

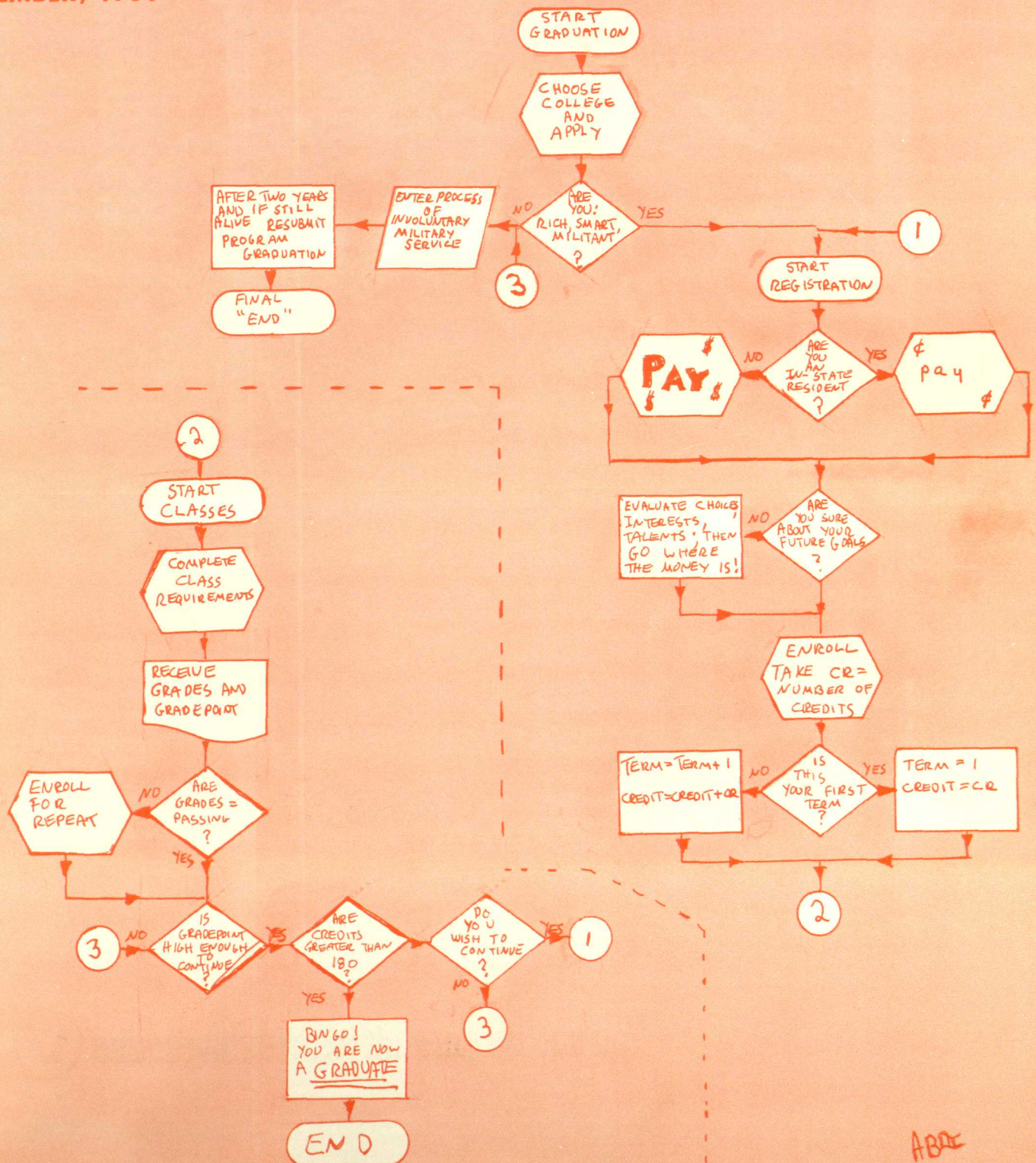
# SPARTAN ENGINEER

ENGINEERING LIBRARY



EMBER, 1969

25¢



ABR

**If you want to grow  
with a growth company...**



**go with  
Westinghouse.**

In the past five years, our sales have gone up fifty percent and profits have nearly tripled. Our goal is continued growth. Much of this growth will come from our commitment to improve the world we live in.

When you're in everything from computers to urban development, to medical science, to mass transit, to oceanography—the opportunities are boundless.

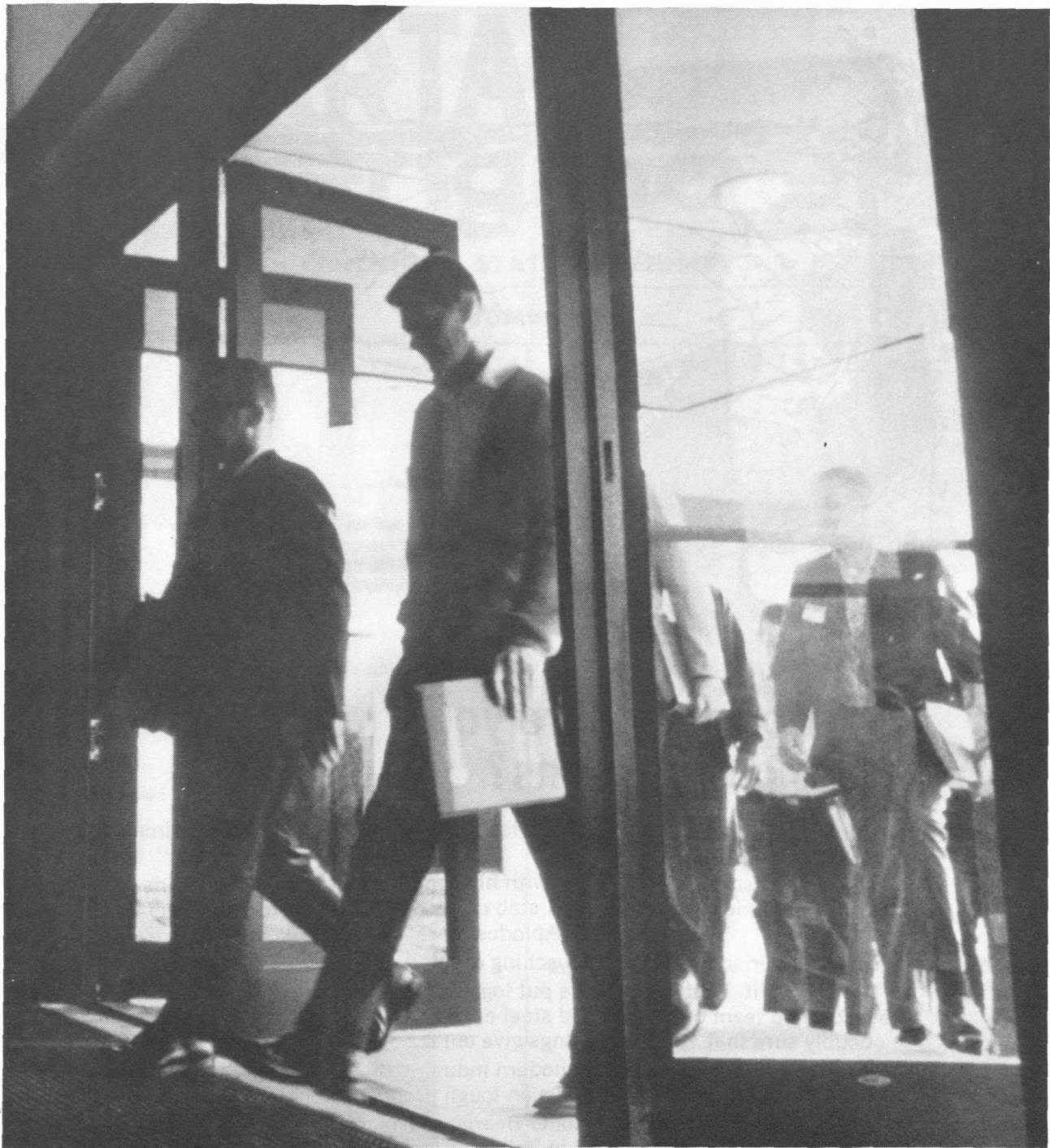
We need help. We need engineers who want to grow and contribute to society at the same time. Westinghouse believes the two are not mutually exclusive.

Talk with our campus recruiter about starting a growth career with Westinghouse, or write Luke Noggle, Westinghouse Education Center, Pittsburgh, Pennsylvania 15221.

An equal opportunity employer.

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





## The college you can't get into without a job.

The college is ours—Western Electric's Corporate Education Center in Hopewell, New Jersey.

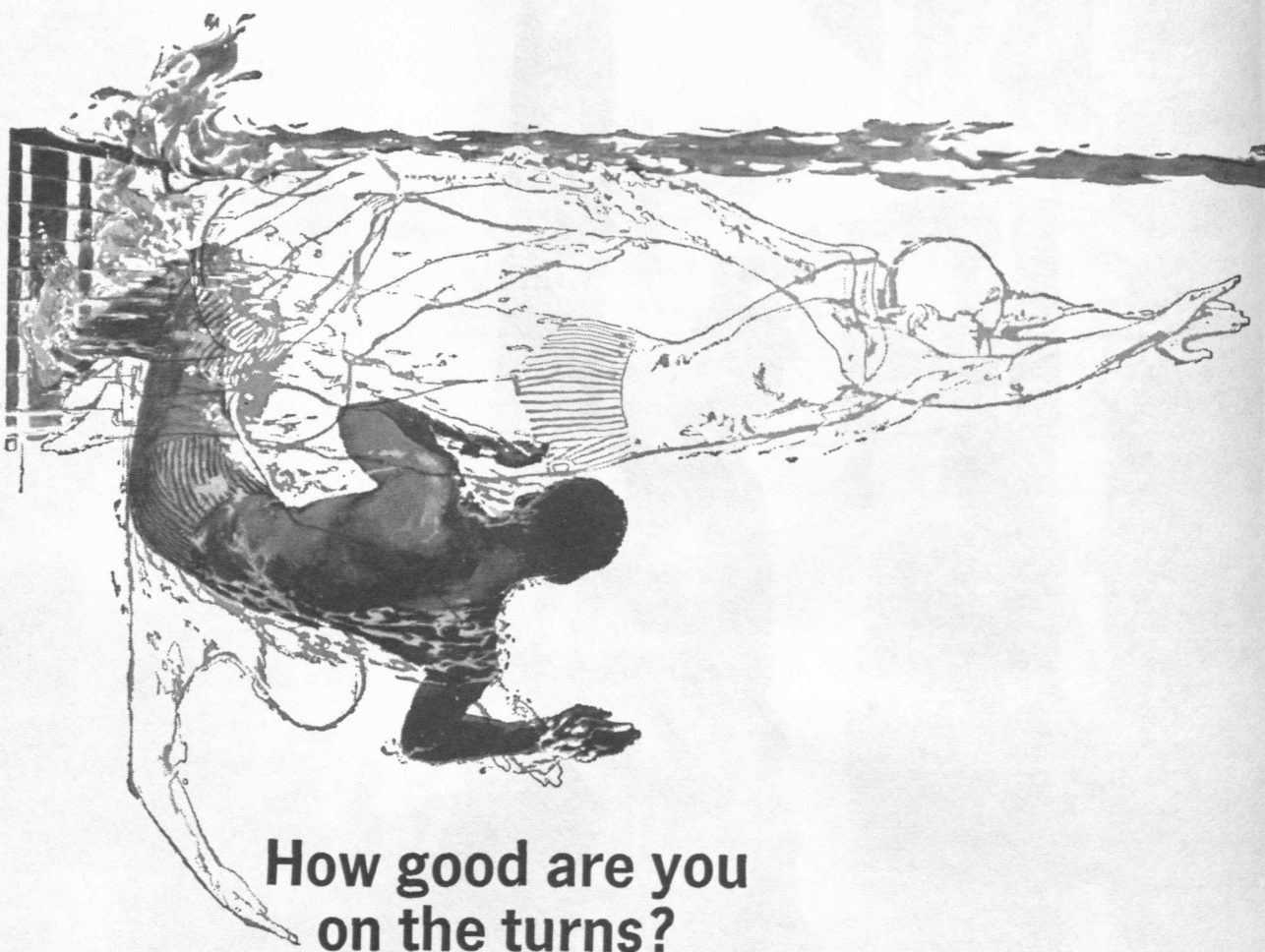
Like your college, ours has a campus with dorms, dining halls, labs and a library. Unlike yours, you can't get into ours without a job. A job at Western Electric.

Our students—engineers, managers and other professionals—develop and expand their skills through a variety of courses, from corporate operations to computer electronics. To help bring better telephone service and equipment, through the Bell System.

*For information contact your placement office. Or write: College Relations Manager, Western Electric Co., Room 2500, 222 Broadway, New York, New York 10038. An equal opportunity employer.*



**Western Electric**  
Manufacturing and Supply Unit of the Bell System



## How good are you on the turns?

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

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

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

We believe it. That's why we've put together the most experienced and best-coached team of bearing and steel engineers in the world. To make doubly sure that Timken bearings give our customers a perfect turn.

If you're up to facing the challenges of modern industry, if you've got the initiative, ingenuity and training to thrive on tough problems, join the team.

Write The Timken Roller Bearing Company, Canton, Ohio 44706.

Tell our Manager of College Relations that you'd like to talk it over.

Timken® bearings sold in 133 countries. Manufacturing in Australia, Brazil, Canada, England, France, South Africa and U. S. A.

An Equal Opportunity Employer.

**On your campus...**

January 29, 1970

A Timken Company Representative  
would like to talk with you!

**TIMKEN**  
REGISTERED TRADEMARK

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

# SPARTAN engineer

MICHIGAN STATE UNIVERSITY

VOLUME 23

NUMBER 1

NOVEMBER, 1969

## STAFF

Art Bell, III ..... editor  
 Nick Bassel ..... features editor  
 Dave Karrer ..... humor & art editor  
 Bob Patterson ..... advertising manager  
 circulation manager  
 Aimee Colmery ..... art assistant  
 Mary Harvey ..... editorial assistant

## ADVISOR:

Mr. Alan Hoffman

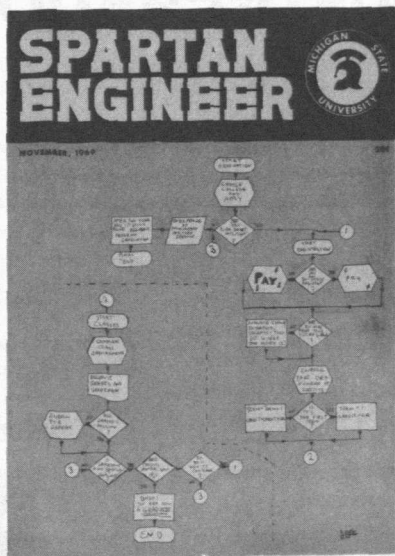
## FEATURES:

## PAGE

Draft Deferment Information .....	12
IEEE - Why Every EE Should Join .....	37
<i>Nick Bassel</i>	
Superengineer .....	25
Student Evaluations of Faculty .....	31
<i>Comments</i>	
The Engineering Equal Opportunities Program .....	16
<i>Nick Bassel</i>	

## DEPARTMENTS:

Editorial .....	6
Brain Sprainers .....	8
New Products .....	22
Engineers .....	40



This month's cover, by Art Bell, depicts the automated processes a student encounters prior to graduation.



Member, Engineering College  
 Magazine Associated

Chairman: Professor Gordon Smith  
 Oklahoma State University, Stillwater, Oklahoma  
 Publisher's Rep.: Littell-Murray-Barnhill, Inc.  
 369 Lexington Ave., New York 17, N.Y.  
 737 N. Michigan Ave., Chicago, Ill.

Published four times yearly by the students of the  
 COLLEGE OF ENGINEERING, MICHIGAN STATE  
 UNIVERSITY, East Lansing, Michigan 48823.

The office is on the first floor of the Engineering Building,  
 Room 144, Phone 517 355-3520.

Subscription rate by mail \$1.00 per year. Single copies 25¢.



# How would you keep it from having a nervous breakdown?

You tell us.

We've got an answer. But we're looking for more. Our new Century Series of computers is probably the most advanced on the market. One of the reasons is that we're constantly looking for answers to questions like this.

Maybe you can help.

Especially if you're an Electronic, Mechanical, Chemical or Industrial Engineer.

But we need answers in other areas too.

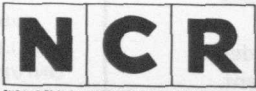
And people to find them. Chemists, Physicists. Marketing specialists. Programmers. Accountants.

Write William G. Benner, Coordinator, College Relations, Executive and Professional Placement, NCR, Dayton, Ohio. If you've got the right answers, he's got the questions.

It's all part of an NCR plan

to revolutionize the way businessmen do business.

An equal opportunity employer.



**NCR. Business will never be the same.**

# . A Celanese career IS freedom, satisfaction, reward, & a little self-discipline.

We feel you should settle for nothing less than the professional opportunity that offers you the most satisfaction and reward. A career in which you can be yourself. *Do your own thing.*

Naturally, that takes a bit of planning and equipment on your part. Like a degree in chemistry, chemical, industrial or mechanical engineering. Or accounting. Plus a degree of imagination. Ambition. Responsibility. A little self-discipline.

With them, you'll find the professional climate excellent at Celanese. For some very good reasons.

We're big. But not too big. More important, we're still actively young and growing. In the past ten years, or so, our sales have almost quadrupled.

And we won't tie you up with long, formal training programs. You'll learn as you practice your profession. Reap the rewards of performance — not on age, or how long you've been with us. Of course, you'll be working with experienced pros. So, when you need a hand you'll get it. Because it's to our mutual advantage to have you grow as fast as you can — and go as far as you can.

Your Placement Officer can tell you more about careers at Celanese. And about our developments in chemicals, fibers, plastics, coatings and petroleum products. Or write to: John B. Kuhn, Manager of University Relations, Celanese Corporation, 522 Fifth Avenue, New York, N.Y. 10036.

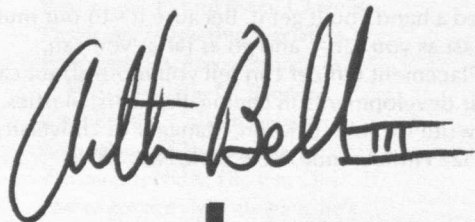


An equal opportunity employer

**M**y feelings about the processes of obtaining a college degree are pretty clear when one studies this issue's cover. I exaggerated the seemingly rigid, automated steps of graduation; to make one point, we do have a voice in the quality of the instruction we receive. It is up to us, the current student body, to insure against this type of educational system ever getting the chance to start. Conformity and institutionalization are the direct results of apathy, or lack of involvement.

I should now go into the standard plug for joining the various academic councils that exist for each department, but I think any kind of involvement is the best kind and no certain type of activity should have more prestige associated with it than another. The sheer numbers of ways to participate makes non-participation virtually impossible, but trends are still pointing towards cranking out a production line of graduates rather than allowing each individual the right to obtain an individualistic education.

The end result of education should not be an eight-to-five job with lots of fringe benefits and a comfortable happy ever-after, but rather application to the ideas presented, creativity and further pursuit of knowledge. Without soapboxing this further, I conclude that we are not robots programmed to engineer, but engineers given the opportunity to live our own lives rather than follow some predestined path. Involvement is an individual seeking a voice, and the time for involvement is now, before we fall victim to the evils of conformity. □





The *lampyridae* beetle family. Delight of small boys. Biological light bulb. And prime source of raw material for another Du Pont innovation.

*Luciferase*, an enzymatic protein with intriguing properties, obtainable only from fireflies. *Luciferin*, an organic molecule also found in fireflies, but synthesizable. *Adenosine triphosphate* (ATP), a common energy-yielding substance found in all living cells.

Those are the three main ingredients in *lampyridae's* love light. And because ATP is common to all living cells, university researchers discovered they could produce an artificial glow by mixing luciferin and luciferase wherever life is present.

Noting that phenomenon, Du Pont scientists and engineers went on to develop it into a practical analytical system. Correlating the intensity of the artificial

"glow" with the amount of ATP present in bacteria, they designed a means of measuring the reaction.

The result is the luminescence biometer—the first really basic im-



provement in bacteria-counting methods since the days of Louis Pasteur. Rather than waiting days for a culture to demonstrate growth density, a doctor or technician can now get a digital readout of bacteria concentration in a matter of minutes.

Other potentially lifesaving uses for the biometer are being suggested every day—such as diagnosing metabolic rates, enzyme deficiencies and nerve damage.

Innovation—applying the known to discover the unknown, inventing new materials and putting them to work, using research and engineering to create the ideas and products of the future—this is the venture Du Pont people are engaged in.

You can become one of them, and advance professionally in your chosen field. See your Du Pont Recruiter. Or send us the coupon.

# Venture: Use a love call to count bacteria.

Du Pont Company  
Room 7890, Wilmington, DE 19898

I'd like your latest information on opportunities at  
Du Pont for graduates with degrees in \_\_\_\_\_

Name \_\_\_\_\_

University \_\_\_\_\_

Degree \_\_\_\_\_ Graduation Date \_\_\_\_\_

Address \_\_\_\_\_

City \_\_\_\_\_ State \_\_\_\_\_ Zip \_\_\_\_\_

An Equal Opportunity Employer (M/F)



Ventures for better living.

Beginning with this issue, the staff of the Spartan Engineer would like to introduce their new feature . . .

## BRAIN SPRAINERS

Bill is half as old as Alfred will be when the latter is twice as old as Charles was 10 years ago. Alfred is twice as old as Charles was when the latter was half as old as Bill will be in 12 years' time. Bill is half as old as Charles will be when the latter is three times as old as Alfred was 18 years ago. What are the ages of the three?

\* \* \* \* \*

If Sara shouldn't, then Wanda would. It is impossible that the statements: "Sara should," and, "Camille couldn't," can both be true at the same time. If Wanda would, then Sara should and Camille could. Therefore, Camille could. Is the conclusion valid?

\* \* \* \* \*

If a hard-working bookie is to realize a profit on his endeavors by giving odds AGAINST the possibility that in a room full of men there will be two men with the same birthday, what is the maximum number of men who can be in the room before the odds swing away from the bookie's favor?

Using only mathematical signs and without changing the position of any of the figures, can you make this into an equation?

$$2967 = 17$$

*Problem A Day, R. M. Lucey*

\* \* \* \* \*

If Smith does not beat his wife, and has no friend called Jones, who is a bachelor, then either there is not any equality in the world or there is not any independence—or else, all is right with the world. But if there is independence in the world, Smith beats his wife. If Smith has a bachelor friend, Jones, or forgets to bring his wife flowers, then he does not beat his wife. If he does not beat his wife, there is something wrong with the world. If it is false both that Smith has no bachelor friend called Jones and that he forgets to bring his wife flowers, then it is also false that either nothing is wrong with the world or there is equality in the world. But there is equality in the world. Does Smith bring flowers to his wife? Is there independence?

*Answers on page 33.*

# GROWTH



As the nation's fifth largest municipal utility, the Board of Water and Light is growing. Our new Delta Power Generating Plant with an ultimate capacity of 1,500,000 kilowatts is an example. Scheduled for completion in 1972, Delta will turn out more than three times the combined power of our present generating stations.

As we expand our facilities, more top engineering personnel will be required to provide the knowledge and planning to ultimately serve the Lansing area community.

The use of electricity doubled in the last decade. If this trend continues in the next ten years, the Board will probably do as much building and work as it has in the past 75 years. We have the challenge for a young engineer to work and grow with the Board of Water and Light.

When you start considering an engineering future, visit the Personnel Department at 123 West Ottawa, Lansing, Michigan.



## BOARD OF WATER AND LIGHT

Serving Lansing since 1885.



**Hit me.**

Sooner or later, somewhere, sometime, some nice little old lady is going to tap bumpers with you in a parking lot.

Be prepared.

If you're buying a new car, make sure you get one with a color-coordinated rubber bumper (that's why you didn't notice it). Union Carbide research scientists sat down and puzzled out a good way to make a molded urethane rubber bumper. A bumper that won't chip, crack, rust. A bumper that's wrinkle-free. And quiet as can be.

Bumpers aren't our only automotive business. We make everything from plastics for padding and interiors, to chemicals for carpeting and tires, to solvents for paints, to hydraulic fluid for brakes, to PRESTONE antifreeze and summer coolant.

Back to bumpers. Drive carefully. Watch out for the other guy. And get a car with a bumper bumper to save your bumper bumps.

**UNION  
CARBIDE**

THE DISCOVERY COMPANY

This page is for

**YOU**

Letters sent to the Editor

containing comment,

suggestion, or

criticism, will be printed on this page.

Address letters to . . .

**SPARTAN ENGINEER**  
144 Engineering Bldg.  
East Lansing, Mich.

# The Bug Slayer

No computer stamps out program bugs like RCA's Octoputer.  
It boosts programming efficiency up to 40%.

Programming is already one-third of computer costs, and going up faster than any other cost in the industry.

A lot of that money is eaten up by bugs — mistakes in programs. With usual methods, programmers don't know of mistakes until long after a program is written. They may have to wait days for a test run.

RCA's Spectra 70/46, the Octoputer, takes a whole new approach based on time sharing.

It substitutes a computer terminal for pencil and paper and talks to the programmer as he writes the program, pointing out mistakes as they are made.

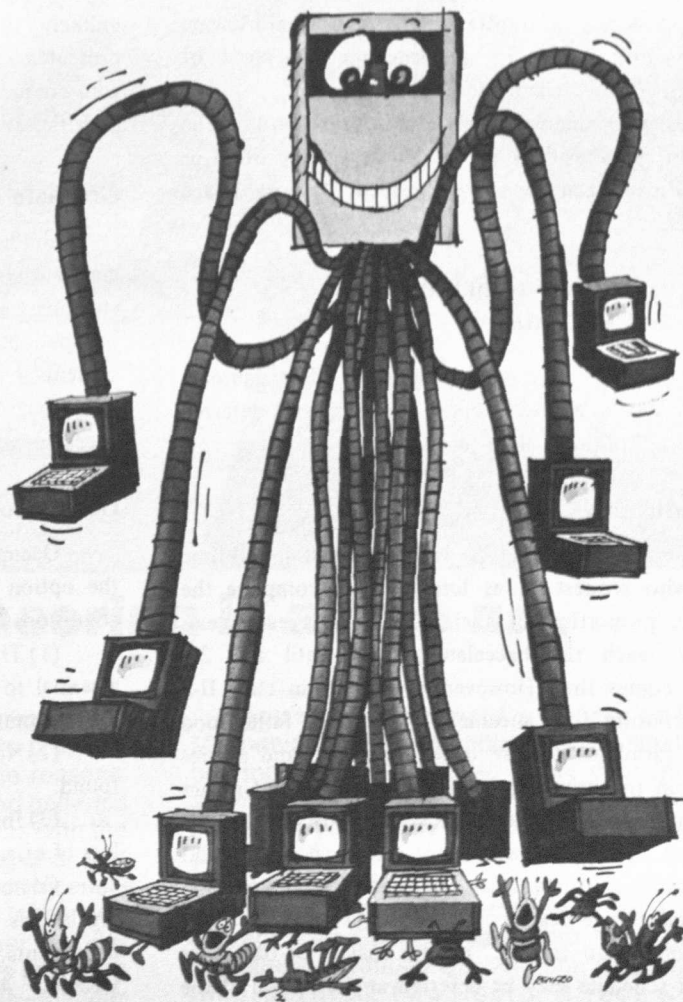
The Octoputer is the only computer available today that has this capability. It's as much as 40% faster. And it works on IBM 360 and other computer programs as well as our own.

Costs go down. Programs get done faster. And you need fewer programmers — who are scarce and getting scarcer.

Of course, Octoputer does more than just slay bugs. It's a completely new kind of creature that does time sharing and regular computing together.

The Octoputer concentrates on remote computing because that's where the industry is going. We got there first, because communications is what RCA

is famous for. It puts Octoputer a generation ahead of its major competitor. It can put you ahead of yours. **RCA** COMPUTERS



For career information visit your College Placement Office.

# DRAFT DEFERMENT INFORMATION

Deferment: Undergraduates, graduate students, and occupational

## General Rules

1. Classification is based on information supplied by the registrant or others in his behalf. Keep the local board fully informed.

2. Personal appearance before your local board may be requested within 30 days of date of mailing of a local board classification notice. A new classification card will be mailed after the personal appearance whether or not the classification is changed.

3. Appeal is available for 30 days after classification card is mailed by local board, personal appearance may be skipped, and appeal made directly.

4. Appeal may be transferred to appeal board having jurisdiction over place of residence or of place of employment *if* request is made in appeal letter.

5. Less than unanimous vote of appeal board can be appealed to the President within 30 days. Only State or National Director can appeal to President if appeal board vote unanimous.

## Students in two-year technical institutes and apprentices

Students in programs not leading to a baccalaureate degree and men in approved apprentice programs deferred in II-A at the option of their local boards.

## Undergraduates

Student deferment (II-S) is granted to all full-time students who request it, as long as they complete the appropriate proportion of their total course each year, until they reach the baccalaureate or until age 24, whichever comes first. However, deferment in class II-S causes forfeiture of automatic right to fatherhood deferment (available to any other registrant) and assures placement in the prime age group, if the President names such a group, when their deferred status ends, at any time before age 35. II-S deferment does not prohibit consideration for occupational deferment after completion of the baccalaureate degree.

Students who transfer, change major, or otherwise fall behind schedule may be deferred at the option of the local board.

If not deferred, and if ordered for induction, any full-time undergraduate student may request and will be

granted I-S(C) deferment to the end of the academic year (12 months after course of study begins). This deferment may be granted only once but may be followed by further deferment in II-S or other deferred classification. I-S(C) classification does not forfeit the right to fatherhood deferment, but includes later liability to prime age group.

Freshmen of typical age are advised *not* to request student deferment until they have proved to their own satisfaction the likelihood of being able to complete their degree. They cannot be drafted before age 19 and are unlikely to be ordered for induction at 19, but are protected by the I-S(C) if induction is ordered. Freshmen who request and get student deferment acquire its penalties even if they leave school after one semester.

## Graduate students

Graduate students in the first or second year of graduate study may not be deferred as students. Full-time students who also teach may not be deferred in occupational status. Third or subsequent year graduate students may be deferred in II-S at the option of their local boards for no more than five years past the baccalaureate degree to obtain a PhD.

## Occupational deferment

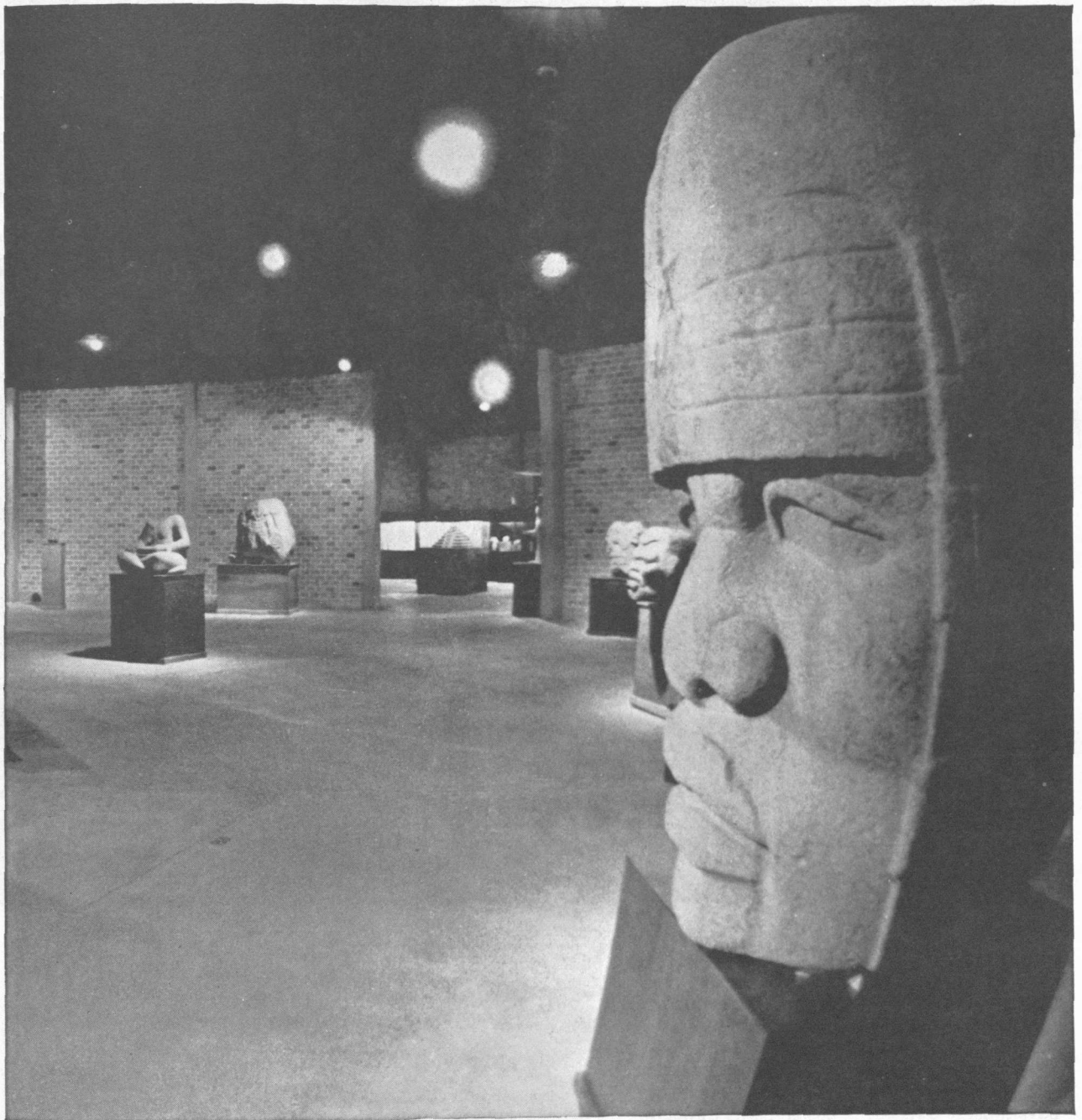
Occupational deferment (II-A) may be granted at the option of the local board when all of the following conditions exist and are proved by the employer.

(1) The registrant is engaged in an activity which is essential to the national health, safety, and interest, or to the community.

(2) No replacement of similar competence can be found.

(3) Induction of the registrant would cause material loss of effectiveness to the essential activity.

For more complete information on rules, regulations, and procedures governing classification, deferments, and appeals, send 25¢ (\$10 per hundred) for DRAFT ACT and 50¢ for DRAFT FACTS FOR GRADUATES AND GRADUATE STUDENTS to Scientific Manpower Commission, 2101 Constitution Avenue, N.W., Washington, D.C. 20418.



## At Ebasco, engineering is a fine art.

*Scientia gratia artis.* The art objects of present and past civilizations are no longer the private preserve of the privileged. And power is one of the reasons. Power that makes innovative museums and galleries a reality; that unites a multitude of cultures with the culture-hungry world via telecommunications; that reaches out to satisfy man's material needs by energizing his cities as well as his mind. This is the kind of power you can create at Ebasco—power that demands engineering closely akin to art. Its scientific tools: the most modern of technologies—nuclear engineering, composite structures, systems design and, more important, human imagination to anticipate man's needs a decade or more in the future.

If you're aiming toward a degree in Electrical, Mechanical, Civil, Metallurgical or Nuclear Engineering and would like to apply your ingenuity to attaining some of man's constructive goals, why not let us tell you how you can help achieve them at Ebasco...Engineers, Consultants and Constructors to the power industry.

To arrange for an on-campus interview, contact your College Placement Director or write to College Relations Department, Ebasco Services Incorporated, Two Rector Street, New York, New York 10006. **EBASCO**  
An Equal Opportunity Employer.

# Fellowships

**For:**  
Masters,  
Engineer  
and  
Doctoral  
Degrees

**In the  
fields of:**  
Electrical  
Engineering,  
Aerospace  
Engineering,  
Mechanical  
Engineering,  
Physics and  
Mathematics

**Benefits include:**  
Educational stipend,  
dependent allowance,  
all academic expenses,  
professional salary,  
employee benefits and  
travel allowance. Value of  
these ranges from  
approximately \$7,500  
to \$12,000 annually.

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.

Requirements: B.S. degree (or equivalent) for Masters Fellowships; M.S. degree (or equivalent) for Engineer and Doctoral Fellowships; U.S. citizenship; grade point average of 3.0 or better out of a possible 4.0; selection by Hughes Fellowship Committee.

Hughes plans to substantially increase the number of fellowship awards leading to the degree of Engineer.

For additional information, complete and air-mail form to: Hughes Aircraft Company, Scientific Education Office, P.O. Box 90515, Los Angeles, California 90009.

**HUGHES**

HUGHES AIRCRAFT COMPANY

An equal opportunity employer—M & F

Hughes Aircraft Company, Scientific Education Office,  
World Way, P.O. Box 90515, Los Angeles, Calif. 90009  
Please send me information about Hughes Fellowships.

Name (printed): \_\_\_\_\_

Address \_\_\_\_\_

City \_\_\_\_\_ State \_\_\_\_\_ Zip \_\_\_\_\_

I am interested in obtaining:  Masters  Engineer  Doctoral

fellowship in the field of \_\_\_\_\_

I have (or expect) a Bachelor's degree in \_\_\_\_\_ (Field)

by \_\_\_\_\_ (Mo., Yr.)

from \_\_\_\_\_ (Institution)

GPA is \_\_\_\_\_ out of possible \_\_\_\_\_

Also have (or expect) Master's degree in \_\_\_\_\_ (Field)

by \_\_\_\_\_ (Mo., Yr.)

from \_\_\_\_\_ (Institution)

GPA is \_\_\_\_\_ out of possible \_\_\_\_\_

U.S. CITIZENSHIP IS REQUIRED





# We've got some unusual shoes to fill

We're not looking for ordinary people. Or satisfied people. We want people who question, who want to know why. We need them because they can help us grow. We'll give them as much challenge as they care to seek out.

At the same time, we offer something more than challenge. We offer opportunity. And in some unusual areas. The communications network is so vast

and touches so many facets of life that you'd be surprised at the variety of jobs in the Bell System. Whatever your background, whatever your field of study, we probably have a pair of shoes for you to fill.

Why not ask a Bell System representative? Make an appointment when he comes to your campus.

An equal opportunity employer.



# The Engineering Equal Opportunities Program


As most of us are aware, Michigan State University is engaged in extensive efforts to recruit black students from the urban areas. Our own college of engineering is doing its part by means of a unique program known as *Engineering Equal Opportunities Program* (EEOP). The purpose of the program is to get black students interested in engineering, to provide motivation, to tutor them where necessary, to get them jobs with Engineering people and basically to get them into school and to keep them there. The distinctive feature which makes this program unique, is an action-oriented basis of a 1:1 correspondence between the people assisting with the program, and those potential engineers.

The program is coordinated by Mrs. N. Hardie. More than one-third of our faculty is volunteering up to ten hours a week into the program, as well as several graduate students. In addition, several undergraduate students are serving as a tutorial resource.

Several firms have assisted by means of financial contribution, and also by offering summer employment to their students. The firms referred to include DuPont, Dow, AC Spark Plug, and Michigan Bell.

As a measure of its success, the program opened last year with twenty-seven students. Of these, twenty-one are still in school. Additionally, eight of these students were employed this past summer in engineering-oriented summer jobs.

This year, the program has involved forty more black students, and it is hoped that the program will continue to be a success, and that these students will benefit as a result of the efforts of many conscientious people who are willingly donating their time and effort, in order to help others. □

A decorative graphic on the left side of the page consists of several vertical black bars of varying heights and widths, arranged in a staggered pattern.

by Nick Bassel

## What keeps dynamic young engineers like Jim Bregi and Jeff Quick at Ford Motor Company?



**"They tell us to do it...not how to do it!"**

"The real world is out here," says Jeffrey Quick, Product Design Engineer in our High Performance Engine Department. "These aren't academic problems... not when you've got someone waiting for a solution!"

"My job is to make Jeff's designs work," says Jim Bregi, Manufacturing Engineer at the Dearborn Specialty Foundry. "Between us, we have a lot of responsibility, but that's what makes this job so challenging." After only three years with Ford Motor Company, Jim is Supervisor of Foundry Facilities with a section of eight people working for him... including three gradu-

ate engineers. His day might include anything from solving a problem in thermo-dynamics to helping hire a new engineer. "I don't know of another job that would have allowed me to move ahead as fast as this one."

"They're completely flexible," says Jeff. "Whether it comes to trying something new or changing job assignments. You get to play a part in your own destiny. I see people getting ahead fast... I wouldn't be here unless I were sure I could, too."

There are opportunities to "move ahead" in every field of engineering at Ford Motor Company. If you want to put your en-

gineering degree to good use, see our recruiter when he visits your campus. Or contact Mr. Robert Farmer, College Recruiting Department, Ford Motor Company, American Road, Dearborn, Michigan 48121. An equal opportunity employer.



... has a better idea



ORGANIZATION	LOCATIONS HAVING CURRENT OPENINGS	MAJOR PRODUCTS PRODUCED	DISCIPLINE REQUIREMENTS	TYPE OF WORK PERFORMED
CHEMICALS GROUP —Chemicals Division —Agricultural Division —Plastics Operation	Assonet, Mass. Augusta, Ga. Brandenburg, Ky. Carrllton, Ohio Canton, Ohio Charleston, Tenn. Joliet, Ill. Lake Charles, La. Little Rock, Ark. McIntosh, Ala. New Haven, Conn. Niagara Falls, N.Y. Pasadena, Texas Rochester, N.Y. Saltville, Va. Stamford, Conn.	Polyvinyl Plastics Plastic Piping Chlor-Alkali Products Ammonia Phosphates Urea Nitrogen Acids Hydrazine Petrochemicals Insecticides Pesticides Polyurethane Carbon Dioxide Animal Health Products Automotive Chemicals	ChE ME IE Chemistry Accounting Business Adm. Transportation Marketing	Process Development Design, Maintenance Planning, Scheduling Production, Sales Accounting Marketing Financial Analysis Distribution Project Engineering (Plant Startup & Construction) Research Engineering Technical Service
ALUMINUM DIVISION	Chattanooga, Tenn. Gulfport, Miss. Hannibal, Ohio New Haven, Conn. Sedalia, Mo.	Architectural Products Aluminum Extrusions Aluminum Sheet, Plate, Coils Aluminum Wire & Cable Primary Aluminum	ChE IE ME Met. Eng. Accounting Business Adm. Ind. Tech. & Mgmt.	Manufacturing Production Sales Maintenance Finance Metals R&D
BRASS DIVISION	East Alton, Ill. New Haven, Conn.	Brass Fabricated Parts Sheet & Strip—Brass ROLL-BOND Panels Stampings	ChE IE & O.R. ME Met. Eng. Accounting Business Adm. Ind. Tech. & Mgmt.	Manufacturing Production Sales Maintenance Finance Operations Research
FINE PAPER & FILM GROUP —Ecusta Paper Division —Film Division	Covington, Ind. Pisgah Forest, N.C.	Carbonizing Paper Fine Printing Papers Specialty Paper Products Cigarette Paper & Filters Cellophane	ChE Chemistry Pulp & Paper Tech. IE ME Math Business Adm. Accounting	Marketing Process Engineering Plant Engineering R&D, Design Development Statistician Systems Engineering Production Mgmt. General IE Accounting
OLINKRAFT, INC.	West Monroe, La.	Kraft Paper Kraft Bags Corrugated Containers Lumber Plywood Industrial Cartons Multiple Cartons	ChE Chemistry Pulp & Paper Tech. IE ME EE	Process Engineering Plant Engineering R&D, Design Systems Engineering Production Mgmt. General IE
WINCHESTER GROUP —Winchester-Western Division —Energy Systems Division —Ramset Operations —Weaver Co.	East Alton, Ill. El Paso, Texas La Porte, Ind. New Haven, Conn. Marion, Ill. Tallahassee, Fla.	Sporting Arms Ammunition Powder Actuated Tools Smokeless Powder Solid Propellants Safety Flares Franchised Clubs Safaris Telescopic Sights	Accounting Finance Business Adm. ME IE Math, Physics Ind. Mgmt. Computer Opt. Marketing ChE, Chemistry Personnel Mgt.	Finance, Accounting Manufacturing Programming R&D, Design Production Control Purchasing Marketing, Sales Plant Engineering Operations Research
ORMET CORP.	Burnside, La. Hannibal, Ohio	Alumina Aluminum	ChE IE ME Metallurgy Accounting Business Adm. Ind. Tech. & Mgmt.	Manufacturing Production Maintenance Finance

If you find this chart interesting,  
we're interested.

For additional information about Olin,  
please contact your Placement Office or write Mr. Monte H. Jacoby, College Relations Officer,  
Olin, 120 Long Ridge Road, Stamford, Conn. 06904. Olin is an Equal Opportunity Employer (M & F) and a Plans for Progress Company.



# Xerox: For engineers who think of more than engineering.

Creative people like John Gardner see engineering as only one outlet for their talents.

Among John's other concerns is today's widespread shortage of technical talent. Due in large part, as he sees it, to children's lack of exposure to the excitement of science.

John's doing something about it. He's turned the Gardner basement into a part-time laboratory, with almost-weekly demonstrations and projects for neighborhood kids. Where children as young as seven make simple photoelectric devices. Measure ballistic projectile velocities. And explore subjects like polarized light, fiber optics, and electronic calculators, with the help of equipment loaned by Xerox.

"My biggest delight," John recalls, "was seeing the first youngster's face light up when he gave his home-made electric motor a shove, and it kept moving."

"Children's interests," John maintains, "should be stimulated early. Not by

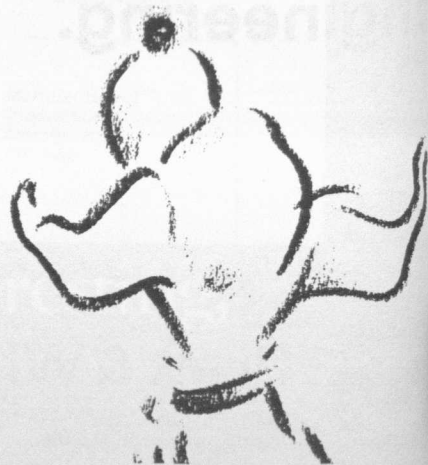
spoon-feeding answers, but by stimulating them to question."

As an Area Manager in our Advanced Development Department, John asks—and answers—some interesting questions of his own. If you'd like to work for the kind of firm that respects, supports and recognizes people like John, why not talk to us about the opportunities at our suburban Rochester, New York facilities. Your degree in Engineering or Science may qualify you for some intriguing openings in a broad spectrum of developmental and manufacturing areas.

See your Placement Director for a copy of our brochure and to arrange an interview with our representative. Or, write directly to Mr. Roger VanderPloeg, Xerox Corporation, P.O. Box 251, Webster, New York 14580. An Equal Opportunity Employer (m/f).

# XEROX

CAVU\*



# \*CEILING AND VISIBILITY UNLIMITED

At Pratt & Whitney Aircraft "ceiling and visibility unlimited" is not just an expression. For example, the President of our parent corporation joined P&WA only two years after receiving an engineering degree. The preceding President, now Chairman, never worked for any other company. The current President of P&WA started in our engineering department as an experimental engineer and moved up to his present position. In fact, the majority of our senior officers all have one thing in common—degrees in an engineering or scientific field.

To insure CAVU\*, we select our engineers and scientists carefully. Motivate them well. Give them the equipment and facilities only a leader can provide. Offer them company-paid, graduate education opportunities. Encourage them to push into fields that have not been explored before. Keep them reaching for a little bit more responsibility than they can manage. Reward them well when they do manage it.

Your degree can be a B.S., M.S., or Ph.D. in: **MECHANICAL • AERONAUTICAL • ELECTRICAL • CHEMICAL • CIVIL • MARINE • INDUSTRIAL ENGINEERING • PHYSICS • CHEMISTRY • METALLURGY • MATERIALS SCIENCE • CERAMICS • MATHEMATICS • STATISTICS • COMPUTER SCIENCE • ENGINEERING SCIENCE • ENGINEERING MECHANICS.**

Consult your college placement officer—or write Mr. William L. Stoner, Engineering Department, Pratt & Whitney Aircraft, East Hartford, Connecticut 06108.

CAVU\* might also mean full utilization of your technical skills through a wide range of challenging programs which include jet engines for the newest military and commercial aircraft, gas turbines for industrial and marine use, rocket engines for space programs, fuel cells for space vehicles and terrestrial uses, and other advanced systems.



## Pratt & Whitney Aircraft

EAST HARTFORD AND MIDDLETOWN, CONNECTICUT  
WEST PALM BEACH, FLORIDA

**U  
A**  
DIVISION OF UNITED AIRCRAFT CORPORATION  
An Equal Opportunity Employer

## NEW PRODUCTS ...



Sixteen conventional batteries ride over the power plant in the rear of the experimental Westinghouse electric vehicle. The foreign sports car, converted from conventional power, has a 96-volt electrical system and a 20-horsepower motor.

### A Battery-Powered Car

From Westinghouse research comes the proof that the electric vehicle is alive and doing well and has adapted itself to an environment in which it can compete and survive. The requirement for the future of the high-speed over-the-road electric automobile has been to develop a highly-efficient, long-life, lightweight power source, inexpensive enough to make this type of vehicle practical.

Until such a power source is available, Westinghouse is concentrating on improving vehicles now in commercial production. These vehicles include 11 basic models ranging from one-man plant personnel carriers to golf cars, to surrey-top buses, roomy enough for ten motel guests and luggage.

Westinghouse officials say despite its slow speed, these vehicles have a lot going for them such as they

don't need to be warmed up before taking off, they produce no fumes, and they can maneuver very easily.

The Westinghouse three-wheeled pick-up truck, just going into production, has a 12 mile-an-hour speed and is powered by six six-volt lead-acid batteries. The two passenger truck can carry loads up to 500 pounds from factory floor, to warehouse to loading dock.

Inside the sleek Lotus Europa body is a 50-pound electric motor which rides over the rear assembly. The power source, also in the rear, is a group of 16 conventional batteries totaling 96 volts. The propulsion package can generate up to 20 horsepower. Advanced solid-state controls are located under the hood in the front of the car. The car is capable of operating at speeds of 65 miles an hour for 20 miles. At a speed of 45 miles an hour, the vehicle will travel 30 miles before requiring a battery charge. □





## You'll flip over it!

Drop whatever you're doing and flip through the pages of our booklet, "Careers with Bethlehem Steel and the Loop Course." Pick up a copy at your placement office, or write: Manager of Personnel, Bethlehem Steel Corporation, Bethlehem, PA 18016.

**BETHLEHEM STEEL**

*An Equal Opportunity Employer*



We're a diversified company. A big one. Our sales will run more than half a billion dollars this year.

They'll come from computer service, education systems, helicopters, farm equipment, space systems, all kinds of technical services.

And airplanes.

Airplanes turn us on. We've built them for going on sixty years.

Our planes scored the nation's top kill ratios against Zeros and

again against MiGs.

We've won the Thompson Trophy, the Collier Trophy, and the Doolittle Award.

Our chief exec is a reconstructed test pilot. We've got more fighter jockeys in management than any other company in the country.

Besides our attack airplanes, we're involved in the 747, S-3 and the DC-10 and the SST programs to the tune of hundreds of millions of dollars.

Our simulators are the finest in

industry. So is our schedule performance. And our titanium capability. And our record of coming up with growth designs.

This is where you ought to be if you're an AE, EE, ME, or IE with a thing about airplanes.

Sit down and write our campus rep tonight. He's the guy with the long white scarf. Address: College Relations Office, LTV Aerospace Corporation, P.O. Box 5907, Dallas, Texas 75222. We're an equal opportunity employer.



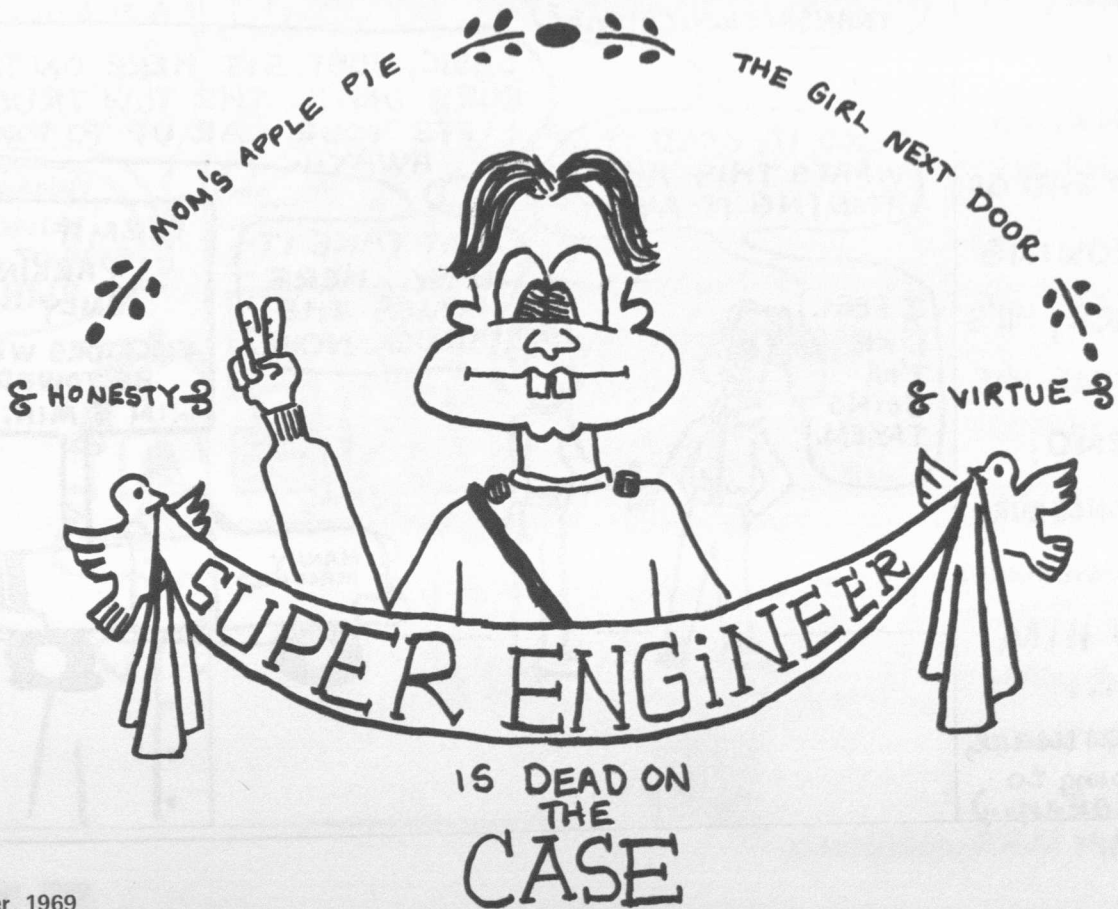
**Airplanes  
turn you on?  
Join the club.**

**LTV AEROSPACE CORPORATION**

*A quality company of Ling-Temco-Vought, Inc. LTV*

# HAVE YOU EVER BEEN GIVEN A BUNCH OF TRASH

By someone you thought  
was a friend?  
NEVER FEAR!!!



AS WE LOOK IN ON THE EXCITING LIFE & ADVENTURES OF MANSFIELD FINSTERWAL, WE FIND HIM AT Grannies...



MANNY'S DATE SUPPLIED BY THE MSU AGRICULTURE DEPT. (YES, SHE'S OVER 21.)

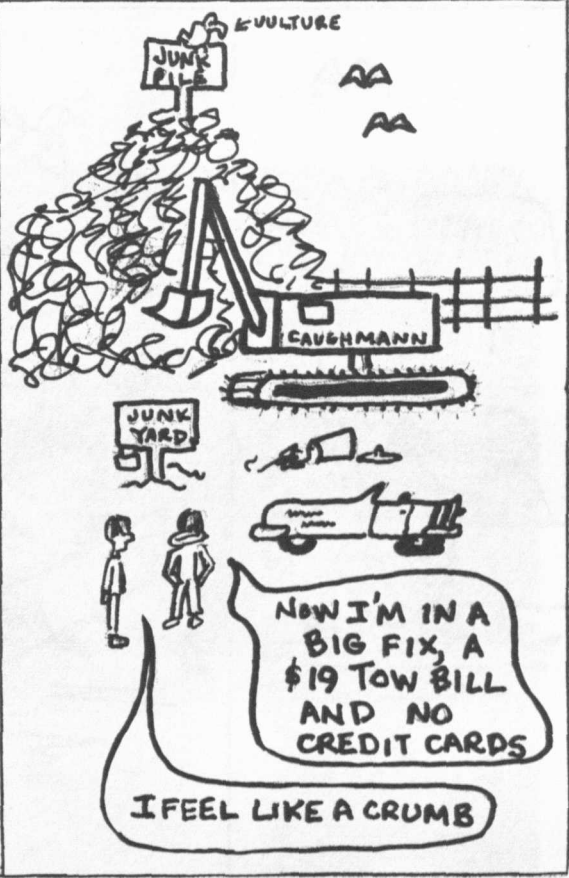
MANNY IS REALLY THINKING, INSTEAD OF BORROWING A JACK, HE'S LETTING HIS FRIEND, JOHANNESBURG P. KINDINGDONGER HELP HIM OUT... (and as usual, he's going to get taken...)





AS THE SUN SLOWLY SINKS BEHIND 3RD BASE, AND THE CONSERVATION OF MOMENTUM CHANGES THE STATE OF EQUILIBRIUM OF MANNY'S CAR AFTER THE LIMIT AS TIME APPROACHES ZERO ~ (BREATH) ~ WE FIND MANSFIELD AND CO. IN THE NEAREST JUNK YARD WITH A \$19 TOW BILL

LET'S LISTEN IN, SPORTS FANS



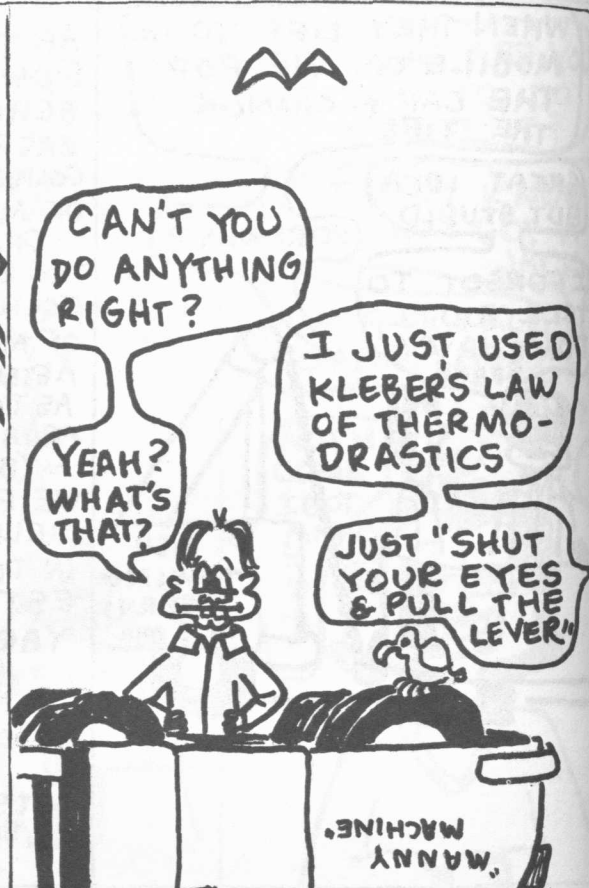
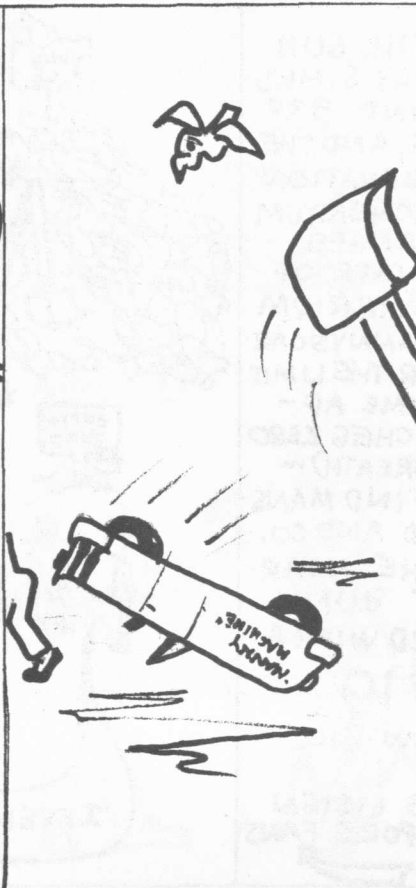
VULTURES DONATED BY OUR 'LEADERS' MOST BELOVED TRIANGLES.



SO... JOHANNESBURG IS DELEGATED TO DRIVE THE CAUGHMANN MACHINE\* OVER TO CHANGE THE TIRE.

\* A CAUGHMANN MACHINE

IS SOMETHING THAT NEVER WORKS QUITE RIGHT... LIKE THE SCHEDULE YOU GET FROM



BASSEL - MOOSUSKI'S GOING TO GET YOU!



AND SO OUR GALLANT HERO DOES HIS DITTY:



Q.E.D. *Aim*

# Dan Schmidt, Missouri '64, met the challenge in mining at St. Joe



Since he graduated from the University of Missouri at Rolla, Dan found opportunity for progress at St. Joe. He's Plant Engineer at St. Joe's ultra-modern Fletcher mine. There he's responsible for some of the most sophisticated equipment to be found in any mine-mill complex on earth. He works with a young, aggressive team in a company that's tops in the industry. □ Dan and his wife Carole and their two sons find life pleasant in Southeast Missouri. He hunts, fishes and competes in

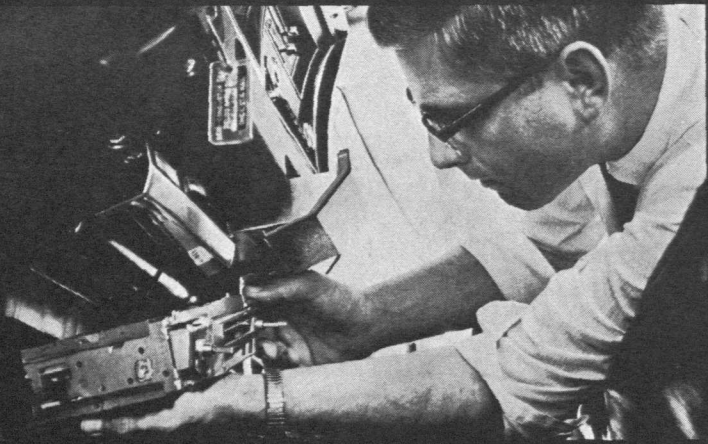
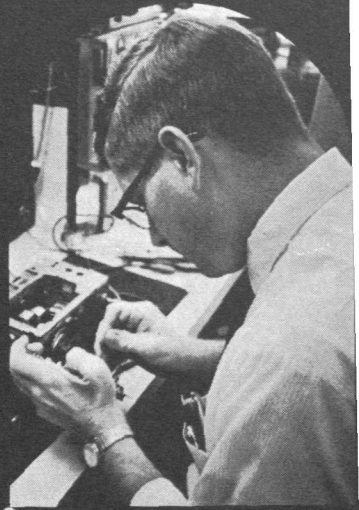
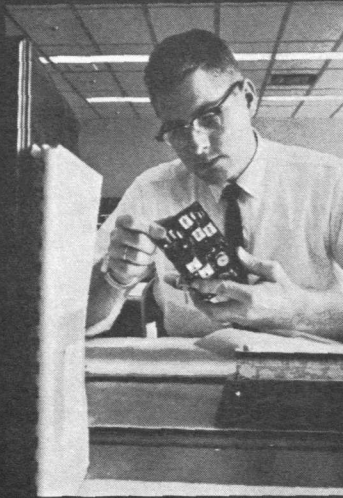
softball and tennis. They live in the country but they are only 90 minutes drive from big city attractions such as major league baseball in St. Louis. □ St. Joe has challenging opportunities for people with the ability and the drive to meet them. They are located in Southeast Missouri, Pennsylvania, Upper New York State and New York City. □ You may find your challenge and your future with St. Joe.

## ST. JOE

Producers and Marketers of Lead, Zinc, Zinc Oxide, Iron Ore Pellets, Iron Oxide, Agricultural Limestone, Cadmium, Copper Concentrates, Silver and Sulphuric Acid.

ST. JOSEPH LEAD CO., 250 Park Avenue, New York, New York 10017

SJ-389



## 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 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 it. 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 Bob Byse. 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**



AN EQUAL OPPORTUNITY EMPLOYER  
DIVISION OF GENERAL MOTORS  
KOKOMO, INDIANA



# Comments On Student Evaluation Of Faculty Members

1. The end of the term is just a bad time. Perhaps the most useful time for an evaluation is early enough in the term to permit an instructor to reinforce his strengths or to modify his weaknesses.
  2. If one grades hard he is rated down. A low + correlation may be found between grade in course and favorability of rating. This is not unreasonable to expect, just as cured patients have higher opinions of a doctor than uncured (or non-voting) patients.
  3. Students will not appreciate the instructor until they have been out of school awhile. Again past research indicates students on campus respond somewhat more favorable than they will five years later concerning the same faculty performances.
  4. Students don't recognize good teaching. Didn't all faculty, when they were undergrads, think some teachers were good and some were not?
  5. Data obtained are not reliable. Evidence shows reliability of opinions is very high for faculty rated very highly or very badly, less high but respectable for those with middling ratings.
  6. The data obtained are not valid. Empirical evidence gives strong indication of individual responses to individual queries, not just a generalized response to the teacher as a person.
  7. The classroom is a man's academic "castle". The evaluation exists in the minds of the students. Shouldn't one at least periodically be curious enough to find out what it is?
  8. One can't define good teaching. On the contrary, experienced teachers in a given course or area know a great deal about teaching methods which are effective in that course or area, and this is demonstrable.
- If you have any comments or suggestions on how engineering procedures can be improved, write to—

*Spartan Engineer*  
Room 144, Engineering Bldg.  
M.S.U.  
East Lansing, Michigan 48823

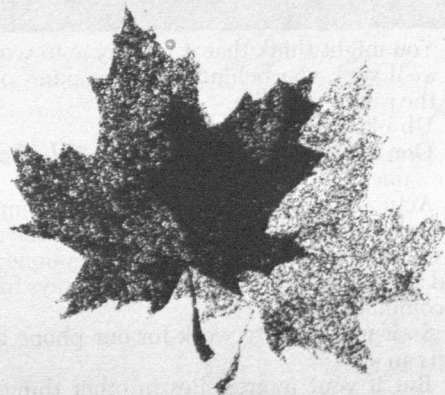
*\*This is important if we are to obtain quality instruction.*

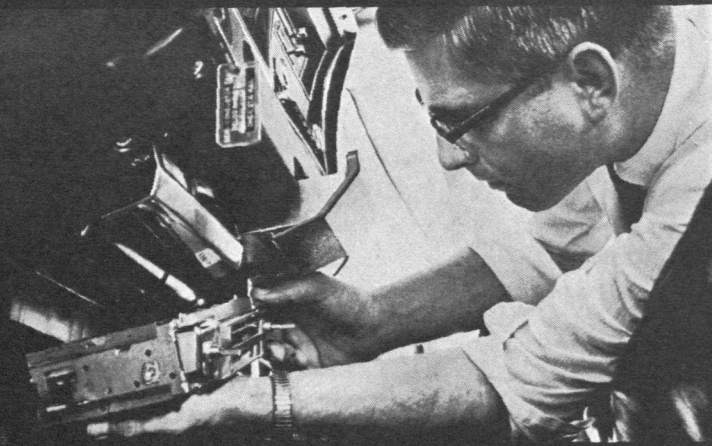


Well Professor Winkleshister,  
I was going to hand my term  
paper in today, but I left  
it in the research book that  
I checked out of the library.  
And when returning it to  
the library, I accidentally  
dropped it in the mail box,  
and the postmaster won't  
let me have it back because  
I forgot to put my name  
on the paper. What can I say?

We are but the  
leaves of a tree  
groping for the  
warming knowledge  
of the sun for  
life.

*Aim*





## 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**



AN EQUAL OPPORTUNITY EMPLOYER  
DIVISION OF GENERAL MOTORS  
KOKOMO, INDIANA

# Comments On Student Evaluation Of Faculty Members

1. The end of the term is just a bad time. Perhaps the most useful time for an evaluation is early enough in the term to permit an instructor to reinforce his strengths or to modify his weaknesses.
  2. If one grades hard he is rated down. A low + correlation may be found between grade in course and favorability of rating. This is not unreasonable to expect, just as cured patients have higher opinions of a doctor than uncured (or non-voting) patients.
  3. Students will not appreciate the instructor until they have been out of school awhile. Again past research indicates students on campus respond somewhat more favorable than they will five years later concerning the same faculty performances.
  4. Students don't recognize good teaching. Didn't all faculty, when they were undergrads, think some teachers were good and some were not?
  5. Data obtained are not reliable. Evidence shows reliability of opinions is very high for faculty rated very highly or very badly, less high but respectable for those with middling ratings.
  6. The data obtained are not valid. Empirical evidence gives strong indication of individual responses to individual queries, not just a generalized response to the teacher as a person.
  7. The classroom is a man's academic "castle". The evaluation exists in the minds of the students. Shouldn't one at least periodically be curious enough to find out what it is?
  8. One can't define good teaching. On the contrary, experienced teachers in a given course or area know a great deal about teaching methods which are effective in that course or area, and this is demonstrable.
- If you have any comments or suggestions on how engineering procedures can be improved, write to—

*Spartan Engineer*  
Room 144, Engineering Bldg.  
M.S.U.  
East Lansing, Michigan 48823

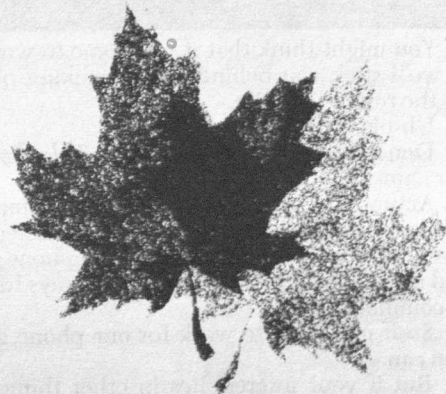
*\*This is important if we are to obtain quality instruction.*



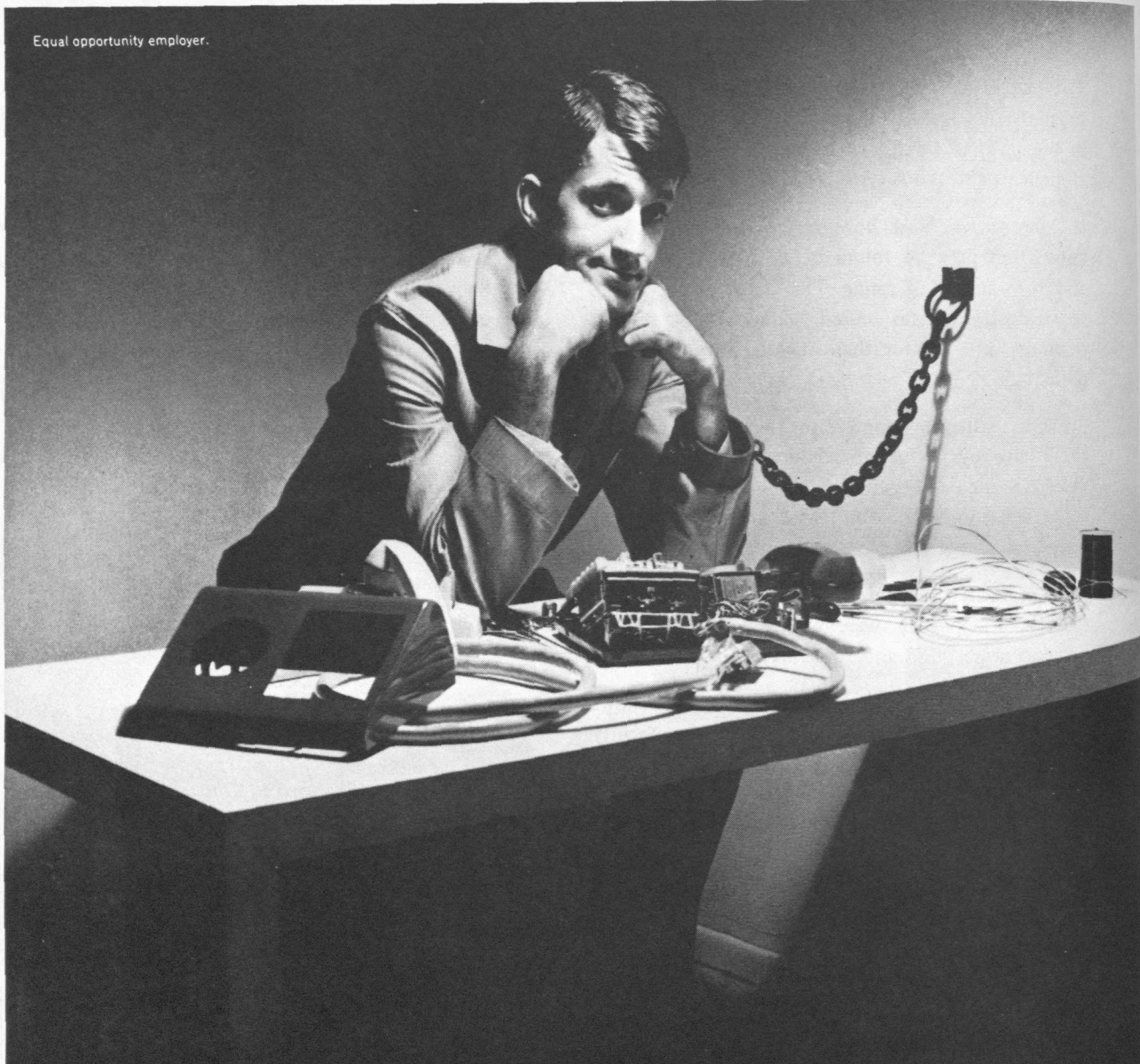
Well Professor Winkleshister,  
I was going to hand my term  
paper in today, but I left  
it in the research book that  
I checked out of the library.  
And when returning it to  
the library, I accidentally  
dropped it in the mail box,  
and the postmaster won't  
let me have it back because  
I forgot to put my name  
on the paper. What can I say?

We are but the  
leaves of a tree  
groping for the  
warming knowledge  
of the sun for  
life.

*Aim*



Equal opportunity employer.



## Maybe our name gives you the wrong impression.

You might think that if you come to work for us we'll stick you behind a desk making phones for the rest of your life.

Uh-uh.

Don't be misled by the word *Telephone* in our name.

Actually we're a group of over 60 companies and some of them happen to be in the telephone business. They're in our General Telephone group and are involved in developing new ways for man to communicate.

So if you want to work for our phone group, you can.

But if your interest lies in other things, you might prefer working for another of our com-

panies, like Sylvania.

Sylvania manufactures over 10,000 products alone, knocking out everything from Micro-Electronic Semi-Conductor Devices to Educational Communications Systems.

The communications field is one of the fastest-growing industries around. The more it grows, the more we grow and the more room you have to stretch within us.

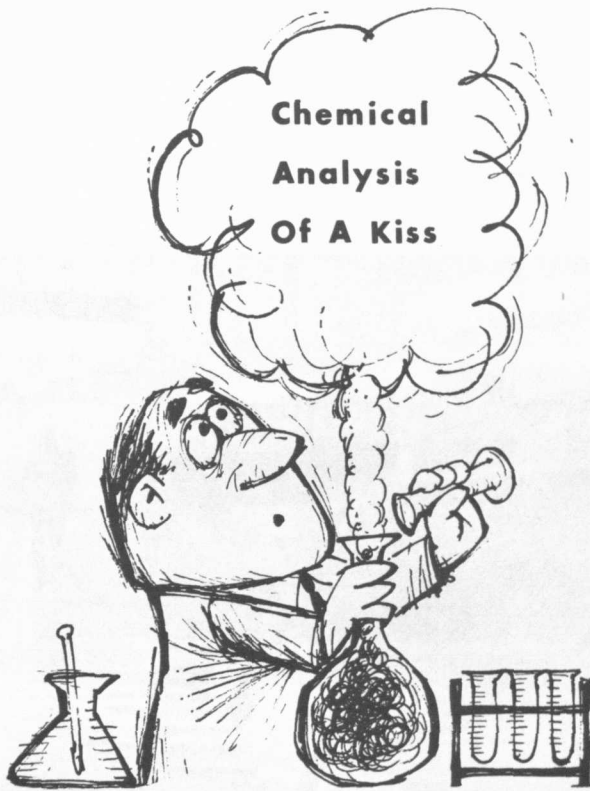
We're looking for Scientists and Engineers with ambition and ideas.

Together we can discover new worlds.

Or make an old one easier to live in.

### General Telephone & Electronics

Sylvania Electric Products • Lenkurt Electric • Automatic Electric • Telephone Companies in 34 States • General Telephone Directory Company • General Telephone & Electronics Laboratories  
General Telephone & Electronics International • GT&E Data Services • GT&E Communications



Properties: color, colorless to deep red. Is not affected by water, but reacts strongly to alcohol.

Occurance: cars, porches, parlors, and parks. In most cases the compound has only a transitory existence, but it may exist for a considerable period of time.

Chemical Behavior: It quickly breaks up when exposed to a bright light, but it seems more stable by moonlight. It frequently plays the part of catalyst producing bonds of a more permanent nature. The appearance of the parent compound produces a quick and violent displacement of the individual members of the compound.

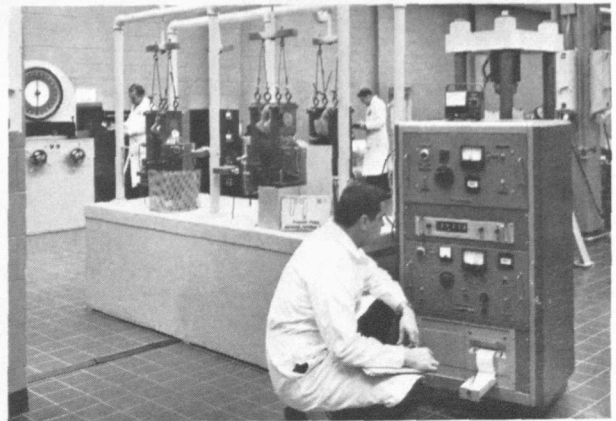
Future Developments: Although it is not new, it is constantly being rediscovered. Very little is known about the nature of the compound, in spite of the fact that many heads are busily engaged on the problem until late every night.

Answers to Brain Strainers on page 8:

1. Alfred-30, Bill-18, Charles-28.
2. The statement is valid.
3. Twenty-three men.
4.  $2 \times 9 + 6 - 7 = 17$  or  $\sqrt{296} - 7 = 17$
5. Smith forgets to bring his wife flowers; there is no independence.

# FUTURES

Career opportunities unlimited in the Malleable castings industry.



Fatigue Life Analysis. Eutectic Cell Size. Carbon Equivalent Determinations. Those titles represent just a few areas of current investigation by Malleable foundries into methods of improving their product and its method of production. Research has produced literally volumes of new and useful data in recent years . . . so much so that there is a dearth of engineering talent to put this knowledge to work.

Many important changes are just

around the corner. Computer control of melting cycles will soon be applied on a practical basis. Die casting of iron may be coming out of the theory stage. The pace of new discoveries will be just that much faster in the years ahead.

Take a hard look at a career in the Malleable castings industry. Malleable foundries are of a size where you will have the opportunity to put your top skills to use almost immediately. It's a growing industry,

as witnessed by the \$75 million expansion program now under way. Its future is as bright as that of its major customers — producers of cars, trucks, and other transportation products, farm, construction and other types of machinery.

The image of the foundry laboratory as a cubbyhole is being shattered. Pictured above is one of several new laboratory facilities built by producers of Malleable castings in the last few years.

MALLEABLE FOUNDERS SOCIETY • UNION COMMERCE BUILDING  
CLEVELAND, OHIO 44115



**Someday soon,  
a fog disperser  
may guarantee  
that you  
won't lose  
a single day  
of Christmas  
vacation.**



PHOTO: JOHN HARRISON



The chairs are lumpy. You get edgy. You develop coffee mouth. You're bored.

In the not-too-distant future, airports may be using an FMC Corporation machine to disperse fog and all those attendant miseries. We've already tried it out in Sacramento, California, and it works. Someday, it may be standard equipment at airports around the world.

Actually, you don't know it, but even now you come in contact with FMC every day in a hundred different ways.

That candy bar you ate at noon—we probably made the machinery that wrapped it. We made the Avril® rayon fibers in your slacks and the Dynacor® cord in your radial tires.

On a grander scale we are a major factor in alleviating the world's food problems. Harvesting machines, fertilizers, packaging equipment—FMC is involved in every phase of food production except actually growing it—but we do supply seeds.

We even make fire engines.

In this day and age, it's important to do what you can to make life more productive. Naturally, we look forward to meeting people who are similarly inclined.

Write or ask your placement director for the descriptive brochure, "Careers with FMC." FMC Corporation, Box 760, San Jose, California 95106. We are an equal opportunity employer.



**FMC CORPORATION**  
Putting ideas to work in Machinery,  
Chemicals, Defense, Fibers & Films

# Welcome to the cold, cruel world.



Of course, if your father's a millionaire, or you're about to marry an heiress, you have no problems. But, if not, then there's only one sensible thing to do. Come to work at Allison Division of General Motors.

There's nothing cold or cruel here. Just the opposite. Particularly if you're an engineer with big ideas. Aerospace projects? Allison's got them. Turbofan. Turbojet. Turbo-prop. Turboshaft. Military and commercial applications right across the board.

Maybe you're more down-to-earth. Fine. Some of Allison's

advanced military vehicle projects will be more your cup of tea. Like the new M551 General Sheridan, for instance. The powershift transmission, of course, is our specialty and even the gun launcher is an Allison brainchild. There's more. And you can be part of it. Take your time. Check them all. But don't forget Allison. Remember, it can be beautiful . . . even without an heiress. Send for Allison's new brochure: Destination Tomorrow. Write: Ken Friedlein, Scientific Placement, Allison Division of General Motors, Indianapolis, Ind. 4620

FMC CORPORATION  
Putting ideas to work in business  
Chrysler, Defense, Truck & Truck

**Allison**  
An equal opportunity employer M/F





# IEEE - Why Every EE Should Join

by Nick Bassel

The M.S.U. student branch of IEEE represents and exists explicitly for the EE students of the college. It is operated by officers elected by and from within the student membership, and these officers are especially receptive to suggestions and constructive criticisms from the members.

IEEE offers students who share common interests a chance to get together outside the classroom. The chapter can be as dynamic and useful as the members care to make it. It can even be utilized to express collective student opinion on issues relevant to our academic careers.

IEEE is the largest professional group in Electrical Engineering. Someday, you will be a professional engineer and it will cost you a lot less to join now as a student than it will then. IEEE membership can serve you well throughout your professional career.

As a very good start, you can attend our meetings and get some ideas as to what it is like, what it really means to be an Electrical Engineer. Top-notch men from industry offer presentations on exciting new developments on what an engineer can expect as he enters his chosen profession, and on other areas of vital interest. These meetings give you an insight unobtainable

in classrooms and textbooks, as to what exciting opportunities lie ahead.

In addition, many publications are available free or at a reduced rate to student members. Some of these are described briefly as follows:

## Student Journal:

Articles of general interest to students, like discussions of new areas, articles relating to jobs, and student-level articles on important advances.

## Spectrum:

Technical articles on latest developments, and coverages of conferences and papers.

## Group Transactions:

The groups consist of a listing of specific areas of Electrical Engineering, of which there are many to choose from. You select the area or areas in which you are most interested, and thereupon, you begin receiving (quarterly, usually) publications of a more technical nature, relating specifically to your personally chosen area of interest.

Now is a good time to join! If you are an EE, not yet a member of IEEE and are interested in joining, (and you should be!) just get in touch with any of the officers for more information, or drop in and see Professor Ryder, our faculty advisor, about membership.

**REMEMBER: STUDENT PROFESSIONALISM MEANS MEMBERSHIP IN IEEE.**


# SUMMARY OF ENGINEERING STUDENTS

FALL TERM 1969  
COLLEGE OF ENGINEERING


Major	UNIVERSITY COLLEGE					GRADUATE		DEPARTMENTAL TOTALS			
	Fr.	Soph.	Jr.	Sr.	MS	PhD	Non-Deg.	Under Grad.	Grad.	Total	% Total
AE	—	11	13	14	10	26	—	38	36	74	-13.9
CHE	—	52	48	37	13	11	—	137	24	161	0.0
CE	—	83	66	64	34	17	10	213	61	274	0.0
CPS	—	82	62	36	2	3	5	180	10	190	+60.0
EE	—	129	112	98	42	51	—	339	93	432	-7.7
ES	—	1	2	—	—	—	—	3	—	3	-30.4
Mat. Sci.	—	3	8	2	—	—	—	13	—	13	-30.4
ME	—	128	95	110	13	22	—	333	35	368	-9.4
Mech.	—	1	—	2	3	19	—	3	22	25	+25.0
MTE	—	11	6	7	6	9	—	24	15	39	-23.5
SYS	—	14	7	12	10	8	12	33	30	63	+117.0
No Mjr.	723	32	—	—	—	—	—	755	—	755	3.6
<b>Total</b>	<b>723</b>	<b>547</b>	<b>419</b>	<b>382</b>	<b>133</b>	<b>166</b>	<b>27</b>	<b>2071</b>	<b>326</b>	<b>2397</b>	<b>-.01</b>

\*Increase/Decrease from Fall, 1968

## Civil Engineers:

Get the facts on structural design of Full-Depth  Deep-Strength<sup>®</sup> Asphalt pavements for highways and streets.

A new and modern pavement design system that incorporates solutions made from extensive computer analysis, The Asphalt Institute's method uses data from the AASHO Road Test, the WASHO Road Test, British road tests and the in-use experience of several states.

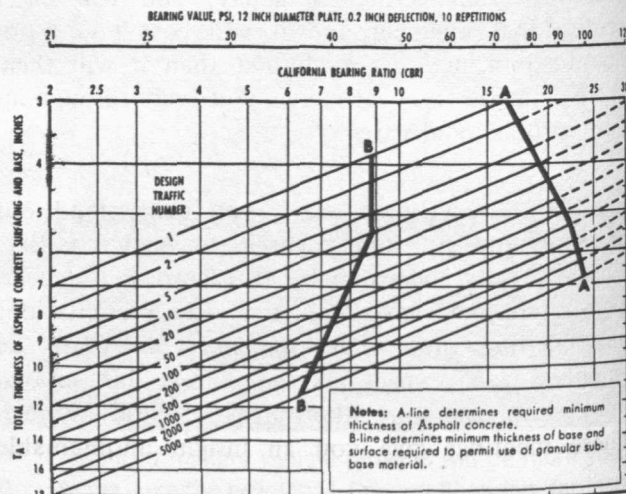
Today, as more states, counties and cities turn to new Full-Depth  Asphalt pavement\* for all their road needs, there is a growing demand for engineers with a solid background in the fundamentals of Asphalt pavement design, technology and construction.

Start now to prepare yourself for this challenging future. Get the latest information on the Thickness Design Method developed by The Asphalt Institute. This modern method of structural design is based on extensive evaluations with the IBM 1620 and the mammoth IBM 7090 computers. How to use this method is explained in The Asphalt Institute's Thickness Design Manual (MS-1). This helpful manual and much other valuable information are included in the free student library on Asphalt construction and technology now offered. Write us today.

\*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<sub>A</sub>—a mathematical symbol used in The Asphalt Institute structural design formula to denote Full-Depth.

# The Asphalt Institute

College Park, Maryland 20740



Thickness Design Charts like this (from the MS-1 manual) are used in this computer-derived method. This chart enables the design engineer quickly to determine the over-all Asphalt pavement thickness required, based on projected traffic weight and known soil conditions.

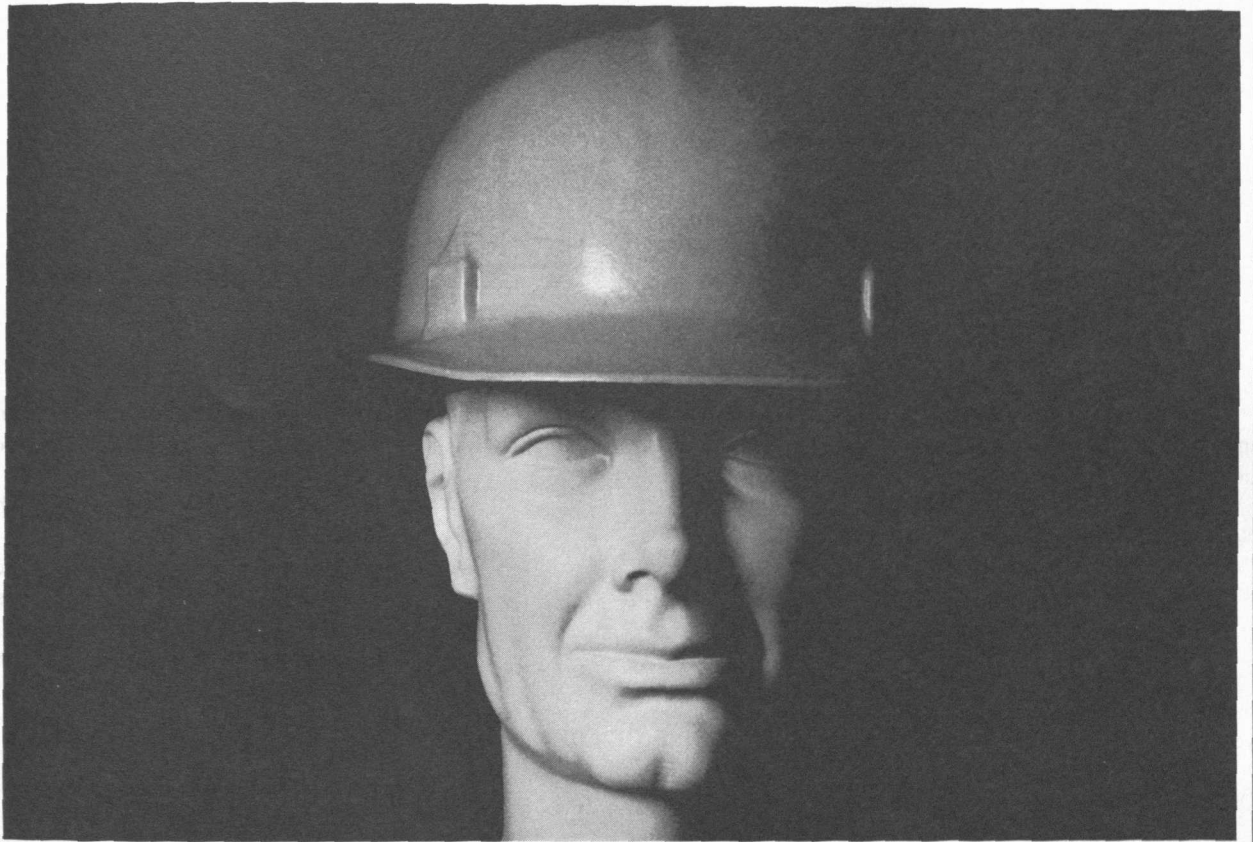
THE ASPHALT INSTITUTE, College Park, Maryland 20740  
Gentlemen: Please send me your free library on Asphalt Construction and Technology, including full details on your new Thickness Design Method.

Name \_\_\_\_\_ Class or rank \_\_\_\_\_

School \_\_\_\_\_

Address \_\_\_\_\_

City \_\_\_\_\_ State \_\_\_\_\_ Zip Code \_\_\_\_\_



## This is no place for "what's his name."

At B&W, you won't be just another face in the crowd. We'll know who you are and what you do. Because, at B&W, we give you something important to work on. And the responsibility for getting the job done.

It could be in a metallurgy lab. In our own nuclear fuel plant. Or our own steel mill.

You might be helping to develop the most advanced steam generators, better specialty steels, machine tools or computers and control systems.

With so many things going for us, we need people who want to pitch in today. And take charge of the projects coming up tomorrow. If you have it, you'll get to see your ideas grow from the talk

stages all the way through to client satisfaction. And a chance to make a name for yourself.

Watch for our representative on your campus. Or contact us direct. Manager, College Recruiting, The Babcock & Wilcox Company, 161 East 42nd Street, New York, New York 10017.

**Babcock & Wilcox**

# ENGINEERS

Faculty advisor: "Let's not have any more jokes about sex, drinking, and profanity."

Joke editor: "O.K., I'm tired of putting out this magazine anyhow."

SE

Ch. E. walking up to coed: "How many drinks does it take to make you dizzy?"

Coed: "Two, and the name is Daisy."

SE

Judge: "Did you say this man stole your money out of your stocking?"

Girl: "Yes, your honor."

Judge: "Well why didn't you put up a fight?"

Girl: "I didn't know he was after my money!"

SE

O.K., Moses, take out your tablet and number from one to ten; we're going to have a quiz.

SE

NEWS FLASH: The Engineering Library was forced to close yesterday. It seems that someone stole the book.

SE

And then there was the freshman who thought that a neckerchief was a sorority president.

SE

## SINE OF LOVE

I saw her as a most beautiful conglomeration of ellipses, parabolas, and sine waves in perfect symmetry as she slithered into the living room. I sat confidently on the sofa sketching free body designs. I felt the firm pressure of her as she sat down beside me. I would judge its modulus of resilience to be about 0.034 in-lb. I felt her warm breath (approx. 560°R) on my cheek as she said, "Have I kept you waiting too long, Hookie?" "Only 32 minutes and 15 seconds," I replied, as I subconsciously estimated the tensile strength of her sweater to be about 5000 psi.

She ran her soft hand through my brushcut (generating some  $2 \times 10^3$  statcoulombs) and asked, "What did you bring for me?" . . . "Oh," I said dramatically, "that's not for you, that's my slide rule." I withdrew it and adeptly flicked the ash from her cigarette with the slide. "Are all engineers as strong, calm, and romantic as you are, Hookie?" I was mentally computing the acceleration, of my heartbeat to 14.7 thumps per second<sup>2</sup>. "Of course they are," I said as I thought, Engineers romantic? Even I had learned in ME that a woman is nothing more than a slow moving man with a lower center of

gravity . . . She might hypnotize some men with her . . . attractions but not me, an ENGINEER.

I observed her coldly (540°R). She leaned over and kissed me lightly—I glanced down at my lapel only to see a molten mass that had once been my Tau Beta pin. She watched in admiration as I casually put the lighted end of my cigarette in my mouth and blew the smoke from my ears . . . I rose with a masculine air of indifference and stalked from the room on my hands.

SE

Angry father: "What do you mean by bringing my daughter home at this hour of the morning?"

Engineer: "Have to be in class by eight."

SE

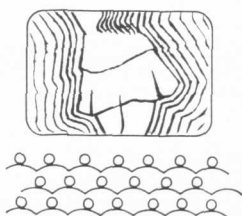
Civil: "I failed my physics exam."  
M.E.: "But I thought you had all the answers written on your cuff."

Civil: "I did but I put on my calculus shirt by mistake."

SE

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

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



*Catch a flick tonight.*  
They can be very interesting.

The color film running through the projector is composed of numerous layers. We put them down in the State of New York on a base we build there from materials we create in the State of Tennessee.

Those layers constitute chemical reactors as thin as 1/10,000 inch. Perhaps seven critical diffusion and reaction steps are run in them. Somebody has to find and maintain an optimum balance for those steps.

Nice work for chemical engineers.

In addition, our involvement in many matters remote

from color film opens other choices:

In photography and beyond, we work with surface diffusion of chemisorbed species; rheology of non-Newtonian fluids; solid-phase polymerization; high-temperature vapor-phase pyrolysis; liquid-phase air oxidations; desalting by reverse osmosis; new fiber yarn configurations. More general: design of plant and equipment from laboratory data through mathematical modeling and dynamic simulation; drying operations for fibers, plastics, and chemicals; study of transport phenomena—mass, fluid, heat; waste disposal and pollution control; on-line manufacturing problems; liaison with customers.

**In case you're interested, keep us in mind.**

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

An equal-opportunity employer. The opportunities are in Rochester, N. Y., Kingsport, Tenn., Longview, Tex., and Columbia, S. C.

**Kodak**

# We want engineers who want to get away from it all.

If you're the kind of engineering student who can't stand the thought of someday sitting at the same desk in the same office day after day, then you're one kind of engineer we want. The kind of engineer we want for a career in technical marketing.

Engineers in this field spend most of their time out in the field. Systems sales and application engineers are always on the go. Talking with customers, selling products and systems. Solving other people's problems.

To do that, you have to understand a lot more than engineering. You have to understand people and how to communicate with them. And that can be one of the toughest jobs there is.

Does it sound like a job you're up to? Then maybe General Electric's Technical Marketing Program has a place for you.

Or places, rather. You might start out in upstate New York. And move on to southern California. Or Atlanta. Or Minneapolis.

But wherever you decide to move with GE, you'll be learning the business. Learning in months what it takes some engineers years to learn.

Our Technical Marketing Program is the one way to get away from it all and, at the same time, get ahead.

**GENERAL  ELECTRIC**

AN EQUAL OPPORTUNITY EMPLOYER

For more information about technical marketing at General Electric, please write to Educational Relations and Recruiting, Room 801T, General Electric, 570 Lexington Avenue, New York, N.Y. 10022