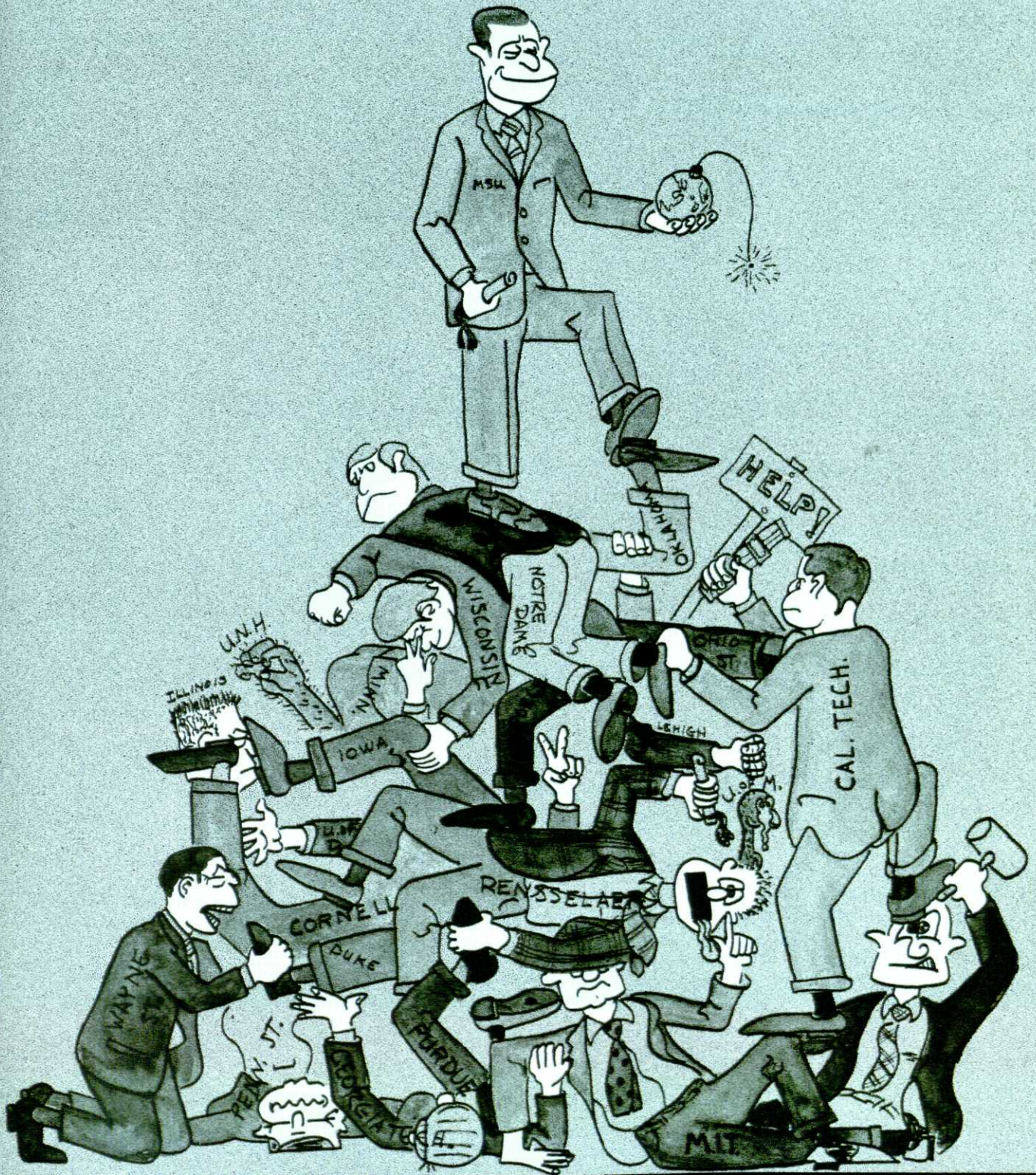


SPARTAN ENGINEER



NOVEMBER, 1968

254



Westinghouse needs engineers with oceans of knowledge

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or knowledge of oceans.



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Telstar _____

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SPARTAN engineer

MICHIGAN STATE UNIVERSITY

VOLUME 22

NUMBER 1

NOVEMBER, 1968

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Mr. Logan Blank



There is much heated debate between engineering colleges as to which particular college is supreme. This month's cover, by Davis Chase, shows the obvious conclusion.

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I claim that the Michigan State University College of Engineering is a damn good school. This claim is not based on a "best of all possible worlds" absolute scale. In fact, there are probably as many genuine defects in our school and in the quality of education we receive as there are students. What makes the school great is its potential for change from within. I have never seen a bureaucracy of this size where there were so many open doors to the offices of those who hold such awesome power over our futures. Any student who has a legitimate complaint about his education and hasn't gotten some sort of satisfaction simply hasn't made any effort in his own behalf.

Even in the absence of student protests, demonstrations, etc., which rarely occur in engineering schools, the trend here has been toward the flexible curriculum and the education of the individual as an individual. If this were a place where engineers were "trained" I would certainly not have made the claim that I did in the first sentence of this editorial. Students here are being educated for the pursuit of the last job they will ever have, not trained for their first. Yet this is just a trend. There are those among both the student body and the faculty who are outspoken critics of the status quo but who have never spoken out. The *Spartan Engineer* wishes to encourage those who have the courage of their convictions by offering space where their ideas may be heard.

The majority of the non-advertising space in the *Spartan Engineer* this year will be devoted to articles which present a view of the College of Engineering not ordinarily seen by the student who only attends classes here. The purposes and activities of some of the professional societies having student chapters on campus will be the subject of a regular column. Another series will feature comments on "an engineering education" by MSU engineering graduates who have achieved high positions in industry or government. Yet another series will present a view of faculty members which is not ordinarily seen in a classroom situation. If, at the end of this year, the average reader isn't at least a little more impressed with the College of Engineering I will be very disappointed.

T. M. Schaefer

Student Organizations

Editor's Note:

Professional organizations provide the student with an opportunity to gain insights into his chosen field at a time when he still has the most options open to him. Descriptions of the student branches of professional organizations and the activities of these student branches will be a continuing feature of the Spartan Engineer.

American Institute of Chemical Engineering

When the American Institute of Chemical Engineers was formed in 1908 Chemical Engineering had just started to become a branch of engineering. Its literature was almost non-existent, and the few who could call themselves chemical engineers were widely scattered. The purposes of the new society were reworded frequently in those early years until the present general objectives were adopted: "The advancement of Chemical Engineering in theory and practice, and the maintenance of high professional standards among its members." Even now the ways and means are left to members of this professional society.

The A.I.Ch.E. has an established student chapter at Michigan State University and provides the opportunity for students to learn about the profession of Chemical Engineering. Members of this organization have a chance to meet with students at various class levels and faculty for stimulating discussion and relaxation. Occasionally, outside speakers from the chemical industry are invited to speak to the group on the latest developments which are of interest to chemical engineers. The student chapter also visits chemical plants periodically.

American Society of Civil Engineers

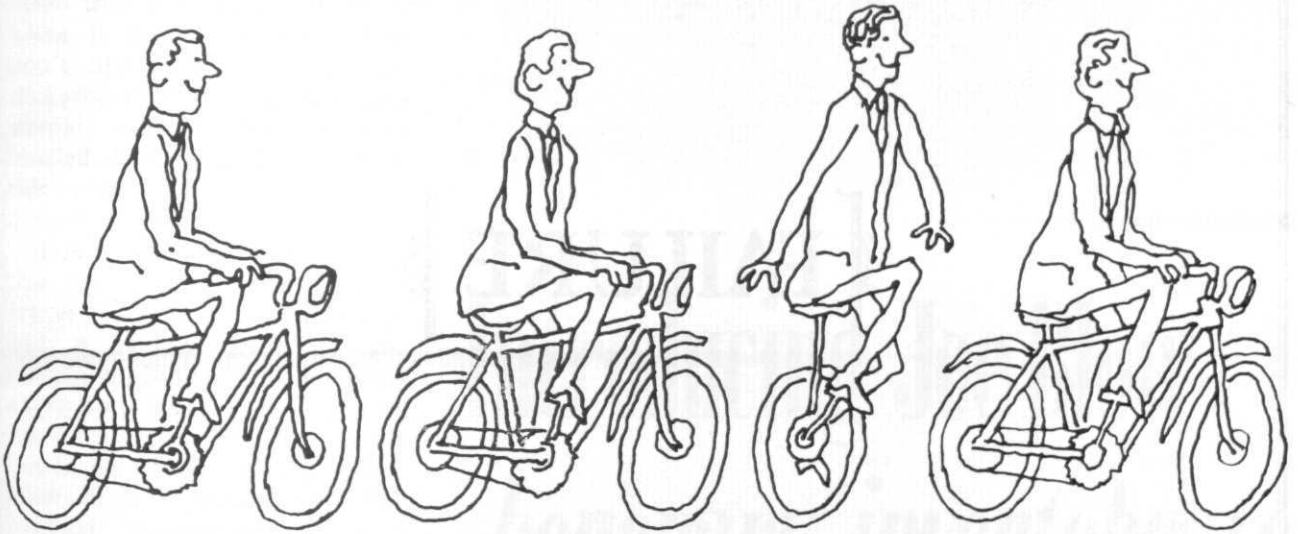
The student chapter of the A.S.C.E. is an organization to help the student prepare himself for entry into the civil engineering profession and the senior society of A.S.C.E. All students who are enrolled in civil engineering are eligible for membership.

The activities of A.S.C.E. include meetings which are open to students, faculty, and alumni; meetings with other societies; field trips to various engineering projects; meetings with professional groups; films and picnics. The local meetings consist of a short business meeting followed by a program consisting of a talk by a professional engineer or professor, slides, films, or other items of interest to the student engineer.

American Society of Mechanical Engineers

The student section of ASME is the professional society for students in mechanical engineering. It has as its purpose the fostering of high ideals and the promotion of mechanical engineering as a profession. One of the main means of accomplishing this is the communication of the latest developments and other information pertaining to the mechanical engineering profession. This is done through "Mechanical Engineering," the monthly publication of ASME as well as a number of other journals and publications.

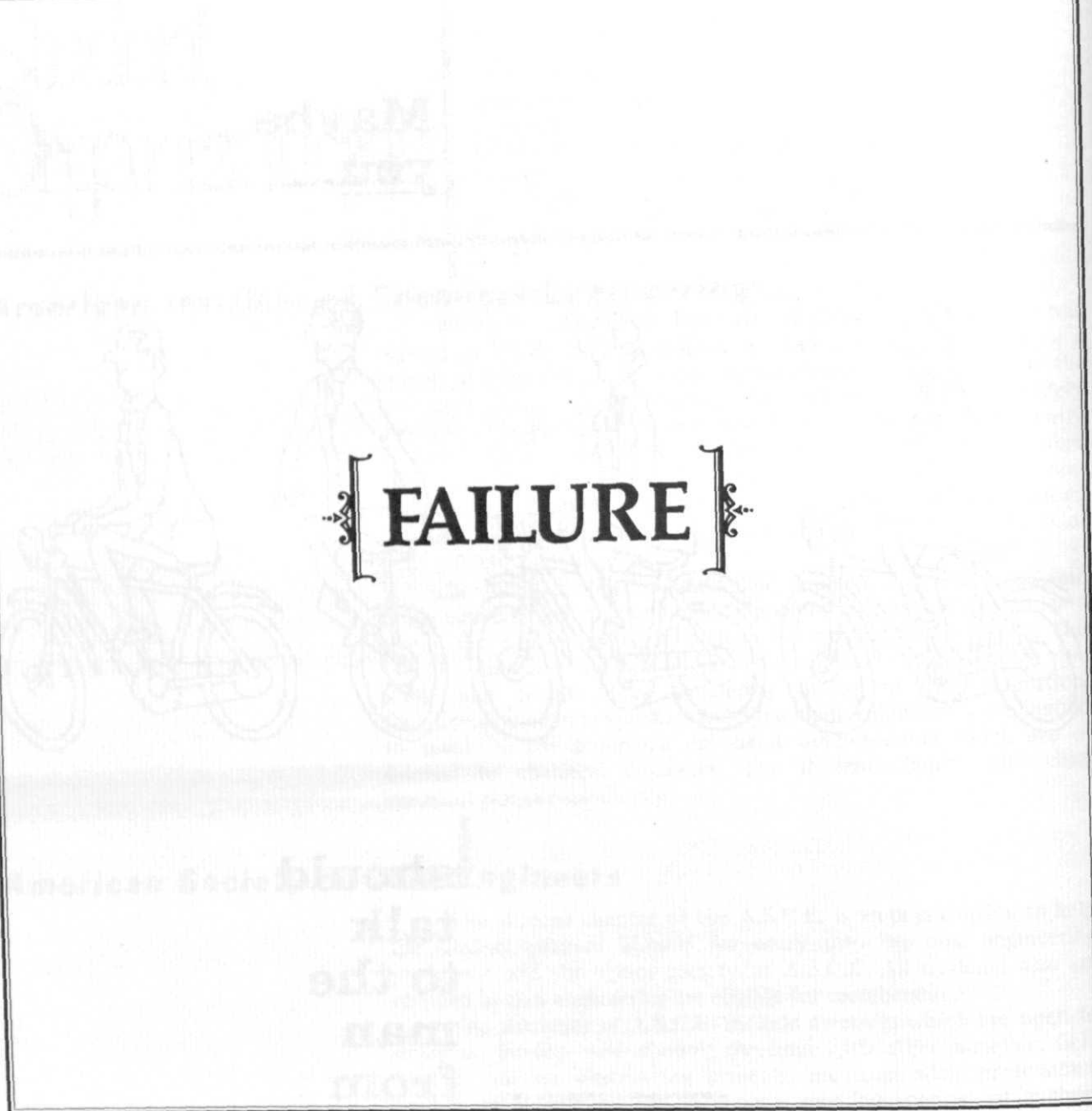
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OK Lead-head, get the slide rule out of your ear, quit sucking your thumb and for once in your life recognize it when somebody's trying to do you a favor. You're *dumb*, Dum-dum. You're being prodded, punched, coerced and kicked around, and you just sit there and take it. You've been hit so hard and so often that you don't even know when it hurts any more. You don't like it, but you've been slickered into thinking that you should like it. You've been hustled, hoodwinked, taken for a ride—you've *been sucked in*, *Lead-head*. Wake up!

You may have guessed that this isn't going to be a positive article—if you want glad-hands and a cheesy grin, try the Placement Bureau. After nosing around the College of Engineering for three plus years I've found plenty to laugh at, but none of it is very funny. The biggest laugh-getter is you, Lead-head, and what you're doing to yourself is the least funny of all.

There's something wrong here. How can people shell out what they do for tuition and then attend class practically *in absentia*? How can Joe Blow Engineering-student sit passively, dully, bored to death and hating the instructor for this imposition on his life, but still sit there, grimly scribbling down whatever's thrown his way? How can he spend all that time and incomplete effort on something for which he sees little value and cares even less? How can he stagger from test to test, hanging on by his finger nails, and then forget everything that happened to penetrate three seconds after the final? How?

Easy. Joe Blow doesn't know what he's doing. Oh, it's not entirely Joe's fault, poor slob, it's the unreasonable academic philosophy that permeates MSU that keeps him groggy. It's the philosophy that assumes a

Introducing Joe Blow- *honorary invertebrate*

by ALLEN SHRATTER

freshman to have his life mapped out before him, knowing exactly what he wants and why. It's the philosophy that views faculty as teaching units and students as learning units, both with rigidly defined functions and characteristics. It's the

philosophy that makes a moral duty out of sticking with the curriculum, and places a stigma on any deviation, any dropped course, any failed subject.

And Joe Blow falls for it!

CONTINUED ON PAGE 11

Editor's Note:
The Spartan Engineer welcomes any constructive criticism from members of the University community. All written, legitimate complaints will receive consideration for publication. Equal space will be provided for rebuttal.



Can there be this kind of excitement in engineering?

A long beautiful drive... just the hint of a slice... and *almost* on the green. Now, address the ball... concentrate—and, wham! to a lie four feet from the cup.

That's the excitement of the game that gets a golfer up at dawn on Saturdays.* We think it's analogous to the excitement that keeps some of our technical people on the job after hours: the pleasure of personal achievement in solving problems for which there are no book solutions.

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INTRODUCING . . .

CONTINUED FROM PAGE 9

Not only falls for it, but reinforces it. Joe Blow has a smug feeling of superiority as he miserably plugs away at his studies. He's working on engineering, baby. He can cut it. Everything else is child's play. All those History and English and Poly-sci majors are goofing off, they're a drag on society. And those bug-eyed Math and Physics majors—they'll never do anyone any good, fooling around with that wild theoretical garbage that has no relevance to the real world. It's the engineers who keep everything together; they're the ones who are doing the work.

This kind of intellectual conceit is what keeps Joe going. He and all the other Joes gather together and reassure themselves. The camaraderie of people under stress and with similar problems is universal, and at the Engineering Building it does keep the atmosphere from becoming unbearably dreary. But the camaraderie also distorts, it lets Joe Blow kid himself. He looks out the window and laughs at the other people, not realizing that the window is a mirror and the other people are laughing back.

Have you ever stopped to ask yourself just what you're really here for, Lead-head? A degree? Sure, sure, everybody knows that. But a degree serves a purely social function. It's a pass key to a job, a document that assures your employer—however falsely—that you can do the work. It's a piece of paper that classifies you. But *you*, yourself, whether you know it or not, should be looking for something more personal. You should be looking for something that is important to you—something that you could with pleasure devote a good deal of your subsequent life.

You're edging away, eh Lead-head? Starting to get a little philosophical, right? Somewhere

along the line you were told that a good little engineer is interested in the Schrodinger equation, cast iron and not much else. And you believe it, don't you Dum-dum?

The fact is that Joe Blow Engineering-student does not know what he wants, and the tragedy is that he's never given a chance to find out. Look at what they do to him. As a freshman he comes in and it's assumed that his philosophical goals are clearly defined. He *wants* to be an engineer; after all, that's what he checked on his admissions form. Immediately he is dumped into basic chemistry and math courses—later, the actual engineering courses begin—all of which are big, high-pressured, often tedious and almost always impersonal. Nowhere along the line is any attempt made to give motivation, to show Joe Blow why it is desirable to be an engineer.

It's sad, it's so sad to watch those many students grinding away at their class work, uninterested and unhappy. By the time they reach a senior level course—where the class size is sufficiently small and the goals of the course sufficiently flexible to make the student/faculty interplay a satisfying experience—the students want to get the hell out. They're so sick and tired of the whole bit that they just want to know what's needed to get by the exams, and what's the most painless way to get through the work. It's just as sad to think of those many students who are driven away from it all by the heavy-handed educational processes. Students for whom engineering would have been just the thing they were looking for, right up their alley, but they never knew it because no one ever told them.

OK, you're right—it doesn't have to be that way. The structure doesn't have to be so rigid and impersonal. Perhaps it's the only way to run other departments in the University,

but the College of Engineering has a paltry several hundred students. Surely the curriculum can be modernized and made more flexible, the atmosphere can be made more informal and relaxed, and the class size can be made smaller.

But when you get down to basics, it's your problem, Lead-head. It's your life and your education and your money down the drain. Have some guts. Review yourself—do you really want to be an engineer? Why? You don't know? Well find out. If you don't like it get out now while you still have the chance. Make a decision and quit chickening out on yourself. Quit sweating the grade so much and start demanding that you be educated. If you have a lot of hang ups some term, can't find the handle on a course for some reason, have the courage to drop it and try again some other time. Most importantly, wake up and see what that man in front of the class is doing. Think about what's going on; open your mouth and ask questions, or give answers, or start an argument, or wonder out loud about something. *React*, and for a change at something other than an exam when you look up horrified and think "what's this? *CALCULUS*? I can't do this—you can't find no derivative on a slide rule."

Don't let yourself be a machine, built to specifications and shipped after graduation to your new father figure—that great giant of American industry—Universal Shafting. Quit satisfying other people and start satisfying yourself. You're entitled.

To close, I shall quote a man whom I will not identify—because, mainly, the quote is probably copywritted and I can't afford the payments. Anyway, to wit: "Let he who don't want none, have memories of not gettin' any; and let that not be his punishment, oh Lord, but his reward."

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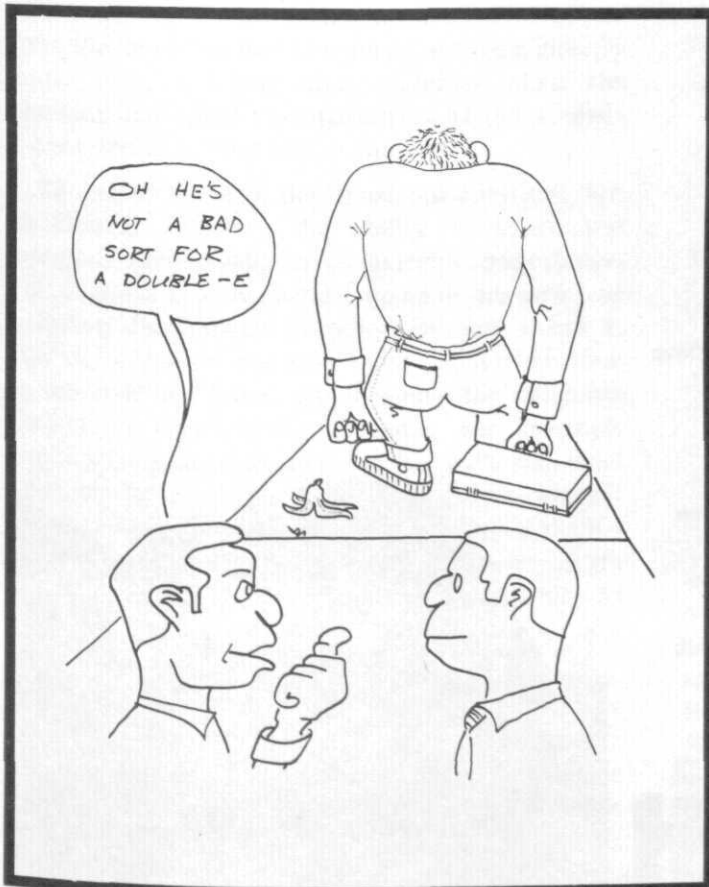


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SUMMARY OF ENGINEERING STUDENTS

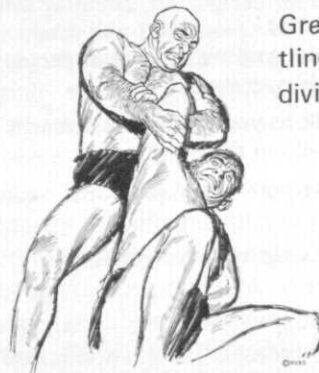
FALL TERM 1968
COLLEGE OF ENGINEERING

MAJOR	UNIVERSITY COLLEGE		COLLEGE		GRADUATE			DEPARTMENTAL TOTALS		
	FR	SOPH	JR	SR	MS	PHD	NON-DEG.	UNDER GRAD.	GRAD.	TOTAL
A.E.		20	13	11	15	27	—	44	42	86
MECH.		—	—	—	1	19	—	—	20	20
ChE.		58	40	39	11	12	—	137	23	160
C.E.		76	63	73	42	17	6	212	65	277
CPS		53	35	31	—	—	—	119	—	119
E.E.		126	112	124	46	59	1	362	106	468
E.S.		9	8	6	—	—	—	23	—	23
M.E.		123	112	114	34	22	1	349	57	406
MtE.		11	9	10	8	13	—	30	21	51
SYS.		6	8	6	5	3	1	20	9	29
No. Mjr.	740	43	—	—	—	—	—	783	—	783
TOTAL	740	525	400	414	162	172	9	2079	343	2422



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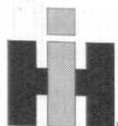
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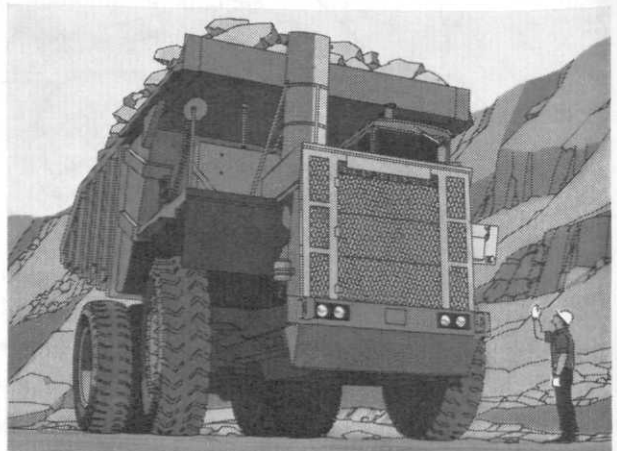
So be sure and talk to your campus placement officer about us. He’ll give you the word.

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HAROLD C. Mac DONALD

by ART BELL

What does the future hold for engineering? Is there anything we as prospective engineers can do to better prepare ourselves for the challenges ahead? I recently talked to Mr. Harold C. MacDonald, a 1940 graduate from M.S.U. in Mechanical Engineering, now part of the management of Ford Motor Company. Mr. MacDonald is currently the Vice President of Product Development Group, which includes the responsibility for automotive and truck engineering, and the product planning aspects of both the automotive and truck activities. His credentials as an authority on engineers comes from the three thousand engineers working directly under him, a figure that increases when the planning and complete engineering of the product is considered, to over twelve thousand.

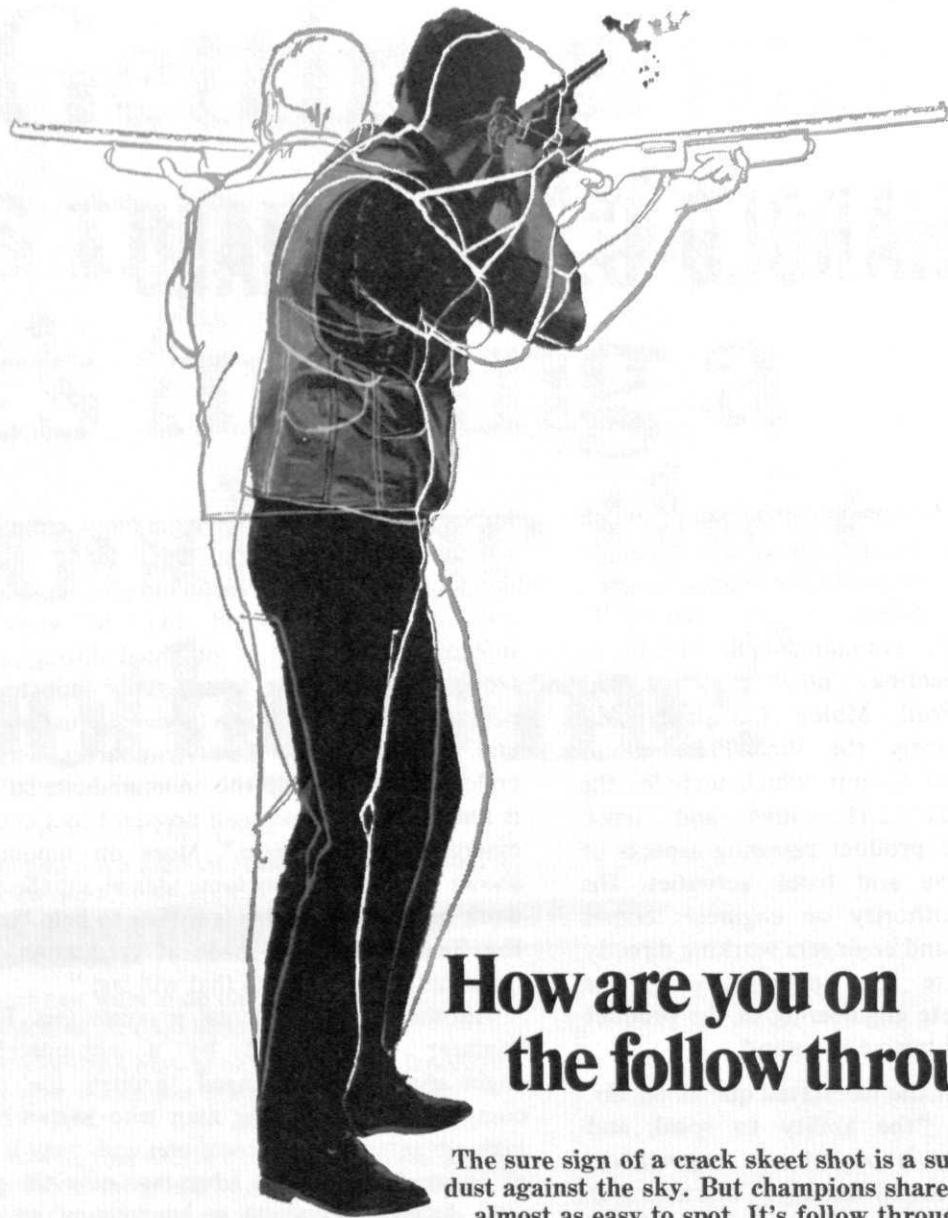
To answer some of the forestated questions, Mr. MacDonald believes "the ability to speak and represent ideas orally is of extreme importance. The engineer that is found lacking in this area is at a distinct disadvantage in today's business world. It used to be that the engineer spent much of his time at the drafting board either doing the designing himself or very closely following the designers working for him, whereas today he has to represent his ideas. He has to plan his whole program himself and is more of an engineering manager than a designer and therefore the better job he can do representing himself to his people and to management, the better or more rapidly he will progress."

Many engineers would like to know what industry looks for in the way of skills and comprehension. Those students in particular that have an eye on industry should know "how things are designed, what the process is within the company or corporation as to how the project is started and the steps of production itself. It is

important to understand what steps are necessary to develop an idea so that it is ready for production. A person must have some idea of the area where he would like to work. This information can best be obtained through summer work, visitations, or members of industry being called back to the schools to give discussions, talks, and even seminars. These are areas where the college itself can help the undergraduate so that he is knowledgeable and well prepared by the time he emerges as a graduate." More on summer jobs shows if a student has some idea about the type of work he wants, industry is willing to help "so when the final contract is made at graduation, it is a meaningful one and one that will last."

Another area of interest is computers. Will the engineer be replaced by a computer? Has engineering itself changed through the use of computers? "The young man who knows how to take advantage of the computer and make it a tool of his trade has a real advantage over the person who doesn't appreciate or understand their use. What engineers are doing now is not really different from what they were doing say twenty or thirty years ago, but it is more refined. A computer is nothing more than a very complex, multi-million dollar slide rule. Where we used to calculate with a slide rule, formulas, and long hand figuring, we do the same with a computer now. It's not any different, but it allows us to do more faster and much more thoroughly; as is the same in so many aspects of our business. We are doing things so exhaustively that the product is much more refined and sophisticated, and therefore much less apt to give the customer problems, it will last longer, and give more value. The more automated it can be, the more inexpensive it's probably going to be. While industry is not trying to automate for the sake of eliminating people from jobs, business is growing

CONTINUED ON PAGE 30



How are you on the follow through?

The sure sign of a crack skeet shot is a sudden puff of clay dust against the sky. But champions share another mark that's almost as easy to spot. It's follow through.

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These fingers once trembled uncontrollably.

The affliction, Parkinson's disease or "shaking palsy." Its cause, a bit of diseased tissue deep within the brain—making the hands tremble uncontrollably.

For years, doctors tried many ways of destroying the troublesome spot. Today, in carefully selected patients, operations for Parkinson's disease are performed safely and successfully with a new type of surgery based on cryogenics—the science of extreme cold—that was pioneered by Union Carbide.

Working with surgeons at Saint Barnabas Hospital, New York City, Union Carbide designed equipment by which the intense cold of liquid nitrogen, at 320 degrees below zero F., is applied with pinpoint exactness to the diseased tissue. Instantly frozen and destroyed, the uncontrollable trembling ceases.

Medical science is finding more and more uses for intense cold—another example of how Union Carbide takes familiar things and puts them to new and beneficial uses.

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FOR YEARS ENGINEERS HAVE SOUGHT A CHAMPION! THEY ASKED HOWDY DODDY & CAPT. KANGAROO. BUT NOW DURING THE DARKEST HOUR !



AS THIS EPISODE OPENS WE FIND SUPER ENGR. - WHO IS REALLY MANSFIELD FINSTERWAL - ENJOYING SOME GOOD FUN AT GRANNIE'S HOUSE - NASTY NASTY NASTY



MANNY - OLD FRIEND!

NOT TOO BAD - I'VE BEEN HAVING KIND OF A ROUGH TIME FINDING AN ELECTIVE TO TAKE



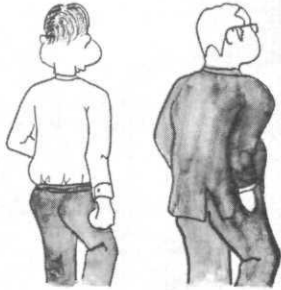
HI TOM HOW'RE THINGS?



HAVE YOU TALKED TO YOUR ADVISOR?

MAYHAP I'LL STOP IN ON HIM

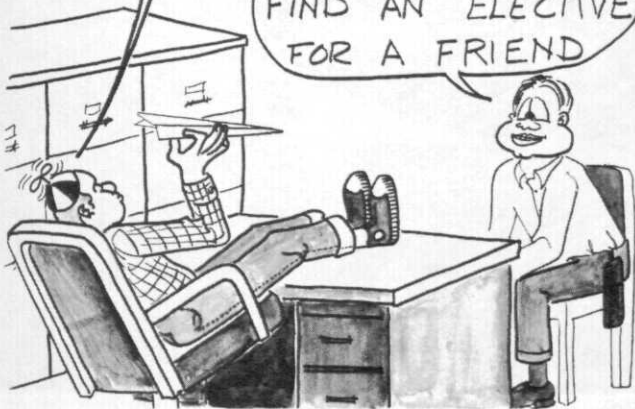
YEA BUT IT DIDN'T DO MUCH GOOD



NOW RECOGNIZING HIS RESPONSIBILITY TO HIS FELLOW ENGINEERS; NEXT MORNING WE FIND MANNY IN THE OFFICE OF HELPFUL BLOWGUN LANK

HI MANNY WHAT'CHA WAN'?

I'D LIKE YOU TO HELP ME FIND AN ELECTIVE FOR A FRIEND



LET' SEE -- HOW ABOUT CONFUSION 318?

OR FOODS AND NUTS - HOWZAT?

FOUND IT - TURKEY FARMING

NO NEAT YIPPIE SKIPPY!



LOOK - WHAT'S A GOOD COURSE THAT'LL HELP AN ENGR'S EDUCATION?

HOW SHOULD I KNOW I'VE NEVER TAKEN AN ENGRING COURSE IN MY LIFE !!

PHOO-BA!



NOW AS A TOKEN OF OUR GRATITUDE

POOF!



After 3000 years we're just beginning to unravel the mystery of magnetism.

The lodestone was known about for at least 2000 years before some unsung genius put it to work as a compass to guide ships in the China Seas.

The world had to wait nearly another 1000 years before other significant uses were found. But some of these also promise far-reaching effects in steering man's course.

We are now engaged in magnetic research at RCA that includes the structure of matter, and what takes

place in a given circuit at a few degrees above absolute zero.

From such research we have already developed superconductive memories; small electromagnets of incredible field strength; parametric microwave amplifiers; infrared detectors of exceptional sensitivity. And this, we know, is only the beginning.

At RCA, these and other broadly varied projects are carried on in an atmosphere that fosters creative

freedom, personal satisfaction—and rewards.

But this steady technological thrust into the unknown (an effort that ranges from atomic to space probes) requires engineers and scientists of the highest caliber.

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Be one of the more than a hundred students to win this outstanding opportunity. You will study at a prominent university through the Hughes Fellowship Program. Work-study and full-study academic year plans are offered. You will gain professional experience with full-time summer assignments in Hughes research and development laboratories. You may take advantage of a variety of assignments through planned rotation.

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by _____ (Mo., Yr.)

from _____ (Institution)

GPA is _____ out of possible _____

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GPA is _____ out of possible _____

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The less you've heard about us the better.

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But we don't think it is.

Many people think we're only a big chemical company.

Chemicals being the biggest thing we have.

But what we'd really like you to know is that we're also a forest products company. Olinkraft.

Plus a lightweight paper company. Ecusta.

Plus a packaging film company.

And that we're an aluminum company. And a brass company.

And a sporting arms and ammunition company. (You've heard about Winchester? That's us.)

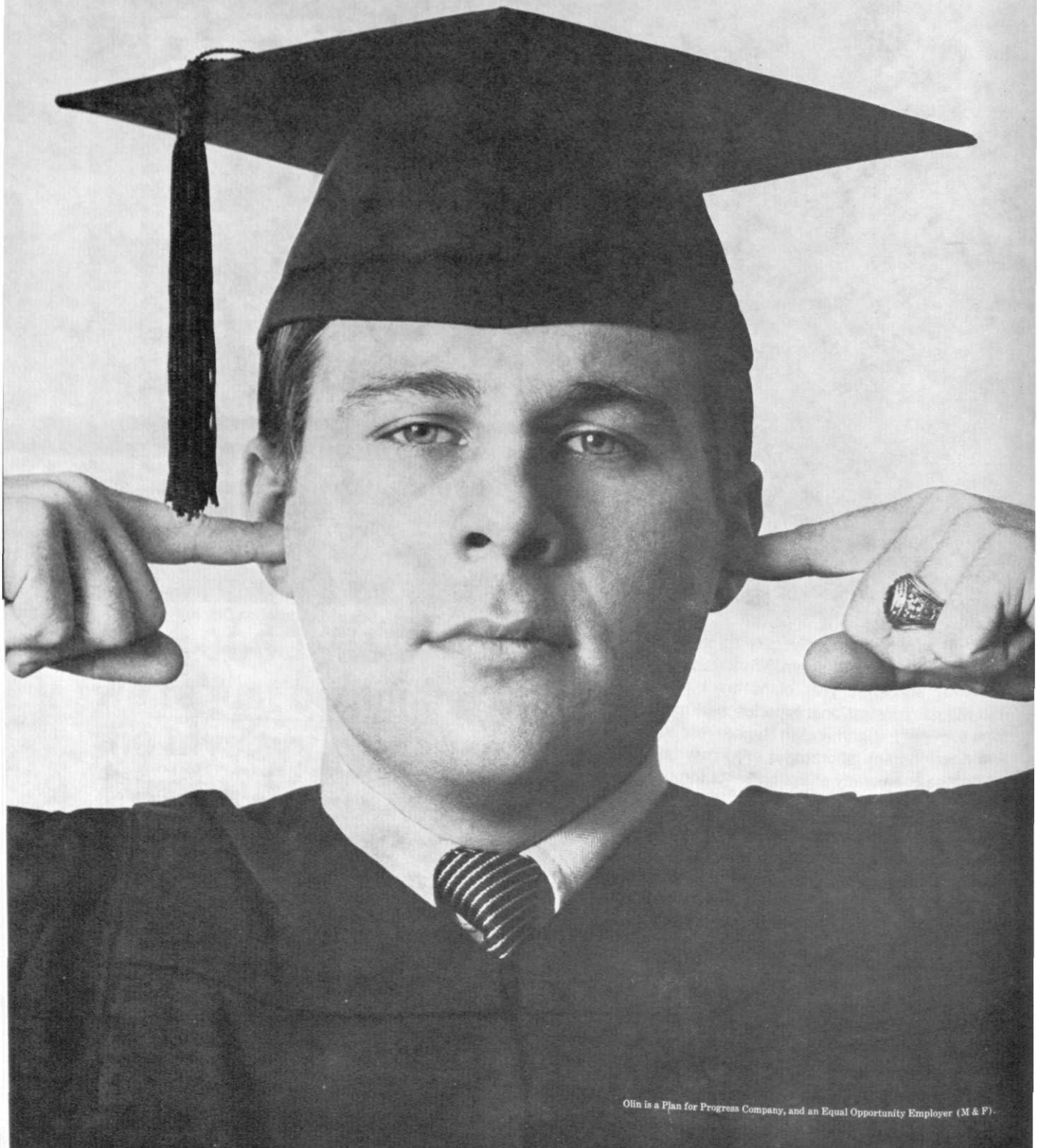
The reason we're telling you all this is that the competition to get you is awfully tough.

And a big corporation that can offer you the choice of a dozen smaller companies, has an edge.

But don't let this steer you away from chemicals, if that's on your mind. There's everything here from inorganics and organics to specialty and agricultural.

Now you've heard more about us. That's better.

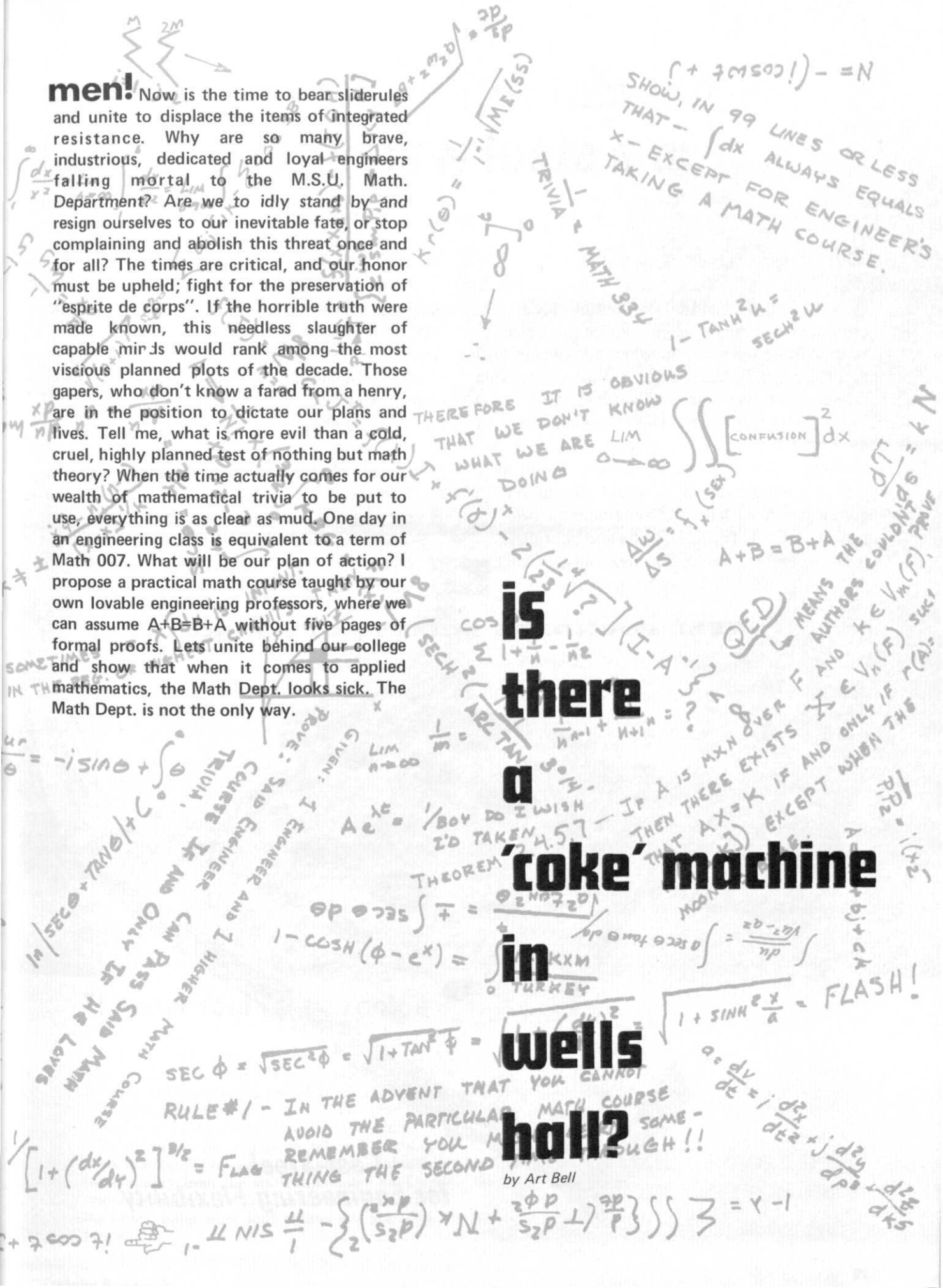
You can do two things now. Meet with your Placement Officer. Or write Monte H. Jacoby, our College Relations Officer, here at Olin, 460 Park Ave., N. Y. 10022. **Olin**



men! Now is the time to bear sliderules and unite to displace the items of integrated resistance. Why are so many brave, industrious, dedicated and loyal engineers falling mortal to the M.S.U. Math. Department? Are we to idly stand by and resign ourselves to our inevitable fate, or stop complaining and abolish this threat once and for all? The times are critical, and our honor must be upheld; fight for the preservation of "esprit de corps". If the horrible truth were made known, this needless slaughter of capable mir:ls would rank among the most viscious planned plots of the decade. Those gapers, who don't know a farad from a henry, are in the position to dictate our plans and lives. Tell me, what is more evil than a cold, cruel, highly planned test of nothing but math theory? When the time actually comes for our wealth of mathematical trivia to be put to use, everything is as clear as mud. One day in an engineering class is equivalent to a term of Math 007. What will be our plan of action? I propose a practical math course taught by our own lovable engineering professors, where we can assume $A+B=B+A$ without five pages of formal proofs. Lets unite behind our college and show that when it comes to applied mathematics, the Math Dept. looks sick. The Math Dept. is not the only way.

is there a 'coke' machine in wells hall?

by Art Bell



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.

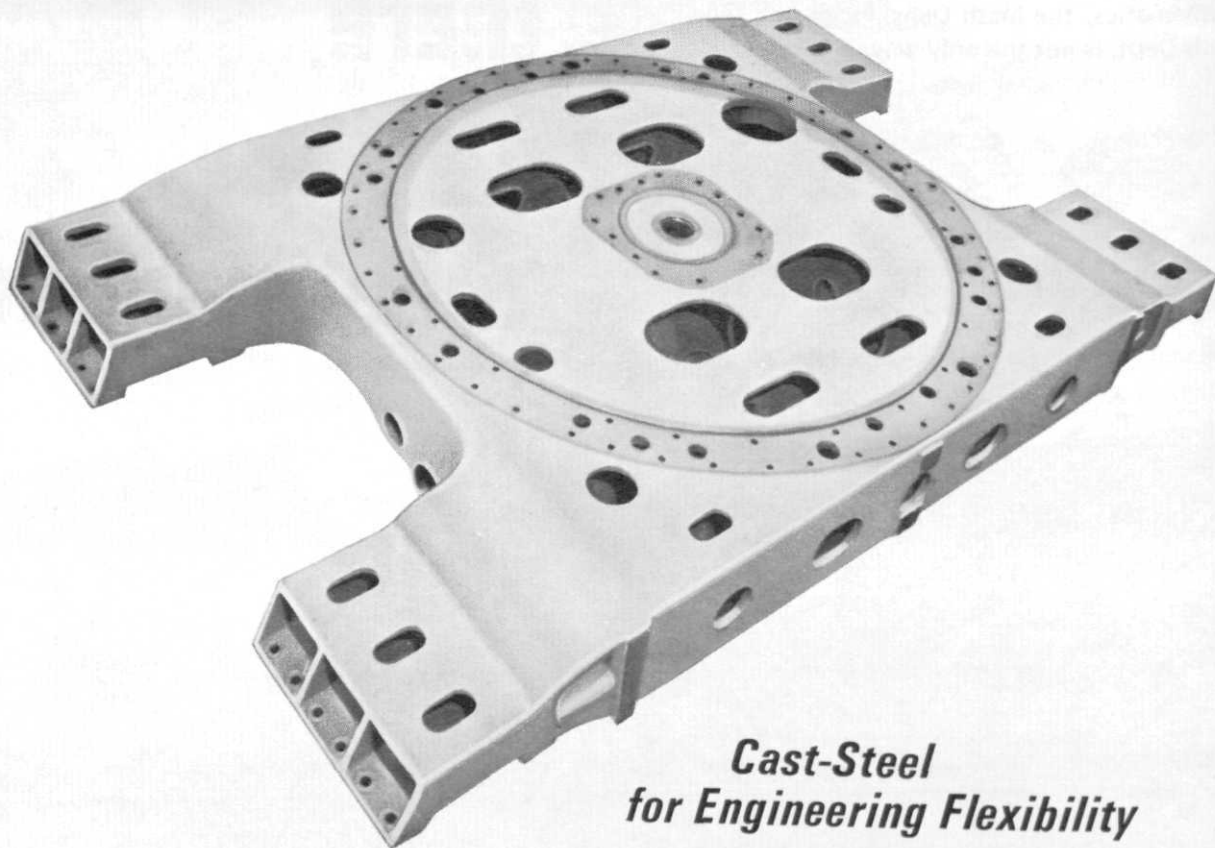
Cast-steel means design flexibility. In addition to offering an unlimited range of

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*



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.

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Babcock & Wilcox

The 5 billion dollar corporation you probably never heard of.

Funny how big you can get and still remain virtually anonymous.

Somehow we've managed to do it.

We're a group of over 60 companies, making everything from microwave integrated circuits to color television. And we rank number 9 in the top 500 corporations in the nation.

Pretty hot stuff for a nobody.

But though you may not recognize our name, maybe the name Sylvania rings a bell.

It's one of our companies.

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So here we are, 5 billion dollars strong, growing all over the place, and looking for engineers and scientists to grow with us.

Why don't you think us over with your Placement Director?

Incidentally, we are known in the communications field as General Telephone & Electronics.

Pssst. Pass it on.



GENERAL
& ELECTRONICS

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It's not often an engineer gets to design a company.

When he does, he tends to take care of his own kind.

He designs a company that is one heck of a good place for an engineer to work.

You can tell LTV Aerospace Corporation is an engineering oriented company.

The ratio of engineers to everybody else is exceptionally high.

The computer support is tremendous.

The Robert McCulloch research

laboratory is the newest and one of the finest big labs in the country.

The engineer who wants to be a technical specialist here can do as well as the engineer who gets into administration.

The engineer who wants to keep working on an advanced degree can do it right here.

And the projects: they range from deep space to the ocean floor — military and commercial aircraft, V/STOL;

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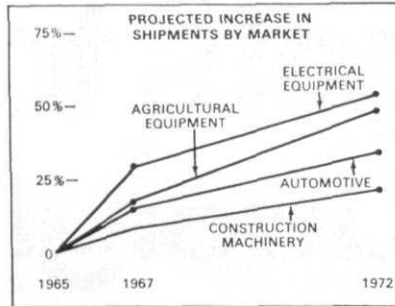
One of the outstanding characteristics of the Malleable Castings Industry.

The Malleable iron industry began its growth in 1826 with the development of a unique cast material by a Yankee genius named Seth Boyden. Malleable was heralded by pre-Civil War America as the iron which "could be hammered and shaped without breaking." But in time, as markets changed and technologies advanced, the material made the transition from wagons and cannons to cars and rocket heads, upgrading its applications from simple structural parts to highly reliable mechanical components.

In 1965 and again in 1966, sales of Malleable castings were over 1.1 million tons, the best years in the industry's long history.

The chart at right shows the projected Malleable growth curve in its four major markets through 1972. These figures were

developed after an extensive survey of industry customers, and indicate that Malleable will soon be a 1.4 million ton-a-year industry. And this growth is matched by increasing opportunities for technically trained people.



Currently, the average American new car uses 120 pounds of Malleable castings, some of which are shown above. Reading up, they include a connecting rod, bearing retainer, air conditioner clutch, joint yoke planet carrier, housing cover, non-slip differential case, and the calipers mounted on a disc brake.

For more information, write for a copy of "Malleable Iron, Material for America on the Move."

MALLEABLE FOUNDERS SOCIETY • UNION COMMERCE BUILDING
CLEVELAND, OHIO 44115



HAROLD C. MacDONALD

CONTINUED FROM PAGE 15

such that there is a continuing shortage of skilled people, particularly now. You must bear in mind that the computer is only a mechanical device to do rapidly that which some engineer has understood to the point that he could construct the program for the computer and come up with meaningful answers. So maybe some engineer will come and just by rote will do a certain problem and not really understand how or why it's being done, but some engineer understood it and had to set it up and harness the mechanical device. Maybe if you took the average of all engineers there are some who are overshadowed by the computer, but generally I think the engineer understands exactly where he stands. More engineers are being employed today because there are more problems, opportunities, and more potential than there was twenty years ago."

What importance do higher degrees, whether technical or of a business nature, command in industry. Is management learned through books or by practical experience. Mr. MacDonald felt that "after you have been exposed to management for a

number of years and worked with various problems that management involves, you learn by experience or the 'college of hard knocks', as they say. However I do think that a business degree or something of that type in addition to the engineering degree would be of great value to anyone so they can move into management with more ease and confidence as far as the financial and business aspects of the company are concerned. Certainly a person with a masters degree is more valuable to industry than a person with just a bachelors degree, but when you weigh the man with a masters degree and no experience versus a man with a bachelors degree and experience, much will depend upon the type of background the person has had. Each case is individual unto itself, but certainly the masters degree is of extreme value to us."

I have tried to obtain the answers to my questions by asking an authority. I'm sure as far as engineering management goes, my answers were very accurate and sound. Whether or not we as undergraduates will succeed depends not on following someone else's previous road, but following our own inclinations as Mr. MacDonald has done.

How to keep a cow's mind on milk. Instead of flies.

An informal report on a few current projects at Shell. Some of them might seem like offbeat work for an oil company. But this is a company that contributes broadly and significantly to society. A company of experts that brings out the best in its engineering, scientific and business people.



Shell scientists have come up with a vast improvement over even the most talented cow tail. It's called VAPONA® insecticide. A plastic strip impregnated with it will kill flies in a cow stall for up to three months. And VAPONA® insecticide combined with CIODRIN® insecticide keeps cows fly-free 24 hours a day—even out in pasture. Give you ideas for further applications?

Energy from under the sea

Shell is heading into ever-deeper water in the search for oil and natural gas. Recently we designed and installed permanent drilling/production platforms as tall as a 34-story building, with



still bigger structures in the works. And we are operating in considerably deeper water from floating platforms. We are also searching on land in 16 states to help meet burgeoning energy needs.

Digestible detergents



The main trouble with detergents is they don't go away. They pollute streams, make fresh water foamy. The solution: detergent compounds that organisms can consume. These "biodegradables" clean clothes just as effectively, but keep streams free of detergent foam. Elsewhere in the chemical part of our business, Shell research has resulted in a wealth of plastics for home and industry, and fertilizers to alleviate food shortages.

The name of the game

More gasoline per barrel of crude oil delights engineers, scientists and conservationists alike. Our new hydrocrackers actually produce *more* than a gal-



lon of refined product from a gallon of feed stock. And we are using sophisticated techniques to tailor-make products by reassembling hydrocarbon molecules.

The pursuit of excellence leads Shell into a variety of fields, both on and off the beaten track for an oil company. If you have a more-than-one-track mind, a desire to explore, to pit your skills against many kinds of problems, there could be a place for you in Shell.

Perhaps your training in engineering, science or business can contribute to tomorrow's new developments. For information about openings throughout Shell sign up at the placement office for an interview with our representative. Or write to Q. C. Stanberry, Recruitment Representative, Dept. E, The Shell Companies, Box 2099, Houston, Texas 77001.

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Meet the 1968 Loop Class

This "class photograph" was taken when Bethlehem Steel's 1968 Loop Course convened in July.



We're proud of them, 180 fine young men and women, representing 88 colleges and universities. And now they're on their way toward important management responsibilities in this dynamic corporation.

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We need virtually all types of engineers and other technical graduates. The assignments we offer were never more interesting; your opportunities for progress were never better.

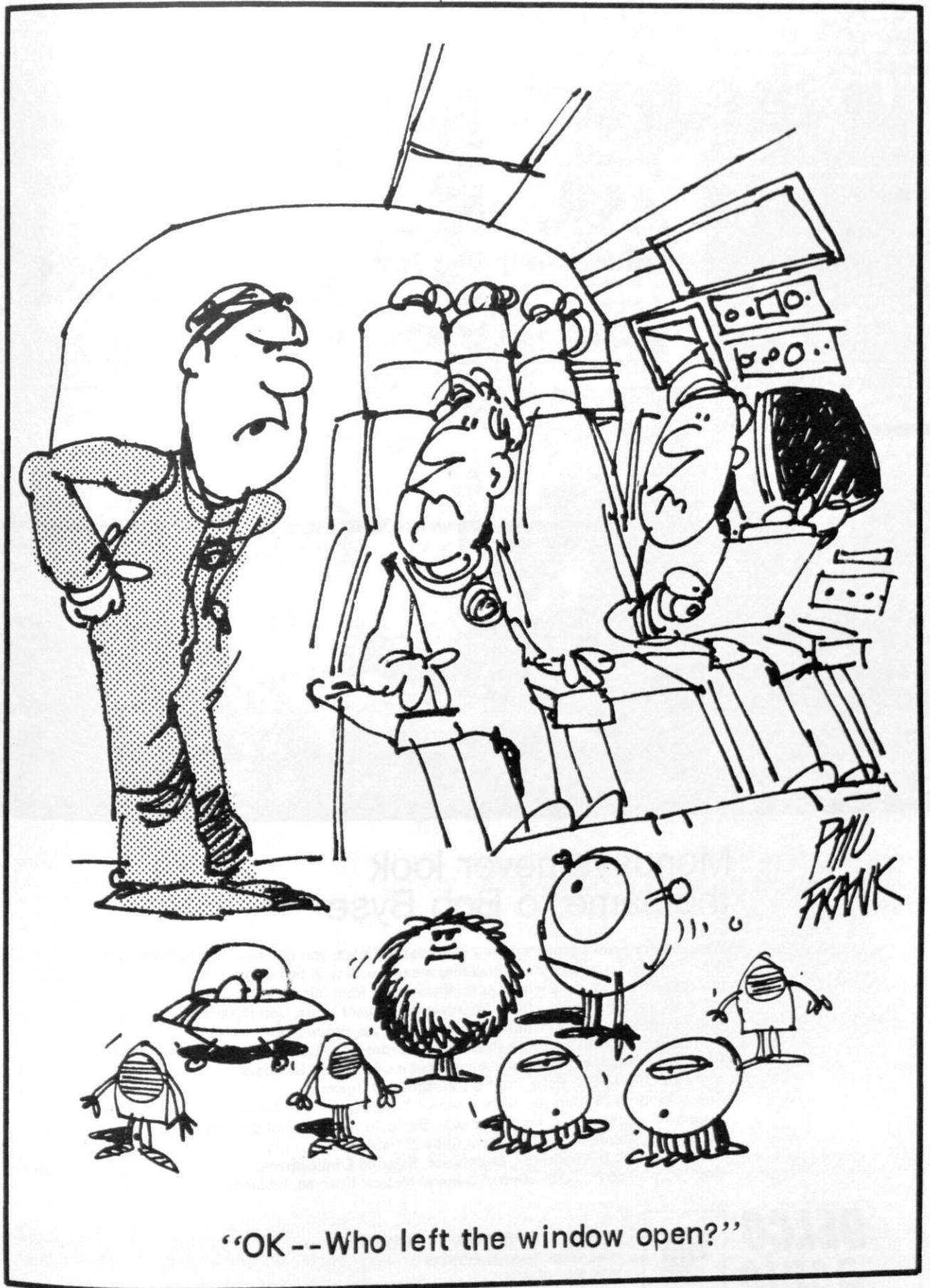
First step: pick up a copy of our booklet, "Careers with Bethlehem Steel and the Loop Course," at your placement office, or write to our Manager of Personnel.

Maybe next year *you'll* be in the picture!

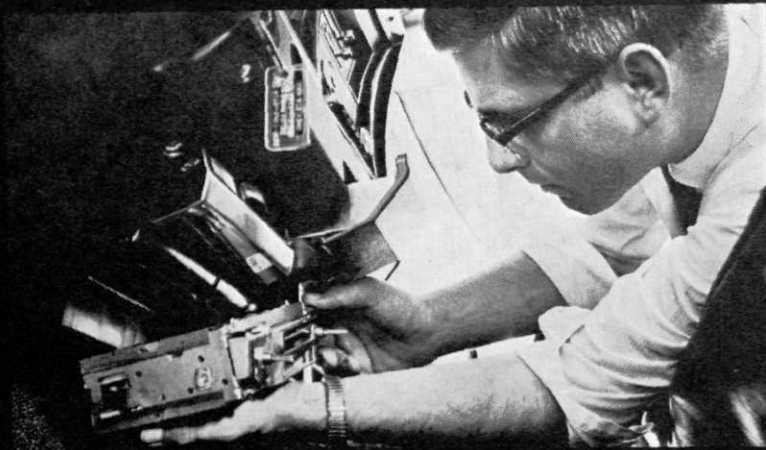
Bethlehem Steel Corporation, Bethlehem, Pa. 18016

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"OK--Who left the window open?"



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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.

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ENGRINEERS

Famous last words: "Hell, he won't ask us that."

SE

Recently we overheard two ME's talking.

My new car has a top speed of 155 miles per hour and will stop on a dime," said one.

"What happens then," said the other.

"A small putty knife emerges and scrapes you gently off the windshield."

SE

Freedom: Being able to do what you please without considering anyone except your wife, the police, the boss, the insurance company, the state, federal and city authorities and the neighbors.

SE

Pilot to Navigator: "Where are we?"

Navigator to pilot: "Due to my extensive training in calculus and trigonometry, as well as inertial guidance, I have calculated our position to be three miles south-southwest from infinity."

SE

Recent tests in the biology department prove that grasshoppers hear through their legs. When a tuning fork was placed near a grasshopper, it was found that in all cases the insect would hop. There was no reaction to this stimulus, however, when the insect's legs were removed..

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 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."

SE

"To me," said one student of prof., "he's a pain in the neck."

"Strange," said another, "I have a much lower opinion of him."

SE

Coroner: "And what were your husband's last words, Madam?"

Widow: "He said 'I don't see how they can make any profit on this stuff at a dollar and a quarter a quart.'"

The entire class sat spellbound as the professor announced: "That concludes my examination of the human sexual response. However, there's one more point I'd like to make before getting off the subject..."

SE

Engineer's definition of a rare girl: One you can have a good time with even if you play your cards wrong.

SE

A guy just called by his draft board happened to think of a friend who was rejected because he wore a truss. So he hastily purchased one and rushed down to the board. After the examination, he noticed that the official had written N.E. after his name.

"What's the N.E. for?" he asked.

"Near East," was the reply. "Anyone who can wear a truss upside down can ride a camel for two years."

SE

A woman approached the pearly gates and spoke to Saint Peter.

"Do you know if my husband is here? His name is Smith."

"Lady, we have lots of them here, you'll have to be more specific."

"Joe Smith."

"Lotsa those too, you'll have to have more identification."

"Well, when he died he said that if I was ever untrue to him, he'd turn over in his grave."

"Oh, you mean Pinwheel Smith."

John C. Heiman,
a typical Kodak
industrial engineer ▶



◀ Elwood R. Noxon,
a typical Kodak
industrial engineer

What was crucial six months ago? Hard to remember.

Six months is a long time to a Kodak industrial engineer. Much happens. Men like these carry on as if the whole company—top to bottom and stem to stern, cameras to industrial adhesives, food emulsifiers to check microfilmers—were a big laboratory for the practice of industrial engineering under the best of conditions. Management finds it pays to let them think so. Happy, they make their advance as strictly professional industrial engineers or hide their industrial engineer's insignia and use their skills to take over other functions in the organization.

Apart from the common denominator of an employer that appreciates industrial engineers and can always use more of them than we get, Heiman and Noxon lead very different working lives. Without assuring these gentlemen against the possibility that six months hence they will have traded specialties, here's the contrast:

Heiman is an accomplished simulation man, a thinker in Fortran, a builder of models for the big computer to manipulate.

He made a good score lately when given six weeks to overhaul the reasoning behind the design of a chemical manufacturing system that had evolved over the last five years as a multi-channel processing plant with problems in line interference and flexibility. He and a colleague, checking each other, spent three weeks writing a program that covered building size, reactor size, product flow, and auxiliary equipment. Debugging took another three weeks. All the while a third man was collecting experience data from the old production area.

The experience data were converted into Monte Carlo input distributions. Various configurations of the proposed production equipment were studied in thirty computer experiments, each simulating twelve weeks of operation.

Result: a system costing 3% more than the original but with 25% more capacity, plus proof that certain manifold connections between reactors wouldn't work.

Noxon works on mechanical goods. He pities industrial engineers who don't get to collaborate with their mechanical engineer partners right from when a project still consists of only rough sketches. He does get called into his projects that early.

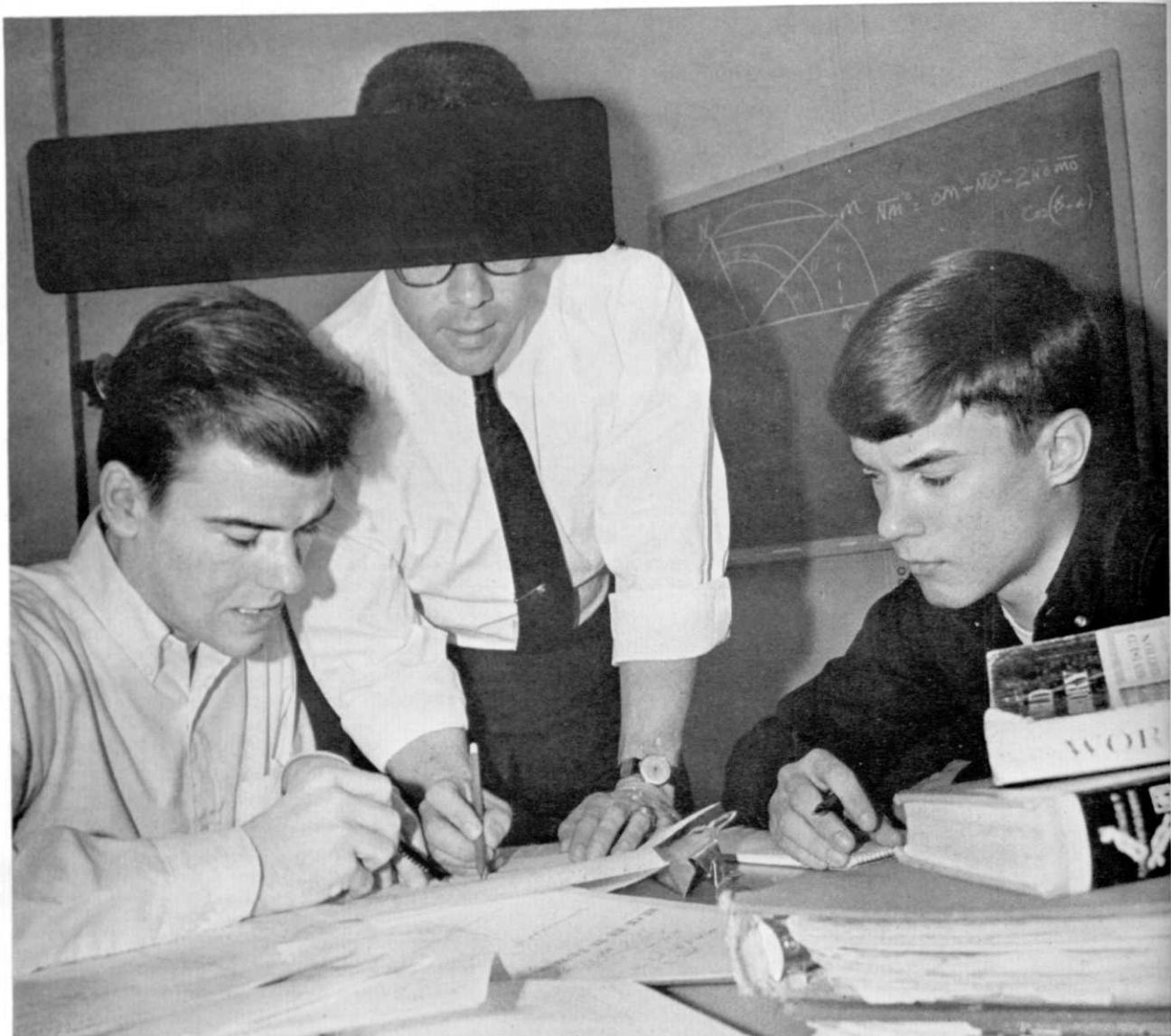
His place is in the middle. At his extreme left is the design engineer who created the product idea. Next sits the manufacturing engineer, devising ways for the production boss to transform the idea into reality at the required volume. To the quality-control engineer at the other end of the table is entrusted the whole reputation of the company as it rides on the proposed new product. Between him and Noxon, the production boss awaits instructions. Noxon's job is to sell cost awareness right and left. Unless each of the five gets in his licks, there will be trouble.

Noxon can't stay in the conference room all day. The action is on the factory floor. In putting together job designs, learning curves, and space requirements for the 1970 line, he cannot ignore the ongoing commitment to 1969 product and the lively remnant of '68 production. And cost reductions had better continue when Noxon and his teammates study the "audit assembly" movies from initial production.

Industrial, chemical, mechanical, and electrical engineers who find their profession interesting and would like to practice it in a way that best suits their individual makeup should talk to
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Pete Drobach has a knack for getting to the root of a problem.

High school students John Magish and John Ripley would be the first to agree.

They're both student members of a "big brother" program that Pete sponsors. Each week, they spend several hours of their own time helping less advanced classmates with their studies.

Pete is more than a sponsor. He's also a consultant—particularly when they're stumped by the logic of a tough "new math" problem.

But when Pete graduated from Rutgers in 1964, it wasn't these youngsters with their homework problems that brought him to General Electric. It was the chance to help people in industry solve tough technical problems. A career in technical marketing at General Electric gave him the opportunity.

Today, Pete's an application engineer in steel mill

drives and automation systems. His ideas on how to apply products from many of GE's 160 separate businesses enable his customers to improve the efficiency and productivity of their plants.

Like Pete Drobach, you'll find opportunities at General Electric in R&D, design, production or 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 801A, 570 Lexington Avenue, New York, N.Y. 10022.

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