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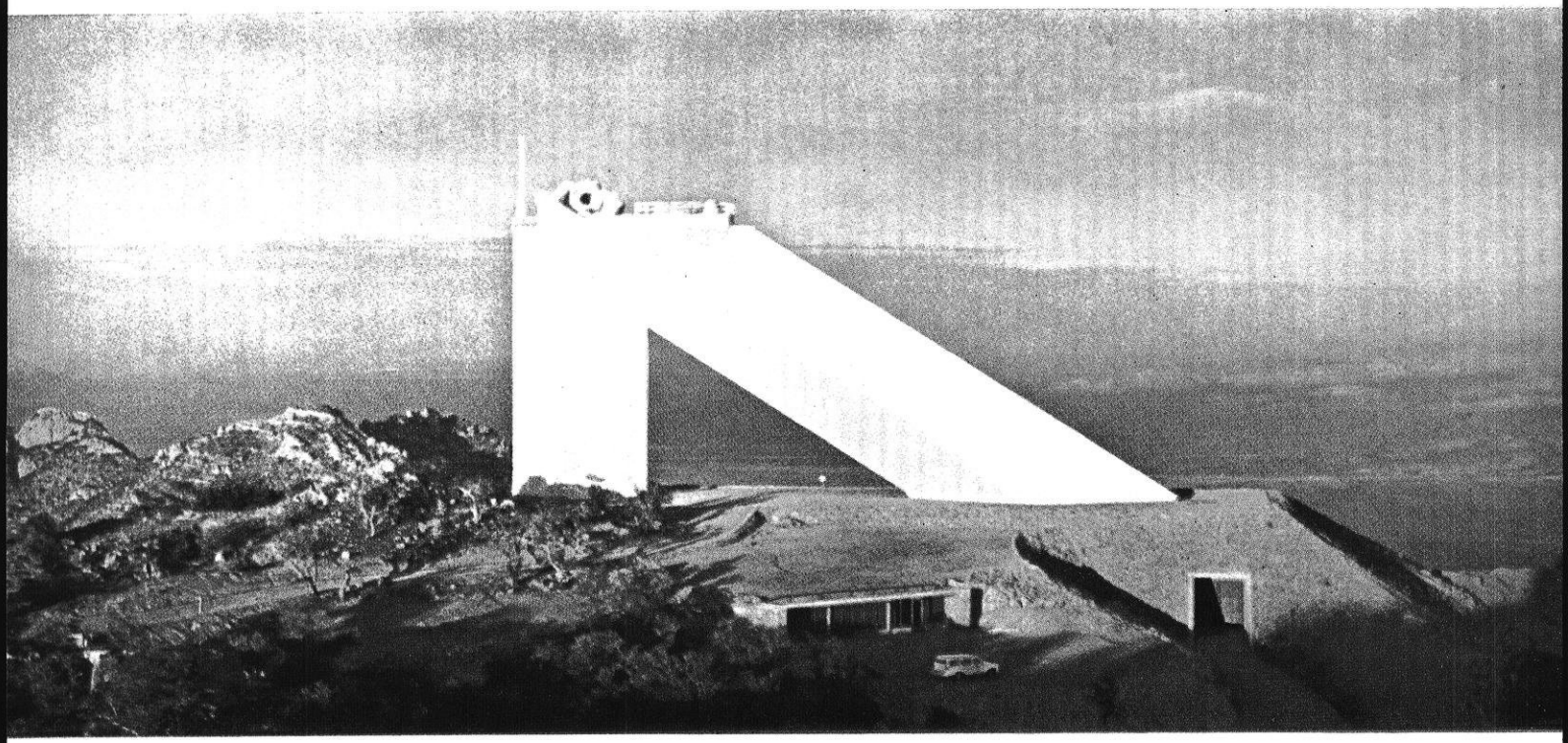
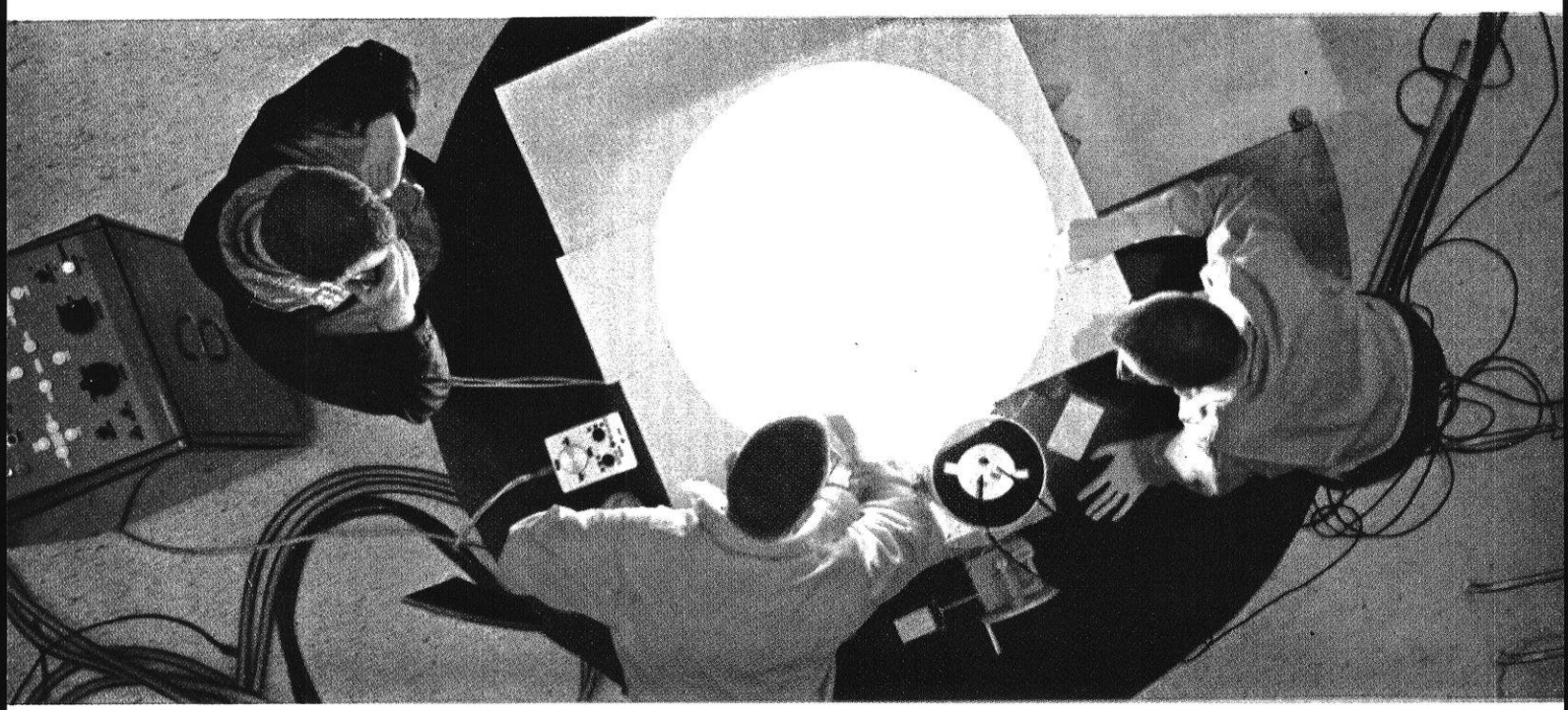
THE WISCONSIN ENGINEER

MEMBER E.C.M.A. • MARCH 1965 • 25 CENTS

OFFICIAL PROGRAM . . . Page 13



On top of Kitt Peak, the world's largest solar telescope



gives scientists the largest image of the sun man has ever had

At the top of the gleaming white tower in the upper picture is a 60-inch quartz mirror which precisely tracks the sun all day in the clear, dry air above the Arizona desert.

It is cradled in a carriage called a heliostat, built by Westinghouse.

Part of this telescope is tunneled out of the flank of the mountain. Sunlight is reflected 480 feet down this tunnel and back up 280 feet into a dark viewing room by means of two other mirrors, also on Westinghouse mountings.

By studying the sun's image here, scientists hope to learn more about the sun's magnetic field and how sunspots affect our weather and communications.

The 60-ton heliostat at the Kitt Peak National Observatory is designed to track the daily motion of the sun to an accuracy of 1/1000 of an inch.

You can be sure if it's Westinghouse

For information on a career at Westinghouse, an equal opportunity employer, write L. H. Noggle, Westinghouse Educational Department, Pittsburgh, Pa. 15221.

March in Brief

THIS MONTH . . .

We are happy to have the opportunity to use our magazine as the Official Program of the 1965 Engineering Exposition. This issue, Volume 69, Number 6, March 1965, had the largest press run in the history of the magazine. We would like to express our gratitude for the fine cooperation we received from the Exposition Committee and the Democrat Printing Company in producing this issue.

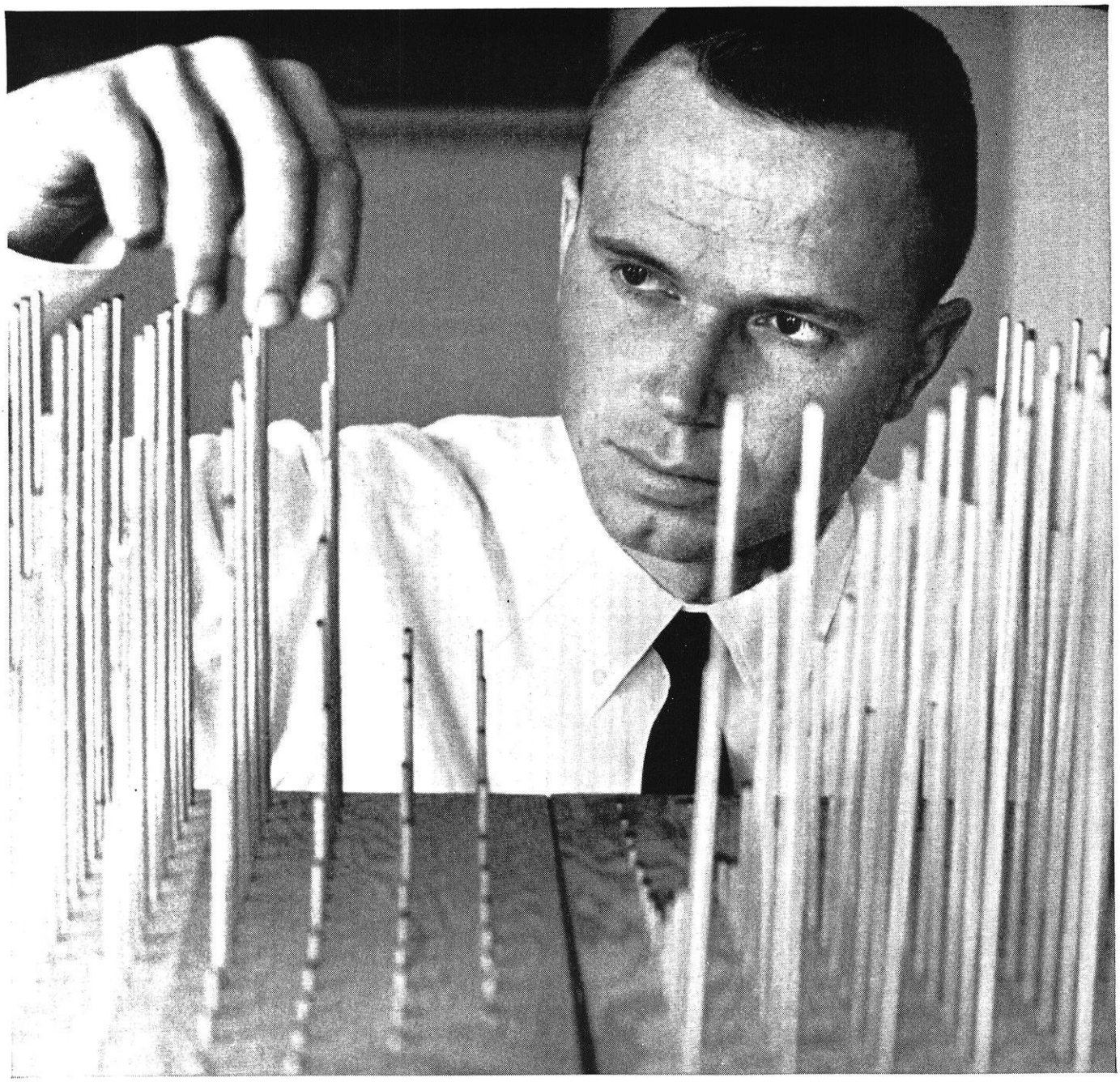
Our staff artist, Jim Tyndall has provided the artwork for the cover, in addition to the campus map on page 15.

ABOUT THE MAGAZINE . . .

We hope that those of you reading our magazine for the first time find it interesting and useful as you attend the Exposition. You may be interested in knowing a few background details pertaining to the *Wisconsin Engineer*. Our staff is composed of full-time undergraduate students of the University of Wisconsin, working in an office in the Mechanical Engineering Building. The magazine is published monthly from October through May, and normally contains three student-written technical articles, news of new developments in science, industry, and government, campus news, a popular photo feature—The Girl-of-the-Month, an editorial dealing with a subject pertinent to engineering students, and of course, our famous (or infamous) jokes. A limited number of sample copies of past issues will be available at the *Wisconsin Engineer* Booth at the exposition; please stop by and see us. Also, we invite you to become a regular reader by filling out the enclosed card and dropping it in the mail today.

THE EXPOSITION . . .

We are certain that your visit to the Exposition will be enjoyable, educational, and enlightening. The students in charge have worked long hard hours in an effort to ensure this. The staff of the *Wisconsin Engineer* bids you a hearty welcome to the Badger Engineering campus.



Special agent plots overthrow of hidden enemy.

The hidden enemy is vapor in automobile fuel lines. Causes vapor-lock that stalls cars on warm days.

Our special agent is Dr. John O. Becker, University of Illinois, '64. Here he plots a temperature-pressure-fuel relationship as he specializes in fuel volatility at our Whiting, Ind., Research & Development lab. One of his theories has already been proven. The next step—a practical application useful in re-blending gasoline. To make it less prone to vapor-lock.

In his spare time, Dr. Becker is boning-up on car engines of the future. Maybe someday he'll help us formulate a new kind of fuel for a yet-unknown engine.

How about you? Looking for a challenge—and a chance to contribute to the exciting new technologies shaping tomorrow's world? Your opportunity may be here at American Oil. Whether you're a mechanical engineer, as Dr. Becker is, or a chemist, metallurgist, mathematician or physicist.

For more information, write 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.

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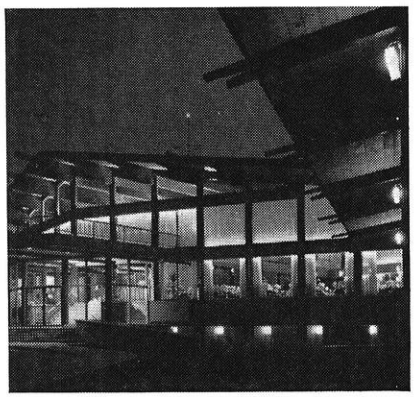
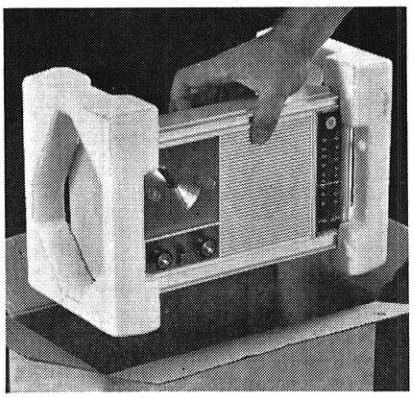
Interested? Contact your Placement Officer now for a date to see an IH representative when he visits your campus. Or if interviews are not scheduled, write directly to the Supervisor of College Relations, International Harvester Company, 180 N. Michigan Avenue, Chicago 1, Illinois. That ground floor may be closer than you think. How far you travel is pretty much up to you.

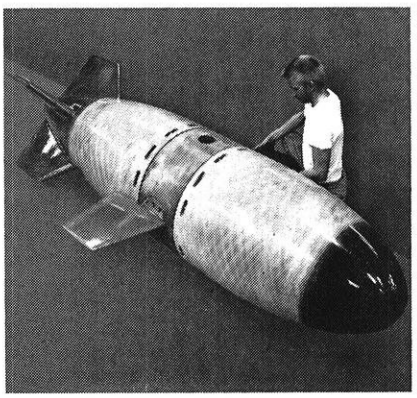
KOPPERS 1965



Laminated wood arches



Foam plastic packaging



Reinforced plastic underwater buoy

Koppers is one of the most diversified companies in the country, supplying more than 270 products and services to some forty industries. Koppers employees are working on new adhesives for the aircraft and automotive markets, new wood treatments and protective coatings for the construction industry, pioneering in sound control, developing new plastics for packaging and insulation, designing new and improved techniques for the steel industry.

Product expansion. Koppers has just completed a transaction that will strengthen its role in the plastics industry. An equal partnership—called Sinclair-Koppers Company—has been formed that brings together Sinclair Oil Company's basic sources of ethylene with Koppers facilities and experience in producing and marketing many thermoplastic products. By the end of 1967, the total plastics capacity of Sinclair-Koppers is projected at nearly twice the capacity of these facilities today.

Koppers also recently acquired the assets of Hardinge Company, Inc., York, Pa., manufacturer of grinding equipment for mineral processing, to increase its services to the iron and steel industry.

How we operate. Koppers has five divisions in addition to Sinclair-Koppers Company: Tar and Chemical, Engineering and Construction, Metal Products, Forest Products, and International Division. Each division maintains its own management, sales and marketing, and applied research and development staffs. The company also operates a central research department with laboratories at its new $8,000,000 Research Center in Monroeville, Pa.

What we expect from Koppers people. Koppers looks for: Proficiency in one's own field; understanding of related fields; ability and desire to advance in responsibility; understanding of our economic system and the importance of profits for individual and corporate success.

What we offer in return. Opportunities for individual development in the many industries we serve; opportunities for providing products for most of the major markets in the country. As your unique talents develop in this climate of opportunity, you can move *within* the company to areas best suited to your interests and qualifications.

What we need. Chemists and chemical engineers for work in plastics and chemical synthesis for basic research, product development, process engineering, manufacturing and sales. Mechanical engineers for product development, manufacturing engineering, sales and design. Metallurgical engineers for basic research and development. Electrical engineers and civil engineers for design and construction.

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LETTERS

ENGINEER:

I have been receiving the *Wisconsin Engineer* for the last couple of years and I would take this moment to tell you how much I enjoy getting this regular news of our alma mater. Many changes have taken place on the Wisconsin campus since I graduated in 1942, and again in 1948 and 1950 (BS, MS, Ph.D., respectively, in Civil Engineering). I scarcely recognize even the names of faculty on your board of advisors but you will be glad to know that I can at least recognize various elements of the joke page which date back to my undergraduate years and before!

As an alumni note, you might be interested in knowing that on February 1, 1965, I shall have completed five years in my position as the third Dean of the School of Engineering at the University of Southern California.

A considerable number of Wisconsin alumni have done well at graduate study at USC, and besides myself, there are at least three other Wisconsin alumni on the faculty, Professor R. C. Merz, Chairman, Department of Civil Engineering, E. Kent Springer, Professor of Mechanical Engineering, and David B. Wittry, Assoc. Professor of Electrical Engineering.

You may be interested to know that I am chairman of the Relations With Industry Division of the American Society for Engineering Education, and President of Los Angeles Chapter, California Society of Professional Engineers. I have recently been named to a three year term on the civilian board of visitors advising the US Army Transportation School at Fort Eustis, Virginia.

I have always been proud of my engineering education at the University of Wisconsin and I am taking out a life membership in the UW Alumni Association.

With best wishes for continued success with the *Wisconsin Engineer* I assume that you see our student publication, the *USC Engineer*, from time to time.

Very sincerely,

A. C. INGERSOLL, CE '42, *Dean School of Engineering, University of Southern California*

MEMBER OF ENGINEERING COLLEGE MAGAZINES ASSOCIATED

Chairman: PROF. J. R. BISSETT, Dept. of Civil Engineering, University of Arkansas, Fayetteville, Arkansas 72701.

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VOLUME 69, NUMBER 6 MARCH 1965

OFFICIAL PROGRAM

1965 Engineering Exposition

Starts on page 13

THE WISCONSIN ENGINEER

The Student Engineer's Magazine Founded in 1896

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Nothing—if you're bored by Project Mohole, turbine engines, the world's tallest crane, and biggest strip-mining shovel, a telephone cable-laying ship now crossing the Pacific, space exploration, the Spirit of America race car, the Alweg Monorail, a moveable grandstand for the new District of Columbia Stadium, Atlas missiles and defense work—

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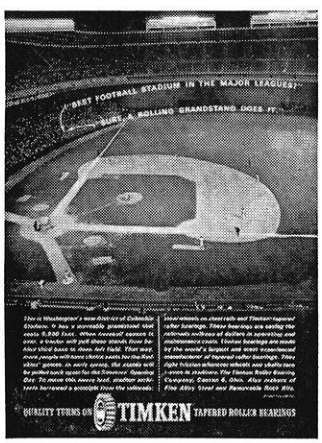
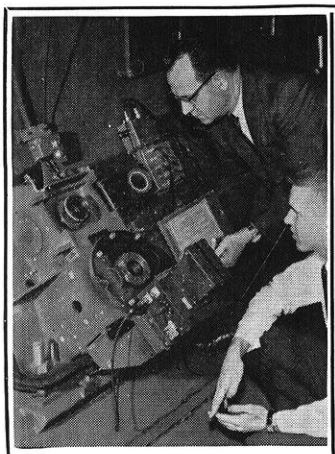
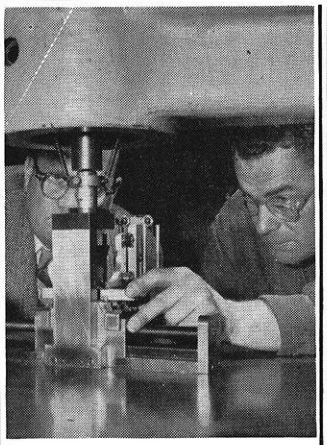


We need



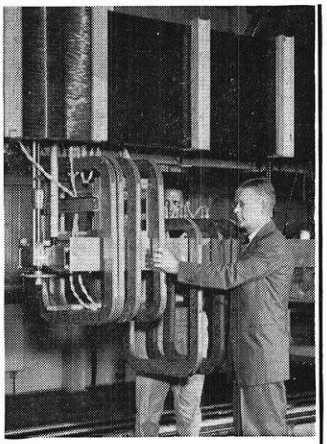
AERO ENGINEERS

To conduct design studies of high speed, high performance reentry systems and to solve basic problems in theoretical and experimental aerothermodynamics, aeroballistics, and hydroballistics. To perform the aerodynamic design and development of modern hypervelocity wind tunnels and ballistic ranges . . .



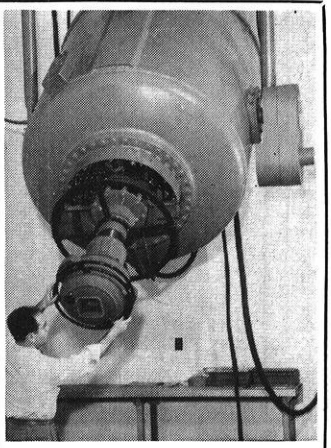
MECHANICAL ENGINEERS

To conceive, design, develop and test: missiles, underwater weapons, sounding rockets, nuclear weapons, sonars, special test equipment, experimental research equipment, structures, and all types of mechanical, pneumatic, hydraulic and electromechanical mechanisms for these weapon systems and equipment.



ELECTRONIC ENGINEERS

To design and develop: a new underwater communication system, an advanced underwater detection system, a new submarine fire control system, an airborne missile system, influence fuzing. To design instrumentation for evaluation of ordnance and for aeroballistic research. To perform experiments to examine the feasibility of new concepts . . .



PHYSICISTS & MATHEMATICIANS

Physicists to conduct basic and applied research in underwater acoustic effects, oceanography, electromagnetic and infra-red radiation, magnetic and semi-conductive materials, and to conduct effectiveness-analyses studies of weapon systems. Mathematicians to conduct numerical analyses, programming, and trajectory plotting.

but we want Tau Beta Pi types or equivalent!

Of course, every employer WANTS the cream of the crop, but the point is: we can get them! Not because of money or blue sky promises or "Extra" benefits, but because the Naval Ordnance Laboratory offers the best opportunity for vital engineering work in a near academic environment. (Some graduate degree courses are actually held here at NOL, and this is prime ground for PhD theses, as you may know.) Fact is, *some 40% of those graduates we hired last year were Tau Beta Pi members*, so you can understand our obvious pride.

The Naval Ordnance Laboratory takes the lead in the research, design, development, and test of all kinds of weapons systems and devices . . . ranging from the smallest arming circuit to a complete underwater-to-air-to-underwater nuclear missile system. (The SUBROC missile and its digital computer fire control system were conceived and developed at NOL.)

The NOL campus includes almost 200 buildings on 900 acres of suburban countryside just outside Washington. The annual budget for in-house research and development averages some $30 MILLION, and our facilities are the finest in the world. *But hypersonic wind tunnels, pressurized ballistic ranges, 2,000,000 gallon hydroballistics tanks, Mach 20 shock tunnels, 10-million volt x-ray equipment, IBM-7090's and all the other material benefits don't make a research laboratory.*

It's the pervading intellectual atmosphere . . . the freedom to think and create . . . the encouragement to better oneself that sets NOL apart. For instance, we want engineers (and engineering-oriented physicists) who can create and push an idea from original design straight through to prototype testing in unfamiliar environments—including beneath the sea. We want people who are interested in our excellent advance-degree program, and in associating with recognized authorities on a day-to-day basis. We want people who will take advantage of what the Washington area has to offer—people who live the full life.

If this appeals to you—whether you are Tau Beta Pi material, or even a guy with unfulfilled genius—drop by your College Placement Office to arrange an interview with an NOL representative. Or, write direct to Mr. L. E. Probst, Professional Recruitment Division, with your specific questions.

NOL

U.S. Naval Ordnance Laboratory, White Oak, Silver Spring, Maryland

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Across the Editor's Desk

DEAD BUTTS

This issue of the *Wisconsin Engineer* has several pages devoted to the 1965 Engineering Exposition, including pictures of some unusual engineering students preparing their exhibits. We say the students are unusual because it seems that Wisconsin students who participate in extra-curricular activities are a vanishing breed. All over the campus activities are suffering from reduced participation in spite of increasing University enrollment. For example, fraternity membership is not increasing as rapidly as enrollment, Mil Ball had more chairmanships than chairmen this year for the first time, and student exhibits at the Engineering Exposition have dropped twenty five percent since 1956. Students seem to be studying more and participating less and we think it's a bad thing. Grades, of course, keep you out of the Army, but we think it's a very rare case where a few well-spent hours away from the books ever made the difference between staying in and flunking out.

No, grades are no excuse. What we think is happening is that somehow the University is attracting a batch of mama's boys (and girls) who can't run and chew gum at the same time. Looking out of their little shells all they see is the cold cruel world that would be too much work to stay alive in. So they reason that it's better to do as little as possible, i.e., only what they absolutely have to do. Hence the type of college student who is willing to see the world for himself is disappearing out of sheer laziness and apathy. The new herd wants its experience on a silver spoon rather than finding it on its own. We think such people tend to stink up the place and we congratulate the few participating students left on this campus for their maturity.

—MEAGHER

B-52. 8-engine jet bomber with range of over 9000 miles. Backbone of the Strategic Air Command.

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If you are, there's a place for you on the Aerospace Team—the U. S. Air Force.

No organization in the world gives young people a greater opportunity to do vital, responsible work.

For example, just a short while ago a 23-year-old Air Force lieutenant made a startling breakthrough in metallurgy. And a recent All-America tackle is doing advanced research in nuclear weapons.

If you have talent, you'll have a chance to show it in the Air Force. Your work can put you and your country ahead.

You can earn your commission at Air Force Officer Training School, a three-month course open to both men and women. To apply, you must be within 210 days of your degree.

For more information, contact the Professor of Air Science. If your campus has no AFROTC, see your Air Force recruiter.

U.S. Air Force

1965
Engineering Exposition

"Theory to Reality"

WELCOME TO THE 1965 ENGINEERING EXPOSITION

It is a pleasure to welcome you to the 1965 Engineering Exposition, which has been planned and organized and is being operated by our engineering students, supported by an advisory committee of the faculty. Individual students and student organizations have designed and built the exhibits to demonstrate new developments in engineering and and new applications of engineering principles which will affect all of us in the future. They have also provided exhibits to illustrate the instructional and research activities of the College.

The Exposition serves many purposes. It is a valuable experience for our undergraduate students in exercising imagination and in developing talents for planning and for working with people. It provides visitors from the entire State an excellent opportunity for inspection of our buildings, our laboratories, and our research programs. Through especially arranged and guided tours for high school students it helps to present a picture of engineering as a career. Finally, it develops cooperation between our students and industry in exhibiting current developments in a variety of industrial fields.

We hope that you enjoy your visit with us and that you will find the 1965 Engineering Exposition both interesting and instructive. To the Polygon Board, the chairman of the Exposition and the many student committees, exhibitors, faculty advisers and all others who have assisted in so many ways, congratulations on a fine show.

Dean, College of Engineering
KURT F. WENDT

HISTORY OF THE EXPOSITION

The 1965 Engineering Exposition is presented by the Engineering students of the University of Wisconsin under the sponsorship of the Polygon Board. The present exposition is the fifth to be presented on a triennial basis dating back to 1953. The original idea of the engineering exposition evolved in 1940 when engineering students sought a constructive use of their talents after annual feuds with law students over whether St. Patrick was an engineer or a lawyer got out of hand. The first exposition was presented in 1940 and a second held in 1941. World War II brought a temporary end to exposition plans, and it was not until 1953 when Polygon Board began the present tradition of expositions.

The engineering exposition is presented to provide the public with a better understanding of the rapidly developing field of engineering.and by doing so to provide encouragement and enlightenment for the development of future engineers.

Seated: (L. to R.) Prof. J. A. Marks, Edwin Novak, Louis Jacobs, Roger Ruda.
Standing: Glen Schaefer, James Burke, Robert Schaase, Gerald Steidman, Steven Iclabande, James Beckwith, Gerald Brusewitz, John Huston, Robert Rosecky, Edward Priepke, Thomas Sieber, Gary Willard, John Frieders.

POLYGON BOARD: SPONSOR OF THE EXPOSITION

The Polygon Board is the coordinating body of student activities and opinions in the College of Engineering. The Board is composed of eighteen directors and a president. Two directors are elected from each of the nine student chapters of engineering societies on the campus.

The purpose of the Polygon Board is to organize engineering campus activities, to provide a service to engineering societies and to represent engineering student opinions both to the faculty and to the University as a whole through a voting representative on the Student Senate.

In addition to sponsoring the Engineering Exposition, the Board organizes the annual celebration of St. Patrick's day by engineers in recognition that St. Patrick was an engineer. The Board conducts an extensive program to make summer jobs in industry available to engineering students. Polygon Board also provides a voice for any suggestions by students and faculty for improvements to the College of Engineering and the engineering campus.

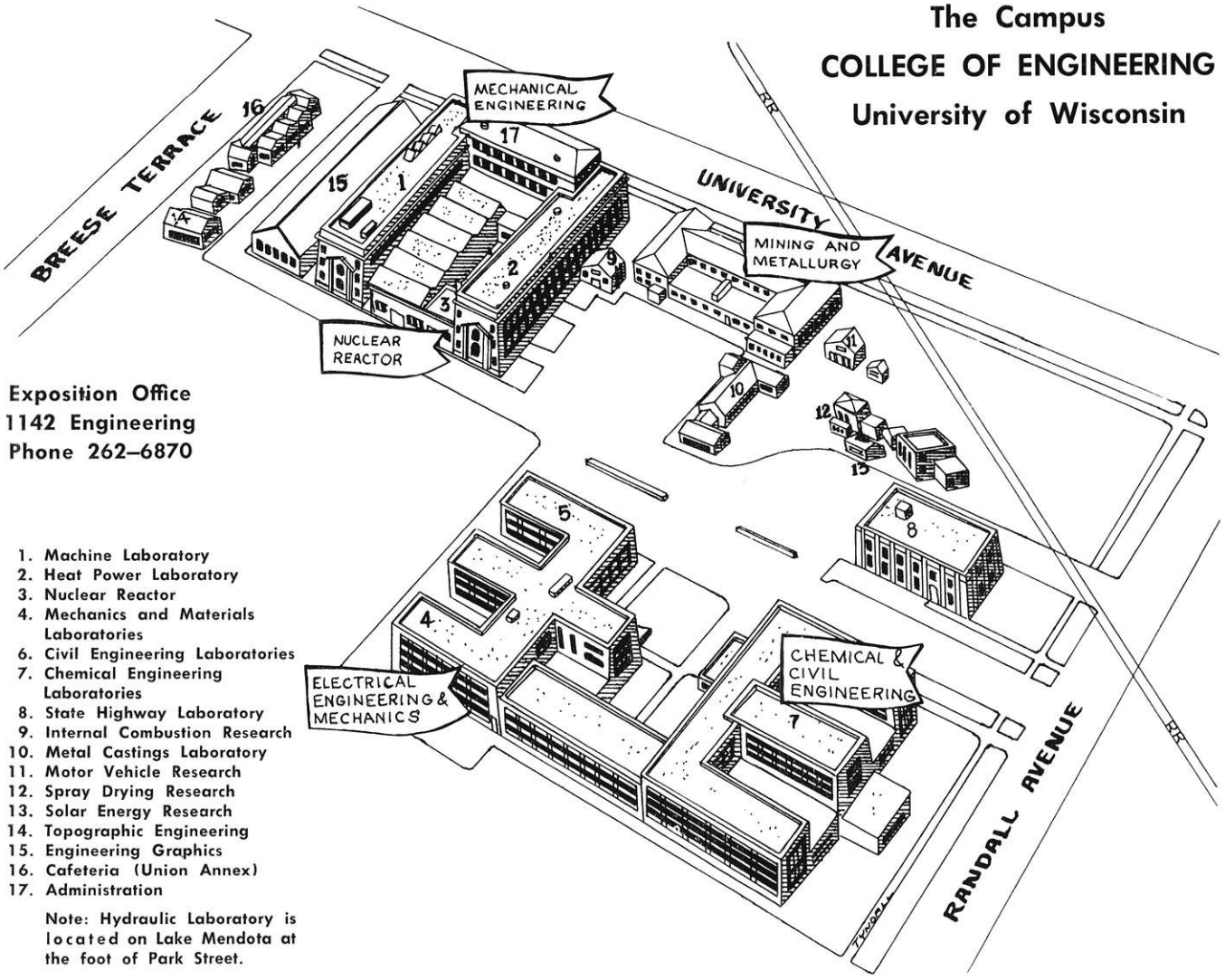
The Engineering Exposition with its theme "Theory to Reality" is an attempt by the students to present the role of the engineer in society today and to point out engineering principles and some of the new developments in the field of engineering. It is hoped that this exposition will foster a better understanding of the field of engineering work and encourage the development of future engineers.

Louis J. Jacobs
President, Polygon Board

ORGANIZATIONS COMPOSING POLYGON BOARD

American Institute of Chemical Engineers
American Nuclear Society
American Society of Civil Engineers
Society of Automotive Engineers
American Foundrymens Society
American Institute of Mining and Metallurgical Engineers
Institute of Electrical and Electronics Engineers
American Society of Mechanical Engineers
American Society of Agricultural Engineers

The Campus
COLLEGE OF ENGINEERING
University of Wisconsin



Exposition Office
1142 Engineering
Phone 262–6870

1. Machine Laboratory
2. Heat Power Laboratory
3. Nuclear Reactor
4. Mechanics and Materials Laboratories
6. Civil Engineering Laboratories
7. Chemical Engineering Laboratories
8. State Highway Laboratory
9. Internal Combustion Research
10. Metal Castings Laboratory
11. Motor Vehicle Research
12. Spray Drying Research
13. Solar Energy Research
14. Topographic Engineering
15. Engineering Graphics
16. Cafeteria (Union Annex)
17. Administration

Note: Hydraulic Laboratory is located on Lake Mendota at the foot of Park Street.

HIGH SCHOOL DAY PROGRAM
April 2, 1965

Friday, April 2, has been designated as High School Day at the Engineering Exposition. The following special program has been arranged for the high school students.

10:00 a.m.	Opening of the Exposition Ticket sales
10:30 a.m.	Welcoming Address to the Students by Kurt F. Wendt, Dean, College of Engineering in Room 105, Mechanical Engineering
10:45 a.m.	Movie (to be run continuously throughout the day) in Room 105, Mechanical Engineering
10:45 a.m. to 12:00 noon	Guided tours of the Exposition available to those groups desiring them.
12:00 noon to 1:00 p.m.	Lunch
1:00 p.m. to 5:00 p.m.	Guided tours available to groups.
5:00 p.m.	After 5 p.m. there will be tours as scheduled for special groups by previous arrangement.
9:00 p.m.	Closing of the Exposition

EXPOSITION HOURS

Thursday, April 1	1:00 PM to 6:00 PM
Friday, April 2	10:00 AM to 9:00 PM
Saturday, April 3	10:00 AM to 9:00 PM
Sunday, April 4	1:00 PM to 6:00 PM

PRIZES FOR STUDENT EXHIBITS

	First	Second	Third
Individual Student	$25.00	$15.00	$10.00
Student Organization	50.00	30.00	20.00
Graduate Student	15.00	10.00	.....
Student Group	50.00	30.00	20.00
Craftsmanship	15.00	10.00	.....

MOVIES

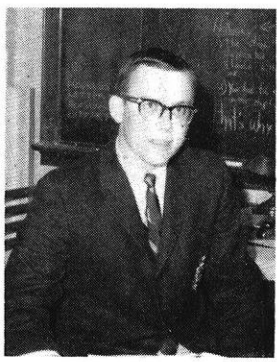
Movies will be shown continuously throughout the Exposition in room 105 of the Mechanical Engineering Building and in the New Engineering Building, room 1327.

Executive Committee

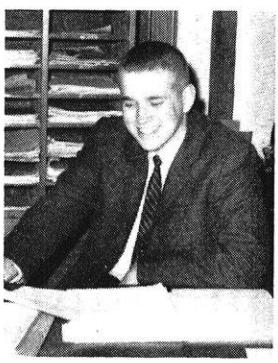
General Chairman
DON C. HOLLOWAY
ME-3, Janesville, Wis.

High School Chairman
STEVE A. SCHELLIN
E-5, Pewaukee, Wis.

Student Exhibits Chairman
DEAN TAYLOR
ChE-4, Stevens Point, Wis.

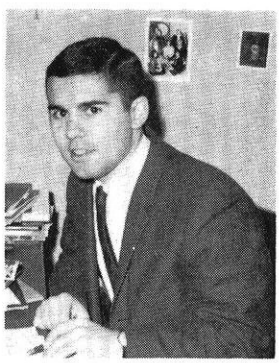


Bldg. & Grounds Chairman
WILLIAM WIDMOYER
ME-3, La Crosse, Wis.

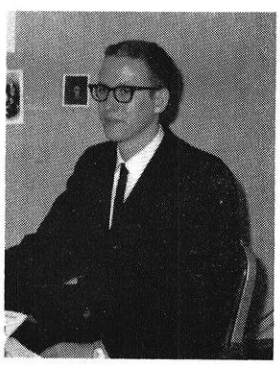


Industrial Exhibits Chairman
ROBERT B. BORSUM
ChE-4, Appleton, Wis.

Finance Chairman
DONALD L. ALF
EE-3, Redgranite, Wis.



Program Chairman
LOUIS J. JACOBS
ChE-4, Chicago, Ill.



Industrial Exhibits Co-Chrm.
STANLEY E. FREDRICKSON
CiE-4, Rice Lake, Wis.

Publicity Chairman
GLEN R. SCHAEFER
CiE-4, Palmyra, Wis.

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High School Relations	Prof. L. B. Greenfield
Program	Prof. C. R. Loper
Finance	Prof. A. T. Tiedemann

STUDENT EXHIBIT JUDGES

Werner Senger ..... Gisholt Machine Company
Retired Vice-President of Engineering

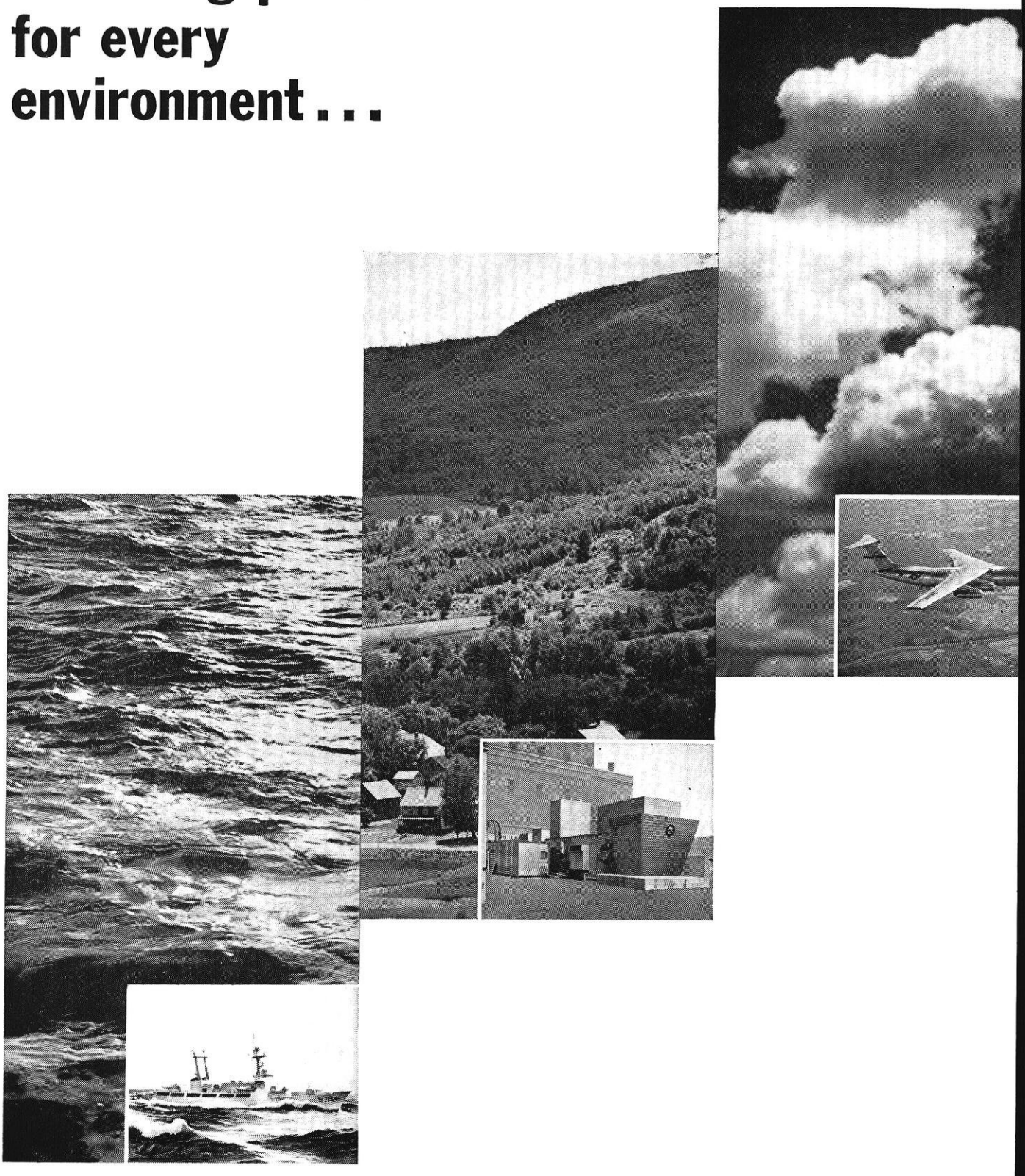
John A. Duffie ..... University of Wisconsin
Assistant Director of Experiment Station

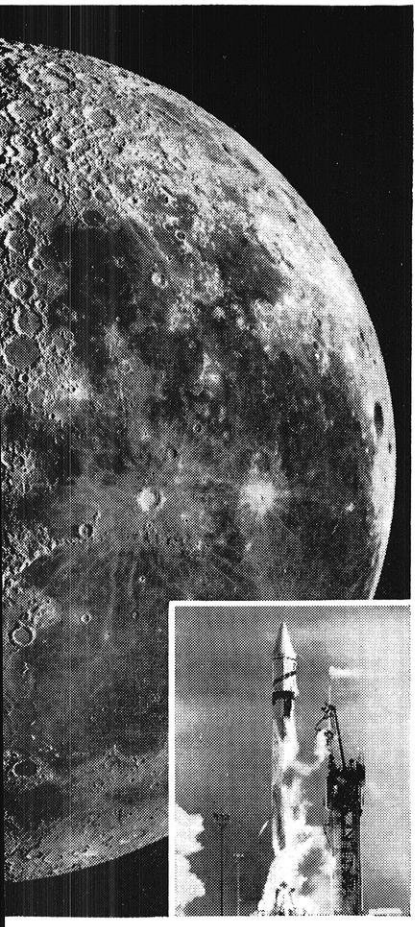
Reinhard Graetzer ..... University of Wisconsin
Research Assistant in Department of Physics

Industrial Exhibitors

I-1. Allen–Bradley Company; Milwaukee, Wisconsin
I-2. Allis–Chalmers Corporation; Milwaukee, Wisconsin
I-3. Argonne National Laboratory; Lemont, Illinois
I-4. Collins Radio Company; Cedar Rapids, Iowa—"Creative Concepts in Electronics"
I-5. Continental Can Company; Chicago, Illinois—"Come Lead the Packaging Revolution"
I-6. Controls Company of America; Milwaukee, Wisconsin—"Pioneering Leadership in Control Systems"
I-7. Corps of Engineers, U. S. Army; Rock Island, Illinois
I-8. Cutler–Hammer, Inc.; Milwaukee, Wisconsin—"New Technologies—New Opportunities in the Aerospace Field"
I-9. Douglas Aircraft Corporation; Santa Monica, California
I-10. Falk Corporation; Milwaukee, Wisconsin
I-11. Ford Motor Company; Dearborn, Michigan—"Gas Turbine Truck"
I-12. General Telephone Company of Wisconsin; Madison, Wisconsin
I-13. Giddings & Lewis Machine Tool Company; Fond du Lac, Wisconsin—"Numerically Controlled Machine Tools"
I-14. Harnischfeger Corporation; Milwaukee, Wisconsin—"Model Overhead Mill Crane"
I-15. International Harvester Company; Milwaukee, Wisconsin
I-16. Kohler Company; Kohler, Wisconsin
I-17. Marathon Corporation; Neenah, Wisconsin
I-18. National Aeronautics and Space Administration; Washington, D. C.—"Photography from Five Years of Space" presented by the Photographic Society of America
I-19. Nekoosa–Edwards Paper Company; Port Edwards, Wisconsin
I-20. Reynolds Metals Corporation; Richmond, Virginia
I-21. Scott Paper Company; Green Bay, Wisconsin
I-22. Sundstrand Corporation; Rockford, Illinois
I-23. Waukesha Motors, Inc.; Waukesha, Wisconsin—"Gas Turbine"
I-24. The West Bend Company; West Bend, Wisconsin—"Gasoline Engines and Outboard Motors"
I-25. Wisconsin Power and Light Company; Madison, Wisconsin
I-26. Wisconsin Telephone Company; Milwaukee, Wisconsin—"Continuity of Satellite Communications"

Providing power for every environment...





Being a technically trained man . . . we assume you are looking ahead to a career of exciting growth and accomplishment and that you are looking for a company possessing these same qualities.

If our assumption is correct, we would like you to take a close look at us. For this Company, while solving the problems of the day, thrives on a sort of creative restlessness which anticipates the challenges of tomorrow. And more important to you, it recognizes its engineers and scientists as the master key to its present success and future progress.

From a solid foundation of basic and applied research, our Company has gained a firm foothold in the land, sea, air, and space programs that are helping to shape our nation's future. Our engineers and scientists are exploring ever-broadening avenues of *energy conversion for every environment.* Should you join them, you'll be assigned early responsibility . . . to apply your engineering talents to such areas as advanced gas turbines . . . rocket engines . . . fuel cells and nuclear power.

provides challenge for virtually every technical talent at Pratt & Whitney Aircraft

Such trail-blazing projects command the best of varied talent. That's why you'll find at Pratt & Whitney Aircraft men with college training as diverse as their responsibilities. You will also find that opportunities for professional growth are further enhanced by our corporation-financed Graduate Education Program. Your degree? It can be a B.S., M.S. or Ph.D. in: **MECHANICAL • AERONAUTICAL • ELECTRICAL • CHEMICAL and NUCLEAR ENGINEERING • PHYSICS • CHEMISTRY • METALLURGY • CERAMICS • MATHEMATICS • ENGINEERING SCIENCE or APPLIED MECHANICS.**

For further information concerning a career with Pratt & Whitney Aircraft, consult your college placement officer—or—write to Mr. William L. Stoner, Engineering Department, Pratt & Whitney Aircraft, East Hartford 8, Connecticut.

SPECIALISTS IN POWER . . . POWER FOR PROPULSION—POWER FOR AUXILIARY SYSTEMS. CURRENT UTILIZATIONS INCLUDE AIRCRAFT, MISSILES, SPACE VEHICLES, MARINE AND INDUSTRIAL APPLICATIONS.

Pratt & Whitney Aircraft

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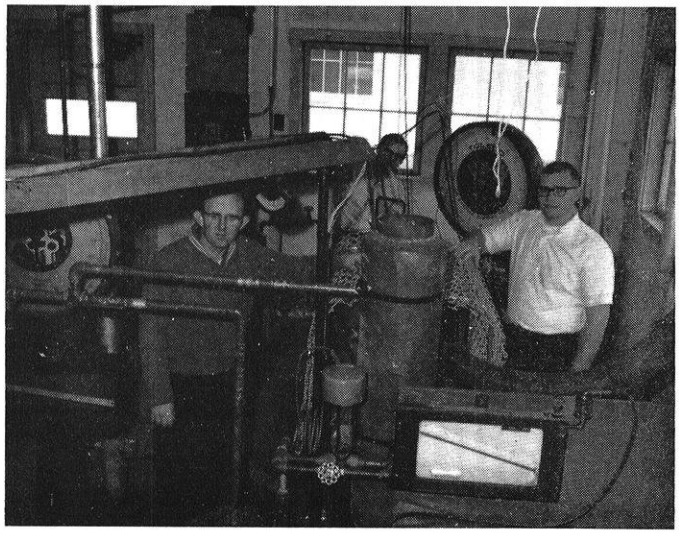
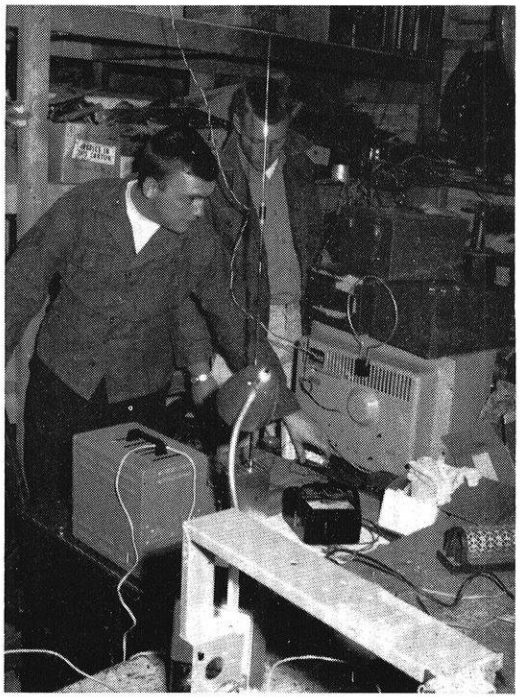
FLORIDA OPERATIONS WEST PALM BEACH, FLORIDA

DIVISION OF UNITED AIRCRAFT CORP.

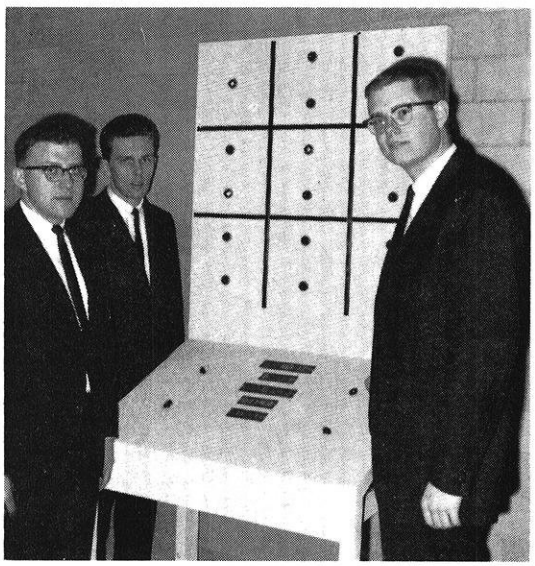
An Equal Opportunity Employer



John Rekster, Lee Morse, and Paul Spink pose with their exhibit, a Falcon engine on a dynomometer.



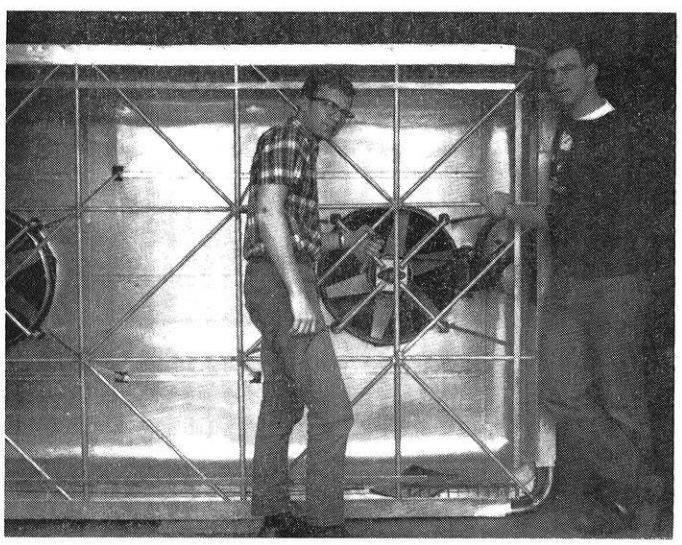
Art Mueller and John Albright of Theta Tau told us they were working on a Robot Car, part of "Delay in the 4th Dimension," S-13.



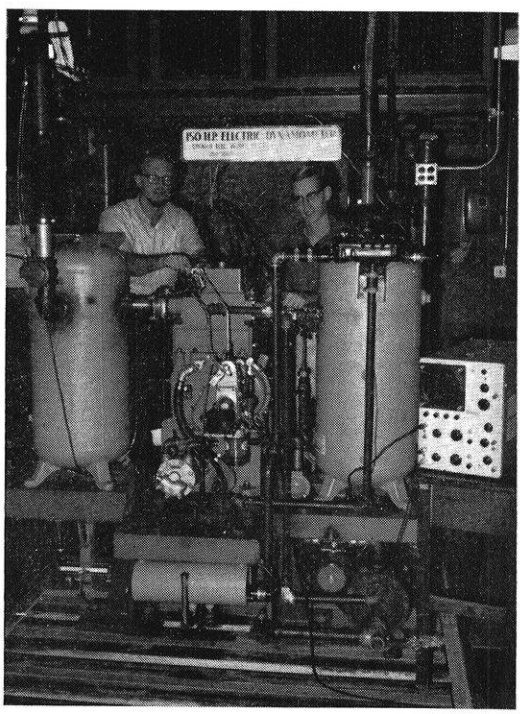
Eta Kappa Nu, a Tic-Tac-Toe machine that can't lose. Jerry Loritz, Bill Mordan, and Ken Bures.

Exhibits in the Making

Staff Photos by Pat Meagher & Bob Smith



Society of Automotive Engineers, Ground Effects Machine. Bill Wartinbee and John Huston.



The effects of Supercharge on a diesel engine will be exhibited by John Shapinski & Ken Cambell.

Student Exhibitors

AGRICULTURAL ENGINEERING

S-1. Forage Gumming Tester
Al Gresch and Jerry Brusewitz
S-2. Automatic Cameral Control Unit
Gary Schoen and Keith Behling
S-3. Scale Model Mechanized Farmstead
Wayne Hankel and Richard Brandt
S-4. New Milk Concentrate
John Rosenau
S-5. Diversification in Agricultural Engineering
American Society of Agricultural Engineers

CHEMICAL AND CIVIL ENGINEERING

S-6. American Institute of Aeronautics & Astronomy
S-7. Phases of Civil Engineering
American Society of Civil Engineers
S-8. Uses of Plastics
American Institute of Chemical Engineers
S-9. The Analog Computer
Max Blanchet and Ronald Sorensen
S-10. Highway Engineering Exhibit
Chi Epsilon Fraternity
S-11. Fiber Optics
Mark Grunze and Don Williams

ELECTRICAL ENGINEERING

S-12. Demonstration of F.M. Stereo Transmission and Reception
Kappa Eta Kappa
S-13. Delay in the 4th Dimension
Theta Tau
S-14. Sound
Triangle
S-15. Electronic Robot
Institute of Electronics and Electrical Engineers
S-16. Communications—from Theory to Practice
Badger Amateur Radio Society
S-17. Automatic Tic-Tac-Toe Player
Eta Kappa Nu Electrical Engineering Honor Society
S-18. SCA Multiplex Demonstration
John P. Byrns
S-19. Demonstration of SG-1 Search Radar
Donald Adamavich and Gary Kjelstad
S-20. Transistorized Ignition Systems
Jack Mercier
S-21. The Electronic Phone Patch-A Directional Amplifier
Carl F. Dudey
S-22. Tool Temperature Analogue Computer
James Jaeschke
S-23. Demonstration of Engineering Computer Lab
Merle, Henry, Kisely
S-24. U. of Wisconsin in Outer Space
Institute of Electronics and Electrical Engineers
S-25. Analog Computing
Institute of Electronics and Electrical Engineers

MECHANICAL ENGINEERING

S-26. Air Effect Machine
American Society of Mechanical Engineers
S-27. Tau Beta Pi
S-28. Making a Magazine
Wisconsin Engineer Magazine Staff
S-29. Low Power Laser
D. Benta and R. Dupuis
S-30. High School Student Orientation
Student Committee of Public Relations for the College of Engineering
S-31. Spacecraft Guidcance by the Stars
Robert Schasse
S-32. Effect of Supercharge on Diesel Engine
John Shipinski and Ken Campbell
S-33. Schlieren System
Frank Janes
S-34. How Does Your Engine Knock?
Artur Quader and David Trumpy
S-35. Testing Dexterity with Sequenching Controls
Robert J. Sandberg
S-36. Principles of Reactor Engineering
American Nuclear Society
S-37. Automatic and Semi-Automatic Thermal Fabrication
Rodney Raether
S-38. Automatic Controlling of Conveyor System
George Ignatjeus, Thomas Brunner, F. Mesner
S-39. Ground Effects Machine
John Huston and Bill Wartinbee
S-40. Demonstration of Auto-Screw Machine
William E. Roper
S-41. Automatic Box Sorter
William E. Roper
S-42. Critical Path
R. James Horton
S-43. Milling Machine with Strobe Light
Schweer, Wilbert, Grunge, Prust, Moise
S-44. Steel Rule Die and Coaster
R. H. Ansari, Desai
S-45. Plastic Molding
Bansal, Tanhankar
S-46. Combustion Flame Propagation
Gary L. Norland and Harold Weber
S-47. Brake Exhibit
Society of Automotive Engineers
S-48. Turret Lathe Demonstration
Richard Devor, William Kempke, Ray Degner, Lynn Stohlgren, Tim Verhaeghe
S-49. Radio Frequency Excited Plasma Tunnel
Warren Hingst, Munthir Aldruby and Tom Moran
S-50. Engine Analyzer
Society of Automotive Engineers
S-51. Radar Demonstration
Society of Automotive Engineers
S-52. Engine Dynamometer
Society of Automotive Engineers
S-53. Effects of Supercharging of a Diesel Engine
Society of Automotive Engineers
S-54. Removable Hardtop
Roger R. Sleger
S-55. Statistical Experimental Design in Photography
Thomas Kofler

MINING AND METALLURGY

S-56. Extractive Metallurgy—Metals Through Chemistry
Daniel E. Nass
S-57. Ore Flotation—Bubbles in Action
Thomas O. Friz
S-58. Explosive Forming
Robert Reesman
S-59. Martensite Transformation in TiNi
Vinod K. Sarin
S-60. Nucleation of Solidification and Results on Castings
R. C. Rauschenberger and J. H. Wildermuth
S-61. Whiskers for Fiber Reinforced Materials
Lee Mallin and Erv Huseby
S-62. Jumping Wire
Thomas Parks Jr. and John Holtan
S-63. Exploration, Evaluation and Design for Mining a Vein-Type Crebody
Peter Behr, Kelly Strebig and Doug Buell
S-64. Model Demonstration of Fluid Flow in a Reservoir
Peter Behr, Kelly Strebig and Doug Buell
S-65. Metallurgy and Mining
Douglas Fay

RESERVE OFFICERS TRAINING CORPS

S-66. NORAD Telephone Display
Department of Aerospace Studies
S-67. Blue Print of the Future
Army Reserve Officers Training Corps

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.

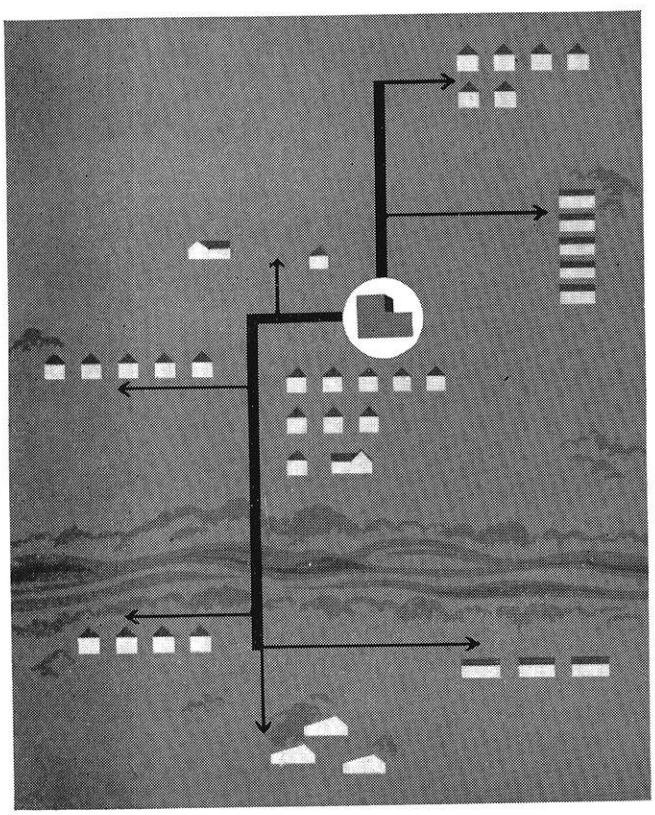
As part of a continuing effort, programs have been designed to analyze communications needs of an area for determining the best plant network layout and switching office location.

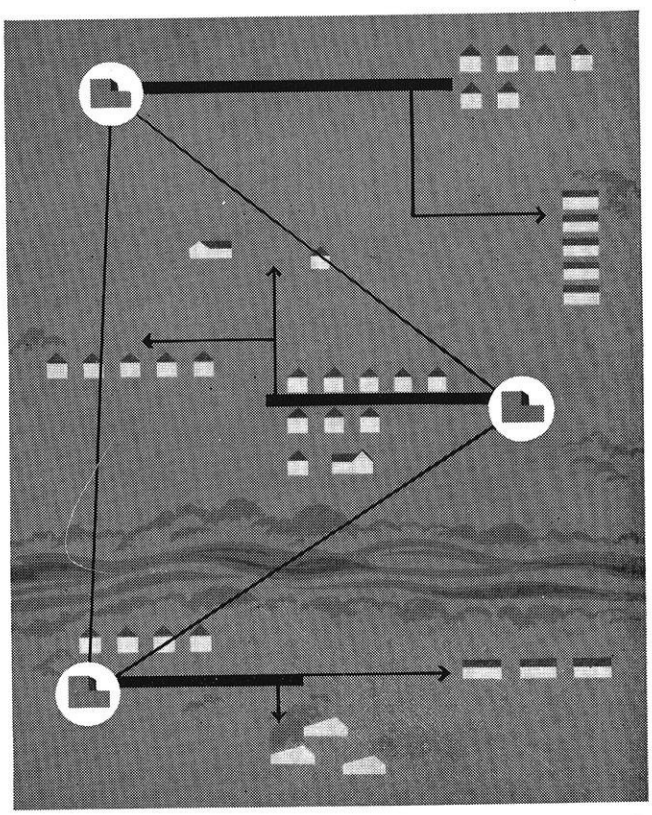
In general, the necessary data are collected and the engineer selects a number of alternative plans to be analyzed in detail by a computer. His final decision is based primarily on an analysis of the computer output.

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?**

■ Young engineers find challenging opportunities at Allison where "Energy Conversion Is Our Business."

For instance, here's Warren Neil Holcomb who came to Allison following his graduation from Purdue University last year with a BS Degree in Mechanical Engineering.

He first entered Allison's Accelerated Experience Program . . . a program designed to help the young engineer gain on-the-job experience in the shortest possible time. Holcomb's eight-month work tour included assignments in: Stress Analysis, Experimental Test Operations, Production Engineering, Aerothermo Design, Product Design, Field Service, Product Reliability and Materials Laboratories.

Upon completion of the program, Holcomb started with the new T78 Regenerative Turboprop Engine Mechanical Design Group. He is currently assisting in design and development of the gear section.

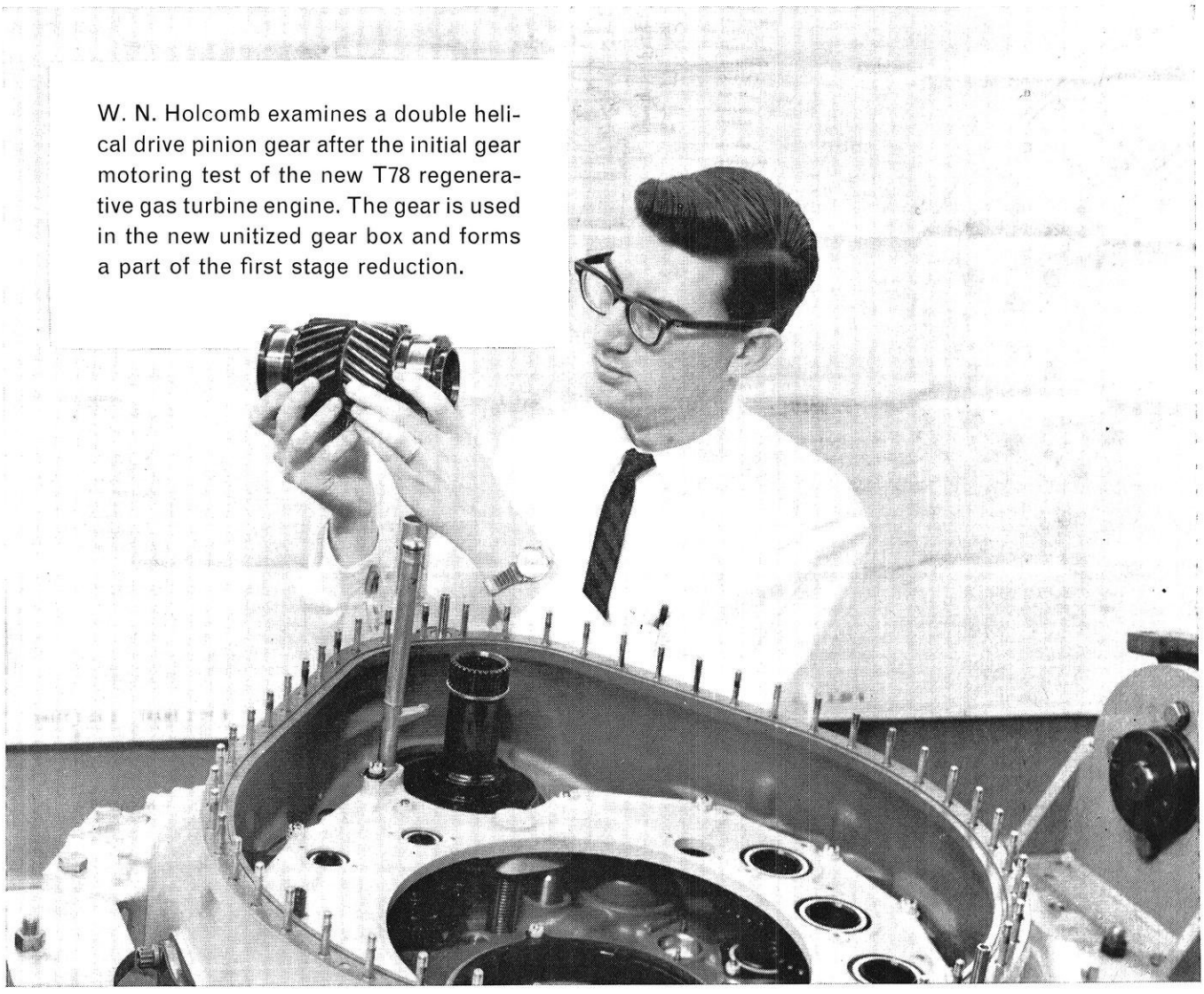
The T78 engine represents another major step forward for Allison in the design of aircraft engines. It's a versatile engine that will not only improve capability of current aircraft, but also serve as the power plant for a whole new generation of future aircraft.

Perhaps you, too, will like the creative climate at Allison. Why not see our representative when he visits your campus. Or, write for a copy of our brochure which tells how the young engineer can rapidly advance his professional career at Allison. Write to: Allison Division, General Motors Corporation, Indianapolis, Indiana 46206, Att.: Professional and Scientific Placement.

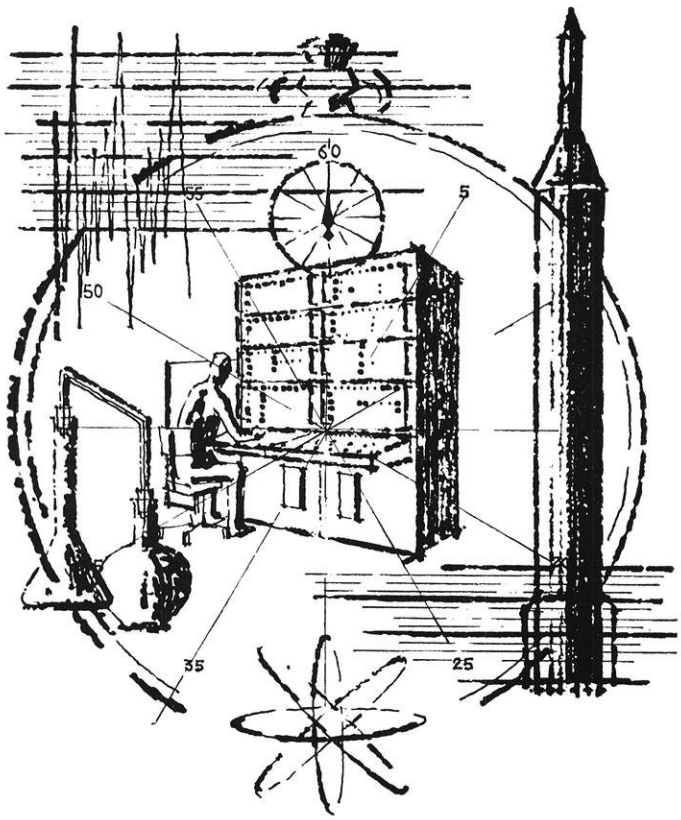
50 YEARS OF 1915 50 1965 ENERGY CONVERSION

An equal opportunity employer

Allison GM
THE ENERGY CONVERSION DIVISION OF GENERAL MOTORS, INDIANAPOLIS, INDIANA
General Motors



W. N. Holcomb examines a double helical drive pinion gear after the initial gear motoring test of the new T78 regenerative gas turbine engine. The gear is used in the new unitized gear box and forms a part of the first stage reduction.



SCIENCE HIGHLIGHTS

By HAROLD WEBER, me4

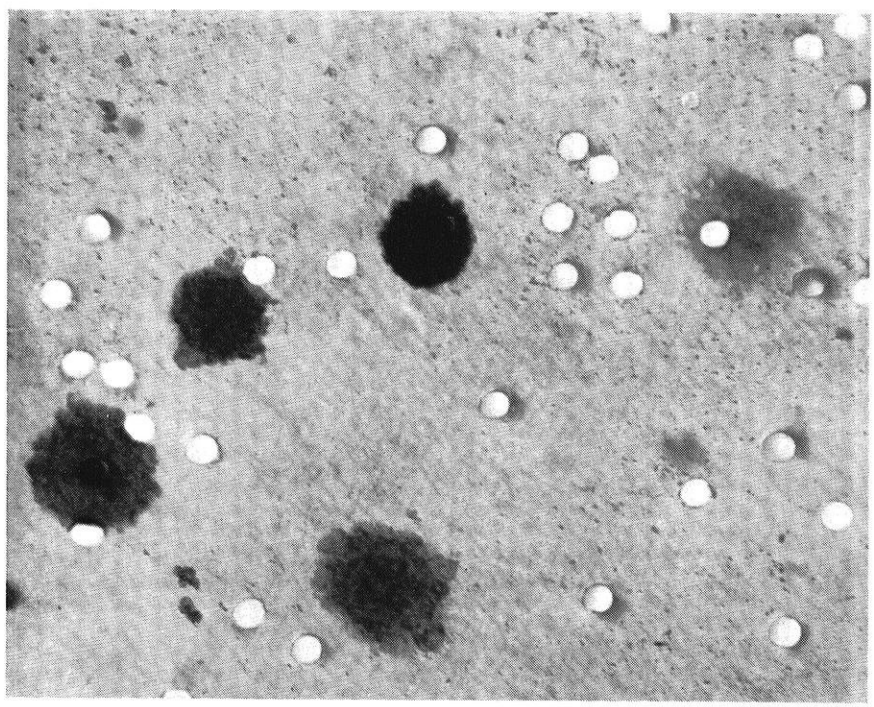
CELL FILTER

A thin sheet of plastic containing superfine holes bored by atomic particles holds promise as an important new medical research tool. It may also prove useful in the early detection of some forms of cancer.

Research on fission fragment "tracks" in solid materials by a team of scientists at General Electric's Research Laboratory led to the discovery that holes made by atomic particles passing through some materials could be etched out to form uniformsized tubes by dipping the material in a suitable reagent. In a thin plastic film, less than one thousandth of an inch thick, bombardment by fission fragments creates irregular holes a few atoms in diameter. Chemical etching converts the ragged holes into tubes of uniform size and roundness. Tube diameters ranging from one micron or less up to about ten microns have been achieved. The number of holes can be increased simply by longer irradiation.

Tests of the new filter have been conducted by the Memorial Sloan–Kettering Cancer Center in New York City. Cancer cells were successfully filtered from blood samples from more than 100 cancer patients. Experiments with the filter are continuing at the Center.

Because the new filter, which General Electric has named "Nuclepore," has cylindrical holes of uniform diameter, the holes do not clog easily. Delicate particles, such as cells, can be non-destructively filtered by gravity, rather than by applied pressure. Since the filter is transparent and chemically resistant, cells can be stained for study right on its surface, thus reducing the danger of accidental damage to the cells.



Atomic particles passing through a thin sheet of plastic make a filter fine enough to filter cancer cells from blood.

NEW CROSS SECTION FOR TIRES

A new tire designed to give better handling, improved high-speed performance, longer tread life and less power consumption than previous tires in the same price range has been announced by B. F. Goodrich Tire Company.

It is designed for the new 1965 automobiles and comes as original equipment on many new cars, according to C. H. Caldwell, BFG's manager of passenger tire sales. The new tire is available at B. F. Goodrich outlets in a complete range of sizes for replacement on all passenger cars, Caldwell said.

The new tire has a wider cross-section and lower section height than previous tires that were original equipment on new cars. It has a rounded tread shoulder which enables it to roll over highway seams and other road irregularities without the "trolley track effect" characteristic of other tires, Caldwell said.

The wide track gives the tire a 4 to 5 per cent lower profile than previous original equipment tires. This, along with a reduced angle of the cords, makes for better stability, better steering response, and better high-speed performance. The rounded tread shoulder permits the use of a more stable cord body without penalizing ride as a compared to former tires, according to Caldwell.

This improvement in steering and handling can be felt by the driver as soon as he takes the wheel.

Dynamometer tests, which measure a tire's performance on a spinning roadwheel, show that the new tire rolls 3 per cent easier than previous tires.

"This saving in power amounts to more than one horsepower on a large automobile at 65 to 70 miles an hour."

"This is a tire that fills the bill for all types of drivers. It exceeds the rigorous test requirements of car manufacturers for new automobiles," Caldwell said.

WESTINGHOUSE FUEL CELLS POWER TV SET DIRECTLY FROM COAL

At the Westinghouse Research Laboratories a standard television set is operating directly from a handful of powdered coal. Westinghouse research engineers are using the experiment to demonstrate an experimental 100-watt fuel cell system which converts gases from the coal directly into electricity.

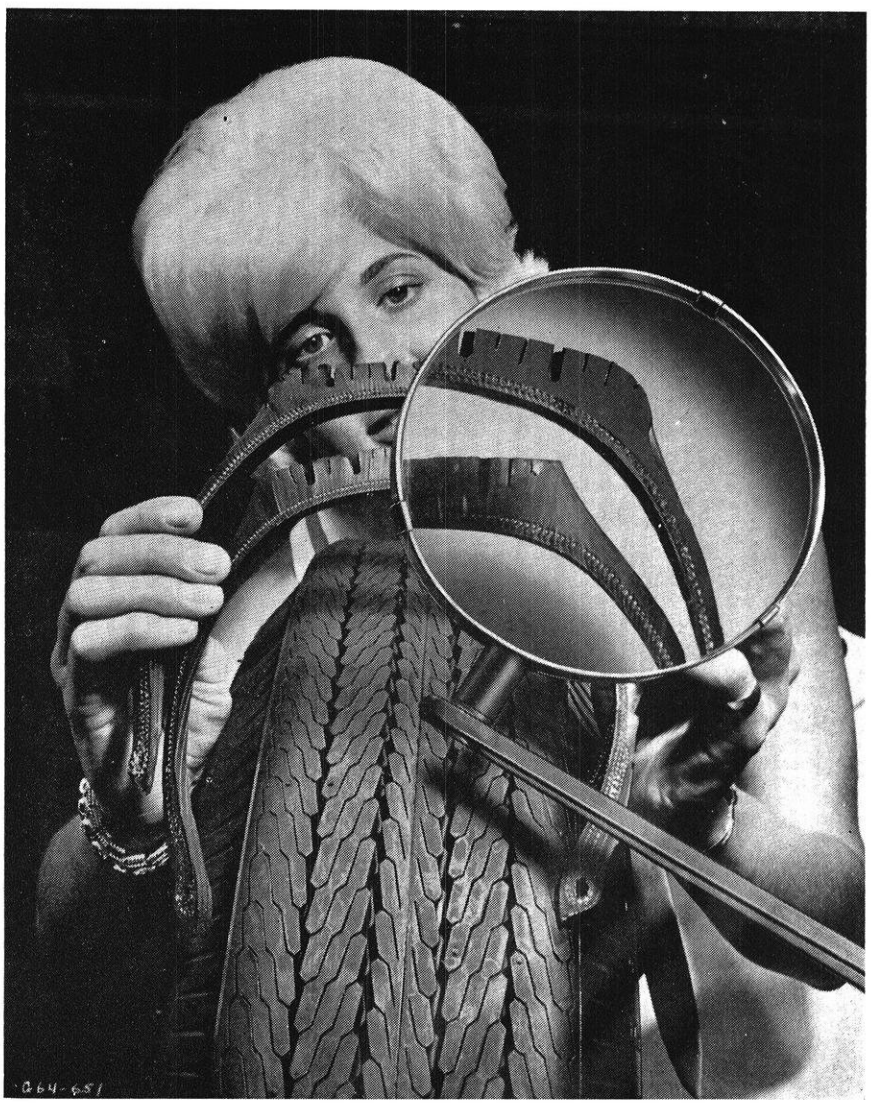
The system was developed under a research contract with the Office of Coal Research, U.S. Department of the Interior. The contract is aimed at the eventual development of a practical, large-scale coal-burning fuel cell system for electric power generation. Such large-scale fuel cell power plants will, however, not develop until large plants for generation of d-c power have been built. Electrolytic industries will probably be the first commercial users of such cell systems.

A group of engineers headed by David H. Archer, manager of the Laboratories' fuel cell development section, designed and constructed the experimental unit announced today.

The experimental system consists of a fuel cell battery having 400 thimble-size fuel cells, plus a chemical reactor for producing volatile gases from the coal fed into it. Both the reactor and battery operate at high temperature—1800 degrees Fahrenheit.

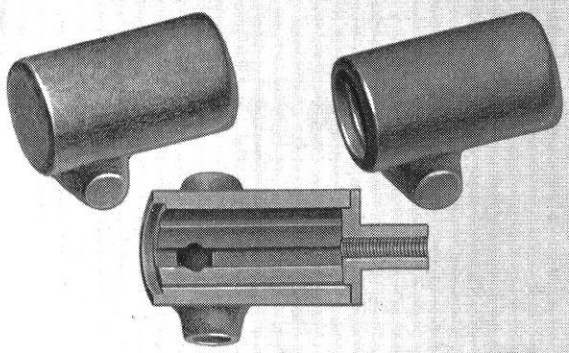
Such high-temperature operation is considered to be the most promising approach to a fuel cell system capable of burning natural carbonaceous fuels—such as coal, oil, wood and natural gas—with ordinary air.

(Continued on page 30)



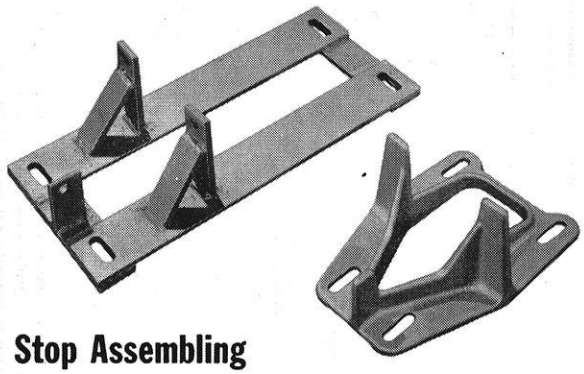
This new B. F. Goodrich Tire gives better handling, more stability, and rolls 3 percent easier than previous tires.

Eliminate Waste with Malleable Castings



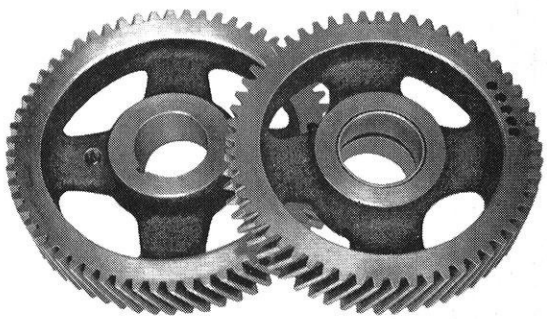
Stop Wasting Metal

Why pay for 2.8 pounds of metal . . . then machine out and scrap 1.2 pounds? Changing this snap coupler to a Malleable iron casting with a cored center reduced initial cost 31 cents and cut the first interior machining operation by 72 per cent (subsequent operations were up to 25 per cent less expensive, too). Through expert use of cores in parts that require interior design details, your Malleable foundry puts metal only where it is useful.



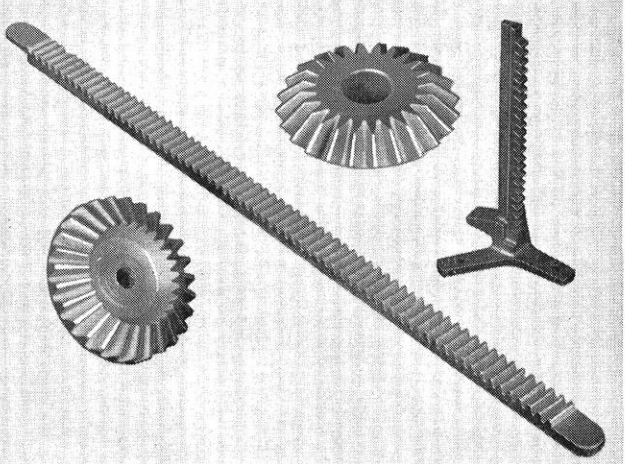
Stop Assembling

Making a bracket out of steel plate is very simple . . . until it's time to weld nine individual pieces into a finished product with the necessary dimensional accuracy. It's slow and costly. Redesigned and made as a single Malleable casting, this motor mount for an industrial overhead door opener has the required accuracy, strength and better appearance . . . and cuts costs 23%.



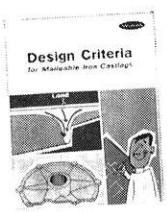
Stop Needless Hardening

Pearlitic Malleable provides both excellent wear resistance and bearing properties. These camshaft and idler gears wear as well without hardening as other hardened ferrous metals previously used for these parts, but tool life and machining time are greatly improved. If still harder surfaces are needed, pearlitic Malleable takes either flame or induction hardening exceptionally well.



Stop Unnecessary Machining

Malleable producers cast parts so close to finished shape that very often little or no machining is required. These Malleable iron gears, for example, are used without any machining on the teeth.



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

Ford Motor Company is:

challenge

Dale Anderson
B.A., Wittenberg University

At many companies the opportunity to work on challenging projects comes after many years of apprenticeship and a few grey hairs. Not so at Ford Motor Company where your twenties can be a stimulating period. There are opportunities to prove your worth early in your career. Dale Anderson's experience is a case in point.

After receiving his B.A. in Physics in June, 1962, Dale joined our College Graduate Program and was assigned to our Research Laboratories. Recently he was given the responsibility for correcting cab vibration occurring on a particular type of truck. His studies showed that tire eccentricity was the cause of the trouble. Since little change could be effected in tire compliance, his solution lay in redesigning the suspension system. Tests of this experimental system show the problem to be reduced to an insignificant level.

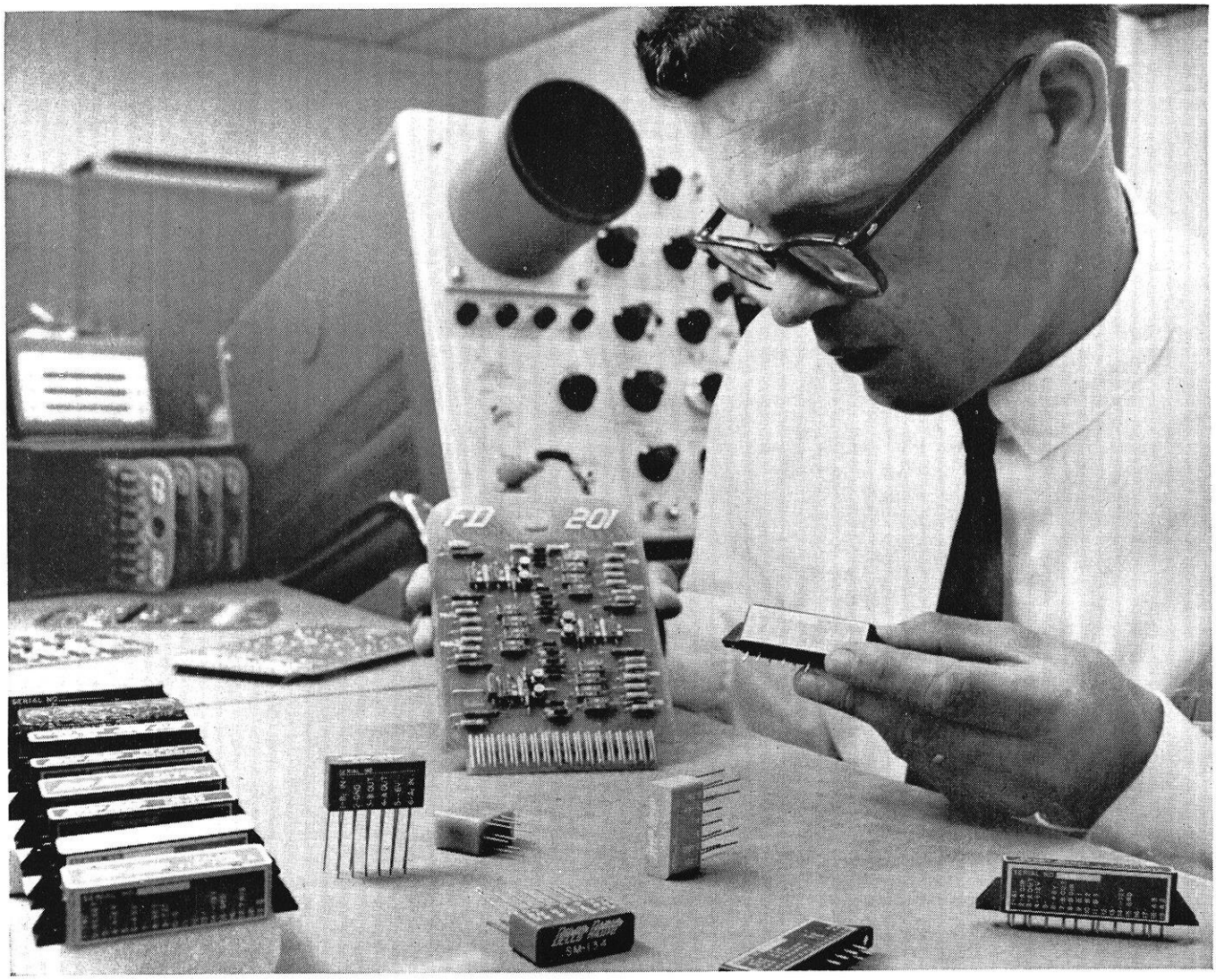
That's typical of the kind of meaningful assignments given to employes while still in the College Graduate Program—regardless of their career interest. No "make work" superficial jobs. And, besides offering the opportunity to work on important problems demanding fresh solutions, we offer good salaries, a highly professional atmosphere and the proximity to leading universities.

Discover the rewarding opportunity Ford Motor Company may have for you. How? Simply schedule an interview with our representative when he visits your campus. Let your twenties be a challenging and rewarding time.

THERE'S A FUTURE FOR YOU WITH... Ford MOTOR COMPANY

The American Road, Dearborn, Michigan

An equal opportunity employer



FROM CAMPUS TO CAREER WITH DELCO RADIO

Dewey Nelson came to Delco Radio Division of General Motors in 1958 with a BSEE from Iowa State University. Today, as a project engineer at Delco, Dewey helps design the building blocks for digital control systems—such as the logic cards and modules pictured above. He also assists in designing complete digital systems using these parts.

Like other talented young engineers at Delco, Dewey can enjoy the prospects of a longtime, satisfying career with this stable electronics division of General Motors. He can look forward to a happy future for his family in the friendly, growing environment of Kokomo, Indiana where schooling is tops . . . desirable new homes and apartments plentiful . . . cultural and recreational attractions nearly endless. And both Purdue and Indiana Universities offer undergraduate and graduate work locally.

As a young graduate engineer you, too, might soon be on your way to a challenging and rewarding career with Delco Radio. You'll find abundant opportunities in such areas as silicon and germanium device development, ferrites, solid state diffusion, creative packaging of semiconductor products, development of laboratory equipment, reliability techniques, and applications and manufacturing engineering.

Our brochure detailing the opportunities to share in forging the future of electronics with this outstanding Delco-GM team is yours for the asking. Watch for Delco Radio interview dates on your campus, or write to Mr. C. D. Longshore, Dept. CR, Delco Radio Division, General Motors Corporation, Kokomo, Indiana

An equal opportunity employer

solid state electronics

DELCO RADIO DIVISION
OF GENERAL MOTORS
Kokomo, Indiana

YOU CAN SHARE IN A GROWTH LIKE THIS

Whose growth? Fisher Governor Company, manufacturer of automatic controls for any and all fluids, gases or air that flow through pipe. We are the leader in our growing industry. Our sales have shown a relatively steady rise during the past decade (from 18-million to 41.5-million—a 130% increase in just ten years). See chart above. Our products—control valves, pressure regulators, liquid level controls and instruments—are key elements in industrial automation.

Location: Fisher is basically an "Engineering" company with 1,500 employees located in a pleasant Iowa community of 22,000. It's less than 10 minutes to the modern Fisher plant and engineering facilities from any home in Marshalltown. The community has an outstanding cultural and educational environment.

Type of work: Fisher offers a rewarding challenge to the graduate engineer (BS and MS) who is interested in design and development, research and test, sales or manufacturing.

Advancement: Coupled with Fisher's policy to promote from within, advancement opportunities reflect a growing company within a growing industry.

If a growing company like ours appeals to you, consult your placement office or write directly to Mr. John Mullen, Employee Relations Manager, FISHER GOVERNOR COMPANY, Marshalltown, Iowa.

An Equal Opportunity Employer

If it flows through pipe, chances are it's controlled by

FISHER® Controls SINCE 1880

Science Highlights

(Continued from page 25)

FILL 'ER UP!

The world's busiest filling station is probably Kennedy International Airport in New York. About a million gallons of aircraft fuel are consumed daily by the giant airliners that stop at the airport. Soon this giant filling station will be automated.

Present fuel handling methods are becoming outmoded, so the Port of New York Authority, which operates Kennedy, has contracted for a completely new fuel distribution system. The entire intelligence system will control the flow of aircraft fuel from huge bulk storage tanks through an underground piping to secondary holding tanks which each airline will tap to fuel its planes.

A 50-mile underground network of transfer pipes, suction lines and ramp hydrants will distribute fuel to each passenger terminal. Most of the conventional tank trucks will be eliminated and vehicular traffic on aircraft ramps will be reduced. A 40-tank secondary storage area with a capacity of 17,320,000 gallons of fuel will be located nearer the passenger terminals and some two miles away from the present bulk tanks.

The computer will scan the secondary tanks and transmit supply and demand instructions to the bulk areas. The data received at the bulk area will be electronically monitored and supply lines will automatically open to allow the proper grade of fuel to flow between the two areas.

DETECTORS FOR TOXIC GASES

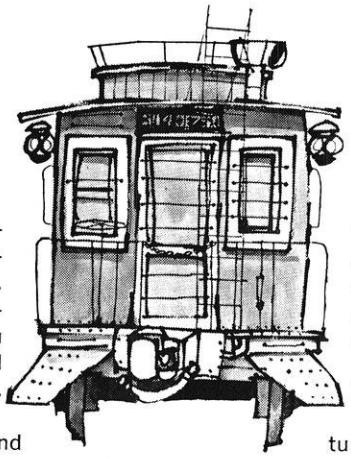
Many potentially deadly gases and dust particles, a number of which are used extensively in NASA and Air Force rocket propulsion research, can now be safely monitored by two new instruments developed for the Air Force by IIT (Illinois Institute of Technology) Research Institute. Both monitors were developed by Dr. Robert S. Branman, IITRI research chemist.

According to Dr. Branman the first of these devices was designed to detect poisonous boron compounds but can be adapted to detect minute quantities of other toxic or flammable gases including chlorinated hydrocarbons, nitrogen dioxide, and petroleum fuels. This monitor will sense immediately a toxic level for pentaborane which, in an eight hour period, is lethal at concentrations of ten parts per billion parts of air.

The principle on which the device operates is simple. The monitor pumps air through a gas pilot light which has a colorless flame until a contaminant passes through it. When a contaminant is present the flame has a characteristic color, in the case of pentaborane a faint green. A photomultiplier measures the intensity of the color and transmits this information to a meter display. When the intensity of the color indicates a hazardous concentration of toxic gas the monitor activites an alarm system.

END

OUR ENGINEERS NEVER RIDE THE CABOOSE



Sometimes an engineer can get so sidetracked in the course of a project that he forgets where it was going in the first place. This is calamitous. The engineer loses interest, and the wheels start to slow down in a dozen different places. ☐ Hamilton Standard follows the project management concept, which enables the engineer to keep sight of the entire program, providing the "what and when" direction, establishing and maintaining responsibility for the "how" and excellence of work required to accomplish the programs. Specifically, the engineer will have the opportunity to participate in and pursue a program from the beginning to final production, including phases of ☐1) Precontract — prepare R&D proposals, defining the tasks, technical as well as costs and schedules. 2) Planning — developing complete detailed plans covering each element of the contract. 3) Design & Analysis — creating the hardware ideas — applying the state-of-the-art, and assuming responsibility for the basic structure of the final product. 4) Development & Qualification — preparing development and qualification test programs to determine and demonstrate product performance, conducting these tests, evaluating results, solving the problem areas to assure complete product development and technical integrity, serve as technical consultant to manufacturing and maintain customer coordination, analyzing in-service or field product performance. ☐ Some of the present projects involve *space and life support systems, environmental conditioning systems, v/stol propulsion systems, micro-electronics, ground support equipment, turbine and rocket engine controls, industrial valves, electron beam machines, air induction and special controls.* ☐ Hamilton engineers are encouraged to broaden their personal capabilities by taking advantage of in-plant technical courses lectures and seminars. Enrollment in useful short courses at various colleges and universities is also authorized. Engineers may also qualify for the company's rotational program. This provides opportunities for assignments in several departments to broaden the individual's knowledge of the company's scope of operations. ☐ In summary: an engineer's future with Hamilton Standard is limited only by his ability and desire to make a contribution to the team effort — and his capacity to shoulder responsibility. He's got a wide-open track to personal progress. ☐ *We invite you to climb aboard for an immediate interview and to submit a resume of your qualifications to this equal opportunity employer — write to Mr. Timothy K. Bye, Supervisor of College Relations, Windsor Locks, Conn., or see your Placement Office for an appointment with our representative when he visits your campus.*

Hamilton Standard DIVISION OF **United Aircraft**

Not long ago, one of our city-bred engineering graduates was making a trip through the country. As he passed a fertile field he spied an unusual sight—a farmer helping a calving, and he stopped his car to watch the spectacle. He could tell that the farmer was having an awful time assisting the cow.

Presently he got out of the car, approached the farmer and said, "Want some help?" And so sweating and straining, he assisted the farmer at the difficult task. Then at last, the calf was born.

Gratefully, the farmer accompanied the engineer to his automobile to see him off. But hesitating, as he wiped the sweat from his brow, the engineer looked up and said, "Say, mister, just how fast was the calf going, when it hit the cow?"

* * *

A lobbyist who was opposing a large appropriation for a state college approached a legislator who boasted of his self-education.

"Do you realize," asked the party lobbyist gravely, "that up at the university men and women students have to use the same curriculum?"

The legislator looked startled.

"And that men and women often matriculate together?"

"No!"

The lobbyist came closer and whispered, "and a young lady student can be forced to show a male professor her thesis?"

"I won't vote 'em a single cent!" exclaimed the legislator.

* * *

We point with pride to the purity of the white space between our jokes.

* * *

What's the definition of a virgin?
An ugly 3 year old.

* * *

A wolf lounging in a hotel lobby perked up when an attractive lady passed by. When his standard "Good evening, Dear" brought nothing more than a frigid glance, he sarcastically interjected:

"Pardon me, I thought you were my mother."

"I couldn't be," she replied icily, "I'm married."

* * *

The meek little bank clerk had his suspicions. One day he left work early and, sure enough, at home he found a strange hat and umbrella in the hallway and his wife was on the couch in the living room in the arms of another man. Wild for revenge, the husband picked up the man's umbrella and snapped it in two across his knee.

"There!" he exclaimed. "Now I hope it rains!"

* * *

Then there was the janitor who worked in the girls' dorm and was entrusted with a pass-key to every room in the building. The following week the dean ran across him and asked, "Why didn't you come around Friday for your pay, John?"

"What! Do I get wages, too?"

"PRINTABLES"

By D. E. ROSNEC

Life is one thing after another. Love is two things after each other.

* * *

Two of Uncle Sam's sailors, retiring from the sea, purchased a small saloon in a country town. They immediately closed the place up and began painting it inside and out.

The villagers, after a few days, gathered outside the place and one of them knocked at the door. A window opened, and one of the former sailors inquired the reason for the gathering outside.

"We want to know when you are going to open up," was the reply.

"Open up?" retorted the man at the window. "We bought this place for ourselves."

Little Girl: "Mother are there skyscrapers in heaven?"

Mother: "No dear, it takes engineers to build skyscrapers."

* * *

Senior (at a basketball game): "See that big substitute down there playing forward? I think he's going to be our best man next year."

Coed: "Oh, darling, this is so sudden."

* * *

Rush Chairman: "Our fraternity maintains four homes for the feeble minded."

"Rushee: "I thought you had more chapters than that."

Getting a joke column is rough. If it's funny enough to tell, it's been told; if it hasn't been told it's too clean; and if it's dirty enough to interest an engineer, the editor gets fired.

* * *

A kiss is a mouth full of nothing that tastes like heaven and sounds like a cow pulling her foot out of the mud.

* * *

A boy and a girl were out driving. They came to a quiet spot on the country lane and the car stopped. "Out of gas," said the boy. The girl, carefully opened her purse and rolled out a bottle. "Wow!" exclaimed the boy, "You've got a whole pint—what kind is it?"

"Gasoline," replied the girl.

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.

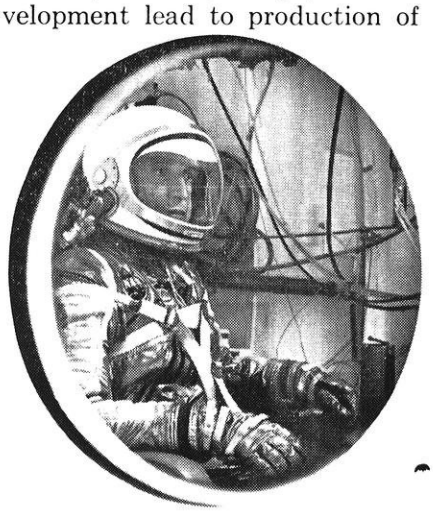
You will never be satisfied with run-of-the-mill assignments. You demand exciting, challenging projects.

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

Uncertain about these career decisions?

a. Join a large company? ( ) or medium? ( ) or small company? ( )

b. Prefer to work in systems analysis and techniques? ( ) or on equipment design? ( ) or multi-unit large systems? ( )

c. Aim to be a Technical Specialist? ( ) or Administrative Manager? ( ) or Program/Project Manager? ( )

d. Have an advanced degree in your sights? ( ) or feel BS is sufficient for satisfying career growth? ( )

Don't worry!

For those graduates who are uncertain regarding their career plans, we welcome the opportunity to discuss the wide variety of interesting and challenging assignments available with Sylvania Electronic Systems. SES is equipped to foster the professional growth of graduates with widely differing goals. This is possible primarily because SES is actually a highly diversified complex which encompasses 19 R&D laboratories, 4 manufacturing plants and a world-wide field engineering operation. The Division's mission is to manage government systems programs for General Telephone & Electronics, the parent corporation.

The small group form of organization — a traditional small company advantage — is practiced at SES to encourage individual progress and development. SES offers its personnel absorbing assignments to perform, yet also affords a bird's-eye view of the total picture in advanced electronics.

A wide variety of current in-house projects enables you to move right into the heart of today's most advanced developments in electronic systems. You may start here in a technical or administrative capacity in any one of these broad areas: **space/earth communications · electronic reconnaissance · detection · countermeasures · information handling · arms disarmament and control · sophisticated electronic networks such as the ground electronics system supporting Minuteman command and control functions.**

Finally, opportunities are numerous for ambitious individuals to accelerate their advancement through participation in division-wide conferences, in-plant courses and seminars, and post graduate study plans conducted on an unusually generous scale.

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Total Communications from a single source through

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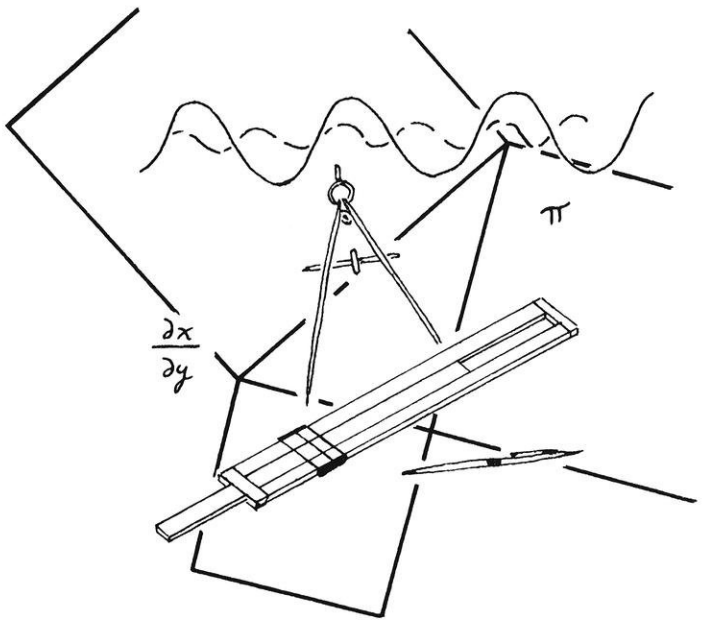
THE

MENTAL MAZE

By CLIFTON FONSTAD, JR. ee4



MARCH is always a Big month for engineers. After all, St. Pat was an engineer, an electrical engineer at that, and the whole country celebrates the fact each year. We trust you make a big day of it, too.

And now, in honor of St. Pat (and the Engineering Exposition) let's cut the chatter short and turn to our first puzzle—the first bend in this month's Mental Maze.

1. Try this quicky to loosen you up. Twice a fraction plus half that fraction times that fraction equals that fraction. What is the fraction?

2. That was easy so why stop now—try another one. A professor is the same age as his wife with the digits reversed. One eleventh of the sum of their ages equals the difference in their ages. How old are they? The man is older.

3. Three engineering students, a E.E., and M.E., and a Ch.E. dropped by the Wisconsin Engineer office the other day with a puzzle they had come up with. It seems that they started out at their house walking in step and heading for the new Engineering building. When they reached the building they were again in step—for the third time. The E.E. had a stride of 30 inches; the M.E. took steps of 24 inches; and the Ch.E., who had dropped his slide rule on his foot and had it in a cast, made only 14 inches with each step.

How far from the engineering building do the students live?

4. It is possible to divide the nine digits into two groups so that one will divide into the other an integral number of times. For example, to get seven:

$$\frac{16758}{2394} = 7$$

or two:

$$\frac{13458}{6729} = 2$$

There are four different ways of forming a fraction of the nine digits to get five. Can you find any or all of them?

5. So far this month has been a good one for numbers. This next puzzle won't be any different and it concerns Tioga Tech.

The campus police on the Tioga Tech campus are an active bunch. Five policemen can write 5 tickets in 5 minutes. The entire force can write 100 tickets in an hour and forty minutes. How many men are there on the Tioga Tech campus police force?

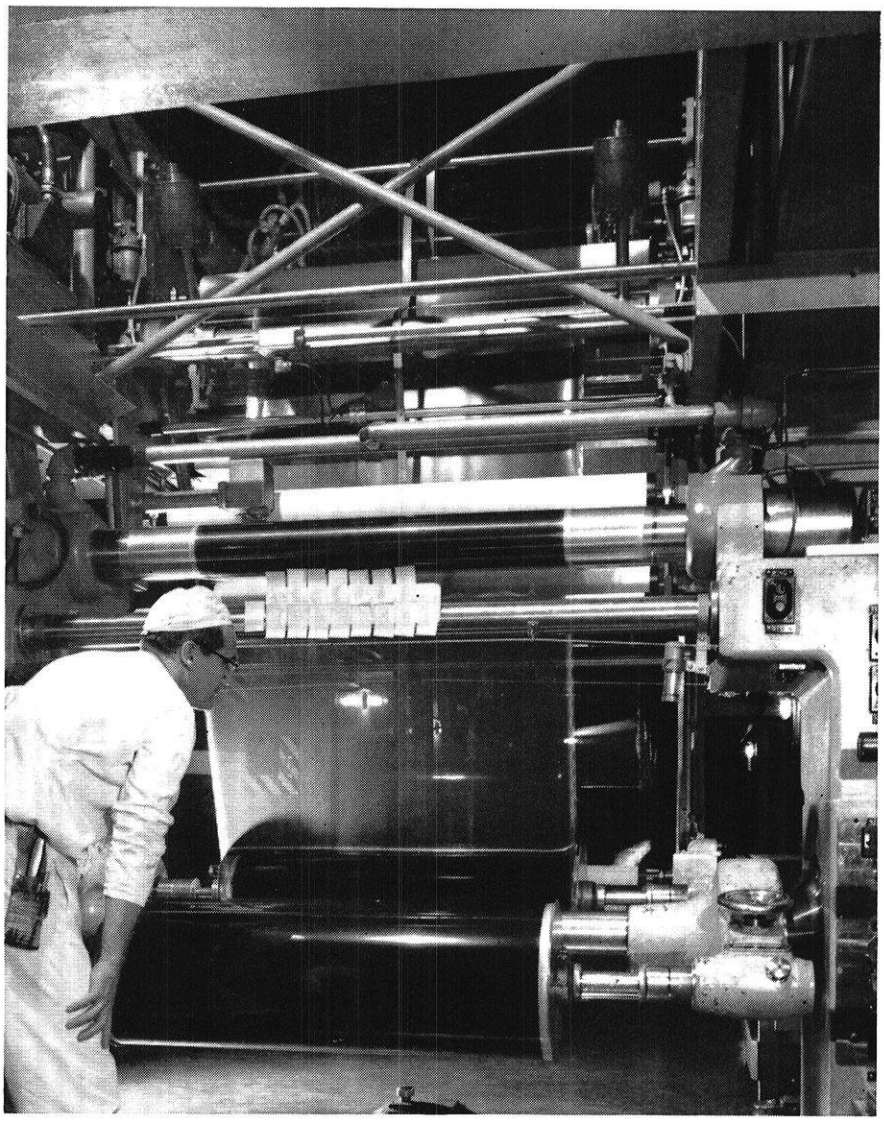
6. And now, one final quicky. It takes 1,140 pieces of type to number the pages of a book (each piece of type is used only once). How many pages are there in the book?

ANSWERS: The answers to last month's Mental Maze are:

1. 4.
2. "next n integers."
3. 52/2703.
4. 24 MPH.
5. 6/7 hour.
6. 70 or 250 yards.

Keep those answers coming in. Remember the first set of correct answers sent to the Mental Maze, Wisconsin Engineer, 333 Mechanical Engineering, University of Wisconsin, Madison, Wisconsin, wins five dollars and the monthly Maze Master.

Design a better one and call it chemical engineering



We understand as well as the next company the difference between, let us say, a chemical equipment design engineer and an electro-mechanical development engineer. To turn out the volume we intend of such a fantastically demanding cross-product of chemical and mechanical engineering as a KODAPAK Cartridge of KODACHROME-X Film, we have to interest fresh graduates answering to both these job descriptions and many, many others.

In talking to shoppers from the campus, we find it wise to be very specific about job descriptions. We would create the wrong impression at the interview by referring to the job available as "professional engineer."

The young man is winding up four or five years of building himself into a good all-around engineer. Now comes the time to get specific. He is smart enough to know that the demand by strong organizations for all-around engineers under 25 can be expected to remain slack. He is right. The projects awaiting engineers are terribly specific. But if he has picked the right employer, he will find that with each project brought off well the walls between the compartments of engineering get a little softer.

By the time he discovers he has been transformed into that vague "professional engineer," he is having too much fun fighting our competitors by the boldness of his concepts to care what specialty he promised to devote his career to.

On the chance that we might be the right employer, drop us a line.

EASTMAN KODAK COMPANY,

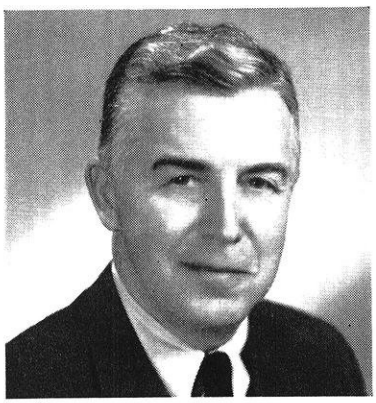
Business and Technical Personnel Department, Rochester, N.Y. 14650

An equal-opportunity employer offering a choice of three communities:
Rochester, N.Y., Kingsport, Tenn., and Longview, Tex.

Kodak

Should You Work for a Big Company?

An interview with General Electric's S. W. Corbin, Vice President and General Manager, Industrial Sales Division.



S. W. CORBIN

■ Wells Corbin heads what is probably the world's largest industrial sales organization, employing more than 8000 persons and selling hundreds of thousands of diverse products. He joined General Electric in 1930 as a student engineer after graduation from Union College with a BSEE. After moving through several assignments in industrial engineering and sales management, he assumed his present position in 1960. He was elected a General Electric vice president in 1963.

Q. **Mr. Corbin, why should I work for a big company? Are there some special advantages?**

A. Just for a minute, consider what the scope of product mix often found in a big company means to you. A broad range of products and services gives you a variety of starting places now. It widens tremendously your opportunity for growth. Engineers and scientists at General Electric research, design, manufacture and sell thousands of products from microminiature electronic components and computer-controlled steel-mill systems for industry; to the world's largest turbine-generators for utilities; to radios, TV sets and appliances for consumers; to satellites and other complex systems for aerospace and defense.

Q. **How about attaining positions of responsibility?**

A. How much responsibility do you want? If you'd like to contribute to the design of tomorrow's atomic reactors—or work on the installation of complex industrial systems—or take part in supervising the manufacture of exotic machine-tool controls—or design new hardware or software for G-E computers—or direct a million dollars in annual sales through distributors—you can do it, in a big company like General Electric, if you show you have the ability. There's no limit to responsibility . . . except your own talent and desire.

Q. **Can big companies offer advantages in training and career development programs?**

A. Yes. We employ large numbers of people each year so we can often set up specialized training programs that are hard to duplicate elsewhere. Our Technical Marketing Program, for example, has specialized assignments both for initial training and career development that vary depending on whether you want a future in sales, application engineering or installation and service engineering. In the Manufacturing Program, assignments are given in manufacturing engineering, factory supervision, quality control, materials management or plant engineering. Other specialized programs exist, like the Product Engineering Program for you prospective creative design engineers, and the highly selective Research Training Program.

Q. **Doesn't that mean there will be more competition for the top jobs?**

A. You'll always find competition for a good job, no matter where you go! But in a company like G.E. where there are 150 product operations, with broad research and sales organizations to back them up, you'll have less chance for your ambition to be stalemated. Why? Simply because there are more top jobs to compete for.

Q. **How can a big company help me fight technological obsolescence?**

A. Wherever you are in General Electric, you'll be helping create a rapid pace of product development to serve highly competitive markets. As a member of the G-E team, you'll be on the leading edge of the wave of advancement—by adapting new research findings to product designs, by keeping your customers informed of new product developments that can improve or even revolutionize their operations, and by developing new machines, processes and methods to manufacture these new products. And there will be classwork too. There's too much to be done to let you get out of date!

FOR MORE INFORMATION on careers for engineers and scientists at General Electric, write Personalized Career Planning, General Electric, Section 699-12, Schenectady, N. Y. 12305

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