

TECHNOLOGY

REVIEW

May 1957



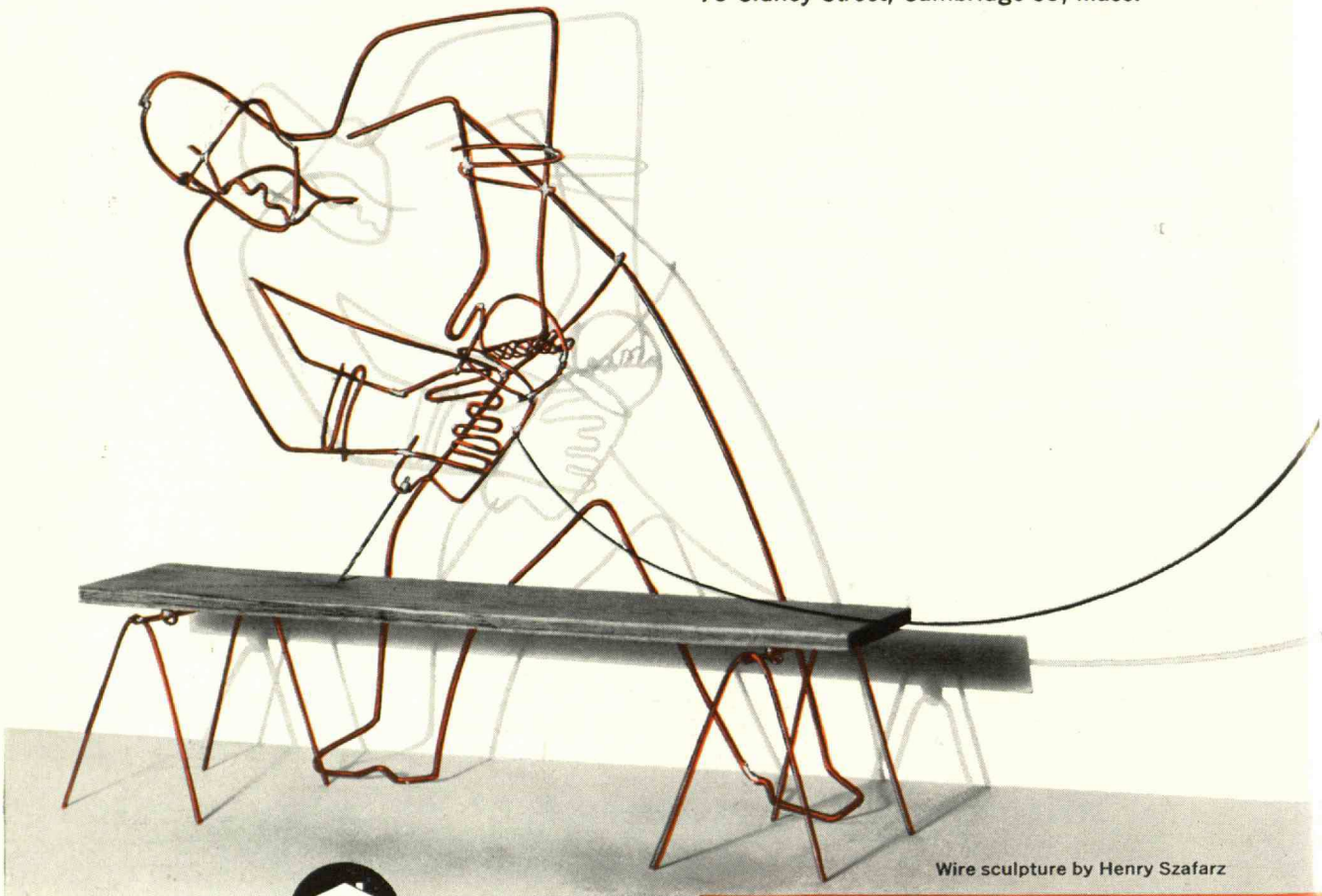
"Week-end Wizard"

The spirit of do-it-yourself has made us a nation of handy men. At the same time, it has sharpened our appreciation of power tools and equipment: Simplex-TIREX cords and cables, for instance. These expertly engineered cords and cables are on the job everywhere: in home workshops, in factories, in mines, and on giant construction projects.

TIREX cords and cables, newly improved for greater flexibility, feature cured-in-lead Neoprene Armor that resists abrasion, oil, heat and water . . . gives longest service.

SIMPLEX WIRE & CABLE CO.,

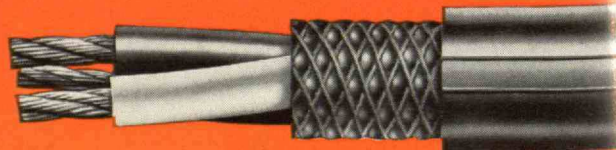
79 Sidney Street, Cambridge 39, Mass.



Wire sculpture by Henry Szafarz



Simplex



Tirex Portable Cable

LINEAR ACCELEROMETERS

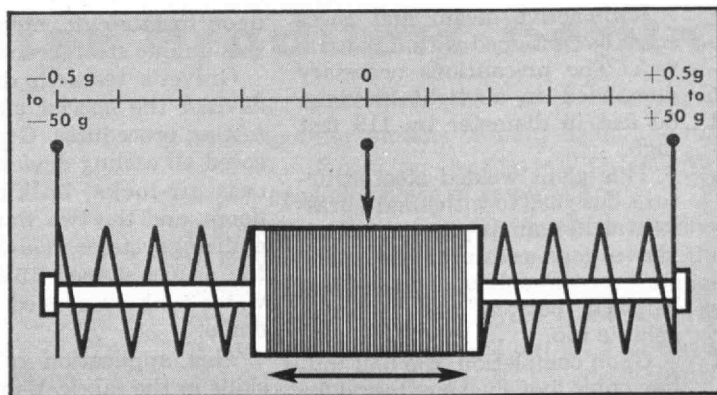
for Aircraft and Missiles

ZERO CROSS-COUPPLING NON-PENDULOUS TYPE



Shown Actual Size

Honeywell Linear Accelerometers sense positive or negative accelerations or both in either the vertical or horizontal plane. Designed for use in aircraft and missiles, they are available in a variation of ranges from ± 0.5 g to more than ± 50 g's depending upon requirements. These units consist of a centrally located mass restrained by coil springs and supported on a linear-type ball-bearing. Any movement of the mass on either side of the null displacement position is measured by a potentiometer pick-off, providing a high level output signal. Viscous damping is incorporated for improved dynamic response. Zero cross-coupling is inherent with this true linear non-pendulous design. (Cross-coupling is defined as a change in output signal caused by an acceleration applied from any direction in a plane normal to the sensing axis) Excitation may be as high as 100 volts (A-C or D-C) depending on the potentiometer resistance. *Write for Bulletin LA . . .* Minneapolis-Honeywell, Boston Division, Dept. 1, 1400 Soldiers Field Road, Boston 35, Mass.



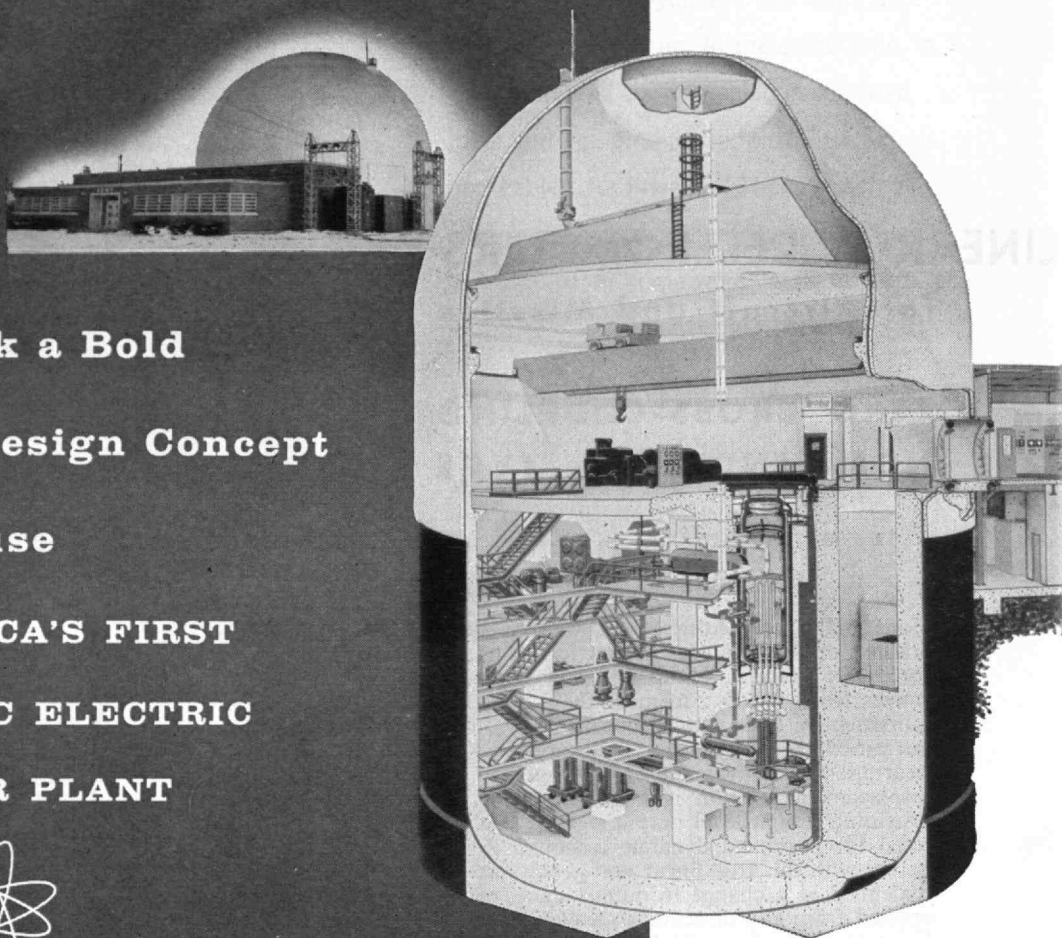
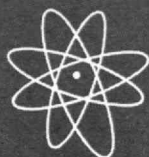
- LINEAR RESPONSE
- D-C OUTPUT SIGNAL
- VISCOUS DAMPING
- HERMETICALLY SEALED
- EXTREMELY RUGGED
- WEIGHT: APPROXIMATELY 0.9 POUNDS
- ENVIRONMENT: MEETS MIL-E-5272A

MINNEAPOLIS
Honeywell
BOSTON DIVISION



Write for Bulletin LA

**It Took a Bold
New Design Concept
to House
AMERICA'S FIRST
ATOMIC ELECTRIC
POWER PLANT**



How do you house an atomic electric power plant? Dig a hole five stories down. Erect a giant ten-story welded steel "containment vessel." Seal it off air-tight, and you have one of the largest pressure vessels man has ever been called on to build.

That's the story, over-simplified, of the unique housing required for America's first nuclear-powered electric plant, the Experimental Boiling Water Reactor, at Argonne National Laboratory, Lemont, Illinois.

In our practical, efficient world of engineering, there is a sound structural reason for the unusual dome-shaped building, now recognized by everyone as the symbol of atomic-power-for-peace.

Radioactive steam and gases must be contained within the system. The precautions necessary demanded an air-tight building, 80 feet in diameter by 119 feet high.

This giant welded steel structure, designed to withstand a pressure of 15 pounds per square inch above gage pressure, was made concave throughout, with a semi-ellipsoid bottom and a hemispherical top.

Upon completion, the half-million cubic foot shell was tested for air-tightness. Never before had so large a welded structure required such thorough testing against air loss.

Graver's skills, backed by a century of experience, were called

upon to fabricate, erect and test this unique steel structure.

Graver's research department devised the special air-tightness testing procedures. Graver fabricated all sealing devices—the access air-locks, bulkheads and doors, and the two water-demineralizing systems. It also furnished the saucer-shaped 15,000 gallon water tank suspended under the dome.

This application of Graver's skills in the fabrication and erection of America's first atomic power plant is indicative of Graver's readiness to help you fulfill your plans for the future, no matter how unusual or exacting the requirements.

Building for the Future on 100 Years of Craftsmanship in Steels and Alloys

GRAVER TANK & MFG. CO., INC.

EAST CHICAGO, INDIANA • NEW YORK • PHILADELPHIA • EDGE MOOR, DELAWARE
PITTSBURGH • DETROIT • CHICAGO • TULSA • SAND SPRINGS, OKLAHOMA
HOUSTON • LOS ANGELES • FONTANA, CALIFORNIA • SAN FRANCISCO

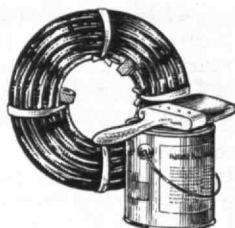
GRAVER®

... tires or toys



... ribbons or ropes

... house paints or hoses



Better Products begin with CABOT!

It's truer today than ever — no product has a monopoly on quality.

As competition stiffens in many fields, the manufacturer's search for a meaningful product *difference* — one that will put a hefty *plus* in sales — must begin with the wisest possible choice of raw materials.

It is here that Cabot, with its 75 years experience in supplying superior raw materials to industry, can be of immense help — whether you make house paints or garden hoses. From the wide variety of Cabot materials... from our extensive experience in raw material problems... may come the product plus you've been looking for.

It costs you nothing to find out if Cabot can help you... why not call us today?

WHICH OF THESE CABOT MATERIALS CAN HELP YOUR PRODUCT?

CABOT CARBON BLACKS... more than 45 different grades of channel, furnace and thermal blacks for use by the rubber, printing ink, paint, varnish, lacquer, enamel, plastics, paper, phonograph record, battery and other industries.

WOLLASTONITE... as a paint pigment, this white, uniform calcium metasilicate, has more desirable properties than other extenders used singly or in combination. Excellent for ALL types of paint, and for the quality improvement of wall tile and semi-vitreous ceramics.

CAB-O-SIL®... this unique colloidal silica, in extremely small quantities, greatly improves large numbers of products. The best flow control agent available, it's especially remarkable for its

unusual combination of properties. Used for rubber, paint, varnish, printing ink, plastics, lubricants, cosmetics, many other products.

CABFLEX® PLASTICS CHEMICALS... a complete range of plasticizers developed for the specific improvement of rubber and vinyl plastic products.

PT® PINE TAR PRODUCTS... these versatile quality controlled materials improve the performance of a wide variety of products, including: rubber, paint, cordage, oakum and insecticides.

For complete information, phone or write:

GODFREY L. CABOT, INC. CABOT
77 FRANKLIN ST., BOSTON 10, MASSACHUSETTS
Phone: Liberty 2-7300

Work-Study Plan for Master's Degree in Chosen Field

sponsored by

Knolls Atomic Power Laboratory

in conjunction with

Rensselaer Polytechnic Institute

CANDIDATES BEING CHOSEN NOW FOR COURSES BEGINNING IN JUNE AND SEPTEMBER

Knolls, operated by General Electric for the Atomic Energy Commission, is developing a two-reactor system for the new Triton, the world's largest submarine; another new project...to design a reactor for a Navy destroyer power plant system. Qualified young engineers and physicists who join the new WORK-STUDY PLAN can start immediately on some phase of these large-scale programs.

The Plan pays approximately 85% of full salary the first year and 100% the next. The Master's degree can be obtained in 2½ years or less, depending on individual background. The candidate takes his M.S. in the field of his choice, with a minor in nuclear engineering.

If you have a B.S. degree in engineering or physics, you are eligible to apply.

1st SEMESTER:	<i>Half time at R.P.I.—fees and tuition paid; half time on job, half pay.</i>
2nd SEMESTER:	<i>Half time on job, half time off for special nuclear courses at laboratory; full pay; fees and tuition paid.</i>
SUCCEEDING TERMS:	<i>Full time on job—full pay; up to 4 hours off each week to attend classes at R.P.I. Full tuition refund.</i>

MEMO TO ENGINEERS AND SCIENTISTS AT ALL LEVELS:

Your inquiries are also invited for a number of attractive positions now open—outside of Work-Study Plan.

If you are interested in this program, send a resume of your education and experience to:

Mr. A. J. Scipione, Dept. 109-EM

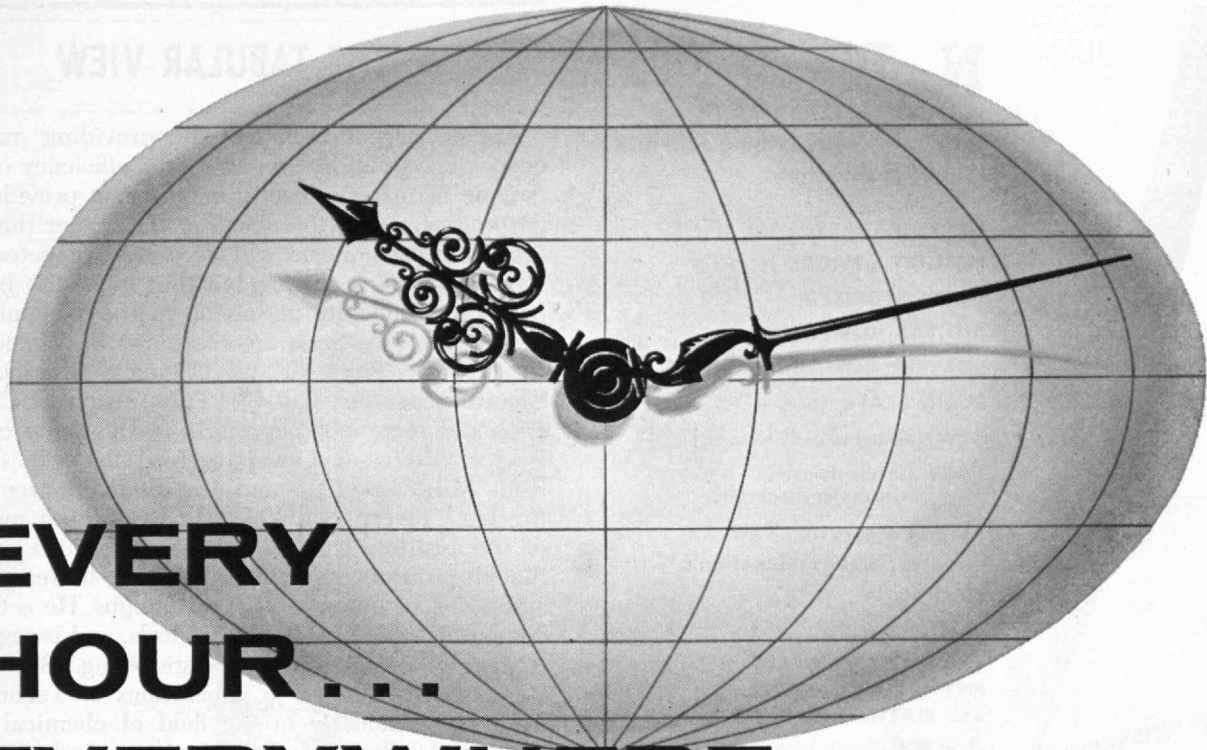


Knolls Atomic Power Laboratory

OPERATED FOR A. E. C. BY

GENERAL  ELECTRIC

SCHENECTADY, N. Y.



EVERY HOUR... EVERYWHERE

...electric power becomes more abundant

In the twentieth century, prosperity is directly related to abundant electricity! This realization has swept the globe in recent years, leaving in its wake an outcropping of power facilities beyond the most extravagant predictions. In all corners of the earth, electrification is becoming the watchword for progress.

Even in the United States, where an ample supply of electrical power has long been taken for granted, electric generating capacity is increasing at an unprecedented rate. In fact, the projected new capacity to be installed in the next decade will substantially exceed the total capacity that the American utility industry has attained in the seventy-five years it has been in existence.

Combustion Engineering is proud of its contribution to the more abundant power movement. Doing business throughout the free world, C-E has helped bring the most advanced, the most economical facilities for steam-electric generation to countries all over the globe. And in 1956 it did so on a greater scale than ever before — with sales of utility boilers at home and abroad, expressed in terms of generating capacity, reaching an all-time record of ten million kilowatts — more capacity than the entire American utility industry installed in any year prior to 1954. These newly ordered C-E Boilers will soon be helping to bring more electricity to homes and industries in twenty-seven states of the U.S.A. and numerous foreign countries.

C-E ACTIVITY "ROUND THE WORLD" IN 1956 is shown by this list of countries outside the U.S.A. in which C-E steam generating and related equipment was placed in service in 1956—or is currently on order or under construction. This equipment includes boilers not only for power generation but for all steam requirements of industry—in plants small and large, using a wide variety of fuels.

Argentina
Belgium
Brazil
British West Indies
Canada
Chile

Colombia
Cuba
Dominican Republic
Ecuador
Egypt
El Salvador

England
Finland
Formosa
France
Guatemala
Holland

India
Israel
Italy
Japan
Korea
Mexico

Newfoundland
Norway
Panama
Peru
Philippines
Puerto Rico

Sicily
South Africa
Spain
Spanish Morocco
Sumatra
Venezuela

COMBUSTION ENGINEERING

Combustion Engineering Building • 200 Madison Avenue, New York 16, N. Y.



ALL TYPES OF STEAM GENERATING, FUEL BURNING AND RELATED EQUIPMENT; NUCLEAR REACTORS; PAPER MILL EQUIPMENT; PULVERIZERS; FLASH DRYING SYSTEMS; PRESSURE VESSELS; SOIL PIPE

N. B.

Write for the folder describing activities of The Lincoln Laboratory:

HEAVY RADARS
MEMORY DEVICES
TRANSISTORIZED
DIGITAL COMPUTERS
SCATTER COMMUNICATIONS
SOLID STATE

AEW (air-borne early warning)

SAGE (semi-automatic ground environment)

... and others which are integral parts of the nation's air defense system.

Our need for qualified **PHYSICISTS, ENGINEERS and MATHEMATICIANS** is urgent.

RESEARCH AND DEVELOPMENT

MIT LINCOLN LABORATORY

Box 28, Lexington 73, Massachusetts



GEARS

Made to Your Specifications

You and we can form a team—you to draw up the specifications; we to make the gears—that will be profitable to both of us. Gears of all types, all sizes, all materials. Design-engineering service available.

Custom Gears Exclusively

DIEFENDORF GEAR CORPORATION

Syracuse 1, N. Y.

DIEFENDORF
GEARS

THE TABULAR VIEW

Engineering Profession.—By providing mastery over science, and by increasing the efficiency of production of material needs, engineering provides opportunity for man to engage in the higher things of life. Future engineers will need the competence to solve technical problems, but they must also be prepared to co-operate in solving man's economic and social problems. Such are the views of **WARREN K. LEWIS**, '05, Professor of Chemical Engineering, Emeritus, expressed at the Tulsa Regional Conference and recorded (page 351) in this issue of The Review. Professor Lewis received the S.B. degree from M.I.T. in 1905 and the Ph.D. degree from Breslau University in 1908. He has been a member of the Institute's teaching staff since 1905 and although professor emeritus since 1945, he remains an active and vigorous man about campus. He is the recipient of many professional awards, and is regarded as the father of chemical engineering. But "Doc" Lewis is best known to generations of Technology Alumni, particularly in the field of chemical engineering, for his effective, inspiring, and sparkling teaching. Some of his better known anecdotes from his teaching and professional experience have been collected in a booklet, *A Dollar to a Doughnut*.

High School Science.—Because science has become a vital part of the total culture of our times, (Concluded on page 336)



FREE BOOKLET TELLS WHAT CO₂ CAN DO FOR YOU

agriculture
chemistry
metals
electronics
refrigeration
food
drugs
textiles
rubber

There's practically no end to the important jobs that CO₂—combined with Liquid Carbonic savvy—is doing. Chances are this combination can come up with some surprising answers for you, too. For scores of CO₂ applications, covering all industry, send for LIQUID's new free booklet, "Applications Unlimited." Just use the coupon below.

MAIL THIS COUPON

THE LIQUID CARBONIC CORPORATION
3100 South Kedzie Ave., Chicago 23, Illinois TR

Send me my free copy of "Applications Unlimited."

Name _____

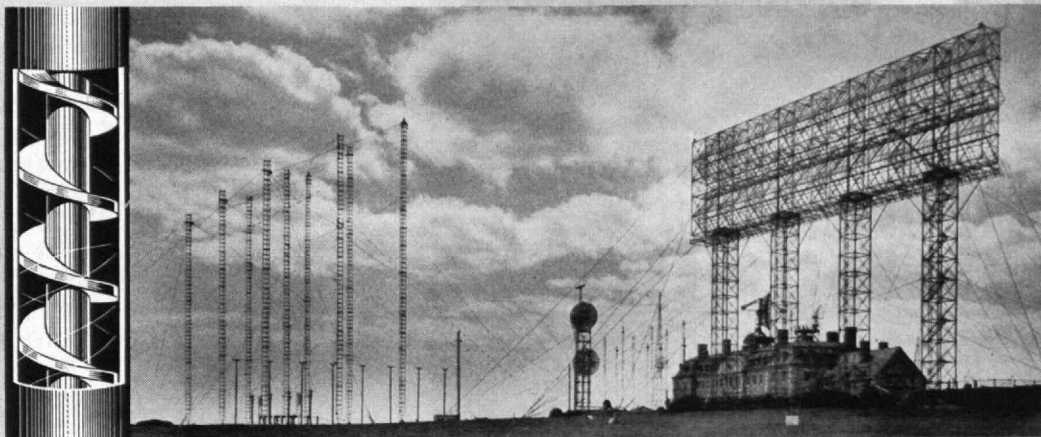
Company _____

Position _____

Address _____

City _____ Zone _____ State _____

Demonstrating Outstanding Characteristics
for Forward Scatter Systems...



Round Hill Field Station, M.I.T.'s Lincoln Laboratories, South Dartmouth, Mass.

Styroflex Coaxial Cable

A recent series of experimental tests conducted by the Round Hill Field Station of M.I.T.'s Lincoln Laboratories at South Dartmouth, Mass., clearly showed that Styroflex coaxial cable has a number of practical advantages when used as the connecting link between the antenna and transmitter or receiver in forward scatter systems.

The tests demonstrated the particular importance of these general Styroflex characteristics:

1. 1000-foot continuous lengths without splices.
2. Low attenuation.
3. Excellent electrical properties.
4. Capacity to handle high power.
5. No age deterioration regardless of climatic conditions.

An additional advantage of Styroflex—when used as a receiving transmission line—is its extremely low inherent noise level.

Inquiries regarding specific applications for Styroflex are invited.



PHELPS DODGE COPPER PRODUCTS
CORPORATION

300 PARK AVENUE, NEW YORK 22, N. Y.

custom-built equipment for the mechanical and process industries

We develop special equipment and machines from ideas to blueprints — to prototypes — to pilot plants — to the final product or process. Our technical staff and plant facilities are geared to handle the most intricate jobs all the way from small scale laboratory equipment up to contracts in excess of \$1,000,000.

Phone TWinbrook 3-6800 or write to:

Artisan

METAL PRODUCTS, INC.

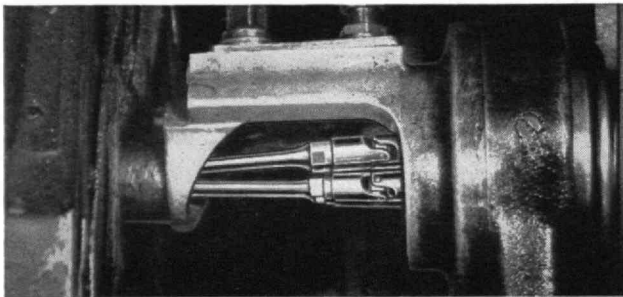
73 POND STREET, WALTHAM 54, MASS.

For a comprehensive summary of our work and the equipment we make, write for our brochure "Process Equipment".

Designers and manufacturers of

AUTOCLAVES - CONDENSERS AND HEAT EXCHANGERS - DISTILLATION EQUIPMENT - EXPERIMENTAL EQUIPMENT - EVAPORATORS - JACKETED KETTLES - MIXERS - PIPE, PIPE COILS, AND BENDS - REACTORS - SPECIAL MACHINERY - TANKS

Solving a breakage problem AT CLOSE QUARTERS



The manufacturer of this button-drilling machine had a tough problem: the universal joints on these parallel shafts carried such a torque load there were frequent complaints of breakage . . . yet the close centers prohibited use of a larger joint. **The solution** was a Curtis Universal Joint of the same size but higher torque.

This is only one of many problems solved by Curtis Joints — size for size the strongest universal joints designed for industry. Selected materials, precision engineering, and over 30 years' experience manufacturing universal joints make them that way.

14 SIZES ALWAYS IN STOCK
3/8" to 4" O.D.
(6" joints on special order)

Not sold through distributors. Write direct for free engineering data and price list.

TRADE
MARK
CURTIS
UNIVERSAL JOINT CO., INC.
8 Birnie Avenue, Springfield, Mass.
As near to you as your telephone

EXCLUSIVELY A MANUFACTURER OF UNIVERSAL JOINTS SINCE 1919

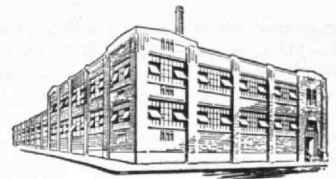
THE TABULAR VIEW

(Concluded from page 334)

there is good reason for teaching it in secondary schools as an indispensable element of modern liberal education. There is also need to develop a sense of the importance and pride of learning, according to views expressed (page 355) by CHANCELLOR J. A. STRATTON, '23. Dr. Stratton's remarks were originally presented as part of a symposium on Secondary School Education, held in Kresge Auditorium on January 17, under the auspices of the Boston Section of the Institute of Radio Engineers. To the many honors Dr. Stratton has already received, the Medal of Honor of the I.R.E. — that society's highest award — was presented in New York in March for his contributions as teacher, scientist, author, and administrator. Since becoming provost in April, 1949, Dr. Stratton has been primarily concerned with the Institute's educational policies. Appointments as M.I.T. Vice-president in 1951, and Chancellor in 1956, have increased his administrative responsibilities as well.

Automation. — One of the most elusive things we have run across in recent years is a rational and concise definition of automation. GORDON S. BROWN, '31, Professor of Electrical Engineering, regards this form of robotry as "a manifestation of a great revolution in the way man co-operates with nature" in his article in this issue (page 359). Professor Brown received the S.B., S.M., and Sc.D. degrees from M.I.T. in 1931, 1934, and 1938, respectively. He was director of the Servomechanism Laboratory from its formation in 1941 until 1952, during which time he made an enviable name for his professional work in this field. He was named associate head of the Department of Electrical Engineering in 1950, and head of that Department in 1952. Except for introductory remarks not reproduced here, The Review's article represents the text of an address delivered by Professor Brown some months ago before the Royal Canadian Institute.

The Pullman
Company



"Roughly what would such a building cost?"

We are often asked this question by executives who want facts before making any commitments.

Based on current projects, we can give not only a reliable estimate, but also information as to the type of construction most suitable and the time required for completion.

W. J. BARNEY CORPORATION

Founded 1917

INDUSTRIAL CONSTRUCTION

101 Park Avenue, New York

Alfred T. Glassett, '20, President