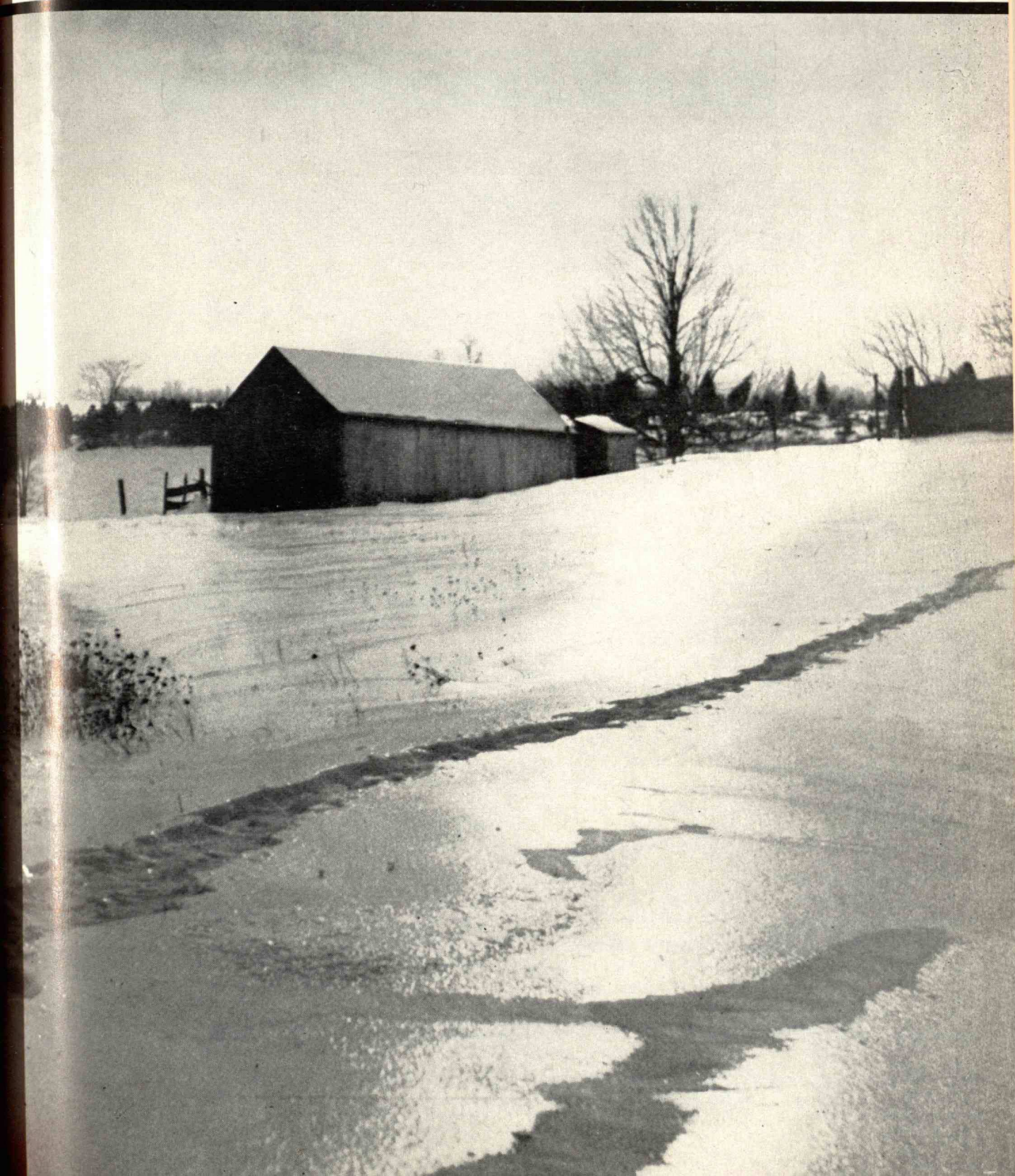
TECHNOLOGY
REVIEW
February 1957

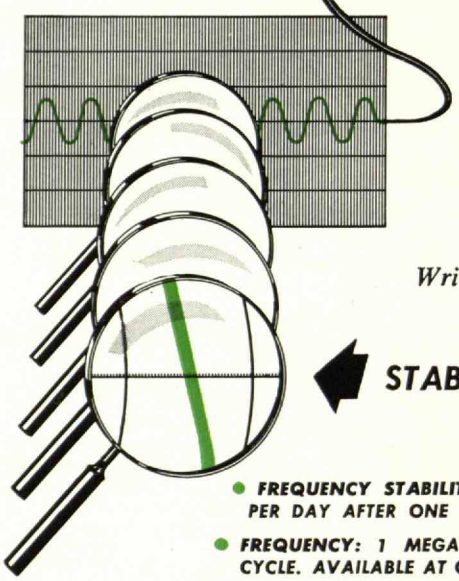


Proven Outstanding in its Class . . .

ULTRA STABLE OSCILLATOR

MODEL 101-C

HYCON EASTERN



Hycon Eastern's new Ultra Stable Oscillator is a one megacycle signal source of exceptional stability. It is useful wherever precise time measurements or frequency control are required, as in reinsertion of carrier in suppressed carrier systems, telemetry, astronomical measurements, navigation systems, geophysics or other critical applications.

Write for Ultra Stable Oscillator Bulletin

STABILITY: 1 PART IN 10^9

- **FREQUENCY STABILITY:** DRIFT RATE LESS THAN 1 PART IN 10^9 PER DAY AFTER ONE MONTH'S OPERATION.
- **FREQUENCY:** 1 MEGACYCLE, VARIABLE OVER A RANGE OF 1 CYCLE. AVAILABLE AT OTHER FREQUENCIES ON SPECIAL ORDER.
- **CRYSTAL OVEN:** STABILIZED TO BETTER THAN 0.01°C BY TEMPERATURE-SENSITIVE RESISTANCE BRIDGE. OVEN CONTAINS NO MOVING PARTS.
- **DISSIPATION IN OSCILLATOR CRYSTAL:** STABILIZED AT A POWER LEVEL LESS THAN ONE MICROWATT.
- **2 OUTPUTS:** SINE WAVE—4 VOLTS RMS; PULSE—1 VOLT.
- **OUTPUT IMPEDANCE:** APPROXIMATELY 250 OHMS.
- **POWER REQUIRED:** 150 VOLTS, 100 MA, REGULATED DC, AND 6.3 VOLTS, 3 AMPERES, AC OR DC. (Matching Power Supply available)

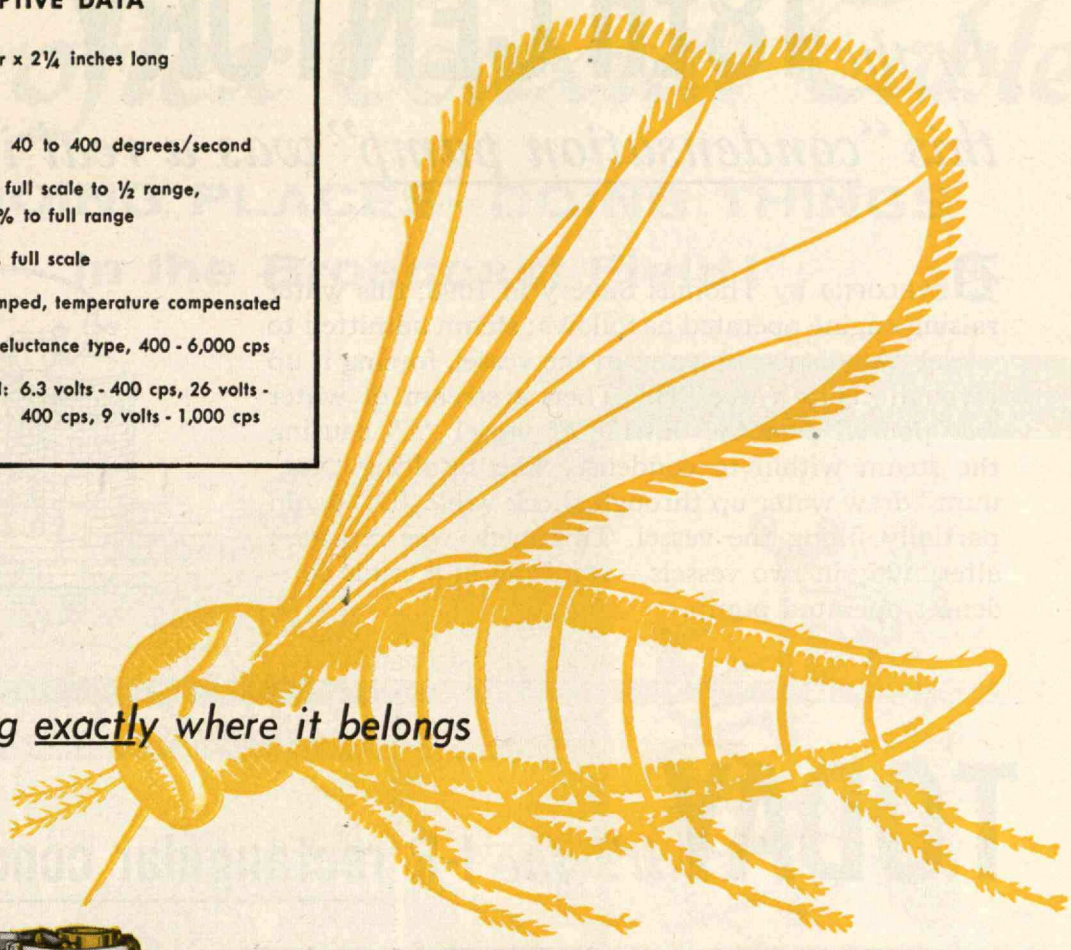
HYCON EASTERN, INC.

75 Cambridge Parkway Dept. H-2 Cambridge 42, Mass.

Affiliated with HYCON MFG. COMPANY, Pasadena, California

DESCRIPTIVE DATA

- **SIZE:** 1 inch diameter x 2¼ inches long
- **WEIGHT:** 3.8 ozs.
- **FULL SCALE RANGE:** 40 to 400 degrees/second
- **LINEARITY:** 0.1% of full scale to ½ range, within 2% to full range
- **RESOLUTION:** 0.01% full scale
- **DAMPING:** Fluid damped, temperature compensated
- **PICKOFF:** Variable Reluctance type, 400 - 6,000 cps
- **MOTOR EXCITATION:** 6.3 volts - 400 cps, 26 volts - 400 cps, 9 volts - 1,000 cps



Putting the sting exactly where it belongs

Gnat Rate Gyro
Shown actual size

GOLDEN GNAT

Miniature Rate Gyros for Missiles and Aircraft

Here is a precision, minature rate gyro. It's tiny . . . measures only 1 inch in diameter and 2¼ inches in length. It's rugged . . . withstands 100G shock and 10G vibration to 2,000 cps. It has a record of proven performance.

Even under the most severe environmental conditions the Golden Gnat will perform as required. To make this possible many unique design details have been incorporated. One such detail is the Gnat's *gold plated* steel housing for improved corrosion resistance and positive hermetic sealing.

Wherever the need exists for high performance miniature rate gyros such as for autopilot stabilization in missiles and aircraft, antenna stabilization and fire control applications, the Golden Gnat is ideally suited. Write for Bulletin GN . . . Minneapolis-Honeywell, Boston Division, Dept 1, 1400 Soldiers Field Road, Boston 35, Mass.

MINNEAPOLIS **Honeywell** H HONEYWELL

BOSTON DIVISION

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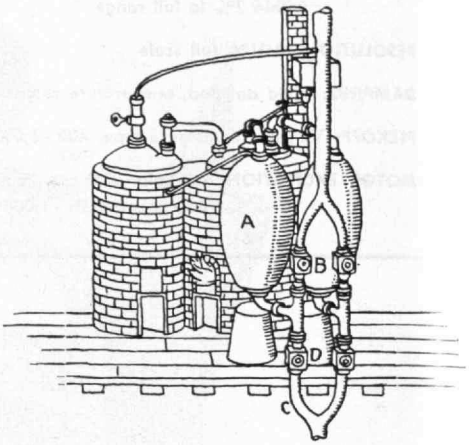
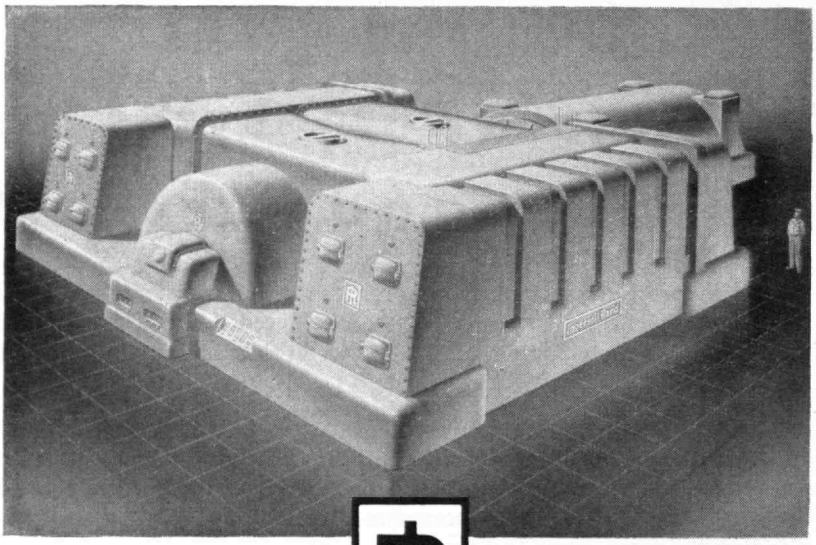
In the 18th CENTURY

this "condensation pump" was a real innovation

DEVELOPED by Thomas Savery in 1698, this water raising engine operated as follows: steam admitted to vessel "A" displaced water in the vessel, forcing it up through check valve "B." Then a stream of water was poured over the outside of vessel "A" causing the steam within to condense. The resulting "vacuum" drew water up through check valve "D," again partially filling the vessel. This cycle was repeated alternately in two vessels — resulting in a crude condenser-operated pump.



TODAY *it's the* I-R rectangular condenser



that's setting the standards of performance in modern steam power plants

I-R Surface Condensers are a vital adjunct to modern, high-pressure steam turbines. Ingersoll-Rand research and engineering over the years have steadily increased condenser efficiency per cubic foot of space, effecting economies in installation cost and station construction.

The forward looking twin shell condenser at the left, integrated with a 191,000 KW turbine, marks another important advance in condenser design by Ingersoll-Rand.

If you're interested in a profitable, progressive career in engineering look into the job opportunities available at Ingersoll-Rand. For further information contact your placement office or write to Ingersoll-Rand.

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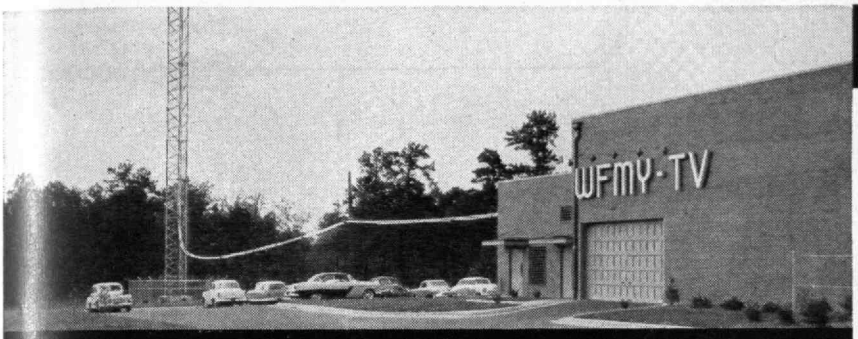
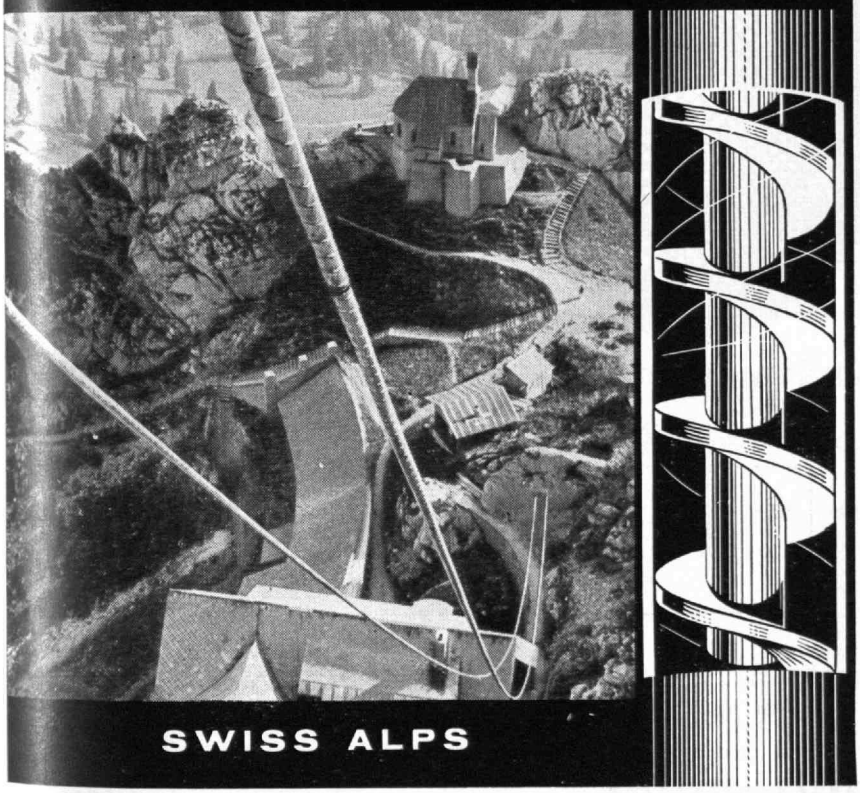
12-475

Styroflex Coaxial Cable

IS GOING PLACES—DOING THINGS in the Broadcast Field!

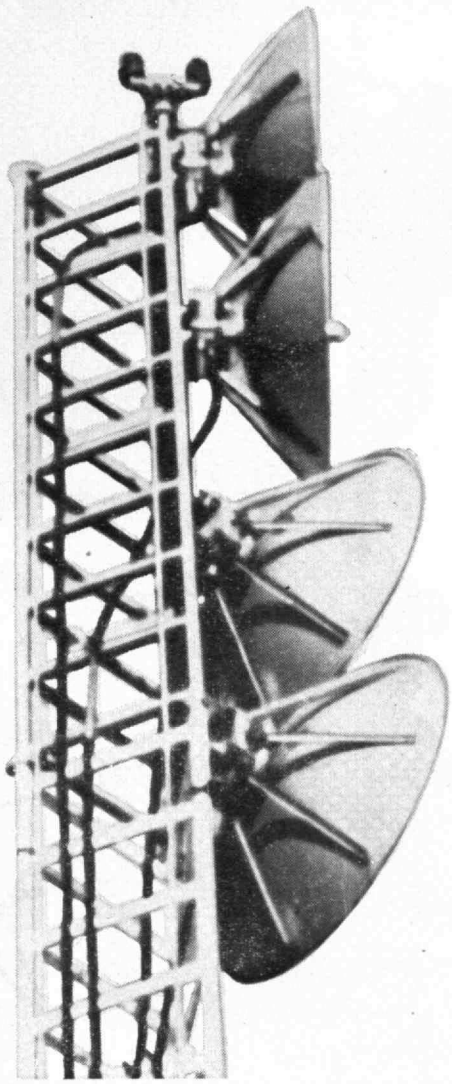


UNITED STATES



SWISS ALPS

ALASKA



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FROM DATA TO DIGITS...

Today Hughes is developing systems which convert radar data and other information to digital form and process it for use in performing control functions.

These systems will be able to receive and store vast quantities of data from many different sources and distribute it, after processing, over large and complex ground nets.

Special-purpose digital computers are employed, utilizing magnetic drum memory and novel programming techniques. The systems will also include visual displays and employ the latest concepts of human engineering to simplify equipment operation and minimize the possibility of human error. Vacuum tubes are being replaced by transistors or ferrite cores in flip-flops, registers, and amplifiers; and diode matrices are being replaced by ferro-magnetic circuitry.

These and other features of the new systems promise to maintain and extend Hughes leadership in the fields of digital computers and processing systems. In order to design and build these and future systems, Hughes requires engineers with experience in electronic circuit design, logical design, electronic packaging, radar systems, and many others.

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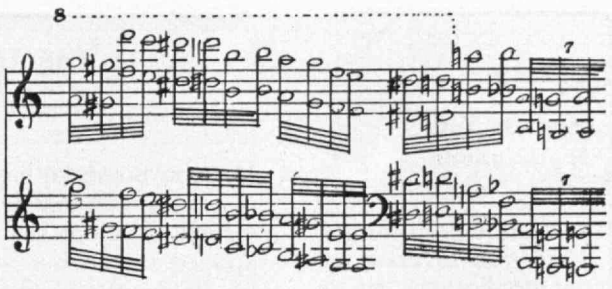
THE TABULAR VIEW

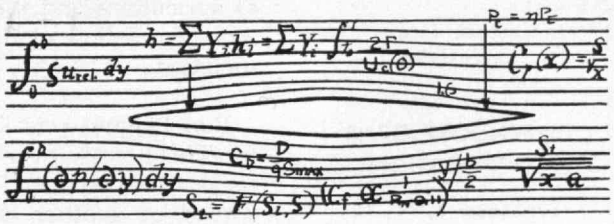
Liberating Creative Energy. — An industrial society, such as that which much of the Western world has created for itself, makes quite different demands upon its educational system than, let us say, an agrarian society. In "Education for Our Industrial Society" (page 197), WILLIAM R. HAWTHORNE, '39, at the Department of Engineering of the University of Cambridge, examines the type of training that appears to be best suited to Anglo-American needs. Holding that physics and mathematics might well play a more significant role in current training, Professor Hawthorne believes that, whatever subjects are taught, proper instruction, inspiration, and social support are required to raise society to higher levels of achievement so that the creative energies of our people can be released. Text of The Review article is based on the Mollie B. Mandeville Lecture he delivered at Brown University on April 25, 1956, while Professor Hawthorne was Jerome Clarke Hunsaker Professor of Aeronautical Engineering at M.I.T. A native of Benton, England, Professor Hawthorne received the B.A. degree from Cambridge University in 1934 and a year later came to M.I.T. as a Commonwealth Fund Fellow, where he studied fuel engineering and received the Sc.D. degree in 1939. He joined Babcock and Wilcox, in England, as development engineer, working on combustion, heat transfer, and steam generation. From 1940 to 1944 he was scientific officer and head of the Gas Turbine Division at the Royal Aircraft Establishment in Farnborough, and later became deputy director of engine research at the Ministry of Supply (Air) in London. He returned to M.I.T. in 1946 as associate professor of mechanical engineering, and from 1947 to 1951 was George Westinghouse Professor of Mechanical Engineering. Except for his Hunsaker Professorship at M.I.T. in 1955–1956, Professor Hawthorne has been at the University of Cambridge since 1951.

Soup's On! — A growing amount of increasingly complex equipment, much of it electrically operated but all of it requiring cleaning, maintenance, and repair, seems to be required in the modern home kitchen. Perhaps it is understandable, therefore, that the modern housewife may have mixed feelings regarding the blessings which the mechanization of the kitchen is supposed to have brought. But mechanization is merely one aspect of the impact technology has had in bringing about a marked change in the home preparation of foodstuffs; certainly the food-processing industry has brought about a drastic revolution in home cooking. In fact — possibly stimulated by the fact that the average family can no longer afford to employ culinary help, even if it could find personnel for hire — the food industry even claims that some of its products include a "built-in maid service." The revolution which technology has wrought in America's kitchens in the past half century is examined (page 201) by HARRY W. VON LOESECKE.

(*Concluded on page 184*)



SWEET MUSIC FOR AERODYNAMICISTS



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MARTIN
BALTIMORE

THE TABULAR VIEW

(Concluded from page 182)

Mr. von Loesecke has spent his professional life in, or closely affiliated with, the food industry and obviously does not share the view that "Science Has Spoiled My Dinner" – to take a title from an article by Philip Wylie in the April, 1954, issue of the *Atlantic Monthly*. After graduation from Harvard University, Mr. von Loesecke became research chemist for the General Electric Company, the American Protein Corporation, and the United Fruit Company. He has also been senior chemist, industrial specialist, and technical adviser in a variety of projects related to agriculture and the food industry. Mr. von Loesecke is a fellow of the American Public Health Association.

Red Plague. – As in other articles he has written for The Review over the past decade, in this issue (page 204) JAMES A. TOBEY, '15, traces the origin and spread of another of man's maladies. Dr. Tobey shows how modern therapeutics has achieved marked success in the past 10 years in a segment of public health in which laws and education have, unfortunately, made but little headway. Dr. Tobey brings to this article – as to his other writings in The Review and elsewhere – a vast knowledge of public health law, and related matters. After having attended the Roxbury Latin School, he received the S.B. degree from M.I.T. in 1916. He went on to take an LL.B. degree from Washington Law School in 1922, an M.S. from the American University in 1923, and returned to M.I.T. for his Dr.P.H. degree which was conferred in 1927. His professional life has been spent in advancing public health and laws affecting it, in lecturing at such institutions as M.I.T., Yale, Harvard, and Columbia universities. He has been associate editor of the *American Journal of Public Health*, has written about 20 pamphlets and more than 100 articles.