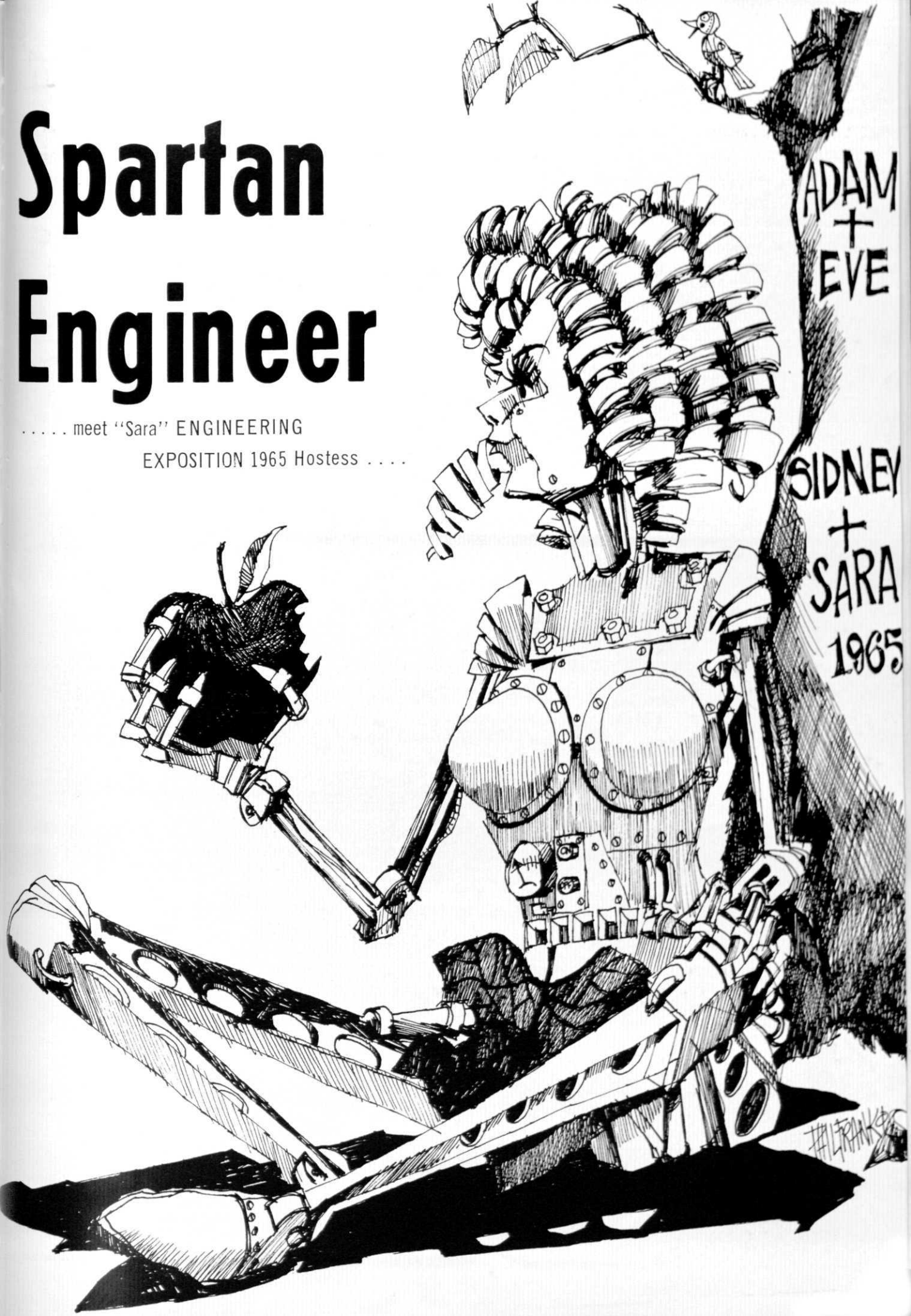
Spartan Engineer

. . . . . meet "Sara" ENGINEERING
EXPOSITION 1965 Hostess . . . .



What's down under the sea? Hostile submarines? New food sources? Biological wonders like the archaic coelacanth fish? ¶ In many ways, we know more about the surface of the moon than we do about the sea around us. The sea guards its secrets in darkness, with pressures that crush steel like an eggshell. Radio waves that put us in touch with the stars can penetrate less than 100 feet of its depth. ¶ Westinghouse scientists are helping to unravel the sea's mysteries by perfecting new precision instruments for measuring salinity, acoustics, currents, pressures, sea floor contours. ¶ Westinghouse was the first to develop centralized engine room control for oceanographic ships, a development that will help make hydrographic and oceanographic surveying faster and more accurate than ever before. ¶ New undersea propulsion methods under investigation at Westinghouse involve fuel cells, thermoelectric generators, thermionic converters, cryogenic propellants. Strange words, strange world. ¶ For more data concerning a challenging career at Westinghouse, an equal opportunity employer, see our representative when he visits your campus, or write L. H. Noggle, Westinghouse Educational Center, Pittsburgh, Pa. 15221.

You can be sure if it's Westinghouse

Who grows the "hair" that crowns a million beauties?

The same Union Carbide whose alloys help keep the crunch in rock crushers.

The "hair" is our DYNEL modacrylic fiber. It looks like real hair and feels like it.

It's the same DYNEL that's used to make luxurious deep-pile coats. It's the same fiber that's used to make filters for heavy-duty industrial air systems and home air conditioners. And its versatility is the reason why we'll be "growing" millions of extra pounds of DYNEL this year.

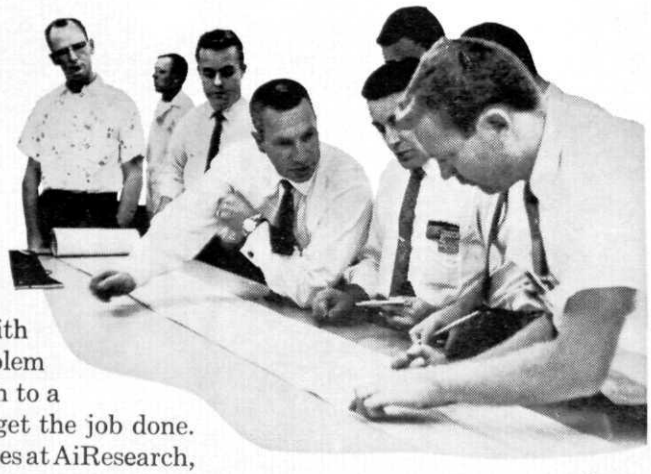
Lots of things are going on at Union Carbide. We're producing new alloys to re-surface equipment such as rock-crusher rolls and keep them in action longer. Other new alloys are helping the chemical industry stop costly attacks of acids and corrosives. And we've recently introduced some new silicone rubber compounds with greatly improved resiliency for use by the aerospace and automotive industries.

To keep bringing you these and many other new and improved products, we'll be investing half a billion dollars on new plant construction during the next two years.

Union Carbide Corporation, 270 Park Avenue, New York, N. Y. 10017. In Canada: Union Carbide Canada Limited, Toronto • Divisions: Carbon Products, Chemicals, Consumer Products, Fibers & Fabrics, Food Products, International, Linde, Mining & Metals, Nuclear, Olefins, Plastics, Silicones, Stellite

UNION CARBIDE

Why become an engineer at Garrett-AiResearch? You'll have to work harder and use more of your knowledge than engineers at most other companies.



If you're our kind of engineer, you have some very definite ideas about your career.

For example:

You've worked hard to get a good education. Now you want to put it to work in the best way possible.

You will never be satisfied with run-of-the-mill assignments. You demand exciting, challenging projects.

You not only accept individual responsibility – you insist upon it.

Does that sound like you? Then AiResearch is your cup of tea.

Our business is mainly in sophisticated aerospace systems and subsystems.

Here, research, design, and development lead to production of actual hardware. That means you have the opportunity to start with a customer's problem and see it through to a system that will get the job done.

The product lines at AiResearch, Los Angeles Division, are environmental systems, flight information and controls systems, heat transfer systems, secondary power generator systems for missiles and space, electrical systems, and specialized industrial systems.

In the Phoenix Division there are gas turbines for propulsion and secondary power, valves and control systems, air turbine starters and motors, solar and nuclear power systems.

In each category AiResearch employs three kinds of engineers.

Preliminary design engineers do the analytical and theoretical work, then write proposals.

Design engineers do the layouts; turn an idea into a product.

Developmental engineers are responsible for making hardware out of concepts.

Whichever field fits you best, we can guarantee you this: you can go as far and fast as your talents can carry you. You can make as much money as any engineer in a comparable spot – *anywhere*. And of course, at AiResearch, you'll get all the plus benefits a top company offers.

Our engineering staff is smaller than comparable companies. This spells opportunity. It gives a man who wants to make a mark plenty of elbow room to expand. And while he's doing it he's working with, and learning from, some of the real pros in the field.

If the AiResearch story sounds like opportunity speaking to you—don't fail to contact AiResearch, Los Angeles, or Phoenix, or see our representative when he comes to your campus.

An equal opportunity employer

AiResearch *is* challenge

GARRETT

Los Angeles Phoenix

SPARTAN ENGINEER

VOLUME 18 NUMBER 4 MAY, 1965

This is Sara, our hostess for the 1965 Engineering Exposition. For more of Sara, see page 6.

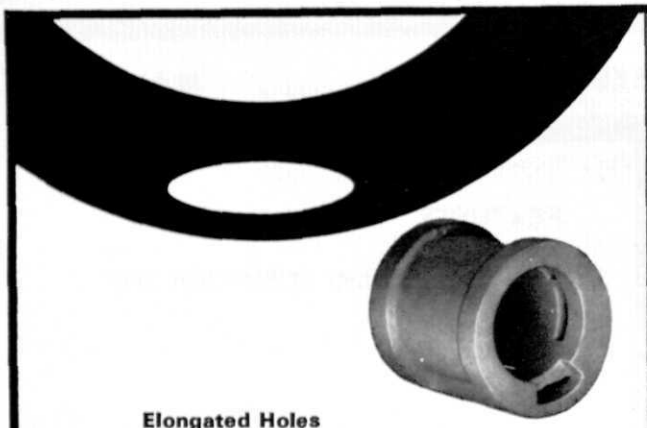
FEATURES

DEPARTMENTS

Member, Engineering College Magazine Associated
Chairman: J. Gale Chumley
Louisiana Polytech Institute, Ruston, Louisiana
Publisher's Rep.: Littell-Murray-Barnhill, Inc.
369 Lexington Ave., New York 17, N.Y.
737 N. Michigan Ave., Chicago, Ill.

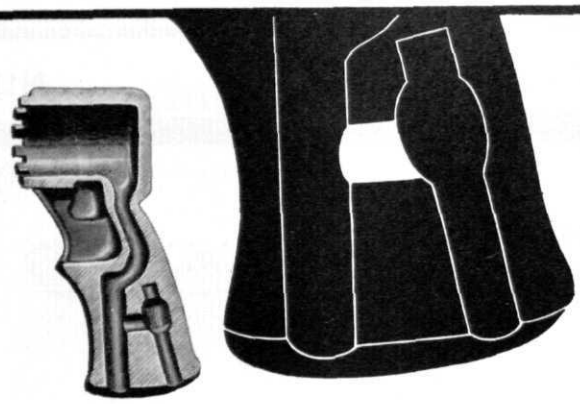
Published four times yearly by the students of the COLLEGE OF ENGINEERING, MICHIGAN STATE UNIVERSITY, East Lansing, Michigan 48823. The office is on the first floor of the Engineering Bldg., Phone 517 355-3520.
Subscription rate by mail $1.00 per year. Single copies 25¢.

Unusual Shapes Cost Less To Produce When They are Malleable Castings.



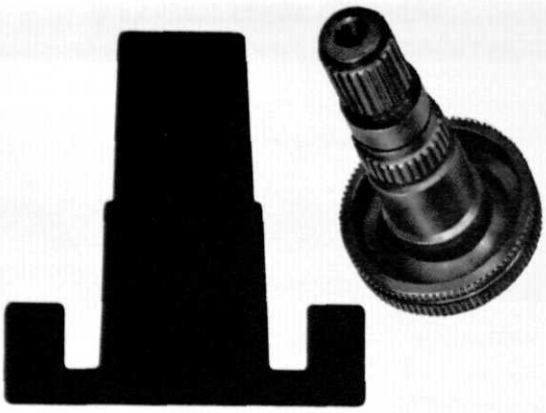
Elongated Holes

Round holes? Simple! Odd-shaped holes? Use Malleable! Here's a shape where casting is the only economical solution . . . and only Malleable provides both the strength and easy machinability that are needed. Excellent wear resistance on the inside of this air tool cylinder is achieved by hardening the 53004 pearlitic Malleable up to Rockwell 58C.



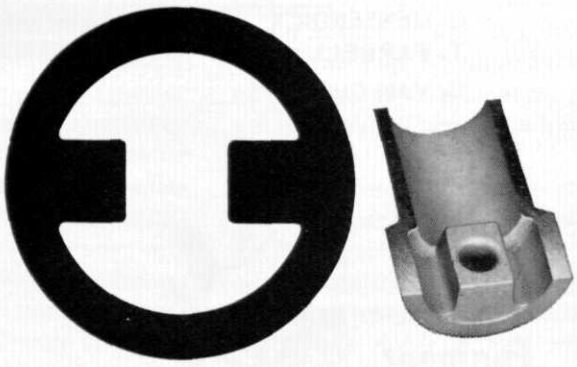
Blind Holes

Blind holes present a situation where the only practical manufacturing method is casting. This example shows a cross-section of the handle of a pneumatic impact wrench. Shell coring produces the holes with such accuracy that only a few finish machining operations need be performed.



Deep Grooves

Deep grooves are real money-wasters in other forming methods . . . but not in Malleable castings. In this transmission gear, the switch to pearlitic Malleable cut material cost 15% . . . cut machining cost 25%.



Internal Bosses

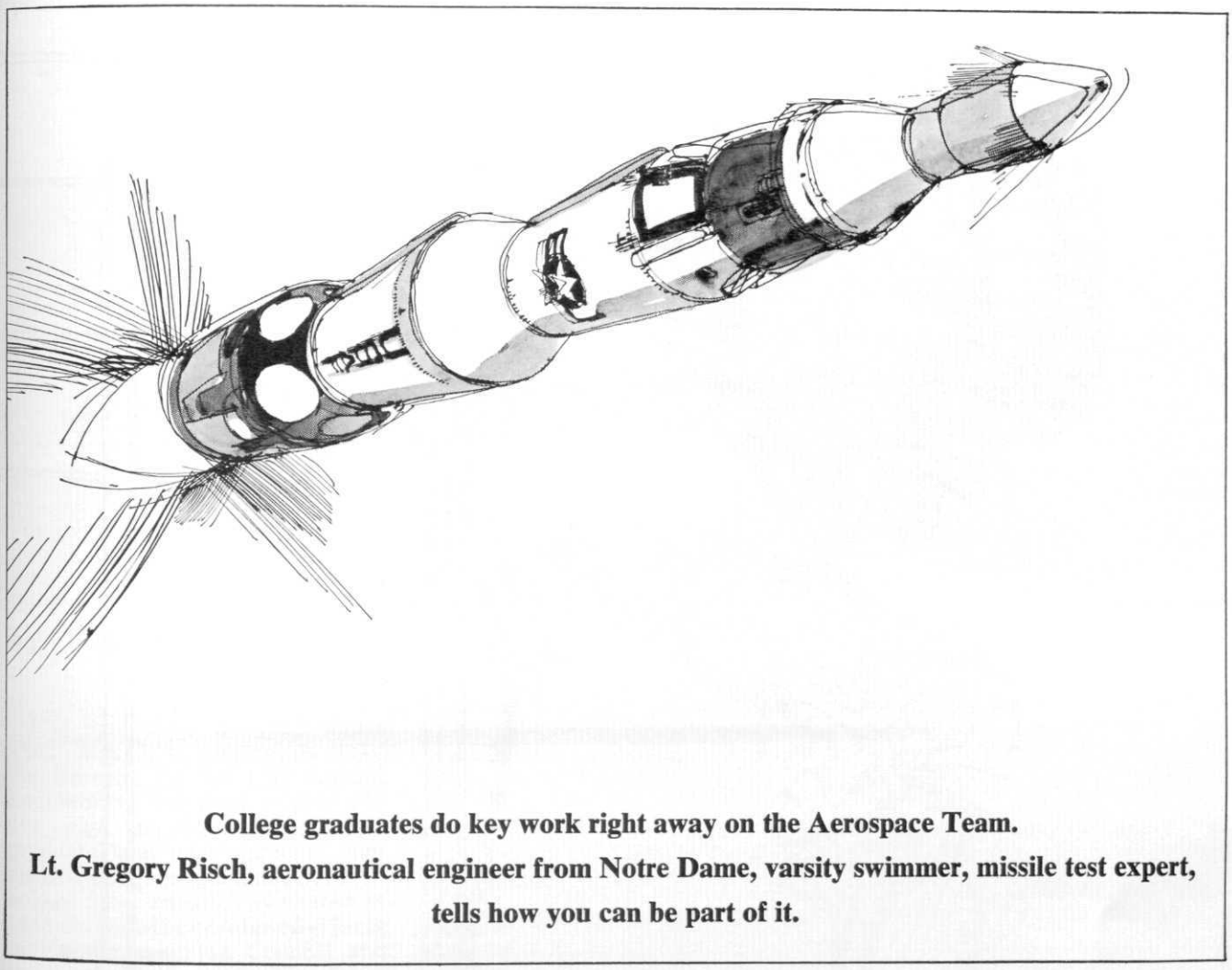
Here is a shape that can cause real problems . . . except when it's cast of Malleable iron. The interior cavity, two bosses and the holes through the bosses are formed with a shell core. This method cuts cost 75% compared to welding several components. The Malleable casting looks better . . . achieves closer tolerances.

There are many ways you can do a better job at less cost with modern Malleable castings. Our new brochure, "Design Criteria for Malleable Iron Castings", tells how.

Send for your free copy today.

MALLEABLE FOUNDERS SOCIETY

MALLEABLE FOUNDERS SOCIETY • UNION COMMERCE BUILDING • CLEVELAND, OHIO 44114



College graduates do key work right away on the Aerospace Team.
Lt. Gregory Risch, aeronautical engineer from Notre Dame, varsity swimmer, missile test expert, tells how you can be part of it.

(Lt. Risch, B.S. '62, did extensive undergraduate work in aerodynamics, helping to construct one of the country's largest and most successful smoke tunnels. He has played an important part in the operations of the test range at Cape Kennedy.)

What's the best way to become an Air Force officer?

I wouldn't want to call any one way the "best" way. We count on getting top-quality officers from all our sources. First, there's the Air Force Academy. I received my commission through Air Force ROTC. Many colleges and universities will soon be providing two-year AFROTC programs that you can apply for during your sophomore year. Then, for the college graduate, there's Air Force Officer Training School—OTS.

Who's eligible for Air Force OTS?

Any college graduate, male or female, or a college student within 210 days of graduation, is eligible to apply. Who the Air Force will take depends on what the particular needs are at the time. Those with scientific or engineering degrees can usually count on receiving the first openings.

Does the Air Force have jobs for nonscience majors?

There are quite a few jobs in nontechnical fields such as administration and personnel. And it is not essential that prospective pilots or navigators have backgrounds in the sciences. However, since the Air Force is one of the world's leading technological organizations, a keen regard for science is important.

What sort of work do young Air Force officers do?

Important work. An Air Force career gives young people the opportunity to do meaningful work right from the start. That's the thing I like best about it. I'm only a couple of years out of college, but already I'm working on a vital project in an area that really interests me. In other words, I'm getting to *use* the things I studied in college. My education is paying off, both for me and for the United States.

What are the possibilities for advancement?

They're plenty good. The Air Force believes in giving its young officers all the responsibility they can handle. That's not only good for you, it's good for the Air Force. It gets the best-qualified people into the top jobs where they can contribute most to our defense effort.

How long am I committed to serve?

Four years from the time you receive your commission. If you go on to flight school, four years from the time you're awarded your pilot or navigator wings.

Where can I find out more?

If there's an Air Force ROTC unit on your campus, see the Professor of Aerospace Studies. If not, contact the nearest Air Force recruiting office. It's listed in the white pages of the telephone book under "U.S. Government".

United States Air Force.


CUTTING OIL
GREASE
RUST STOP
OIL
Sara
Sidney
PHIL FRANK

THE ENGINEERING EXPOSITION 1965

by Ron Pryzma

It's that time of year again when M.S.U.'s engineers take the limelite as the 17th Annual Engineering Exposition gets under way, displaying the latest products and developments that applied science and modern technology have to offer. Created in 1948 through the combined efforts of the Engineering Council and Dr. Loren Miller, Retired Dean of the Engineering College, it has since become the largest, free annual engineering exposition in the Midwest, attracting some 20,000 visitors yearly, from industries, high schools, and other colleges and universities.

Credit for the organization of this year's exposition belongs to the Engineering Council, who have done outstandingly well in the past. This year's General Chairman is Craig Laubenthal who is receiving the aid of the other council members, and their respective Fraternities, Clubs, and Societies. The Council itself has a threefold purpose. It provides a nucleus of organization for the coordination of all Engineering College organizations and activities. It strives to promote the best interests of the Engineering College relative to University activities, and it provides leadership for All-College and/or All-University activities originating in the Engineering College.

As a function of the Engineering Council, the Exposition helps to develop leadership in Engineering students through the planning, building, and providing exhibits for presentation during the Exposition weekend. It provides each student in the Engineering College an opportunity to show his various talents. Students are also given the opportunity to become better acquainted with their fellow engineering students, the faculty, and the administration of the Engineering College through their work on projects and exhibits. The student may also perform before the open public during the Exposition at which time the parents of other engineering students and the general public are invited to see the exhibits and participate in the program.

Until three years ago, our expositions consisted mainly of industrial and Michigan State engineering displays, but lately M.S.U. has been inviting all of the JETS organizations in the State of Michigan down to take part in the exposition. JETS (Junior Engineers Technical Society) are clubs comprised of high school students whose interests follow the lines of engineering and science. These students will also display projects, either individually or as a team effort, and, as a matter of fact, the number of JETS' projects will far outnumber those of M.S.U. and of industry combined. The Exposition has rapidly become a show for the high school students of Michigan.

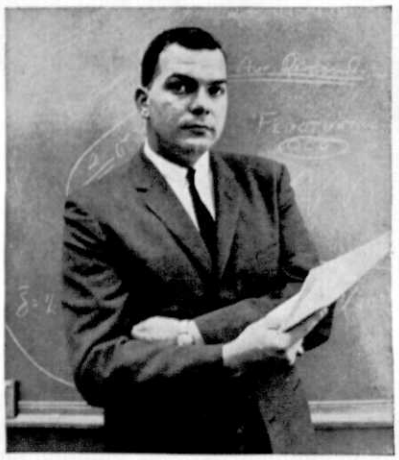
All exhibits and projects will be competing for awards this year and the judging panel will consist of representatives from industry. This year, however, there will be four classes of entries instead of three. They are the Individual Exhibits, Chartered Group Exhibits, Non-Chartered Group Exhibits, and the new division, the Graduate Student Exhibits. The exhibits will be judged in the following four areas:

1. Scientific Thought (30 points) -- Project's illustration of one or more of the following: Completeness of observation, controlled experimentation, sound theoretical basis as demonstrated by analysis, synthesis, cause and effect, reason, or comparisons.
2. Creative Ability (30 points) -- Project's originality in plan and execution and its demonstration of new or improved ways of expressing or communicating scientific ideas.
3. Application (20 points) -- Practical and economic implications of the project as an application of scientific or engineering knowledge.
4. Construction and Presentation Quality (20 points) --

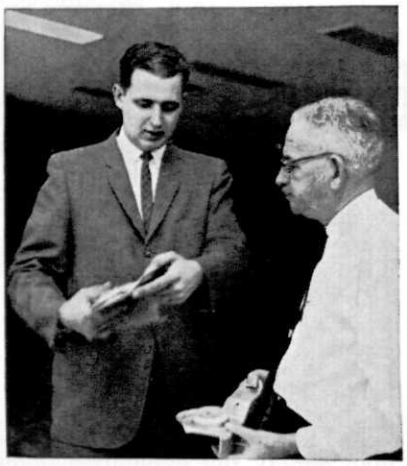
CONTINUED TO PAGE 11

Men on the move at Bethlehem Steel

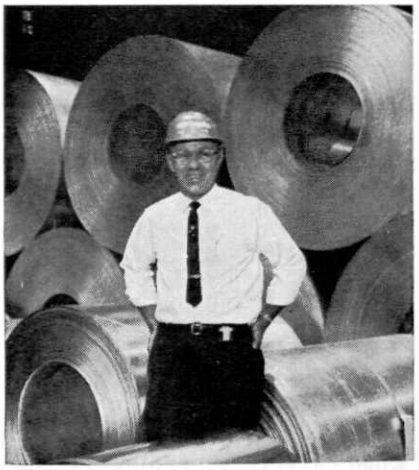
BETHLEHEM STEEL



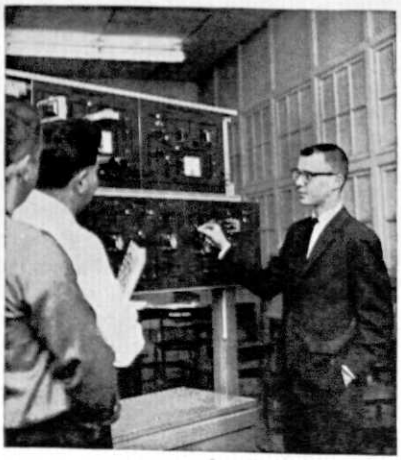
JIM ANTHONY, I.E., JOHNS HOPKINS '60—An operations research man at our Sparrows Point, Md., Plant, Jim applies techniques such as linear programming, regression analysis, exponential smoothing, CPM, and PERT to complex production problems.



TOM FREE, MET.E., CASE INSTITUTE '60—After experience in both mills and laboratories, Tom became a Lackawanna Plant metallurgical service engineer. His job is to solve problems in customers' plants.

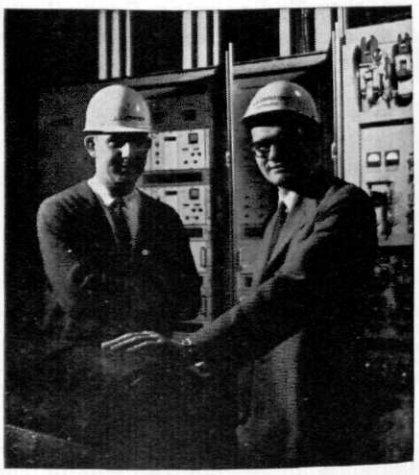


DICK PEOPLES, C.E., NORTHEASTERN '60—Dick helped build our new, $20-million continuous galvanizing mill at the Lackawanna Plant, near Buffalo, N.Y. Now he's foreman of the mill's production line.



JIM BULLOCK, E.E., BROWN '58—Jim is an electrical engineer at our Bethlehem, Pa., Plant. His broad-ranging duties include instructing technicians in the intricacies of electronics.

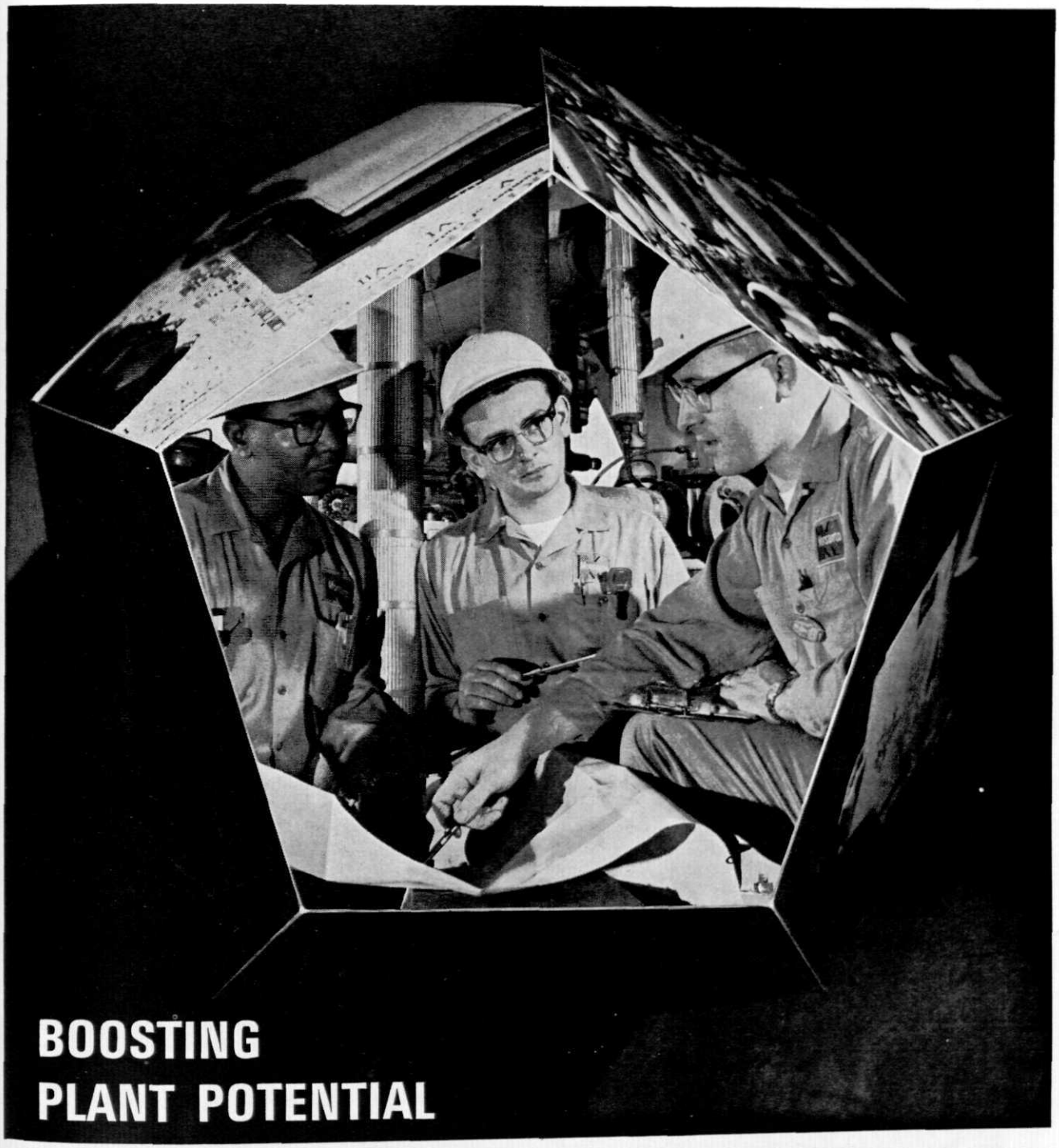
SAM COLEMAN '62, DOUG HATCHER '61, BOTH M.E., SOUTH CAROLINA—Sam and Doug are salesmen in our Atlanta District. Their technical training is a valuable asset in selling steel products.



JOHN O'BRIEN, CH.E., NOTRE DAME '60, AND DICK HOSTETTER, M.E., PENN STATE '58—Production engineer O'Brien and research engineer Hostetter worked together on an automatic gage-control system for a mill at our Sparrows Point, Md., Plant.

These alert young men are a few of the many recent graduates who joined the Bethlehem Loop Course, one of industry's best-known management development programs. Want more information? We suggest you read our booklet, "Careers with Bethlehem Steel and the Loop Course." Pick up a copy at your Placement Office, or write to our Manager of Personnel, Bethlehem, Pa.

An equal opportunity employer



Another of your future's many facets at Monsanto

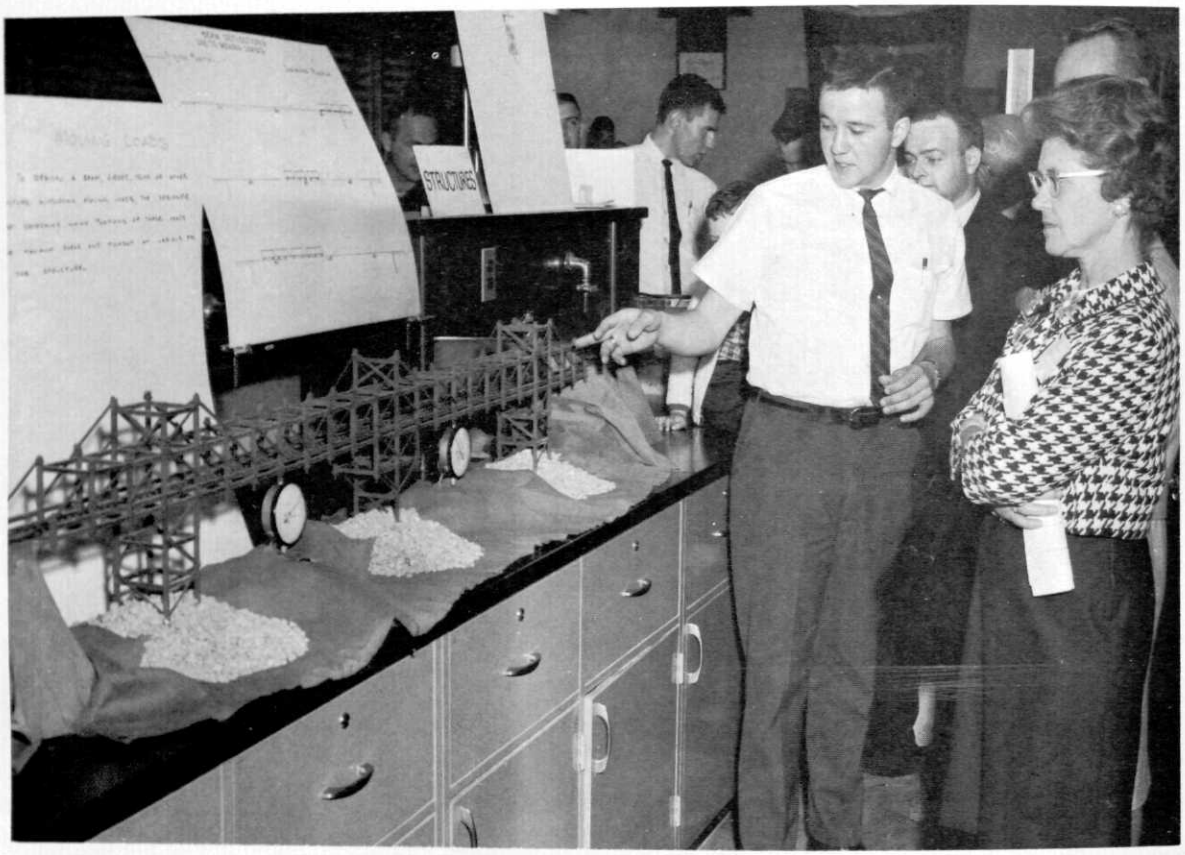
As a billion-dollar manufacturer of hundreds of products—in 40 U. S. plants, 15 overseas—Monsanto considers the manufacturing engineer of prime importance. His talents are needed to find new ways (and improve old ways) of increasing yields, improving control, lowering costs—bringing plants up to optimum performance.

You will have the satisfaction of applying your engineering skills and knowledge, and seeing the results . . . from inception to final operation . . . and have the full responsibility for your decisions. There are production challenges now awaiting good men . . . plus substantial rewards for meeting them.

Let us show you what they can mean to you . . . professionally, personally, financially. Write today—we'll send you our brochure, "Your Future and Monsanto." Address: Manager, Professional Recruiting, Dept. 962, Monsanto, St. Louis, Missouri 63166.

An Equal Opportunity Employer

Monsanto®



This is an example of the exhibits presented by MSU engineering students. This particular exhibit won first place at last years Exposition.

This exemplifies the industrial exhibits presented at the Exposition.

CONTINUED FROM PAGE 7

Project's neatness and relative durability, and its ability to communicate well enough to the average person the concepts being displayed.

Industrial exhibits will be furnished by interested concerns and by departments of the Engineering College. This year, for instance, the Mechanical Engineering Department is presenting an exhibit from the General Motors Proving Grounds. Last year Chrysler's Turbine Car was made available to us.

In the way of student exhibits this year, we can look forward to seeing a 007 1/2 car, a student version like the Aston Martin used in "Goldfinger," and there will be a microwave photometer on display. Each engineering department will have open labs manned by students. Station WSKA will be broadcasting from the campus this weekend and WMSB-TV will carry highlights of the Exposition on their Polygon program.

Because spring is in the air and most M.S.U.'s engineers are males, Selma will be on display with the best interests of Sex and Science at heart. Selma is a female robot, more correctly termed a "Playbot," and any engineer who feels himself "God's gift to women" should consider making a pass at her.

The Engineers' Ball is one of the last scheduled events and during the intermission there will be the annual dubbing of the Knights of St. Patrick and the presentation of awards and prizes.

Beginning with this coming Exposition, the Engineering Council will honor three outstanding engineers with an award given by a student, faculty, and administration committee. The award is to be based on a minimum grade point average and the student's participation in activities in the engineering school and other University functions.

In any event, this should give you, the reader, some idea of what the Exposition stands for and what to expect this year, but remember that it will be only as successful as you make it. We at Spartan Engineer hope to see you there.

"Advancement is our most important Achievement."

THE JETS

by Joe Bowman

With the Engineering exposition right around the corner, recognition will soon be given to many promising young engineers for their original ideas and dedication to science. If a count were taken of the prize winners one would find a high percentage of them to be members of the JETS --the Junior Engineering Technological Society. This organization is composed mainly of junior and senior high school students who have an aptitude for and interest in science and who are preparing themselves for careers in the field of engineering. The object of the JETS program is to give such students the chance they need to expand their horizons and develop their capabilities as engineers, thus enabling them to meet the requirements of a college curriculum in engineering. When first conceived by Professor L. G. Miller, then Dean of Engineering at Michigan State University, the JETS program was designed with three major goals:

"1. The program should be formed to stimulate interest in engineering and science among high school youth. It should offer a broad range of scientific experiences including professional assistance of men actively engaged in the scientific fields.
2. It should provide opportunities for those who have aptitudes for mathematical and scientific subjects to prepare for an engineering or scientific career. In addition, it should promote and encourage good scholarship and proficiency in high school subjects as prerequisites for engineering courses in college.
3. It should aid the student to discover and appriase his own abilities, aptitudes, and interests. He should be able to compare his talents with the requirements of the engineering profession by making and carrying to completion suitable projects within his ability."[1]

On the basis of these three tenets, the first chapter of the JETS was founded in November, 1950 at East Lansing High School and named Junior Engineering Training for Schools. From this point the JETS expanded slowly but steadily to cover the state of Michigan. In March, 1952, the first out - of - state club was founded in Middletown, New York, making the eleventh in the chain. In the school year of 1953-54, girls were encouraged to take an active interest in the JETS program. In March, 1954, the fiftieth JETS club was chartered at Milford, Michigan, with sixteen members. Furthermore, by the end of the year, there were fifty-nine clubs in eleven states. By 1957 chapters had been organized outside the United States -- in Bangkok, Thailand, and Augsburg, Germany. In October, St. Peter and Paul High School in Saginaw, Michigan, added the one-hundredth club and the name of the JETS was officially changed to Junior Engineering Technical Society. This change was brought about as a result of a policy change in the program. Now the organization would provide information pertaining to three fields of endeavor: "(1) receiving an engineering degree via a college education, (2) becoming a technician through work in a technical school, or (3) becoming a craftsman through an apprenticeship."[2] In this same year the individual clubs became chapters in the overall organization. By the end of the 1957 school year there were 223 chapters, an increase of 125% over the previous year's total of ninety-three. The following year, the total number of chapters was 365, which represented thirty-five states, one territory, and two foreign countries.

In the fall of 1958, the JETS was extensively reorganized and placed under the direction of an executive board made up of representatives from industry, government, education, and professional societies. Two of the

CONTINUED ON PAGE 14

Sophisticated, work-saving aids help Bell System engineers provide important communications services

As an engineer your future could be important to us. You might be able to contribute to our continuing leadership in the communications field. Therefore, you should know something about us and how we operate.

Bell System engineers deal with modern problems in modern ways. They have at their command the latest in technology and equipment.

An example is how computer programs aid in providing telephone service for new communities.

Engineers at Bell Telephone Laboratories have devised computer programs broad enough in scope so that Bell System operating telephone companies can use them to engineer the required wide variety of telephone plant networks.

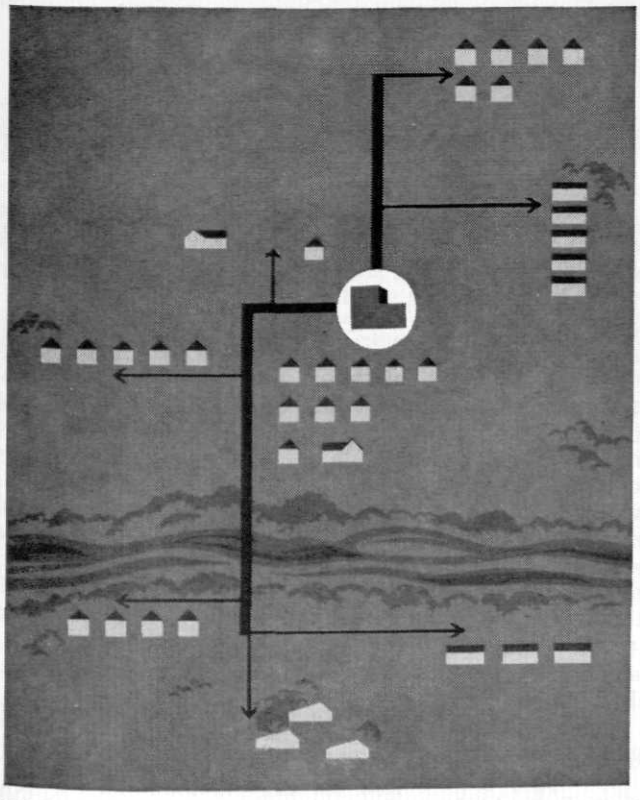
As part of a continuing effort, programs have been designed to analyze communications needs of an area for determining the best plant network layout and switching office location.

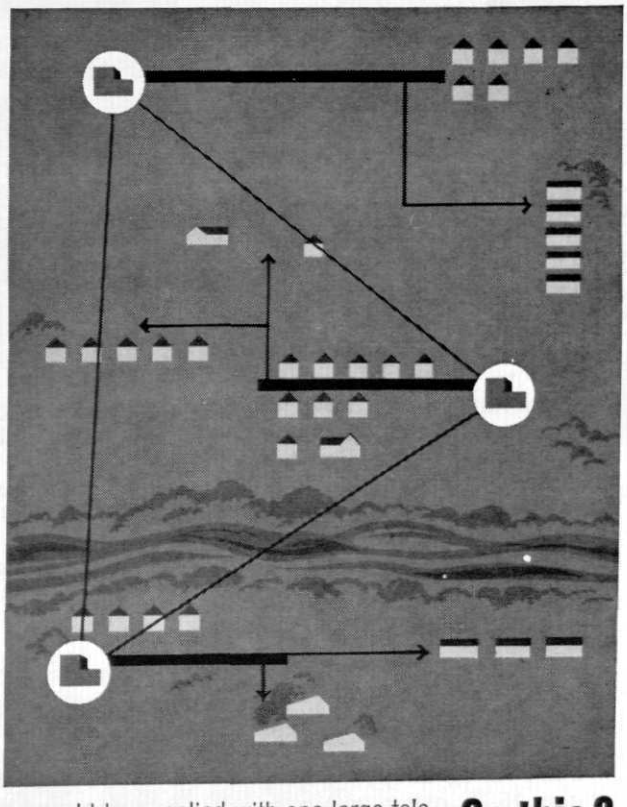
In general, the necessary data are collected and the engineer selects a number of alternative plans to be analyzed in detail by a computer. His final decision is based primarily on an analysis of the computer output.

The computer supplies more significant data, and supplies it much faster, than laborious, manual calculation methods. The engineer is thus relieved of dull, time-consuming computation, and he plans facilities with increased confidence—knowing that he is providing efficient and economical communications, tailored for a given area.

You may well find a rewarding career in the Bell System, where people find solutions to exciting problems. The Bell System companies are equal opportunity employers. Arrange for an on-campus interview through your Placement Office, or talk to a local Bell System company.

Bell System
American Telephone and Telegraph Co. and Associated Companies





This? In this hypothetical geographical area, communications could be supplied with one large telephone switching office and a network of cables (left), or with three smaller offices and a different network (right). Many other combinations of offices and cable networks might be possible. This situation, although hypothetical, is typical of the complex telephone engineering problems that are being solved with the aid of computer programs designed at Bell Laboratories. **Or this?**

CONTINUED FROM PAGE 12

original members of this board of directors are MSU President John A. Hannah and Dean of Engineering John D. Ryder.

From this time onward the JETS organization grew steadily, adding about 125 chapters a year, with great promise of expanding beyond its present proportions. As of September, 1964, the JETS boasted 1500 chapters, composed of 43,000 members in all fifty states, a territory, and eight foreign countries.

As the JETS grew in enrollment and number of chapters, the scope of their activities broadened. Early in their history, they initiated the JETS project exposition which is held every year in conjunction with the MSU Engineering Exposition. As more and more interest was taken in this project exposition by young engineers, companies began to award scholarships for first-place exhibits. Industries proved to be the most important ally in the promotion of the organization. The first of these companies, Republic Aviation Corporation of Farmingdale, New York, offered the following services to the chapters in its area: (1) providing professional engineers and scientists to act as counselors, (2) supplying financial assistance for club operating expenses, (3) assisting faculty advisers in outlining club programs and activities, (4) providing material about engineering, science, mathematics, and career guidance, and (5) furnishing instructions and guidance for completion of projects. In Michigan, the Consumers Power Company agreed to support the JETS Program by (1) helping to organize new clubs, (2) providing consulting engineers, (3) aiding in programming JETS activities, (4) making available outside engineering advice or counsel, (5) aiding in arrangement of field trips, (6) providing judges for local contests, and (7) helping to solve any general problems arising in the individual chapters. With the weight of industry behind them, the JETS continued to fulfill their purpose of preparing high school talent for engineering careers.

The overall scope and purpose of the JETS organization is effectively summed up by this passage from the annual JETS report for 1963-64:

This particular exhibit was presented by a high school member of the JETS in a past Exposition.

"Launched as an experimental project in 1950 by Michigan State University, the JETS program today serves as a cooperative effort through which industry, engineering and technical societies, and educational institutions may work together to enhance the science and engineering programs in their local high schools. Although emphasizing engineering and the physical sciences JETS is designed to stimulate learning in all professional fields. It combines the assistance and guidance of professional men, actively engaged in the technical fields, with classroom activity under the guidance of high school instructors of science and mathematics. The program stimulates the student's interest in technology and engineering by providing an opportunity to apply the principles learned in high school subjects to actual engineering and technical projects. He becomes acquainted with men who are actively engaged in the field and through them receives a preview of the engineering and technical professions. By this means, the student can gauge his abilities against the scholastic and personal requirements of the technical vocations."

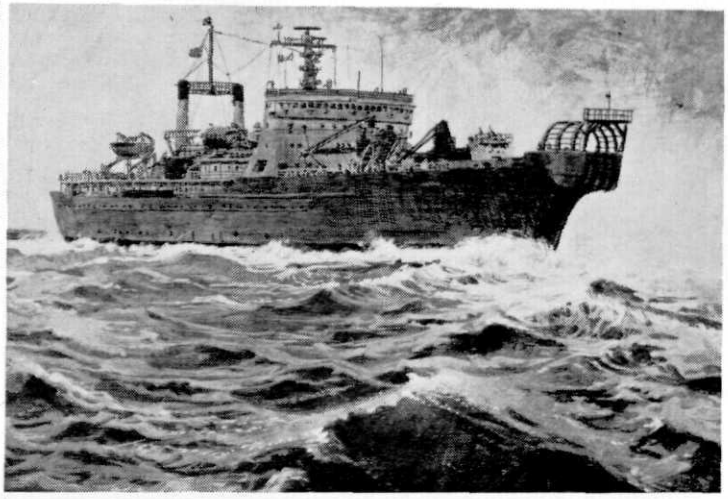
It can be seen by this passage just how important it is to find persons to fill future engineering professions, and to make sure our present students are qualified to accept this responsibility. Thus, in an age when so much of our effort is concentrated in the field of scientific advancement, it is organizations like the JETS which prove their real value to the future of our nation.

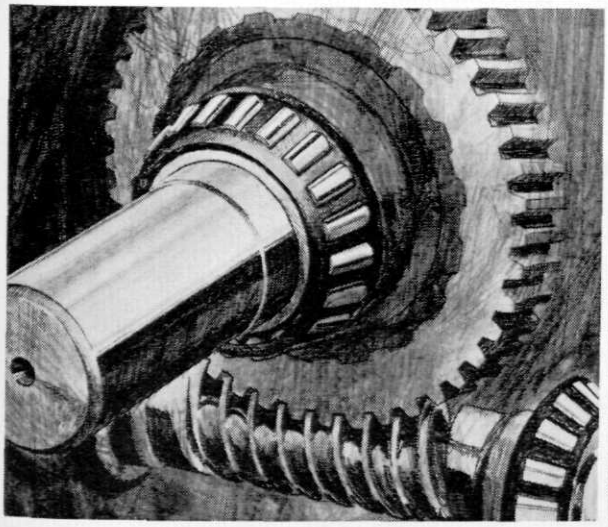
BIBLIOGRAPHY

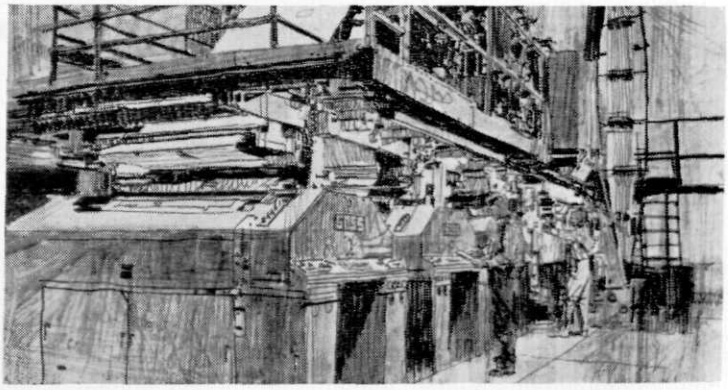
1. Harold W. Phend, "The Junior Engineering Technical Society," speech to the American Association for the Advancement of Science, Dec. 29, 1964.

2. From "The JETS Story," published by the Junior Engineering Technical Society, New York.

NEWS TRAVELS FASTER ON TIMKEN® BEARINGS







"NEITHER RAIN NOR . . ." In snow country, the mail goes through on a Ski-Doo Bombardier power-sled, made by Bombardier Snowmobile Ltd., Quebec. It is also used on trap lines, for sports and for hauling supplies. Timken® bearings in the clutch give it extra capacity in a small space.

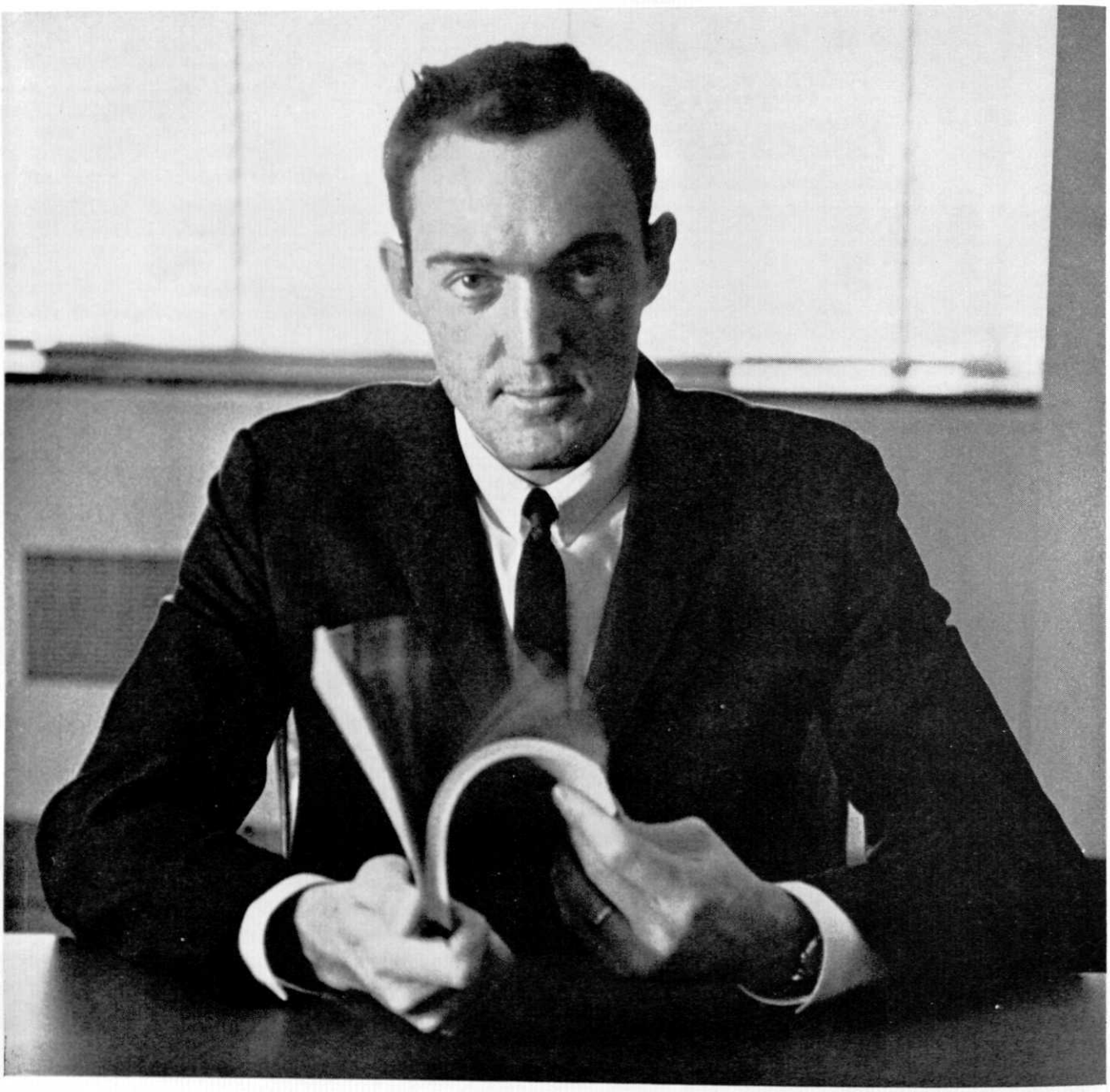
WHEELS AND SHAFTS. Whatever you build—wheelbarrows to steel rolling mills—Timken tapered roller bearings can help it perform better, longer. They're precision-made of nickel-rich steel by: The Timken Roller Bearing Company, Canton, Ohio. Also makers of Fine Alloy Steel and Rock Bits.

WORLD-WIDE CABLES. The C.S. Long Lines, new Bell System cable-laying ship, is on the high seas. In its wake, thousands of miles of cable, paid out at eight knots. 2,816 Timken bearings keep the ship's linear cable engine operating.

EXTRA! EXTRA! This Goss Headliner Mark II press runs 70,000 newspapers an hour. It prints in color. It folds. It delivers the papers to the loading dock. Not one Timken bearing has required premature replacement.

QUALITY TURNS ON
TIMKEN®
TAPERED ROLLER
BEARINGS

Learn More About the Timken Company, an Equal Opportunity Employer. Send for Career Booklet.



How about a friendly game of cards?

Watch out for our Gene Wollaston, though. He stacks the deck. In fact, he's already stacked 80 decks—of computer cards—to build a mathematical model to solve important refinery problems. With his special skills, Dr. Wollaston helps determine proper product yields and properties from key refinery operations. The final result should be an improved product—at a tremendous saving of time and money. (Once the model is built, the cost of solving a problem is as little as $3.00.)

So, as a card player, Gene's helping to take the gamble out of running a refinery. No mean accomplishment for a chemical engineer two years out of Illinois Institute of Technology.

You're not a card player? Don't worry. As long as you're looking for a meaningful challenge, your opportunity may be here at American Oil. We're also experimenting with fuel cells, spatial environment, and rust protection in car engines—to mention a few of our diverse fields of interest. Some of them may interest you, whether you're in Engineering, Physics, Chemistry, Mathematics, or Metallurgy.

You can find out by writing for more information. To J. H. Strange, American Oil Company, P. O. Box 431, Whiting, Indiana.

STANDARD OIL DIVISION STANDARD AMERICAN OIL COMPANY

How to tell a career from a job

A job is a job. A career is a place to grow. A career has a future. A job lives from day to day. In a job you get what you can, do what you must. In a career, rewards parallel your contributions.

We're a career company. More than a third of our 90,000 employees have been with us at least 15 years; 10,000 for more than 25 years. There are reasons for this. To assure growth we invest over $90 million a year in research. Fifty percent of last year's sales ($2.4 billion) came from products unheard of just 28 years ago. Because customers like these products, we've grown 750% since 1937.

Our career men share in this growth because we fill virtually all responsible positions from within. Our young men work in several areas to develop their capabilities. This way they can change positions without leaving the company.

There are job men and career men. If you seek a career, we'd like to tell you about an interesting and rewarding one at Du Pont. Write us a letter or clip and mail our coupon today.

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

BETTER THINGS FOR BETTER LIVING . . . *THROUGH CHEMISTRY*

An equal opportunity employer

TECHNICAL MEN WE'LL NEED FROM THE CLASS OF '65

Chemists	Mechanical Engineers
Chemical Engineers	Industrial Engineers

E. I. du Pont de Nemours & Co. (Inc.)
2519-A Nemours Building
Wilmington, Delaware 19898

When I'm graduated, I'll be a _____.
(List profession)

Please rush me more information about how I might fit in at Du Pont.

Name _____

Class _____ Major _____ Degree expected _____

College _____

My address _____

City _____ Zone _____ State _____

The automobile motor pounded and suddenly wheezed to a stop on a lonely road. "I wonder," mused the ME, "what that knock is."

"Maybe," suggested the blonde companion, "it's opportunity."

SE

A small college opened up in the Midwest and when the first semester began the college president discovered that there was not enough room in the dormitory for all the students. So the president decided to quarter the male students and the coeds in the gymnasium. Since there was no time to put up a partition, he painted a heavy white line down the center of the gym. Then he told the students: "If any of you crosses the white line into the side of the gym that belongs to the other sex, you will be fined $5 for the first offense, $10 for the second offense, $20 for the third offense, and so forth. Are there any questions?"

"Yes sir," one of the male students asked promptly, "What's the rate for a season ticket?"

SE

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."

SE

There are only two kinds of parking left on campus -- illegal and no.

SE

It's easier for a girl to walk the straight and narrow if she happens to be built that way.

For Ch.E's: We've often heard it said that gasoline and alcohol don't mix. Actually, they mix, but they just don't taste good.

SE

A preacher recently announced that there are 735 sins.

He is being beseiged with requests for the list, mostly from college students who think they're missing something.

SE

Coed: "If wishes came true, what would you wish for?"

Engineer: "Gosh, I'm afraid to tell you."

Coed: "Go ahead, you sap. What do you think I brought up this wishing business for?"

SE

Not only is it proper to hold an engineer's hand in the dark, but it's usually necessary.

SE

One of the prettier girls I knew always says, "To err is human but it feels divine."

SE

The Coed, excited about having been pinned by a fraternity man the night before, dressed hurriedly and was walking towards the campus when she came upon a group of male friends. Stopping in front of them, the girl proudly thrust out her chest and commanded happily, "Look!"

But in the excitement, she had forgotten to wear the pin.

The operation we do best
Is just to multiply!

SE

THE ENGINEER'S PSALM

Dr. Smith is my instructor;
I shall not pass.
He maketh me to exhibit mine ignorance before the whole class.
He telleth me more than I can write,
He lowereth my grade.
Yea, though I walk through the corridors of knowledge, I do not learn.
He tries to teach me;
He writeth equations before me in hopes that I will understand them.
He bombardeth my head with integrations,
My sliderule freezeth up,
Surely enthalpies and entropies shall follow me all the days of my life.
And I shall dwell in the College of Engineering forever.

SE

Answers to Last Issue's Brain Spainers

1. Not always.
2. 48 and 84
3. No.
4. The person in the portrait was his daughter.
5. Both fighters flew the same distance, 400 miles, since each flew for 240/300 hours during the operation.
6. Since 28 - 2x2x7, the number must be of the form 2 3 5 where (a-1) (b-1) (c-1) - 28. Thus the number is 960.
7. 6 cuts. No matter how the cutting is done, the faces of the central cube must result from separate cuts. The job may be done without any piling.

SE

THE ADVERTISER'S INDEX

This is one of our mechanical engineers making a mistake

They are to wed in June, and the guy had better shut up before she gets miffed. A gal has every right to resent the implication that the betrothed outpoints her in understanding of sewing and fabrics and what's good or bad about them. Even if it's true. Which it is. We have made him a pro at it.

It is our crafty intent to stop at nothing in our efforts to make garments or fabric furnishings that carry our identification tag (as for KODEL Fiber) so pleasing to the ultimate buyer in every way that she will attribute the satisfaction all to the fiber and look for that tag evermore.

This means we put mechanical engineers, chemical engineers, chemists and—yes—physicists to work freshening up the technology of dyeing, knitting, weaving, sewing, and the other elderly arts practiced not by us but by our customers' customers.

As in all the other industries in which we participate and for which we seek scientific and engineering recruits – photography, information retrieval, aerospace, plastics, graphic arts, x-ray, chemicals—there is much to challenge the intellectually ambitious in satisfying the common yearnings of mankind for adornment of the person and the home. Past technical accomplishments in fibers and fabrics, weak by comparison with what can be anticipated when fresh, better informed minds pitch in, have sufficed nonetheless to create the present affluence where there is plenty of money on hand to do what smart people will tell us to do. All we need are more smart people.

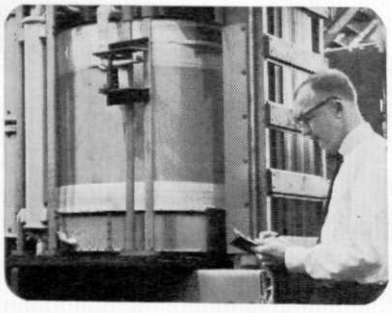
Drop us a line. From polymer theory to workable yarn and from workable yarn to clothes on the back, rugs on the floor, and curtains on the windows extends a long row of assorted disciplines and aptitudes.

EASTMAN KODAK COMPANY,
Business and Technical Personnel Department, Rochester, N.Y. 14650
An equal-opportunity employer offering a choice of three communities:
Rochester, N.Y., Kingsport, Tenn., and Longview, Tex.

Kodak

DRESDEN NUCLEAR POWER STATION—America's first full-scale producer of commercial electric power from the atom, rated 200,000 kw. Dresden 2, a 714,000-kw second-generation design is now being built—like the original—by General Electric.

ELWOOD P. STROUPE, MSChE, PURDUE '62 is a design engineer at the Atomic Power Equipment Department. He has contributed to the design of Dresden 2's reactor—heart of the system. He'll follow it right through installation.



RONALD F. DESGROSEILLIERS, BSEE, U.S. MILITARY ACADEMY '60 is on the Manufacturing Training Program at G.E.'s Power Transformer Department. Ron is a production foreman helping build massive transformers for Dresden 2.

WORKING ON THE SALE of Dresden 2's turbine-generator is William J. Mahoney, BMS, Maine Maritime Academy, '56. After serving four years in the U.S. Navy, Bill joined the Technical Marketing Program to help G.E. meet its customer's needs.

A PREVIEW OF YOUR CAREER AT GENERAL ELECTRIC:

Producing Power from the Atom

It takes a big company to handle a massive project like Dresden 2—with research-backed know-how for new designs, manufacturing capabilities to produce next-generation equipment, and in-depth knowledge of customer needs. At G.E., you'll be part of a uniquely decentralized organization with more than one hundred product operations that design, build and sell thousands of products—from transistors to turbines. When a big job requires it, these operations can be tied closely together—like the 57 departments at work on Dresden today. That's one of the reasons why G.E. pioneers in so many areas and is a leader in so many fields. Write us now—or see your placement officer—to define your career area at General Electric. General Electric Co., Section 699-13, Schenectady, N. Y. 12305. (An Equal Opportunity Employer)

Progress Is Our Most Important Product

GENERAL ELECTRIC

2903
8