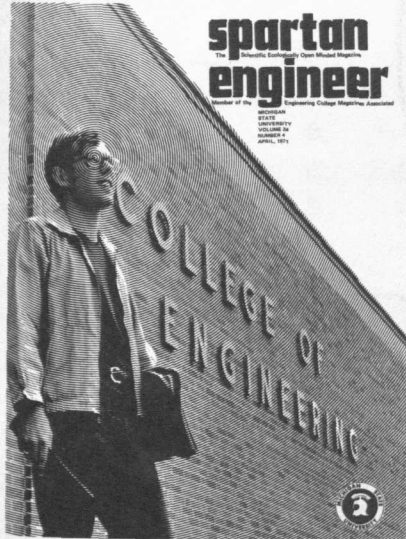
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*Paul wishes to thank all those who made his engineering degree possible.

In this issue our central theme is the image of an engineer and the roles an engineer plays in society. The cover is of Jim Schepers depicting the *typical* or the mind's eye engineering student.

Member, Engineering College Magazine Associated / Chairman: Daniel L. Griffer, Jr. Iowa State University, Ames, Iowa / Publisher's Representative: Littell-Murray-Barhnill, Inc. 369 Lexington Ave., New York, 17, N.Y. / 737 N. Michigan Ave., Chicago, Ill. / Published four times yearly by the students of the COLLEGE OF ENGINEERING, MICHIGAN STATE UNIVERSITY / East Lansing, Michigan 48823. / The office is on the first floor of the Engineering Building / Room 144, Phone 517 355-3520. / Subscription rate by mail \$2.00 per year / Single copies 40 cents / Printed by Greenville Printing Company.

A statement of policy:

The objective of the magazine is to communicate the exchange of ideas between: students and professors, professors and professors, departments, and colleges within the university. The Spartan Engineer believes that the engineering world can no longer neglect the social interactions of the outside world and is dedicated to initiating programs within its bounds that not only seek to relate the latest discoveries of pure science, but also show a genuine concern for the questions troubling our environment. The Spartan Engineer also identifies with the American ideal of free enterprise and its attempt to perfect the efforts of mankind in constructing a new world through human engineering.

WHEN YOU'RE REALLY BUSY!!



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3. Over 3000 up to the minute Technical Reference books on hand.

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who are you?

I am:

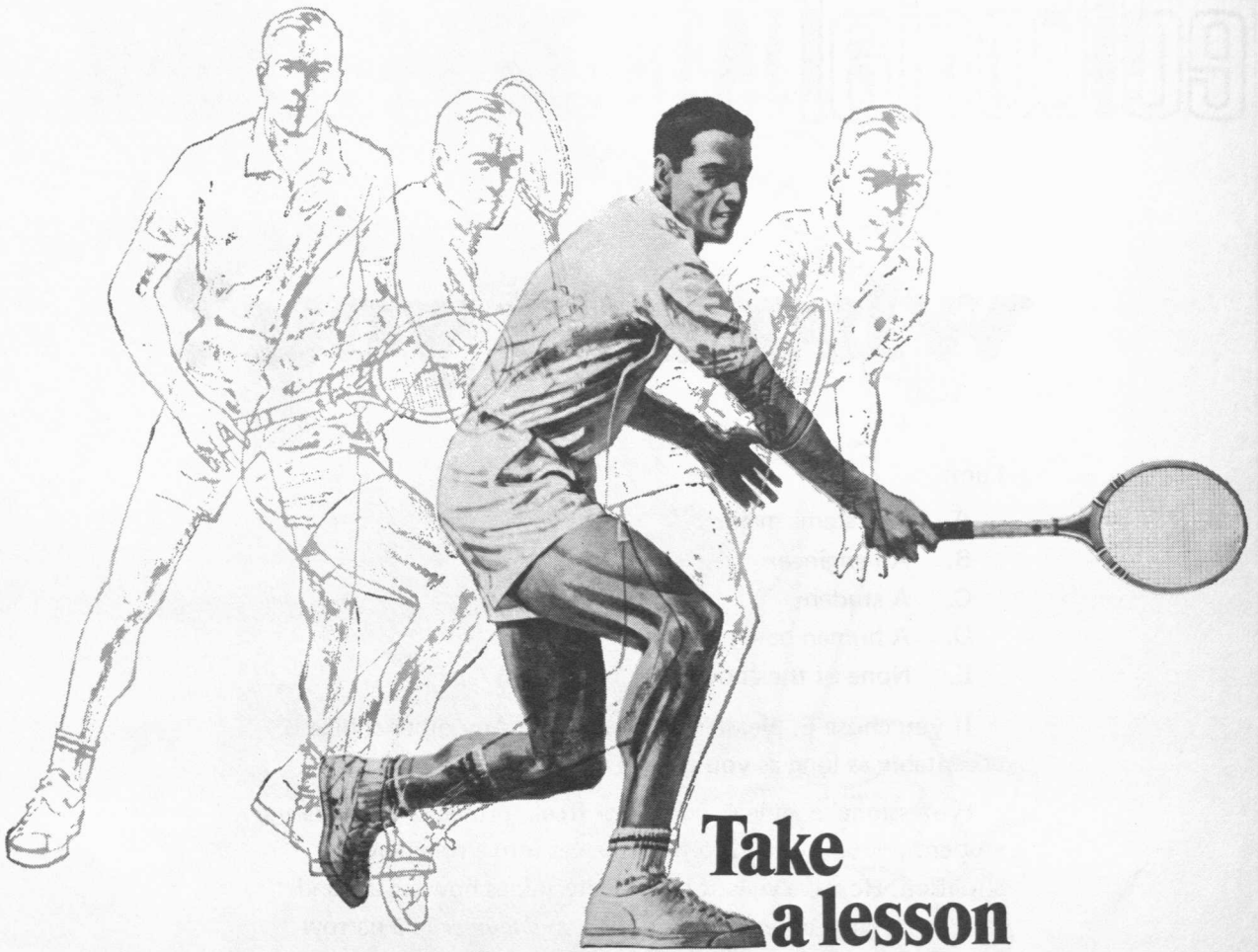
- A. A systems major
- B. An engineer
- C. A student
- D. A human being
- E. None of the above

If you chose E, please read no further. Any other choice is acceptable as long as you chose D. as well.

Professional engineer, computer freak, professor, engineering student . . . we all tend to fit ourselves into a role playing situation. How we view this role determines how we act and think to a large extent. If we define an *engineer* in a narrow stereotype fashion and say, "I am an engineer", we are limiting ourselves needlessly. It is easy for engineering problems to swallow a person whole; therefore, it is important that we view ourselves in a manner which makes this impossible.

The typical stereotype engineer is often seen wearing a slide rule from his belt, jeans and a T-shirt. He can often be heard to say, "Yesturday I couldn't even spell ingunear, but today I am one." Obviously, this is the type of image we must avoid, but finding a good viable image is a much harder task. Above all an engineer must remain human so as not to lose himself and the world while solving its problems, but more is needed. Should we live by the set standards of our profession, or should we live by our own, often more rigorous standards. How should we set our priorities . . . ourselves and families, society as a whole, the good of the corporation, security, getting ahead, etc? How important is our profession to us? These and other questions must be answered if we are to find for ourselves a workable image to live by. Each person alone must answer these questions as well as "Who am I?"

Vince Rybicki



Take a lesson from a tennis pro.

A tennis champion's powerful backhand looks as smooth and unhurried as a ballerina's graceful bow. How's he do it? By being in the right position in plenty of time.

"Remember this about the backhand," the pros advise. "Get both feet around pointing toward the sideline. And always make sure the right foot's forward, so your body doesn't cramp your swing."

Getting into proper position early is good advice for college seniors, too. Here's the first step:

When companies interview on your campus, make sure they interview you. When The Timken Company representative stops by, don't let him go without seeing you.

He'll fill you in on our work (maybe your work) with the aerospace, automotive, construction, chemical industries. Our openings in production, engineering, sales, finance, metallurgy.

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It has been said, "ignorance is bliss," however, ignorance is also dangerous. Many graduating and future engineers are unaware of the myriad of fields stemming from the area in which an engineer degree is obtained. A shrinking job market; an excess of Bachelor-of-Science, degree-holding engineers; and the need for engineering backgrounds in the fields of medicine, law, and ecology — all of these are areas of promise for the interested engineer.

Through engineering technology medicine has witnessed the dawn of a new era unprecedented by any previous one. Engineers have been responsible for the development of pulsers to keep the heart beating, electrocardiographs to record heart action, and the electron-microscope showing parts of the living cell never before seen by man. These, of course, are only a sampling of the developments made in medicine through engineering. Technology in electronics, telemetry, and fluid

mechanics has opened the door to new studies in internal and external organ structure and function; rate of flow of blood in the circulatory system; and development of artificial organ and external organ supporting devices. It is necessary to keep in mind that the engineer is not developing any new technology in his field, but, is a user of technology and is applying it to another field in an adaptable manner.

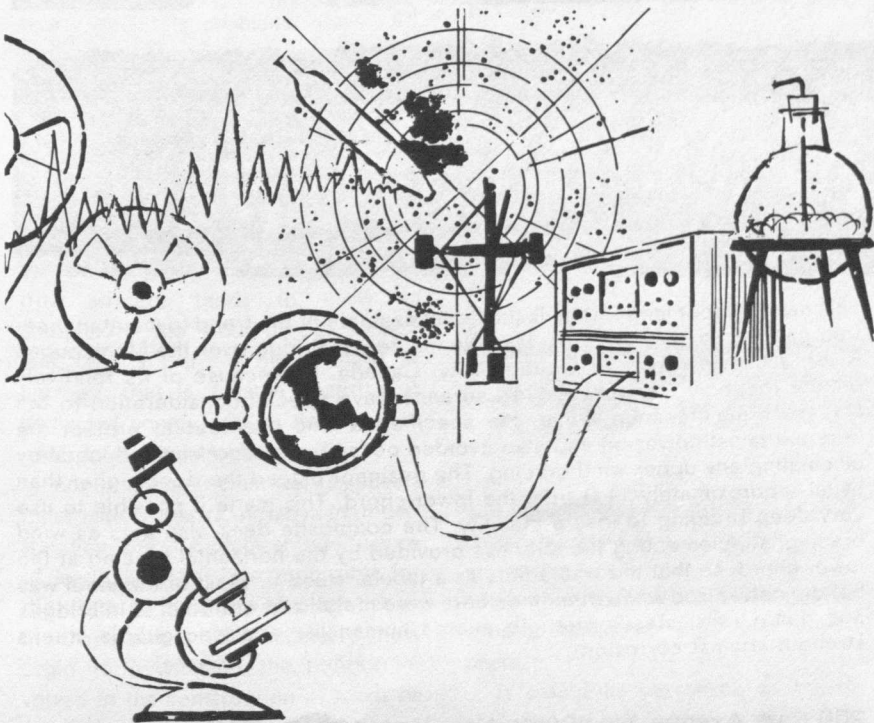
There appears to be one prerequisite for the engineer associated with the medical field. He must be familiar with and understand the function and construction of the portion of the body involved. Therefore, he must either learn about it while applying his technology to it; or as a few farsighted engineers have done, learn about the body before attempting to apply any technology to it. This may entail a full degree in medicine or a few pre-medical courses depending on the individual and his field of work. The engineer having pre-

DO YOU WANT TO BE JUST AN ENGINEER?

vious medical training or in a rare case working in medicine has a definite advantage over an engineer working for a doctor. The medical background of the engineer gives insight into definite medical problems, and he would often see solutions a doctor may not even believe possible. An engineer with a medical background may also have a better chance landing a job with a company which is a manufacturer of medical electronic equipment. Each new piece of equipment manufactured is accompanied by a patent.

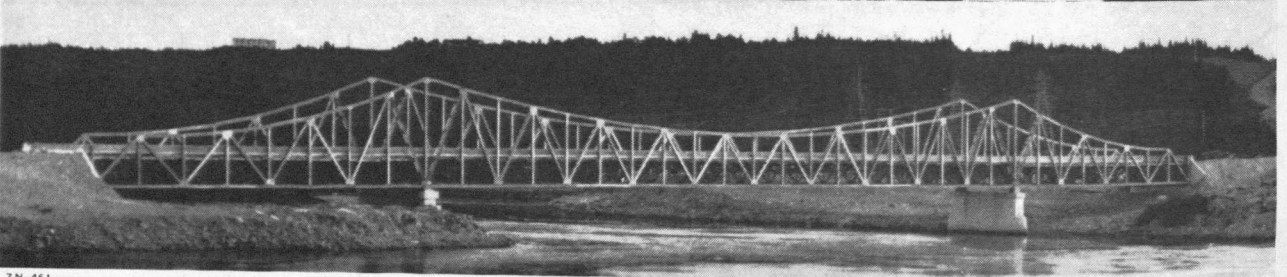
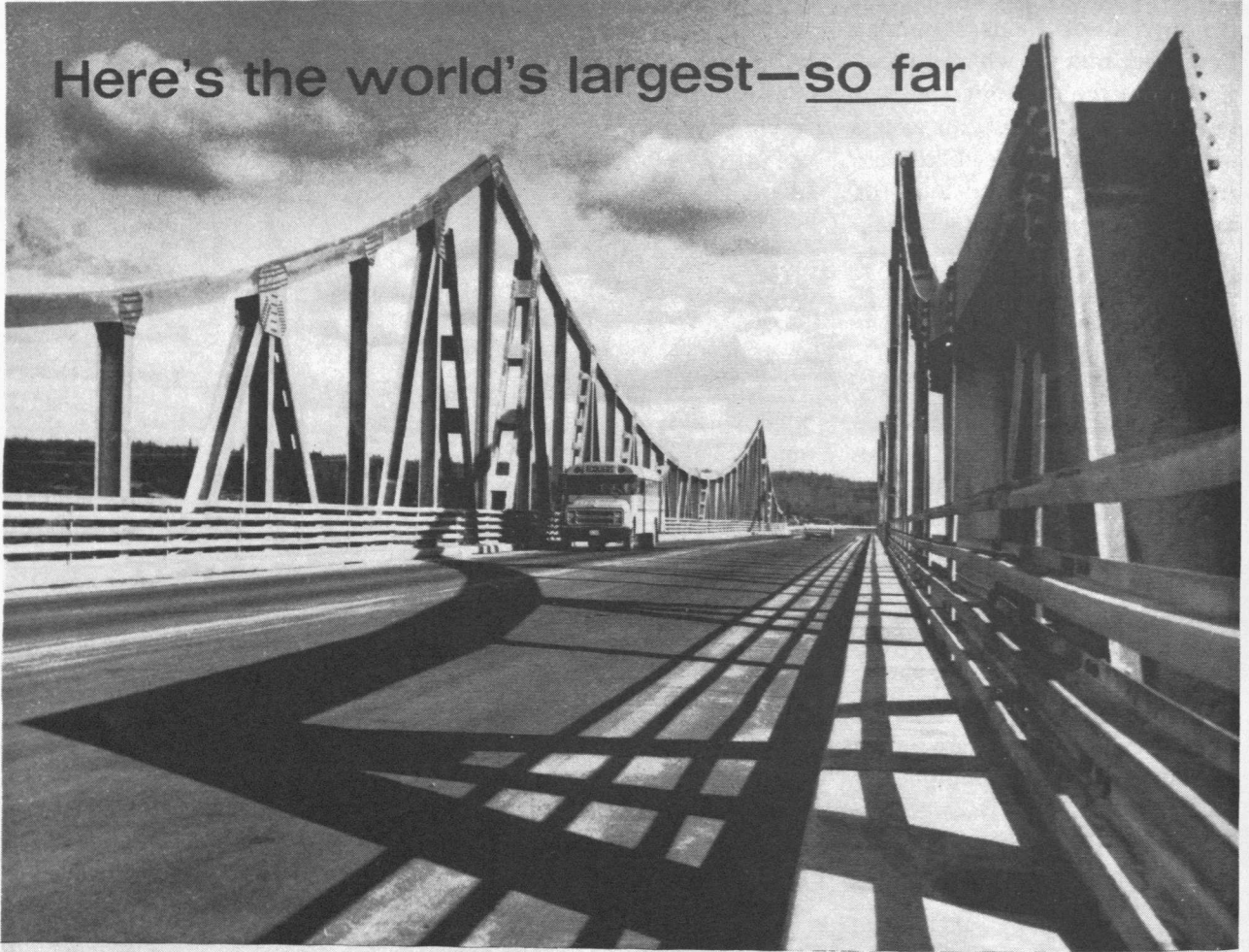
Patent law has been an integral part of United States law since 1790, when Congress enacted the first statute regarding the issuance of patents. Since then many laws have been added to protect patent holders, and aid in the issuing of new patents. Deciding what an invention is and how to resolve cases of dual claim is a problem of increasing difficulty with technology moving at a snowballing rate. There-

continued on page 16



Galvanized Steel Bridges— save the taxpayers dollars—

Here's the world's largest—so far



2N 461

This new 900 foot long bridge is the latest example of the trend to maintenance-free galvanized steel bridges. It is the Hauterive Bridge over the Manicougan River, 250 miles north of Quebec City, Canada. □ Because of its relatively remote location, designer Emile Laurence gave special consideration to the taxpayers maintenance dollar. He specified a zinc overcoat to protect the bridge against corrosion and also avoided possible damage from tall loads by eliminating any upper wind bracing. The designer placed the deck higher than usual—approximately 14 ft from the lower chord. This made it possible to use very deep bridging to insure stability. The composite deck also acts as wind bracing, supplementing the stiffness provided by the horizontal bracing at the lower chord, so that the whole acts as a tubular truss. □ Most of the steel was hot dip galvanized while other members were metallized with zinc. □ In bridges and guard rails, steel's strength guards human life and zinc guards steel's strength against corrosion.

ST. JOE
MINERALS CORPORATION

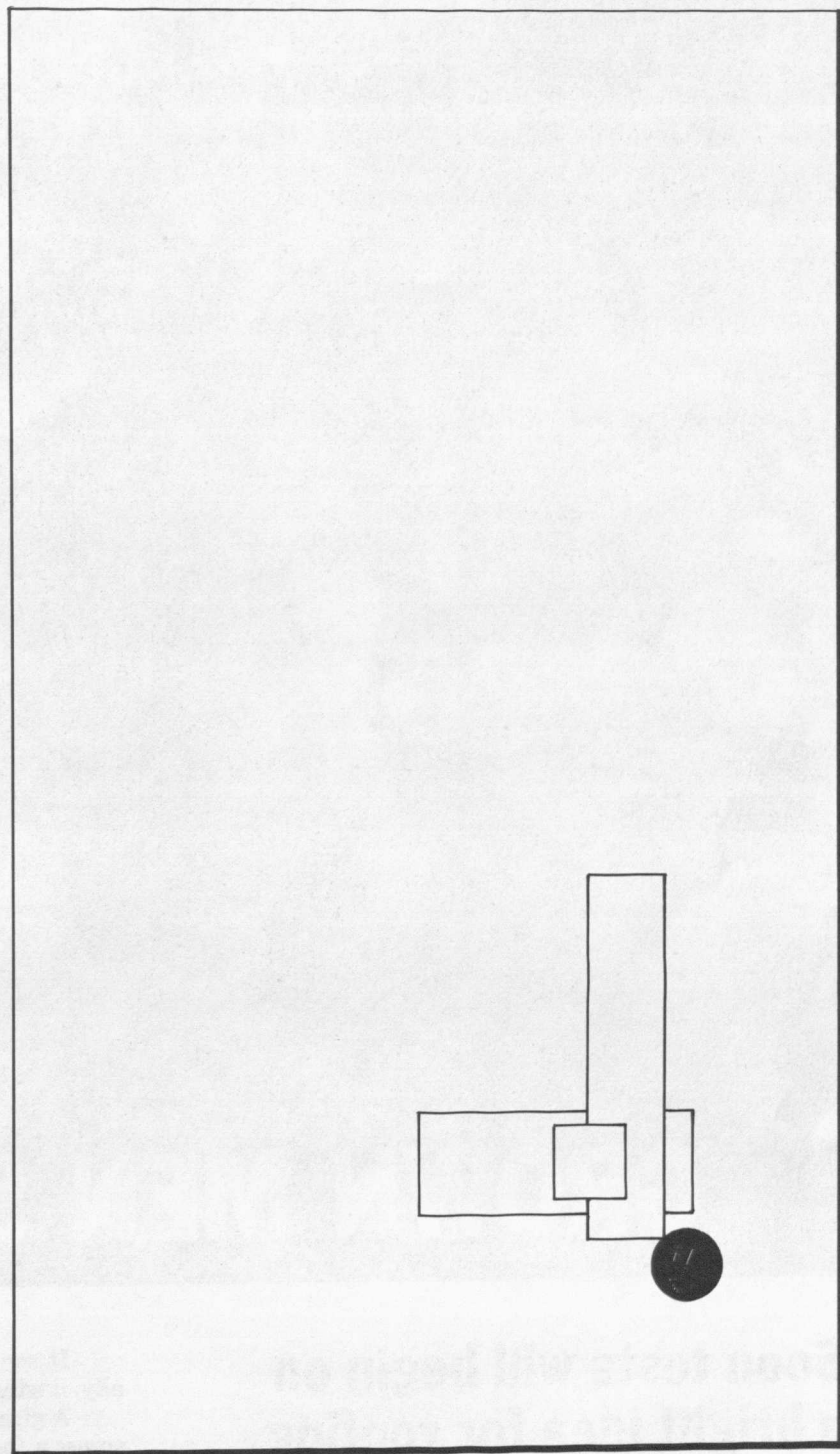
250 Park Avenue, New York, New York 10017, Tel. (212) 986-7474

Social consciousness is developed very early in Black youths out of necessity if he is ever to achieve manhood. The mere fact that he or she is Black and lives in an environment in which institutional racism is an integral part, forces this kind of development. Black people are constantly aware of this cancer of institutional racism that erodes their souls and limits their opportunities from birth to death. They realize that recognition of the existence of cancer is the first step toward treatment of the cancer. The mere fact that they are enrolled in an *educational institution* will not immunize them from the cancer of *institutional racism*. If they fail to recognize the existence of this cancer, they will be drawn into and will become an integral part of that disease.

The Black engineer must maintain his social consciousness in order to survive. He is forced to recognize the political and social implication of his action as an immunity against the cancer of *institutional racism*.

It should be obvious by now, why the Black engineer has maintained his *social consciousness*. Yet, it would be unfair and unrealistic to expect him to tackle society's problems alone. All engineers, electrical, chemical, industrial, mechanical, etc., must begin to understand the importance of developing a social consciousness. Some engineers may question the need to develop this consciousness, yet one would have to be blind in order not to see the symptoms of a sick society. As our society tends to grow in complexity the state of our society will tend toward a higher state of entropy; that is, a large quantity of dedicated energy will be necessary in order to maintain social stability.

For example, chemical engineers must take the extra initiative in understanding the sociological significance of lead paint, which is responsible for the death of hundreds of Black babies in urban areas. Civil engineers must begin to understand the politics involved in the construction of roads or urban housing. Mechanical engineers



A QUEST FOR SOCIAL CONSCIOUSNESS

(A BLACK PERSPECTIVE)

will have to take the extra initiative to design bumpers that will not crumble on impact, at 5 m.p.h., or take the extra time to study the problem of exhaust emissions into our atmosphere.

It would be unrealistic to expect engineers to suffer from *metaphysical*

guilt for the injustices that have been perpetrated against mankind, but we must recognize the fact that they in general are not immune to the *ills of society* — The same cancer that is eroding the soul of the Black engineer may be eroding yours. THINK ABOUT IT!!





GROWN MEN SHOULDN'T

Soon tests will begin on a bright idea for roofing stadiums with stainless steel balloons. And nickel's helping make it happen.

It sounds like something out of Jules Verne. Actually, it's fresh out of our advanced design studies.

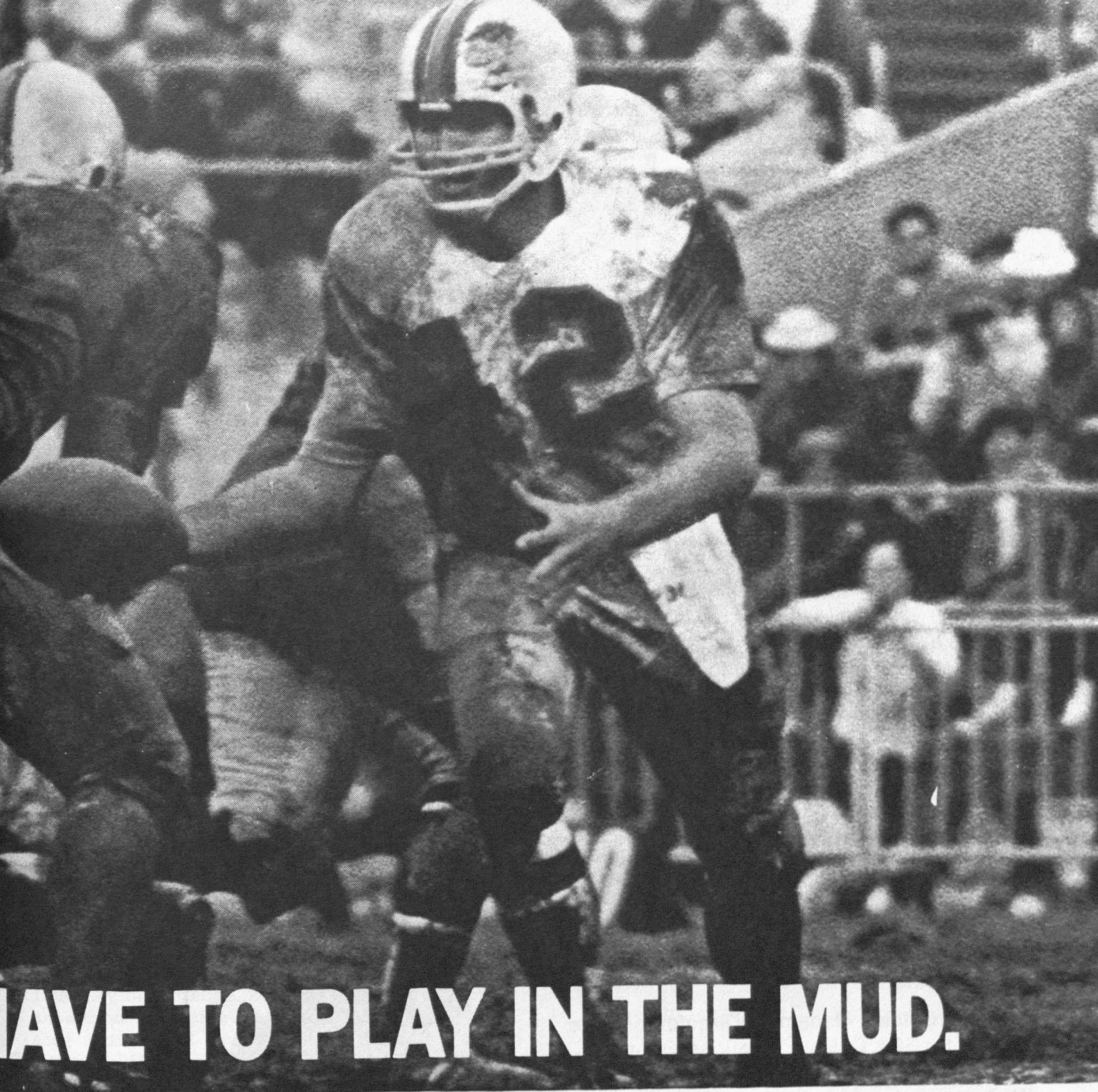
A gigantic, *inflatable* metal lid that can be stretched across a football stadium without any pillars or posts of any kind.

The idea is so mind-boggling that most people have a hard time visualizing it.

Think of a pie that's hollow inside, with the bottom and the top made of a metal skin only 1/16th of an inch thick. When the air is pumped into the pie, the whole thing gets so rigid it can be jacked up into place over the field and never even flutter during a windstorm.

The weather stays outside, the players don't slide around on their backsides, and the spectators don't drown. Somehow, the whole thing seems a little more civilized than a public mud bath.

And the cost could be as little as 1/3 of a conventional trussed roof.



HAVE TO PLAY IN THE MUD.

The metal is nickel stainless steel. The nickel is added to make the skin easier to work, and to give it the necessary toughness and strength. Plus corrosion resistance.

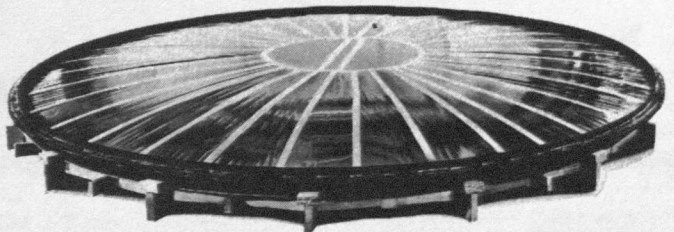
It's a fascinating idea, this revolutionary roof of nickel stainless steel. Scale models are about to be thoroughly tested. But the point of the story is this. Just as our metal helps, one that makes other metals stronger, or easier to work with, or longer lasting, so International Nickel is a helper.

We assist dozens of different industries all over the world in the use of metals. We offer technical information and the benefit of our experience. Often, Inco metallurgists are able to anticipate alloys that will be needed in the future, and to set about creating them. Sometimes, we come up with whole new concepts—like a stainless steel balloon for a stadium roof.

This kind of genuine helpfulness, we figure, will en-

courage our customers to keep coming back to us. And that helps all around.

The International Nickel Company, Inc., New York, N.Y. The International Nickel Company of Canada, Limited, Toronto. International Nickel Limited, London, England.



Model test roof of nickel stainless steel.

INTERNATIONAL NICKEL HELPS

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The technological potential of the future seems to frighten some people.

But not you!

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These problems and how well we solve them will determine the future well-being of all mankind.

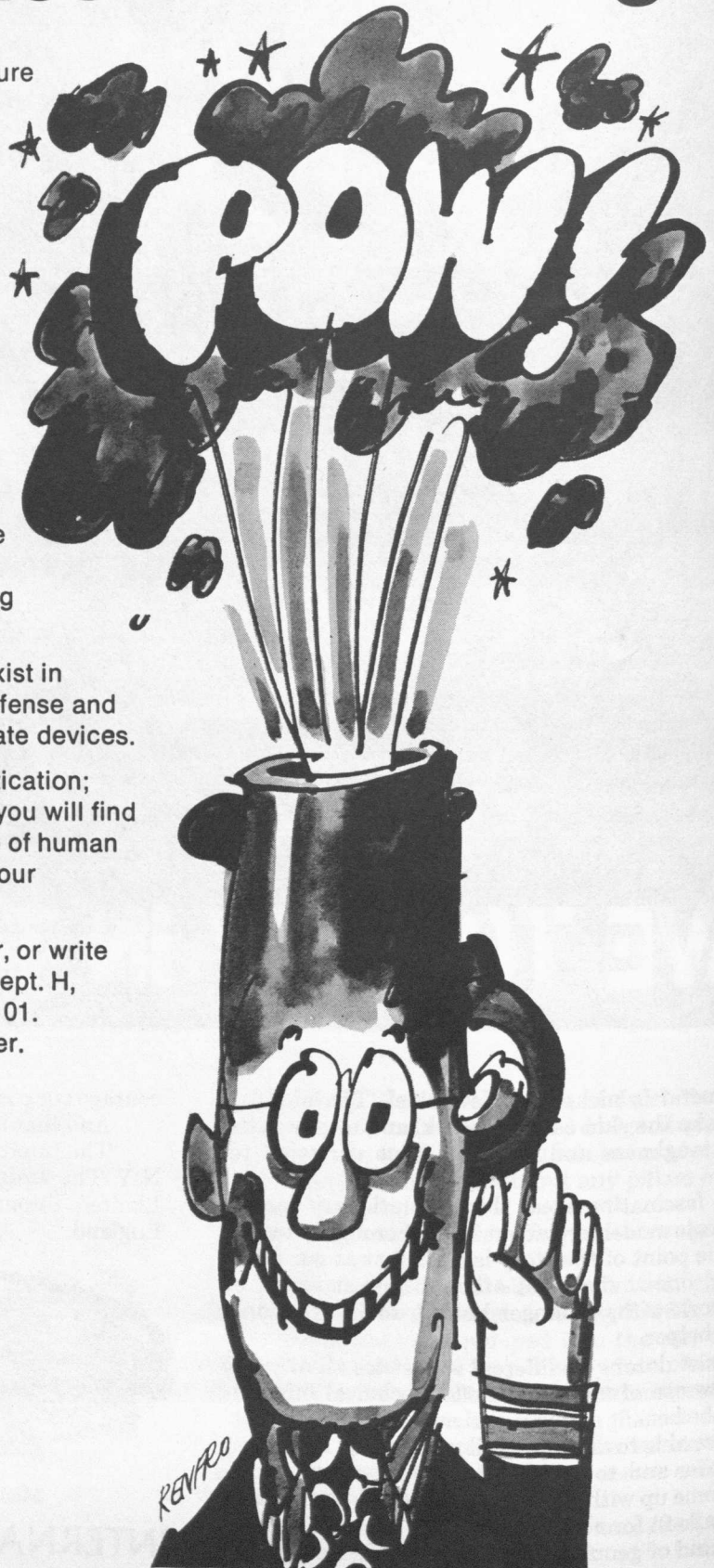
At RCA, you can start your career in one of our Rotational Programs, to give you a wide overview of our activities, or direct assignment in one of the following degree areas: Electronic or Mechanical Engineering or Computer Science.

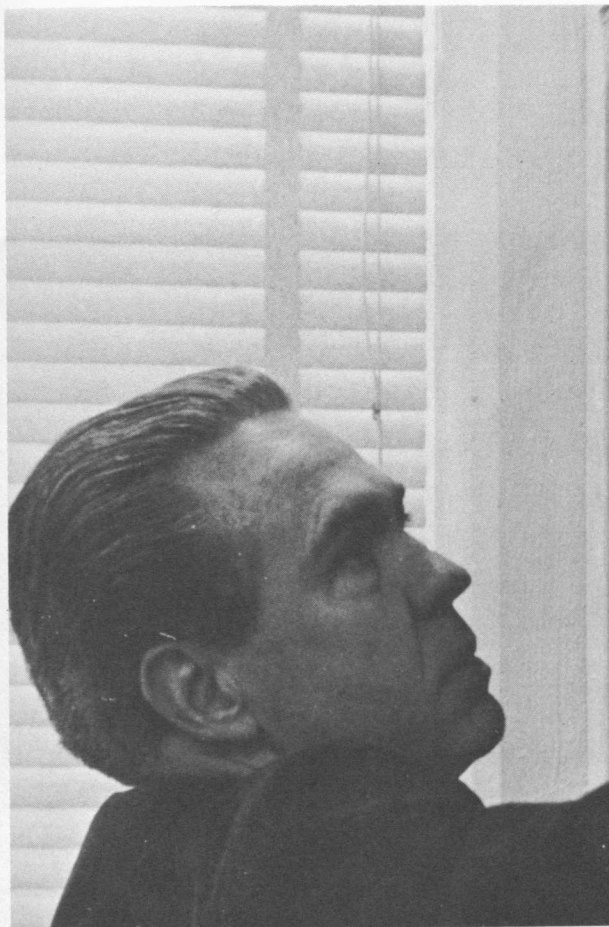
Design and development openings exist in computer hardware and software, defense and commercial electronics and solid-state devices.

Aside from our technological sophistication; we are a diverse corporation, where you will find yourself working with a unique group of human beings who are deeply involved with our future welfare.

See your College Placement Director, or write directly to: RCA College Relations, Dept. H, Cherry Hill, Camden, New Jersey 08101. We are an equal opportunity employer.

RCA





Professors' Profiles

Dr. TRIFFET

I went in with a few prepared questions, but I emerged with a greater reward than just a few questions answered. Dr. Triffet is one of the more interesting people to talk to. He received a degree in history, philosophy, and mathematics from the University of Oklahoma, only to find an interest in engineering which he soon undertook at the University of Colorado. He received a doctorate from Stanford while working in rocketry and industrial research.

When I asked which he enjoyed more, teaching or research in industry, he replied, "I like neither better than the other. The latter offers excitement and pays better, but there is little continuity; whereas teaching gives you a chance to work with young people, and acquire deeper knowledge, but may be lacking in realism." He also showed a remarkable interest in student problems, which I, having been a former member of the engineering college, found hard to believe.

Staying on the subject of teaching, I asked about the interactions between the faculty and the student and the latter's drive for professionalism. He answered, "Closer relations are needed, but there has been a vast

change for the better in the college over the last few years. Also I hope for more interchange between the College of Engineering and the rest of the University." It would seem his degree in humanities had a broadening effect on his outlook.

Dr. Triffet remarked as to how creative design had been neglected in the college and how it should deal more in applied science than in pure science. He also voiced an opinion that engineering students need more background in the business-based areas affecting an engineer's practice.

"The engineer is a synthesizer of knowledge, and the more up-to-date and diversified his knowledge, the better his decisions will be."

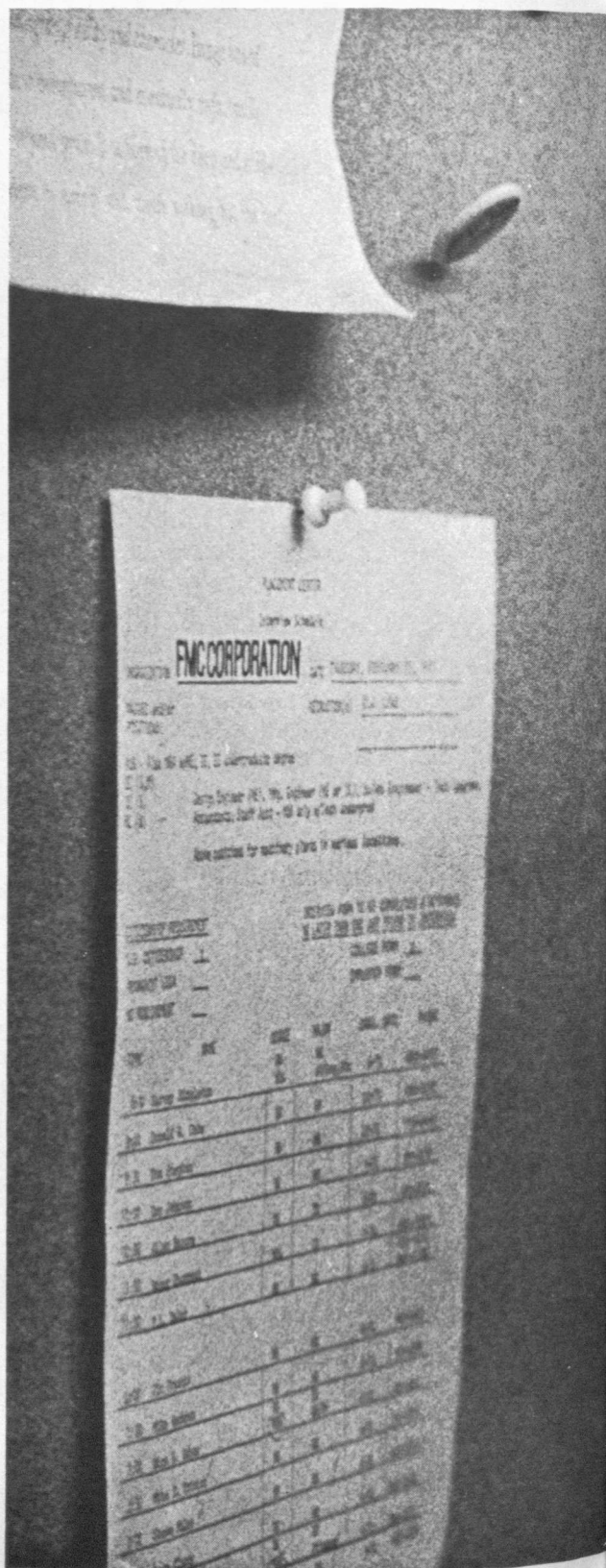
Back to the issue of professionalism in engineering, he had this to say, "Responsibility is part of it, both to society and to your client. But also personal integrity, to say and do what you think is right regardless of the outcome, providing you remain on guard against wrong ideas and try not to destroy good new ones. Realistic idealism is about the right attitude."

Not wanting to change the topic a great deal, I asked him what is the engineer's responsibility to society on

the pollution question. "He can and should help more than anyone to solve the problem; eventually more than words will be needed. Engineers should always participate in developments to help guide them in the best direction."

So I spoke of defense monies and how they should be reappropriated to the fight against pollution and the next ten minutes of conversation was unexpected. "Yes, federal money should be divided so as to help the people first, but they also need to be defended. The engineer needs to help with both efforts. He also needs to work against what he knows is wrong, but to do it within the system." Will this work? "The trial of Calley proved it will. What other nation has ever tried one of its own soldiers for brutality in war time? No other country ever even tried to get rid of slavery. And what we do, we do in the open — on television. The future of America has brightened in the last five years, we are growing again. As far as foreign relations go; a handful of kids can accomplish more than a whole army of soldiers."

Don't let our name confuse you.





On some campus in the U.S. this year a well-intentioned interviewee is going to confuse us with the Foremost Machine Company or some other FMC.

We'll understand.

Having only letters for a name might be sophisticated in some circles.

But sometimes it's just plain hard to remember.

Perhaps we should explain how it came about.

FMC doesn't mean Ford or Foremost or anything else but FMC. Way back long ago it used to mean Food Machinery Company. And later on, it stood for Food Machinery and Chemicals.

But 10 years ago because we'd become so diversified, we dropped the name, although for obvious reasons we kept the initials.

It makes sense. We became the nation's largest producers of rayon. We built Deep Dive for the navy's underwater salvage teams. And we continue to turn out such diversities as railroad cars, printing presses, cranes, barges, compact tractors, automated food plants, and dozens of industrial chemicals. The list goes on and on.

Most of what we produce never gets seen by the public, so our name is seldom visible. Worse, it sometimes gets confused.

So remember: FMC means FMC. If that still doesn't do it for you, write us at Box 760, San Jose, California 95106 for our free brochure "Careers with FMC." Or see your placement director for an interview. We're an equal opportunity employer.



FMC CORPORATION
Remember us by our initials.

"I can do my kind of work here...there's always a lot of variety."

Bob Sedgewick, Western Electric.

And his achievements that first year at Western Electric are proof.

Bob's major project involved the use of the computer to develop ways of producing integrated circuit masks for the future with even smaller features than those used today.

He also worked out a job-shop scheduling program that uses computer graphics, a two-dimensional representation of computer data. This may well replace the traditional push-pin type of wall chart method for analysis of job operation.

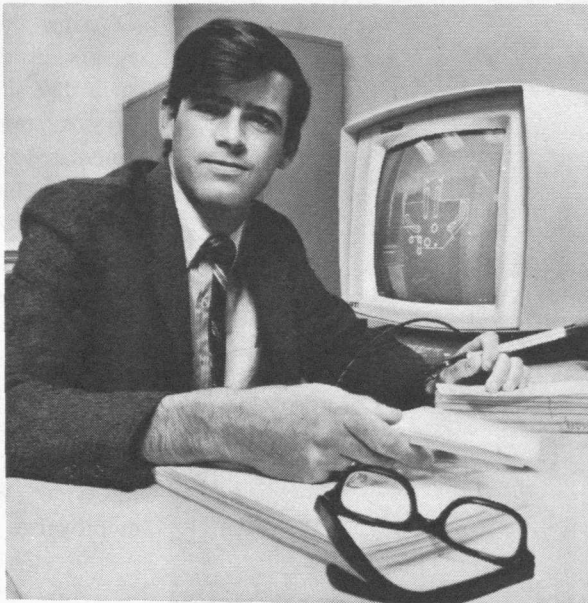
Another contribution during that first year was his work evaluating computer performance. This involves communication between computers, where a small computer extracts information from a big one. The goal of this

project was to optimize computer operation.

It was this project which led to the development of a paper on evaluating computer performance which Bob presented at the Fall Joint Computer Conference in Houston, Texas. His paper won the respect of his peers and was reviewed by a computer trade journal.

We hired Bob right after he was graduated from Brown. Now, two years later, with one more degree and a full year on the job behind him, Bob is taking advantage of our tuition refund program—this time studying part-time for his Ph.D. at Columbia.

How does Bob feel about his career at Western Electric? "There's a lot of freedom here," said Bob. "I don't know where else I could have done as much in so short a time."



Western Electric

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Code of Ethics



For Engineers

Preamble

The engineer, to uphold and advance the honor and dignity of the engineering profession and in keeping with high standards of ethical conduct:

Will be honest and impartial, and will serve with devotion his employer, his clients, and the public;

Will strive to increase the competence and prestige of the engineering profession;

Will use his knowledge and skill for the advancement of human welfare.

Section 1 — The engineer will be guided in all his professional relations by the highest standards of integrity, and will act in professional matters for each client or employer as a faithful agent or trustee.

Section 2 — The engineer will have proper regard for the safety, health, and welfare of the public in the performance of his professional duties. If his engineering judgment is overruled by nontechnical authority, he will clearly point out the consequences. He will notify the proper authority of any observed condition which endanger public safety and health.

Section 3 — The engineer will not advertise his work or merit in a self-laudatory manner, and will avoid all conduct or practice likely to discredit or unfavorably reflect upon the dignity or honor of the profession.

Section 4 — The engineer will endeavor to extend public knowledge and appreciation of engineering and its achievements and to protect the en-

gineering profession from misrepresentation and misunderstanding.

Section 5 — The engineer will express an opinion of an engineering subject only when founded on adequate knowledge and honest conviction.

Section 6 — The engineer will undertake engineering assignments for which he will be responsible only when qualified by training or experience; and he will engage, or advise engaging, experts and specialists whenever the client's or employer's interests are best served by such service.

Section 7 — The engineer will not disclose confidential information concerning the business affairs or technical processes of any present or former client or employer without his consent.

Section 8 — The engineer will endeavor to avoid a conflict of interest with his employer or client, but when unavoidable, the engineer shall fully disclose the circumstances to his employer or client.

Section 9 — The engineer will uphold the principle of appropriate and adequate compensation for those engaged in engineering work.

Section 10 — The engineer will not accept compensation, financial or otherwise, from more than one interested party for the same service, or for services pertaining to the same work, unless there is full disclosure to and consent of all interested parties.

Section 11 — The engineer will not compete unfairly with another

engineer by attempting to obtain employment or advancement or professional engagements by competitive bidding, by taking advantage of a salaried position, by criticizing other engineers, or by other improper or questionable methods.

Section 12 — The engineer will not attempt to injure, maliciously or falsely, directly or indirectly, the professional reputation, prospects or practice of another engineer, nor will he indiscriminately criticize another engineer's work in public. If he has knowledge that another engineer is guilty of unethical or illegal practice, he shall present such information to the proper authority for action.

Section 13 — The engineer will not associate with or allow the use of his name by an enterprise of questionable character, nor will he become professionally associated with engineers who do not conform to ethical practices, or with persons not legally qualified to render the professional services for which the association is intended.

Section 14 — The engineer will give credit for engineering work to those to whom credit is due, and will recognize the proprietary interests of others.

Section 15 — The engineer will cooperate in extending the effectiveness of the profession by interchanging information and experience with other engineers and students, and will endeavor to provide opportunity for the professional development and advancement of engineers under his supervision. □

ENGINEERS

What's the German name for bra? Der Holdenfromflop! The engineering name? A device used to minimize the flutter and vibration, compensating for pitch and gyration.

SE

Professor: "A fool can ask more questions that a wise man can answer."

E.E.: "No wonder so many students fail your exams."

SE

Strange but true: Even if the world was round, people would still be falling off the edge.

Engineers, don't worry about what you do in life. God grades on a curve.

SE

A recent doctors report stated emphatically that Moby Dick is not a social disease, however, the research on Grape Nuts is still not conclusive.

SE

Two young engineers were sitting in a bar. One noticed a young lady at the other end of the bar and turned to his companion: "Say, is that Hortense?" "I don't know," shrugged his friend, "she looks relaxed to me."

Overheard in the Brody cafeteria: "Ma Brody may not be the galloping gourmet, but she sure does give you the trots."

SE

Question: How does an MSU engineer propose marriage?

Answer: You're gonna have a what?

SE

A young girl with adventure in her soul joined a circus. Anxious to do everything right, she asked her employer for a few tips. "I don't want to make a lot of beginner's mistakes," she said. "Well, for one thing," replied the manager, "don't ever undress around the bearded lady."

DO YOU WANT, continued from page 5

fore, engineers are frequently being called upon to prove or disprove some aspect of a pending patent, and large corporations are staffing their law departments with lawyers having an engineering background — needless to say, there are few of these men. A typical case may be to prove one company's process for producing steel, although similar to another company's, is unique. The case may require consultation with chemists, metallurgists, and mechanical engineers. Chicago Steel Foundry versus Burnside Steel Foundry was similar to the previous case. The case of Marconi Wireless Telegraph Company versus DeForest Radio Telephone and Telegraph Company was one requiring electrical engineering background in determining who

was the original circuit designer.

There are also many engineers working in the United States Patent Office trying to determine the validity of one patent in relationship to another. The government has also been using civil and chemical engineers lately in an effort to slow down the destruction of our environment by pollution of the air and water.

Today, Ecology is the fastest growing field in which engineering technology is being applied. Sewage disposal plants are a must in large cities dumping waste into the water, and will become a must for all waterside cities in the future. Treatment of chemical waste to reuse the waste or make it harmless to the environment is becoming a large part of plant planning. However, one need only drive through Gary,

Indiana, Wyandotte and River Rouge, Michigan, just mentioning a few places, to see how much needs to be done. Air pollution has caused physical harm to individuals living in areas with a high concentration of solid particles in the air. Effective processes for extracting the mainly carbon solids from exhaust of factories have yet to be developed, while attempts such as the catalytic air burner have been able to curtail some air pollution. Finally, noise pollution is being attacked by the commercial aircraft industry with the design of the whisper-jet.

Although these are only a few of the many fields open to aspiring engineers, they hold a wealth of knowledge and possible progress through engineering technology. □

Calling us just a telephone company is like calling Leonardo DaVinci just a painter.



Leonardo's parachute.

General Telephone & Electronics is involved in domestic and international telecommunications... home entertainment... every type of home and industrial lighting... computer software systems... and all phases of advance research.

But please don't get us wrong. We started

in the telephone business. We grew up in the telephone business. And we're still very much in it.

So we don't really mind your referring to us as just a phone company.

It simply serves to remind us of how far we have come.



GENERAL TELEPHONE & ELECTRONICS

On your way up in engineering, please take the world with you.

The best engineers are far from happy with the world the way it is.

The way it is, kids choke on polluted air. Streets are jammed by cars with no place to go. Lakes and rivers are a common dumping ground for debris of all kinds.

But that's not the way it has to be.

Air pollution can be controlled. Better transportation systems can be devised. There can be an almost unlimited supply of clean water.

The key is technology. Technology and the engineers who can make it work.

Engineers at General Electric are already working on these problems. And on other problems that need to be solved. Disease. Hunger in the world. Crime in the streets.

General Electric engineers don't look for overnight solutions. Because there aren't any. But with their training and with their imagination, they're making steady progress.

Maybe you'd like to help. Are you the kind of engineer who can grow in his job to make major contributions? The kind of engineer who can look beyond his immediate horizons? Who can look at what's wrong with the world and see ways to correct it?

If you are, General Electric needs you.
The world needs you.

GENERAL  ELECTRIC

An equal opportunity employer