SPARTAN ENGINEER

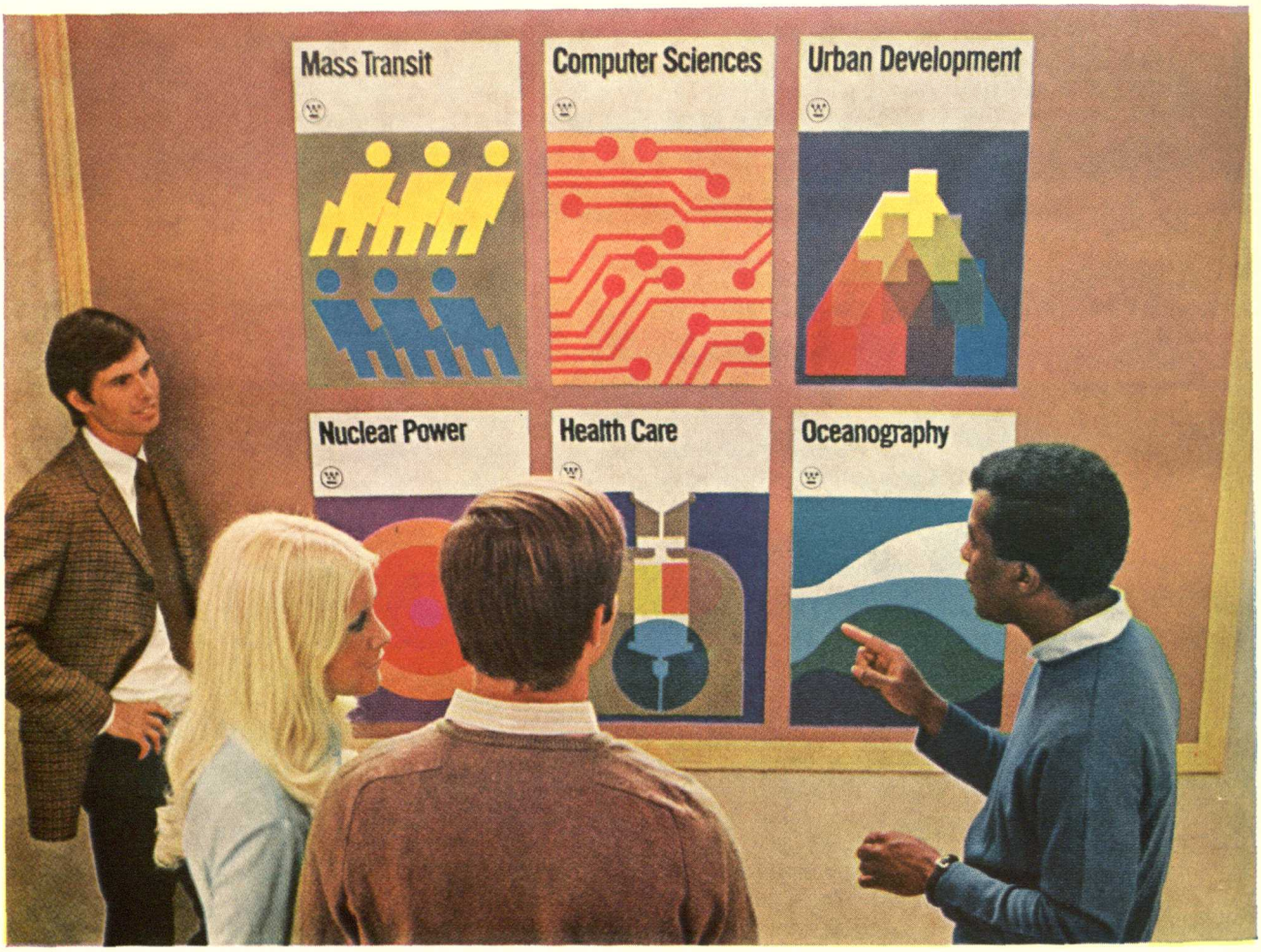
MICHIGAN STATE UNIVERSITY

UARY, 1970

25¢

SENIORS
SEE SUMMARY OF
PLACEMENT BUREAU INTERVIEWS
ON PAGE 22

If you want to engineer a better world...



a great place to start is with one of the most diversified companies in the world.

Westinghouse thinks its responsibilities are as big as its capabilities—and that's big.

And when you're in everything from computers to urban development, to medical science, to mass transit, to oceanography—there's action. For example...

Transportation: Our computerized transit systems can operate on a 90-second schedule, and meet the transportation needs of many cities.

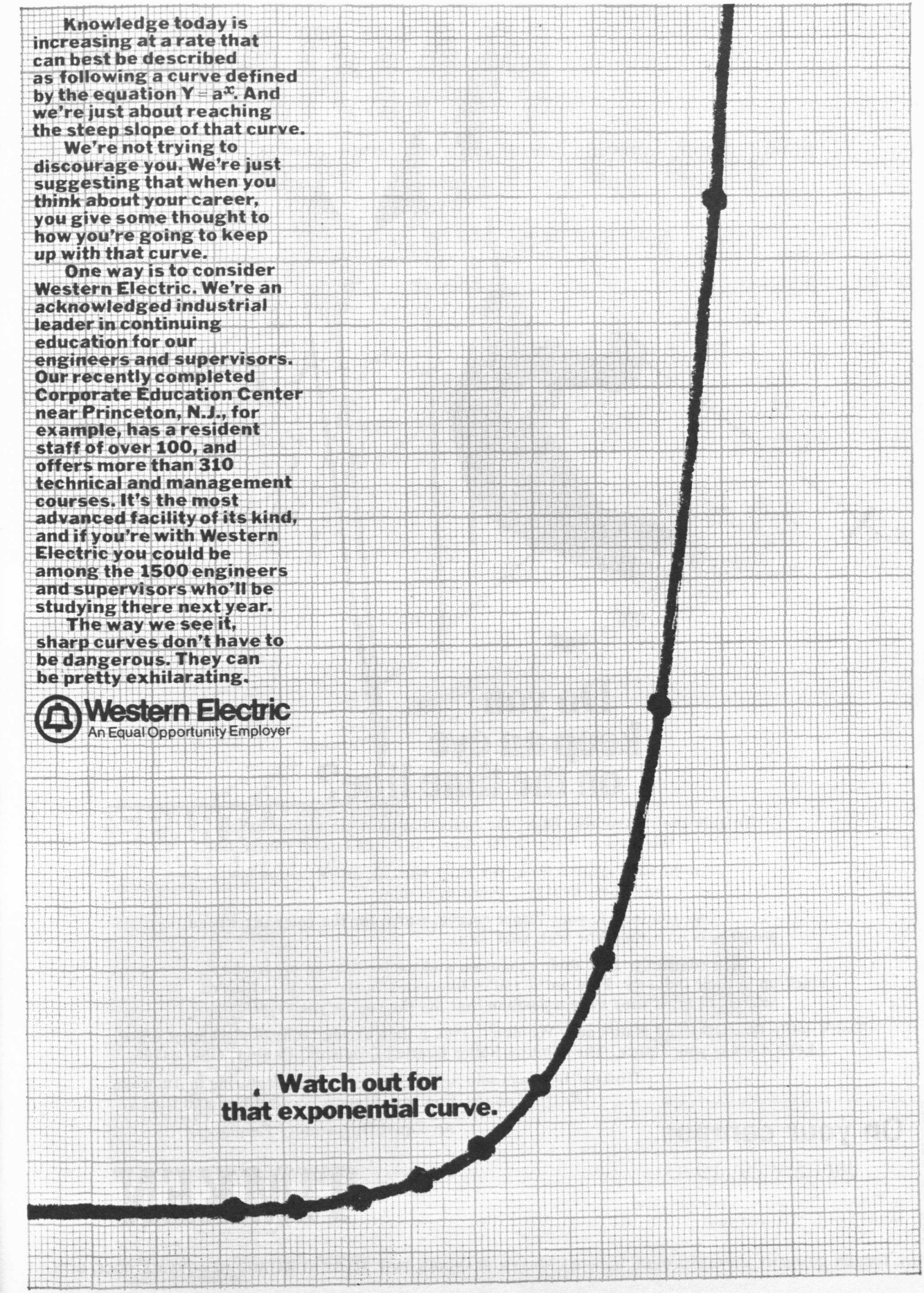
Urban Development: Our new construction concepts will provide better communities across the country. Projects are planned or underway in 30 major cities.

Health Care: We are using a systems approach to provide better medical care for more people. Example: electronic equipment that lets nurses monitor the hearts of eight patients simultaneously.

Nuclear Power: Westinghouse leads the way in nuclear power generation. Seven nuclear plants in operation, 34 in various stages of design. We're working on a breeder reactor to keep us ahead.

That's a sampling. We're just getting started. If you'd like to help us engineer a better world, talk with our campus recruiter. Or write Luke Noggle, Westinghouse Education Center, Pittsburgh, Pa. 15221. An equal opportunity employer.

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


Knowledge today is increasing at a rate that can best be described as following a curve defined by the equation $Y = a^x$. And we're just about reaching the steep slope of that curve.
We're not trying to discourage you. We're just suggesting that when you think about your career, you give some thought to how you're going to keep up with that curve.
One way is to consider Western Electric. We're an acknowledged industrial leader in continuing education for our engineers and supervisors. Our recently completed Corporate Education Center near Princeton, N.J., for example, has a resident staff of over 100, and offers more than 310 technical and management courses. It's the most advanced facility of its kind, and if you're with Western Electric you could be among the 1500 engineers and supervisors who'll be studying there next year.
The way we see it, sharp curves don't have to be dangerous. They can be pretty exhilarating.
Western Electric
An Equal Opportunity Employer
Watch out for that exponential curve.

Do you keep an eye on the time line?

To gain the competitive edge, the experts in downhill slalom have this advice: "Watch the time line — the fastest course line."

"In the race against time, if a skier slips off and goes too low in the traverses, he'll lose precious seconds."

As you look to your future course, watch for the company whose progress is on a time line with your own.

Ask companies how their expansion and modernization programs stack up in their industry. Find out if you're interested in the markets they're interested in. If they have a position that fits the course you've set.

Don't settle for salary and status quo. We don't. Pick a time at your college placement office. Let's discuss your future. The Timken Roller Bearing Company, Canton, Ohio 44706.

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

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On your campus...

January 29, 1970

A Timken Company representative would like to talk with you!

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REGISTERED TRADEMARK

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

SPARTAN engineer

MICHIGAN STATE UNIVERSITY

VOLUME 23 NUMBER 2 JANUARY, 1970

This month's cover, by Dave Karrer and Dave Borzenski, indicates that the technology of this day's engineer is rapidly increasing.

Member, Engineering College Magazine Associated

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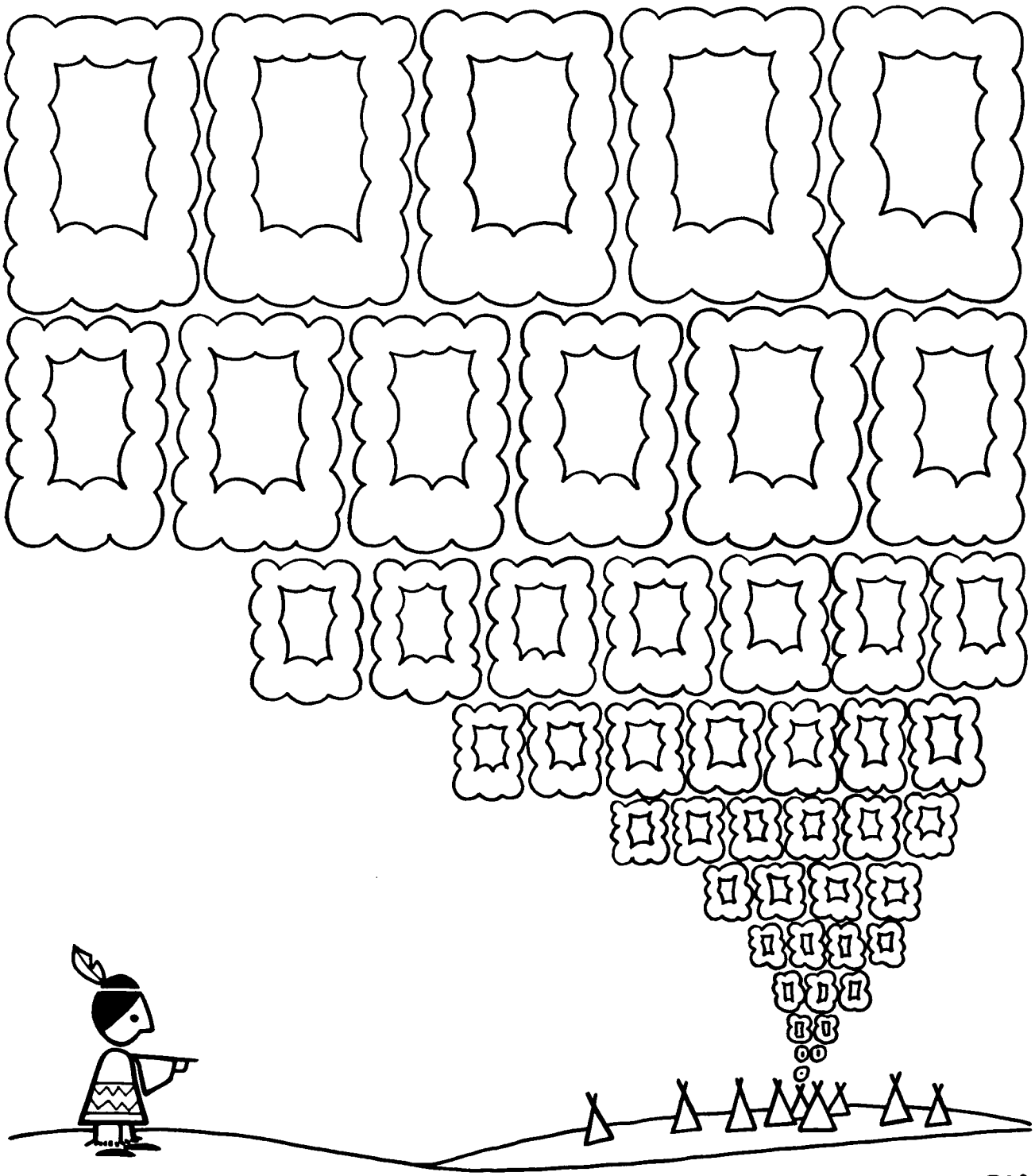


"Chief right. NCR computer much faster!"

Although we haven't really tried to see what our computers could do with smoke signals, NCR engineers have made some amazing things happen.

Consider our NCR printer, for example. The hammers are actually put into free flight, like ballistic missiles, and stopped by precisely adjustable controls. During their movement in free flight, they reach an acceleration many times as great as that of a rocket lifting off its launching pad. These hammers contact the paper less than 100 millionths of a second.

If that kind of technology goes into our computer peripherals, consider the engineering of our computers themselves. Isn't this the kind of work you'd find interesting? See the NCR representative when he visits your campus. Or write: William G. Benner, Coordinator College Relations
The National Cash Register Company, Dayton, Ohio 45409

WE ARE AN EQUAL OPPORTUNITY EMPLOYER M/F

NCR

Editorial

The image of today's engineer is biased, and completely ignores those qualities of professionalism we strive for. When I tell someone I'm an engineering student, their immediate thoughts are math, computers, blue prints, calculations, and equations. Granted these are important in the making of an engineer, but they are only tools of a trade and not the finished product. The view I take the most offense to is that we are all "walking automated problem solvers", which instantly eliminates any human qualities or individuality.

I feel we're being confused with technicians whose job is as close to automated as possible, and this comparison should be silminated and the "true engineer" concept brought into the light. We do the designing, planning, preparation, research, and sometimes even the selling while the technician builds what we create. I don't want to knock the technician, for his job is vital; I only want the engineer to have his rightful place in today's society.

This change of opinion cannot be brought about through a bloody revolution, a strike, a protest march, or even by publicity. The only way of letting the world know a "real engineer" is to be one and never stop. The true engineer is a real, live, thinking, breathing, working, and human person, and this is the image we must put forth. □

Venture: Purify water with the fiber that made men whistle.

Nylon. Reverse osmosis.

A fiber that started making girls' legs more beautiful some 30 years ago.

And a process that's been around a lot longer.

But when Du Pont scientists and engineers look at them in a new way, they combine into an idea that can change the world.

Reverse osmosis is a purification process that requires no phase change. It's potentially the cheapest way to desalinate water.

Du Pont's innovation? Hollow, semipermeable nylon fibers much finer than human hair. Symmetrical, with an outer diameter of .002 inch and a wall thickness of .0005 inch, with an accuracy of manufacture maintained at close to 100%. Twenty-five to 30 million of them encased in a precisely engineered unit 14 inches in diameter by 7 feet long.

The result: a semipermeable surface area of about 85,000 square feet—the size of a 2-acre lot—and up to 10,000 gallons of desalted water per day.

So far "Permasep"® permeators have been used experimentally to purify brackish and polluted water, and in various industrial separations. But the potential to desalt seawater, too, is there.

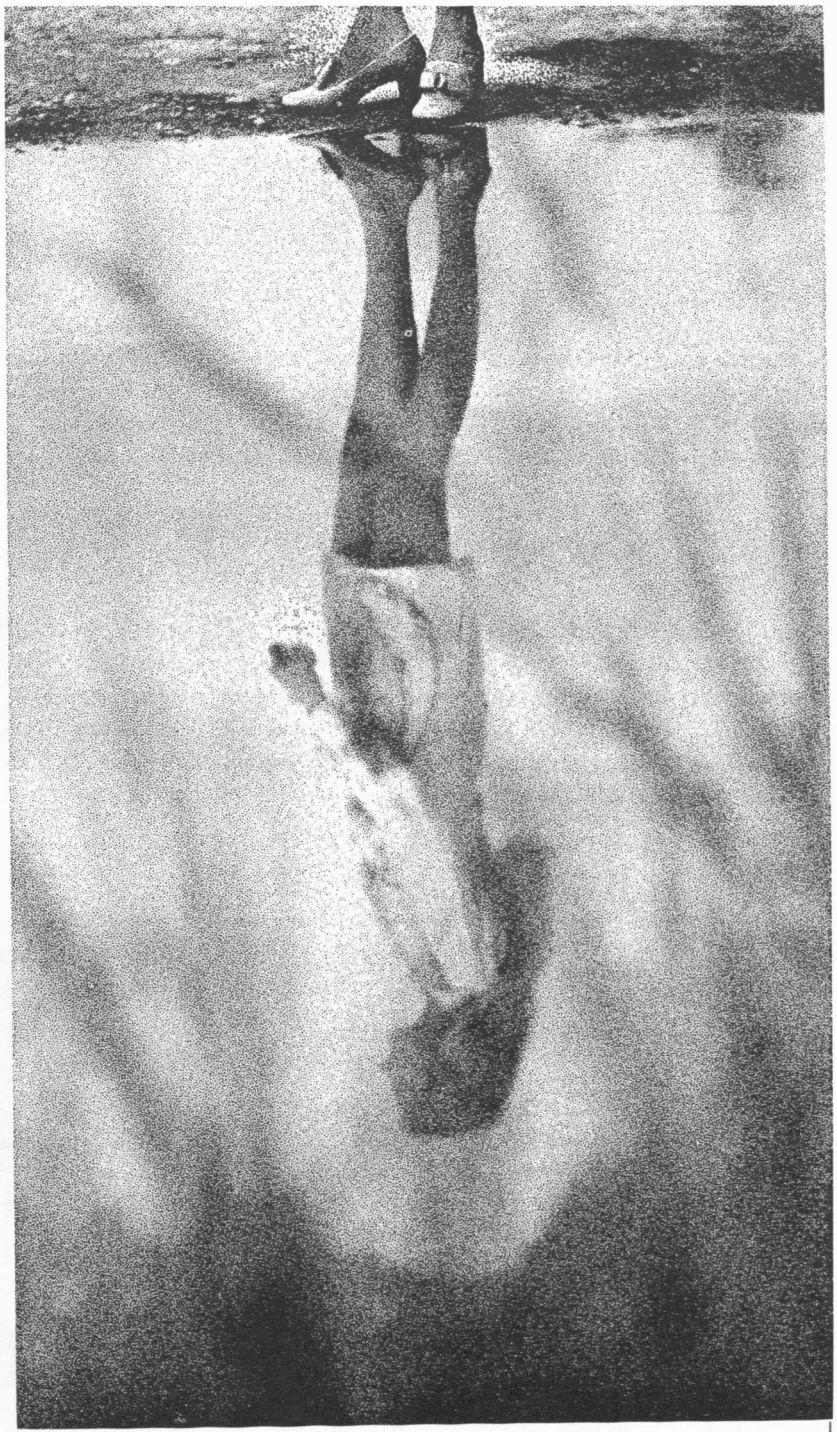
So Du Pont scientists and engineers are even now working toward improved fibers, units and plant designs that should make it possible to get fresh water from salt at a price that any town or nation can afford.

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 now engaged in.

For a variety of career opportunities, and a chance to advance through many fields, talk to your Du Pont Recruiter. Or send us the coupon.

DU PONT
REG. U.S. PAT. OFF.

Ventures for better living.



Du Pont Company, Room 7890, Wilmington, DE 19898

Please send me the booklets checked below.

- ☐ Chemical Engineers at Du Pont
- ☐ Mechanical Engineers at Du Pont
- ☐ Engineers at Du Pont
- ☐ Accounting, Data Systems, Marketing, Production

Name_____

University_____

Degree_____ Graduation Date_____

Address_____

City_____ State_____ Zip_____

An Equal Opportunity Employer (M/F)

BRAIN SPRAINERS

A man is on a bridge from A to B, 3/8 of the way across from A. He hears a train approaching A at a rate of 60 mph. If he runs towards A he will meet the train at A; if he runs toward B the train will overtake him at B. How fast can he run?

A garrison had bread for 11 days. If there had been 400 more men, each man's daily share would have been 2 ounces less; if there had been 600 fewer men, each man's daily share could have been increased by 2 ounces and the bread would have lasted 12 days. How many pounds of bread did the garrison have?

There are two numbers formed of the same two digits in reverse order. The sum of the numbers is 33 times the difference between the two digits, and the difference between the squares of the two numbers is 4752. Find the numbers.

In a series of games, Jim beat Frank and John; Frank beat Joe, Tom and John; Joe beat Jim and Tom; Tom beat Jim and John; John beat Joe. Rank the players according to their winning ability.

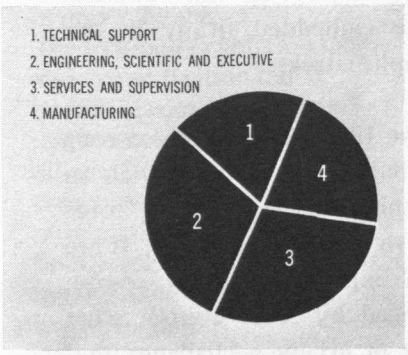
Answers on page 40.

When you've got a company that's run by engineers, this is what it looks like.

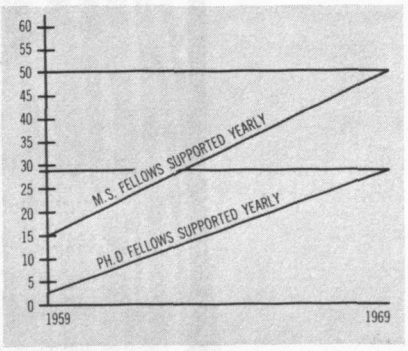
Four-fifths of our management at Hughes-Fullerton are engineers. So we're technically oriented. As the chart shows, 27% of the staff are assigned engineering or scientific tasks in our field of large information systems. Another 24% have technical support assignments. We're set up so that draftsmen draft; technicians work at lab benches; and engineers engineer.

To develop sophisticated information systems, we need a wide range of technical disciplines. This 1968 chart gives some idea of our requirements. One man in five has a Masters or Doctorate in his specialty.

Many of our technical staff continue graduate studies under company-sponsored educational programs. Each year, advanced degrees are earned this way. Support for fellowship programs has steadily increased. In 1959, three Ph.D. and 15 M.S. Fellows were supported by Hughes-Fullerton. During the 1969/70 school year, 29 Ph.D. and 50 M.S. Fellows are being supported.



	ELECTRICAL ENGINEERING	MECHANICAL ENGINEERING	MATHEMATICS	PHYSICS	RELATED SCIENCE	OTHER	SUBTOTAL	SUPPORTING DISCIPLINES	TOTAL
BACHELOR	640	71	99	81	83	16	990	3	993
MASTER	154	17	19	22	19	2	233	4	237
PH D	12	1	4	7	6	2	32	0	32
TOTAL	806	89	122	110	108	20	1255	7	1262



Current activities include: phased-array frequency-scanning radar systems; real-time general-purpose computers; real-time programming and systems software; displays; data processing; satellite and surface communications systems; missile systems; and tactical command/control systems.

For more information on opportunities at Hughes-Fullerton in Southern California—and to arrange for an interview with Staff representatives—contact your College Placement Office. Or write: Mr. D. K. Horton, Supervisor, Engineering Staffing, Hughes-Fullerton, P.O. Box 3310, Fullerton, California 92634.

HUGHES
HUGHES AIRCRAFT COMPANY

Campus Interviews February 16

An equal-opportunity M/F employer • U.S. citizenship is required.

ON OR ABOUT THE COVER

A new decade has dawned on our world recently and as this issues' cover of *Spartan Engineer* indicates that the technology of this day's engineer is rapidly increasing. The Engineer literally holds the world in his hands. The sliderule is the tool that we engineers must use to accomplish the tasks we have set out to conquer. Of course we realize that without a little ingenuity and originality, roads will no longer go through mountains, engines will no longer get smaller yet more powerful and computer circuit boards will no longer become more complicated yet easier to operate.

MSU engineering students must do their part in making this world a better place to live. We must not be content to sit back and mechanically manipulate equations and problems. We must wade through the math and manipulations and beach ourselves on the physical principles at hand. These principles must be embedded firmly in our minds if we are to use imaginations to accomplish tasks.

If all you want is grades then I believe that you're in the wrong boat. I'm not trying to bring down grades, but if you get a 4.0 in an engineering course and you didn't take anything away with you–some scrap of knowledge and experience–then you've failed in my eyes. If we are content to lean on our laurels and past experience in any course, what a waste! Don't be afraid to be challenged by some course, what good are you in the future if you can't face or accept a challenge that is new and different to you? Sure, you're brains get racked and you have to work myriad problems that seem meaningless but again I reiterate that you must try to pursue knowledge at all expense. Don't get bogged in mathematics. Try to find the principle, secret, key, tenet, source, origin, nature of the thing and do your thing on it . . . and good luck. □

David R. Karrer

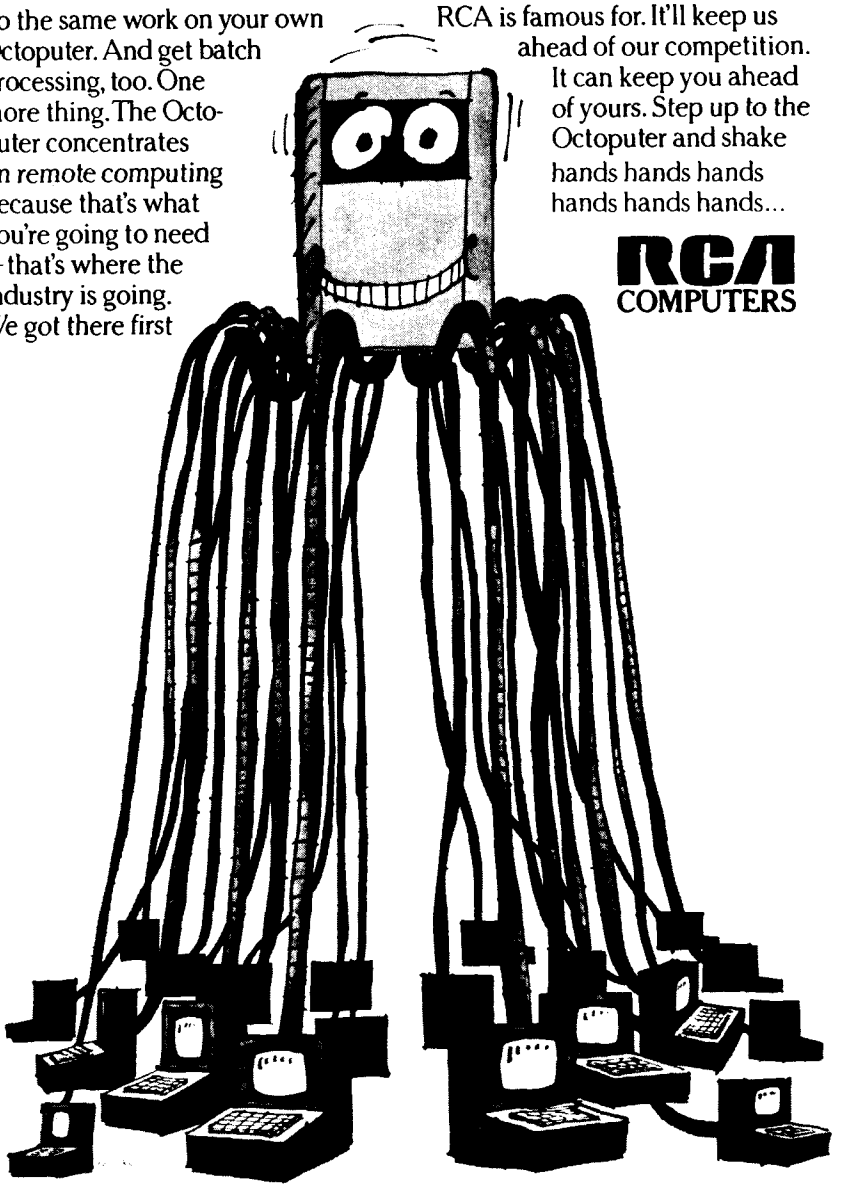
The Octoputer

RCA's many-tentacled computer does time sharing plus regular computing. It's a generation ahead of its major competitor.

Once there were only monster computers that did big batch jobs like payrolls.
Then came the whirling dervishes of time sharing that let a lot of people work at once.
Now there's a new kind of creature that does time sharing and batch work together. So lots of people can use it—efficiently.
It's the Spectra 70/46. The Octoputer. There's nothing else quite like it on earth or under the sea.
The Octoputer's arms are long and strong. It sits in the middle of your company and reaches helping hands out in all directions. Suddenly, your company works harder. More of your people use the computer—solving more problems, finding more facts, writing more programs.
And it does your big batch jobs in its spare time.
The Octoputer does a real armload of work for a handful of change. Check the bills from your time-sharing services.

See if it's not more efficient to do the same work on your own Octoputer. And get batch processing, too. One more thing. The Octoputer concentrates on remote computing because that's what you're going to need—that's where the industry is going. We got there first because communications is what RCA is famous for. It'll keep us ahead of our competition.
It can keep you ahead of yours. Step up to the Octoputer and shake hands hands hands hands hands hands...

RCA COMPUTERS



For career information visit your College Placement Office.

Nick Bassel

Can Man Survive?

It's up to us. Man, alone of all living creatures, threatens the balance and self-regulation of nature. The world we've made is everyone's responsibility and everyone's shame. Fish cannot survive in our poisoned waters. Smoke stacks belch pollutants and poisons into the air. Cars without end fill the air with carbon monoxide. The green areas are being systematically devoured by concrete and asphalt. Mankind is choking in his own garbage.

The breast milk of American mothers now averages .2 parts per million of DDT, four times the "safe" level the U. S. Government allows in cows' milk for human consumption. The smog in the air of certain cities is so severe that it burns the eyes. Millions of acres in Appalachia, Pennsylvania, and Illinois have been ruined by strip mining, a technique which leaves a wasteland behind.

The water table is dropping rapidly in many parts of the country. Two hundred square miles of Lake Erie are completely inert of oxygen. Then there is thermal pollution.

If we can't pass on to future generations the gift of sweet, song-filled air on a summer morning, we will give them sonic booms and wall to wall pollution. If we can't leave them clean lakes and streams, we'll teach them how to make a fast buck. Then they can always swim in the chlorinated waters of their own pools. Though our detergents are killing the lakes and rivers, we'll leave them a legacy of whiter, bolder, brighter laundry . . . at least, some of them.

The population of the earth is 3½ billion people and at the present rate of growth it will be almost double that by the year 2000. This fact in view of the fact that we can't even feed all the people alive now. Then one must consider the quality of life. How much malnutrition, how much overcrowding and discomfort renders life intolerable? Is subsistance living?

We are the authors of our own misfortunes. No one wants to turn the clock back on all the benefits and advances of our technological age. However, the challenge is to channel our technology to benefit all of nature, instead of destroying nature for the temporary comfort and self interests of men.

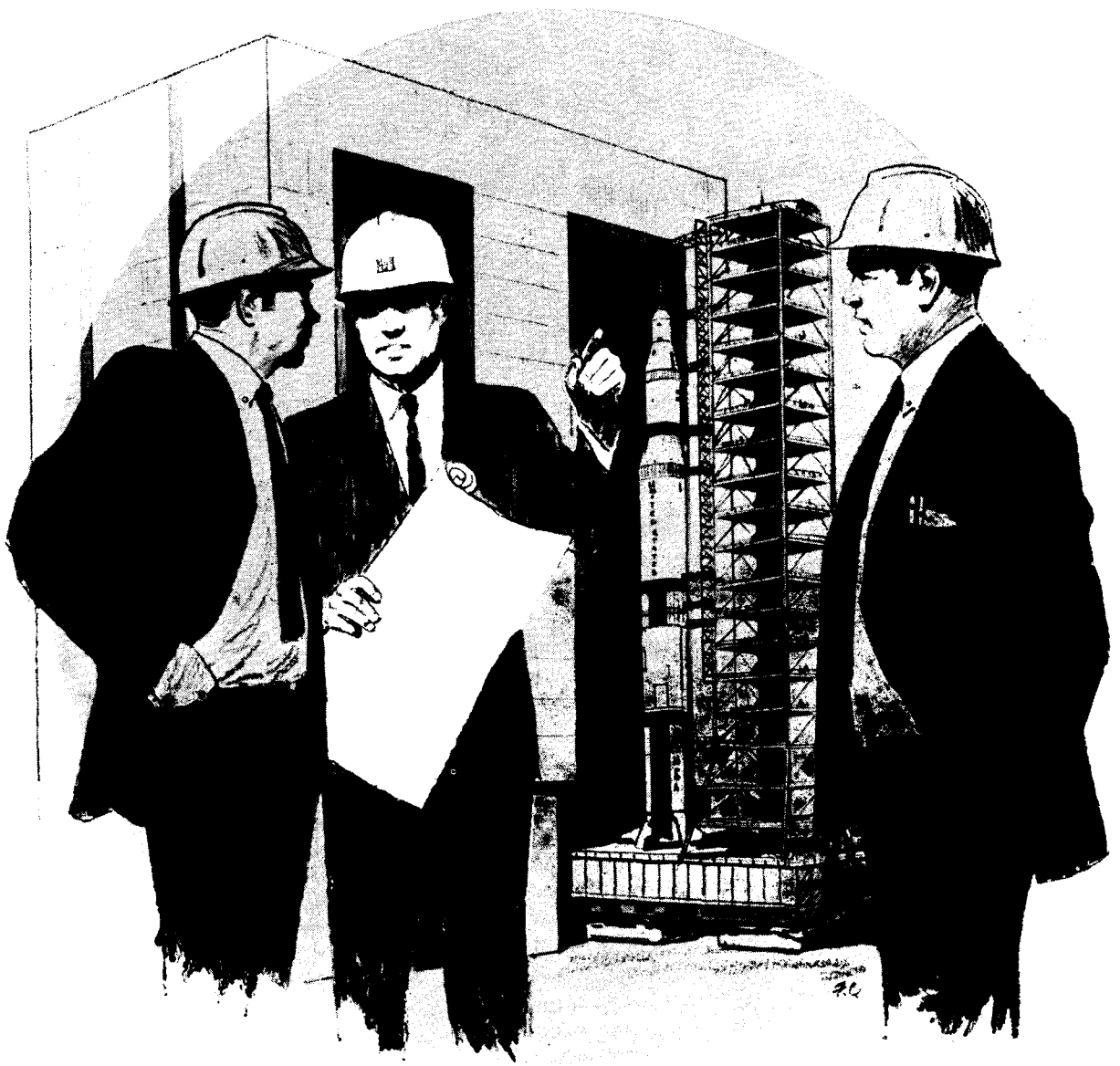
The problems won't go away on their own. Unless famine, over population and pollution are effectively and universally attacked, the human situation will soon become intolerable, not only because of acute shortages of food, but as a result of a general deterioration of the natural, social and political environment.

Old differences and self interest must be set aside in the struggle for the benefit of all people. All people, all industries, and all governments everywhere must cooperate to solve the massive problems ahead. Problems in which we engineers can play a key part. Ours is a shrinking world.

"The politics of ecology will replace both Marxism and Capitalism." □

Engineers: The biggest opportunity is with the world's largest engineering/construction group

The engineer who wants to tackle today's most challenging engineering/construction projects can find the opportunity he's looking for with the Corps of Engineers. As the world's largest construction/engineering organization, the Corps takes on really big and exciting jobs—like NASA's Apollo assembly building, one of the world's largest structures. Corps projects span the entire range of modern construction engineering; hydroelectric power dams, flood control facilities, airports, roads, hospitals, family housing and special application manufacturing plants. Plus a host of stimulating research projects. ☐ The Corps is career headquarters for the engineer who wants to move in and do things, get involved, expand his horizons—starting right now. If that sounds like you, write to us today. We'll tell you all about the advantages of a civilian career with the Corps of Engineers.



Corps of Engineers Department of the Army Washington, D.C. 20314

An equal opportunity employer

There's room for you to grow here in the '70s

New career opportunities in aerospace/electronics

There are no walls around you, no ceiling above you when your career is aerospace/electronics.

And Hughes Field Service & Support Division is an ideal place to start. You can capitalize now on your abilities and training. Get valuable and varied experience quickly. And keep progressing steadily toward your career goals.

Our Division objectives are to assure maximum utilization and operational efficiency of high-performance electronic equipment throughout its life span.

Significant projects include: Communications Satellites; Automatic Test Equipment; Airborne Fire Control Systems; Airborne Communications Systems; and Training Simulators.

Areas of interest:

Field Engineering

Responsibilities include: providing maintenance, operational and technical assistance; on-the-job training; logistic assistance and solution of equipment problems in the field.

Engineering Writing

At Hughes, technical staff members prepare technical publications and instructional devices for the operation and maintenance of electronic systems. Assignments are varied and provide a wide range of systems-oriented experience.

Technical Training

Hughes Technical Training prepares both civilian and military personnel to operate and maintain advanced electronic systems. Instructors work directly with customers to evolve special training devices, plan field training programs and prepare courses for use at customer bases.

Design Engineering

Design Engineers develop sophisticated training simulators, automatic checkout and test equipment, inertial guidance, infrared testing and Command/Control systems. Included are design of analog circuits, digital logic, switch/relay logic and electro-mechanical packaging. Responsibilities extend from concept to final fabrication and evaluation.

Requirements:
B.S. degree in Electrical Engineering or Physics.

Campus Interviews
February 16

For further information on the career opportunities available at Hughes Aircraft Company, please contact your College Placement Officer or write:
Mr. R. J. Waldron,
Hughes Aircraft Company,
P.O. Box 90515,
Los Angeles, Calif. 90009.

HUGHES

HUGHES AIRCRAFT COMPANY

Equal opportunity M/F employer.
U.S. citizenship is required.

ENGINEERS, MATHEMATICIANS:

At NSA, our successes depend on yours.

Because of the nature and scope of the National Security Agency's mission, our successes are in direct relation to your achievements.

At NSA, we are responsible for designing and developing secure/invulnerable communications and EDP systems to transmit, receive and analyze much of our nation's most vital information. The advancing technologies applied in this work are such that they will frequently take you beyond the known and accepted boundaries of knowledge. Consequently, your imagination and resourcefulness are essential qualifications for success.

The Career Scene at NSA: ENGINEERS will find work which is performed nowhere else . . . devices and systems are constantly being developed which are in advance of any outside the Agency. As an Agency engineer, you will carry out research, design, development, testing and evaluation of sophisticated, large-scale cryptocommunications and EDP systems. You may also participate in related studies of electromagnetic propagation, upper atmosphere phenomena, and solid state devices using the latest equipment for advanced research within NSA's fully instrumented laboratories.

MATHEMATICIANS define, formulate and solve complex communications-related problems. Statistical mathematics, matrix algebra, and combinatorial analysis are but a few of the tools applied by Agency mathematicians. Opportunities for contributions in computer sciences and theoretical research are also offered.

COMPUTER SCIENTISTS participate in systems analysis and systems programming related to advanced scientific and business applications. Software design and development is included, as well as support in hardware design, development and modification.

Career Benefits: NSA's liberal graduate study program permits you to pursue two semesters of full-time graduate study at full salary. Nearly all academic costs are borne by NSA, whose proximity to seven universities is an additional asset.

Starting salaries, depending on education and experience, range from $9,169.00 to $15,000.00, and increases will follow systematically as you assume additional responsibility. Further, you will enjoy the varied career benefits and other advantages of Federal employment without the necessity of Civil Service certification.

Check with your Placement Office for further information about NSA, or write to: Chief, College Relations Branch, National Security Agency, Ft. George G. Meade, Md. 20755, Attn: M321. An equal opportunity employer, M&F.

Campus Interview Dates: February 9, 10, 11

national security agency

where imagination is the essential qualification.

Summary of Majors Requested by Employers

From information published By the Placement Bureau

College	Number of Graduates	Requests	Jobs Available Per Graduate
Agriculture	208	310	1.49
Arts and Letters	243	213	.87
Business	607	1439	2.37
Communication Arts	215	259	1.20
Education	1578	5430	3.44
Engineering	**303**	**2349**	**7.75**
Home Economics	139	26	.18
Natural Science	252	1031	4.09
Social Science	323	358	1.10
Veterinary Medicine	87	5	.05

BREAKDOWN WITHIN THE ENGINEERING COLLEGE

Major	Number of Graduates	Average Monthly Salary - 1969 Graduate	Requests	Jobs Available Per Graduate
Agriculture	6	$ 810	46	7.66
Chemical	30	849	400	13.33
Civil	59	809	298	5.05
Computer Science	17	812	76	4.47
Electrical	89	825	533	5.98
Mechanical	85	819	593	6.97
Metallurgical	10	819	153	15.30
Systems Science	7	789	2	.28

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 graduate 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 engineering 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.

Ford

. . . has a better idea

Will Olin turn you into an organization robot?

These soulless creatures who do and think only what they're told are an anathema to Olin.

We want humans. The best we can get.

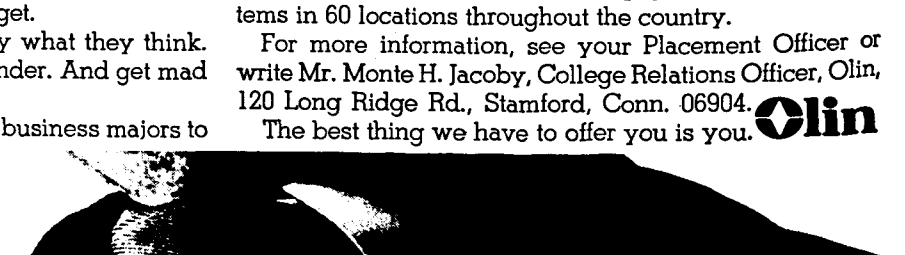
We want people who think. And say what they think.

People who can still dream. And wonder. And get mad when things foul-up.

Specifically engineers, chemists and business majors to work in chemicals, aluminum, packaging material, sporting arms and ammunition, brass, paper and energy systems in 60 locations throughout the country.

For more information, see your Placement Officer or write Mr. Monte H. Jacoby, College Relations Officer, Olin, 120 Long Ridge Rd., Stamford, Conn. 06904.

The best thing we have to offer you is you. **Olin**



Olin is a Plan for Progress Company and an equal opportunity employer (M & F).

Xerox: For engineers who think of more than engineering.

There's one in every crowd. A Doug King, who'd rather do something than talk about it. By vocation, Doug's a Manager (Test Engineering) for Xerox. By avocation, a teacher of functional illiterates. By *instinct, an unabashed do-gooder.* "I just feel that if one person can be effective—*really* effective—it's better than 100 people sitting in a meeting."

The wish being father to the deed, Doug involved himself in inner-city programs and Rochester's Business Opportunities Operation. Doug teaches adults with less than a sixth grade education to read—on a 1-to-1 basis, just teacher and pupil. He went about this in the same professional way he tackles his daily work. He first took a course in how to become a teacher. *Now, he's training fledgling instructors.*

On the business side, one of the persons under his wing had never been anything *more than a janitor.* Doug helped him secure a franchise from a national rug-cleaning company. It's successful, too. As Doug puts it: "For the first time in his life, this fellow finally has a stake in something. And he knows if he needs help or advice, it's there for the asking."

Doug also benefits from his avocation. For one thing, he's more patient. More *understanding of society's so-called* problem children. He knows why they are what they are—and what they can be.

At Xerox, we like people like Doug King. Engineers who can see beyond engineering. Engineers who can feel for humanity. Engineers who seek additional outlets for their talents.

If you're this kind of engineer, we'd like to talk to you. Your degree in Engineering or Science may qualify you for some intriguing openings in a broad spectrum of developmental and manufacturing areas.

We're located in suburban Rochester, New York. See your Placement Director for a copy of our brochure and for the *date of our scheduled campus interviews.* Or, write directly to Mr. Roger VanderPloeg, Xerox Corporation, P.O. Box 251, Webster, New York 14580. An Equal Opportunity Employer (m/f).

XEROX

Excerpts From "PLACEMENT MANUAL" of the Placement Bureau

JANUARY 29, 1970
Columbia Gas System Services Corporation
Consumers Power Company
Cornell Aeronautical Lab., Inc.
Detroit Edison Company
Emerson Electric Company
General Dynamics
General Electric Company
McDonnell Douglas
Timken Roller Bearing Company
Westinghouse Electric Corp.

JANUARY 30, 1970
Consumers Power Company
General Dynamics
General Electric Company
Gulf Research & Development Company
Westinghouse Electric Corp.

FEBRUARY 2, 1970
Borg-Warner Corporation
Borg-Warner Corporation- Roy C. Ingersoll Research Center
Dow-Corning Corporation

FEBRUARY 3, 1970
Alcoa
Dow Corning Corporation
Electronic Communications, Inc.
International Telephone & Telegraph
Michigan Consolidated Gas Co.
National Cash Register Company
Pure Oil Division (Union Oil Company of California)
Texaco, Inc.
United Aircraft Research Lab.
The Upjohn Company

FEBRUARY 4, 1970
Alcoa
IBM Corporation
Interlake Steel Company
Standard Oil Company of New Jersey
Texaco, Inc.
U.S. Steel Corporation

FEBRUARY 5, 1970
Babcock & Wilcox
FMC Corporation – Chemical Division
Goodyear International
IBM Corporation
Miles Laboratories
Mississippi Valley Structural Steel Company
Peoples Gas, Light & Coke Co.
Pittsburgh-Des Moines Steel Co.
RCA
Standard Oil Company of New Jersey

FEBRUARY 6, 1970
IBM Corporation
Inland Steel Company
Inland Steel Container Company
Inland Steel Products Company
Kelsey-Hayes Company
Ortho Pharmaceutical Company
RCA
Roche Laboratories
Youngstown Sheet & Tube Co. – Research & Development

FEBRUARY 9, 1970
Baxter Laboratories, Inc.
Bell Systems
Bendix Corporation
Collins Radio Company
Monsanto Company
Motorola Semi-Conductor
National Security Agency
Naval Weapons Center
Radiation, Inc.
Standard Oil Company of California

FEBRUARY 10, 1970
Bell Systems
Bendix Corporation
Collins Radio Corporation
Dow Chemical Company
Monsanto Company
National Security Agency
Naval Weapons Center
Northern Illinois Gas Company
Republic Steel Corporation
Square D Company
Standard Oil Company of California

FEBRUARY 11, 1970
Bell Systems
Continental Aviation & Engineering Corporation
Dow Chemical Company
General Telephone & Electronics
NASA – Lewis Research Center
National Security Agency
Olin Mathieson Chemical Co.
Philco-Ford Corporation – Consumer Electronic Div.

FEBRUARY 12, 1970
Bell Systems
Caterpillar Tractor Company
General Telephone & Electronics – Service Corp.
NASA – Lewis Research Center
Philco-Ford Corporation – Consumer Electronic Div.
Sinclair Oil Corporation
Xerox Corporation

FEBRUARY 13, 1970
Bell Systems
Caterpillar Tractor Company
General Telephone & Electronics – Service Corp.
Grumman Aircraft Engineering Corporation
Motorola, Inc.

FEBRUARY 16, 1970
Celanese Corporation
Columbia Gas of Ohio, Inc.
W. R. Grace & Company – Industrial Chemical Group
Hughes Aircraft Company
Naval Research Laboratory
The Shell Companies

FEBRUARY 17, 1970
American Oil Company

Chrysler Corporation
Control Data Corporation
Mobil Oil Corporation
The Shell Companies

FEBRUARY 18, 1970
American Oil Company
Amoco Chemicals Corporation
Control Data Corporation
Ford Motor Company
Mobil Oil Corporation
NASA – Marshall Space Flight Center
Pratt & Whitney Aircraft – Division of United Aircraft

FEBRUARY 19, 1970
Armco Steel Corporation
Automatic Electric Company
Chrysler Corporation
Ford Motor Company
Pan American Petroleum Corp.
Texas Instruments, Inc.
TRW, Inc.

FEBRUARY 20, 1970
Idaho Nuclear Corporation
LTV Aerospace Corporation – Missile & Space Div., Mich.
Texas Instruments, Inc.

FEBRUARY 23, 1970
Baxter Laboratories, Inc.
Caterpillar Tractor Company
Factory Mutual Engineering Association
International Harvester Company
Miles Laboratories, Inc.
Northern States Power Company

FEBRUARY 24, 1970
Baxter Laboratories, Inc.
International Harvester Company

FEBRUARY 25, 1970
Chevrolet – Flint Manufacturing
Honeywell, Inc.
Hooker Chemicals Corporation
Naval Air Test Center
Pennsalt Chemical Corporation
Schlumberger Well Services – Research & Development

FEBRUARY 26, 1970
Continental Oil Company
FMC Corporation – Hydrodynamics Div.
LTV Aerospace
Lawrence Radiation Lab.
Vick Chemical Company
York Air Conditioning
Youngstown Sheet & Tube Co.

FEBRUARY 27, 1970
Geological Survey – Water Resources Division
Naval Ship Research & Dev.
Naval Weapons Laboratory
TRW, Inc. – Systems Group
Vick Chemical Company

MARCH 2, 1970
Cameron Iron Works
Chevron Chemical Company
Hunt-Wesson Foods, Inc.

MARCH 3, 1970
Naval Civil Engineering Lab.

MARCH 4, 1970
Humble Oil & Refining Company
Indiana & Michigan Electric Co.
Naval Ordnance Station

MARCH 5, 1970
Humble Oil & Refining Company
Sperry-Rand Corporation (Sperry Systems Mgmt. Division)

MARCH 6, 1970
Humble Oil & Refining Company

MARCH 10, 1970
General Motors Corporation

MARCH 11, 1970
General Motors Corporation
Naval Weapons Center – Dept. of the Navy

MARCH 12, 1970
General Motors Corporation
NASA – Goddard Space Flight Center
Philco-Ford Corporation – Aeronutronic Division
Philco-Ford Corporation – Communications & Electronics
Structural Dynamics Research Corporation

MARCH 13, 1970
Naval Ship Missile Systems Engineer Station

APRIL 6, 1970
Vick Chemical Company

APRIL 7, 1970
Spartan Electronics

APRIL 8, 1970
American Oil Company
IBM Corporation

APRIL 9, 1970
IBM Corporation

APRIL 10, 1970
Corps of Engineers – Dept. of the Army
IIT Research Institute

APRIL 15, 1970
Cadillac Motor Division (GMC)

APRIL 17, 1970
General Electric Company
Ortho Pharmaceutical Company

APRIL 20, 1970
Geigy Chemicals Corporation

APRIL 22, 1970
Army Tank – Automotive Command

APRIL 23, 1970
Army Tank – Automotive Command

The *New Products* feature will appear again next issue. Instead, we introduce a summary of interviewers appearing at the Placement Bureau for the rest of this school year.

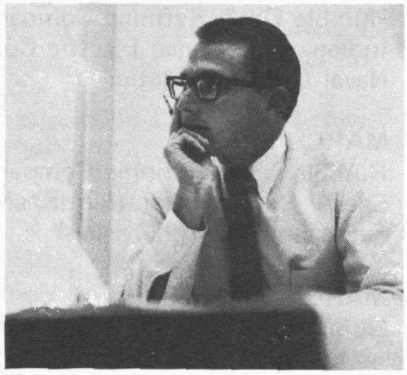
Do you think a bright young engineer should spend his most imaginative years on the same assignment?

Neither do we.

That's why we have a two-year Rotation Program for graduating engineers who would prefer to explore several technical areas. And that's why many of our areas are organized by function—rather than by project.

At Hughes, you might work on spacecraft, communications satellites and/or tactical missiles during your first two years.

All you need is an EE, ME or Physics degree and talent.



If you qualify, we'll arrange for you to work on several different assignments... and *you* can help pick them.

You may select specialized jobs, or broad systems-type jobs. Or you can choose not to change assignments if you'd rather develop in-depth skills in one area.

Either way, we think you'll like the Hughes approach.

It means you'll become more versatile in a shorter time. (And your salary will show it.)

HUGHES
HUGHES AIRCRAFT COMPANY
AEROSPACE DIVISIONS

Some of the current openings at Hughes:

Microwave & Antenna Engineers
Electro-Optical Engineers
Microcircuit Engineers
Space Systems Engineers
Missile Systems Engineers
Guidance & Controls Engineers
Spacecraft Design Engineers
Weapon Systems Engineers
Components & Materials Engineers
Circuit Design Engineers
Product Design Engineers

For additional information, please contact your College Placement Director or write:

Mr. Robert A. Martin
Head of Employment
Hughes Aerospace Divisions
11940 W. Jefferson Blvd.
Culver City, California 90230

U.S. Citizenship is required
An equal opportunity employer

CAMPUS INTERVIEWS

February 16

Contact College Placement Office to arrange interview appointment.

HAVE YOU EVER WONDERED WHEN YOU'D GET A CHANCE TO USE ALL THAT (Req'd) MATH?

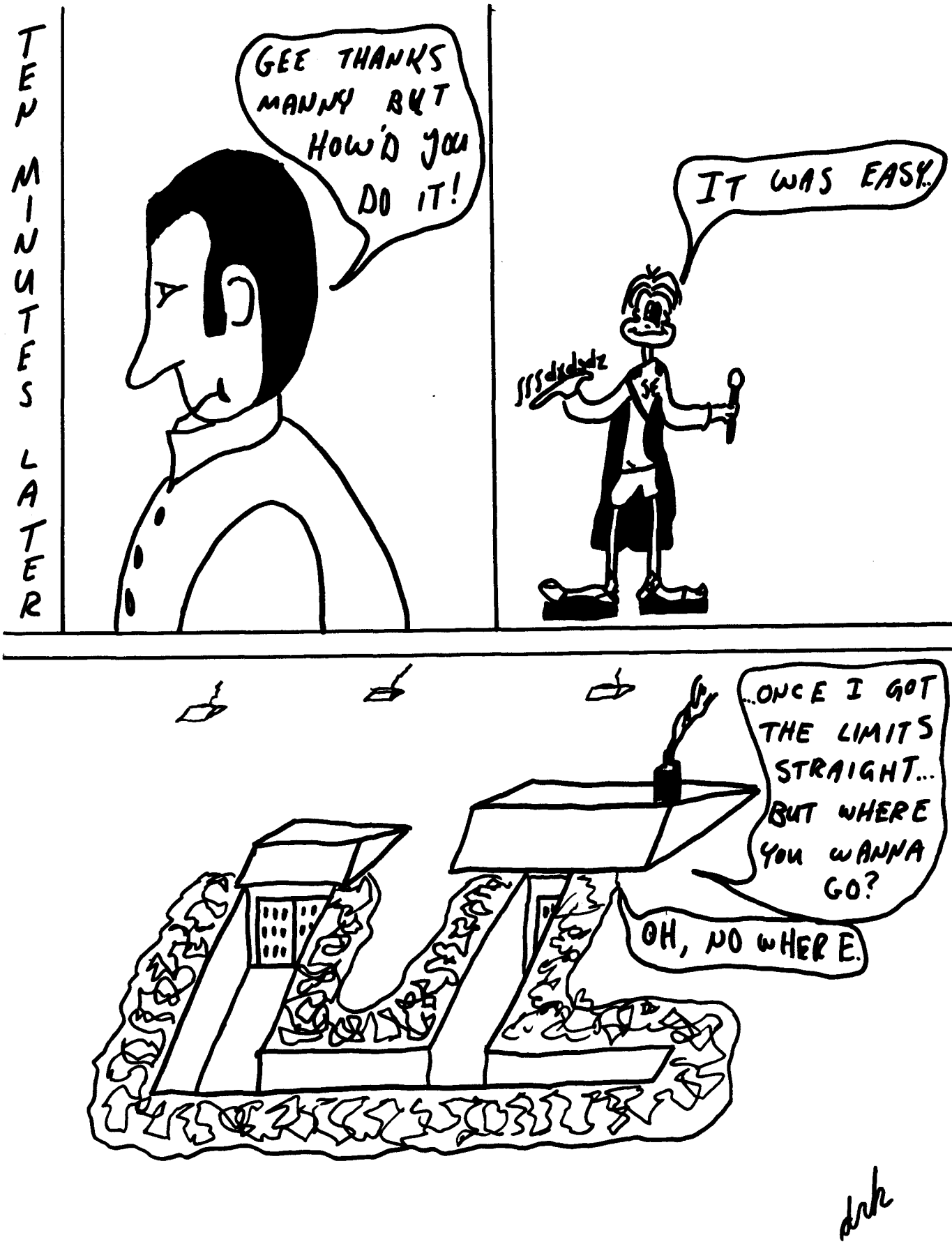
JOINED IN PROGRESS. SPECIAL GUEST STAR KINKY "FATSO" CONWASTE LISTENS TO HIS FAVORITE RADIO PROGRAM....

NO WAY

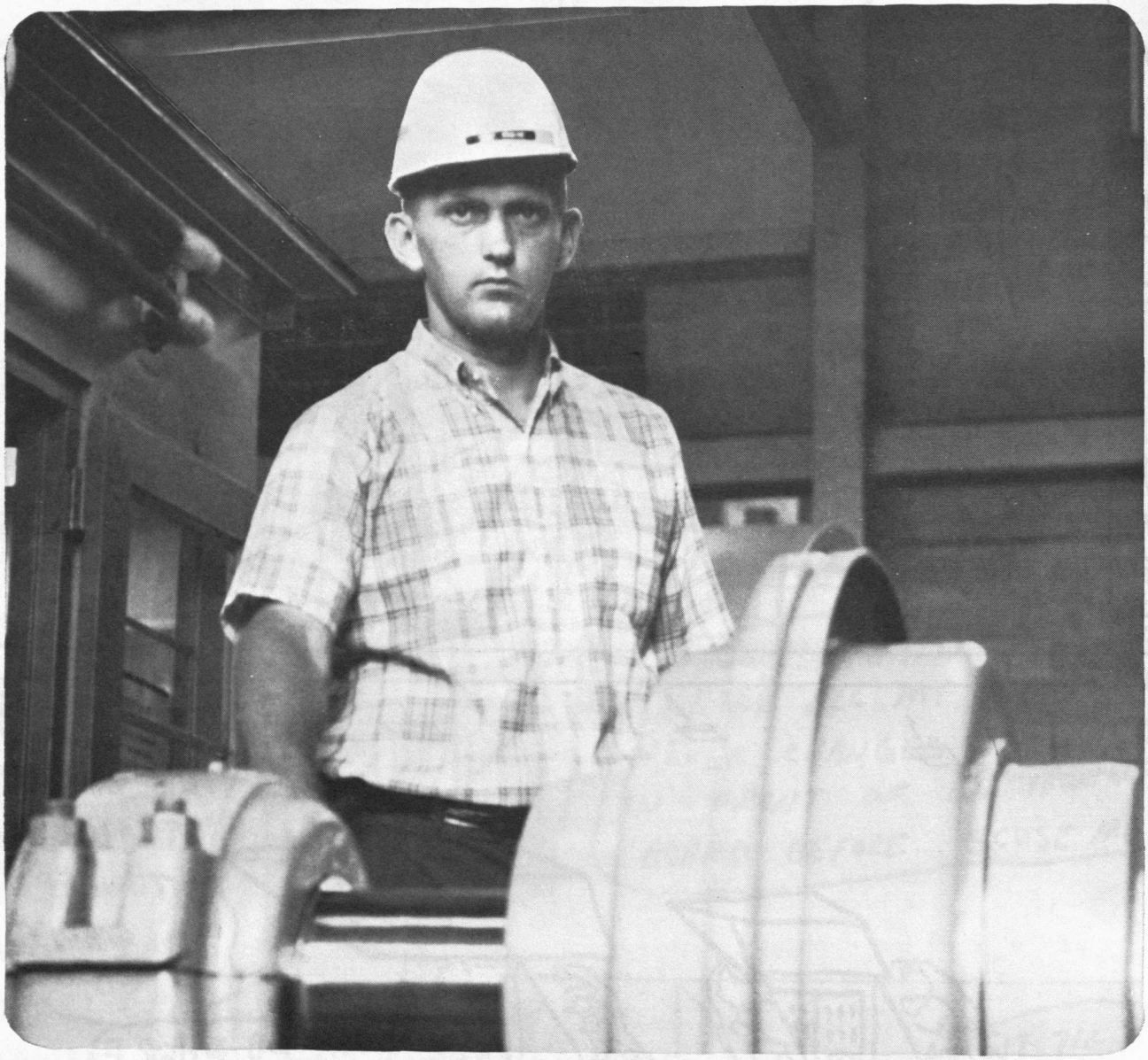

DRUM ROLL
(TL TL TL TL TL)
BUGLE SOUNDS
(TOO-TA - TOO-TA)
AND UPON THE SCENE COMES THE ILLUSTRIOUS MASTER OF THE SLIDERULE, MANSFIELD FINSTERWAL.
(BOO)
HI, YA TUB!
WHAT SEEMS TO BE THE TRANSACTION
1 OR 2 INS OF SNOW?
HI MANNY, WANNA BEER
THE WEATHER REPORT JUST SAID TO EXPECT 1 OR 2 INS. OF SNOW
DID YOU HEAR AN ECHO?
SLUM SWEET SLUM
1 OR 2 INCHES BY MORNING
THERE IT IS AGAIN! DID'JA HEAR IT?
I WAS JUST GETTING OUT MY GOLASHES AND SHOVEL OUT TO SHOVEL THE WALK TOMORROW
YOU KIDDIN? YOU COULDN'T SHOVEL THAT WALK IN A MONTH
THANKS A LOT
NO DON'T GET ME WRONG, WHAT I WANT TO KNOW IS...


WHEN THEY SAY 1 OR 2 INCHES ACCUMULATION BY MORNING, DOES THAT MEAN IN ADDITION TO THE 12 FEET WE HAD THIS AFTERNOON?
WELL I GUESS ILL GET GOING AND START THIS JOB RIGHT AWAY
FAT BUILDS UP FROM SITTING AROUND DOING THERMO PROBS. NECESSITATES CRUTCH.
ONE MONTH LATER.
WELL,.... HUFF PUFF..I .... HUFF.... GOT... PUFF FUFF... THE... PUFF HUFF.. DOOR STEP CLEANED OFF.


GROG! TIME FOR ACTION! GIVE ME A SPOON!
WHAT CAN OUR HERO HAVE IN HIS OVER ACTIVE MIND? THIS IS NO TIME FOR HIM TO EAT HIS APPLE JACKS!
WITH (T)RUSTY SPOON IN HAND MANSFIELD FINSTEROAL MAKES A MAD DASH FOR THE NEAREST CLOSET WHEN MUCH TO HIS SUPRISE....
OW!! THAT'S A FIRST. AFTER ALL MY ANTICS I'VE NEVER CHANGED MY DUDS IN FRONT OF AN IRONING BOARD BEFORE.... S'CUSE ME!
WHAT CAN SUPER ENGINEER DO AGAINST A 12 FOOT WALL OF SNOW WITH A TINY ELEMENT OF VOLUME LIKE A SPOON? LETS GET BACK TO THE
ACTION!
SIT TIGHT CHUM WHILE I CHECK THE SITUAT-ION. T.C.B. ETC.


TEN MINUTES LATER
GEE THANKS MANNY BUT HOW'D YOU DO IT!
IT WAS EASY..
..ONCE I GOT THE LIMITS STRAIGHT... BUT WHERE YOU WANNA GO?
OH, NO WHERE.

Terry Gooding, Kentucky '65, met the challenge in mining at St. Joe



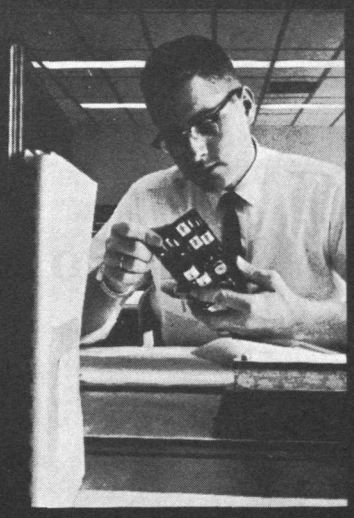
He's Mine Superintendent at St. Joe's Virburnum mine. It's a responsible, challenging and rewarding job with excellent future prospects. ☐ Terry and his wife Judy and their two children enjoy the good life in Southeast Missouri. He hunts and fishes, plays softball and golf. He takes Judy and the kids to St. Louis, only about 90 minutes drive, to the zoo, shopping, pro baseball and football. ☐ St. Joe has challenging opportunities of many kinds in various locations, Southeast Missouri, Pittsburgh, Upper New York State and New York City. ☐ You may find your challenge and your future with St. Joe.

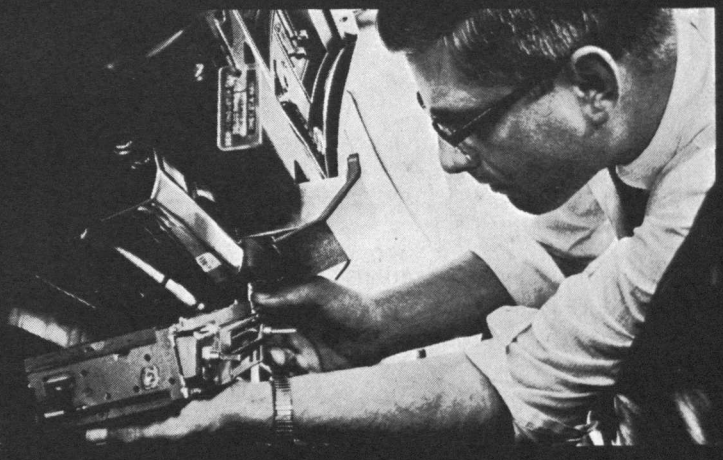
ST. JOE

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-393





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 GM MARK OF EXCELLENCE

AN EQUAL OPPORTUNITY EMPLOYER
DIVISION OF GENERAL MOTORS
KOKOMO, INDIANA

GEOGRAPHIC DISTRIBUTION FOR COLLEGE OF ENGINEERING

STATE	NO. OF STUDENTS	% OF TOTAL	STATE	NO. OF STUDENTS	% OF TOTAL
Arizona	4	1.42	Nevada	1	.35
California	25	8.87	New Jersey	9	3.19
Colorado	2	.71	New Mexico	1	.35
Connecticut	3	1.06	New York	17	6.03
Florida	5	1.77	North Carolina	1	.35
Georgia	1	.35	Ohio	13	4.61
Illinois	25	8.87	Oklahoma	1	.35
Indiana	7	2.48	Pennsylvania	10	3.55
Iowa	5	1.77	Texas	9	3.19
Kansas	1	.35	Virginia	1	.35
Maryland	6	2.13	Washington	6	2.13
Massachusetts	3	1.06	West Virginia	1	.35
Michigan	108	38.30	Wisconsin	4	1.42
Minnesota	4	1.42	Foreign	2	.71
Missouri	5	1.77	Other	2	.71
			TOTAL	282	100%

Ever Hear a Mosquito Cough?

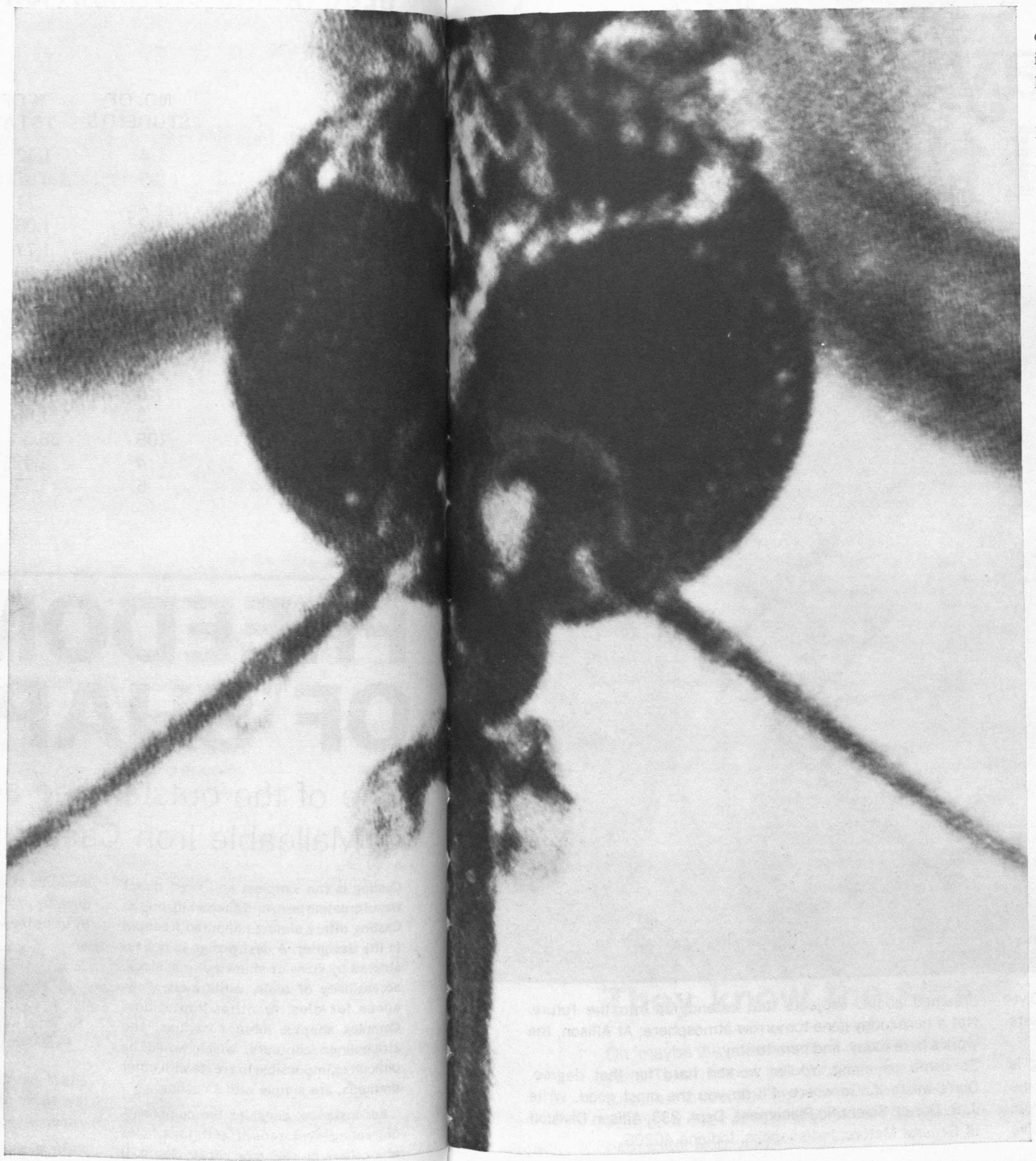


PHOTO: ERNEST BRAUN

Thanks to more effective bug sprays, mosquitoes all over the United States are coughing their last—in public places, fraternity houses, swamp land.

Ten thousand other pesky and destructive pests are also being wiped out.

And the thing that's knocking them dead is a chemical agent derived from the fragile Pyrethrum daisy found on the equatorial plateaus of Ecuador and Africa.

The extracts are pyrethrins. With these we make *Pyrenone*®, now found in nearly every major brand of aerosol. *Pyrenone* is one of more than 300 chemicals manufactured by FMC Corporation.

Thanks to *Pyrenone,* you can give your room a spritz at exam time. And put all the mosquitoes out of their misery, without putting you out of yours.

You might gather from all this that we're a chemical company.

Well, yes and no.

As one of the nation's top 70 corporations, we're one of the largest manufacturers of chemicals in the U.S.

But we also make synthetic fibers, power shovels, harvesting machines, marine vessels, food processing equipment, lawnmowers, fire engines . . . altogether over 10,000 different products vital to our way of life.

We have a stake in the betterment and well-being of people the world over. If that's your goal, too, we have something in common.

For our descriptive brochure "Careers with FMC," write to FMC Corporation, Box 760, San Jose, California 95106. We are an equal opportunity employer.

fmc CORPORATION ®

FMC CORPORATION

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

Let me take you away from all this.

Away from indecision. From confusion. Away to Allison Division of General Motors. Where young aerospace engineers become first team varsity. On a winning team.

In case you haven't heard, Allison is where everything is happening right now. There's an entire family of gas turbine engines for you to work on. Turbofan. Turbojet. Turboprop. Turboshaft. New and exciting projects. The kind you've dreamed about. Projects that extend far into the future. Not a here-today-gone-tomorrow atmosphere. At Allison, the work's here today, and here to stay.

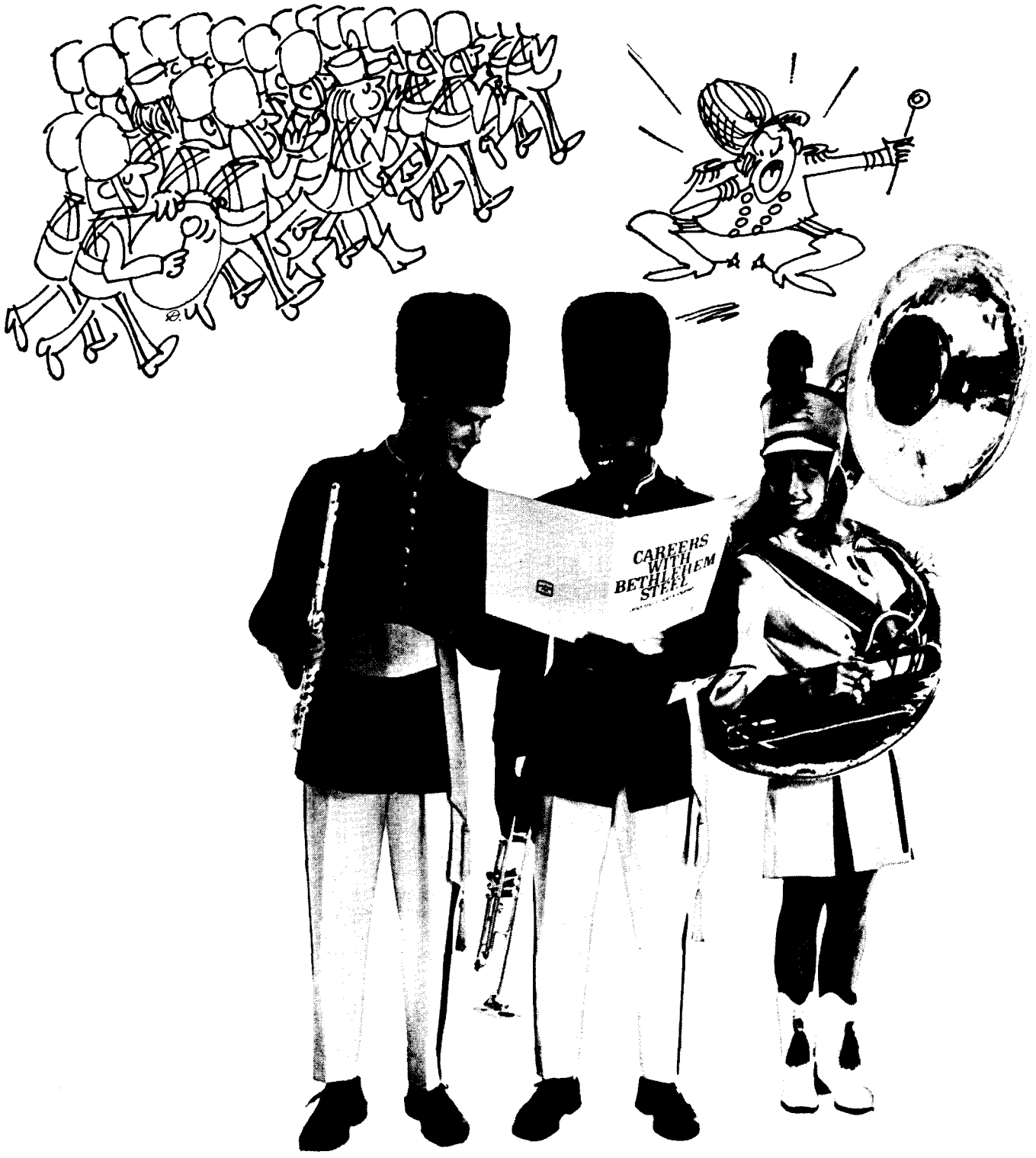
So come on along. You've worked hard for that degree. Don't waste it. Go where it'll do you the most good. Write J. R. Durell, Scientific Placement, Dept. 233, Allison Division of General Motors, Indianapolis, Indiana 46206.

Allison

An equal opportunity employer M/F

GM

MARK OF EXCELLENCE



They know the score!

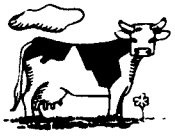
Oh, maybe they don't savvy Sousa, but career-wise, they're virtuosos. How about you? Take note of our booklet, "Careers with Bethlehem Steel and the Loop Course." It could be instrumental in convincing you to make sweet music with *us*. Pick up a copy at your placement office or write: Manager of Personnel, Bethlehem Steel Corporation, Bethlehem, PA 18016.

BETHLEHEM STEEL

An Equal Opportunity Employer

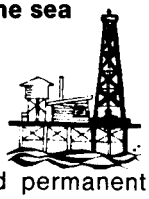
How to keep a cow's mind on milk. Instead of flies.

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.

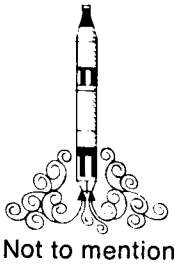


Shell scientists have come up with a vast improvement over even the most talented cow tail. It's called VAPONA® insecticide. A plastic strip impregnated with it will kill flies in a cow stall for up to three months. And VAPONA® insecticide combined with CIODRIN® insecticide keeps cows fly-free 24 hours 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. We have designed and installed permanent drilling/production platforms as tall as a 34-story building, with still bigger structures in the works. And we are researching other means for extending our operations even further into the sea. We are also searching on land in 16 states to help meet burgeoning energy needs.



Up, up and away

Space exploration puts us in orbit, too. And, vice versa, via our high-strength hydrogen peroxide monopropellant. Not to mention our 405* Catalyst, which decomposes hydrazine rocket fuel without heat. Once out there, our AEROSHELL® GREASE-15 lubricates the wheels of progress in a tape system and high-gain antenna used to transmit pictures down to earth. On terra firma, Shell epoxy resins protect launch pads, ground control equipment and missile control centers that put things in orbit.

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

Our most interesting development

When it comes to your own development—so essential to our pursuit of excellence—we're working constantly to recognize, utilize and help expand your knowledge and abilities. We plan work assignments accordingly. We hold "in-house" courses in advanced technology and business, run technical seminars, and 100%-reimburse career-related college courses. But we don't stop there—we're striving to enrich the mix for our professionals with activities like developing and teaching advanced courses, representing Shell on industry committees, and company-wide internal consulting assignments.

For information about openings throughout Shell, sign at the Placement Office for an interview with our Representative, or write to Dr. John Rae, Recruitment Representative, Dept. E, The Shell Companies, Box 2099, Houston, Texas 77001.

*Shell trademark

A company of experts

SHELL

Shell Oil Company • Shell Chemical Company • Shell Development Company • Shell Pipe Line Corporation

An Equal Opportunity Employer

engineers

IT'S UP TO YOU TO CHANGE IT.

we're ready.

A great many people can tell you what needs to be changed in the world . . . not many are prepared to work to make those changes. If changes are to be made, this generation of graduates will be the ones to make them . . . and make a difference in the future of our world.

Engineers with the ambition to innovate will find a world of opportunity with Zenith . . . a world limited only by your interest and ability. We're ready to offer you a wide range of fields in which you can put your creative imagination to work . . . areas from consumer products to communications systems. We design, manufacture and market a variety of electronic products, chief among them being radio, television, hearing aids, and stereo high fidelity instruments, as well as communications and medical electronic equipment. Our Rauland Division is a leading manufacturer of monochrome and tri-color cathode ray tubes as well as producer of various special purpose tubes.

Zenith is a good place for the young engineer to make his contribution to changing the world. We are especially interested in developing our people for advancement and encourage study for advanced degrees through our tuition reimbursement plan. We offer an excellent benefit package which includes one of the finest profit sharing plans in the country. To learn more about a career in engineering-research at Zenith, see your college placement office or write to: Jim Faust, Manager of Professional Recruitment, Zenith Radio Corporation, 1900 North Austin Avenue, Chicago, Illinois 60639.

. . . Why Not Join The Best?

ZENITH®

The Quality goes in before the name goes on®

An Equal Opportunity Employer

AN ENGINEERING PRIMER

Did you arrive at State not knowing anything about our College of Engineering? This beginning reader is designed to start all future engineers off on the right foot.

I. See Johnny.
Johnny is a freshman.
He is learning how to program computers.
See Johnny in the Prep Room.
He is punching out his program deck.
It is 9 a.m.
He is punching his first card.
The deck is twenty cards long.
It is noon.
Johnny is punching his twentieth card.
Johnny is going over to the printer.
He wants to print out his program deck.
See Johnny cry.
The printer is ripping his cards to shreds.

II. See Jane.
Jane is majoring in Electrical Engineering.
Jane is a girl.
Jane is pretty.
She is an engineering major because she is the only girl in all of her classes.
The boys all like Jane.
She is the only girl they ever see.
See Jane in the laboratory.
See the two wires coming out of the machine.
Jane is grabbing the wires.
Hear Jane scream.
Jane is running to the Home Economics Building.
She is changing her major.

III. See Tom.
Tom is an English major.
See Jim.
Jim is Tom's roommate.
Jim is an engineering major.
Hear Tom call Jim uncultured.
Hear Jim smack Tom.
See Tom hit Jim with a book of Thoreau.
Tom is screaming, "Nietzsche, Kant, Schopenhauer, Spinoza," over and over.
Jim is setting up a laser beam.
He is pointing it at Tom.
Don't, Jim!
Too late.
Tom is now energy.

A young engineer got a job in a remote mining camp. On his first day off, he approached his boss and asked, "Say, boss, what do you do around here for amusement?"

The boss replied, "Well all of us usually watch Sam, the cook, drink a gallon of whiskey, gasoline, and red pepper juice. It's the funniest thing you ever saw. Why don't you come along?"

The young engineer was obviously shocked. "No thanks," he said, "I don't go for that kind of amusement."

"Well," answered the boss, "I sure wish you'd come. We really need six men for this thing."

"Why is that?" asked the new man.

"Some of the boys have to hold Sam. He doesn't go for that kind of amusement either."

Question: What's a Michigan State University marriage proposal?

Answer: "You're gonna have a what?"

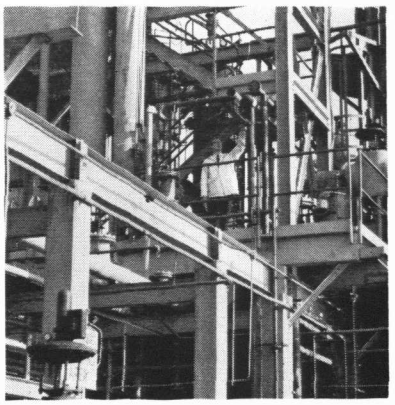
For her first week's salary the gorgeous secretary was given an exquisite nightgown of imported lace. The next week her salary was raised.

EE: "I hear that the administration is trying to stop drinking?"

CE: "That so? First thing you know, they will be trying to make the students stop, too."

Answers to *Brain Sprainers* on page 8:

1. The train is traveling 15 mph.
2. The garrison had 49,500 lbs. of bread.
3. 48 and 84.
4. The winning abilities of the players from highest to lowest is: Frank, Joe, Jim, Tom and John.



This is the image of a chemical engineer.

Making our products. Making our processes work. Inventing new products, better processes. Lucky there are chemical engineers who love the life. But some promising ones suspect before graduation that working on those products and processes year in and year out with the same faces in the same places could prove—shall we say—tiresome?

Give up chemical engineering then—while there's still a chance?

ABSOLUTELY NOT!

This is to break the news to chemical engineers contemplating anything so foolish that marketing the stuff may be more enjoyable than making it. Marketing is that branch of chemical engineering which relates what we can make to what others can use. It is chemical engineering done in other people's plants in collaboration with their chemical engineers. If it could be done by merely jolly salesmen, we'd use merely jolly salesmen.

This kind of chemical engineer lives in a bigger world than the chemical engineering image implies. It's easier to avoid professional obsolescence if the scene changes daily.

Intrigued prospective chemical engineers should drop a line to:

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

An equal-opportunity employer

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.

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