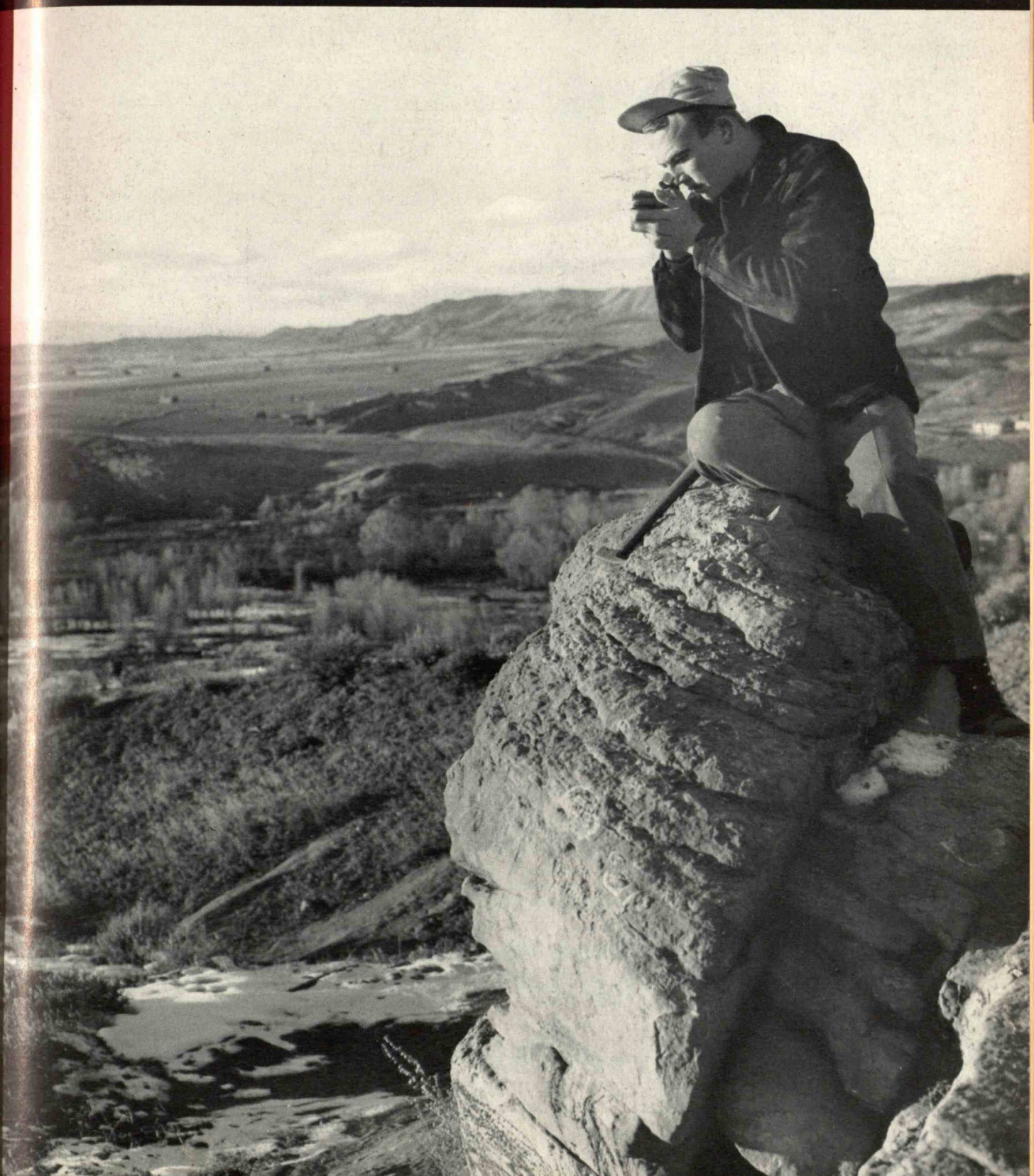


TECHNOLOGY

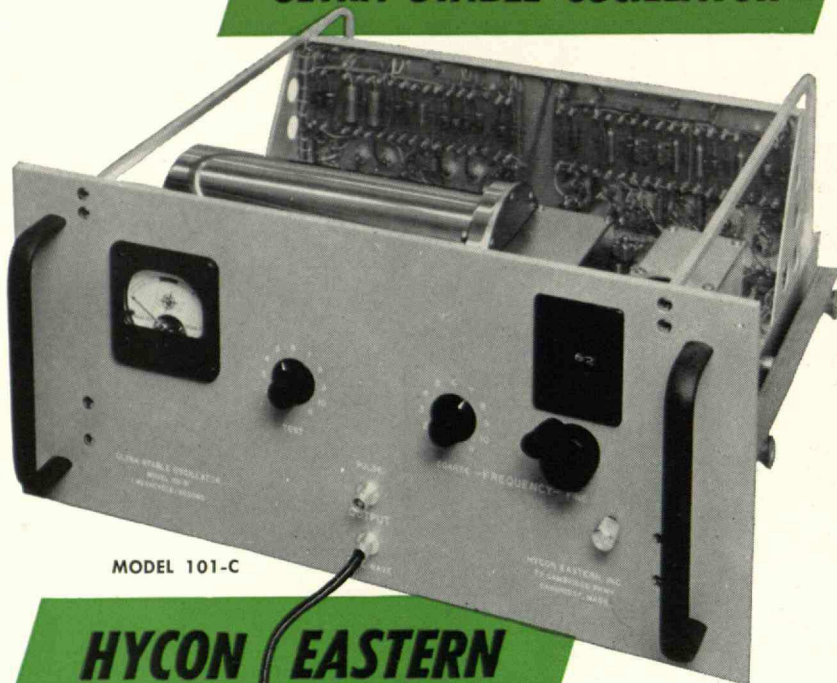
REVIEW

December 1956



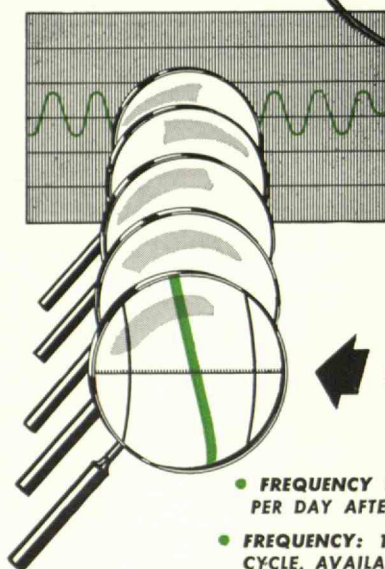
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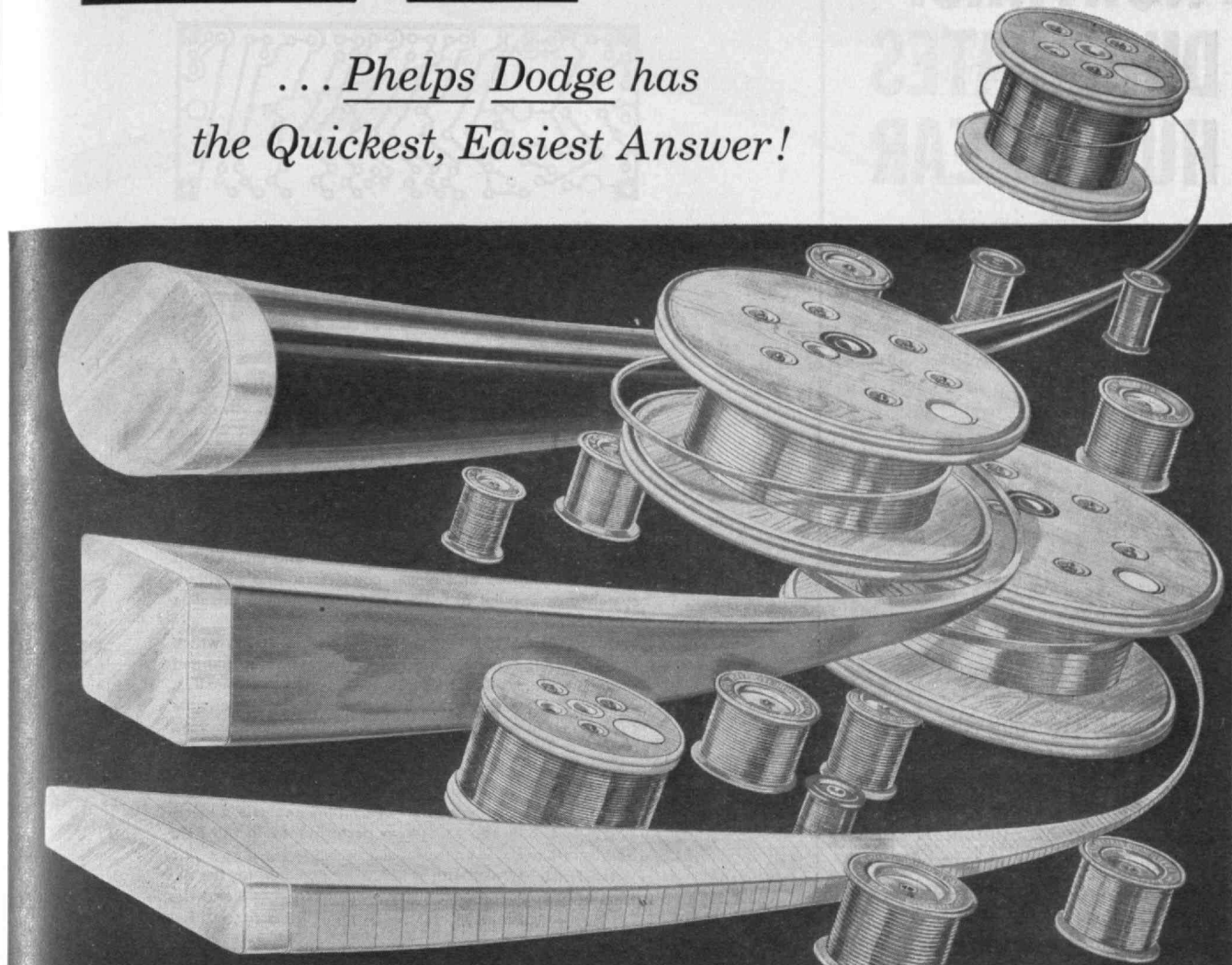


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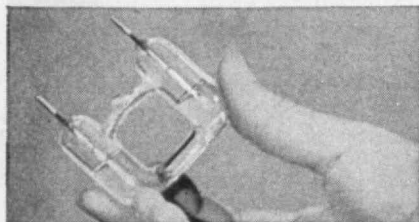
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NORTHROP DUPLICATES HUMAN EAR

For use in its Guided Missile Programs

(HAWTHORNE, CALIF.) Scientists at Northrop Aircraft have duplicated the balance mechanism of the human ear in perfecting a highly effective "brain" unit for use in Northrop's advanced guided missile programs. Weighing little more

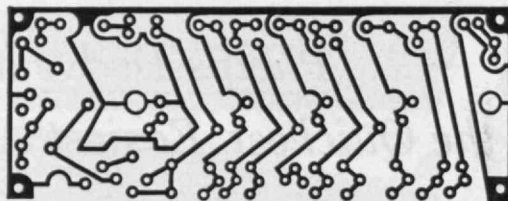


than an ounce, it resembles the convolutions of the inner ear in shape. Northrop engineers say the new instrument is so sensitive that if installed at the top of the Washington Monument it could detect the vibrations created by the footsteps of a small child entering the door at the base of the edifice.

The instrument consists of twin tubes of glass joined at the bottom by two smaller glass tubes. An electrolytic solution, precisely injected by a hypodermic needle, covers tungsten electrodes after they are fused into the glass. These are connected to an AC Wheatstone bridge circuit.

Scientists describe this sensitive device as a manometer accelerometer. In lay terms it is known as a "flying plumb bob," because it can continuously report to the complex automatic guidance "brain" of a missile even the slightest course deviation. It can also be used as an accurate vertical-sensing device in military weapons and for automatic precision leveling in survey operations. It also has potential use in preparing seismographs of earth movements.

At Northrop Aircraft, advanced projects such as this are a constant challenge to the electrical engineer's ingenuity and skill. Here, far-seeing planning has won for Northrop the distinction of being a pioneer in many fields of advanced engineering that relate to the development of supersonic aircraft and missiles.



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If you have had engineering experience in any of the categories shown below, Northrop Aircraft has an attractive position for you, with many benefits. Important among them are high compensation, challenging assignments, steady advancement, recognition of initiative and ability, and continued interest in your progress. Many outstanding engineering positions are offered, as follows:

ELECTRICAL GROUP, which is responsible for the design of such things as power generation and distribution systems, rectifiers and power converters, and auxiliary systems as applied to manned aircraft, guided missiles and ground support equipment.

COMMUNICATIONS AND NAVIGATION GROUP, which is responsible for the design of C/N systems in manned aircraft and installation of guidance systems in missiles.

FIRE CONTROL RADAR GROUP, which is responsible for the installation and application of the most advanced type of fire control systems in fighter-interceptor aircraft. The work covers the installation of the equipment and associated wiring; continuing liaison with equipment manufacturers; preparation of system analysis and reports; and follow-up of system performance in the field as aircraft become operational.

INSTRUMENT GROUP, which is responsible for the design of instrument systems for manned aircraft and the installation of flight test instrumentation for guided missiles.

There are also opportunities for draftsmen with either electrical or mechanical experience.

At Northrop Aircraft you will be with a company that has pioneered for seventeen years in missile research and development. Here you can apply your skill and ability on top level projects such as Northrop's new supersonic trainer airplane, Snark SM-62 intercontinental missile, and constantly new projects. And you'll be located in Northrop's soon to be completed multi-million-dollar engineering and science building, today's finest in comfortable surroundings and newest scientific equipment.

If you qualify for any of these representative positions, we invite you to contact the Manager of Engineering Industrial Relations, Northrop Aircraft, Inc., Oregon 8-9111, Extension 1893, or write to: 1015 East Broadway, Department 4600-BB, Hawthorne, California.



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to produce
steam (by the ton)**

In September 1956, the laying of the pipe for the first long-distance commercial *coal pipeline* in the United States was completed. This unique pipeline—108 miles long—is capable of delivering 150 tons of coal per hour... from the Georgetown, Ohio, properties of Pittsburgh Consolidation Coal Company to the Eastlake plant of The Cleveland Electric Illuminating Company. The coal will be pumped in the form of a "slurry"—a 50-50 mixture of crushed coal and water.

At Eastlake—one of the country's most efficient power stations—the slurry will be delivered to thickeners, vacuum filters, and a battery of C-E Raymond Flash Drying Systems manufactured by Combustion Engineering. Together, these will remove the moisture at the rate of 36,000 gallons per hour. The dried coal will then be

pulverized in C-E Raymond Bowl Mills and burned in four mammoth Combustion boilers of the Controlled Circulation type, together capable of producing over 2,000 tons of steam per hour.

Combustion's participation in this project is another instance of its leadership in pioneering improved means for fuel utilization. Throughout the free world, C-E enjoys a reputation for the most advanced engineering in steam generation and related fields. Whether your steam requirements can best be met by coal, oil, gas, or any of a number of special fuels—and regardless of the type or size of boiler you need—the C-E line of fuel burning and steam generating equipment can supply just the right installation for your needs.

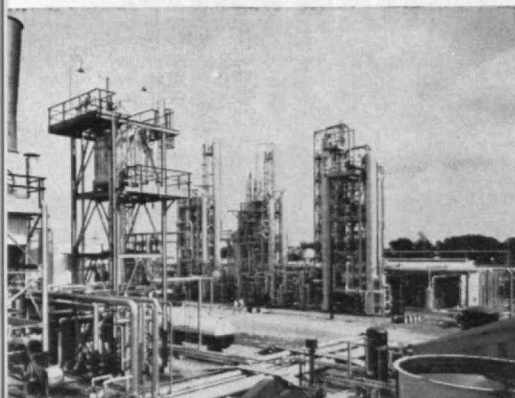
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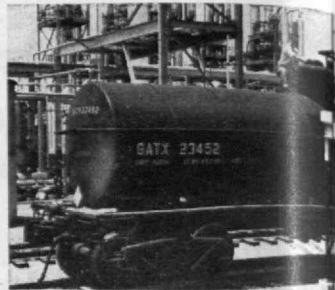
Power and distillation units



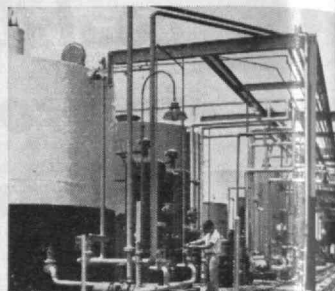
Hydrogen compressors



Distillation Units



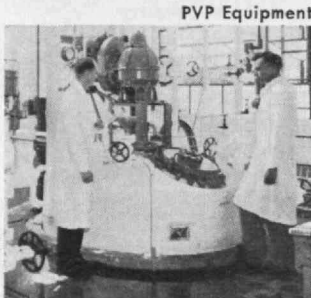
Loading facilities



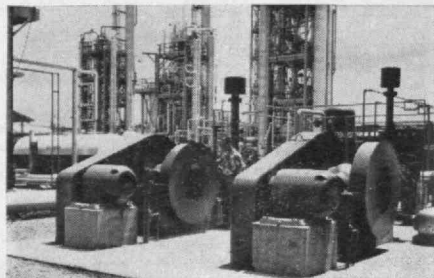
Tank Farm



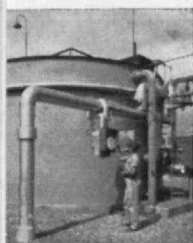
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Distillation Units



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PVP Unit and Administration Building

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Polyvinylpyrrolidone (PVP)

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such as hair control sprays • Drugs
Detergents • Plastics • Solvents
Textiles



Acetylene chemicals derived from high pressure synthesis are expanding horizons in the chemical process industries. After 14 years of research, General Aniline & Film Corporation developed a commercial process for making them, but that process called for a unique plant, unlike any hitherto existing in the U. S.

The critical task of engineering and building this plant was entrusted by General Aniline to The Lummus Company. On stream since early this year, it is now producing at a multi-million pound annual rate for markets in a number of different fields.

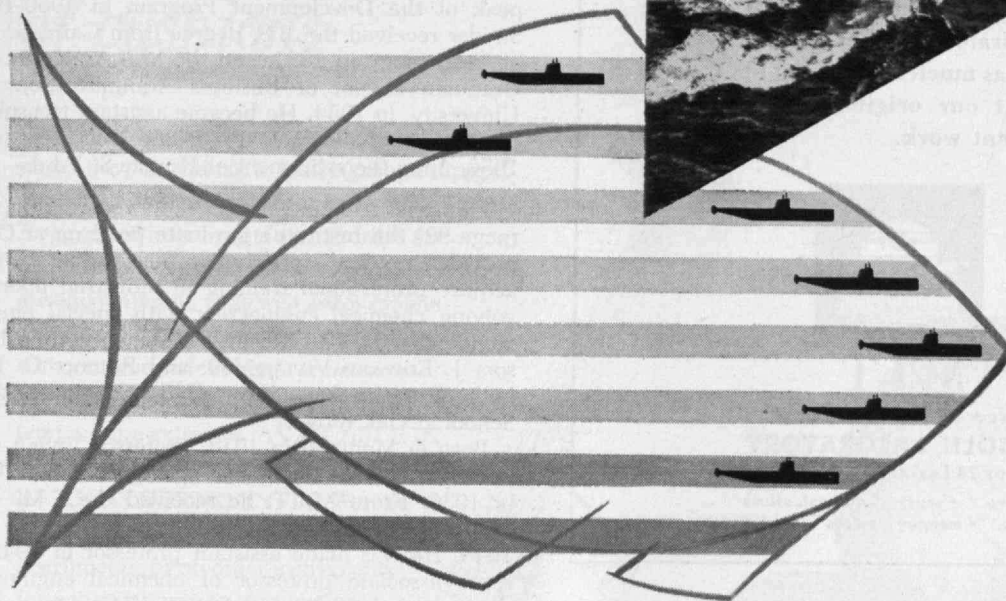
GAF's selection of Lummus for this challenging job is significant to management generally. It underlines the fact that the engineering and construction of a new plant is a specialized undertaking. Its problems do not lend themselves readily — and certainly not economically — to do-it-yourself solutions. They call instead for the knowledge, skills and varied experience of a top-flight engineering service.

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THE TABULAR VIEW

Financially Sound. — In his annual report (page 92) to the M.I.T. Corporation, JOSEPH J. SNYDER, 2-44, Vice-president and Treasurer, since 1952, recorded the Institute's financial position as being sound, and that well over half of the Institute's current revenue for academic operations was provided by industry and the government. Mr. Snyder was also able to report that gifts for the past year (amounting to \$10,387,000) exceeded those at the peak of the Development Program in 1950-1951. Mr. Snyder received the B.S. degree from Carnegie Institute of Technology in 1931, and the M.B.A. degree from the Graduate School of Business Administration, Harvard University, in 1934. He became assistant treasurer of the Institute on January 1, 1946, and treasurer on July 1, 1950, upon the retirement of Horace S. Ford.

Industrial Atomic Energy. — As recorded in this issue (page 93) the Institute's graduate program at Oak Ridge provides unusual opportunity for graduate students to acquire professional training in industrial operations involving chemical engineering with special emphasis on atomic energy. The Review's article is written by Professors J. EDWARD VIVIAN, '39, and ROBERT C. REID, '54, both of whom have directed the Engineering Practice School at Oak Ridge.

Born in Montreal in 1913, Professor Vivian was graduated in chemical engineering from McGill University in 1936. From M.I.T. he received the S.M. degree in chemical engineering in 1939 and the Sc.D. degree in 1945. He was made assistant professor in 1942 and became associate professor of chemical engineering and director of the School of Chemical Engineering Practice in 1946. Two years later he became director of the Oak Ridge Engineering Practice School, and in 1956 was appointed professor of chemical engineering.

Born in Denver in 1924, Professor Reid was graduated from the East Denver High School in 1942, and from the U.S. Merchant Marine Academy at Kings Point in 1945. Purdue University awarded him the B.S. degree in 1950 and the M.S. in 1951. In 1954 he received the Sc.D. de-

(Concluded on page 76)



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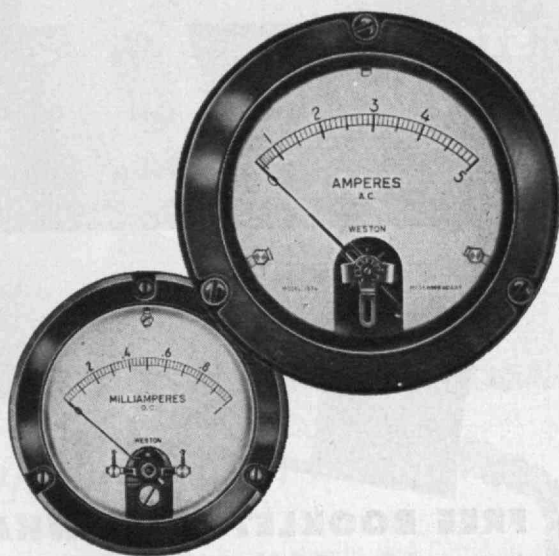
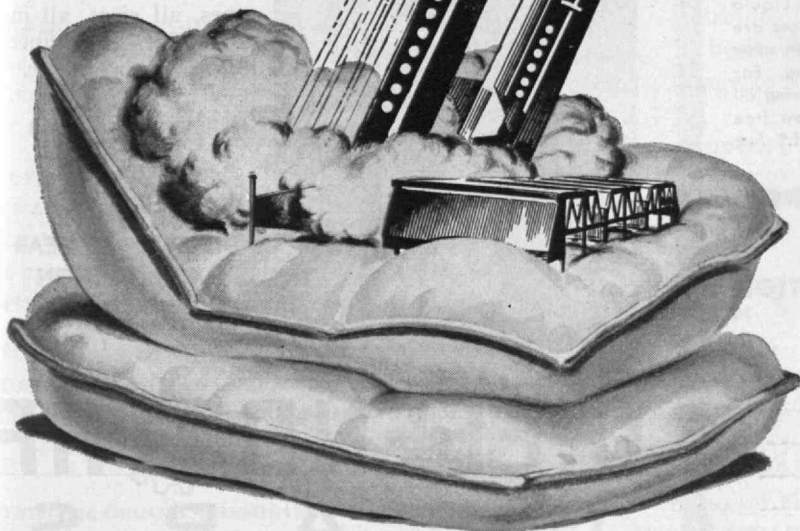
Alfred T. Glasett, '20, President

absorb

SHOCK

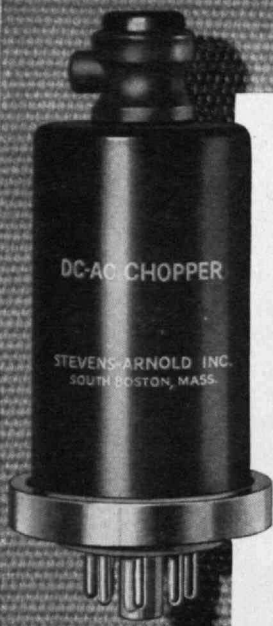
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THE TABULAR VIEW

(Concluded from page 74)

gree from M.I.T. He was appointed assistant professor in 1954, and at that time became director of the Engineering Practice School at Oak Ridge. He returned to M.I.T. this fall.

Exceptional Youths. — Honors come to most people — if they come at all — too late to do them any real good. But, as recorded on page 97, an award recently established as a memorial to Robert Lansing Hardy, '53, aims to provide stimulus and incentive to youths of exceptional merit while such honors can still be an effective spur to professional creativeness.

Visual Probe. — Few members of the Institute's research staff have made greater personal contributions, or have worked under more difficult conditions, than CLIFFORD M. WITCHER. Blind since infancy, Dr. Witcher used his education in physics as a means for developing electromechanical sensory aids for the blind. Engineering on the visual probe (page 98), was completed and the first group of experimental units was ready for field tests when death came to Dr. Witcher. An obituary notice appears on page 88. Long associated with Dr. Witcher, Lamar Washington, Jr., assisted in seeing his article through production.

Olympics Bound. — M.I.T. Sailing Master WALTER C. WOOD, '17, emphasizes the value of sailing at the Institute in his account (page 100) of the part Technology sailors are playing at the Olympics at Melbourne Bay this year.

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