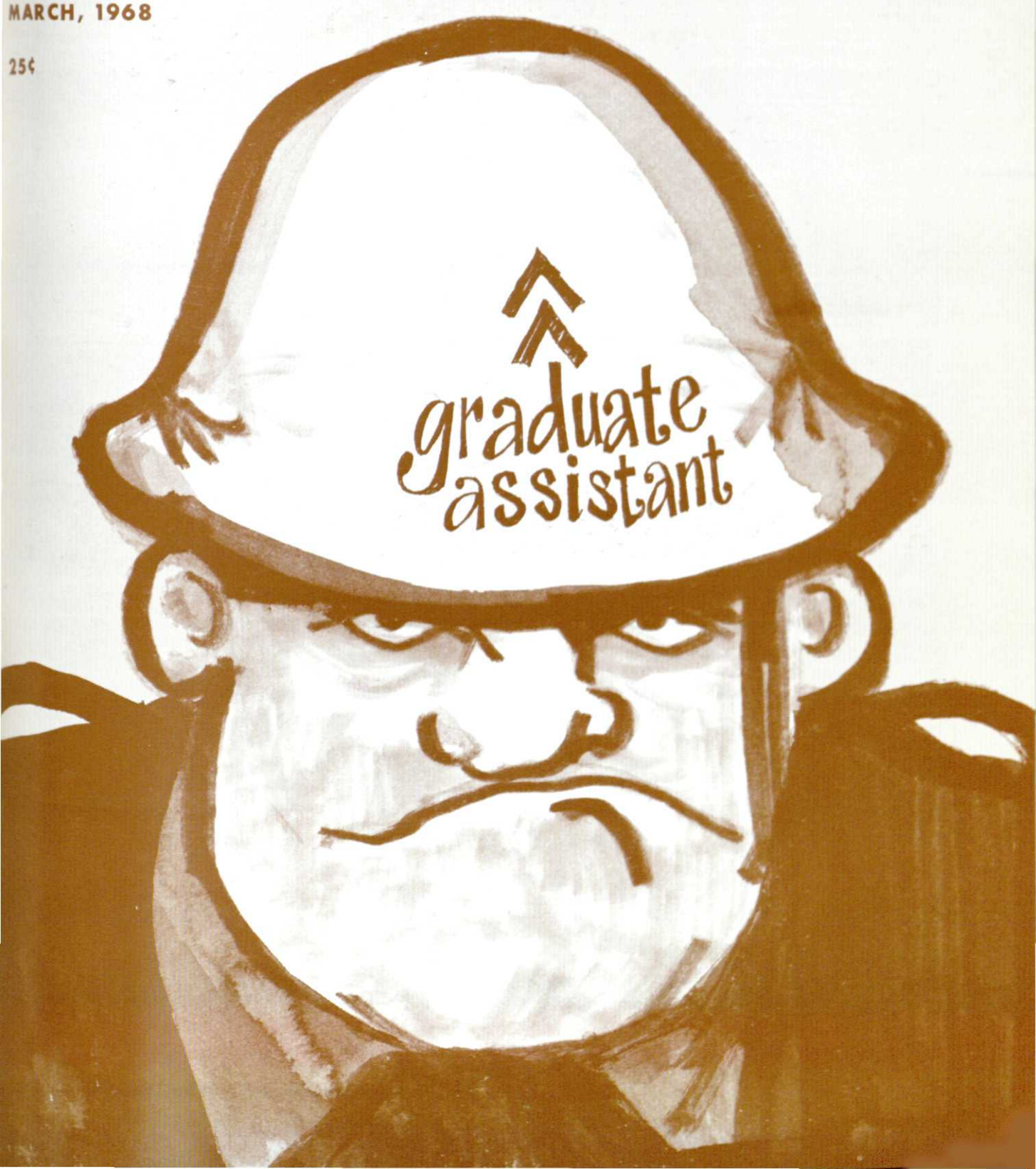
SPARTAN ENGINEER

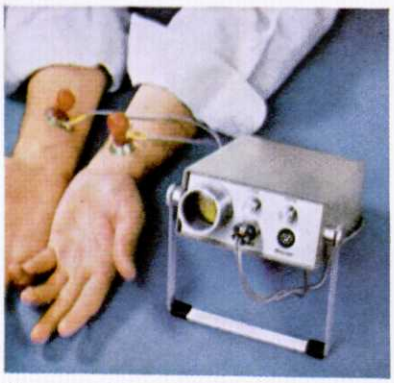
MARCH, 1968

25¢



Jobs that just might change the world.

Save lives with the company whose portable EKG Miniscope goes to the scene of a heart emergency, saves hours when seconds are precious. We need more people to help us develop sophisticated medical equipment ranging from devices that automatically monitor a patient's condition to ultrasonic cleaners.



These graduates needed: Electrical Engineering, Mechanical Engineering, Physical Sciences, Business & Management Sciences.

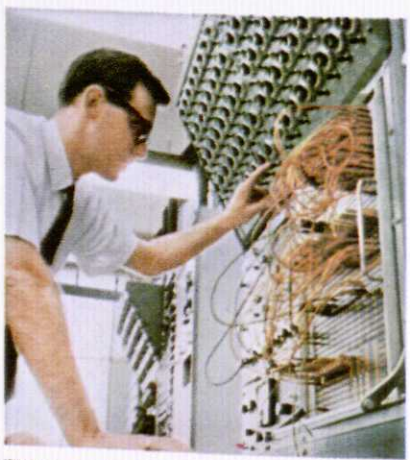
Teach kids who must learn five times as much as kids did forty years ago. Westinghouse has just created a new company to explore teaching problems, devise new methods, machines and systems to help students learn more than students ever learned before—and learn it better. We want the brightest people around—and even for them it won't be easy.

These graduates needed: Electrical Engineering, Industrial Management, Computer Sciences, Social Sciences, Mathematics, Educational Psychology.

Join the underground movement and help beautify America. Westinghouse underground distribution equipment in places like Seattle and Dallas has put wires out of sight so people can enjoy the scenery again. Westinghouse is working on ideas that will change the face of the American City. We're after a pretty special kind of person to help us.

These graduates needed: Physical Sciences, Electrical Engineering, Mechanical Engineering, Civil Engineering & Industrial Engineering.

Work with computers with the company that automates industry's most complicated processes. Westinghouse Prodac computer control can start, stop, track, control things in steel mills and complete chemical plants. Now Westinghouse is being asked to tackle more of the critical processes in industry. We're looking for the most creative tacklers we can find.

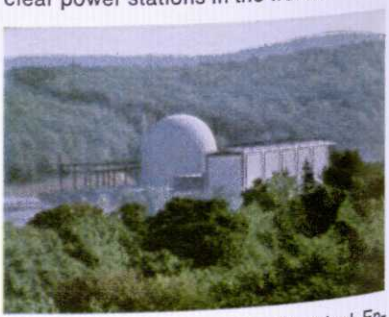


These graduates needed: Industrial Management, Computer Sciences, Electrical Engineering, Mechanical Engineering, Industrial Engineering, Business & Liberal Arts.

Explore the ocean floor with the company that's going down to 20,000 feet. The latest addition to Westinghouse's fleet of submersibles is a vehicle that will help us dive deeper and probably discover more than any other company in oceanography. We'd like to discover talented people who want to come along.

These graduates needed: Electrical Engineering, Mechanical Engineering, Chemical Engineering, Materials Science, Marine Engineering, Ocean Engineering & Science.

Clean up the air with the company that is taking the fumes out of power generation. Westinghouse built the first nuclear generating plant. We need more people to help us fight air pollution by building the largest, most advanced nuclear power stations in the world.



These graduates needed: Electrical Engineering, Mechanical Engineering, Industrial Engineering, Industrial Technology, Chemical Engineering, Civil Engineering.

Want to change the world? Your best opportunity lies with a company like Westinghouse. Contact L. H. Noggle, Westinghouse Education Center, Pittsburgh, Pa. 15221—or see the Westinghouse interviewer on your campus.

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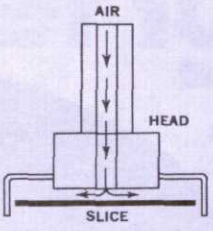
How Western Electric gets uplift from a downdraft



Picking something up by blowing a stream of air down on it may seem rather roundabout. But if you want to pick that something up without touching it, it turns out to be a most successful way.

The something in question is a paper-thin, eggshell-fragile slice of silicon destined for transistors. To touch it is likely to contaminate it, and probably to break it. Tweezers are extremely risky. Even a vacuum pickup is dangerous.

And so the engineers at Western Electric's Engineering Research Center invoked the Bernoulli principle and solved the problem. They developed a pickup device that directs a thin stream of air down onto the slice. The air flows out across the slice and since it is moving and the air below the slice is not, the pressure below is greater than the pressure above and the slice floats. And it doesn't touch the head because the air is, after all, blowing down. Wire guides keep the slice from slipping off.

So now the workers in our transistor plants can pick up silicon slices handily, without worrying about breaking or contaminating them. That our engineers reached back to a classical principle of physics to help them do it only shows the extent of the ingenuity Western Electric applies in its job of manufacturing communications equipment for the Bell System.

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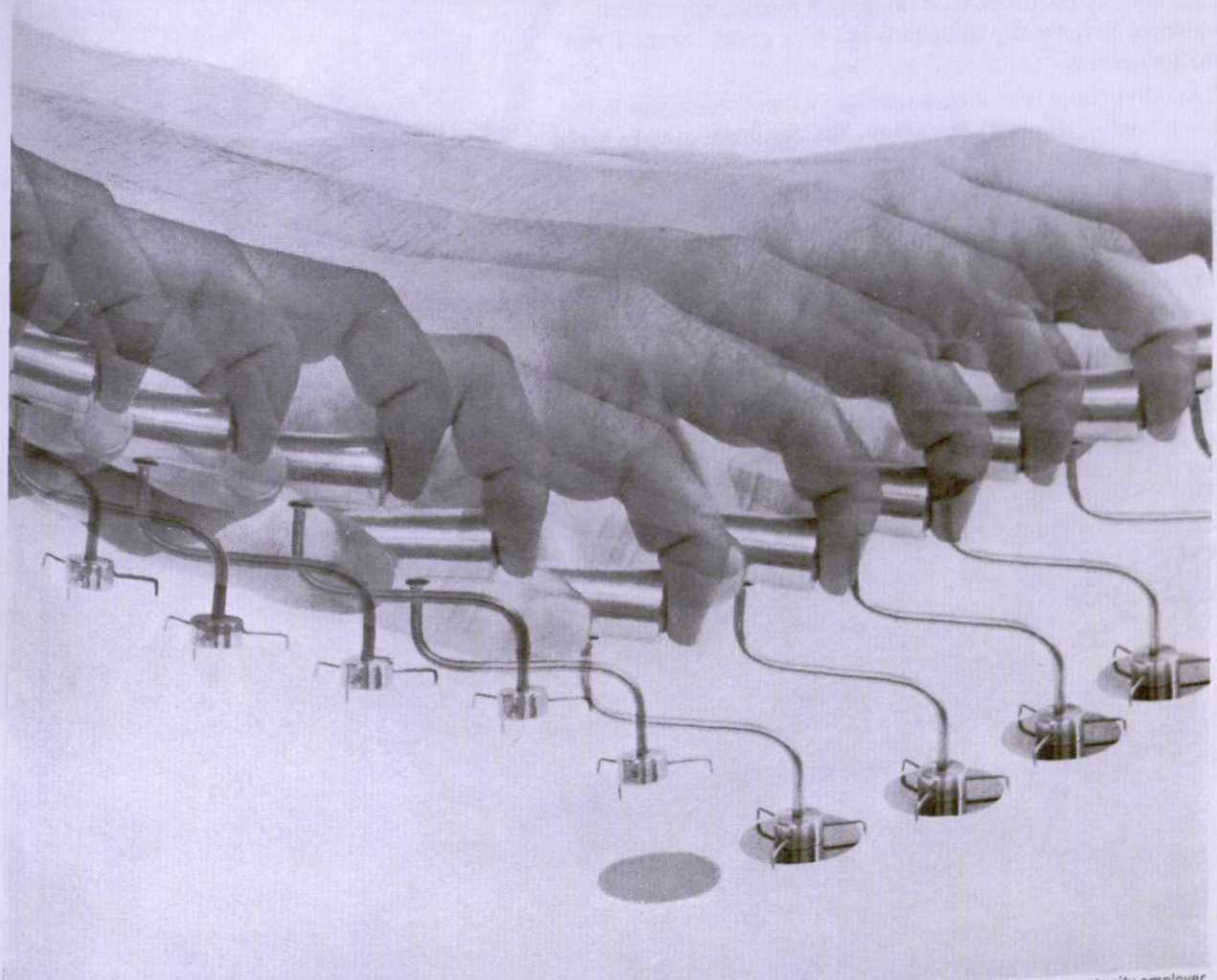

For more information write to: Manager of College Relations, Western Electric Co., Room 2510A, 222 Broadway, New York, N.Y. 10038. An equal opportunity employer.

"What I like about IBM is the autonomy. I run my department pretty much as though it were my own business."

"Tell some people you work for a big company, and right away they picture rows of gray steel desks with everybody wearing identical neckties.

"Well, that's the stereotype. When you look at the reality, things are a lot different. (This is Gene Hodge, B.S.E.E., an IBM Manager in Development Engineering.)

"IBM has over 300 locations. They believe in decentralization, and they delegate the authority to go with it. To me, it's more like a lot of little companies than one big one.

"Take my own situation, for example. I act as a kind of entrepreneur for my department. I decide if we should bid on certain government contracts for my group and then develop the proposal strategy. Of course, upper management reviews my decisions, but to a great extent I run my own show.

"Another thing that makes this like a small company is the close relationship with your boss. You're almost always hired by the manager you're going to report to. And you work for him on your own or in a small team. It's part of his job to know your long term goals and help you reach them.

"This same interest in the individual also shows up in IBM's educational programs. I'm getting my Master's now, and IBM's paying the entire cost, and some of the class time is on company time."

Gene's comments cover only a small part of the IBM story. For more facts, visit your campus placement office. Or send an outline of your career interests and educational background to I. C. Pfeiffer, IBM Corp., Dept. E, 100 S. Wacker Dr., Chicago, Illinois 60606. We're an equal opportunity employer.

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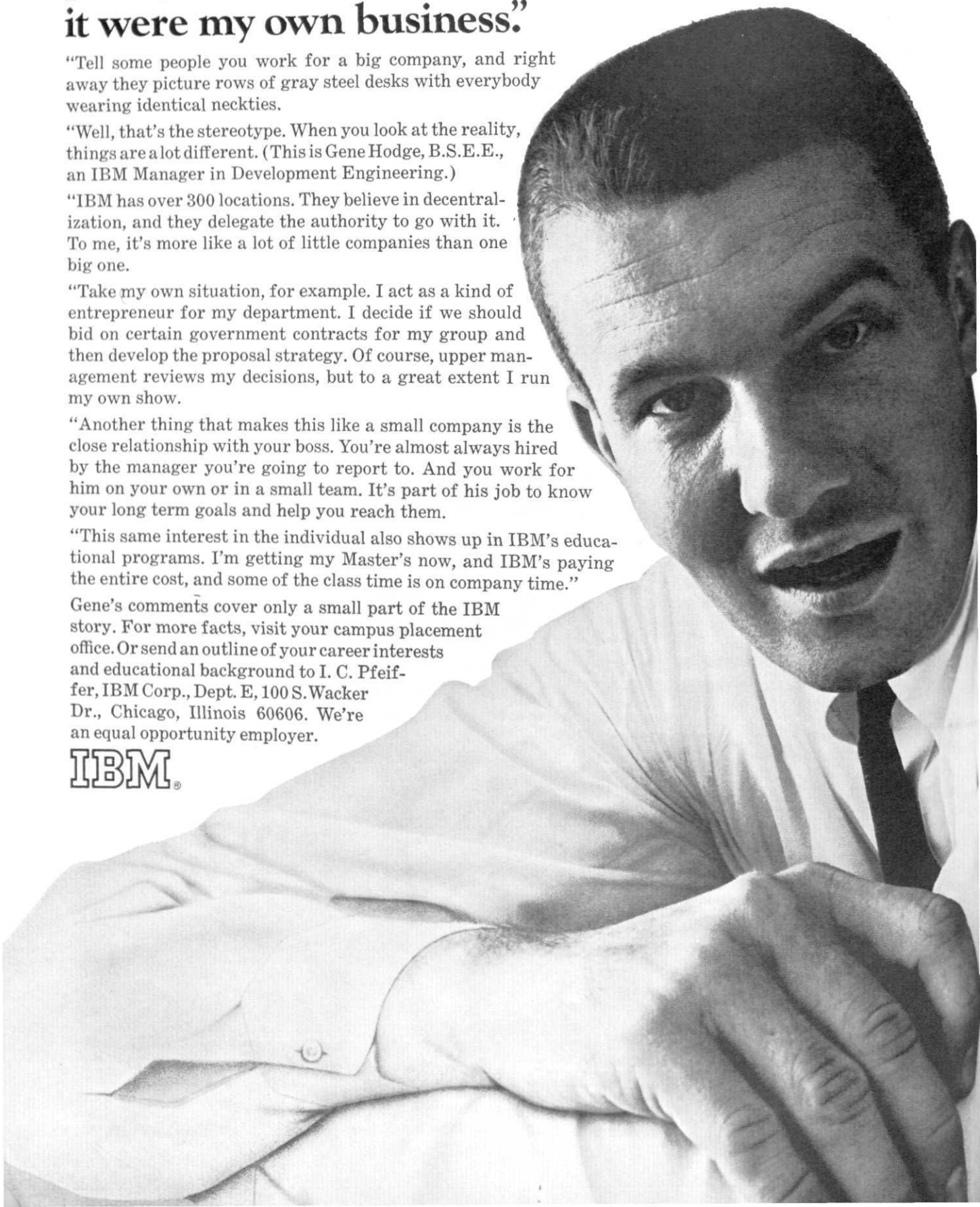
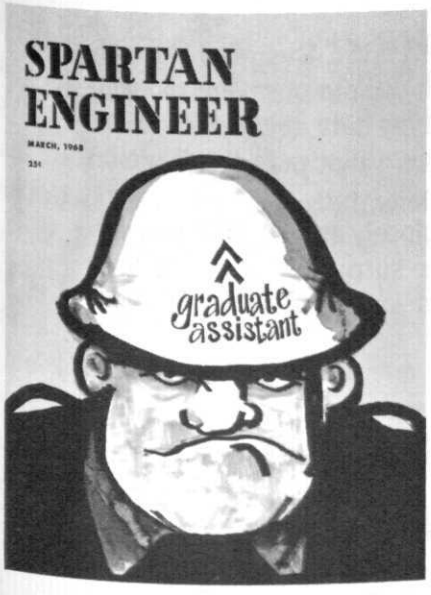


SPARTAN engineer

VOLUME 21 NUMBER 3 MARCH, 1968



Most of us at one time or another have had a course taught by a graduate assistant. This month's cover, by Tom Price, shows us how the new draft laws will not let this happen in the future.

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KNOW BEFORE YOU GO

Most of you know people who are in Viet Nam, or will go there in the near future. Many of you know people who have been there and returned, or who have been there and will never return. And then a few of you know people who will risk jail rather than go. In any case, the decision to go or not to go has been made in many cases not by the individual, but by a local draft board.

When the draft is considered today, Viet Nam must be considered too, for one implies the other to an individual eligible for the draft, and when Viet Nam is considered there is usually trouble.

We have all heard the saying that it is easier to point out an evil than to provide a correction for it. This, in one sentence, is my opinion of Viet Nam. I don't know much about the use of napalm, gas, or fantastic anti-personnel weapons. I don't know much about murdering women and children, whether they are murdered by Americans or Viet Cong. My faith in the mass media, including Joe Pyne and other "unrehearsed" interview shows, is too low to let myself believe that the facts I have been given are the whole truth. In short, I know nothing about why we are in Viet Nam, what we are doing there, or why we are staying. I cannot say what would happen if we left, nor can I say what good we are doing there. I can say, however, that killing is evil, whether done by an army or Clyde Barrow.

Many of you who are reading this editorial will soon have to decide about the validity of the killing the United States is doing, and the draft will speed up your decision. If you decide that the war is unjust, and you are drafted, you will be faced with a few grim alternatives – Canada, jail, or the swallowing of your beliefs. If you select induction, however, you can still refuse to fight. You will just be taken to where the fighting is and be allowed to use your own judgement.

Gary Romans

Who are you with?

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It's reassuring to have a good name behind you. But a name is only a handle which describes the quality of people working for it. Monsanto is swiftly expanding in exciting directions. Monsanto needs more of the same high caliber personnel it presently employs—both graduating students and experienced men and women. Engineers, scientists and college graduates at all degree levels are wanted, and opportunity for growth is an understatement! If you are talented; if you have big ideas; if you'd be proud to say, "I'm from Monsanto," we really ought to get together. Meet the Man from Monsanto when he visits your campus. Or write: Monsanto Company, Manager, Professional Recruiting, Dept. CL 698, St. Louis, Mo. 63166.

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Dean's Letter

A Comment On The Draft From Student Affairs

GEORGE VAN DUSEN
Assistant Dean

It is not the intent of these remarks to enter into a dialogue concerning the relative merits and demerits of the selective service system. Rather, the purpose is to highlight some of the existing selective service regulations and to share some observations assessing the present draft situation relating to occupational and graduate student deferments.

The following paragraphs have been taken from the 1967 Draft Act pertaining to graduate student deferments:

> "A student shall be placed in Class II-S if he is satisfactorily pursuing a course of graduate study in medicine, dentistry, veterinary medicine, osteopathy, or such other subjects necessary to the maintenance of the national health, safety, or interest as are identified by the Director of Selective Service upon advice of the National Security Council."
>
> "A registrant entering his second or subsequent year of graduate study without interruption on October 1, 1967, may be placed in Class II-S. However, he shall not be deferred for more than one additional year to obtain a master's degree; or for more than a total of five years past the bachelor's degree to obtain a Ph. D.; or for more than one additional year whichever is greater."
>
> "Any registrant enrolled in his first year of post-graduate study on October 1, 1967, or accepted for admission for that year, may be placed in Class II-S if he has entered the first class commencing after the date he completed the requirements of admission. He shall be deferred for one academic year only, or until he ceases satisfactorily to pursue his course of study, whichever is earlier. At the end of that one year, students pursuing a course of study deemed to be in the national health, safety, or interest shall be eligible to request continuation in Class II-S."

The literature relating to this policy has been optimistic in recent months with the expectation that the exemption of graduate students in the health-related sciences would be broadened. However, as you are aware, the recent interpretation from Washington via General Hershey simply reaffirms the existing policy as stated.

The following paragraph reflects the policy for occupational deferments as presented in the 1967 Draft Act.:

> "The Director of Selective Service may from time to time upon the advice of the National Security Council identify needed professional and scientific personnel and those engaged in and preparing for critical skills and other essential occupations. Employment in such occupations is the basis for requesting occupational deferment. When such lists are prepared, they will be available through Selective Service. Prior to the publication of new lists of critical occupations and/or activities, local boards may continue to use as guidelines for occupational deferment the Departments of Labor and Commerce Lists of Critical Occupations and Essential Activities that were in use prior to enactment of the Military Selective Service Act of 1967."

We have presently reached a point for students which I choose to call an "era of uncertainty". This phrase may appear trite to some and unscholarly to others, yet in talking with several students during the past few months, uncertainty

CONTINUED ON PAGE 43

You'll manufacture nothing. But create much... as an Air Force Systems Command civilian.

As a civilian scientist or engineer in the Air Force Systems Command, you'll be working with ideas, rather than with "things." And you'll be working on projects technologically years ahead of usual industry involvements. Because the AFSC initiates projects long before contracting out to vendors for production.

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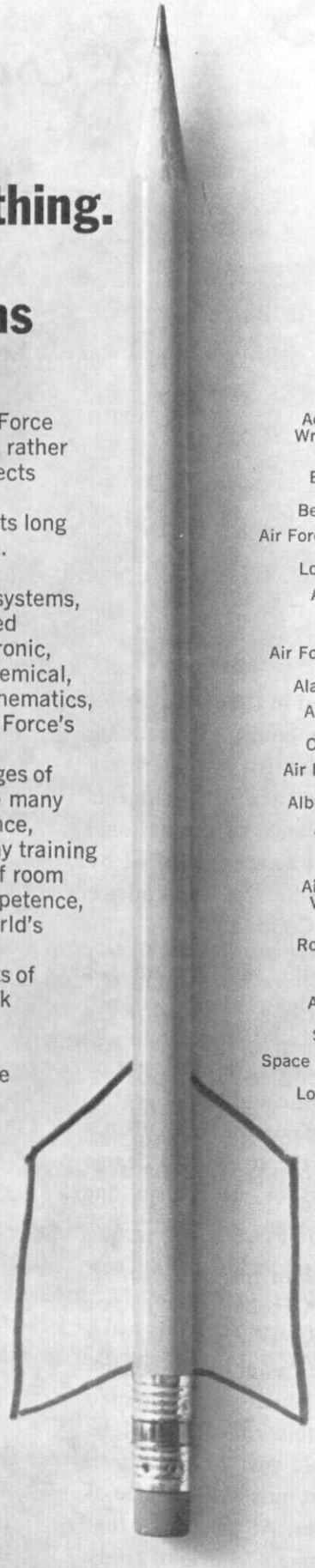
Creative challenge is just one of the advantages of Air Force Systems Command careers. There are many others. Your particular job assignment, for instance, begins on the day you're hired, not after a lengthy training period...so you learn by doing. There's plenty of room for you to grow, both in responsibility and in competence, because the AFSC's R&D effort is among the world's largest. You may choose from a wide range of geographical locations in the U.S. And the benefits of Career Civil Service—including vacation and sick leave, retirement plans, insurance, job security, and excellent opportunities for government financed graduate and post-doctoral studies—are hard to beat.

If you're interested in a career on the frontiers of scientific and engineering knowledge, join us in the Air Force Systems Command. Obtain additional information by contacting your Placement Office to arrange for an interview when a Systems Command representative visits your campus, or write or visit the Civilian Personnel Office at any of the Systems Command locations listed.



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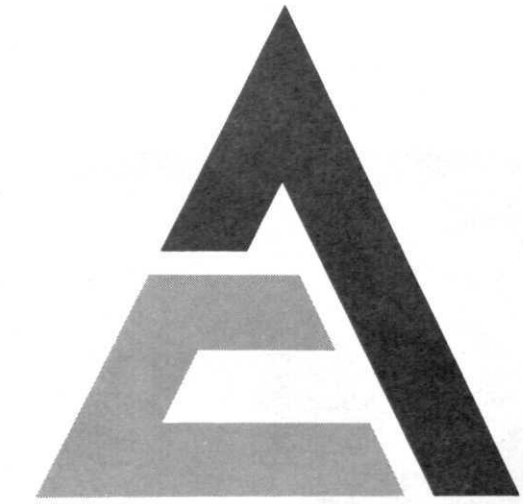

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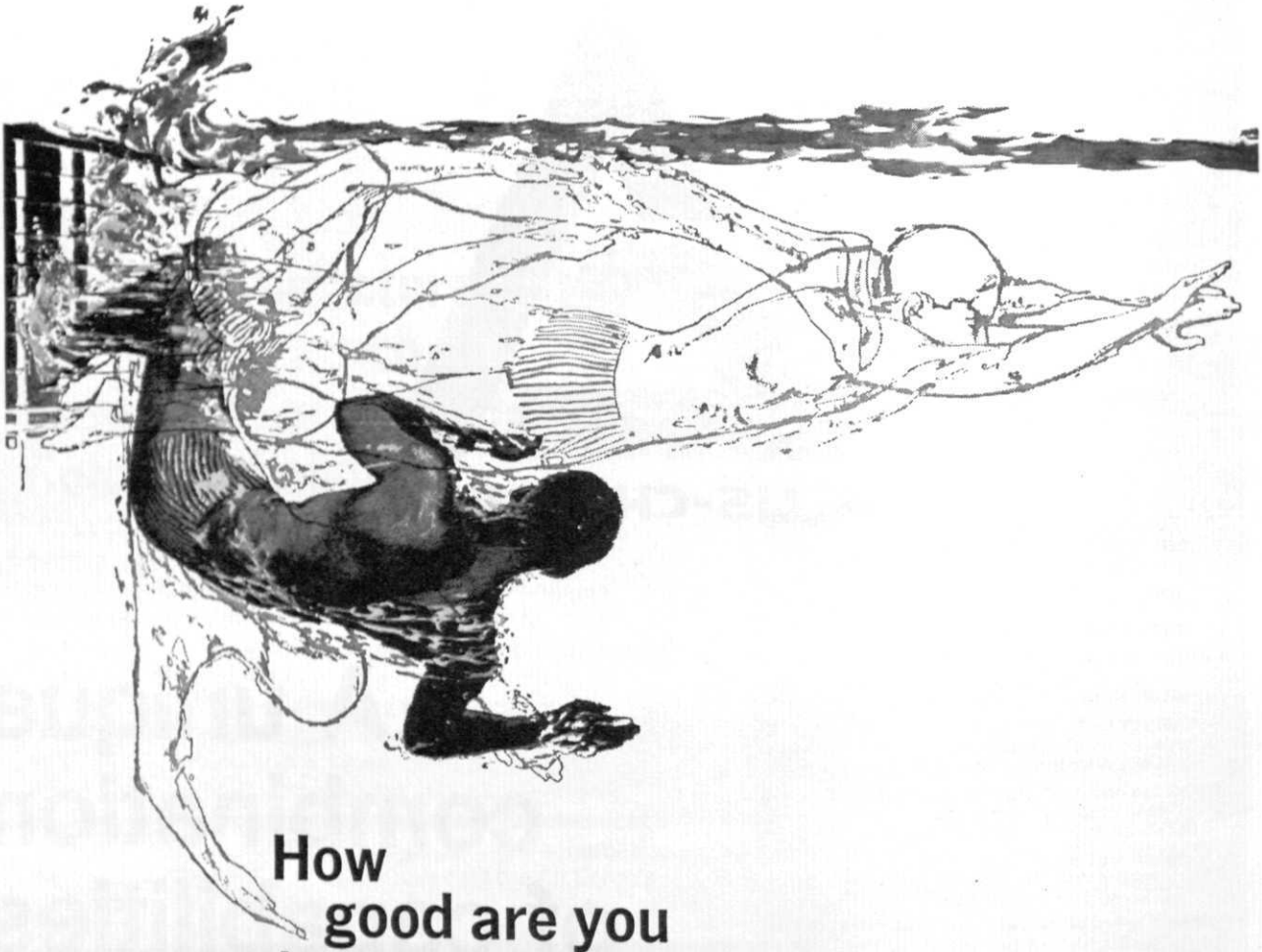

How good are you on the turns?

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."

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ASK YOURSELF WHY ?

By Robert J. Gauthier

The year is nineteen-hundred sixty-eight; the place is a rice paddie, or a jungle river, or maybe a small Vietnamese village. Americans, but more important, human beings, are fighting there, killing, and being killed, dying for causes which are so vague and cloudy in the sense that they are applied. Freedom for the oppressed people and an opportunity for them to choose their own form of government. That really sounds impressive on paper. And so, we move through the countryside, burning, destroying, killing, trying to save the small country of Vietnam. Save from whom? Why, the Vietnamese, of course!

I do not pretend to be an informed person when it comes to the minute details of the war in Southeast Asia in which our country is involved. But, then, this paper contains opinions which are far removed from fact in that they may only be true to the person holding them. Therefore, I continue along my way without worry about being wrong (a very mysterious word indeed). Disagree, please, but know why.

War is a phenomenon which has existed on earth down through the ages. War originates from a disagreement as to the right or wrong (there is that word again) of an issue or action. Our country has been involved in many wars, from the Revolutionary War to the two world wars with others occuring chronologically in between. And they have had purpose and objectives which I shall not be concerned with in this discussion. It is the meaning and purpose of the present conflict which our country is engaged in that I question.

Vietnam is a small country, able to fit within the boundary of some of our states. Yet, week after week, month after month, even year after year, we blast this land and its people with every weapon our technology provides (except for the big one) and still the war goes on. And then one hears these words: "Aw shucks; we can beat them anytime we want to." Who are we kidding? Why won't the leaders of this great nation be honest with the masses that they lead? Is withdrawal of troops that ridiculous a prospect? If it is help we wish to give, is not money spent on a shovel sent to Chile much more rewarding than the tear on a Vietnamese child's face as he watches his home burn to the ground?

We hear on the news report, "one-hundred twelve Americans killed this week, three-hundred enemy dead." How ridiculous this sounds to the mother of one of these statistics . . .

I love my country and believe in the principles upon which it was founded, but I wonder if the war we are now fighting is consistent with these principles. Someday I may point a gun into the face of a Vietnamese soldier but before I pull the trigger, I hope to God that I know why he must die.

Opinions, thoughts, ideas, viewpoints; these are presented in the preceding discussion. To me, they are very real for they are my beliefs. It is my hope that reading these words has caused others to ask the question, why.

When life was easy . . . the end of the world was three blocks away (as far as mom would let you skate). Things have sure picked up since then . . . you can not only travel to the ends of the earth today—but to the moon tomorrow.

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REMEMBER WHEN?

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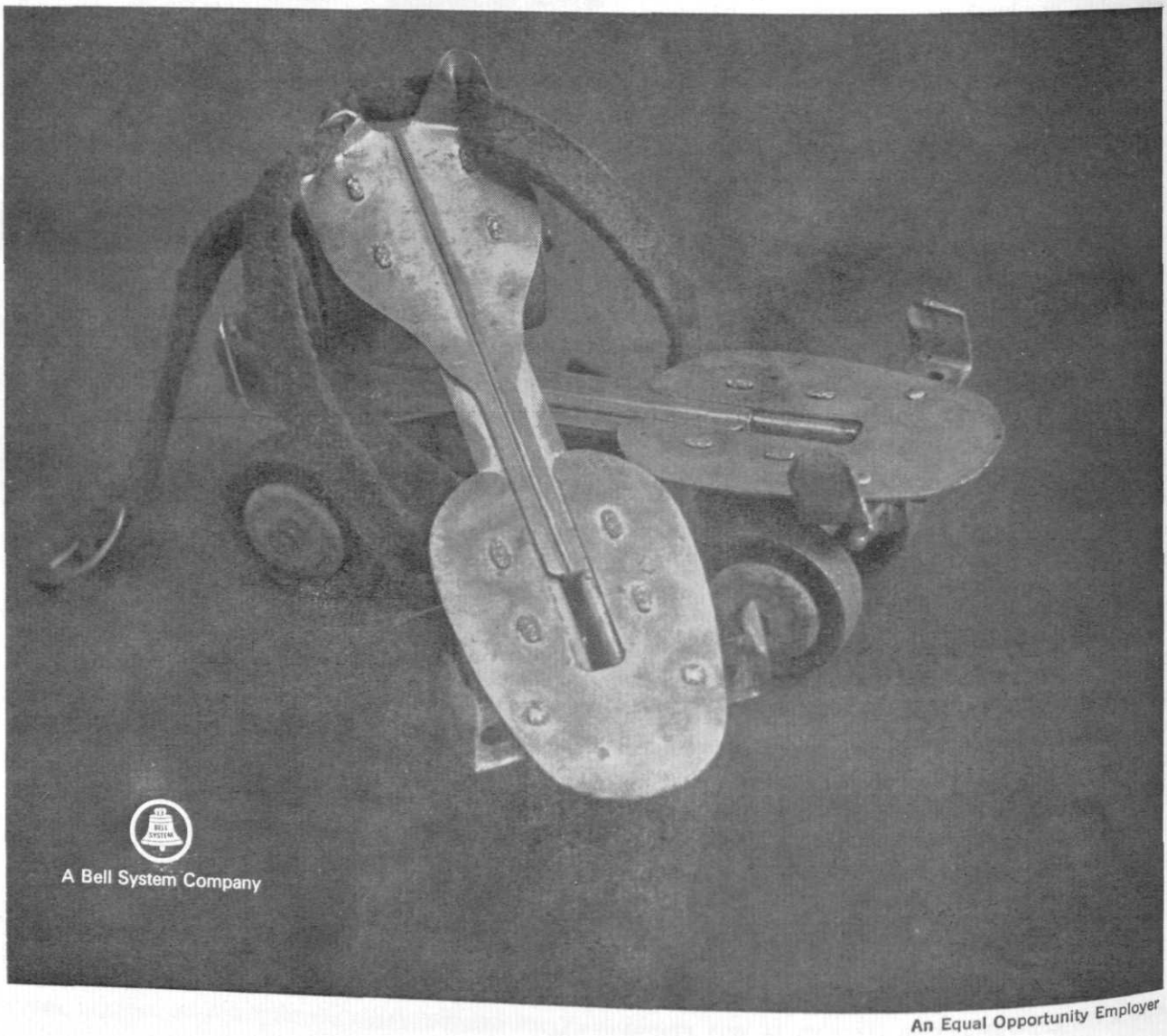

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Anaconda is moving.

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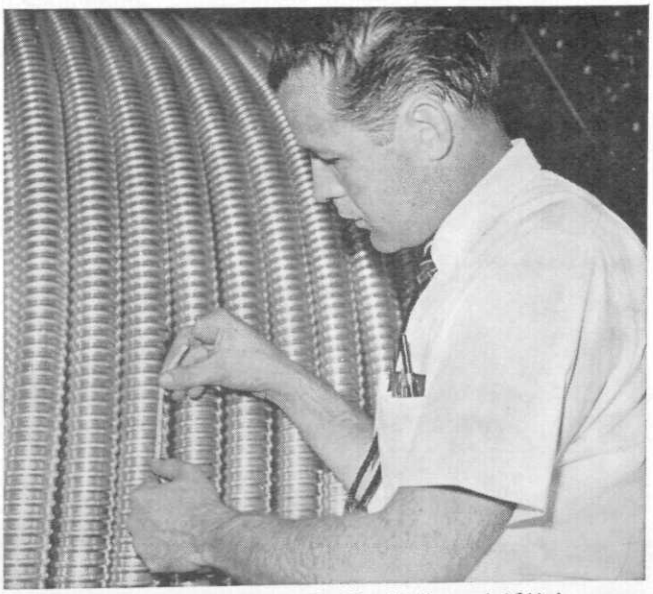
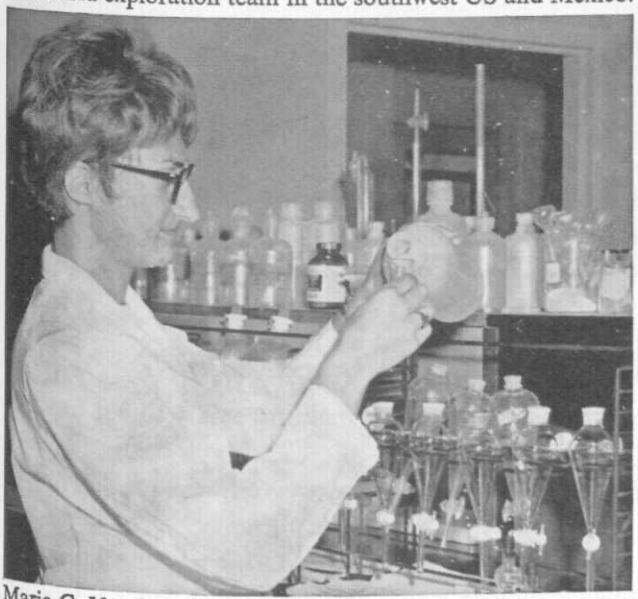
David A. Heatwole (MS Geol., U. of Arizona '66) is a geologist doing geological and geochemical work with an Anaconda exploration team in the southwest US and Mexico.



James F. Lynch (BS Mining E., U. of Missouri, '61) is a general foreman at Anaconda Wire and Cable Company's plant in Marion, Indiana.



Marie C. Vecchione (MS Phys. Chem., Yale '62) is an analytical chemist in Anaconda American Brass Company's research and technical center, Waterbury, Connecticut.

Marlan T. Boultinghouse (BS Geol., Indiana U. '59) is sheet mill superintendent at Anaconda Aluminum Company's plant in Terre Haute, Indiana.

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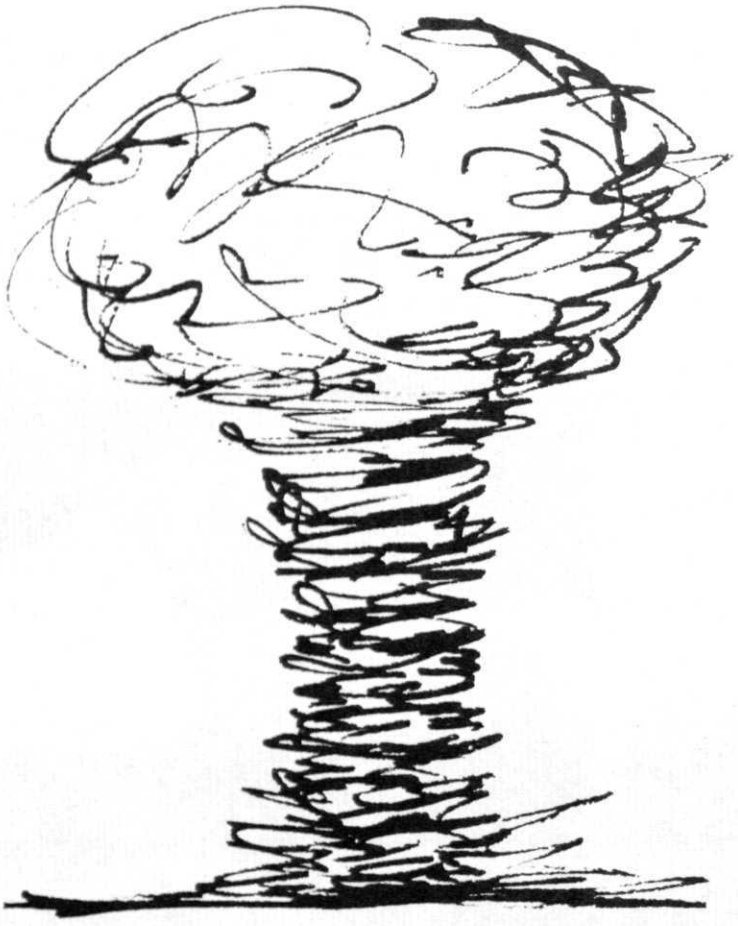


THE ENGINEER'S MIND

by Ron Diehl

What kind of a mind
Does it take to design
A gun that will kill many people

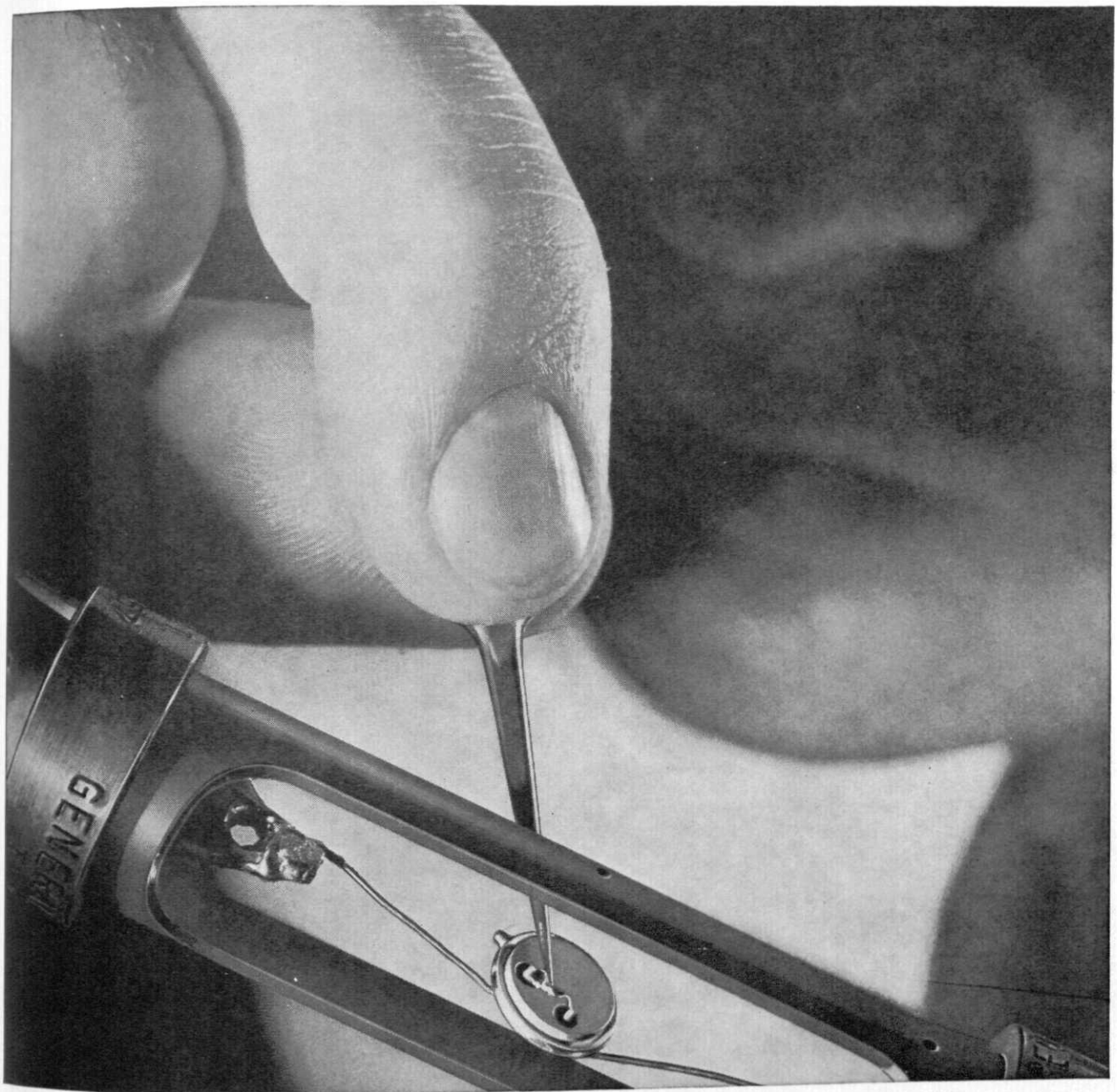
Or deliver a bomb
With designer's aplomb
To destroy every home, church and steeple

We work and we slave
In the 'home of the brave'
To learn what makes worldly things function

Then apply what we've learned
Watching cities be burned
And we really have zero compunction

Well, we're engineers now
We can all take a bow
We are here for the world to find

But when faced with a chore
That will make better war
STOP! Think – is it helping mankind?



This RCA scientist points a tweezer at an experimental FM radio transmitting gallium arsenide device so small it is almost invisible.

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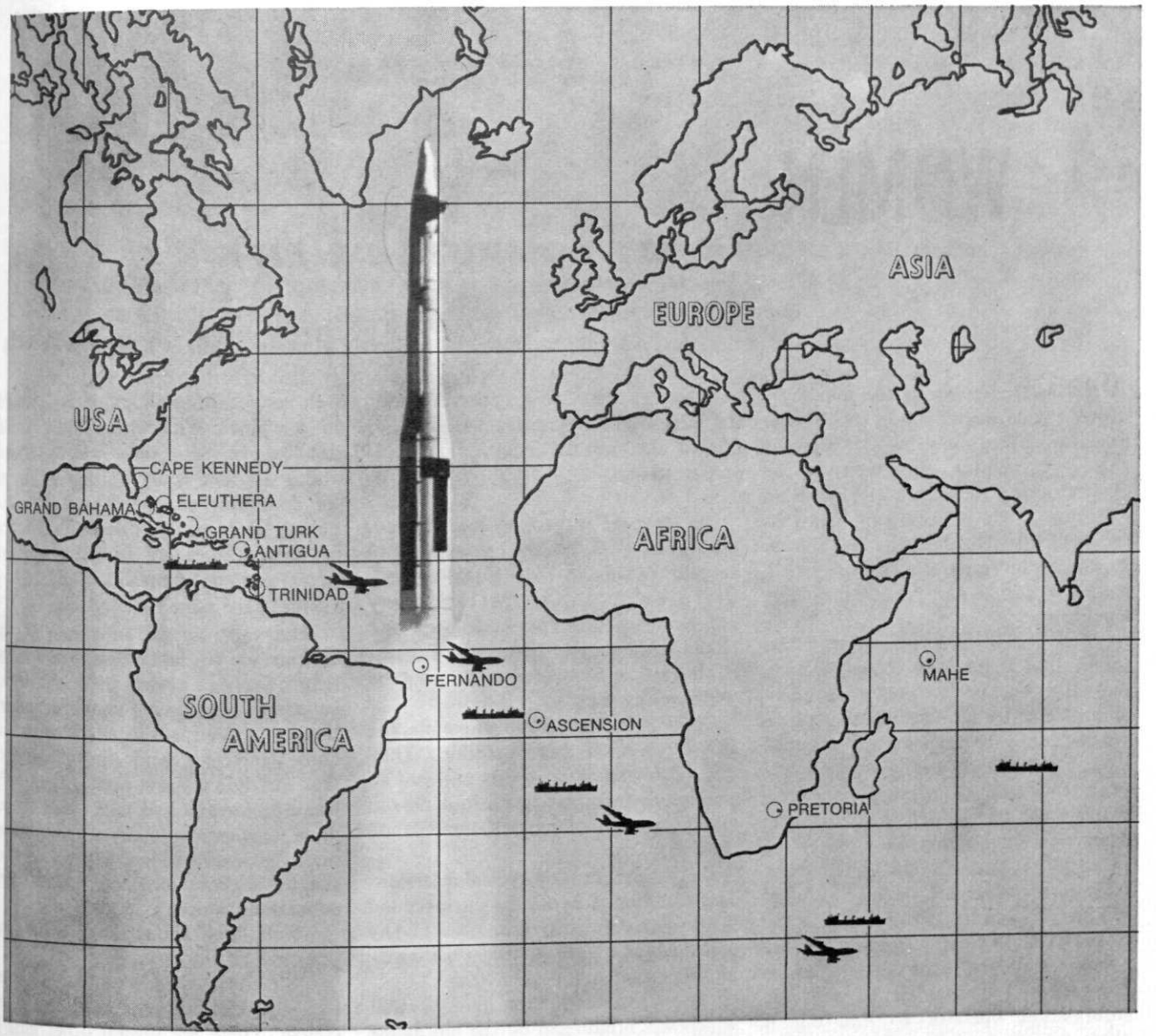

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THE WOMEN IN MY COMPUTER'S LIFE

Michael Fellburg

One afternoon about the middle of winter term I was sitting in the Spartan Engineer office discussing the topic of the day, which happened to be distribution of the then current Spartan Engineer. Being basically curious (nosey), I sifted through the pile of magazines and came up with one which had a woman's name on the mailing label.

After a shallow investigation, it was found that there were indeed women receiving the Spartan Engineer - all of about ten. We concluded that these women must be engineers. This small scale investigation brought upon my head the task of seeking out these women who had chosen the challenging career of Engineering. A trip to the pleasant women in the Engineering office rewarded me with a list of Women Engineers compiled for the Society of Women Engineers at the beginning of the term. So . . . with confidence I proceeded to call the information operator to find out if these women actually exist, and if so, where they might be found on campus. Any student at M.S.U. knows that the phone book is as changing as Romney's opinion on a given subject, but after a while I managed to get the numbers I needed.

A word might be said here in the way of clarification of the term 'engineer'. Unknown to me was the fact that the majors of Computer Science and Engineering Science are included in The College, as well as the normal major fields of study. In the for-what-it's-worth department, here are the statistics, just to get them out of the way: There were, as of Winter '68, twenty-four girls enrolled in the College at the Undergraduate level, of which seventeen are freshmen, one sophomore, and six juniors. The majors of these girls run as follows: nine Engineering Science, seven Computer Science, three no major, one Metallurgy, two Electrical Engineering, one Civil Engineering, and one Chemical Engineering. All of the girls in the 'normal' engineering field were freshmen.

As any self-respecting man knows, having a girl's phone number and actually talking to her are two entirely different things. After many not-so-valiant attempts, I located and talked with many of these girls. The rest of this article is devoted to defining the 'Woman Engineer.'

As in any other group of people, the girls represented a cross-section. They were rich and poor, smart and not so smart, tall and short, good looking and not so good looking, self-assured and nervous.

Let's listen in on a typical interview. The first step is to call the prospect and make an appointment. At the pre-arranged time, I end up at her dorm.

"Hello, is Sarah Peabody there?"

After the usual five minutes wait which was brightened by the girl at the desk, Sarah walked up and said,

"Are you Mike?"

My heart can't decide what to do with all those butterflies and moths interfering with its function, but the interview proceeds.

I guess I half expected a sloppy, fat girl wearing a slide rule on her girdle, bermudas and knee socks, an M.S.U. sweatshirt, tightly curled hair and no make-up. I was pleasantly surprised. Standing before me was a pleasant young lady wearing a skirt and sweater, hose and an inviting smile.

We proceeded to the lounge and found a couch among the necking couples. I inquired as to the lack of shadows and rings underneath her eyes (a mark of the College), and discovered that her average study time nightly is in the neighborhood of two hours. I asked Sarah what it was she liked to do in her spare time. Her first preference was attending movies, but small parties - even an occasional large party - would do in a pinch. With whom? Well, would you believe Sarah has a boy friend whom she met while waiting in line at the computer center...of all romantic places! He is also in Computer Science and a term ahead of Sarah, which was typical of most of the girls who had boy friends in the same field.

The talk turned to classes. I was curious as to how Sarah felt in an Engineering class amid America's handsome intelligent young engineers, their sliderules, advanced calculus and crude language. Sarah, in turn, replied that she didn't know what I meant. She was a junior and had taken only two or three engineering courses, and before that, she was in classes with all types of math majors, physics majors, and education majors.

"Well, how about the two or three you have taken?"

"Oh, those ... I don't know...I guess I feel just like a girl taking any other course. There are several other girls in my computer science classes, you know."

I didn't know because I had barely made it through Engineering 100, which was Introduction to Fortran when I was a freshman, and I had since elected to stay away from programming.

Sarah thinks of herself primarily as a girl, secondly as engineer, and talks and acts accordingly. She feels that engineering was a man's field back when engineers wore metal helmets and made bridges, but now there's no reason why girls shouldn't be engineers. This did not strike me too funny. I asked her how she would feel coming home and having her husband ask her how it went at the office, as he served her dinner. After a few giggles and several "I don't know's", she concluded that she'd like to marry a more intelligent man...would quit working except of course on a consultation basis when they had children.

CONTINUED ON PAGE 43

CONTEST "WHERE IT'S AT"

In the last issue of SPARTAN ENGINEER there appeared a contest which was to test whether or not the average engineering student knew "Where it's at" or, more specifically, whether this student knew his way around the Engineering Building. The results indicate that not only does the average engineer not know where he is but that he doesn't care. Succinctly put, there were only three entries. Thank you, readers.

THE ANSWERS

1. a) Joke Files
   b) 144 E. B.

2. a) Donner Analog Computer
   b) 364 E. B.

3. a) Milling Machines
   b) Machine Shop
   (S. E. Corner, Basement)

4. a) Analog Computer Components
   b) 364 E. B.

5. a) Executive Decision Maker
   b) Ass't. Dean's Office (112 E. B.)

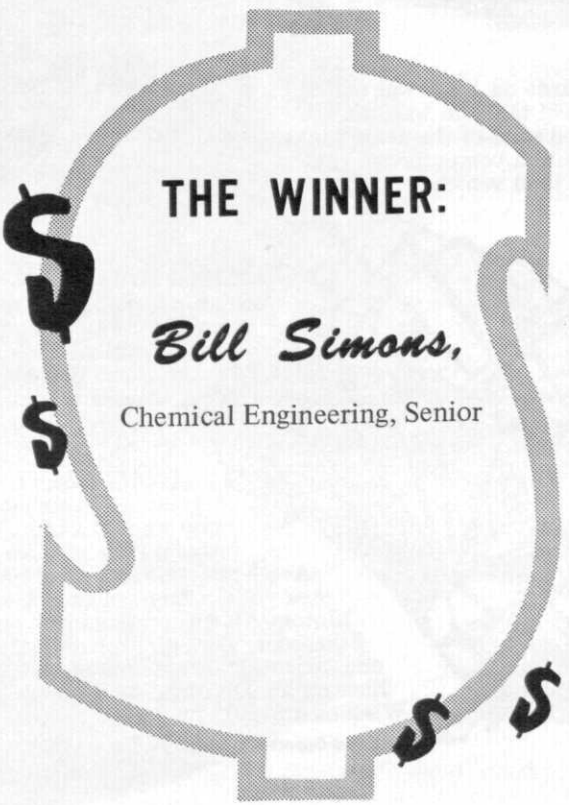
6. a) Campus Mail Box
   b) N. E. Corner Lobby

7. a) Air Flow Apparatus
   b) 131 E. B.

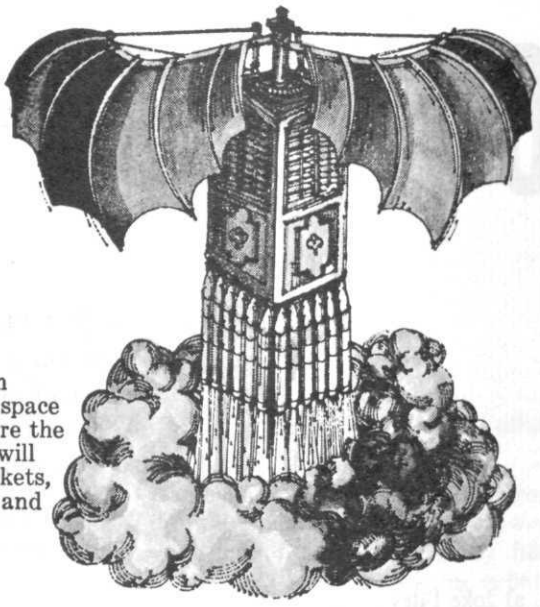
8. a) Water Softeners
   b) 53 E. B.

9. a) Rejected Features for S. E.
   b) 144 E. B.

10. a) "Bull"
    b) 210 E. B.



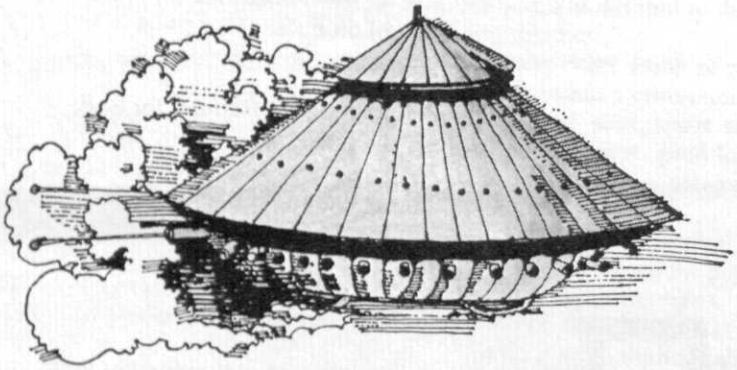
They had the right idea.



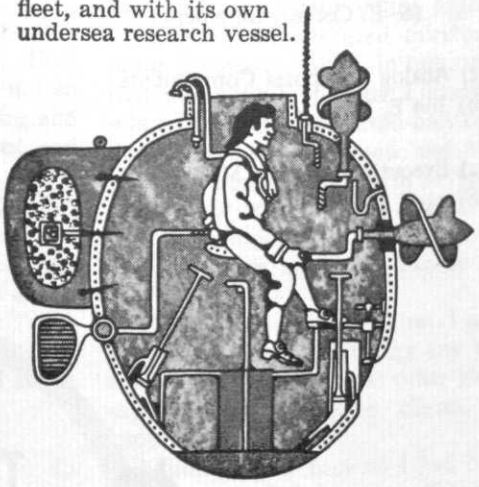
17th-Century Space Flight. Cyrano de Bergerac's science fiction fantasy about a box propelled into space by rockets came close to fact. Before the end of this decade, Apollo and LM will indeed be thrust to the moon by rockets, guided by AC Electronics guidance and navigation systems.

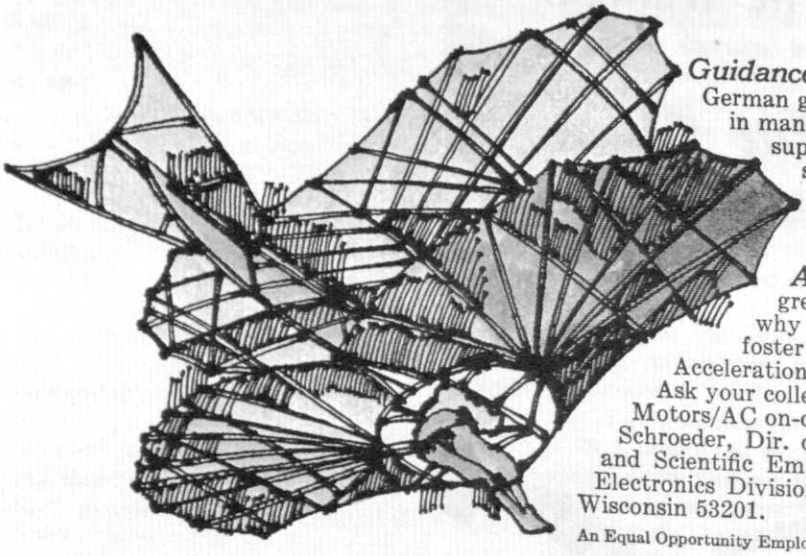
Navigation, Second-Century B.C. Hipparchus's second-century astrolabe was used for celestial navigation until the mid-18th century. Today, ships still depend on stars for guidance . . . through such sophisticated help as AC Electronics' computerized Ships' Self-Contained Navigation System.

Turtle vs. Eagle. In 1776, the American "Turtle" attacked the British flagship "Eagle" in the first wartime submarine action in history. Today, AC Electronics contributes to both the defensive and the scientific role of the submarine...with guidance components aboard our Polaris fleet, and with its own undersea research vessel.



Leonardo's Tank. Leonardo da Vinci was one of the first to envision the use of tanks in warfare. Contributing to the advanced state-of-the-art in tanks, today, is AC Electronics, with a computerized fire-control system for military land vehicles.





Guidance Gets a Lift. Otto Lilienthal, 19th-century German glider, proved that the future of flight lay in man's ability to guide the aircraft. Tomorrow's superjets will be guided inertially . . . by systems like AC Electronics' Carousel IV, chosen for the Boeing 747.

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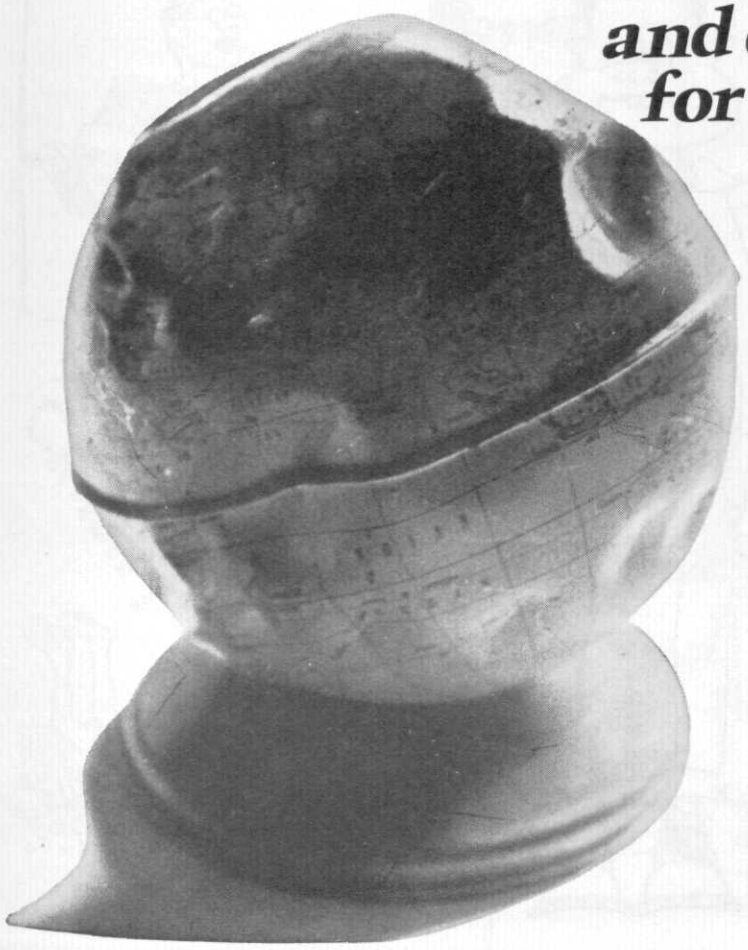
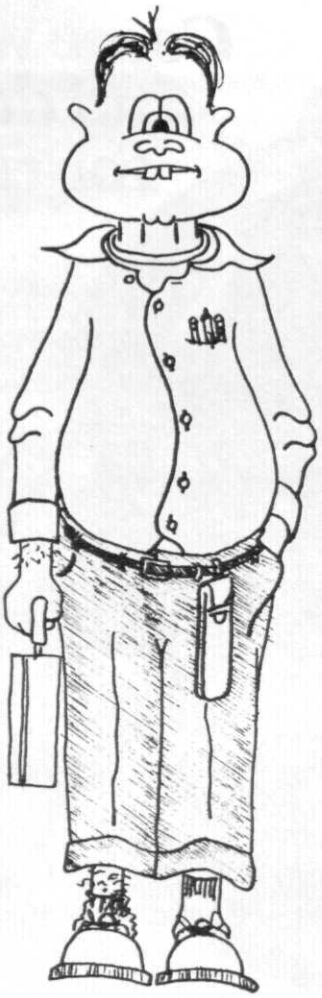
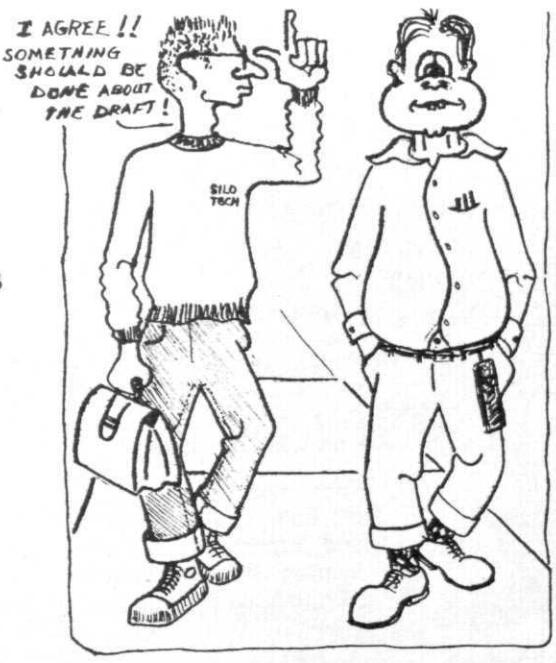


SUPER ENGINEER



AND SO BEGINS THE CAREER OF MANSFIELD FINSTERWALD AS SUPER ENGINEER



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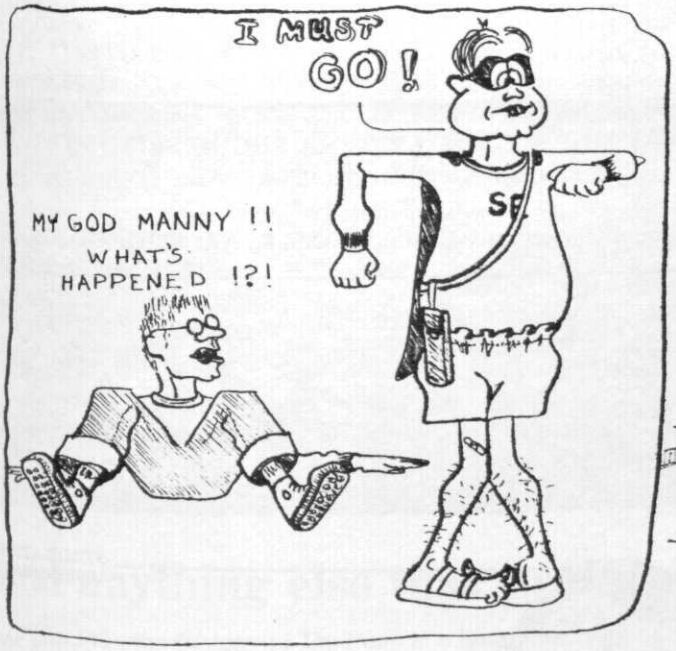

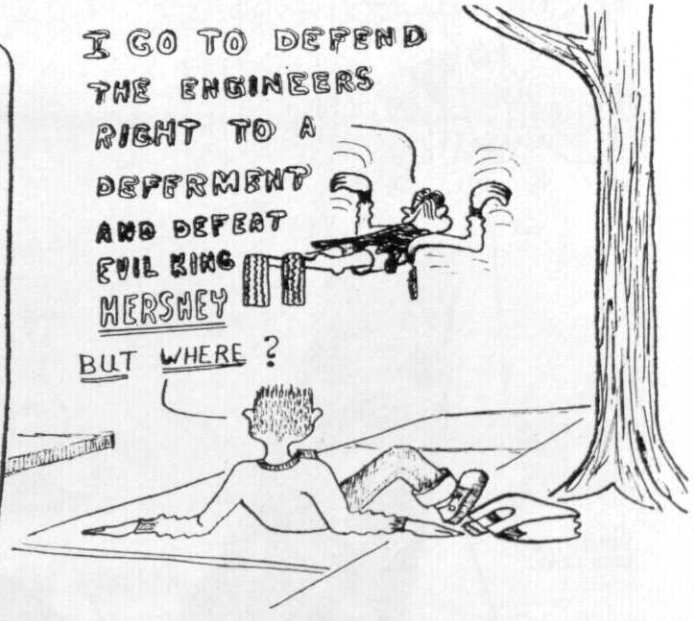

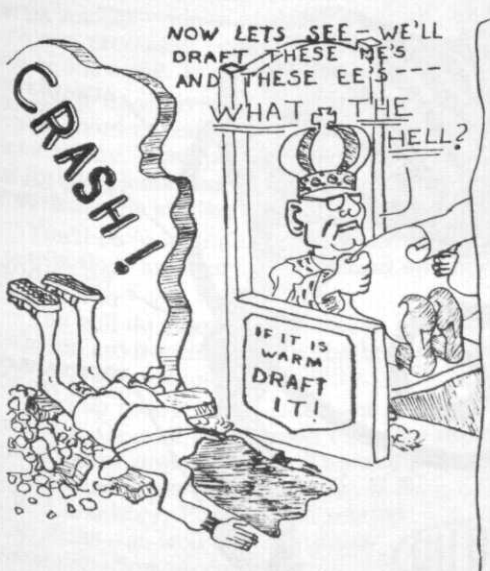

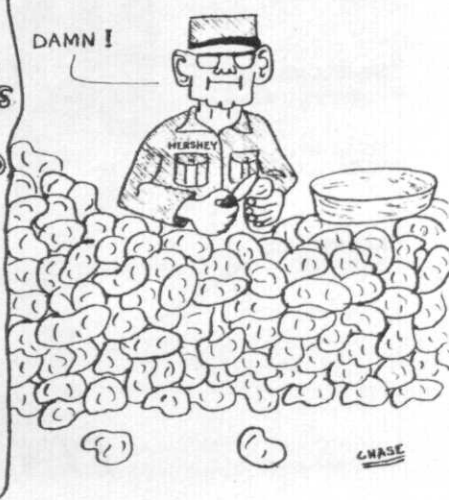

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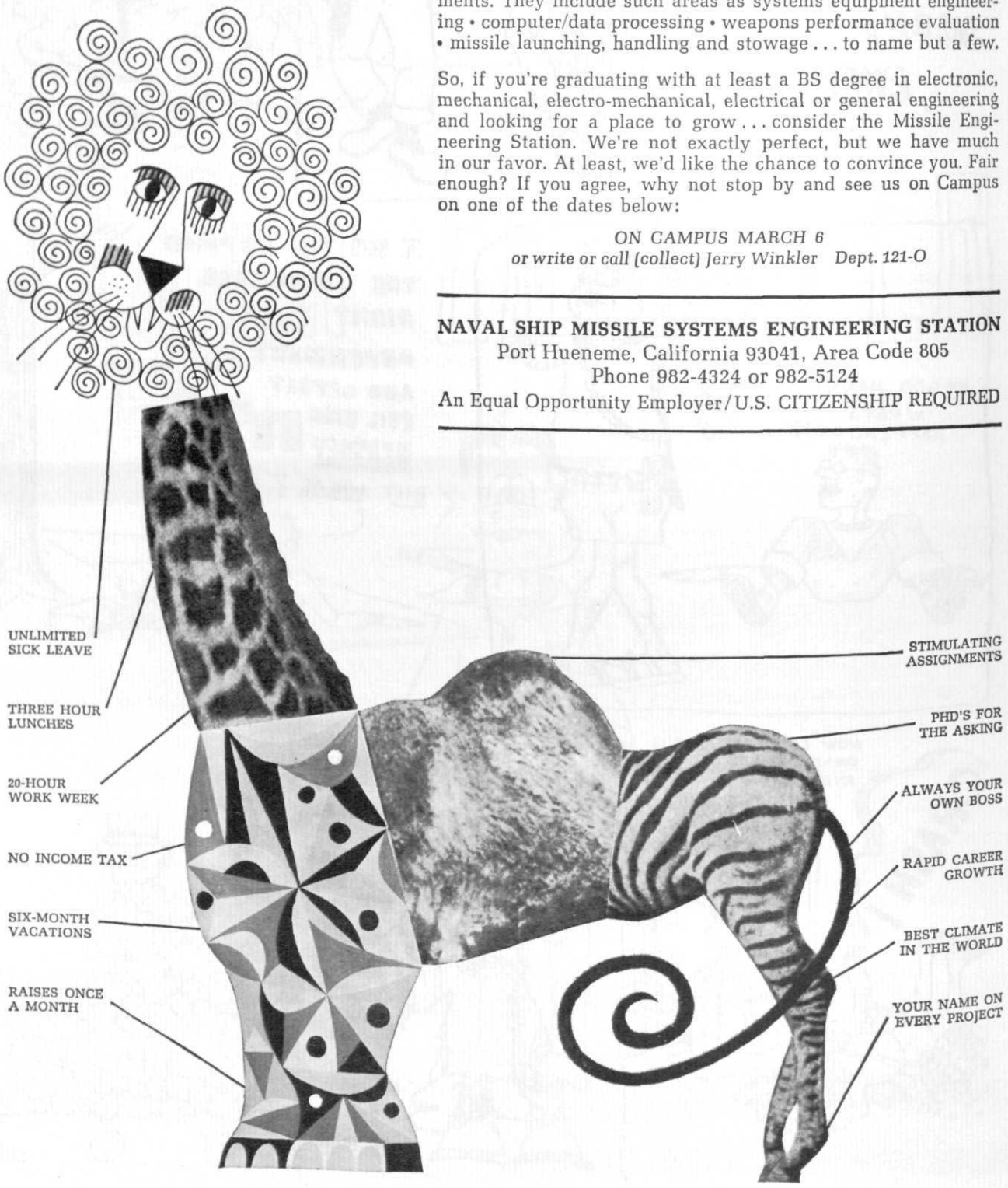

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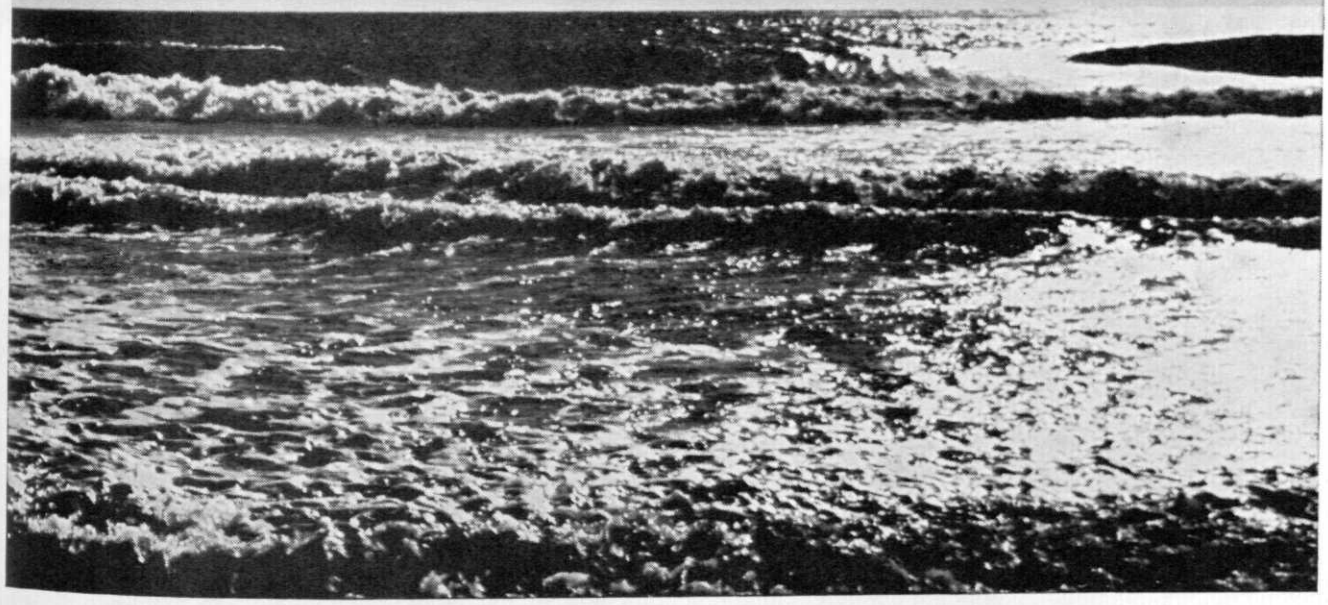

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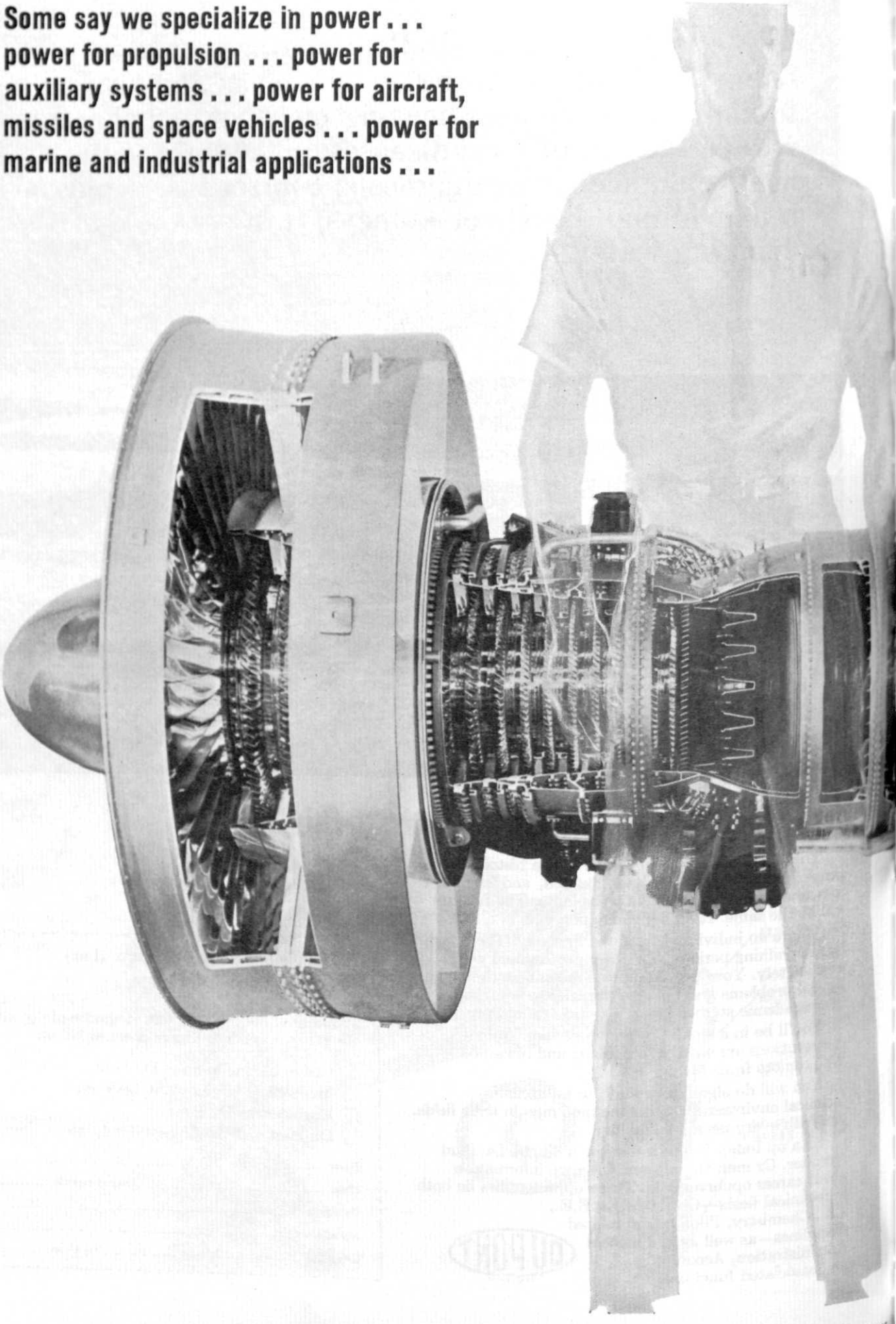
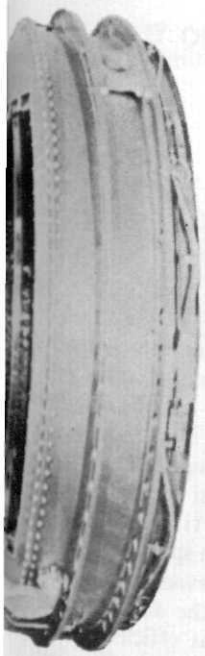


...they're right. And wrong.



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1968

the engineer and the Draft

By William E. Richardson

The male college senior faces many problems concerning his future. He must choose between getting a job immediately after graduation or continuing his education and job preparation through graduate studies. Today, however, his decision is being complicated by the ominous shadow of the great American Eagle. The United States is engaged in a controversial war in Southeast Asia and is availing itself of the conscription laws. As an undergraduate, the student has pushed the fear of the draft into a corner of his mind for he is 2-S and draft exempt for the present. It is only as he approaches the dreaded day of graduation that he becomes harried by the thoughts of being whisked away from his career to the rice paddies of Southeast Asia.

Washington has declared that there are certain draft exempt professions which are critical to the national well-being. Among these are math and science teachers, doctors and dentists, and some highly trained engineers and scientists working on government defense projects. Graduate school deferments are given only to those students pursuing a course of study in medicine, dentistry, veterinary medicine, and optometry. What happens to the young engineer who can not obtain a defense job or one who wishes to continue his education by going to graduate school? Unfortunately, he is drafted.

Is not the work of the engineer as vital to society as the work of the doctor and dentist? Look around you! Nearly everything you see is the work of an engineer. He is responsible for the development of new types of synthetic materials used in clothing, of modern farming and food processing techniques, and of conveniences for the home. He plans new cities, designs and supervises the construction of buildings and develops new transportation and communication systems. He basically adapts nature's forces and resources of material and power for the benefit of man.

The work of the engineer is fundamental to the existence of other professions. Among these are the deferred doctor and dentist. The engineer is responsible for the manufacture and development of medical necessities such as antibiotics, artificial kidney machines, dentist's high speed drills, surgical instruments, and even ambulances. Without these things, the doctor would not be able to work as efficiently and effectively as he does now. The importance of the doctor is obvious, but the role of the engineer can not be overlooked.

In order for this country to grow economically, socially, and technically, we need more engineers of the undergraduate and graduate level. They should be considered just as essential to the nation as other professions, if not more so. The Selective Service and the President should be made aware of this and consideration should be given to changing the draft law to make provisions for granting deferments to practicing engineers and graduate students. If something is not done soon, America's future corps of engineers will be depleted and America will suffer.

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WHAT IS AN HONOR SOCIETY? REALLY

A couple of issues back, the "Spartan Engineer" published an article entitled "What is an Honorary?" This was not the first time I had read the essay, because I was responsible for granting the magazine permission to print it. The article in question was written, strangely enough, as part of the membership requirements of Tau Beta Pi - that of writing an essay. It may sound paradoxical that the president of an honor society would let such an attack be printed, but the fact of the matter is that since its author was merely misinformed and since it afforded me the opportunity to write this article in rebuttal, I was happy to give the O.K.

Perhaps I should begin by quoting the gist of our "high-minded ideals," in order to put the various criticisms voiced, and my answers to them, into a better perspective. Tau Beta Pi's purpose is to "mark in a fitting manner" those who have conferred honor on themselves and their alma mater through distinguished scholarship and exemplary character, and to "foster a spirit of liberal culture" in the engineering colleges. But just what does all this mean to Joe Engineer, when it comes right down to the nitty-gritty? Unfortunately it seems that Mr. Ring's article pretty well sums up the average conception of Tau Beta Pi at M.S.U. So let's take a closer look.

Mr. Ring's main objection seems to lie with the "pledging" activities. He finds that they are generally senseless, non-mind improving, and even perhaps vindictively applied. However, with a little serious thought, one can see past the seeming fruitless inanity to the true purposes, which we believe necessary if we are to ensure the fulfillment of our "flowery" ideals. A certain amount of pride in achievement and evidence of a man's true character are shown in the end result of filing that hunk of brass. And it takes some small measure of dedication to stick around Engineering Building acquiring the signatures of faculty members, graduates, and actives, (not to mention getting a chance to meet the faculty on an informal non-classroom basis). I don't think it's asking a lot to have a prospective member try to meet the present members, either. But if it's mind-improvement the pledge is looking for, what better opportunity than the writing of an essay? Tau Beta Pi places no restrictions as to subjects through the offering of special prizes for outstanding papers in this field. Mr. Ring may observe that the actives watch all these activities with vindictive sneers, remembering the tortures of their own pledge week. I think perhaps now it is obvious that any smiles directed toward pledges are indicative of pleasure that the high ideals of our society may actually be realized in their prospective predecessors. It may sound corny, but to a real Tau Bate, it's true.

I won't bother answering the comments likening initiation ceremonies to Auschivicz and pagan Stonehenge, since obviously when the article was written, the author had no conception of their true nature. Suffice it to say his comparison sounds more like the stereotype of a fraternity Hell-Week of about ten years ago than the formal ceremony of an Honor Society Initiation.

That leaves us with the subject of "What now, now that I'm an active?" Intuitively, one major role of any society is that of self-preservation. Therefore, quite naturally much time an effort is put into the recruiting of new members. But what of fulfilling our stated goals? Our key fulfills our first purpose to a great extent by visibly marking our members. Thus if one is so inclined, he can go around and show it off - that's what it's there for. Perhaps its beholders don't always know what it stands for, but there are two good answers to that: 1)Verbal communication (tell him.) 2) Does it really make a difference? I know what it means, and so does every other of the 135,000 members of our association.

As for fostering a liberal culture in engineering schools, this is up to the local chapter. Here at State, besides doing our darnedest to get pledges to do original writing and to meet the faculty, we offer a slide-rule to the top engineering freshmen each year. We are sponsoring a "Books for Asian Students" drive this spring. There is always the chance to have lectures from distinguished scholars sponsored by the local chapter -- benefitting members and non-members alike. And then there's the "meeting or two a month". How many of you E.E.'s know what a C.E., or an M.E., or an Ag. E. studies? A meeting is a pretty good chance to find out.

Finally, the active chapter holds a banquet - with all the trimmings - once each year. Here's a chance for a guy to show off for his girl, get a meal he'd never see in the dorms, hear an interesting talk from the featured speaker, all in the amiable surroundings of friends - fellow Tau Bates. These banquets are attended by the Dean of Engineering, professors, local distinguished engineers, and their guests. One of our new initiates last February enjoyed dinner with Biggie Munn, a guest at that particular banquet.

In reading over this paper, I've noticed the appearance of the word "chance" quite frequently. I guess really, Mr. Ring, that's what an Honor Society is really all about. We can screen members as to ability and somewhat as to character, but no Honor Society should be a "be all and end all". It's really only a milestone, a beginning, even. It affords its members many chances toward a multitude of diverse activities and situations. But it's only the opportunity. The rest is up to its members. And that, Mr. Ring, is what's behind that smile when we walk up to you and say, "Congratulations, Welcome to Tau Beta Pi!"

Nick Esser,
President, Michigan Alpha
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We need competent, imaginative, flexible individuals. Because we're that kind of company. We encourage our people to take risks, to find novel—even off-beat—approaches to technical, managerial and marketing problems. We believe that only a bold, creative staff can contribute to the continued growth of a corporation that is already bold and creative.

Maybe that's why *Chemical Week* magazine, in awarding us the Kirkpatrick Award for Management Achievement, titled the article "Portrait of a Winner." And wrote "Keys to Celanese Corporation's victory: an alert, aggressive management team, explicit planning and well-defined roles."

If you have a professional degree in chemistry, chemical, mechanical or industrial engineering, physics or marketing, Celanese has a lot to offer you.

Frankly, we also expect a lot. But the rewards are based on performance. Not on how old you are or how long you've been with us. By the same token, we do not have formal training programs. We do have a very deep interest in giving you as much responsibility, and in pushing you along just as fast and far as you can go.

If this sounds good to you, discuss us with your faculty and placement officer. And see our representative when he is on your campus. Or write to: John B. Kuhn, Manager of University Recruitment, Celanese Corporation, 522 Fifth Avenue, New York, N.Y. 10036.

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CELANESE

Depends on the giant. Actually, some giants are just regular kinds of guys. Except bigger.

And that can be an advantage.

How? Well, take Ford Motor Company. We're a giant in an exciting and vital business. We tackle big problems. Needing big solutions. Better ideas. And that's where you come in. Because it all adds up to a real opportunity for young engineering graduates like yourself at Ford Motor Company.

Come to work for us and you'll be a member of a select College Graduate Program. As a member of this program, you won't be just another "trainee" playing around with "make work" assignments.

You'll handle important projects that you'll frequently follow from concept to production. Projects vital to Ford. And you'll bear a heavy degree of responsibility for their success.

You may handle as many as 3 different assignments in your first two years. Tackle diverse problems. Like figuring how high a lobe on a cam should be in order to yield a certain compression ratio. How to stop cab vibration in semi-trailer trucks. How to control exhaust emmission.

Soon you'll start thinking like a giant. You'll grow bigger because you've got more going for you.

A network of computers to put confusing facts and figures into perspective.

Complete testing facilities to prove out better ideas.

And at Ford Motor Company, your better ideas won't get axed because of a lack of funds. (A giant doesn't carry a midget's wallet, you know.)

Special programs. Diverse meaningful assignments. Full responsibility. The opportunity to follow through. The best facilities. The funds to do a job right. No wonder 87% of the engineers who start with Ford are here 10 years later.

If you're an engineer with better ideas, and you'd like to do your engineering with the top men in the field, see the man from Ford when he visits your campus. Or send your resume to Ford Motor Company, College Recruiting Department.

You and Ford can grow bigger together.

Ford

THE AMERICAN ROAD, DEARBORN, MICHIGAN
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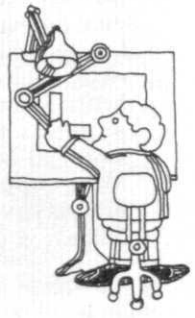
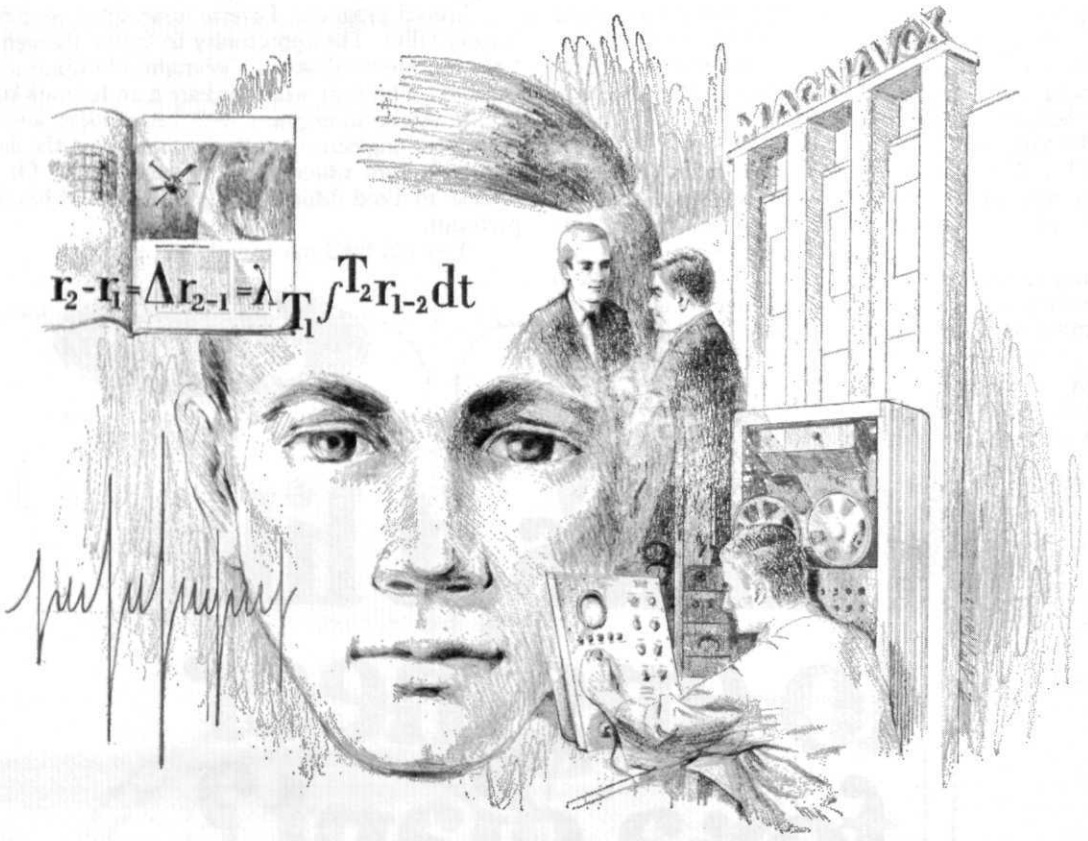
What's it like to engineer for a giant?

Rather enlarging!



If you're looking for responsibility



...see Magnavox

No matter what your field of interest, if you work for Magnavox, responsibility comes early. We're a fast growing organization — from $200 million to over $450 million in five years without major acquisition—and, with Magnavox, you can grow just as fast.

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Magnavox has plants in Indiana, Illinois, California, Tennessee, Mississippi and North Carolina and, no matter which one you join, you're close to good living. Big league sports, both professional and amateur . . . participation sports to stretch your own muscles. Excellent cultural facilities . . . or the chance just to relax and live a little. Excellent schools . . . excellent residential areas. With Magnavox, you're not only close to, but can afford, the better things in life.

If you're looking for responsibility plus

See your College Placement Office for full information on career opportunities at Magnavox. Or write T. P. O'Brien, College Relations Coordinator, The Magnavox Company, 2131 Bueter Road, Fort Wayne, Indiana 46803.

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UNDER the SPREADING INDUS-TREE

(Tau Beta Pi Pledge Essay)

Karl A. Hoenke

"The richest of men is no more happy than he who has a sufficiency for a day.....Many men who abound in wealth are unhappy." Twenty-two centuries after the Greek sage spoke to his apprentice, transcendentalists spoke to the nation. They were alarmed by incipient materialism and the concomitant departure from Nature. This, they felt, possessed all which man required for his happiness; one should employ leisure time in contemplation and study of the natural environment. There is beauty and understanding to enjoy in the stars, the forests, the waters. There is pleasure in leisure so spent. Thoreau retured to Walden and worked but six weeks in the year to provide for the other forty-six. He lived at subsistence, delighting in his nearness to the trees and animals about him, and boasting of his rejection of society. "I had three chairs in my room; one for solitude, two for company, and three for society." That two visitors might adequately represent society affirms that the self-reliant transcendentalist's best room is his with-drawing room.

The common interest of men has changed from their surroundings to their persons, but not philosophically, rather materially. As specialization increases, so also interdependence. The cheerful self-reliance revered by Emerson has yielded to the machine of Vance Packard's pyramid. Confucius said, "The higher type of man seeks all that he wants in himself; the inferior type of man seeks all that he wants from others." Nature has lost its impact. Men have too little leisure, and this little is spent on excitement, variety from workday drudgery. A new concept of relaxation has developed wherein people no longer entertain themselves; instead they rely on camaraderie and diversions. The extras with which to enjoy leisure demand more time spent earning. And so is born a circle.

Happiness is measured by the quantities of luxury, leisure-aiding items one owns. "They measure their esteem of each other by what each has, and not by what each is," lamented Emerson. A socially oriented self-consciousness has arisen around chattels, and the brouhaha of attaining a "success image" has banished forever simplicity and contentment. "The higher type of man is calm and serene; the inferior type of man is constantly agitated and worried." The Delphic oracle precipitated the Greek renaissance with two simple maxims: "Know thyself"; and "Never to excess." This latter is the sage's sufficiency, Emerson's functionalism, and Thoreau's economy. The ancient Greeks proved the profound importance of moderation; Thoreau hoped his example might reawaken an appreciation for simplicity. He observed that "a man is rich in proportion to the number of things he can afford to leave alone."

Food is purposed solely for sustenance; one can quite well survive on a minimal diet of flour, vegetables, water, and occasionally fish. It is mere waste and folly for people to require an extensive cuisine. Sturgeon eggs imported from Russia, octopi imported from Japan, and filleted piranha from the remote Amazon consumed for exotic prestige are manifestations of the new system of values. Recognition for a virtuous manner has been supplanted by recognition for an excessive manner. The fashionably ostentatious are aped

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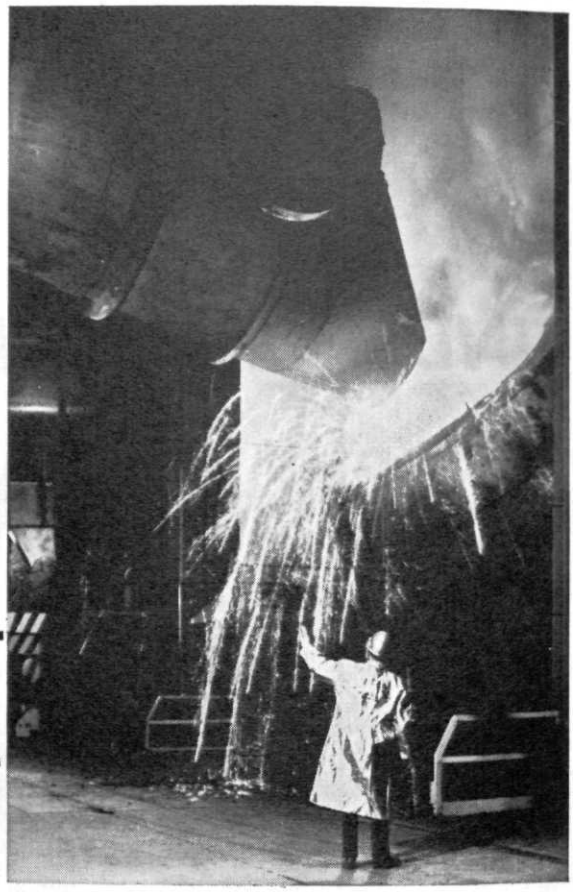

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Furnishing elbow room for new ideas is an old story at the Electric Boat Division of General Dynamics. It's been that way ever since we built the first submarine for the Navy in 1900. Then, as now, the only limit on performance is the level of technology. And today, as we adapt new space-age techniques to undersea exploration, the entire ocean—one billion cubic miles—is fast becoming a vast area of new technological opportunity.

And it's not just the technology, though of course you'll be involved in state-of-the-art developments in electronics, nuclear propulsion, structural dynamics, metallurgy, to name a few. Equally important is the systems approach we're applying to all phases of submarine construction, from original concept, through procurement, construction, inventory control, all the way through to testing and sea trials.

We have a lot to show for it. Our research sub, STAR III, can already gather data at depths of up to 2,000 feet. The AUTEC I and ALVIN II, now in construction, are designed to operate at 6,500 feet and will be completely equipped with the most sophisticated equipment including two bow manipulators, lights, closed-circuit TV, cameras, obstacle avoidance sonar, fathometer and communications systems. And in addition, we are designing and building the NR-I, the world's first nuclear powered research submarine.

So it's no wonder that Electric Boat Division is the acknowledged specialist for all phases of submarine building, overhaul and repair. And that we've been assigned to develop the submarine design that all other yards will be following when converting Polaris submarines for Poseidon operation.

Speaking of development, we have a "people development" program designed to spot your special capabilities—to help you move, to progress, even to change your product area or technical discipline if that's what it takes to increase the certainty of your success. Part of it, is one of the most extensive and far-sighted educational, study and post graduate programs ever offered by any company, to encourage continued academic proficiency. Hundreds of people in our Division participate every year.

Living and working in Groton, Connecticut is a rewarding experience in itself. For in this unique nautical community you are not only close to the men and women who build and sail submarines, but to all the abundant pleasures of the sea. (Not that you're far from more metropolitan pleasures if that's your preference).

Degrees required: BS or advanced degree in naval architecture or aeronautical, chemical, civil, electrical, industrial, management, marine, mechanical and metallurgical engineering. Positions are also available for graduate students in math, physics, psychology and applied mechanics.

If you missed our on-campus interviews but would like to contribute to the new aqua-space technologies we're developing, write to Mr. Donald K. Whynott. Ask for our new informative brochure.

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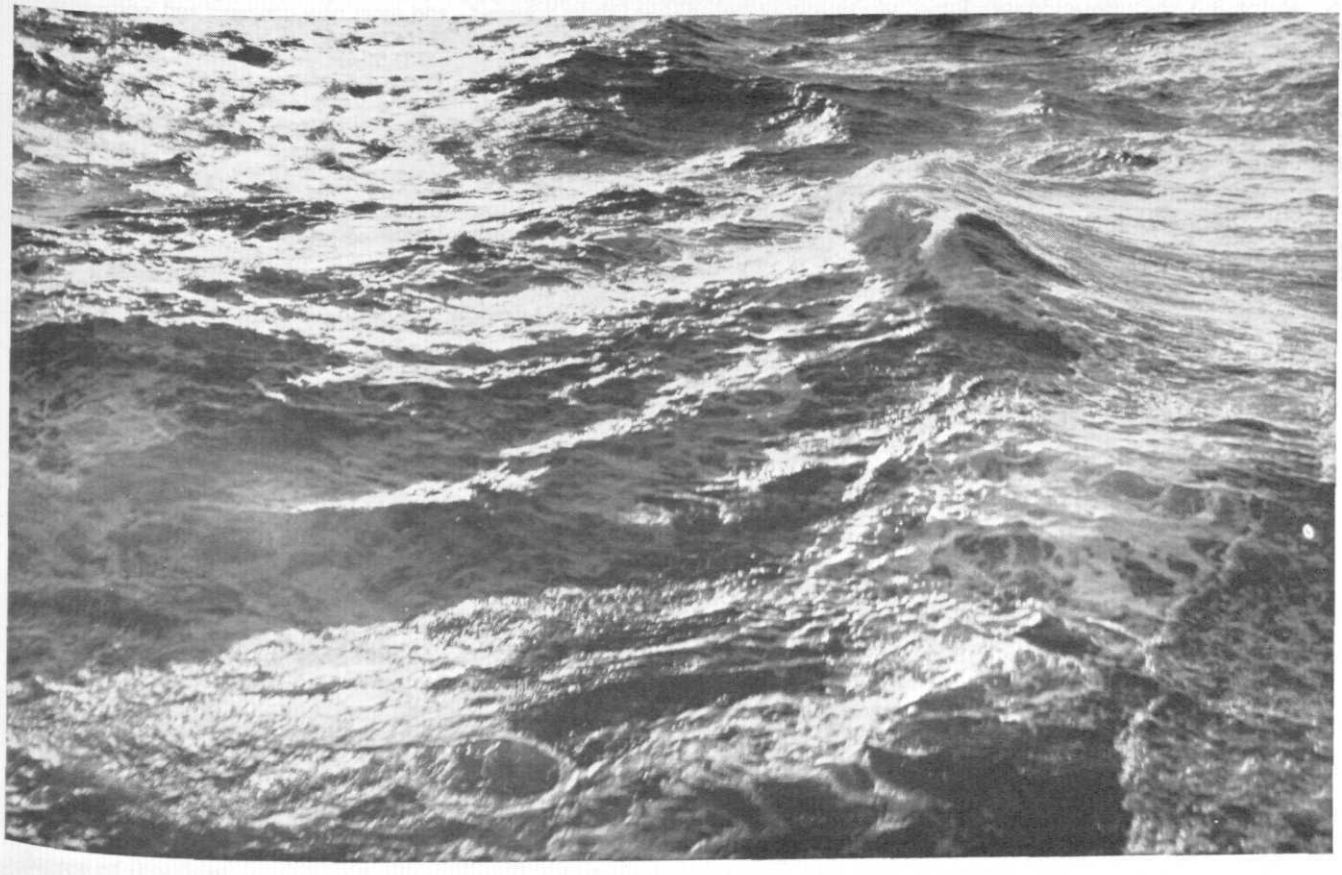
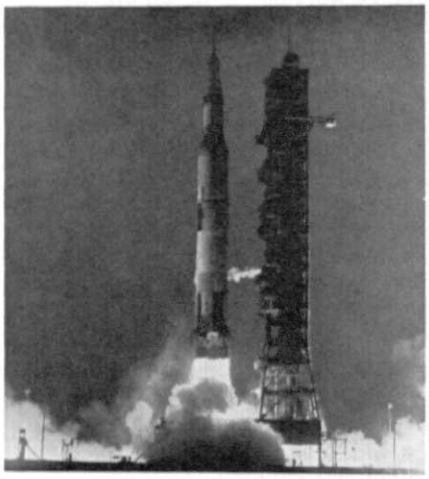
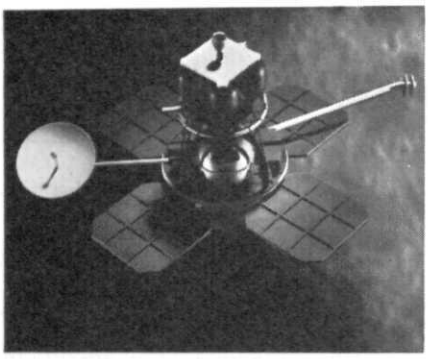




USAF SRAM. New U.S. Air Force short-range attack missile, now being designed and developed by Boeing, is a supersonic air-to-ground missile with nuclear capability. Boeing also will serve as system integration and test contractor.

NASA Apollo / Saturn V. America's moon rocket will carry three astronauts to the moon and return them to earth. Boeing builds 7.5 million-pound-thrust first stage booster, supports NASA in other phases of the program.

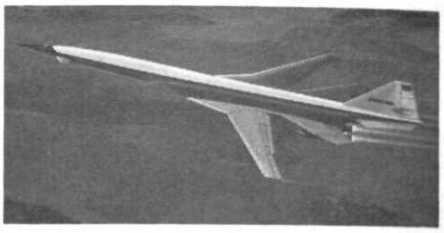
Boeing 747. New superjet (model shown above) is the largest airplane ever designed for commercial service. It will carry more than 350 passengers at faster speeds than today's jetliners, ushering in a new era in jet transportation.

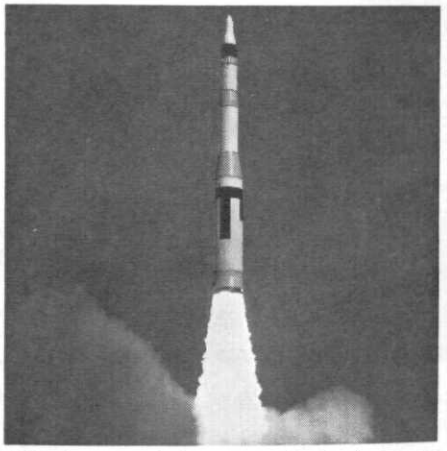


NASA Lunar Orbiter. Designed and built by Boeing, the Lunar Orbiter was the first U.S. spacecraft to orbit the moon, to photograph earth from the moon and to photograph the far side of the moon. All five Orbiter launches resulted in successful missions.

Boeing 737. Newest and smallest Boeing jetliner, the 737 is the world's most advanced short-range jet. It will cruise at 580 mph, and operate quietly and efficiently from close-in airports of smaller communities.

USN Hydrofoil Gunboat "Tucumcari". Designed and being built by Boeing, this seacraft will be first of its kind for U.S. Navy. Powered by water jet, it is capable of speeds in excess of 40 knots. Other features include drooped or anhedral foils, designed for high speed turns.





U.S. Supersonic Transport. Boeing has won the design competition for America's supersonic transport. The Boeing design features a variable-sweep wing, titanium structure and other new concepts and innovations.

CH-47C Chinook Helicopter. Boeing's newest U.S. Army helicopter is in flight test at Vertol Division near Philadelphia. Other Boeing/Vertol helicopters are serving with U.S. Army, Navy and Marine Corps.

USAF Minuteman II. Compact, quick-firing Minuteman missiles are stored in blast-resistant underground silos ready for launching. Boeing is weapon system integrator on Minuteman program.

Opportunity has many faces at Boeing.

Shown above are some of the challenging aerospace programs at Boeing that can provide you with a dynamic career growth environment.

You may begin your career in applied research, design, test, manufacturing, service or facilities engineering, or computer technology. You may become part of a Boeing program-in-being, or be assigned to a pioneering new project.

Further, if you desire an advanced degree and qualify, Boeing will help you financially with its Graduate Study Program at leading universities near company facilities.

See your college placement office or write directly to: Mr. T. J. Johnston, The Boeing Company, P.O. Box 3707, Seattle, Washington 98124. Boeing is an equal opportunity employer.

BOEING

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IMPURE MATHEMATICS

Once upon a time (1/T) pretty little Polly Nomial was strolling across a field of vectors when she came to the edge of a singularly large matrix.

Now Polly was convergent and her mother had made it an absolute condition that she must never enter such an array without her brackets on. Polly, however, who had changed her variables that morning and was feeling particularly badly behaved, ignored this condition on the grounds that it was insufficient and made her way in amongst the complex elements.

Rows and columns enveloped her on all sides. Tangents approached her surface. She became tensor and tensor. Quite suddenly, three branches of a hyperbola touched her at a single point. She oscillated violently, lost all sense of directrix and went completely divergent. As she reached a turning point she tripped over a square root which was protruding from the erf and plunged headlong down a steep gradient. When she was differentiated once more she found herself, apparently alone, in a non-euclidean space.

She was being watched however. That smooth operator, Curly Pi, was lurking inner product. As his eyes devoured her curvilinear coordinates, a singular expression crossed his face. Was she still convergent, he wondered. He decided to integrate improperly at once.

Hearing a vulgar fraction behind her, Polly turned round and saw Curly Pi approaching with his power series extrapolated. She could see at once,by his degenerate conic and his dessipative terms that he was bent on no good.

'Eureka', she gasped.

'Ho, ho', he said. 'What a symmetric little Polynomial you are. I can see you're bubbling over with secs.'

'O Sir,' she protested, 'Keep away from me. I haven't got my brackets on.'

'Calm yourself, my dear,' said our suave operator, 'Your fears are purely imaginary.'

'I,I,' she thought, 'perhaps he's homogeneous then.'

'What order are you,' the brute demanded.

'Seventeen', replied Polly.

Curly leered. 'I suppose you've never been operated on yet,' he asked.

'Of course not', Polly cried indignantly. 'I'm absolutely convergent.'

'Come, come', said Curly. 'Let's off to a decimal place I know and I'll take you to the limit.'
'Never', gasped Polly.
'Exchlf', he swore, using the vilest oath he knew. His patience was gone. Coshing her over the coefficient with a log until she was powerless, Curly removed her discontinuities. He stared at her significant places and began smoothing her points of inflexion. Poor Polly. All was up. She felt his hand tending to her asymptotic limit. Her convergence would soon be gone for ever.

There was no mercy, for Curly was a heavyside operator. He integrated by parts. He intergrated by partial fractions. The complex beast even went all the way around and did a contour integration. What an indignity. To be multiply connected on her first integration. Curly went on operating until he was absolutely and completely orthogonal.

When Polly got home that evening, her mother noticed that she had been truncated in several places. But it was too late to differentiate now. As the months went by, Polly increased monotonically. Finally she generated a small but pathological function which left surds all over the place until she was driven to distraction.

The moral of our sad story is this—If you want to keep your expressions convergent, never allow them a single degree of freedom.

Good old Osbert. We like his style.

And you, too, ought to be thinking *career*. Read our booklet, "Careers with Bethlehem Steel and the Loop Course." It's one of the few books on your required reading list that you won't have to pay for. You can pick up a copy at your placement office, or get one by writing to Manager of Personnel, Bethlehem Steel Corporation, Bethlehem, Pa. 18016.

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BETHLEHEM STEEL

BETHLEHEM STEEL

Words about Wisdom

"One had to cram all this stuff into one's mind, whether one liked it or not. This coercion had such a deterring effect that, after I had passed the final examination, I found the consideration of any scientific problems distasteful to me for an entire year. . It is in fact nothing short of a miracle that modern methods of instruction have not yet strangled the holy curiosity of inquiry; for this delicate little plant, aside from stimulation, stands mainly in need of freedom; without this it goes to wrack and ruin without fail. It is a very grave mistake to think that the enjoyment of seeking and searching can be promoted by means of coercion and a sense of duty. To the contrary, I believe that it would be possible to rob even a healthy beast of prey of its voraciousness, if it were possible, with the aid of a whip, to force the beast to devour continuously, even when not hungry--especially if the food, handed out under such coercion, were to be selected accordingly."

—Albert Einstein

DEAN'S • • •

appears to capture the flavor of the moment. What are the characteristics of this "era of uncertainty?"

1. There are those of you who question whether it is wise to continue plans for graduate study;

   There are those of you who question employers who have indicated they see no change in the prospects for obtaining technical deferments.

I have no magical answers, wordly insight, or inside information to assist you with the dilemma many of you presently face. It is my judgment however, that many of you are making decisions based on the strict interpretation of the policy as it has been printed. As a result your decisions have been made without the benefit of the complete picture. The criteria quoted above have been established by the Military Selective Service Act of 1967 and designed to help local boards determine appropriate classifications. Your local board has the final authority and the criteria for deferments are advisory rather than mandatory. You are strongly urged to contact your local board for an assessment of their position relative to graduate and occupational deferments.

WOMEN • • •

We discussed many of the non-important things people discuss when they have to talk with each other. When she was off guard, I asked her how well she carried the label, "Woman Engineer" (Just imagine meeting a girl in the dorm grill or out at the Dells or wherever you spend your time and have her tell you she's an engineer!) As Sarah put it:

"Those who are worth while talking to stay as if I'd said 'English', but those who are more concerned with their social image rather than with genuine people, find a quick excuse to leave."

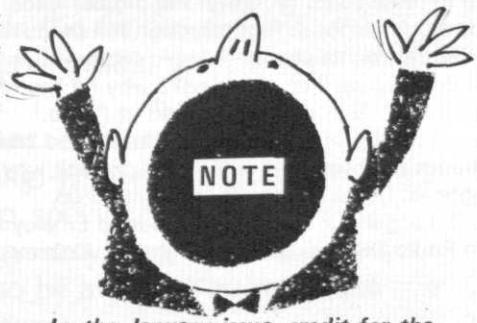
All right, so Sarah won't be the most well liked at Grandmothers, but we can't all be perfect. Sarah mentioned she had to go back to her room because she was expecting a call from her parents. This prompted me to inquire how her parents felt about her being an engineer and in a man's field.

"My dad's an engineer and he doesn't mind at all!"

I thanked her for her time and as she made her way up stairs, a few thoughts came to my mind, which could be generally applied to the women engineers as a whole. Almost 70% of the girls in Engineering are freshmen, with no seniors. I feel this is a reflection of the recent addition of Computer Science into the College, along with the fact that nowadays Engineering isn't just for men. The modern woman has to be in everything as is shown by an increase in the number of women in previously "men only" fields. The only problem I can foresee is having to add women's johns in the G.M.R.&D. lab.

I welcome girls into Engineering and am sorry that I won't be around longer to experience Dr. Potter say:

"All right you guys and Miss Webber, Fluid Flow is...?"



In the January issue, credit for the article "Owning a Stereo Madhouse" was inadvertently omitted. The article was written by Mike Royko.

INDUS-TREE • • •

by monkeys desiring similar attention and status.

The head monkeys in Paris have fomented a tradition far beyond practical economy. It is de rigeuer to possess an original creation, no matter how outlandish. This new garment must be worn with care, only a few times at most. "They...must have new coats, coats to change as often as the man changes in them." Many persons, for want of self-reliance, have adopted this warped importance of self, though a notable minority does more nearly follow the Thoreauvian economy of a relatively few garments worn constantly and simply reeking of assimilated character. To food and fashion may be added autos, homes, furniture, Christmas accessories, and toys, each with its own inherently unwonted elegance. The Germans say, "Besitzen heisst besetz sein." These things do not guarantee happiness, they dispose of it.

The enjoyment of leisure has been made difficult and expensive. Man bargains for more free time and promptly flounders in the myriad ways to spend it–none of them after the transcendentalist. The nearest are the campers, fishermen and hunters who live in the "wilderness" during vacations or weekends. But our contemporary demands comfort for his sojourn; he had the best climate-proofed tent, canned, like-fresh rations to warm up on his Coleman stove, folding chairs (as though his own seat mightn't serve for a while), and transistor radios and televisions with which to keep up on the latest news and be entertained. In many of our more rugged areas, this belated Boone may join excursion groups and carry maps to avoid a confrontation with Nature.

Contentment and transcendentalist leisure are incompatible with today's industrialism. Relaxation is often confounded by a necessity to conclude those last few dutiful details. Leisure time has acquired such ponderous complexity that pressure is never alleviated–pressure Thoreau never felt. He demonstrated that one can exist most happily on a very real minimum, but he was disappointed that "shams and delusions are esteemed for soundest truth while reality is fabulous."

Mondays never look the same to Bob Byse

When you're breaking ground on a new idea at Delco, you don't see a lot of your own desk. For Bob Byse, design engineering means work with two dozen solid professionals . . . people whose specialties range from microelectronics to model making to production. Wherever the project leads, Bob Byse is on his way. And every skill is at his disposal. Right through full production. And beyond. If there's trouble shooting under dealer warranty three years from now, Bob Byse is still the man we'll call for. That's why no two Mondays ever look alike to Bob Byse and his colleagues at Delco.

The question is . . . can you say the same? Take a good hard look at how your responsibility shapes up, compared with Bob's. In fact, why not discuss it with us. By letter or telephone. Collect. Area Code 317/459-2808.

Contact: Mr. C. D. Longshore, Supervisor, Salaried Employment, Dept. 300, Delco Radio Division of General Motors, Kokomo, Indiana.

DELCO RADIO

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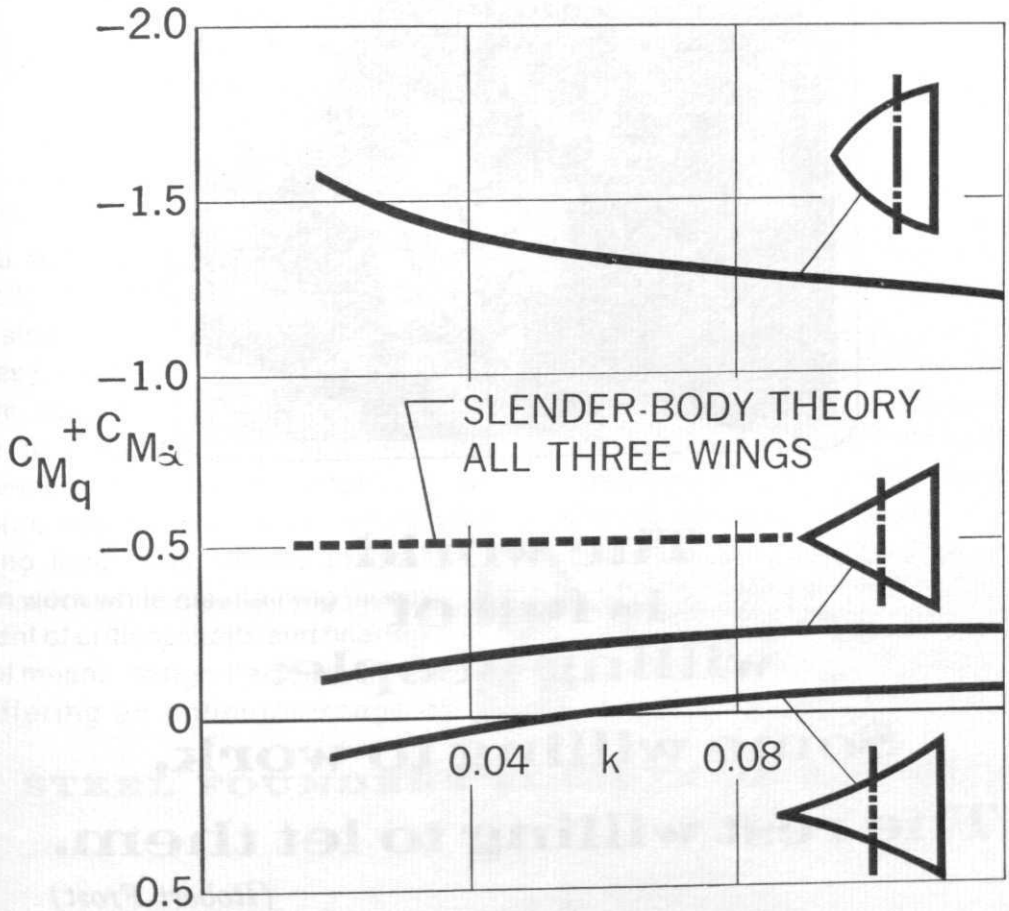

Like Captain.

Take a look at any campus. Big. Small. Rural. Urban. You see the same thing: guys and gals. Same books. Same looks. Same hopes.

And you are there.

Some students really jam in every bit of opportunity they can grab hold of. Some just drift through.

Which are you?

Here's a good tip: If you join the Air Force ROTC program on your campus you'll know you're grabbing a big opportunity. Financial assistance is available. You'll graduate as an officer—a leader on the Aerospace Team. You have executive responsibility right where it's happening. Where the space-age breakthroughs are. You'll be able to specialize in the forefront of modern science and technology—anything from missile electronics to avionics. You can also be a pilot. You won't get lost in some obscure job with no future.

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So graduate with our blessings.

And a commission.

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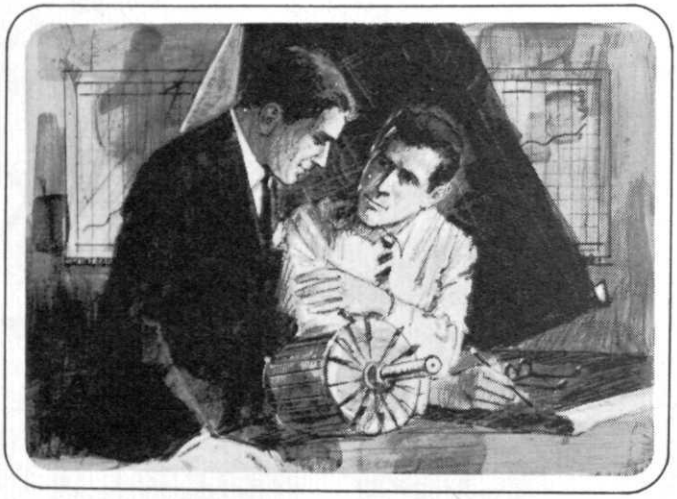


The world is full of willing people:

Some willing to work,

The rest willing to let them.

(Robert Frost)

At Whirlpool, all our engineers are willing and able to make their own significant contributions. That's because they take their work seriously. . . . Whether it's assisting in the development of food, water and waste management systems for NASA or helping housewives get their dishes cleaner.

Whirlpool is where innovation is seldom uttered, but always seen . . . where motivation is part of our way of life . . . where preparation for the future is daily routine.

Sign up today and come in to see us . . . the working is fine.

Whirlpool

An equal opportunity employer

You can't buy this piece in a steel warehouse

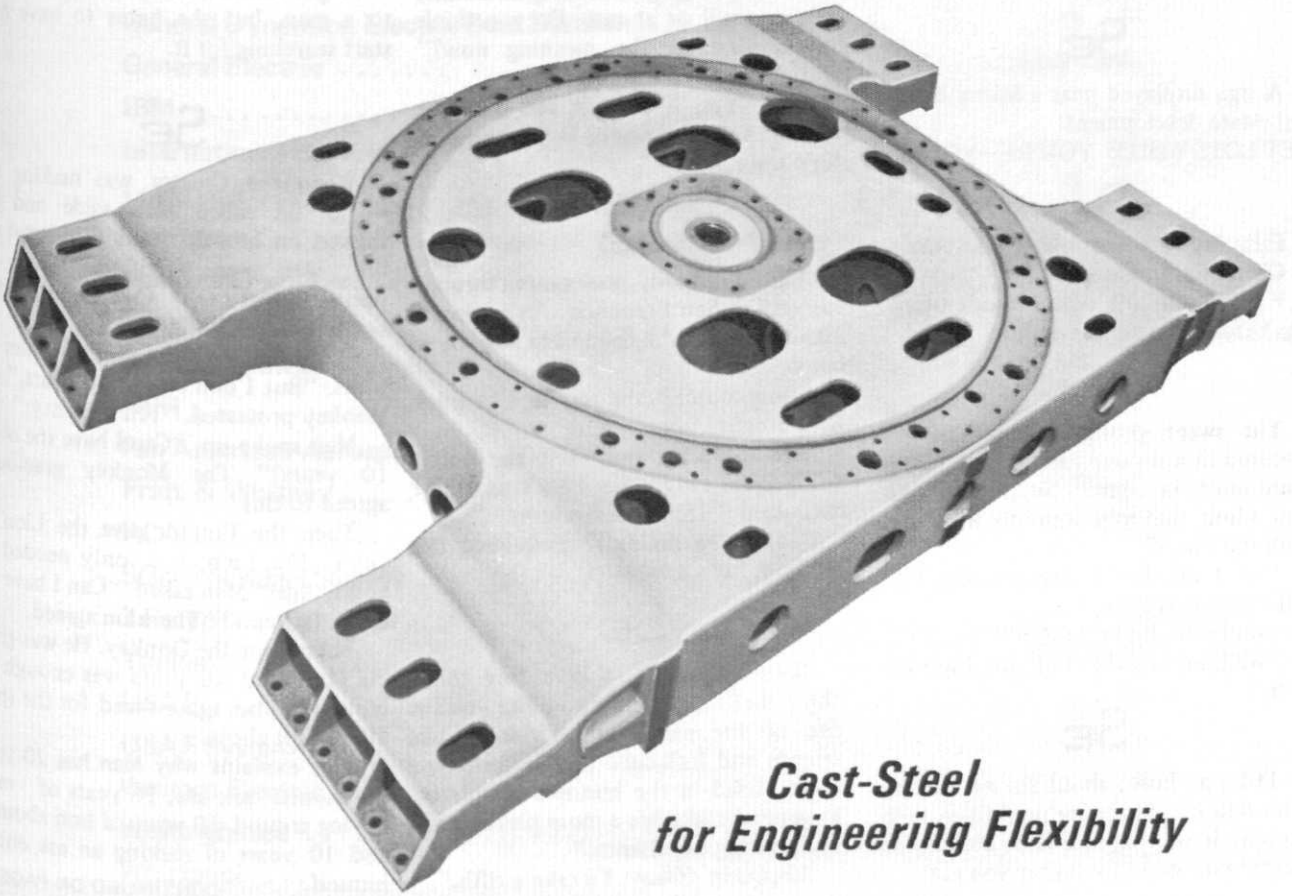
How do you accommodate multiple functions, high non-uniform stresses and complex configuration in a single component made of standard steel shapes? You don't . . . That's why this power shovel body had to be *cast-steel.*

Only with the correct steel composition, and integral one-piece construction, could the designer be sure that the equipment would take the punishing loads and shocks of heavy construction work while maintaining the precise alignment of critical shafts and bearings.

Cast-steel means design flexibility. In addition to offering an unlimited range of shapes, it allows the engineer to put the metal where it's needed for load-carrying ability... Then too, *cast-steel* permits streamlined design —design that minimizes stress-concentration at sharp radii and corners. Can you match such versatility with assembly methods? Don't try.

Want to know more about *cast-steel?* We're offering individual students free subscriptions to our publication "CASTEEL". . . Clubs and other groups can obtain our sound film "Engineering Flexibility." Write Steel Founders' Society of America, Westview Towers, 21010 Center Ridge Rd., Rocky River, Ohio 44116.

STEEL FOUNDERS' SOCIETY OF AMERICA



Cast-Steel for Engineering Flexibility

ENGRINEERS

Three degrees you can get in college: B.S., and everybody knows what that means; M.S., which, naturally, means more of the same; and Ph.D., which means 'piled higher and deeper.'

"That man made love to me, Judge," said the plaintiff in the breach-of-promise suit. "He promised to marry me, and then he married another woman. He broke my heart and I want $10,000."

She got it.

The next case was a damage suit brought by a woman who had been run over by an automobile and had three broken ribs. She was awarded $300.

Moral: Don't break their hearts, kick 'em in the ribs.

A sign displayed near a Miami Beach real estate development:
GET LOTS WHILE YOU'RE YOUNG.

E.E.: My wife worships me.
Chem. E.: Is that so?
E.E.: Yeah, she places burnt offerings before me every evening.

The sweet young thing got herself involved in a divorce case and was being questioned in court. "So, Miss Jones, you admit that you went to the hotel with this man?"

Yes, I do, but I couldn't help myself–he deceived me."

"And how did he do that?"

"Well, he told the clerk that I was his wife."

Did you hear about the millionaire who had his swimming pool filled with scotch? It was impossible to drown–the deeper you sank, the higher you got.

Overheard on campus, one coed to another, describing her date: "He was like a big neutron–all mass and no charge!"

SIGN ON DOOR OF DOCTORS OFFICES:
DR. TOM SMITH, PSYCHIATRIST
DR. TIM JONES, PROCTOLOGIST
SPECIALIZING IN ODDS AND ENDS

An EE was trying to explain the meaning of static and dynamic energy to his girl friend while they were in a parked car.

EE: "Dynamic energy is continuously changing or moving and static energy is still or at rest. Do you think you understand the meaning now?" (getting closer to the girl)

Girl: "Yes, if you get too dynamic with me you'll be placed in a permanent static state."

A little old lady was coming through customs at San Francisco. An inspector asked her what she had inside a bottle in her valise.

"Holy water," she replied in a thick Irish brogue.

The inspector uncorked the bottle and took a swig. "For Pete's sake," he exclaimed. "This is Irish whiskey."

"Saints be praised!" exclaimed the old lady. "It's a miracle!"

Salesman: "See, I have here something that's guaranteed to make you the life of the party, allow you to win friends and influence people, help you forge ahead in the business world, and in general make life a more pleasant and invigorating experience."

Engineer: "Okay, I'll take a fifth."

He drove quite a distance into the country, stopped the car and asked the girl, "Are you a Chesterfield or a Camel girl?"

Somewhat confused she asked, "What do you mean?"

He said, "Would you rather satisfy or walk a mile?"

Sorority Girl: "What makes me so popular with the boys? Is it my looks?
EE: "No."
Girl: "Is it my personality?"
EE: "Nope."
Girl: "I give up." EE: "That's it."

A girl doesn't mind losing her heart to a man, but she hates to have him start searching for it.

When the Creator was making the world, he called Man aside and bestowed on him 20 years of normal sex life. Man was horrified. "Only 20 years?" But the Creator wouldn't budge.

He called Monkey and gave him 20 years, "But I don't need 20 years," the Monkey protested. "Ten is plenty."

Man spoke up, "Can I have the other 10 years?" The Monkey graciously agreed to this.

Then the Creator gave the Lion 20 years. The Lion, too, only needed 10 years. Again Man asked. "Can I have the other 10 years?" The Lion agreed.

Then came the Donkey. He was given 20 years, but 10 years was enough for him, too. Man again asked for the spare 10 and got them.

This explains why Man has 20 years of normal sex life, 10 years of monkeying around, 10 years of lion about it, and 10 years of making an ass out of himself.

CONTINUED ON PAGE 50

THE ADVERTISER'S INDEX

jokes . . .

"The more I think about going out and getting a job the more I think about staying on for a Master's."

SE

A whale and a sardine frequented a certain bar together, once nightly for over three years. One night the sardine came in alone. Now, the bartender was an understanding man, so, after a respectable pause, he ventured to ask the fish, "Where's the whale?", thinking of course, that they were close friends after three years of drinking together. But, to his surprise, the sardine indignantly replied, "What am I, my blubber's kipper?"

SE

At roll call in a Russian regiment, it is reported that an officer sneezed and four men promptly answered, "Here."

Three tourists were standing on a street corner in North Africa. They were an Englishman, an Arabian, and an American. Just then a beautiful woman walked by. The Englishman said, "By Jove!" The Arabian, "By the Prophet!" The American just shifted his chewing gum and said, "By midnight!"

SE

Remember, you hold the future of the world in your hands–sometimes.

SE

In a water safety class the instructor was quizzing her students on common sense in lifesaving techniques.

"What article of clothing," inquired the teacher, would you remove last if you fell in the water with all your clothes on?"

One little freshman raised her hand.

"The blouse", she said. "Air gets under it and acts like a buoy."

This city slicker bought a farm with the intention of raising pigs. His farm was five miles from the farm with the county champion pigs, ten miles from the farm with the state champion pigs, and twenty-five miles from the farm with the national champion pigs. After settling down, he put his only sow in a wheelbarrow, walked her five miles to the county champion pigs, had her bred, and walked back. The next morning he awoke, but much to his disappointment he found no little piglets. So he put the sow back in the wheelbarrow, took her ten miles to the state champion pigs, had her bred, and walked back. The next morning he awoke, but again found no piglets. He put the sow back in the wheelbarrow and walked twenty-five miles to the national champion pigs, had her bred, and walked back. The next morning he awoke and asked his wife, "Honey, do you see any little piglets out there?"

"No," she replied looking out the window, "but that old sow is back in the wheelbarrow again."

There's new muscle in roadbuilding!

Full-Depth T_A Deep-Strength Asphalt pavements

14 advantages of structurally designed Full-Depth Asphalt pavements...

1. Lower stress on subgrade.
2. Reduce total pavement structure thickness.
3. Make many lower quality aggregates usable.
4. Are frost resistant and do not lose strength during the critical spring-thaw period.
5. Protect subgrade from rain during construction, reduce construction delays due to bad weather.
6. Permit haul traffic on base without damage.
7. Prevent water accumulation in pavement courses, minimize need for costly subsurface drainage.
8. Permit large reduction of granular material customarily used in shoulder and base construction.
9. Improve surface riding qualities.
10. Provide for stage construction.
11. Aid uniformity of compaction.
12. Can be built faster and easier than any other pavement type.
13. Are more economical to build and to maintain.
14. Provide a safer driving surface.

FULL-DEPTH Asphalt pavement is an asphalt pavement in which asphalt mixtures are employed for all courses above the subgrade or improved subgrade. FULL-DEPTH Asphalt pavement is laid directly on the prepared subgrade. T_A—a mathematical symbol used in The Asphalt Institute structural design formula to denote FULL-DEPTH.

THE ASPHALT INSTITUTE
College Park, Maryland 20740

Cross-section of Full-Depth T_A Deep-Strength Asphalt pavement

Randy Trost, Wisconsin '67

"I never feel like a rookie"

"Sure it's my first year with B&W, but I've been too busy to think about that. I've been working in my field all along, and the training sort of blends right in."

If Randy Trost sounds like a B&W booster, you should hear what his supervisor says about him.

We're looking for aggressive, talented young engineers like Randy. We want you if you want significant responsibility from the start. In fact, we need more engineers than ever before. That's because we're growing faster. Sales were $560 million last year. Up 17 per cent.

That's how it's been from the beginning. We started out making steam generation equipment. That led to atomic power stations, nuclear marine propulsion equipment, refractories, specialty steel, machine tools, computers, and closed-circuit TV. (And we still make the best boiler in America.)

If you'd like to talk with Randy Trost about B&W, call him collect at our facility in Lynchburg, Virginia, AC 703 846-7371.

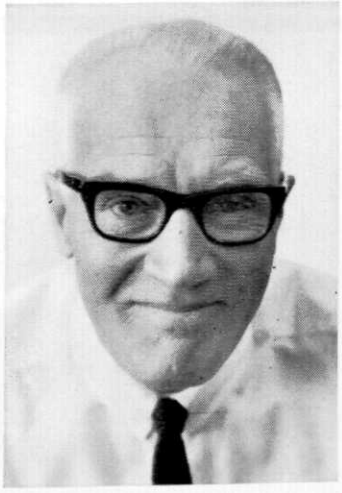
In the meantime, be on the lookout for the B&W recruiter when he visits your campus.

The Babcock & Wilcox Company, 161 East 42nd Street, New York, New York 10017.

Babcock & Wilcox

Top grades as a kid, to get into college. Then the matter of survival through four or five years of engineering study. Soon, with luck, the battle will be won. A full-fledged engineer has been created,

ready to serve



the boss!

AND HE HAD BETTER BE READY FOR YOU. Bosses who think like caricatures lack the capacity to run important operations that call for the brightest operating talent that a stepped-up educational system turns out. The new talent that may or may not choose to make itself available takes a careful look at the carrots being offered.

Once we decide we like that bright new talent—and we decided that quite a while ago—it becomes necessary to put up with their demands. Aside from the expected attractive package of salary, benefits, and advancement plan, the ones we have chosen to chase often demand in addition an opportunity to try their newer and subtler ways of thought against old problems. As it happens, we need this type badly, because we have plenty of stubborn old problems, plenty of financial incentive to crack them, and a very stable platform for launching new ventures that take a little while to pay off. (The latter must not be underrated as an attraction.)

Sweeping generalizations are no more reliable for the Class of 1968 than for the boys of '38. Not all '68's finest engineering minds disclaim knowledge of how to handle a screwdriver nor shun empiricism. We offer excellent carrots, along with money, to engineers with a knack for making things work even when they can't explain why.

EASTMAN KODAK COMPANY
Business and Technical Personnel Department
Rochester, N. Y. 14650

We seek mechanical, chemical, industrial, and electrical engineers. In Rochester, N.Y., we make photographic and non-photographic products. In Kingsport, Tenn., our Tennessee Eastman Company makes fibers, plastics, and industrial chemicals. In Longview, Tex., our Texas Eastman Company does petrochemistry, and in Columbia, S. C., our Carolina Eastman Company has a new fibers plant. Everywhere we offer equal opportunity to all and geographical stability to those who want it.

Kodak

Dan Johnson has a flair for making things.

Just ask a certain family in Marrakeck, Morocco.

A solar cooker he helped develop is now making life a little easier for them—in an area where electricity is practically unheard of.

The project was part of Dan's work with VITA (Volunteers for International Technical Assistance) which he helped found.

Dan's ideas have not always been so practical. Like the candlepowered boat he built at age 10.

But when Dan graduated as an electrical engineer from Cornell in 1955, it wasn't the future of candlepowered boats that brought him to General Electric. It was the variety of opportunity. He saw opportunities in more than 130 "small businesses" that make up General Electric. Together they make more than 200,000 different products.

At GE, Dan is working on the design for a remote control system for gas turbine powerplants. Some day it may enable his Moroccan friends to scrap their solar cooker.

Like Dan Johnson, you'll find opportunities at General Electric in R&D, design, production and technical marketing that match your qualifications and interests. Talk to our man when he visits your campus. Or write for career information to: General Electric Company, Room 801Z, 570 Lexington Avenue, New York, N. Y. 10022

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AN EQUAL OPPORTUNITY EMPLOYER (M/F)