

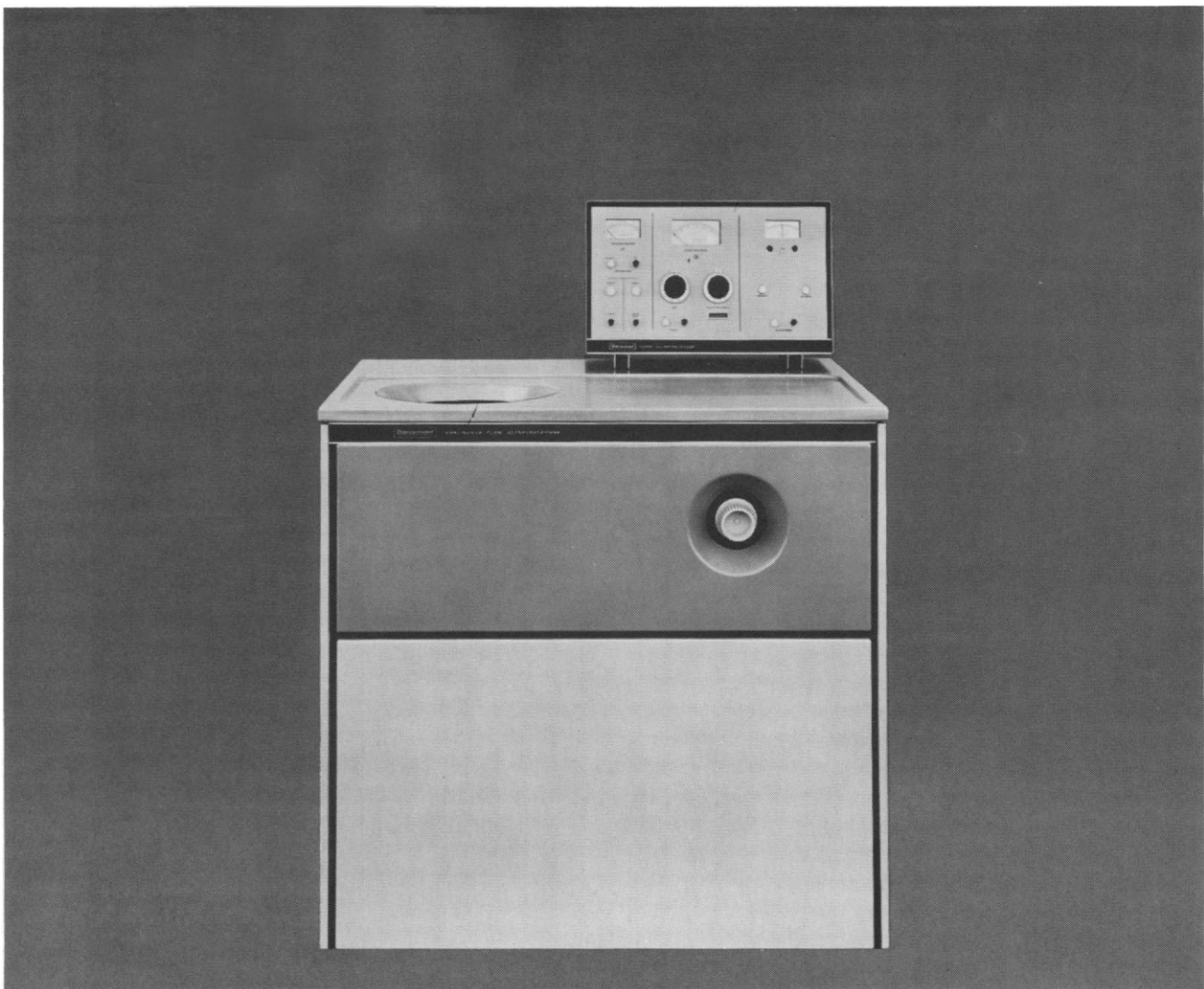
SCIENCE

22 April 1966
Vol. 152, No. 3721

AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE



WOLF
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These three new ultracentrifuges will give you larger volume separations at higher speeds than ever before

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METTLER® 

22 April 1966
Vol. 152, No. 3721

SCIENCE

LETTERS	Damaging Criticism: <i>E. W. Price</i> ; Animal Care: Licensing of Experimenters: <i>F. B. Orlans</i> ; Medical Experimentation on Humans: <i>R. E. Bolinger</i> ; <i>P. J. Burnham</i> ; Data Collection and Systems Analysis: <i>R. C. Amara</i> ; Statistical Method: <i>A. F. Johnson</i> ; Car Safety: Another View of Science: <i>H. H. Wakeland</i> . . .	447
EDITORIAL	Cost of Research	455
ARTICLES	Combination Neutron Experiment for Remote Analysis: <i>R. L. Caldwell et al.</i>	457
	The Accessory Burrows of Digger Wasps: <i>H. E. Evans</i>	465
	The Biological Nature of Man: <i>G. G. Simpson</i>	472
NEWS AND COMMENT	Chicken Trial: Verdict for Science—Integration: Briton at a Negro College	479
	<i>Report from Europe</i> : Europe Considers Industrial Mergers: <i>V. K. McElheny</i>	486
BOOK REVIEWS	<i>Brachiopoda</i> , reviewed by <i>J. T. Dutro, Jr.</i> ; other reviews by <i>J. J. Murray, Jr.</i> , <i>R. R. Sokal</i> , <i>J. Goldstein</i> , <i>O. F. Tuttle</i> , <i>A. G. Norman</i> , <i>P. H. Gebhard</i> , <i>A. E. Stiven</i> , <i>P. Putnins</i> , <i>L. Blitzer</i> ; New Books	494
REPORTS	Rhodizite: Structure and Composition: <i>M. J. Buerger</i> and <i>K. Taxer</i>	500
	Shaping of the Continental Rise by Deep Geostrophic Contour Currents: <i>B. C. Heezen</i> , <i>C. D. Hollister</i> , <i>W. F. Ruddiman</i>	502
	Piezoelectricity in Secondary Explosives: <i>J. N. Maycock</i> and <i>D. E. Grabenstein</i>	508
	Isopycnic Centrifugation for the Isolation of DNA Strands Coding for Ribosomal RNA: <i>P. F. Davison</i>	509
	Native and Renatured Transfer Ribonucleic Acid: <i>T. Lindahl</i> and <i>A. Adams</i>	512
	Heterogeneous Catalysis: Effect of an Alternating Electric Field: <i>V.-J. Lee</i>	514
	Cilia in Nematode Sensory Organs: <i>D. R. Roggen</i> , <i>D. J. Raski</i> , <i>N. O. Jones</i>	515
	Synthesis of Nonribosomal RNA by Lymphocytes: A Response to Phytohemagglutinin Treatment: <i>H. L. Cooper</i> and <i>A. D. Rubin</i>	516
	Mitotic Waves in Laticifers of <i>Euphorbia marginata</i> : <i>P. Mahlberg</i> and <i>P. Sabharwal</i> . .	518

BOARD OF DIRECTORS	HENRY EYRING Retiring President, Chairman	ALFRED S. ROMER President	DON K. PRICE President Elect	H. BENTLEY GLASS DAVID R. GODDARD	HUDSON HOAGLAND MINA S. REES
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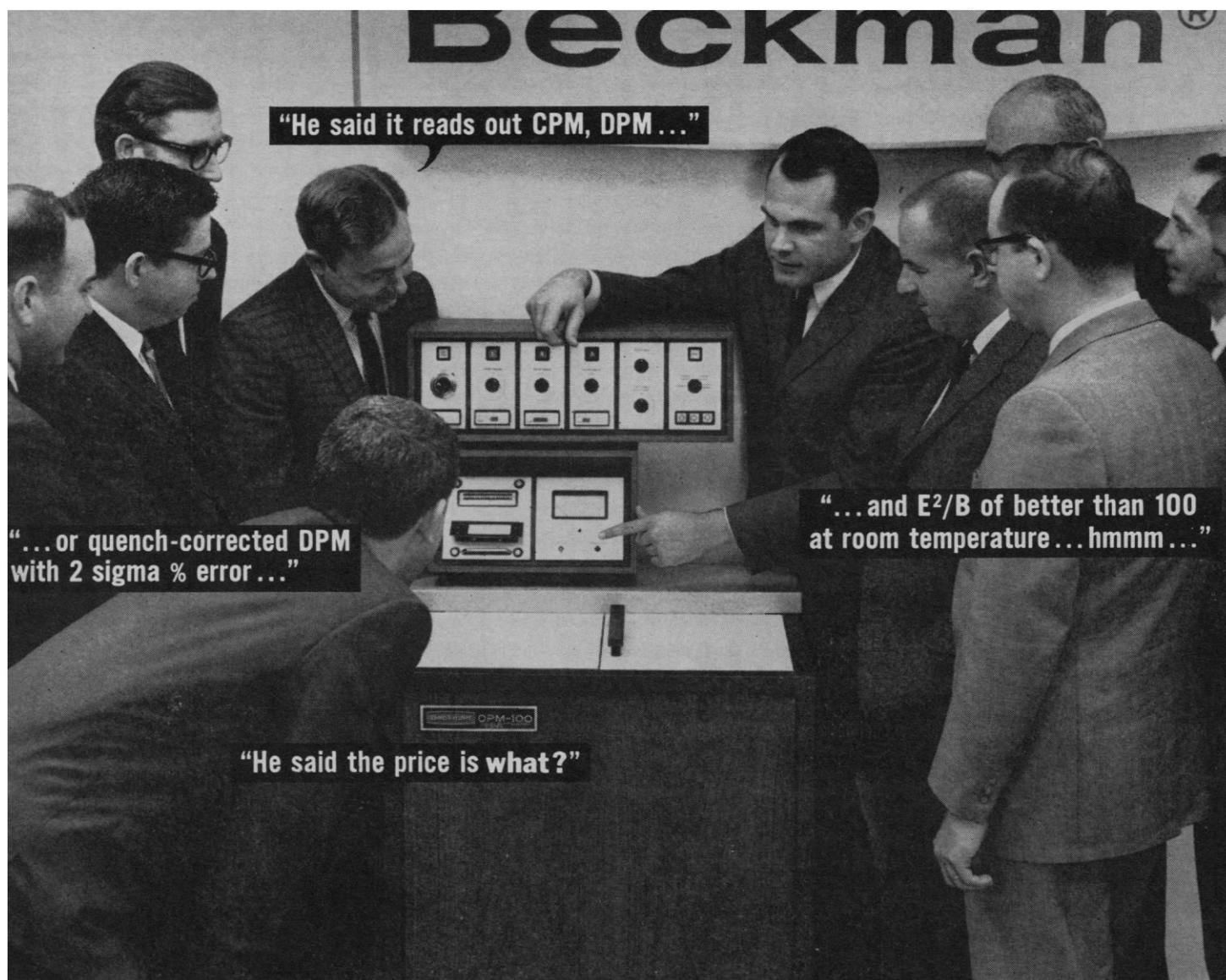
Radiosensitization of X Chromosome of Chinese Hamster Cells Related to Incorporation of 5-Bromodeoxyuridine: <i>W. C. Dewey, B. A. Sedita, R. M. Humphrey</i>	519
Biosynthesis and Composition of Histones in Novikoff Hepatoma Nuclei and Nucleoli: <i>L. S. Hnilica, M. C. Liao, R. B. Hurlbert</i>	521
Bivalve Mollusks: Fluid Dynamics of Burrowing: <i>E. R. Trueman</i>	523
Nicotinamide-Adenine Dinucleotide in Tubercle Bacilli Exposed to Isoniazid: <i>A. Bekierkunst</i>	525
Erythropoietic and Reticuloendothelial Function in Bone Marrow in Dogs: <i>M. L. Greenberg, H. L. Atkins, L. M. Schiffer</i>	526
Amniotic Contraction and Embryonic Motility in the Chick Embryo: <i>R. W. Oppenheim</i>	528
Chromosomes from Testicular Preparations of Lepidoptera: <i>L. D. Miller and S. M. Miller</i>	529
Dieldrin: Extraction of Accumulations by Root Uptake: <i>R. O. Mumma et al.</i>	530
Hydrodynamic Performance of Porpoises (<i>Stenella attenuata</i>): <i>T. G. Lang and K. Pryor</i>	531
Pteridines in the Fat Body of a Mutant of <i>Drosophila melanogaster</i> : <i>C. P. Wright and E. W. Hanly</i>	533
Lymphocytes from Thymectomized Rats: Immunologic, Proliferative, and Metabolic Properties: <i>W. O. Rieke</i>	535
Touch Receptor of Venus Flytrap, <i>Dionaea muscipula</i> : <i>J. R. DiPalma, R. McMichael, M. DiPalma</i>	539
Arterial Constrictor Response in a Diving Mammal: <i>K. M. Bron et al.</i>	540
Courtship in Spiders without Prior Sperm Induction: <i>J. S. Rovner</i>	543
<i>Technical Comments</i> : Mohole: Preliminary Drilling: <i>H. H. Hess and H. S. Ladd</i> ; Particle Sorting and Stone Migration Due to Frost Heave: <i>K. A. Jackson and D. R. Uhlmann</i> ; Vegetational Continuum: <i>R. J. Vogl; G. Cottam and R. P. McIntosh</i>	544
MEETINGS Gene Activation: <i>R. D. Moore</i> ; Brain Research: <i>A. Lajtha, J. Szentagothai, P. B. Dews</i> ; Forthcoming Events	548

ALTER ORR ROBERTS THELSTAN F. SPILHAUS	H. BURR STEINBACH JOHN A. WHEELER	PAUL E. KLOPSTEG Treasurer	DAEL WOLFLE Executive Officer
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COVER

Adult male wolf spider (*Lycosa rabida*). This species was used in experiments which tested the hypothesis that male spiders initiate reproductive display only after filling the palps with sperm. Males treated to prevent performance of the latter act displayed courtship at the same age as control males. See page 543. [Jerome S. Rovner, University of Maryland]



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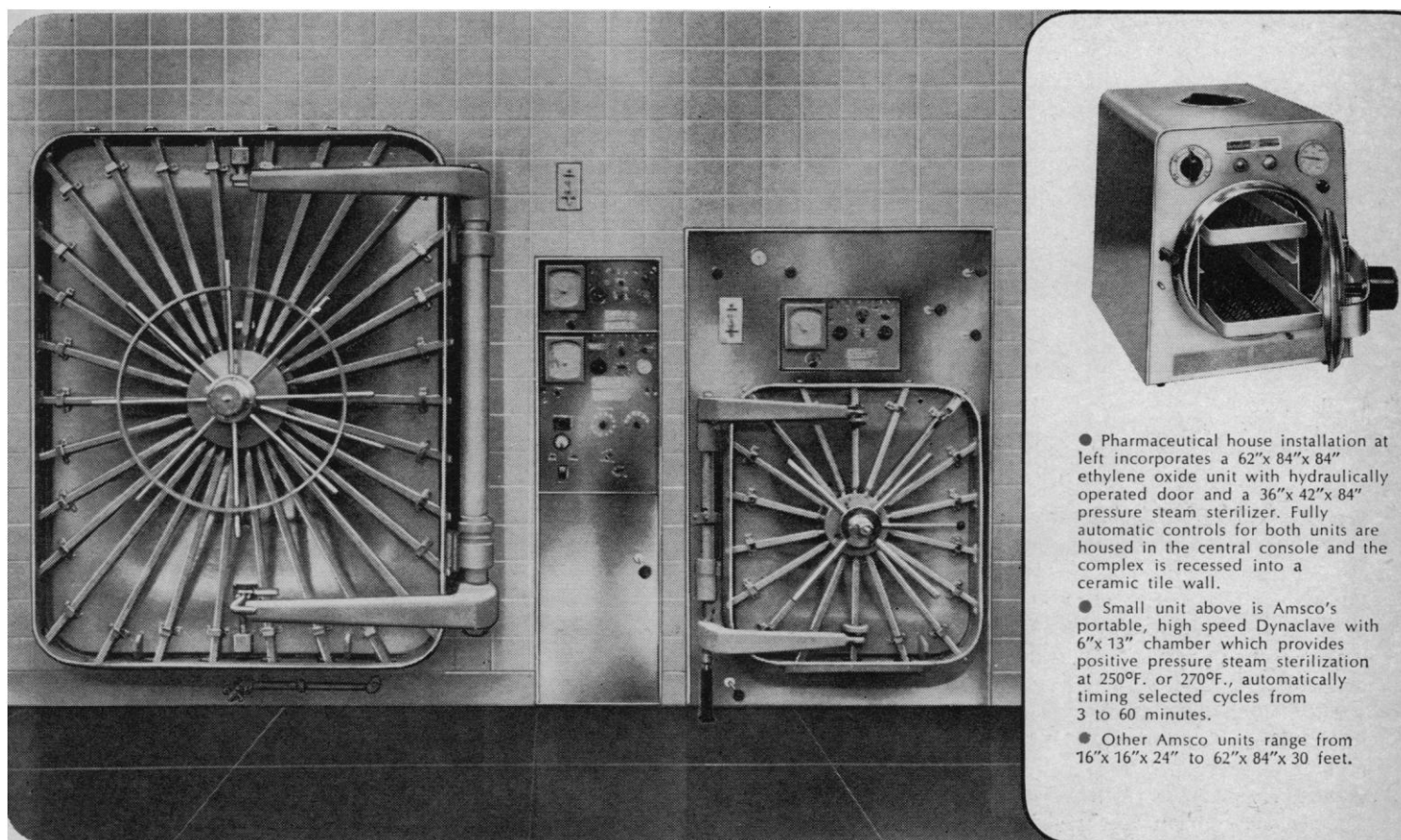
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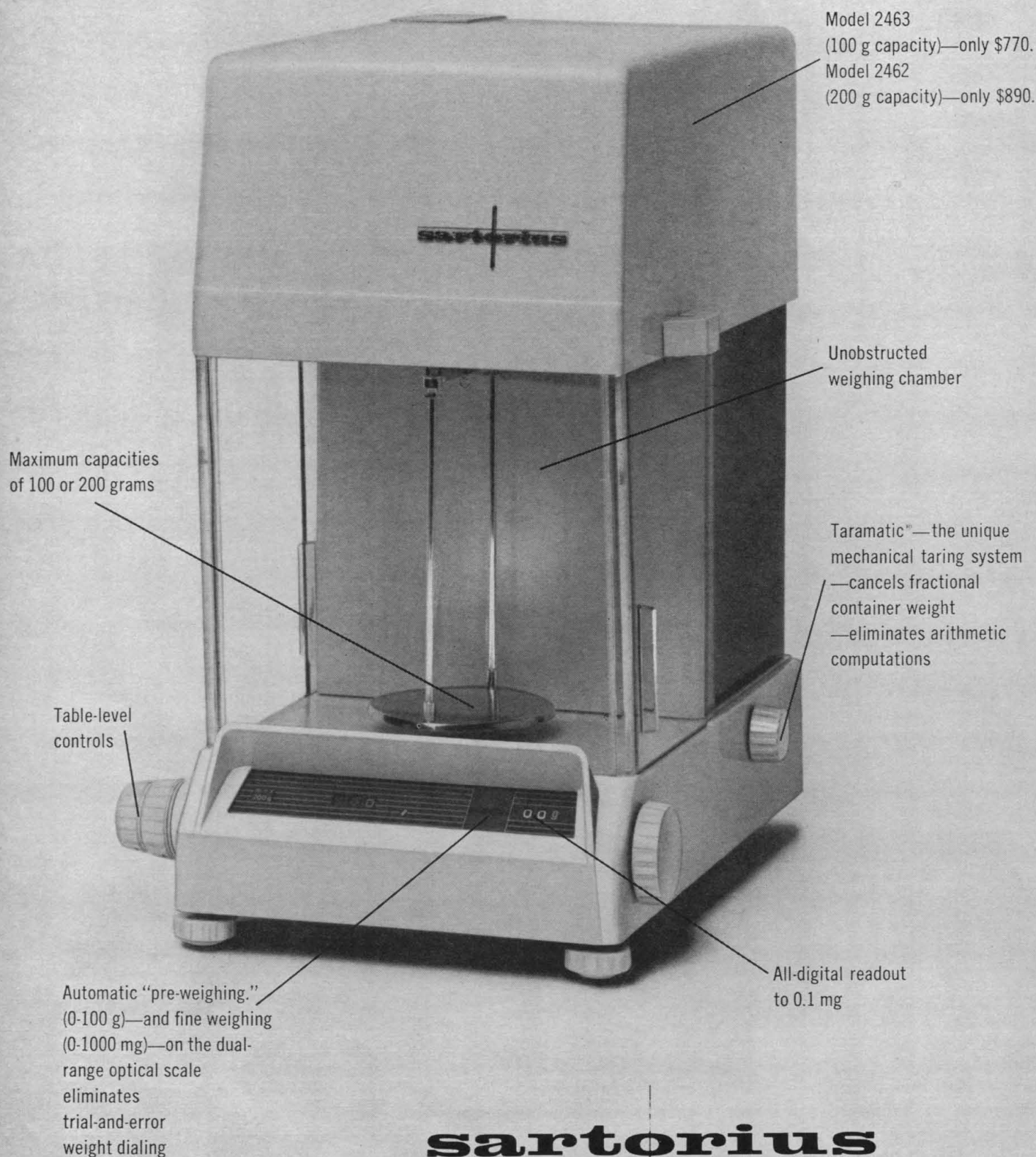


● Pharmaceutical house installation at left incorporates a 62"x 84"x 84" ethylene oxide unit with hydraulically operated door and a 36"x 42"x 84" pressure steam sterilizer. Fully automatic controls for both units are housed in the central console and the complex is recessed into a ceramic tile wall.

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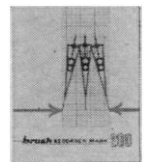
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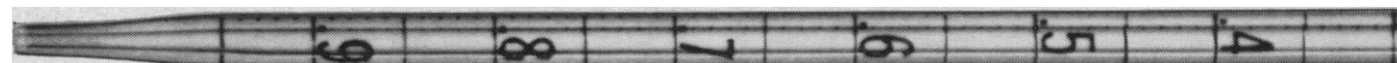


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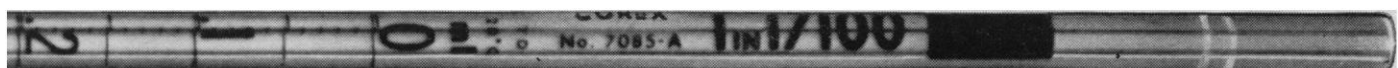


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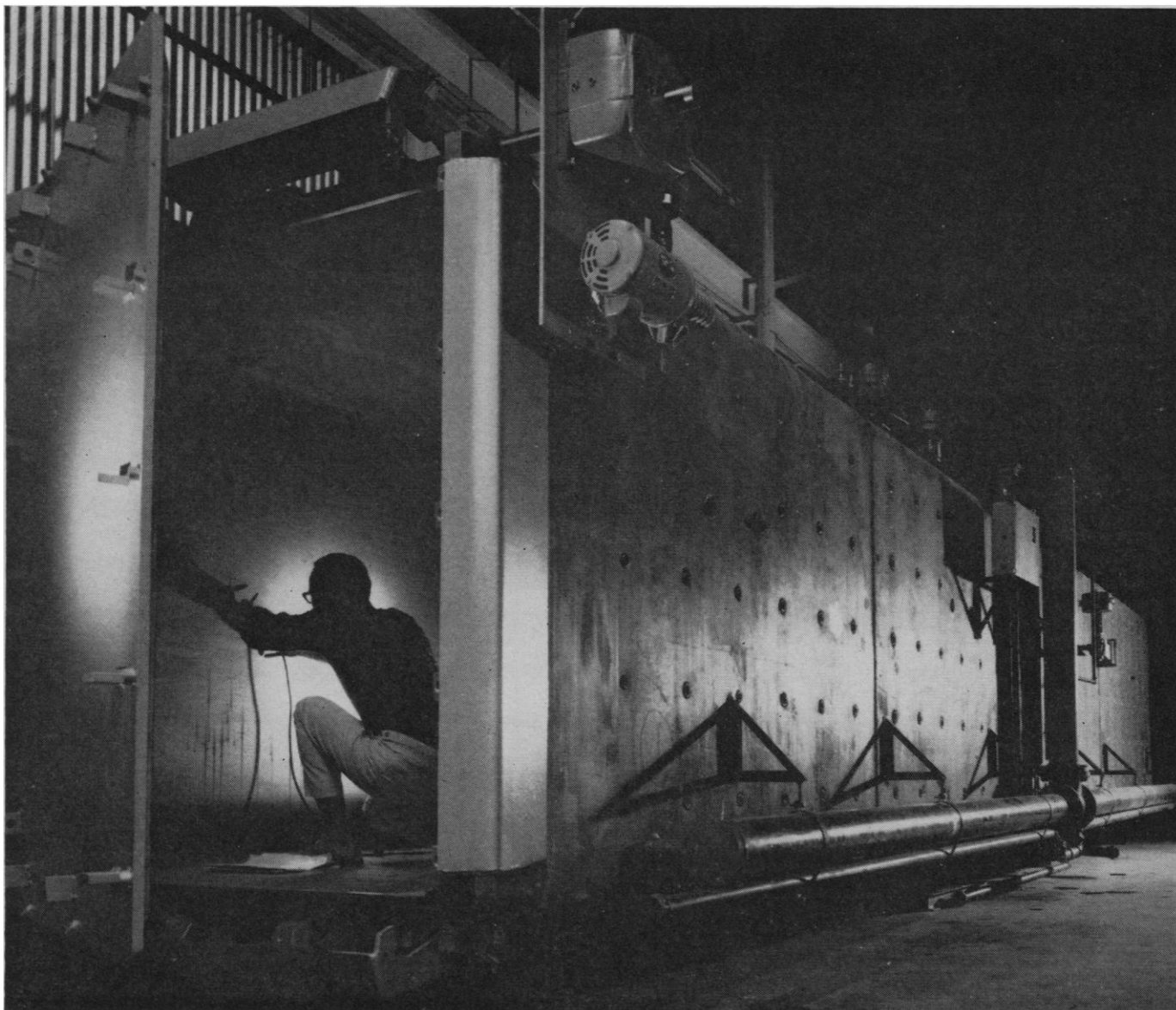
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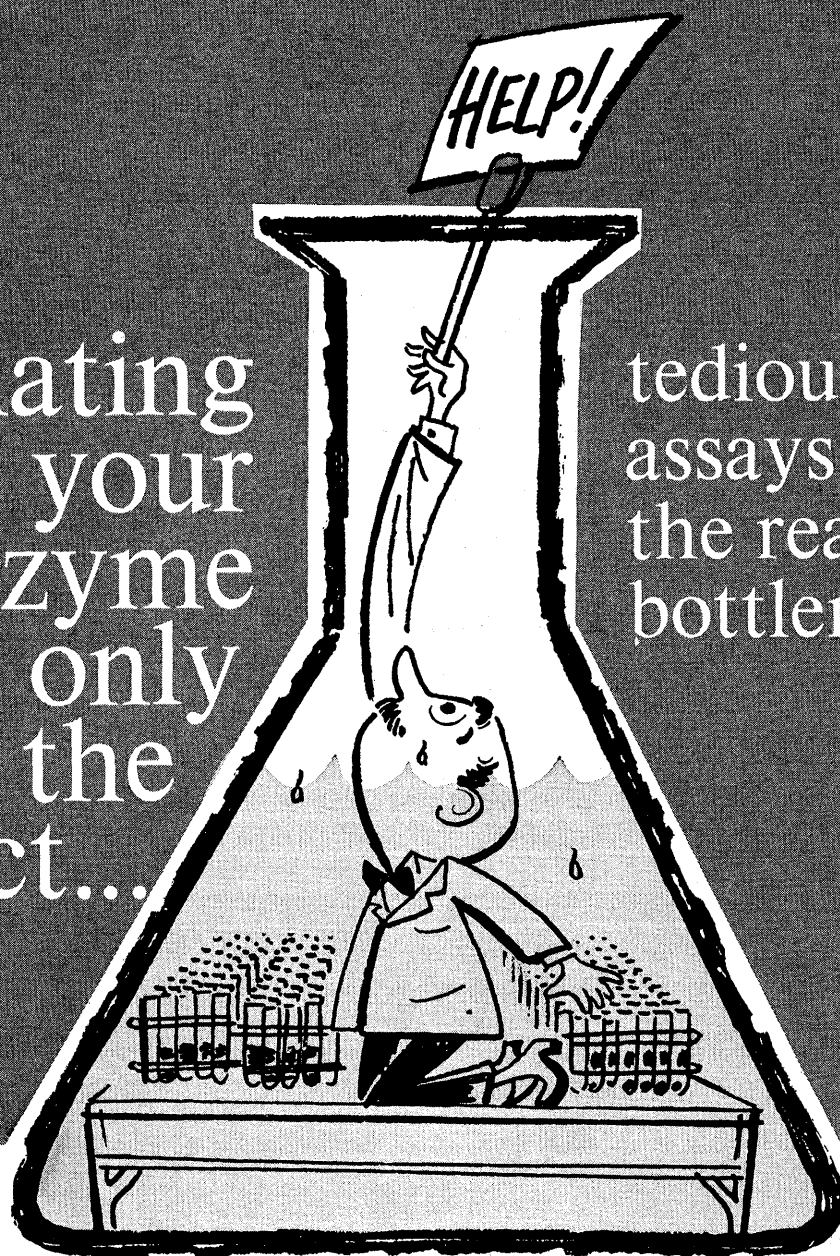
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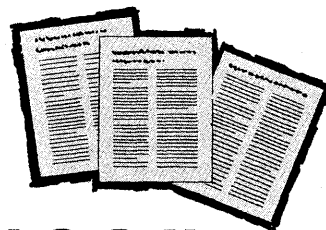
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cholinesterase	hydrolytic enzymes
cytochrome oxidase	lysolytic enzymes
amino acid decarboxylases	NAD-NADH systems
dehydrase	peptidase
alcohol dehydrogenase	phosphohexose isomerase
lactic dehydrogenase	phosphorylase
glucokinase	acid phosphatase
glucose oxidase	alkaline phosphatase
glucuronidase	proteolytic enzymes
hexokinase	sulfatase
histidase	glutamic oxalacetic transaminase
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glutamine synthetase	ornithine carbamoyl transferase
ornithine transaminase	and others

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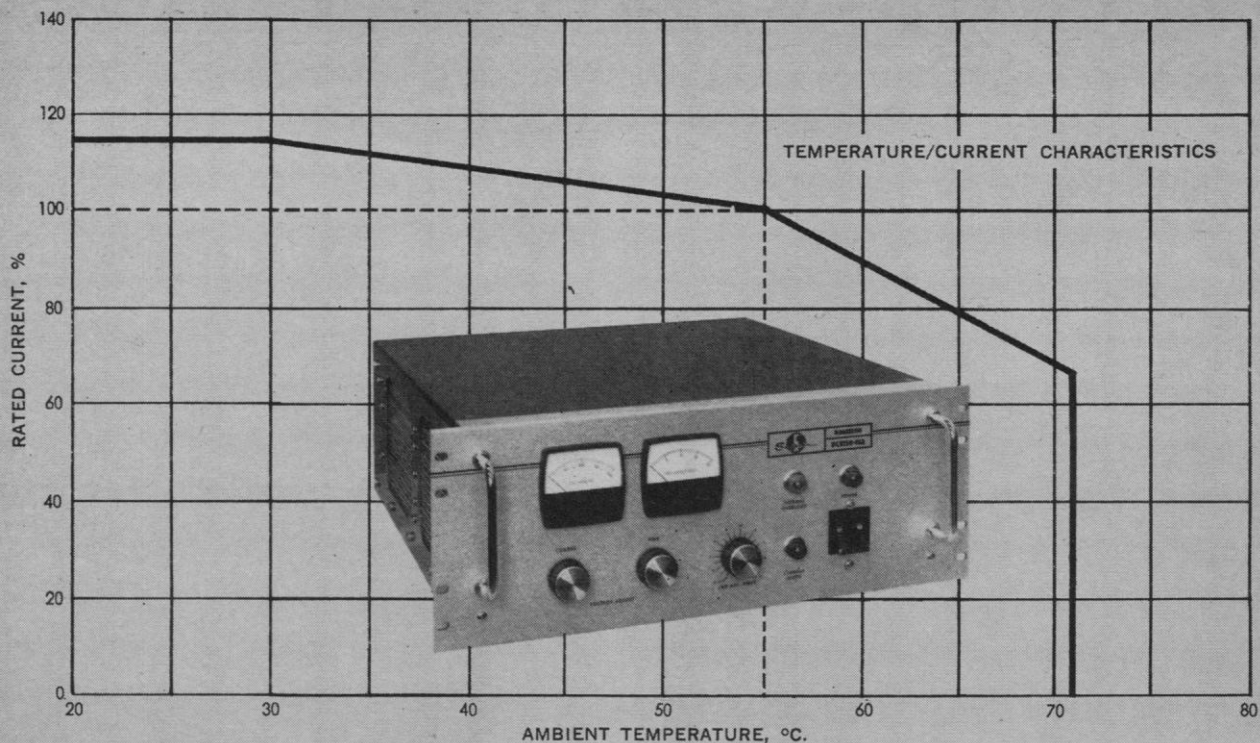
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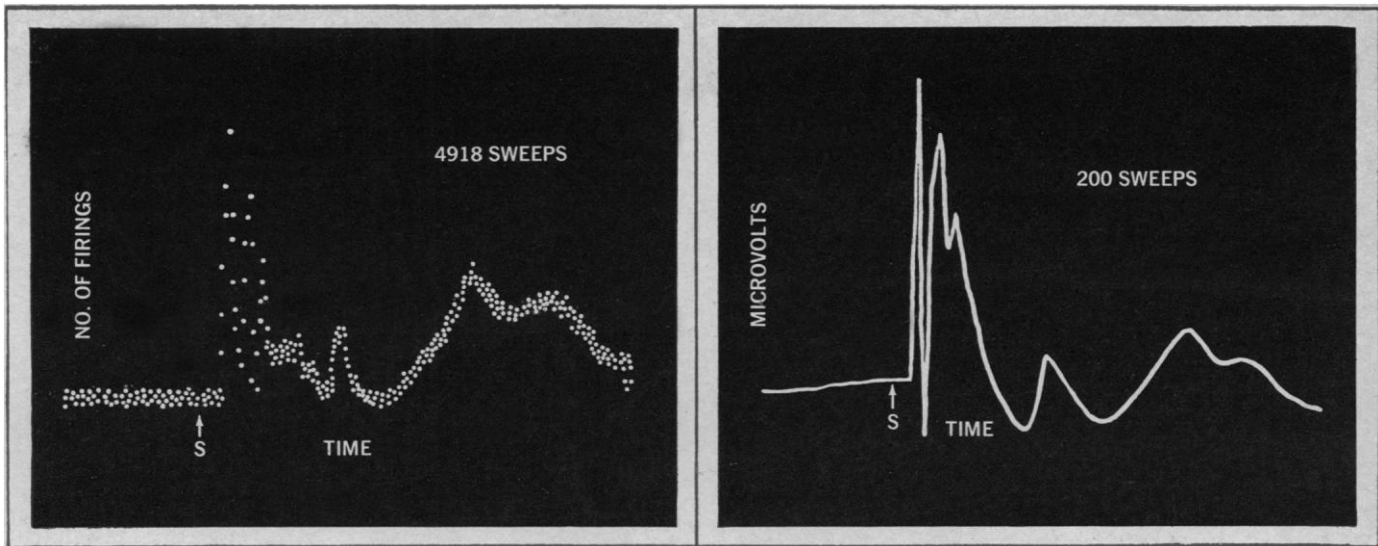
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Voltage	Amps.	Model	Price	Amps.	Model	Price	Amps.	Model	Price	Amps.	Model	Price
0- 20	125	DCR 20- 125A	\$1055	250	DCR 20- 250A	\$1495	—	—	—	—	—	—
0- 40	10	DCR 40- 10A	325	20	DCR 40- 20A	525	35	DCR 40- 35A	\$ 710	60	DCR 40-60A	\$925
0- 40	125	DCR 40- 125A	1350	250	DCR 40- 125A	1995	500	DCR 40-500A	2950	—	—	—
0- 60	13	DCR 60- 13A	525	25	DCR 60- 25A	710	40	DCR 60- 40A	900	—	—	—
0- 80	5	DCR 80- 5A	325	10	DCR 80- 10A	525	18	DCR 80- 18A	710	30	DCR 80-30A	875
0-150	2.5	DCR 150- 2.5A	325	5	DCR 150- 5A	525	10	DCR 150- 10A	710	15	DCR 150-15A	825
0-300	1.25	DCR 300-1.25A	325	2.5	DCR 300- 2.5A	525	5	DCR 300- 5A	710	8	DCR 300- 8A	825





Frequency distribution histogram of single-cell firings in response to 4918 stimuli, and averaged evoked potential to 200 stimuli (visual cortex of cat). Data courtesy of

S. S. Fox and J. H. O'Brien, see "Duplication of Evoked Potential Waveform by Curve of Probability of Firing of a Single Cell", SCIENCE, Vol. 147, 19 February, 1965.

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signal averaging and
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April, 1966

FISHER PRODUCT REPORT

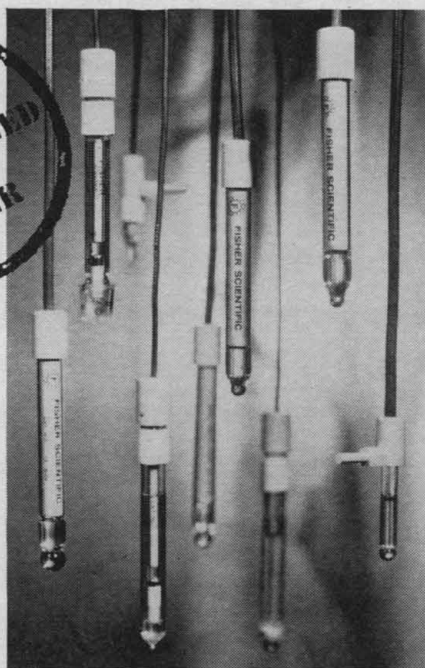
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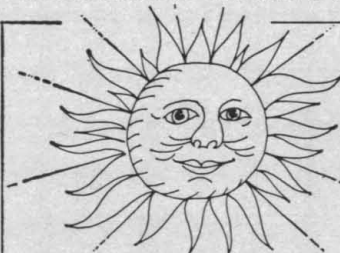


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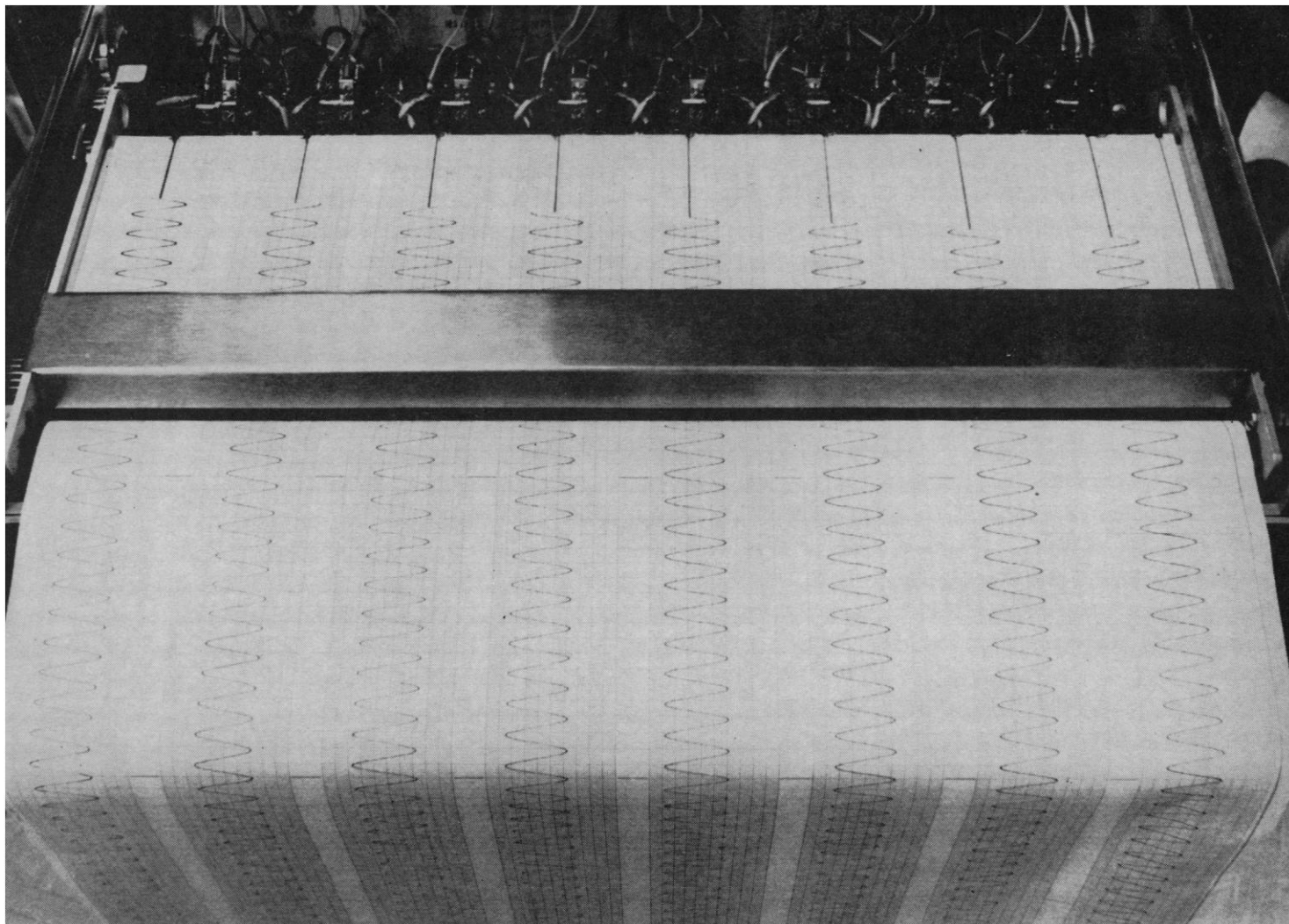
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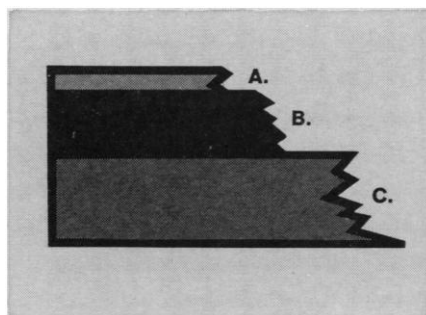


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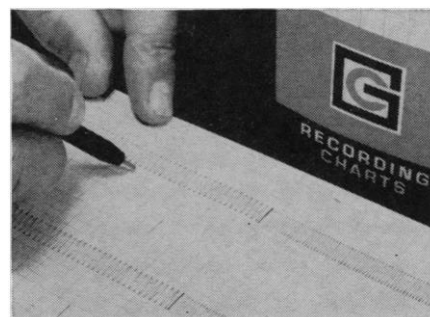
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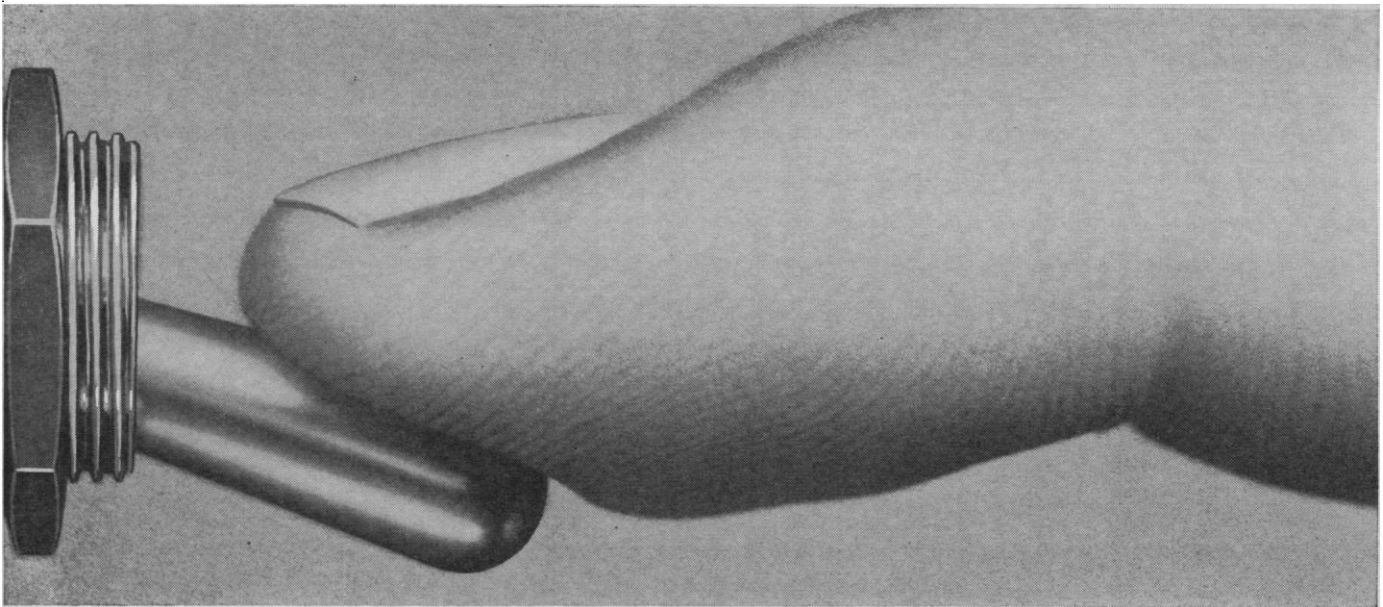


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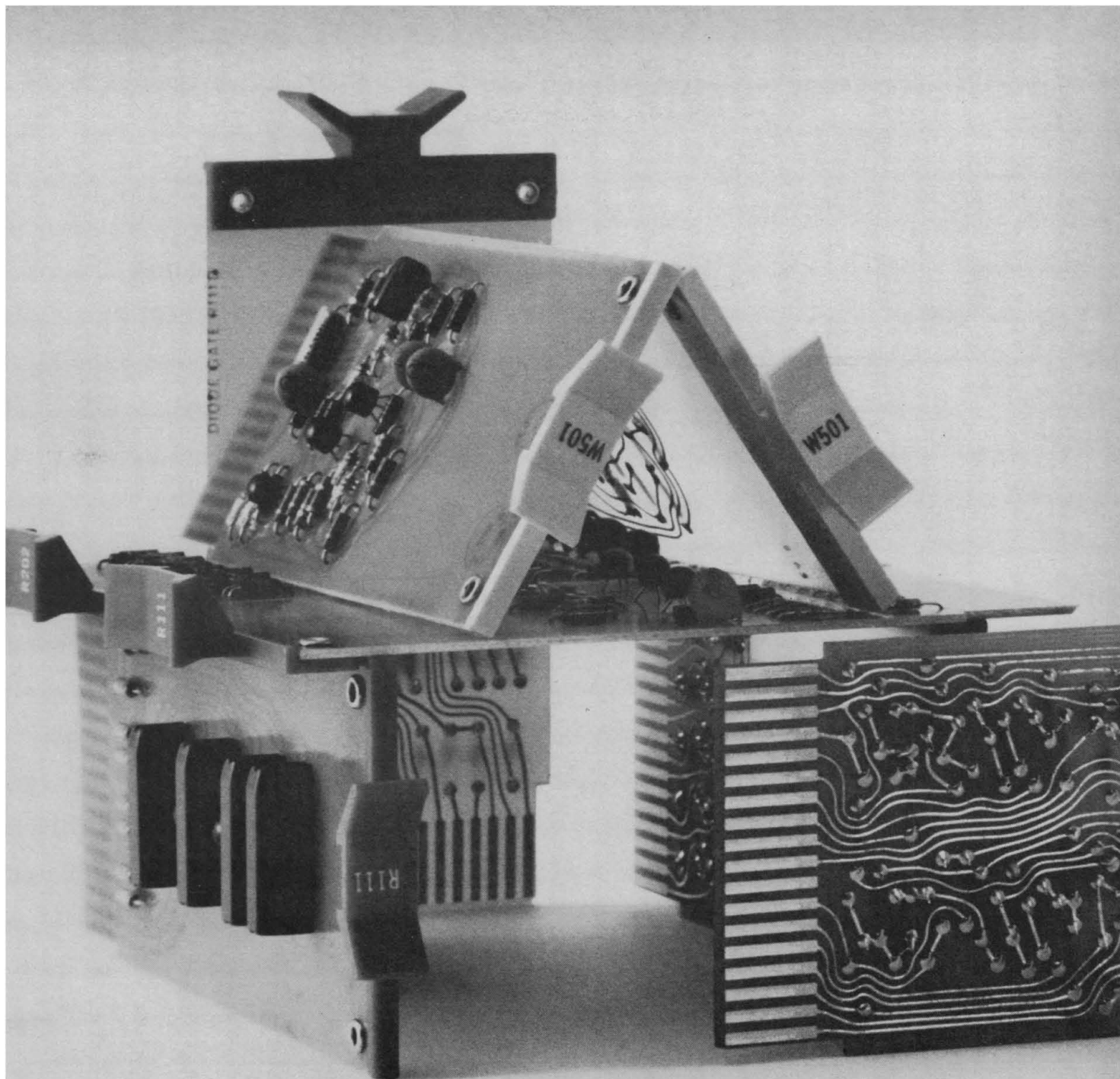


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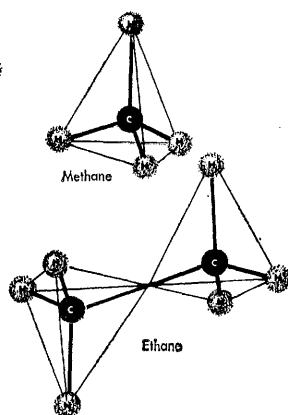
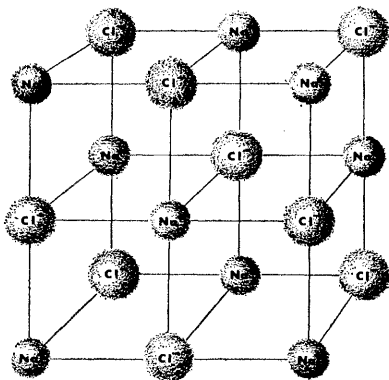
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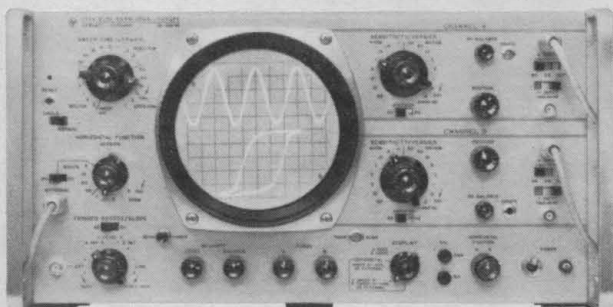
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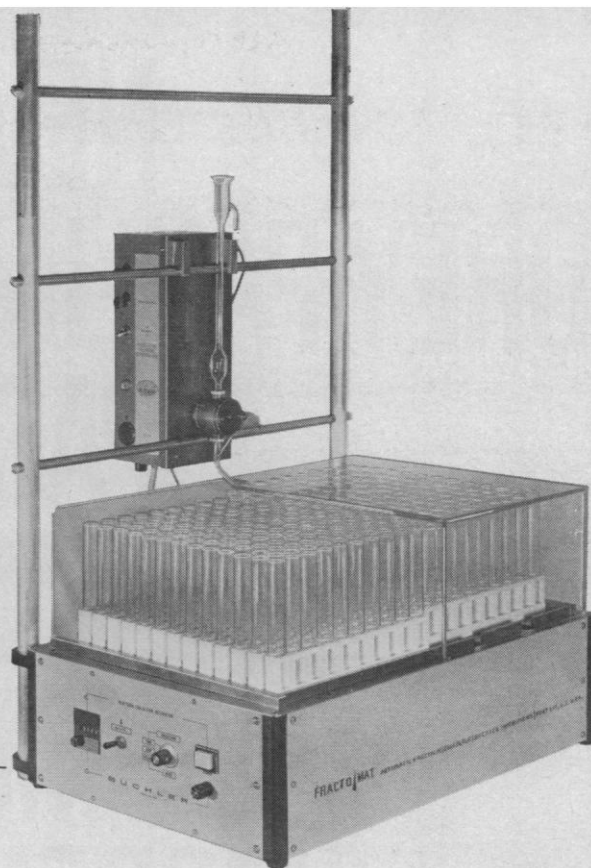
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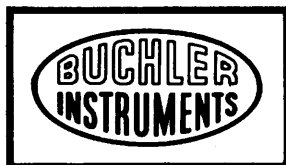
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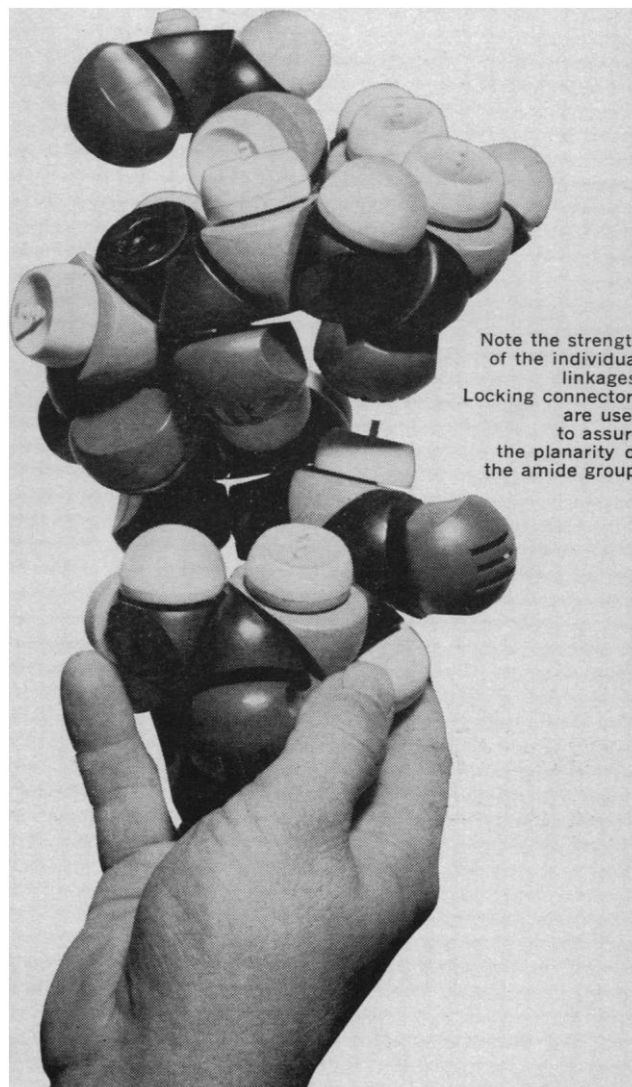
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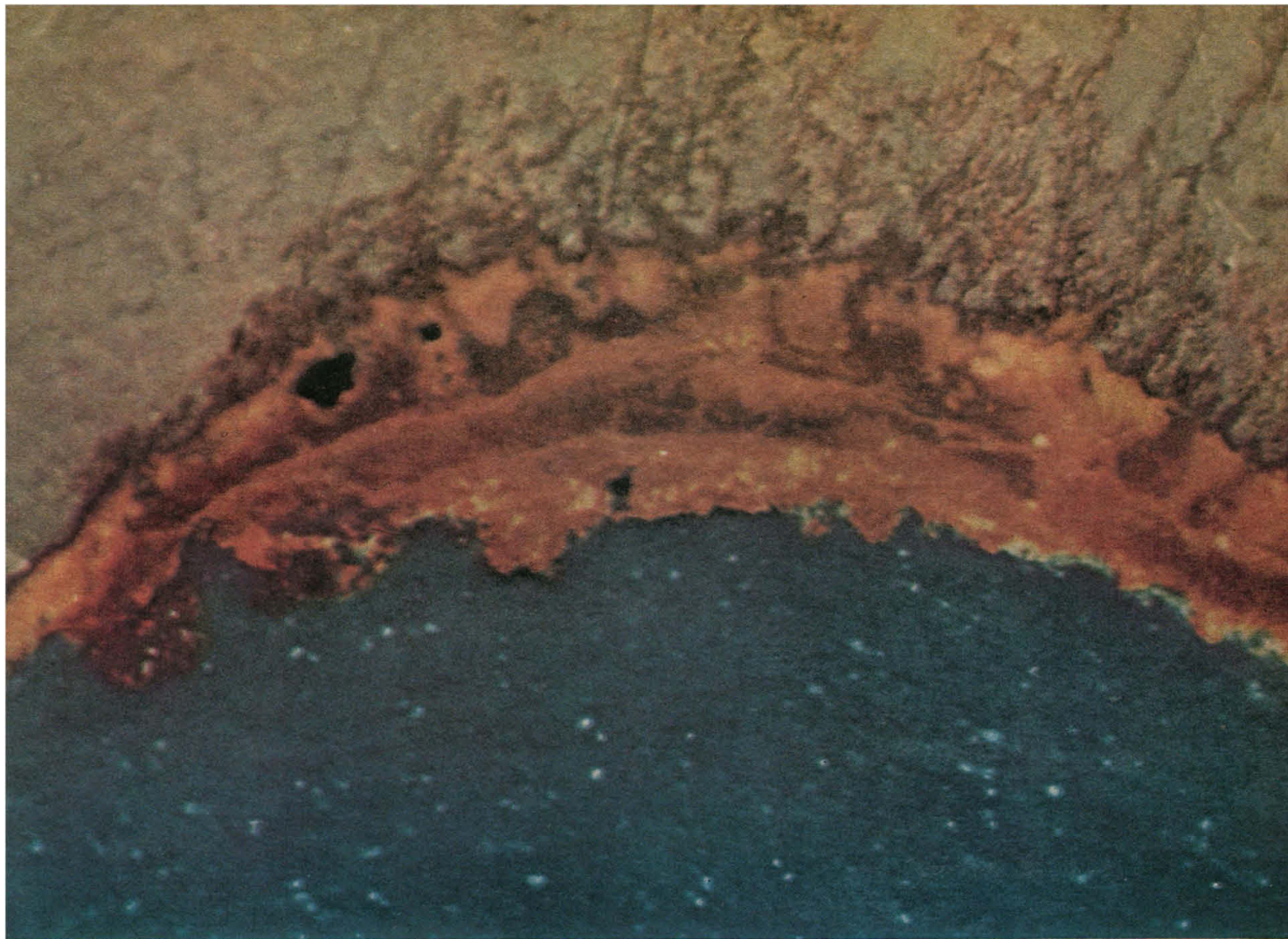
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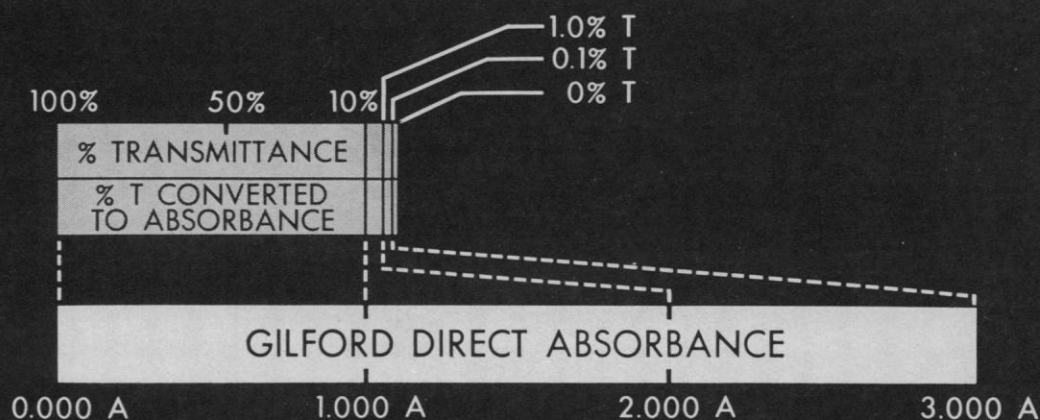
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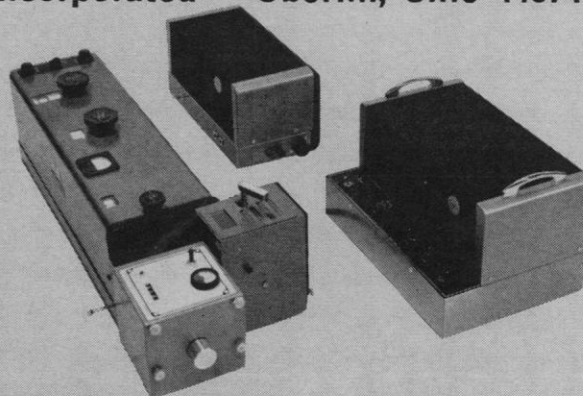
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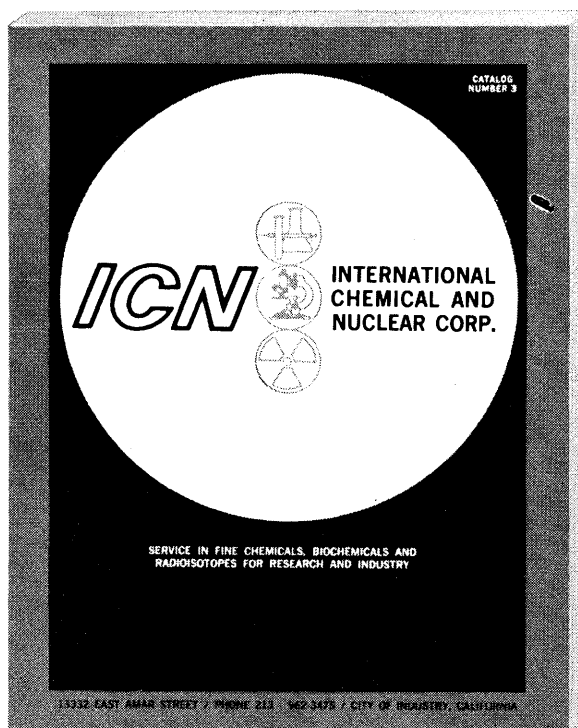
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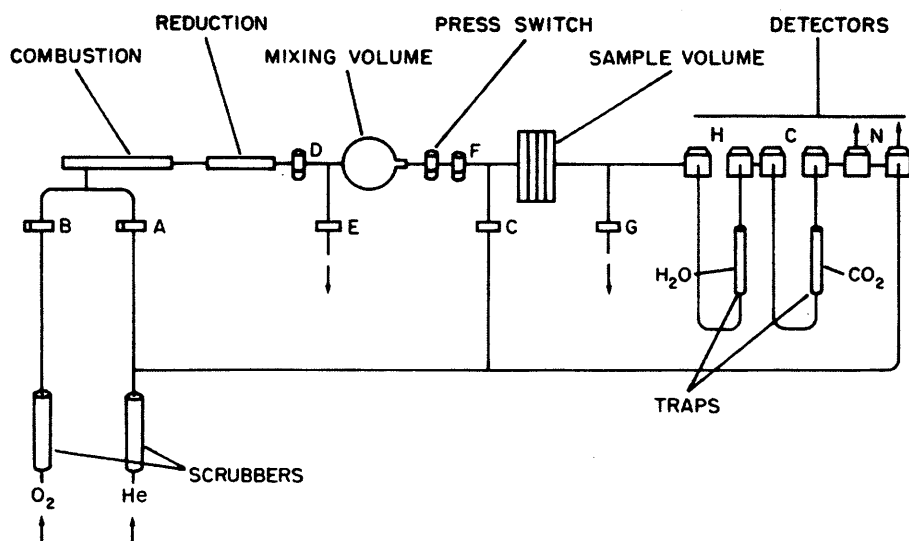
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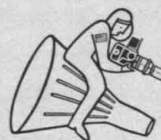
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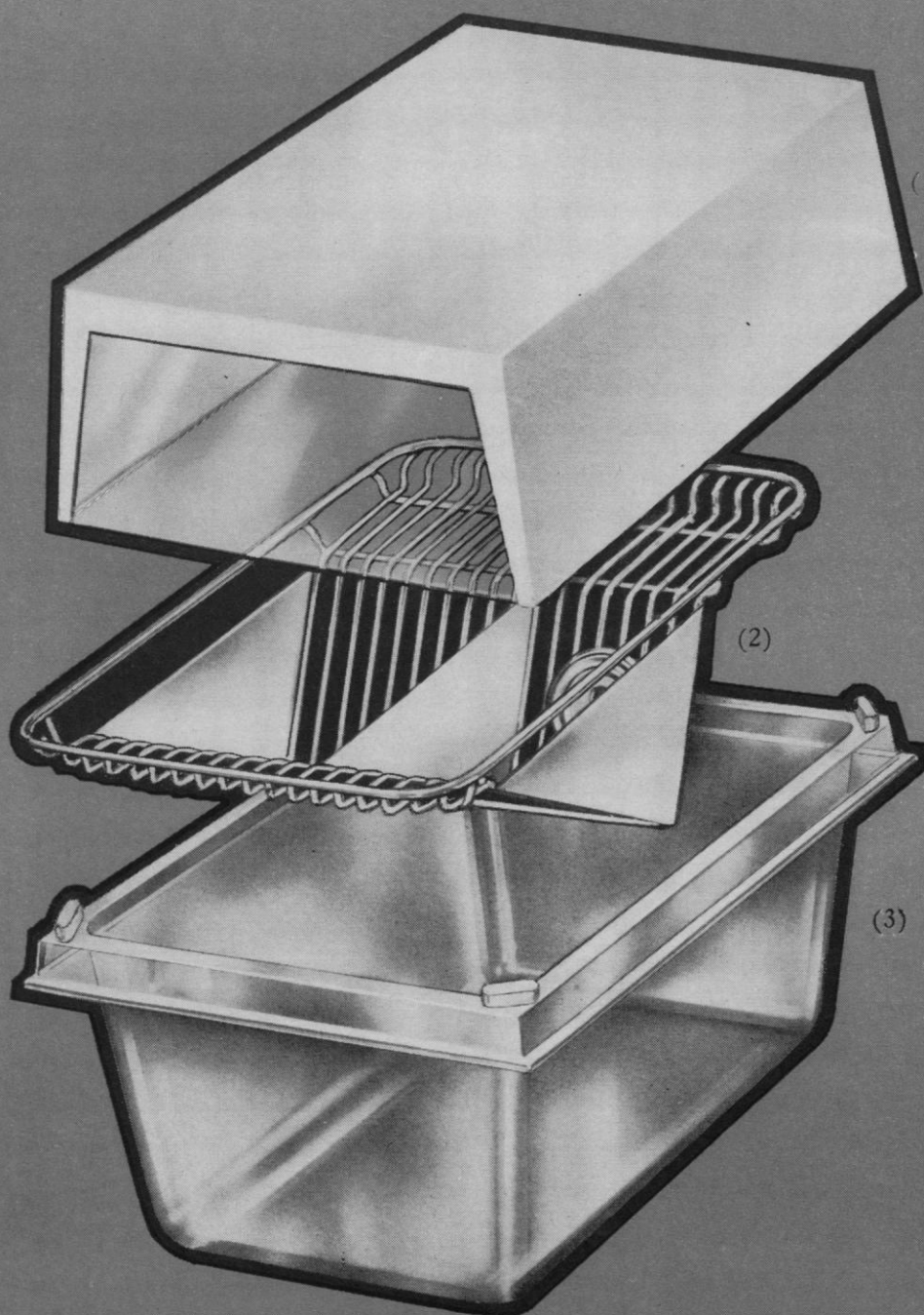
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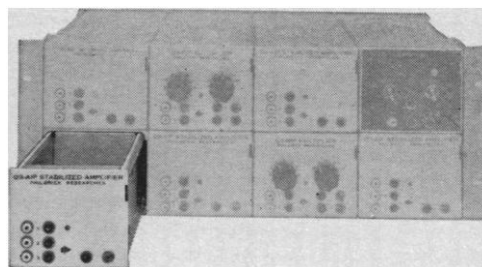
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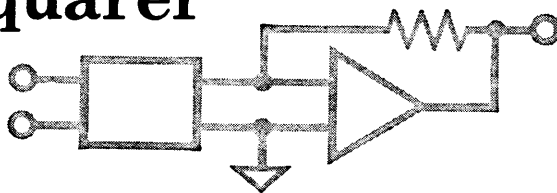


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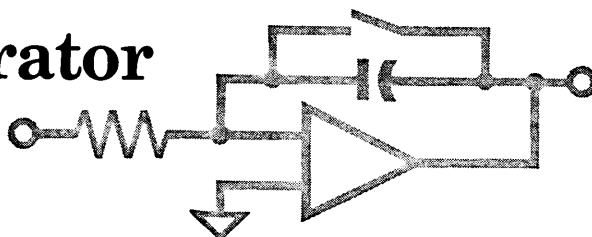
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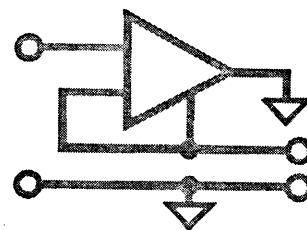
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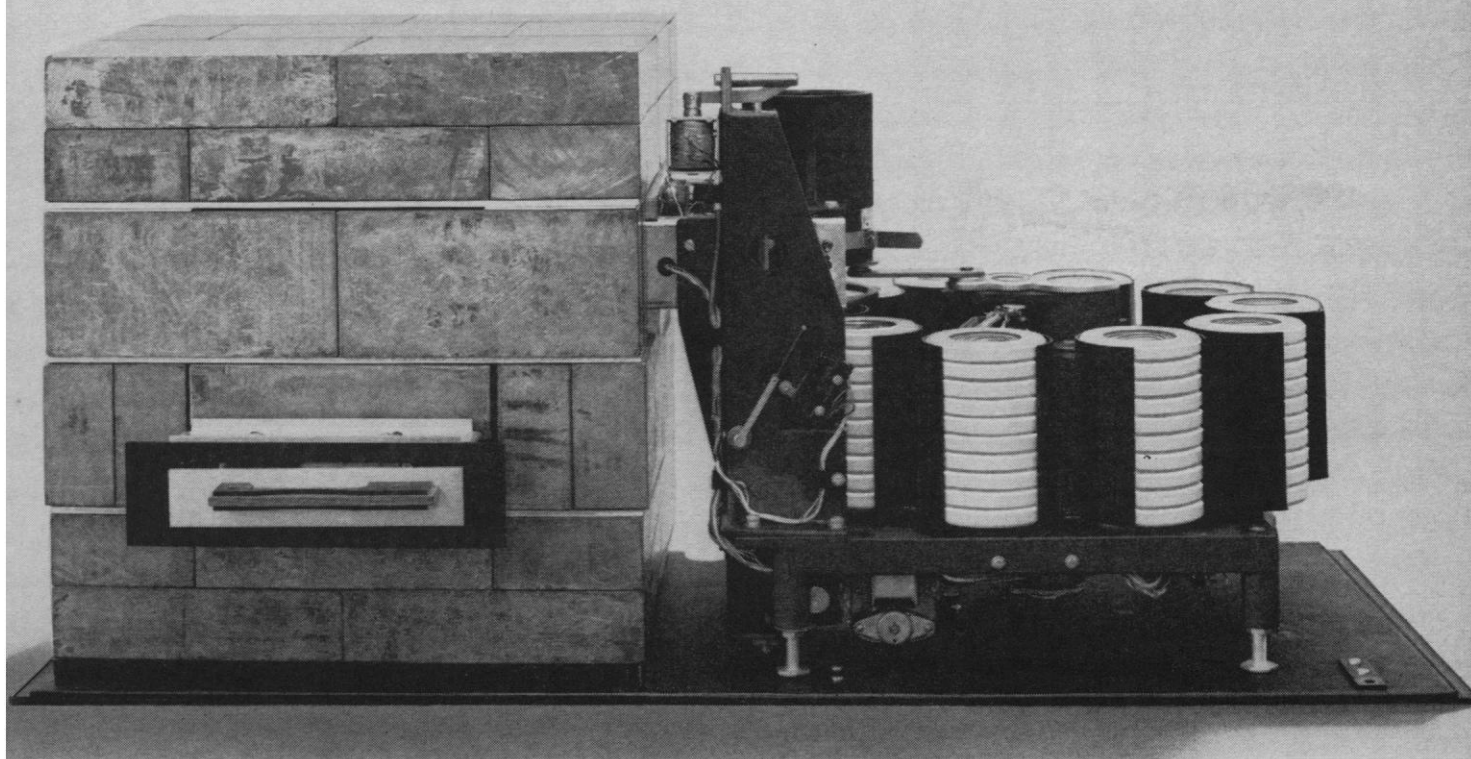
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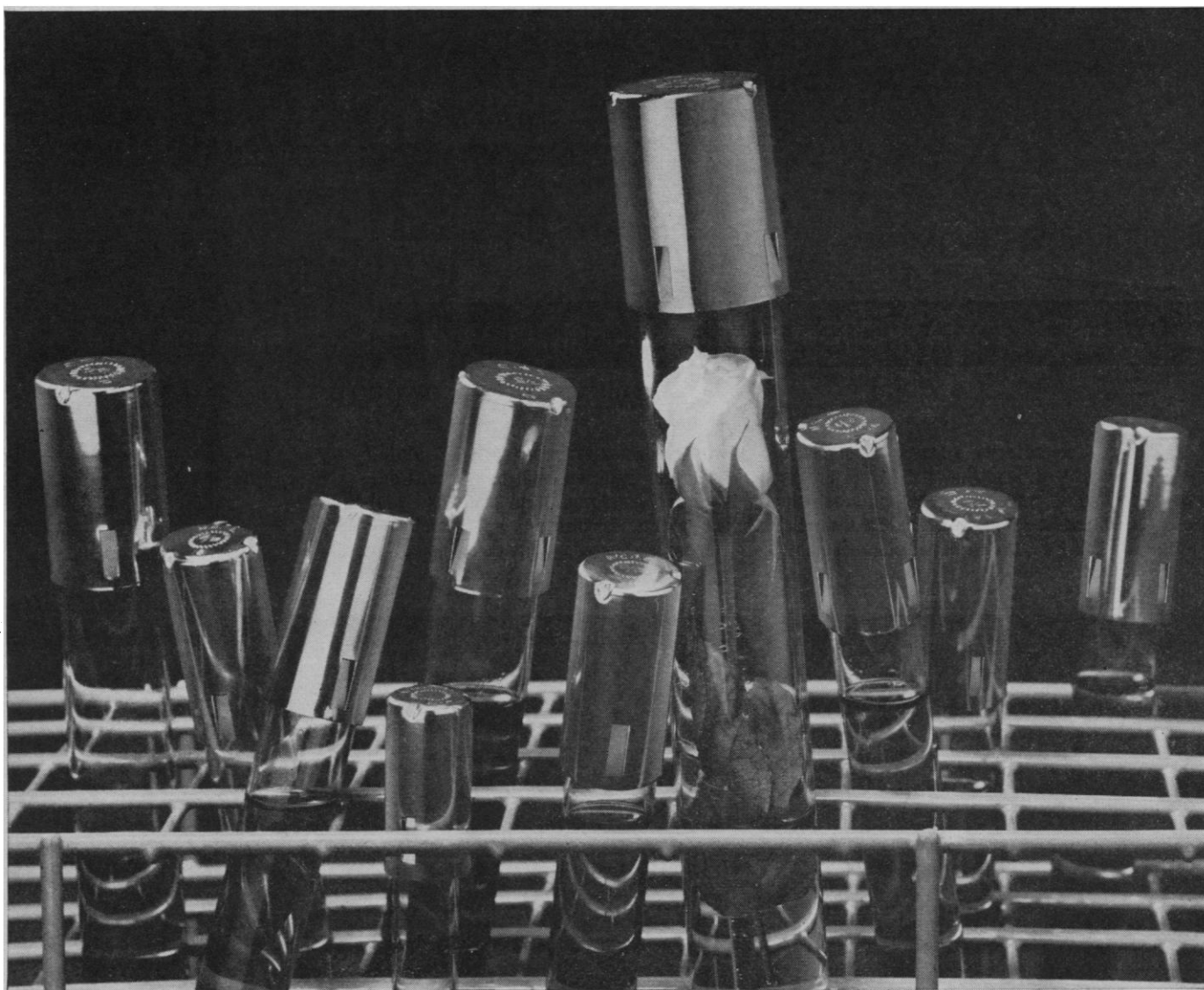
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scientific products

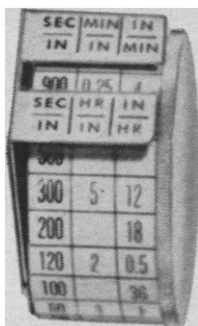
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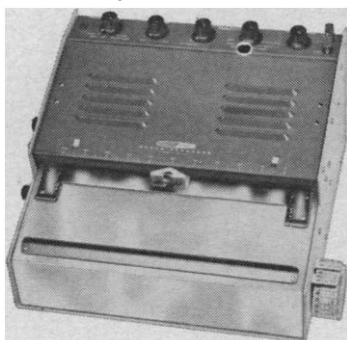
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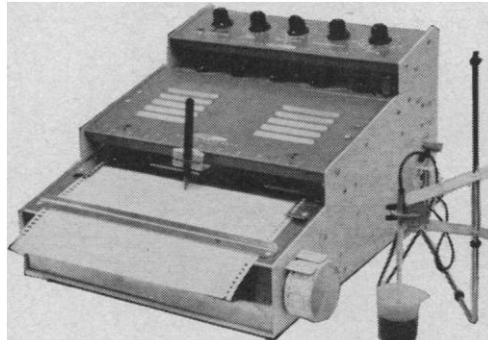


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**Relative to buffer accuracy and assuming proper standardization technique.*

Absolute Accuracy: ± 1.4 mv (± 0.01 pH).

Repeatability: ± 0.002 pH; ± 0.2 mv.

Input Current: less than 10^{-12} amperes.

External Resistance Tolerance: will accommodate up to 10,000 megohms and maintain specified accuracy.

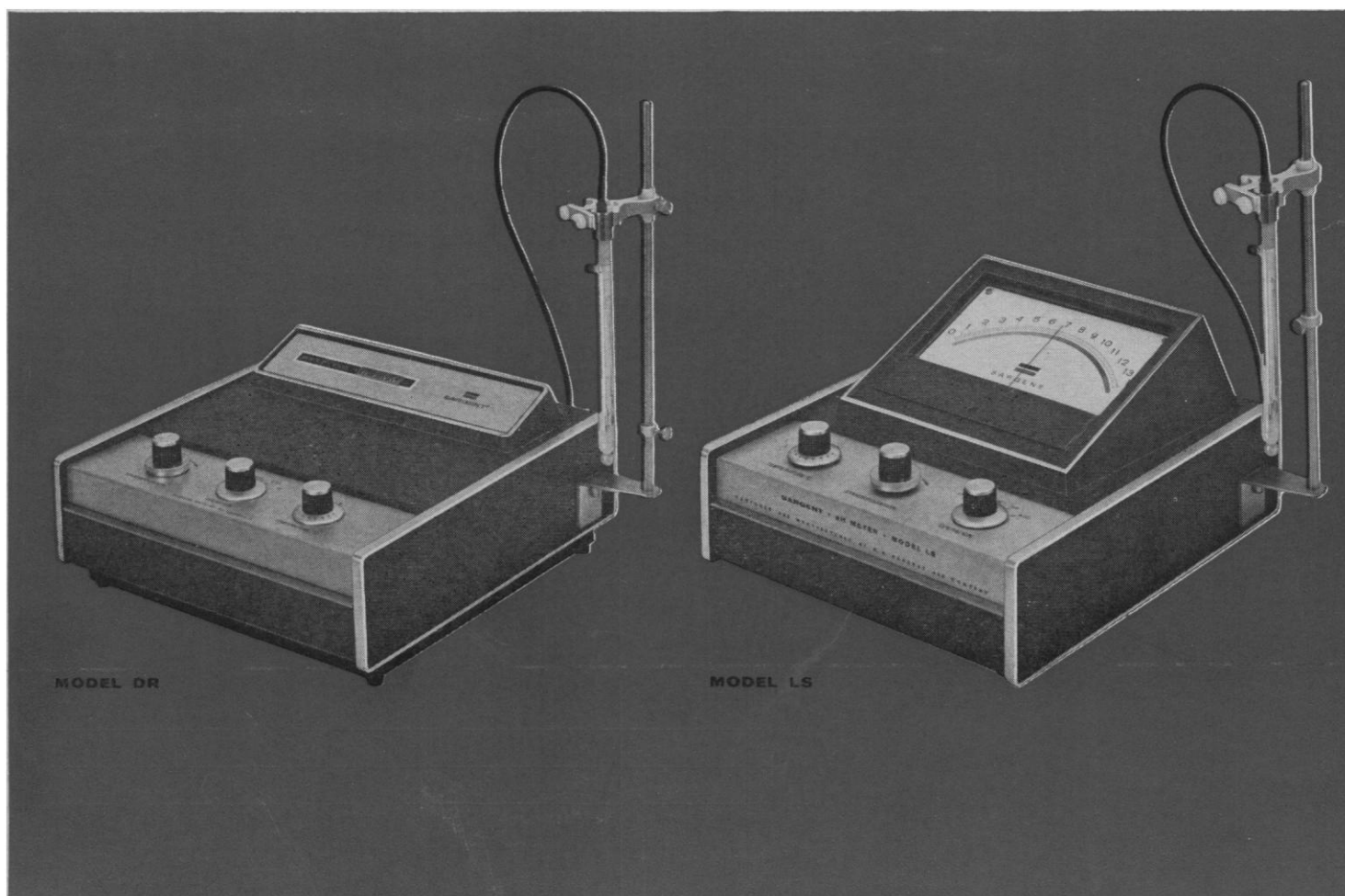
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MODEL LS

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Temperature: manual compensation, 0 to 100°C; automatic compensation, 0 to 100°C.

Relative Accuracy:* ± 0.03 pH within 4 pH of buffer set point.

**Relative to buffer accuracy and assuming proper standardization technique.*

Absolute Accuracy: At meter, ± 5 mv (± 0.05 pH) over full scale.

At recorder outlet, ± 0.6 mv (± 0.01 pH).

Repeatability: pH, ± 0.01 pH; mv, ± 0.6 mv.

Input Current: less than 1×10^{-12} amperes.

External Resistance Tolerance: will accommodate up to 10,000 megohms and maintain specified accuracy.

Price—\$330.00 with accessories

For details, write for Bulletin PHL5

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SPECIFICATIONS

Ranges: Meter: 0 to 14 pH, graduated each 0.1 pH; -700 to +700 mv, graduated each 10 mv (0 to ± 1400 mv by zero displacement).

Recorder: recommended for use with recorders of 5 mv to 250 mv full scale range.

Temperature: manual compensation, 0 to 100°C; automatic compensation, 0 to 80°C.

Absolute Accuracy: At meter, ± 5 mv (± 0.05 pH) over full scale. At recorder outlet, ± 2.5 mv (± 0.025 pH). Manual temperature compensation— $\pm 2^\circ\text{C}$. Automatic temperature compensation— $\pm 2^\circ\text{C}$ (0° to 60°C) $\pm 5^\circ\text{C}$ (60° to 80°C).

Repeatability: pH, ± 0.01 pH; mv, ± 1 mv.

Input Impedance: greater than 10^{14} ohms.

Input Current: less than 1×10^{-12} amperes.

External Resistance Tolerance: will accommodate up to 10,000 megohms and maintain specified accuracy.

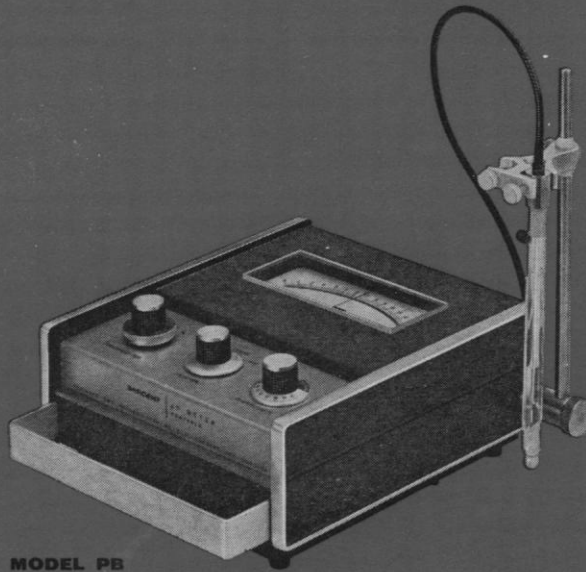
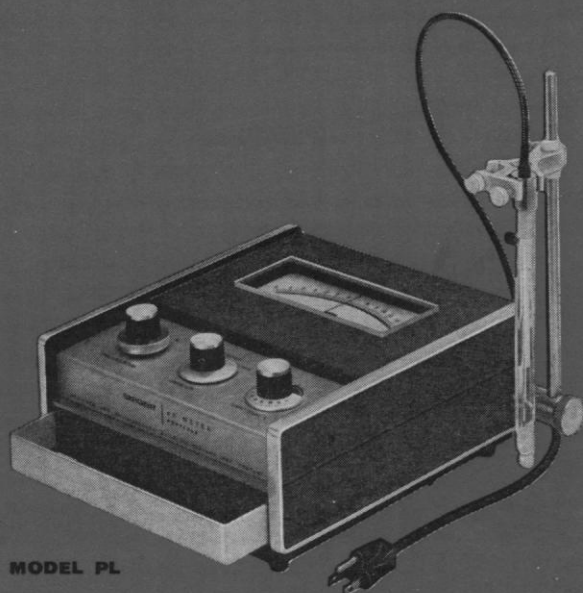
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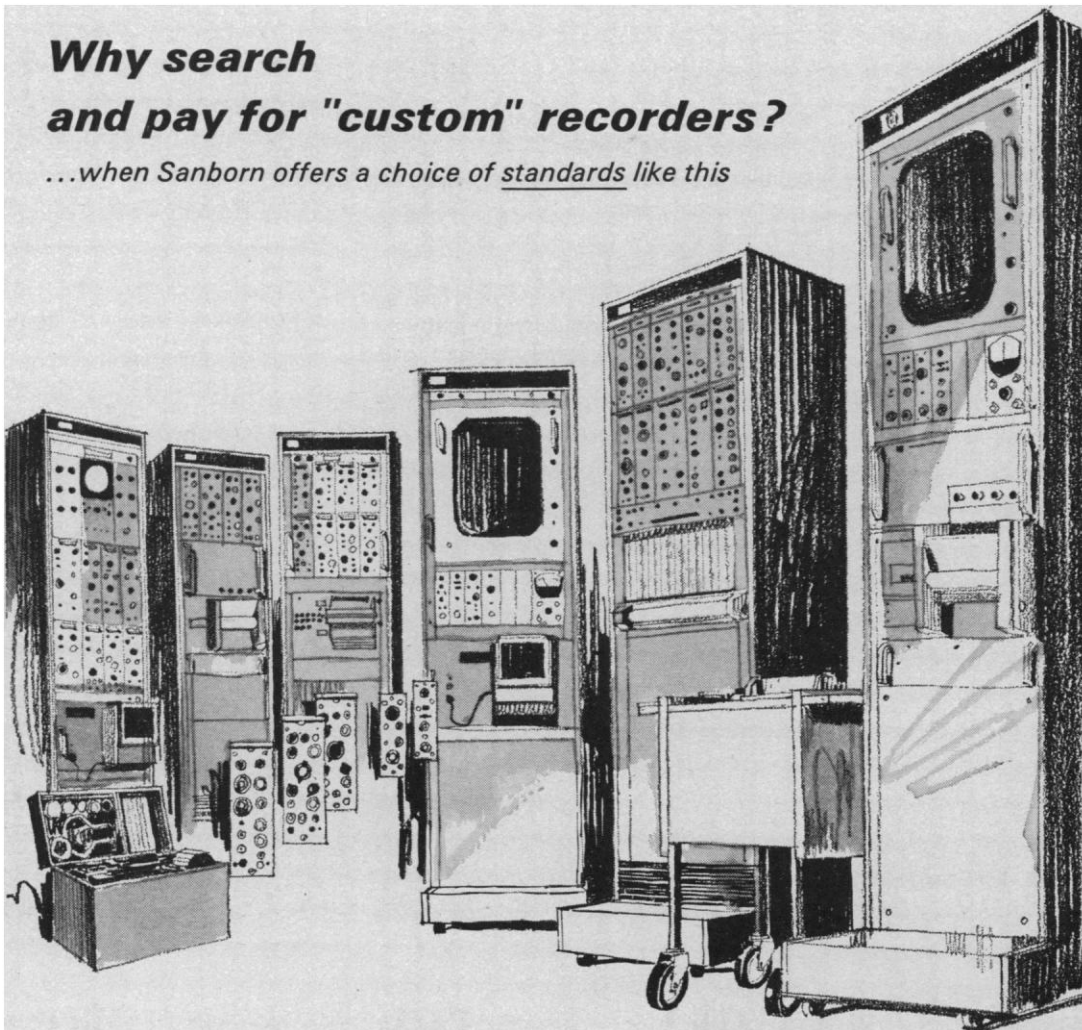
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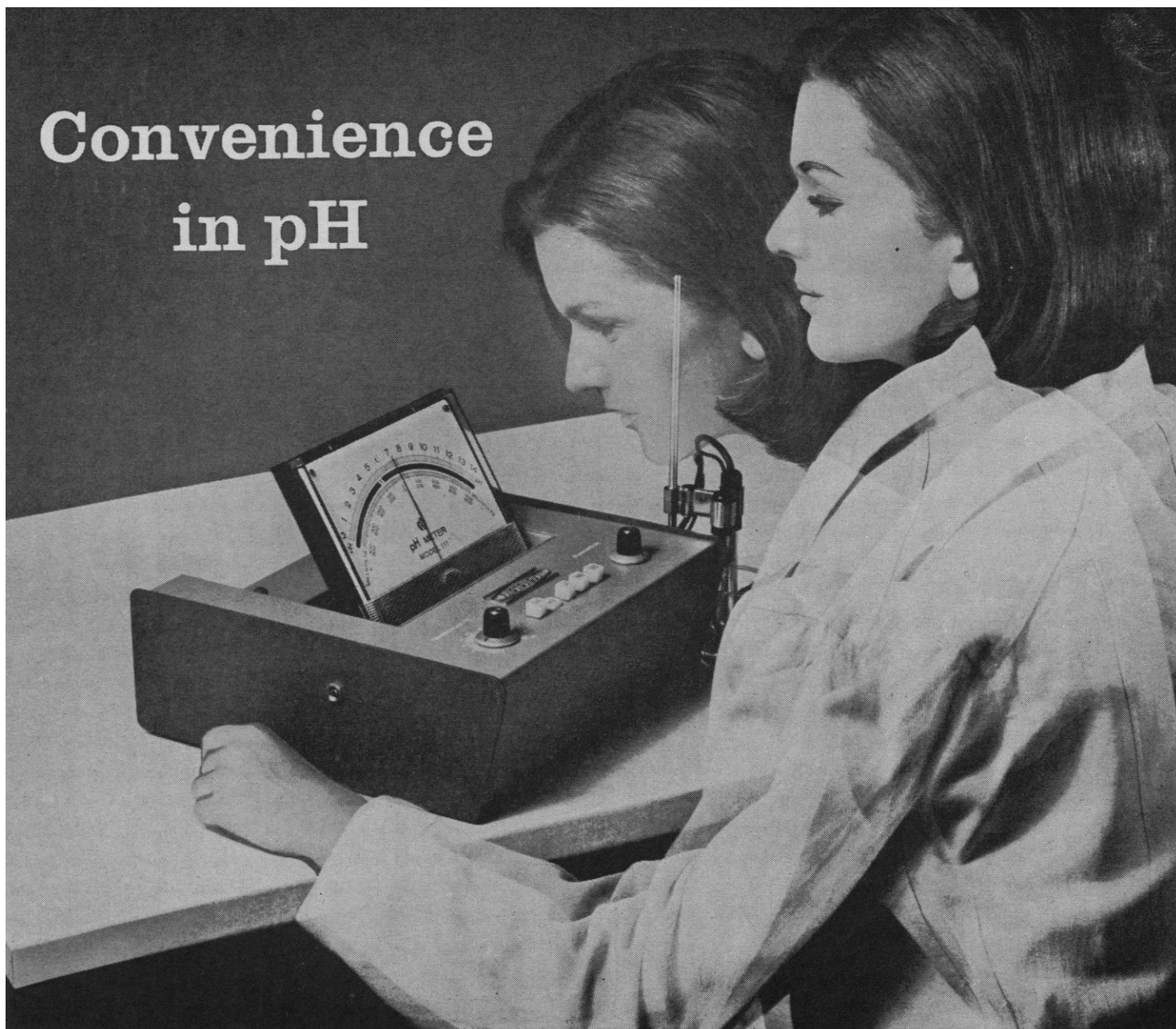


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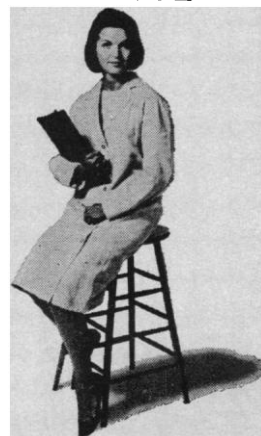
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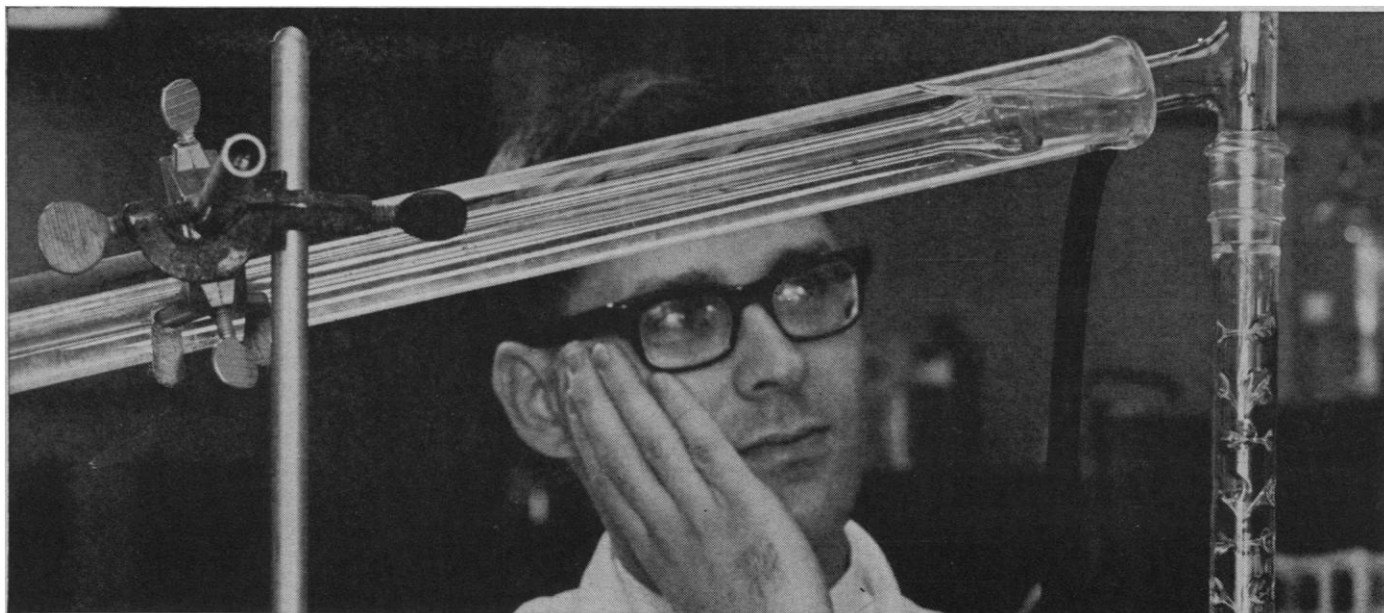
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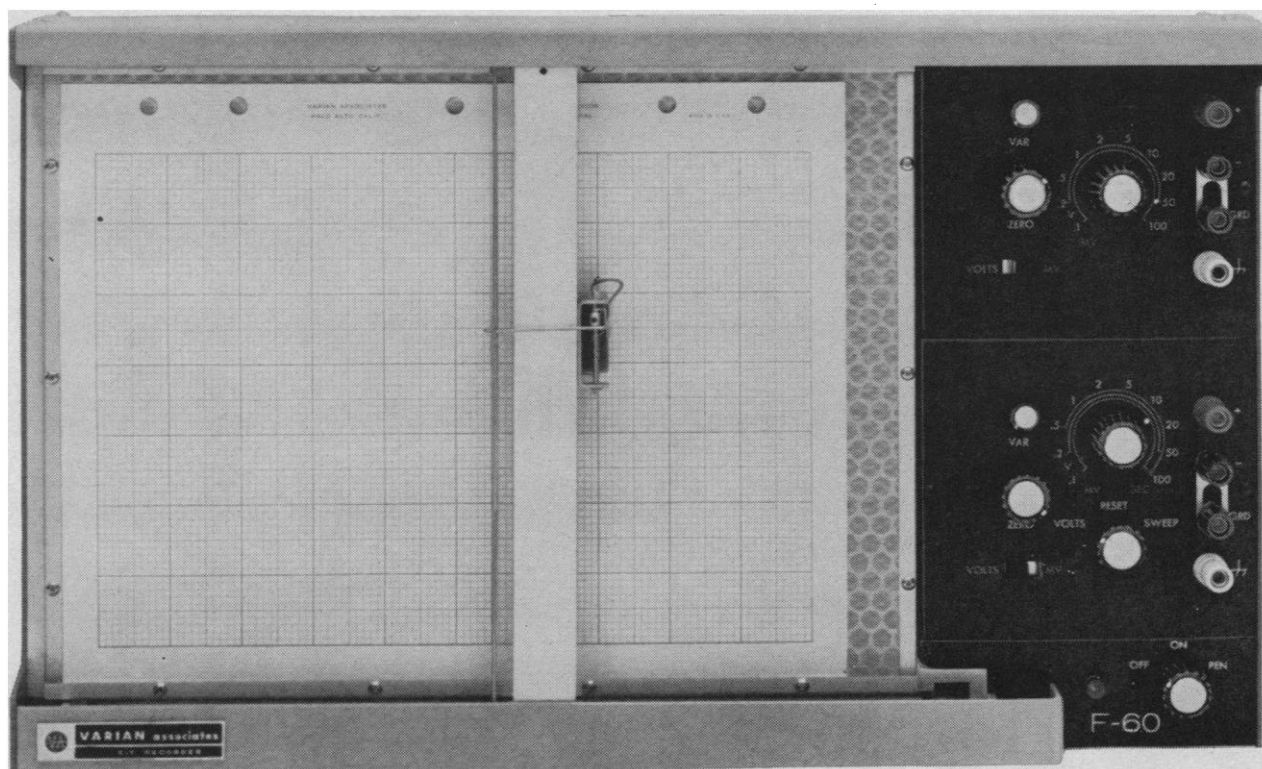
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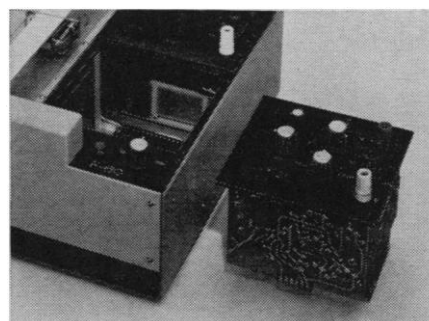
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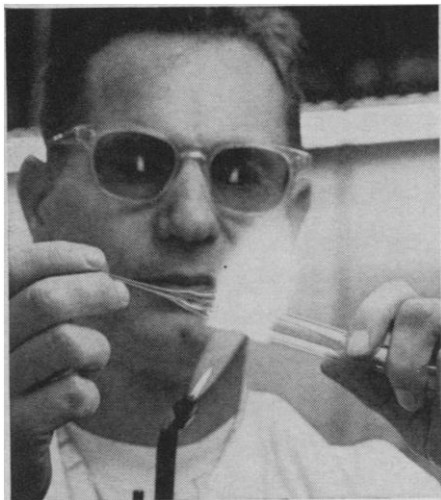
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Data Collection and Systems Analysis

W. C. H. Prentice writes (Letters, 4 March) about the problems raised by the increasing tendency to collect data for their own sake, particularly by means of questionnaire surveys. The remedies he proposes deserve close attention, for they can be generalized to apply beyond the limited domain of such surveys. The problem that Prentice addresses is far more pervasive and serious than may be realized. Because of the ease with which data may now be collected and processed, in some technical, economic, political, and social fields we are almost being studied to death. Many of the studies serve to obscure rather than to illuminate the central issues to be examined for effective decision-making. In addition—and this is potentially more serious—many such data collection studies are being represented as valid systems analyses of complex engineering, economic, political, and social problems.

In recent years some notable successes have been achieved through the application of the "systems approach" to a range of national security problems. The points of view and the techniques developed in such predominantly military systems have just begun to be extended wholesale to nonmilitary government, commercial, and industrial sectors. Examples include the fields of communication, transportation, urban development, education, health, and water-resources development. In the next 5 to 10 years this trend will increase sharply.

Systems analysis can be a powerful

tool for decision-making in which are involved major allocations of resources in complex situations characterized by considerable uncertainty. Its essential components include goal setting (objectives, requirements, constraints), postulation and evaluation of alternatives (modeling, simulation, cost-effectiveness), and data collection (historical surveys, description of environment, structuring of relationships). These components are circularly related in the sense that the process of decision-making involves *sequential* and *iterative* application of goal-setting, alternative generation and evaluation, and data collection at successively deeper levels of analysis. The interactions among these phases—together with considerable human judgment—yield adjustments that ultimately converge to a "best" decision. Representing as it does the application of the scientific method to practical problem-solving, systems analysis is as applicable to problems involving personal choices as to problems involving the selection of an anti-missile missile system.

The basic point is that, in any of these applications, any data collection must be considered an integral part of the systems-analysis process. When this precept is ignored, considerable misplaced effort will result. These difficulties will increase as the complexity of the systems increase, for few limits can then be placed on the quantity of data that might be pertinent.

R. C. AMARA

Stanford Research Institute,
Menlo Park, California

Statistical Method

In reading the Reports in *Science* during the last quarter of 1965, I noted 16 in which statistical procedures were employed to the extent of making statements about "significance" or citing *P* values. (This count did not include reports giving means, standard deviations, or standard errors merely as summary values.) In eight of these reports I found errors in statistical method resulting from failure to understand the following:

1) The analysis of variance must be compatible with the experimental design described.

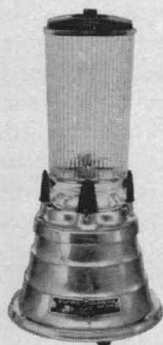
2) With regard to regression: (i) The correlation coefficient cannot "validate" a regression. (ii) The square of the correlation coefficient does not "demon-

GIANT!

AND HOW!

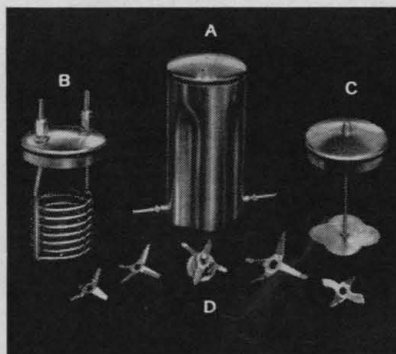
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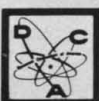
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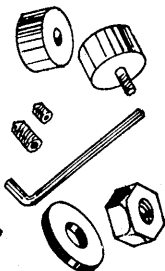
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strate that x determines y ." (iii) When the observations are not occurring randomly about the regression line, then the usual probability statements are not valid.

3) When several values are constrained—for example, total 100 percent—then probability statements about the last value are dependent on those made about the earlier values.

4) Subdivision of an "observation" into several "readings" does not increase the number of "observations."

5) Experimental groups composed of members each treated somewhat differently from the others provide a dubious basis for probability statements.

One report cited P values although there was no clue to how they could have been obtained. In none of the 16 reports was there any discussion of whether results that were nonsignificant were based on sufficient observations so that an effect of interest or concern could reasonably have been expected to be demonstrated. I refrain from commenting on more "subtle" problems, such as the validity of probability statements based on planned vs. unplanned comparisons, on multiple comparisons, or multiple analyses of the same observations.

There seem to be too many week-end statisticians, who don't know much about the art but know what they like.

ARTHUR F. JOHNSON
*Biostatistics Research Support Center,
Veterans Administration Hospital,
Hines, Illinois 60141*

Car Safety: Another View of Science

In the picture it presents of the relations between science and society, *Unsafe at Any Speed*, Ralph Nader's book about lagging automobile safety, runs directly counter to other views of science-and-society of recent years. The trend has been to view science and technology as plowing ahead, guided only by their own internal value systems, applying new knowledge hastily without regard to human and esthetic consequences. In the force of this advance, according to the usual indictment, not only the individual but even organized institutions are almost helpless.

Nader finds almost the exact opposite. Application of scientific knowledge to automobiles is slow and limited . . .

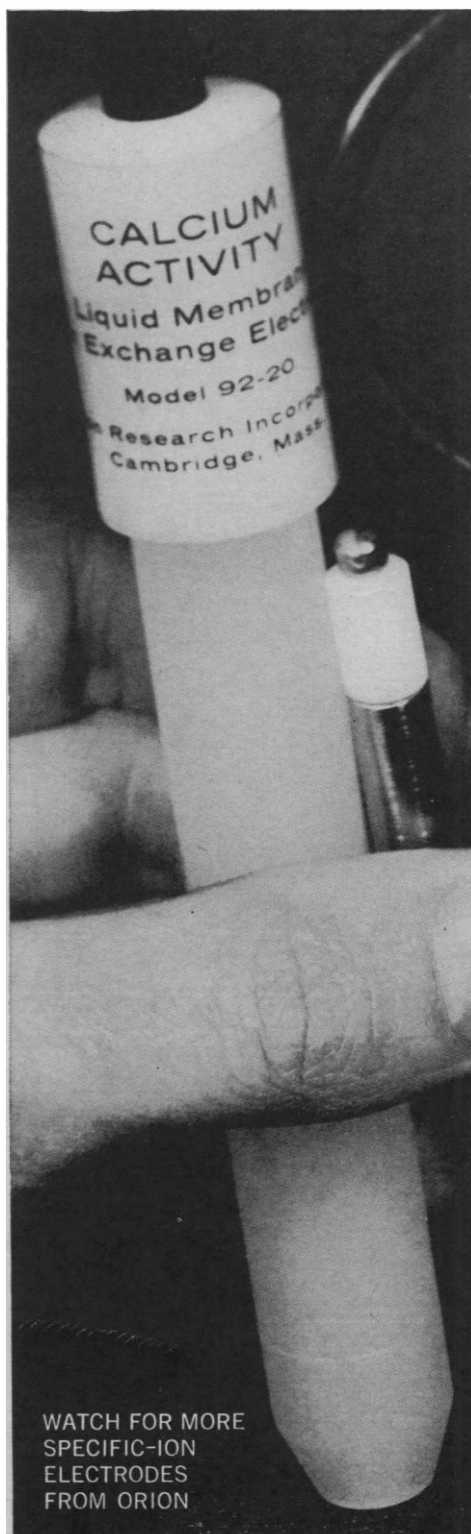
the tastes of the common man win out, in least-common-denominator design that is technologically stagnant. Despite the acres of buildings symbolizing devotion to science, despite the giant proving grounds, the one revolutionary car in 25 years is treacherous on the road and remains uncorrected 5 years later. The institutions of traffic safety . . . are busily directing attention away from science; they have even captured the imprimatur of the President of the United States with which to oppose the spread of knowledge. A group of physicians desperately erects a picket line before the showplace of industry, demanding not freedom from dehumanization by overweening science but some small use of scientific design principles that have been known for over a decade. The picture is of a world-turned-upside-down, and suddenly reverted to the 19th century. Yet the facts are there. . . .

The book constantly reminds one of the struggles of science and technology to aid human welfare 50 to 100 years ago. Those efforts also met powerful adversaries. . . . The time between the first invention of the railroad air brake and its full adoption exceeded 25 years. Long delay in the use of the automatic railroad-car coupler exacted tens of thousands of workers' lives before the Railway Safety Appliance Act of 1893. . . . Even the promulgation by an uncritical automotive technical society of comfortable recommendations for the industry which funds its work has a historical ring; the same sort of "professional" engineering phenomenon was attacked in even greater detail by the English sociologists Sidney and Beatrice Webb more than 50 years ago. . . .

Nader's implied solution is federal control, but he also notes the lack of an organized constituency of informed scientists and engineers. There are two such organizations in the medical profession, neither beholden to the automobile manufacturers. In effect, they are carrying the entire burden of representing the consumer's interest wherever there is a need to speak out about automobile safety. Similar organizations among engineers and scientists would provide a fitting opportunity for public service. In a world which misunderstands the role of the scientist in shaping society, an organized voice demanding scientific reform for human benefit would fill a great need.

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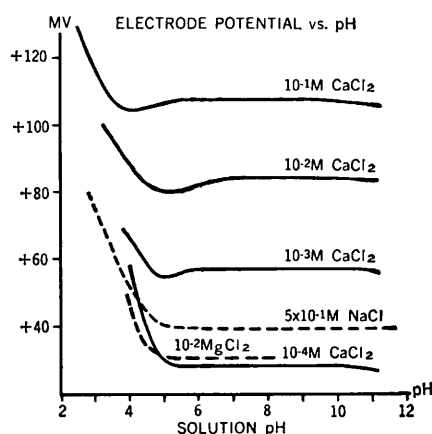
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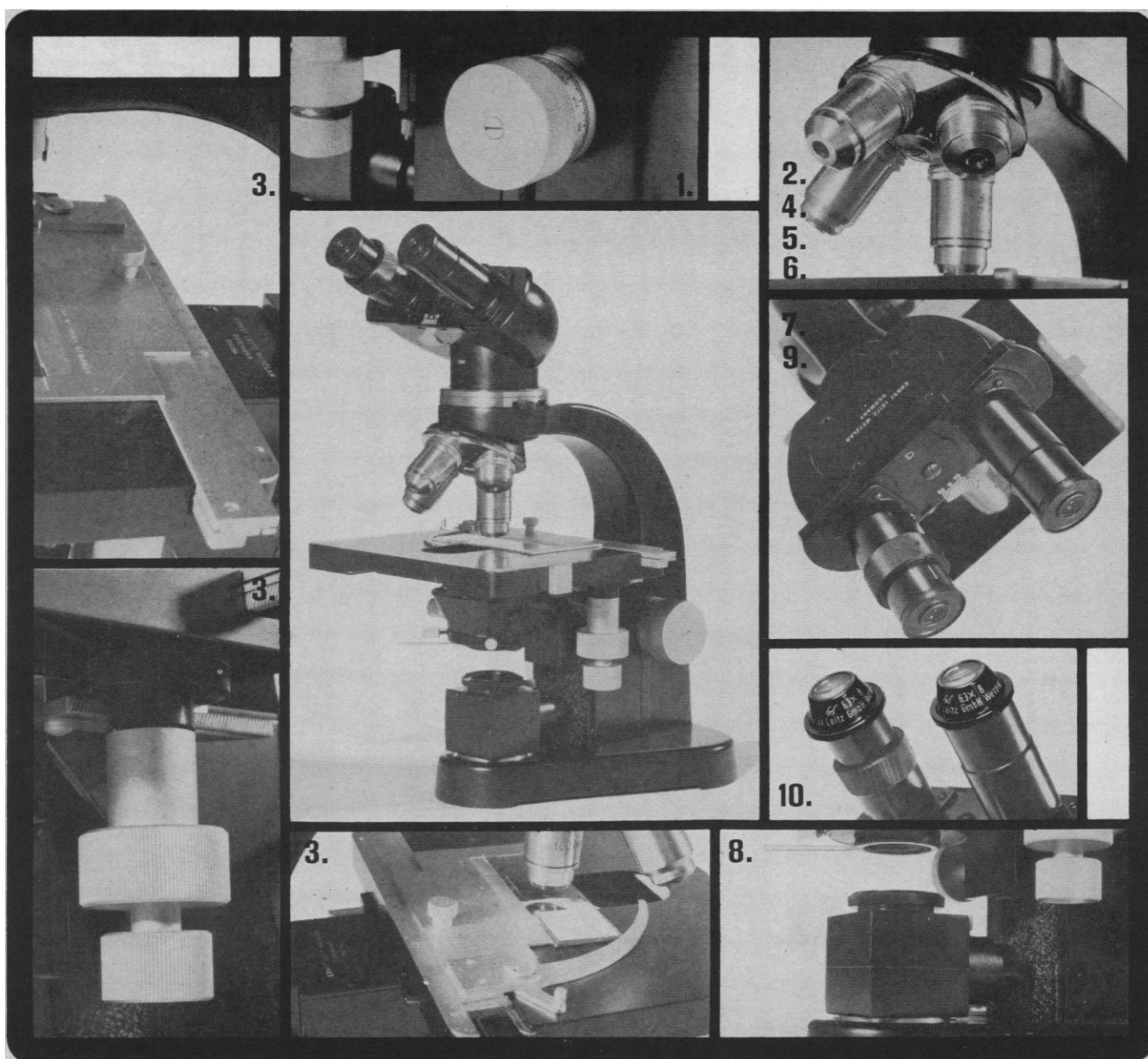
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Cost of Research

The cost of doing research has climbed uninterruptedly since 1940, but the rate of increase has recently slackened. The average increase was about 7 percent a year from 1940 through 1955, and 8 percent a year from 1956 to 1960. Since 1961 it has averaged about 4 percent a year. These rates are averages derived from records kept by 17 research organizations which represent, in approximately equal numbers, industrial, private nonprofit, university-contract, and federal organizations. They take account of salary increases, the greater cost of increasingly expensive and powerful equipment, and all other costs (except capital expenditures) involved in hiring a research scientist or engineer and providing him with what he needs to get on with his research. The data are reported in an updated version* of a study by Ellis A. Johnson and Helen S. Milton of the Operations Research Office (now the Research Analysis Corporation) which was the subject of a *Science* editorial on 26 August 1960.

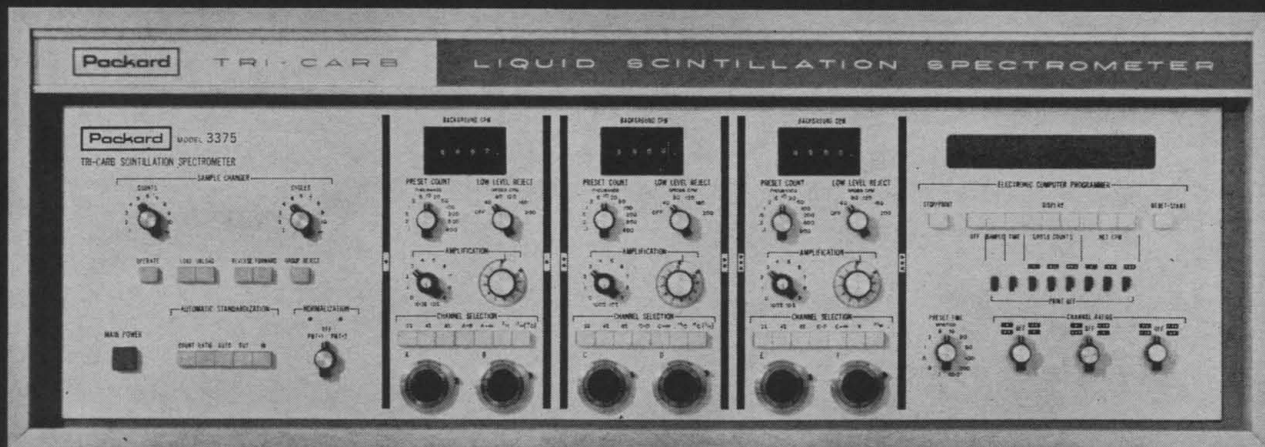
The unit used in the calculations is the "technical man," who is defined as "the professional scientist or engineer, together with his supporting technical, administrative, and housekeeping staffs, and his machines and equipment, i.e., the man plus the overhead costs." If 1950 is taken as a base year and the cost of one "technical man" in that year is set at 100, the cost of a technical man was 138 in 1955, 201 in 1960, and 242 in 1965.

These index numbers facilitate comparisons of the amount of research effort that different amounts of money purchased in different years. For example, a dollar spent on research in 1965 purchased 82 percent as much technical effort as a dollar spent in 1960, or 57 percent as much as one spent in 1955, or 41 percent as much as one spent in 1950. In 1965 the nation's expenditures for research and development were 8 or 9 times as great as in 1950, but, according to the cost-of-research index, the research effort was only 3 to 4 times as great. The level of effort may now have reached a temporary plateau. The budgeted increase of 5 percent, from 1966 to 1967, in federal expenditures for research is barely more than the 4 percent needed to keep pace with the current rate of increase in research costs, and the budgeted increase for all federally supported research and development will be less than enough to match the increased cost.

The cost-of-research index provides a useful refinement in translating dollar units into units of effort. But research effort measured in this fashion should not be equated with research accomplishment. The 1965 technical man with a computer cost more, and probably accomplished more, than the 1955 technical man with a desk calculator. For some kinds of work with some kinds of equipment, it would be possible to make reasonable estimates of the different costs and accomplishments. These estimates, like the cost-of-research index, would help to focus attention on some of the more difficult judgments that will have to be faced. What are the comparative scientific, practical, and social values of different kinds of research, in different fields, at different stages in the development of a research area, and with different degrees of closeness of relationship to useful application or to the formulation of more penetrating scientific generalizations? There is much need for thoughtful judgment in assessing what we are accomplishing and in deciding what we should try to accomplish.—DAEL WOLFLE

* Helen S. Milton, "Cost-of-Research Index, 1920-1965," *Technical Paper RAC-TP-209*, Research Analysis Corporation, McLean, Virginia (March 1966).

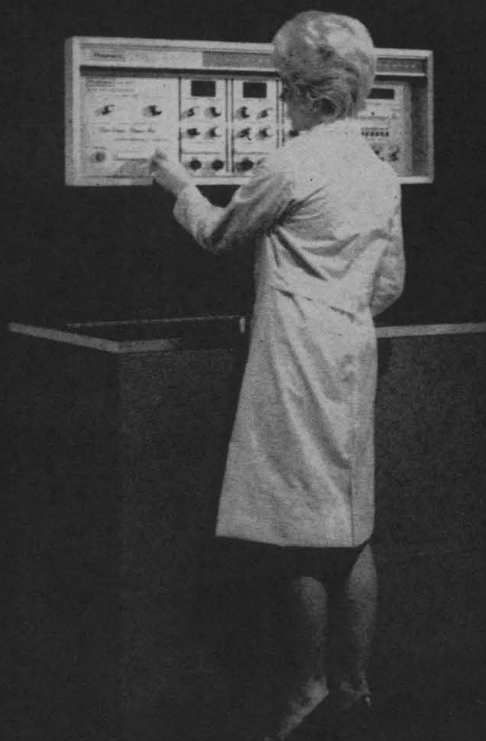
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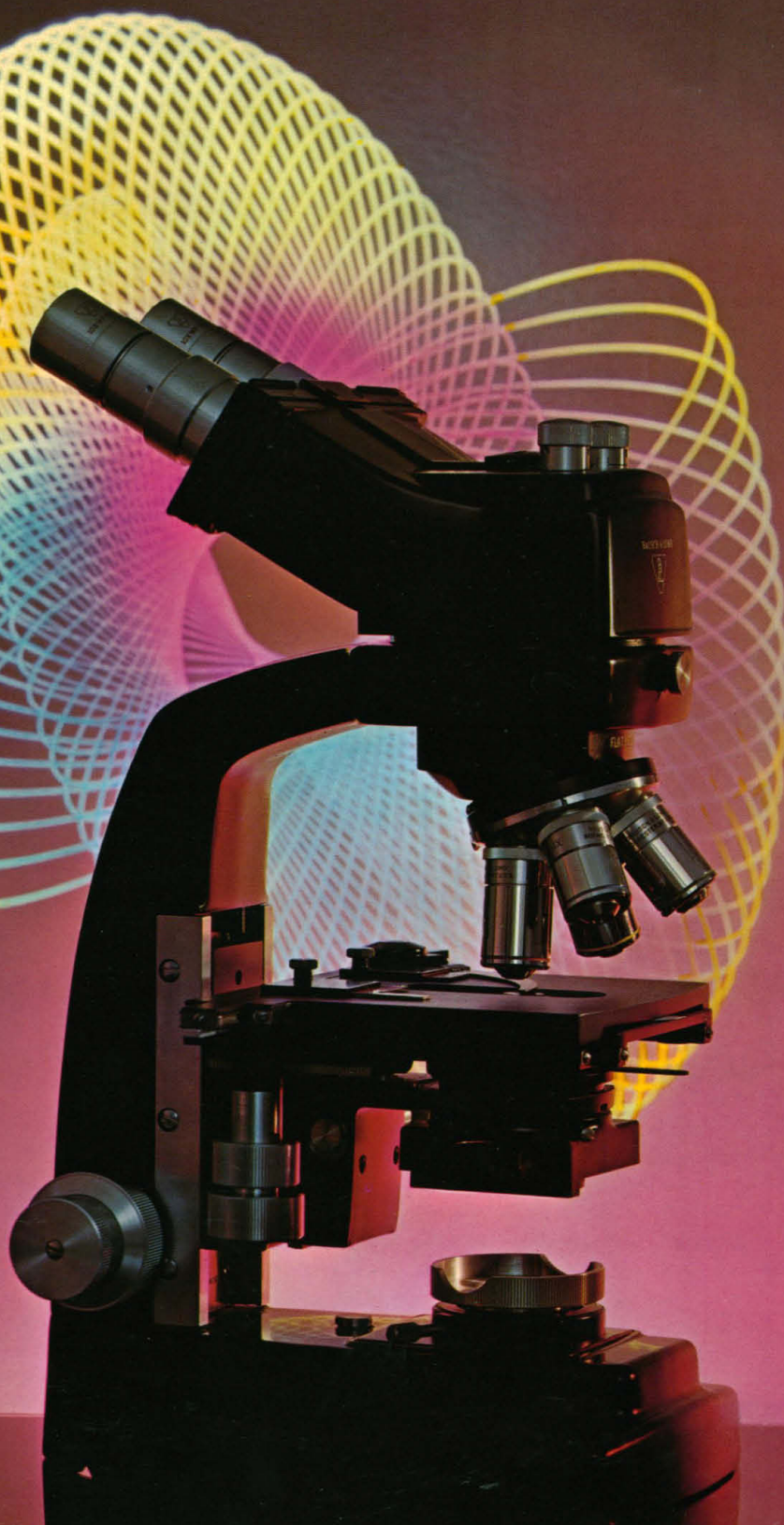
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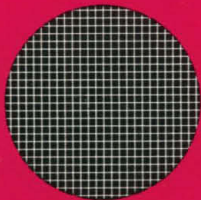
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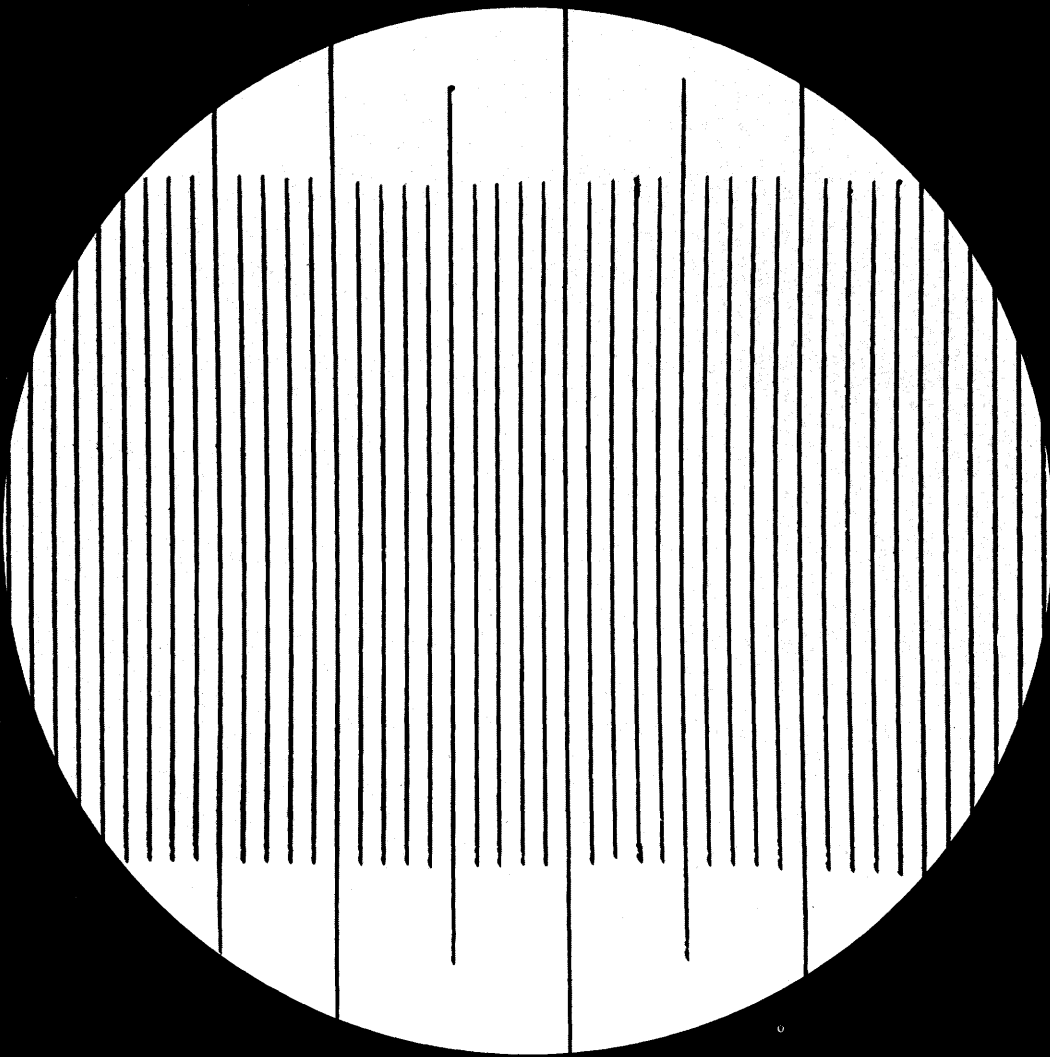
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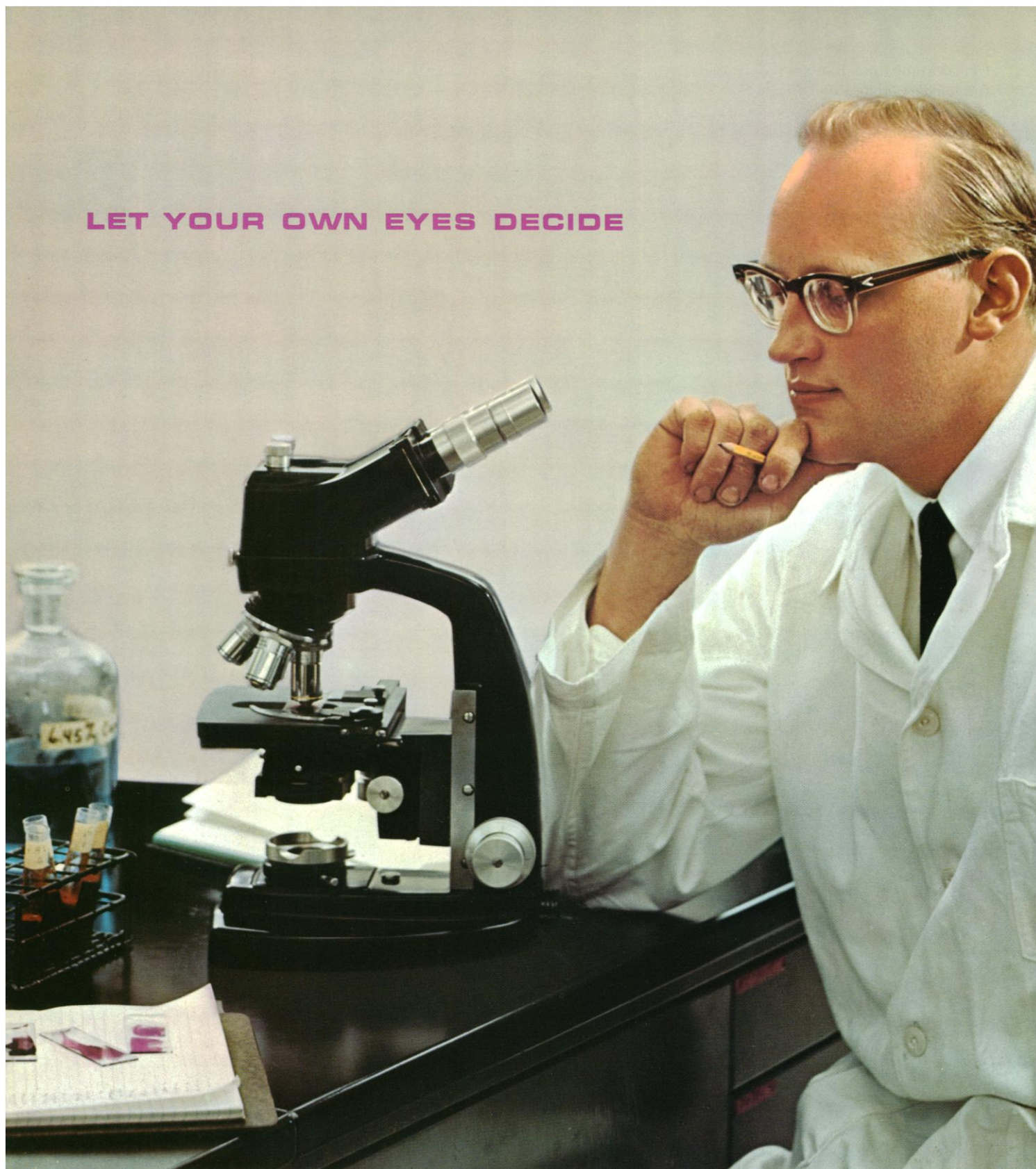
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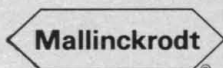
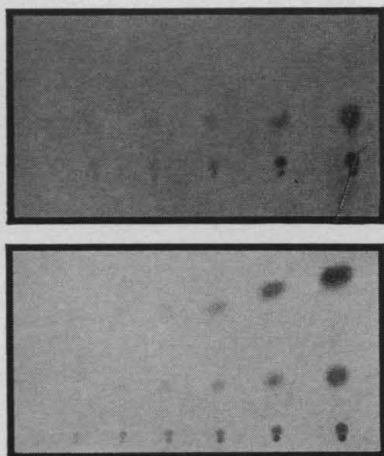
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A. Hamberger (Göteborg) discussed the ability of nerve and glial cells to increase their respiratory enzyme activity during increased functional demands. The changes were not similar in size and time-course for the two cell types. The increased activity of succinoxidase seemed to parallel the increase in the mitochondrial mass. The enzyme changes did not necessarily follow the changes in proteins, RNA, or volume of neurons.

A. Lajtha (New York) described the properties of active mediated transport processes involved in the passage of amino acids into and out of the nervous system. If rates of influx and efflux and affinities are known, concentrations of compounds in the cerebrum can be predicted. Similarly, from effects on flux, effects on concentrations can be predicted. These results show the importance of uptake and exit processes in controlling the amount and distribution of cerebral metabolites.

Each visitor, through his assigned contacts in the host country's various institutes, arranged some demonstrations of important aspects of methodology at these institutes. In addition to visits to laboratories in Budapest, where the demonstrations by J. Szentagothai and his colleagues at the Anatomical Institute and those by G. Adam at the Physiology Department deserve special mention, two scientific excursions were organized, one to Pecs and one to Tihany.

On the excursion to Pecs the departments of the Pecs University Medical School engaged in brain research were visited. E. Grastyán showed a prototype of a 128-channel analyzer for bioelectric potentials developed in collaboration between this institute and the Hungarian Central Physics Department. E. Endroczy showed microinfusion procedures for the topographical study of chemical mediators in the conscious animal. G. Székely discussed studies involving neuroembryological recombination of the central nervous system. Cinematographic records were shown of stepping movements performed by heterotopic legs (fore and hind legs) innervated by heterotopic spinal segment groups transferred to other places of the medullary tube at various embryonic ages, and also of segments recombined in order to increase neuroblast material available at a given level. The whole concept of neuron specificity was discussed. T. F. Meréi demonstrated methods of measuring cerebral protein synthesis and of obtaining rapid

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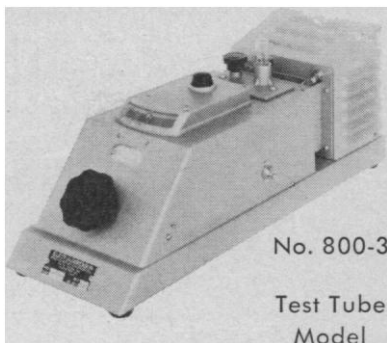
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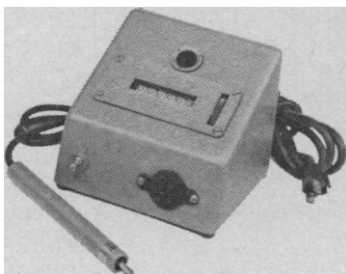
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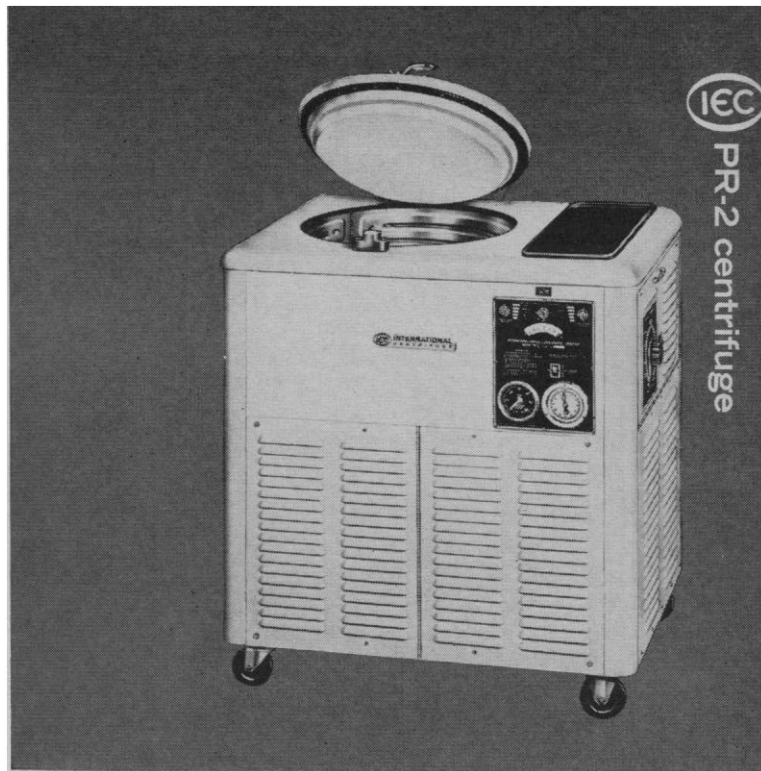


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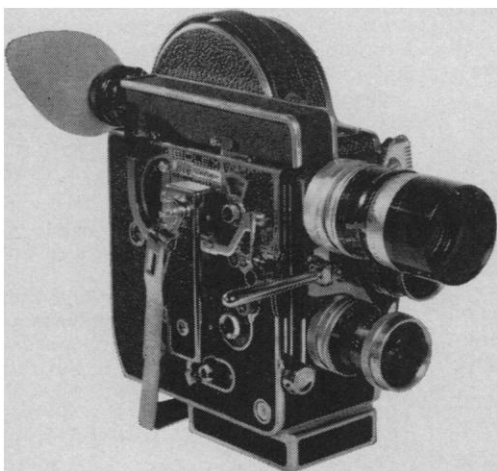


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serial blood samples from small animals. In Tihany (Biological Research Department of the Hungarian Academy) demonstrations of neurohormonal regulation studies were discussed by G. Salanky and his co-workers.

Expenses of the visiting seminar were partly defrayed by grant MH 7345 from the U.S. Public Health Service and by Unesco.

A. LAJTHA

*New York State Research Institute
for Neurochemistry and Drug
Addiction, New York, New York*

J. SZENTAGOTHAI

*University of Budapest,
Budapest, Hungary*

P. B. DEWS

*Harvard University,
Boston, Massachusetts*

Forthcoming Events

April

28-29. Electrical Conduction Properties of **Polymers**, symp., Pasadena, Calif. (A. Rembaum, Jet Propulsion Laboratory, California Inst. of Technology, 4800 Oak Grove Dr., Pasadena)

28-30. Central States **Anthropological** Soc., annual mtg., St. Louis, Mo. (G. H. Fathauer, Dept. of Sociology and Anthropology, Miami Univ., Oxford, Ohio 45056)

28-30. Economic and Social Aspects of **Technological Transfer**, conf., Airlie House, Warrenton, Va. (D. L. Spencer, Dept. of Economics, Howard Univ., Washington, D.C. 20001)

28-30. **Wildflower Pilgrimage**, 16th annual, Gatlinburg, Tenn., and Great Smoky Mountain Natl. Park. (A. J. Sharp, Dept. of Botany, Univ. of Tennessee, Knoxville)

29-30. Georgia **Acad. of Science**, Georgia Southern College, Statesboro. (J. T. May, School of Forestry, Univ. of Georgia, Athens)

29-30. Mississippi **Acad. of Sciences**, Mississippi State Univ., State College. (C. Q. Sheeley, Box 574, State College 39762)

29-30. **Population** Assoc. of America, New York, N.Y. (A. S. Lunde, Natl. Center for Health Statistics, U.S. Public Health Service, Washington, D.C. 20201)

29-30. American Assoc. of **University Professors**, Atlanta, Ga. (W. P. Fidler, The Association, 1785 Massachusetts Ave., NW, Washington, D.C.)

29-1. Association of **Clinical Scientists**, Chicago, Ill. (R. P. MacFate, 300 N. State St., Chicago, Ill. 60610)

29-1. American Soc. for the Study of **Sterility**, Chicago, Ill. (H. H. Thomas, 944 S. 18 St., Birmingham, Ala.)

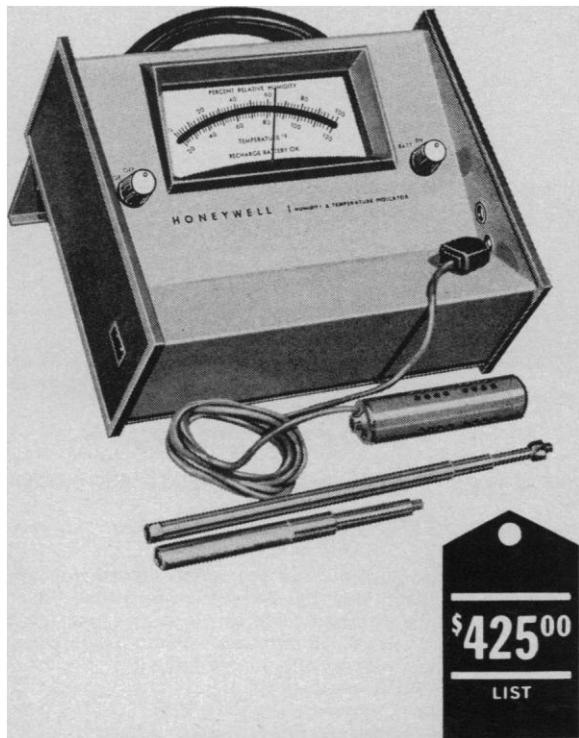
May

1. American Federation for **Clinical Research**, Atlantic City, N.J. (J. F. Bryan, 2000 P St., NW, Washington, D.C. 20036)

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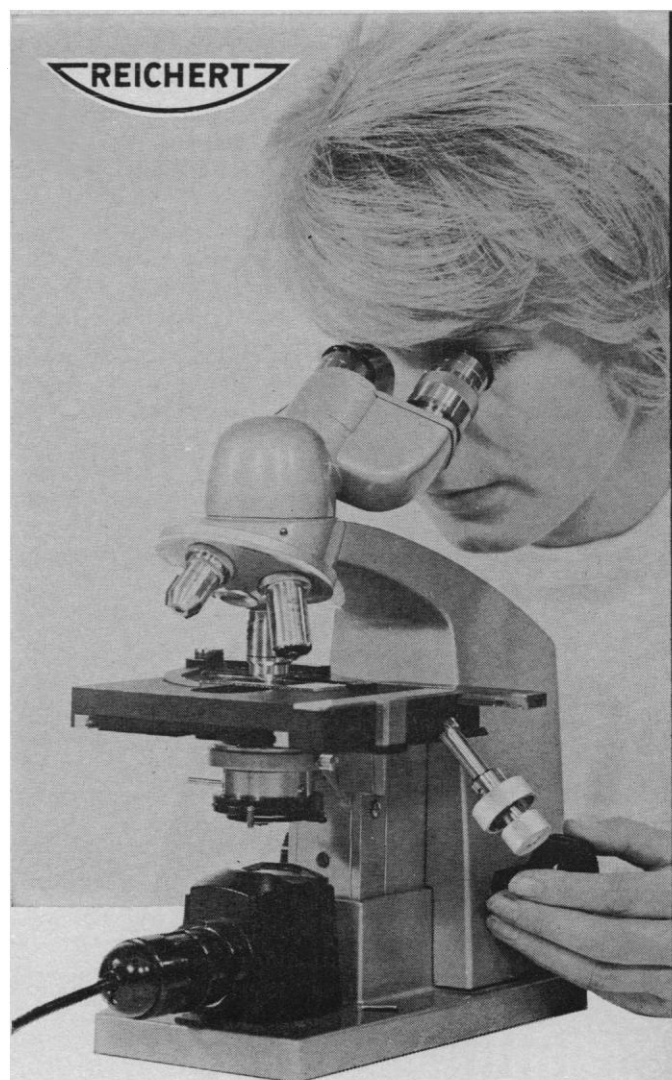
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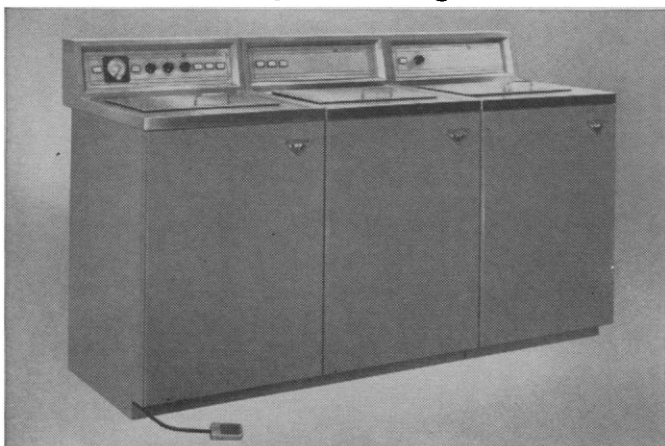
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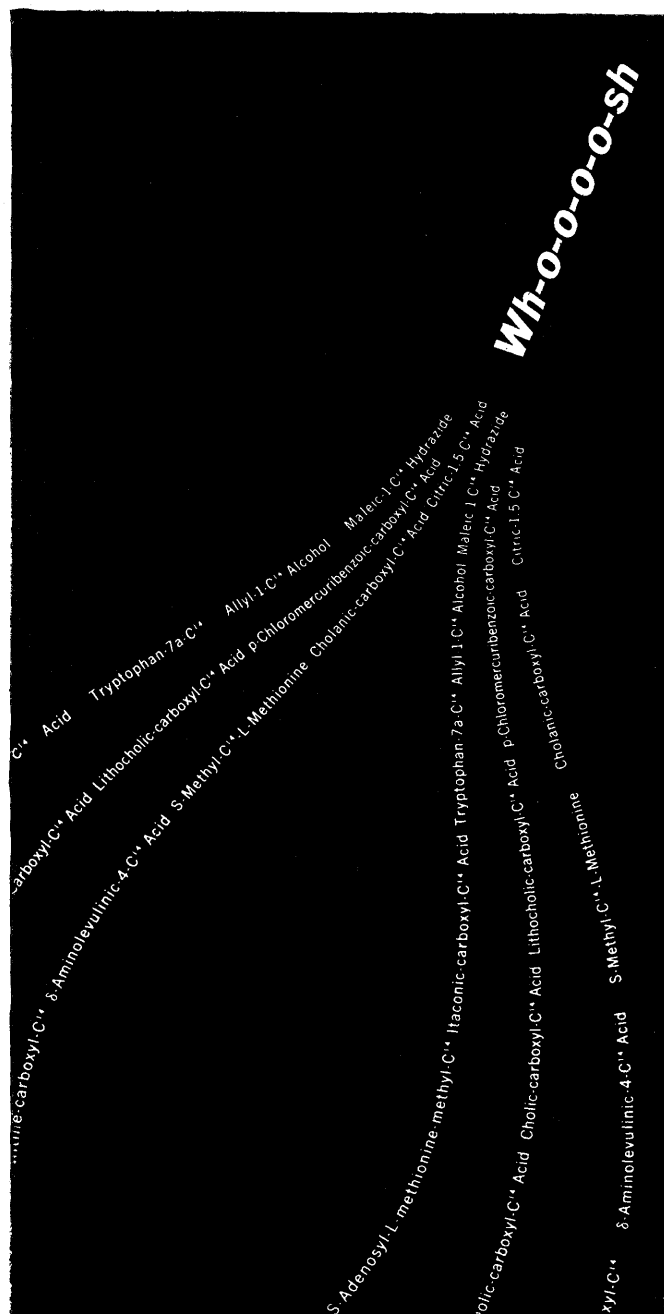
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1-4. AAAS, Southwestern and Rocky Mountain Div., Las Cruces, N.M. (M. G. Anderson, P.O. Box AF, University Park, N.M. 88070)

1-4. American Soc. for **Clinical Investigation**, Atlantic City, N.J. (G. W. Liddle, School of Medicine, Vanderbilt Univ., Nashville, Tenn.)

1-4. American College of **Obstetricians and Gynecologists**, Chicago, Ill. (R. A. Kimbrough, 79 W. Monroe, Chicago 60603)

1-5. American Soc. for **Microbiology**, annual mtg., Los Angeles, Calif. (R. W. Sarber, The Society, 115 Huron View Blvd., Ann Arbor, Mich. 48103)

1-6. **Electrochemical Soc.**, annual spring mtg., Cleveland, Ohio. (The Society, 30 E. 42 St., New York 10017)

1-6. International College of **Surgeons**, North American Federation, Congr., Houston, Tex. (S. E. Henwood, 1516 Lake Shore Dr., Chicago, Ill. 60610)

2-3. **Canadian Aeronautics and Space Inst.**, annual mtg., Ottawa, Ontario. (The Institute, 77 Metcalfe St., Ottawa 4)

2-3. **Bioengineering**, 3rd annual Rocky Mountain symp., University of Colorado, Boulder. (J. C. Daniel, Dept. of Biology, Univ. of Colorado, Boulder 80304)

2-3. American Inst. of **Mining, Metallurgical, and Petroleum Engineers**, Inst. of Petroleum Engineers, Wichita Falls, Tex. (Executive Secretary, 345 E. 47 St., New York 10017)

2-4. Council of **Biology Editors**, Univ. of Notre Dame, Notre Dame, Ind. (R. E. Gordon, Dept. of Biology, Univ. of Notre Dame, Notre Dame)

2-4. **Communications Satellite Systems**, conf., American Inst. of Aeronautics and Astronautics, Washington, D.C. (W. J. Brunke, AIAA, 1290 Sixth Ave., New York 10019)

2-5. **Isochronous Cyclotrons**, intern. conf., Gatlinburg, Tenn. (R. S. Livingston, Oak Ridge Natl. Laboratory, P.O. Box X, Oak Ridge, Tenn. 27831)

2-7. International Inst. of **Optics**, conf., Paris, France. (Conference Secretariat, Inst. for Optics, 3, blvd. Pasteur, Paris 15)

3-5. British Joint **Computer Conf.**, Eastbourne, England. (Secretariat, Inst. of Electrical Engineers, Savoy Place, London W.C.2, England)

3-5. **Industrial Waste**, 21st conf., Purdue Univ., Lafayette, Ind. (D. E. Bloodgood, School of Civil Engineering, Purdue Univ., Lafayette 47907)

3-6. American Chemical Soc., Div. of **Rubber Chemistry**, San Francisco, Calif. (G. N. Vacca, Bell Telephone Laboratories, Murray Hill, N.J.)

3-8. Mechanism of Action of **Fungicides and Antibiotics**, intern. symp., Biological Soc. of the GDR, Reinhardtsbrunn, East Germany. (H. Lyr, Inst. für Forstwissenschaften, Alfred-Möllerstr., 13 Eberswalde die Berlin)

4. Society for **Analytical Chemistry**, mtg., Bristol, England. (The Society, 14 Belgrave Sq., London, England)

4-6. **Genetics Soc. of Canada**, 11th annual mtg., Banff, Alberta. (C. O. Person, Dept. of Genetics, Univ. of Alberta, Edmonton, Canada)

4-6. Society for **Experimental Stress Analysis**, spring mtg., Detroit, Mich. (B. E. Rossi, 21 Bridge Sq., Westport, Conn.)

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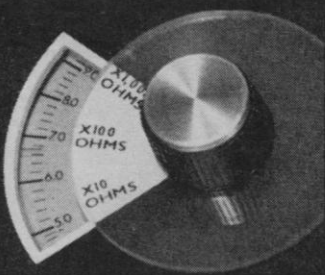
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4-7. **Virginia Acad. of Science**, Madison College, Harrisonburg. (R. C. Berry, Virginia Acad. of Science, P.O. Box 8203, Richmond 23226)

4-8. **Laboratory Medicine**, 12th Congr., Bad Kissengen, West Germany. (W. Altbath, Katharinengasse 3, 87 Würzburg, Germany)

4-11. **Instability Phenomena in Galaxies**, symp., Armenian SSR. (A. N. Hakopian, Acad. of Sciences of the Armenian SSR, Erevan)

5-6. **Human Factors in Electronics**, 7th symp., Minneapolis, Minn. (C. A. Baker, Honeywell, Inc., 2700 Ridgeway Rd., Minneapolis)

5-6. **Rabies**, natl. symp., Atlanta, Ga. (J. R. Ray, American Veterinary Medical Assoc., Chicago, Ill.)

5-6. **Strontium Metabolism**, intern. symp., Annan, Scotland. (J. H. Martin, United Kingdom Atomic Energy Agency, Chapelcross Works, Annan, Dumfriesshire, Scotland)

5-7. **Society for American Archaeology**, 31st annual mtg., Univ. of Nevada, Reno. (D. D. Fowler, Dept. of Anthropology, Univ. of Nevada, Reno 89507)

5-7. **New Jersey Soc. of Professional Engineers**, 42nd annual conf. and exhibition, Atlantic City. (K. G. Stanley, The Society, 495 West State St., Trenton, N.J. 08618)

5-7. **Midwestern Psychological Assoc.**, Chicago, Ill. (F. A. Mote, Psychology Dept., Univ. of Wisconsin, Madison)

5-8. **Protides of the Biological Fluids**, 14th annual colloquium, Bruges, Belgium. (P.O. Box 71, Bruges)

6-7. **Institute on Lake Superior Geology/Mineralogical Soc. of America/Soc. of Economic Geologists**, mtg., Michigan Technological Univ., Saulte Ste. Marie. (A. K. Snelgrove, Michigan Technological Univ., Houghton 49931)

6-7. **North Carolina Acad. of Science**, Catawba College, Salisbury. (J. A. Yarbrough, Meredith College, Raleigh, N.C.)

6-7. **North Dakota Acad. of Science**, North Dakota State Univ., Fargo. (B. G. Gustafson, Univ. of North Dakota, Grand Forks)

6-8. **Society for Applied Anthropology**, 25th annual mtg., Milwaukee, Wis. (The Society, Rand Hall, Cornell Univ., Ithaca, N.Y.)

6-8. **Wisconsin Acad. of Sciences, Arts, and Letters**, Lawrence Univ., Appleton, Wis. (D. J. Behling, 720 Wisconsin Ave., Milwaukee 53202)

6-9. **American Psychoanalytic Assoc.**, Atlantic City, N.J. (H. Fischer, 1 E. 57th St., New York, N.Y.)

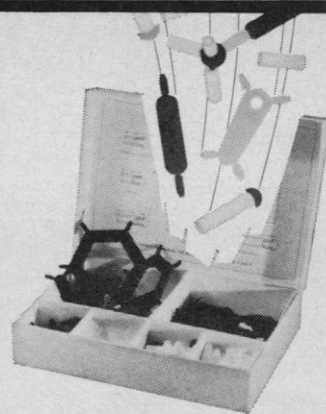
7-8. **Academy of Psychoanalysis**, Atlantic City, N.J. (A. H. Rifkin, 125 E. 65 St., New York 10021)

7-12. **American Ceramic Soc.**, 68th annual mtg., Washington, D.C. (The Society, 4055 N. High St., Columbus, Ohio 43214)

8-10. **Society of the Plastics Industry**, Canadian section, 24th annual mtg., Montreal, P.Q. (The Society, 250 Park Ave., New York 10017)

8-11. **Administrative Management Soc.**, 47th intern. conf., Boston, Mass. (W. H. Latham, Willow Grove, Pa. 19090)

8-12. **Association of American State Geologists**, annual mtg., Univ. of Indiana, Bloomington. (W. C. Hayes, Missouri



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8-12. **Organic Sulphur Compounds**, symp., Univ. of Groningen, Groningen, Netherlands. (M. J. Janssen, Dept. of Organic Chemistry, Univ. of Groningen, Groningen)

8-15. **Stereochemistry**, conf., Bürgenstock, Switzerland. (D. Arigoni, Dept. of Organic Chemistry, Univ. of Zurich, Zurich, Switzerland)

9-10. **Circuit Theory**, 9th midwestern symp., Oklahoma State Univ., Stillwater. (D. R. Wilson, School of Electrical Engineering, Oklahoma State Univ., Stillwater 74045)

9-11. **Nuclear Applications of Non-Fissile Ceramics**, conf., Washington, D.C. (A. Boltax, Westinghouse Astronuclear Laboratory, P.O. Box 10864, Pittsburgh, Pa. 15236)

9-11. **Numerical Solution of Nonlinear Differential Equations**, symp., Madison, Wis. (D. Greenspan, Mathematics Research Center, U.S. Army, Univ. of Wisconsin, Madison 53706)

9-12. **Cell Nucleus Functions and Radio-Sensitivity**, symp., Rijswijk, Netherlands. (H. M. Klouwen, Radiobiological Inst., Organization for Health Research, T.N.O., 151 Lang Kleigweg, Rijswijk)

9-12. **Standards Laboratory** conf., Natl. Bureau of Standards, Gaithersburg, Md. (W. R. Tilley, NBS, Washington, D.C.)

9-13. **Society of Photographic Scientists and Engineers**, annual conf., San Francisco, Calif. (J. B. Bell, 1525 Tennessee St., San Francisco, Calif.)

9-13. **American Psychiatric Assoc.**, annual mtg., Atlantic City, N.J. (P. Woodward, 1700 18th St., NW, Washington, D.C. 20009)

9-14. **Condensation Nuclei**, 6th intern. symp., Albany, N.Y. (D. G. Barry, Atmospheric Sciences Research Center, State Univ. of New York, P.O. Box 7185, Albany 12224)

10-12. **Telemetry**, natl. conf., Boston, Mass. (F. Nieman, NASA Electronics Research Center, 575 Technology Sq., Cambridge, Mass. 02139)

10-14. **American Assoc. of Mental Deficiency**, Chicago, Ill. (G. E. Milligan, 1601 Broad St., Columbus, Ohio)

10-19. **Committee on Space Research**, 9th plenary mtg., Vienna, Austria. (COSPAR, 55, blvd. Malesherbes, Paris 8, France)

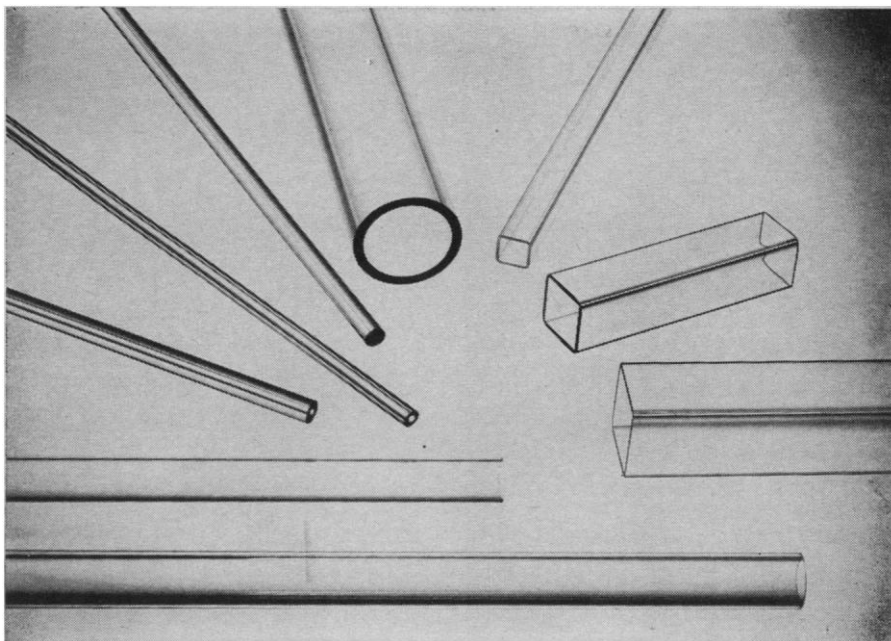
11. **Electroluminescence and Semiconductor Lasers**, seminar, Stevens Inst. of Technology, Hoboken, N.J. (G. J. Herskowitz, Dept. of Electrical Engineering, Stevens Inst. of Technology, Hoboken, N.J. 07030)

11-13. **Analysis Instrumentation**, 12th natl. symp., Houston, Tex. (G. I. Doering, Industrial Nucleonics Corp., 650 Ackerman Rd., Columbus, Ohio 43202)

11-13. **American Inst. of Chemists**, 43rd annual mtg., New Orleans, La. (C. L. Hoffpauir, Southern Regional Research Laboratory, New Orleans 70119)

11-13. **Industrial Research** Inst., spring mtg., Buck Hill Falls, Pa. (The Institute, 100 Park Ave., New York 10017)

11-13. **Military Oceanography**, 3rd U.S. Navy symp., San Diego, Calif. (Office of the Oceanographer of the Navy, Washington, D.C.)



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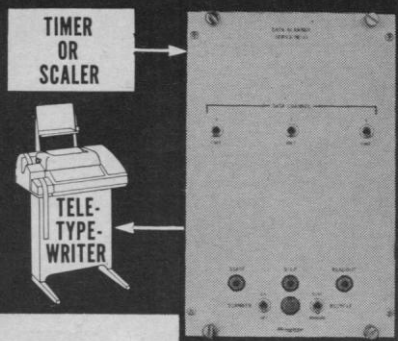
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11-14. American Assoc. for the History of Medicine, Rochester, Minn. (J. B. Blake, Natl. Library of Medicine, Bethesda, Md.)

11-14. Society for Industrial and Applied Mathematics, natl. mtg., Univ. of Iowa, Iowa City. (J. B. Rosser, Mathematics Research Center, Univ. of Wisconsin, Madison)

11-14. Plant Disease Epidemics, Analysis and Implications, workshop, Pennsylvania State Univ., University Park. (P. J. Wuest, Dept. of Plant Pathology, Pennsylvania State Univ., University Park 16802)

11-14. Society of Technical Writers and Publishers, 13th annual mtg., Fort Worth, Tex. (N. J. Kennedy, Box 3706, Columbus, Ohio 43214)

11-21. Photographic Systems for Engineers, seminar, San Francisco, Calif. (J. B. Bell, 1525 Tennessee St., San Francisco)

12-13. Information Retrieval, 3rd natl. colloquium, Univ. of Pennsylvania, Philadelphia. (A. W. Speakman, E. I. duPont de Nemours & Co., Wilmington, Del. 19898)

12-14. Diabetology, 7th annual mtg., Paris, France. (M. Rathery, Hotel-Dieu, 1, pl. du Parvis-Notre Dame, Paris 4)

12-14. Czechoslovak Soc. of Urology, congr., Brno. (M. Jerabek, Clinique Urologique, 53, Pekarska, Brno)

13. Desert Environment, mtg., Fullerton Junior College, Fullerton, Calif. (M. D. Brown, Div. of Life Sciences, Fullerton Junior College, Fullerton)

14. Reliability, 7th annual West Coast symp., Univ. of Southern California, Los Angeles. (R. J. Guarino, TRW Systems, One Space Park, Redondo Beach, Calif.)

15-18. American Inst. of Chemical Engineers, 59th annual mtg., Columbus, Ohio. (The Institute, 345 E. 47 St., New York 10017)

15-18. Kinetics and Catalysis, intern. symp., Columbus, Ohio. (P. B. Weisz, Socony Mobil Research and Development Labs., Paulsboro, N.J. 08066)

15-19. Radiation Chemistry, 2nd symp., Tihany, Hungary. (A. Somogyi, Research Inst. for the Plastics Industry, Hungaria krt. 114, Budapest 14, Hungary)

15-21. Dynamic Role of Molecular Constituents in Plant-Parasite Interaction, U.S.-Japan seminar, Gamagori, Japan. (C. J. Mirocha, Dept. of Plant Pathology and Physiology, Univ. of Minnesota, St. Paul)

16-17. Plant Growth, conf., New York, N.Y. (J. F. Frederick, Dodge Chemical Co., Research Labs., 3425 Boston Rd., Bronx, N.Y. 10469)

16-18. Aerospace Electronics, 18th natl. conf., Dayton, Ohio. (J. M. Mayer, 4525 Fernbrook St., Kettering, Ohio 45440)

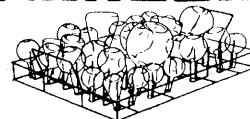
16-18. Society of German Engineers, conf., Berlin. (The Society, Postfach 10 250, 4 Düsseldorf 10, Germany)

16-18. Institute of Electrical and Electronics Engineers, Group on Microwave Theory and Technique, symp., Palo Alto, Calif. (L. Young, Stanford Research Inst., Menlo Park, Calif. 94025)

16-18. Power Instrumentation, 9th natl. symp., Detroit, Mich. (R. C. Austin, Detroit Edison Co., 2000 Second Ave., Detroit 48226)



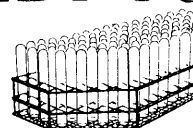
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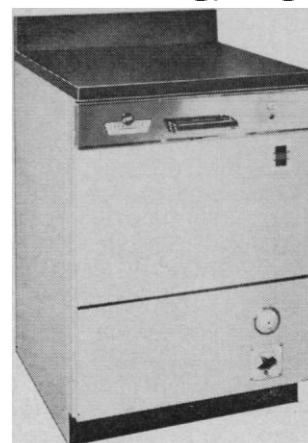
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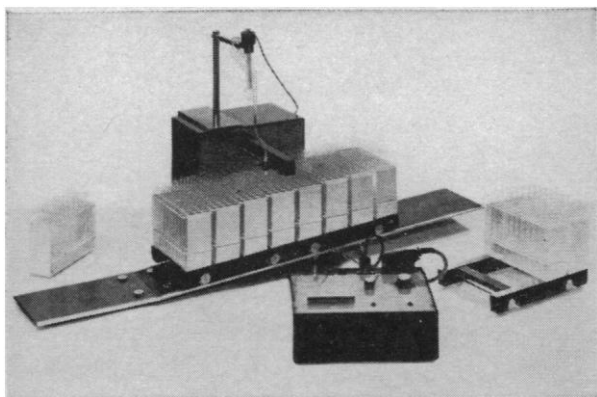
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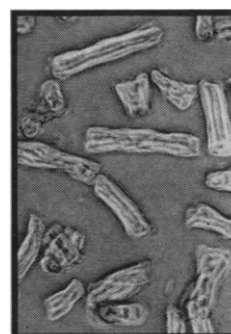
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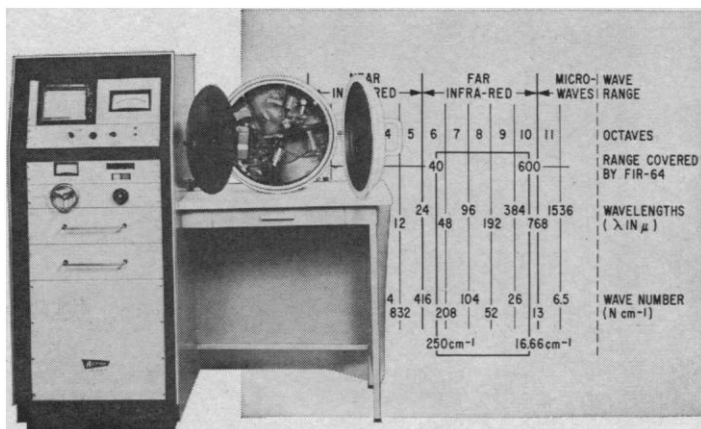
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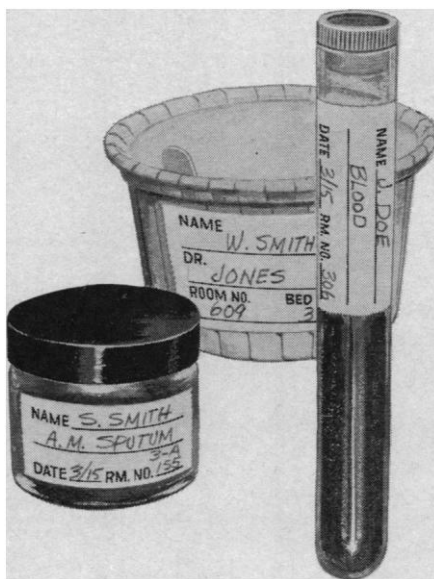
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16-19. **Biomedical Sciences Instrumentation**, 4th natl. symp., Anaheim, Calif. (T. B. Weber, Beckman Instruments, Inc., 2500 Harbor Blvd., Fullerton, Calif.)

16-20. American Soc. of **Civil Engineers**, Denver, Colo. (W. H. Wisley, 345 E. 47 St., New York, N.Y. 10017)

16-20. **Disposal of Radioactive Wastes** into the Seas, Oceans, and Surface Waters, symp., Intern. Atomic Energy Agency, Vienna, Austria. (IAEA, 11 Kärntnerring, Vienna 1)

16-20. American **Industrial Hygiene** Assoc., Pittsburgh, Pa. (A. D. Hosey, 1014 Broadway, Cincinnati, Ohio 45202)

16-20. **Water Resources Engineering**, conf., American Soc. of Civil Engineers, Denver, Colo. (W. H. Wisley, The Society, 345 E. 47 St., New York 10017)

17-19. **Fast Breeder Reactors**, intern. conf., London, England. (H. C. Dunn, British Nuclear Energy Soc., Risley, Warrington, Lancashire, England)

18-20. **Operations Research** Soc. of America, 29th natl. mtg., Santa Monica, Calif. (J. E. Walsh, System Development Corp., 2500 Colorado Ave., Santa Monica)

18-25. **Warm-Water Pond Fish Culture**, world symp., U.N. Food and Agriculture Organization, Rome, Italy. (T. V. R. Pillay, FAO, Via delle Terme di Caracalla, Rome)

19-20. **Membrane Processes** for Industry, symp., Southern Research Inst., Birmingham, Ala. (J. H. Strickland, SRI, 2000 Ninth Ave. S., Birmingham 35205)

19-21. **Organogenesis**, regional conf., Soc. for Developmental Biology, Ames, Iowa. (J. M. Arnold, Dept. of Biochemistry and Biophysics, Iowa State Univ., Ames 50010)

19-22. **Exfoliative Cytology**, intern. congr., Rio de Janeiro, Brazil. (E. von Haam, Ohio State Univ., Columbus)

19-22. German Bunsen Soc. for **Physical Chemistry**, 65th general assembly, Freudenstadt. (The Society, Varrentrappstr. 40-42, 6 Frankfurt am Main, West Germany)

20-21. **Surface Physics**, 4th symp., Washington State Univ., Pullman. (E. E. Donaldson, Dept. of Physics, Washington State Univ., Pullman 99163)

20-22. Royal **Astronomical** Soc. of Canada, general assembly, Univ. of Manitoba, Winnipeg. (R. J. Lockhart, Dept. of Mathematics, Univ. of Manitoba, Winnipeg)

20-22. Society for **Experimental Medicine** of the German Democratic Republic, 3rd general conf., Leipzig, East Germany. (Secretariat, The Society, Friedrichstr. 129, Block F, 104 Berlin, East Germany)

21. **Southern Calif. Acad. of Sciences**, annual mtg., California State College, San Diego. (C. Rozaire, The Academy, Los Angeles Museum, Exposition Park, Los Angeles, Calif.)

22-26. Institute of **Food Technologists**, 26th annual mtg., Portland, Ore. (C. L. Willey, 176 W. Adams St., Chicago, Ill. 60603)

22-26. American **Orthopedic** Assoc., Colorado Springs, Colo. (S. W. Banks, 29 E. Madison St., Chicago, Ill.)

23-24. **High Temperature Reactors** and the Dragon Project, symp., London, Eng-

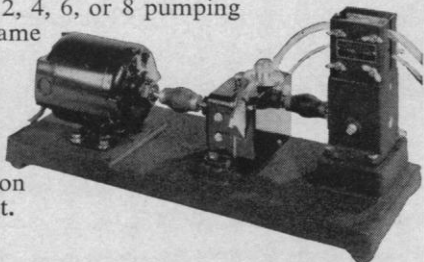
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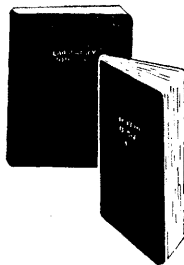
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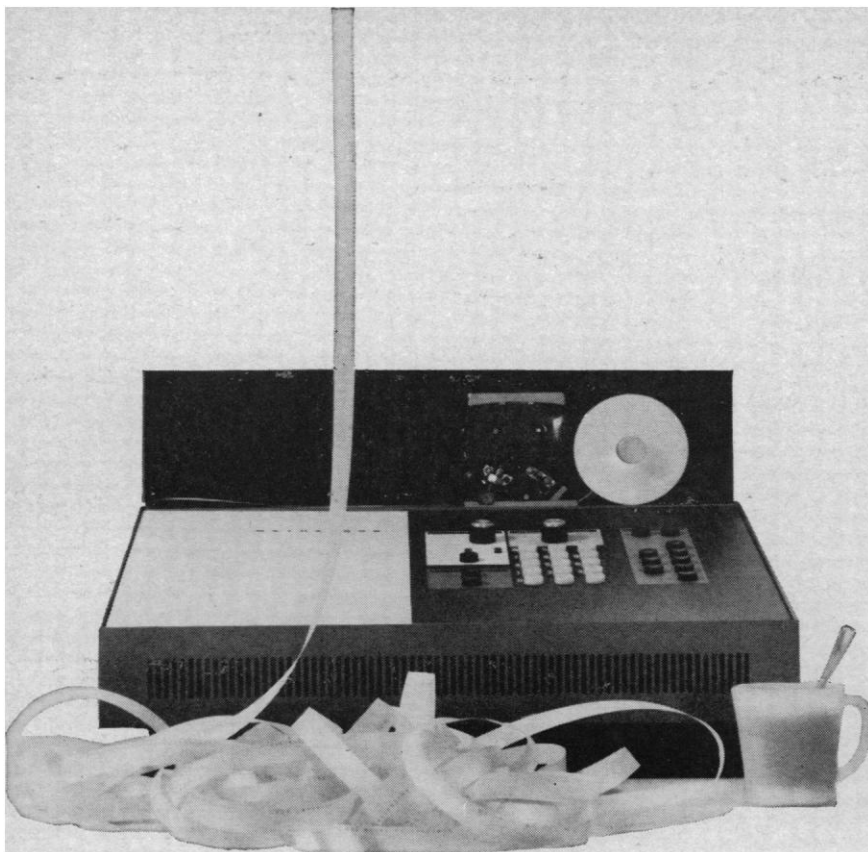
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23-25. American **Astronautical Soc.**, 12th annual mtg., Los Angeles and Anaheim, Calif. (L. Larmore, Douglas Aircraft, 3000 Ocean Park Blvd., Santa Monica, Calif.)

23-25. **Chemical and Petroleum Instrumentation**, 7th natl. symp., San Francisco, Calif. (J. T. Ward, E. I. duPont de Nemours & Co., Wilmington, Del. 19898)

23-25. Dynamics of **Chemical Reactions**, intern. symp., Padua, Italy. (Direzione Istituto di Impianti Chimici, Univ. degli Studi, Padua)

23-26. Association for Research into **Periodontal Disease**, 18th mtg., West Berlin, Germany. (M. J. Matthey, 2 rue Bartholini, Geneva, Switzerland)

23-26. **Spaceflight**, 6th European symp., Brighton, England. (British Interplanetary Soc., 12 Bessborough Gardens, S.W., London, S.W.1, England)

23-28. International Assoc. for the Study of the **Bronchi**, 16th congr., Athens, Greece. (The Association, 189 Blvd. St.-Germain, Paris 7, France)

23-28. **Hormonal Steroids**, intern. congr., Milan, Italy. (L. Martini, Inst. di Farmacologia, Via Andrea del Sarto 21, Milan)

24-26. **Solid Propulsion**, conf., Chicago, Ill. (Chemical Propulsion Information Agency, 8621 Georgia Ave., Silver Spring, Md.)

24-26. **Ultrasonic Testing of Materials**, 2nd intern. symp., Berlin, Germany. (Kammer der Technik FV "Maschinenbau," Clara-Zetkinstr. 115-117, 108 Berlin)

25. American Soc. for **Gastrointestinal Endoscopy**, Chicago, Ill. (B. H. Sullivan, Jr., 2020 E. 93 St., Cleveland, Ohio 44106)

25-27. Society of **Radiographers**, 20th annual conf., Brighton, England. (The Society, 32 Welbeck St., London, W.1, England)

25-27. **Sulfamic Acid** and Its Electrometallurgical Applications, symp., Milan, Italy. (R. Piontelli, Laboratorio di Elettrochimica, Clinica-Fisica e Metallurgia del Politecnico di Milano, 32 Piazza Leonardo da Vinci, Milan)

26-27. **Fiber Soc.**, spring mtg., Williamsburg, Va. (L. Rebenfeld, The Society, Textile Research Inst., P.O. Box 625, Princeton, N.J.)

26-28. American Assoc. for **Cancer Research**, annual mtg., Denver, Colo. (H. J. Creech, 7701 Burholme Ave., Philadelphia, Pa. 19111)

26-28. American **Gastroenterological Assoc.**, Chicago, Ill. (D. Cayer, 2240 Cloverdale Ave., Winston-Salem, N.C.)

26-28. American Inst. of **Industrial Engineers**, 17th annual conf. and conv., San Francisco, Calif. (S. G. McIntyre, 5 Heather Lane, Hillsborough, Calif.)

28-6. **Sea**, 2nd intern. congr., Treboul-Douarnenez, France. (Federation Thermale et Climatique, 6, rue Lafayette, Rennes, Ile-et-Vilaine, France)

29-2. **Special Libraries Assoc.**, annual conv., Minneapolis, Minn. (G. Aspnes, Cargill, Inc., Minneapolis 55402)

30-1. Canadian **Nuclear Assoc.**, intern. congr., Winnipeg. (R. F. Gross, The Association, 19 Richmond St., W., Toronto 1, Ont.)

NEW BOOKS

(Continued from page 499)

Inventor and Entrepreneur: Recollections of Werner von Siemens. Lund Humphries, London; Prestel-Verlag, Munich, ed. 2, 1966. 314 pp. Illus. 54s.

Investigaciones Arqueologicas en el Sitio de el Inga, Ecuador. Robert E. Bell. Casa de la Cultura, Quito, Ecuador, 1965 (available from The Stovall Museum, Univ. of Oklahoma, Norman). 334 pp. Illus. Paper, \$6.

The Language of Logic. Hans Freudenthal. Elsevier, New York, 1966. 111 pp. Illus. \$5. Published in 1961 as *Exacte Logica* (Bohn, Haarlem, Netherlands).

Marcello Malpighi: And the Evolution of Embryology. vols. 1 to 5. Howard B. Adelmann. Cornell Univ. Press, Ithaca, N.Y., 1966. vol. 1, 750 pp. plates; vol. 2, 316 pp. plates; vol. 3, 524 pp.; vol. 4, 550 pp.; vol. 5, 427 pp.

Microbes in Your Life. Leo Schneider. Harcourt, Brace, and World, New York, 1966. 154 pp. Illus. \$3.75 (juvenile book).

The Noble Gases. Isaac Asimov. Basic Books, New York, 1966. 183 pp. \$4.50.

The Nursing Profession: Five Sociological Essays. Fred Davis, Ed. Wiley, New York, 1966. 217 pp. Illus. \$6.95. Five essays: "Nursing leadership and policy: Some cross-national comparisons" by William A. Glaser; "The structure and ideology of American nursing: An interpretation" by Anselm Strauss; "The organizational context of nursing practice" by Hans O. Mauksch; "Problems and issues in collegiate nursing education" by Fred Davis, Virginia L. Olesen, and Elvi Waik Whittaker; and "Nursing and patient care" by Esther Lucile Brown.

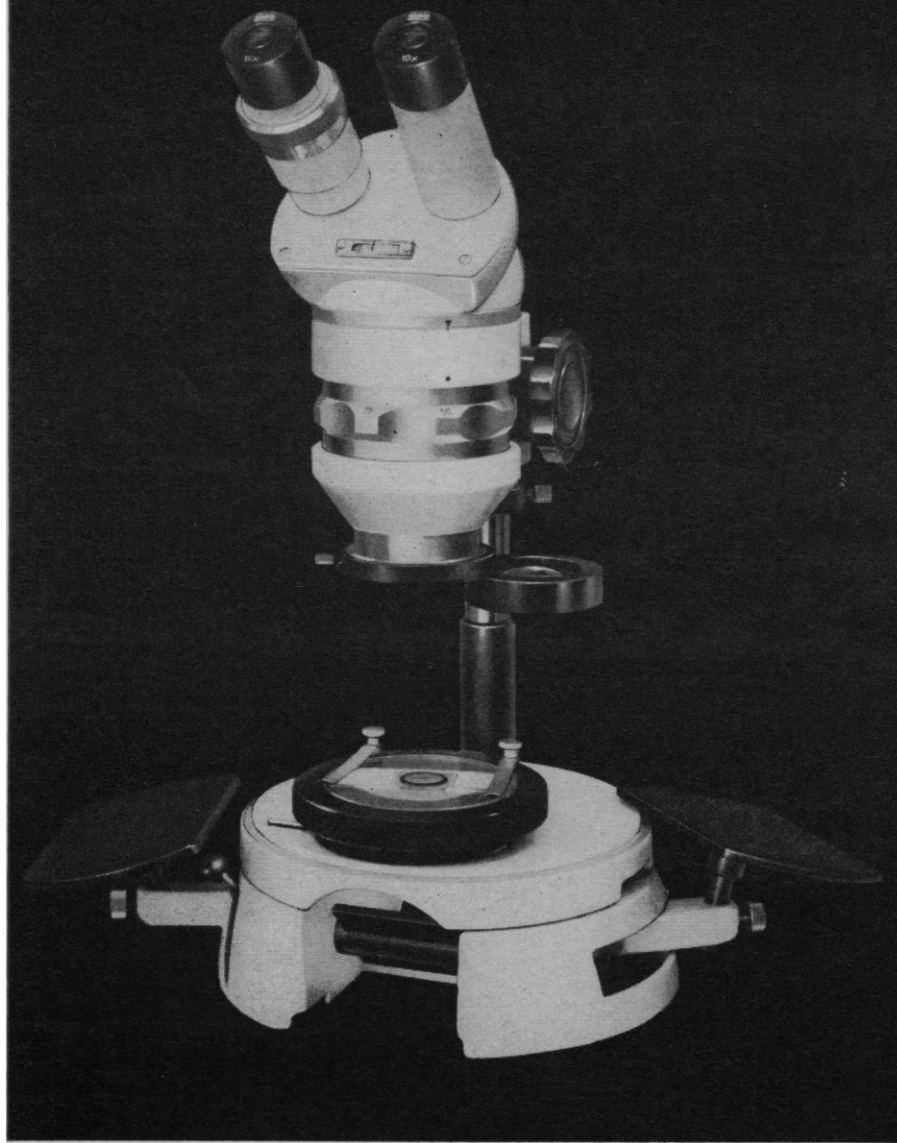
The Origin of the Solar System: Genesis of the Sun and Planets, and Life on Other Worlds. Thornton Page and Lou Williams Eds. Macmillan, New York, 1966. 352 pp. Illus. \$7.95. Sky and Telescope Library of Astronomy, vol. 3, edited by Thornton Page and Lou Williams Page; based on articles published in *The Sky*, *Sky and Telescope*, and *The Telescope* from 1936 to 1965.

Population Ecology and Management of Wisconsin Pheasants. Frederic H. Wagner, C. D. Besadny, and Cyril Kabat. Wisconsin Conservation Department, Madison, 1965. 168 pp. Illus. Paper.

Zur Problematik der materialistisch-dialektischen Analyse und Interpretation physikalischer Forschungsergebnisse. J. Wolfgang Görlich. Harrassowitz, Wiesbaden, Germany, 1965. 133 pp. Paper, DM. 22. Philosophische und Soziologische Veröffentlichungen Series, vol. 8, edited by Hans-Joachim Lieber.

Professionalization. Howard M. Vollmer and Donald L. Mills, Eds. Prentice-Hall, Englewood Cliffs, N.J., 1966. 383 pp. \$9.25. Forty-two papers: The Concept of Professionalization (6 papers); The Social Context of Professionalization (5 papers); Individuals and Professionalization (5 papers); Professional Controls (3 papers); Professional Associations and Colleague Relations (5 papers); Client and Public Relations (3 papers); Relations Among Occupational Groups (5 papers); Professionals and Complex Organizations

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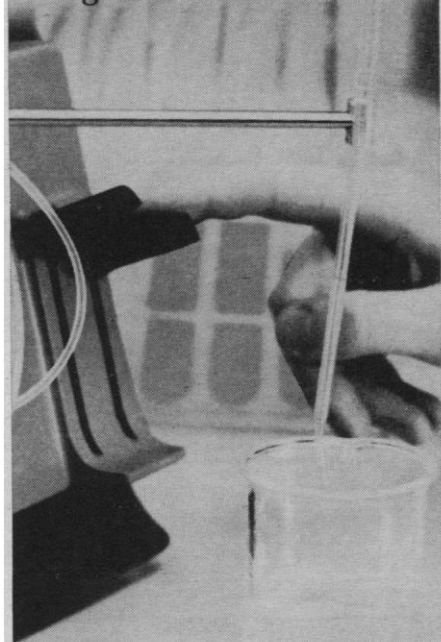
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A Prophet in Two Countries: The Life of F. E. Simon. Nancy Arms. Pergamon, New York, 1966. 179 pp. Illus. Paper, \$2.45.

Psychoanalysis in America: Historical Perspectives. Murray H. Sherman, Ed. Thomas, Springfield, Ill., 1966. 530 pp. \$15.75. Twenty-eight papers: Retrospect (3 papers); Clinical Contributions (7 papers); The Problem of Technique (7 papers); Applications to Culture (4 papers); and Contributions to Theory (7 papers).

Reliability Abstracts and Technical Reviews. vol. 5, *Abstracts 1696–2377*. Natl. Aeronautics and Space Administration, Washington, D.C., 1965. Unpaged.

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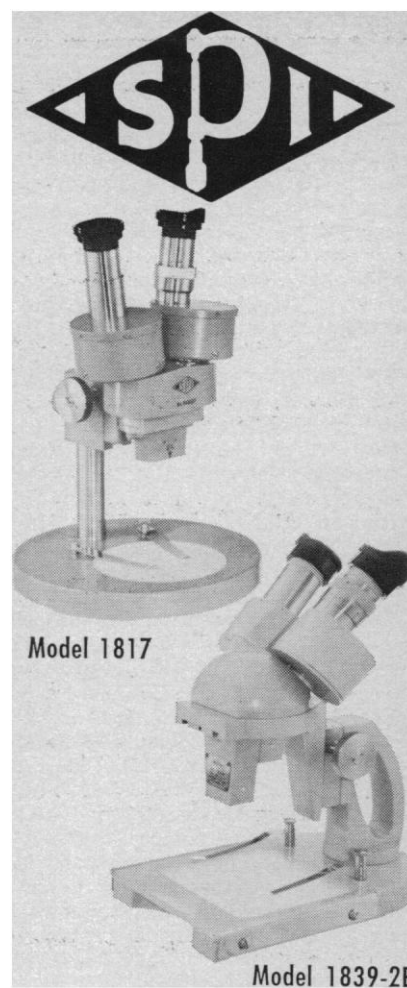
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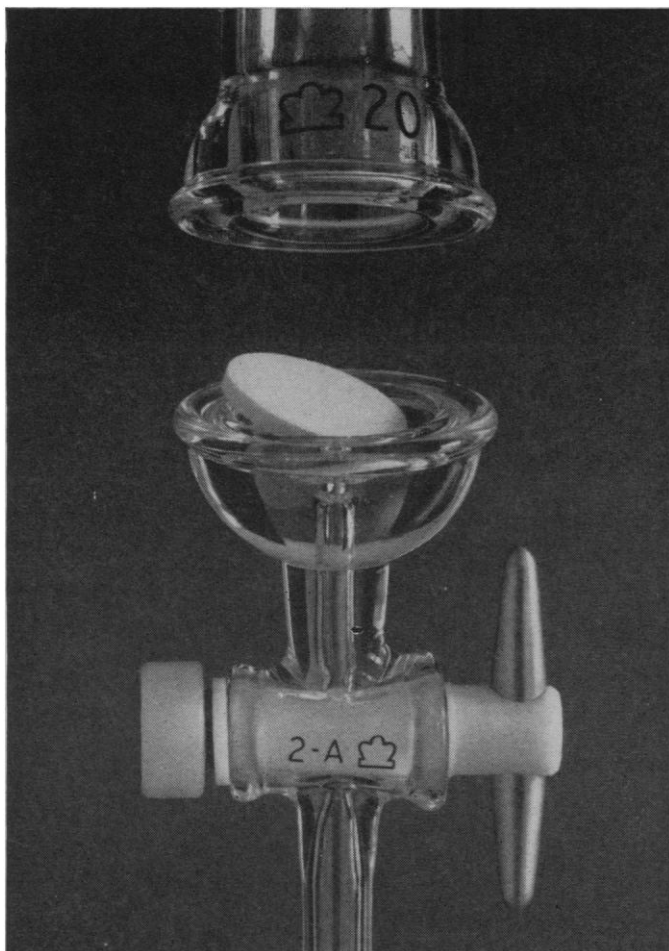
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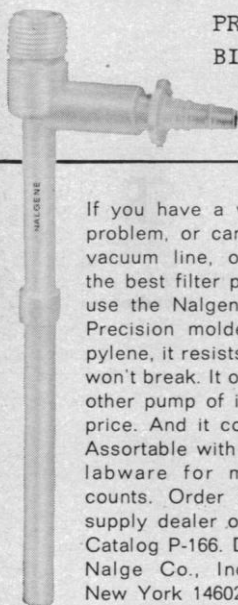
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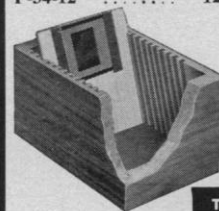
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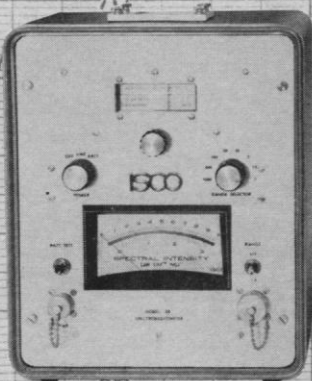
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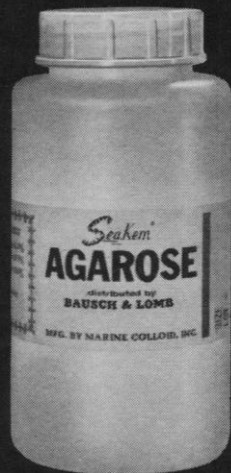
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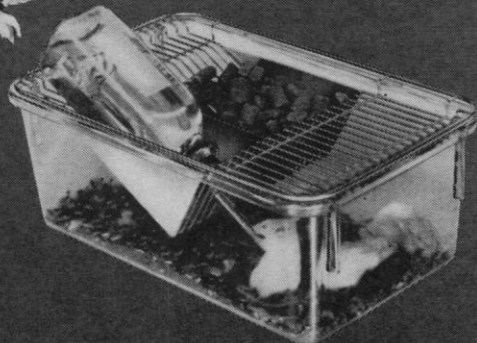
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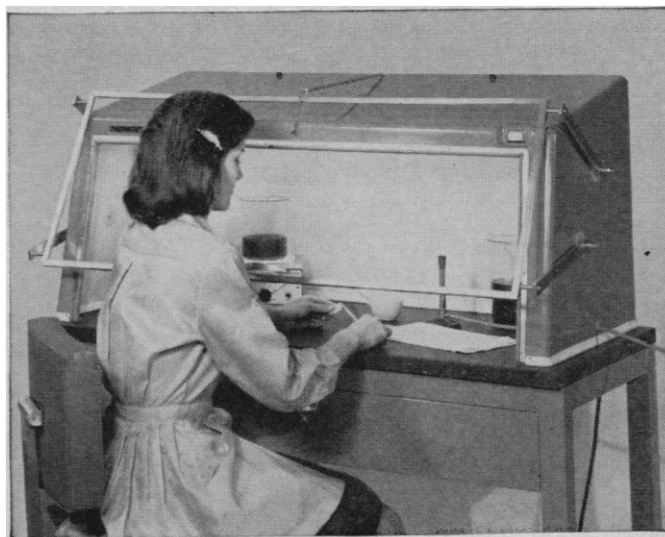
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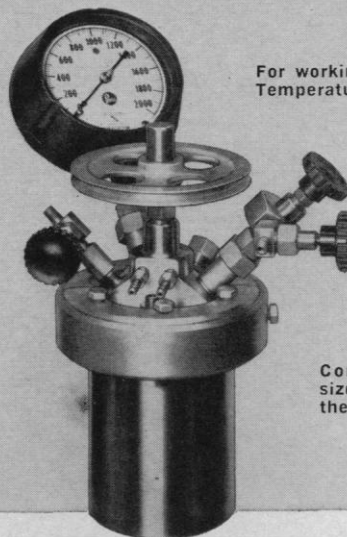
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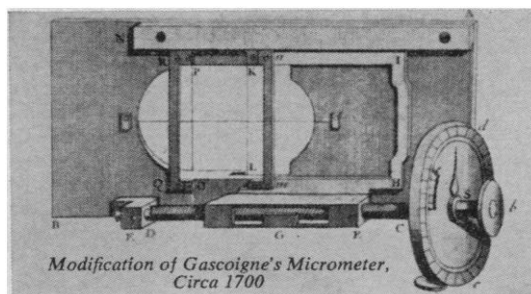
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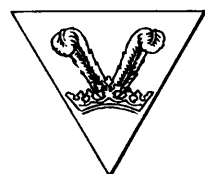
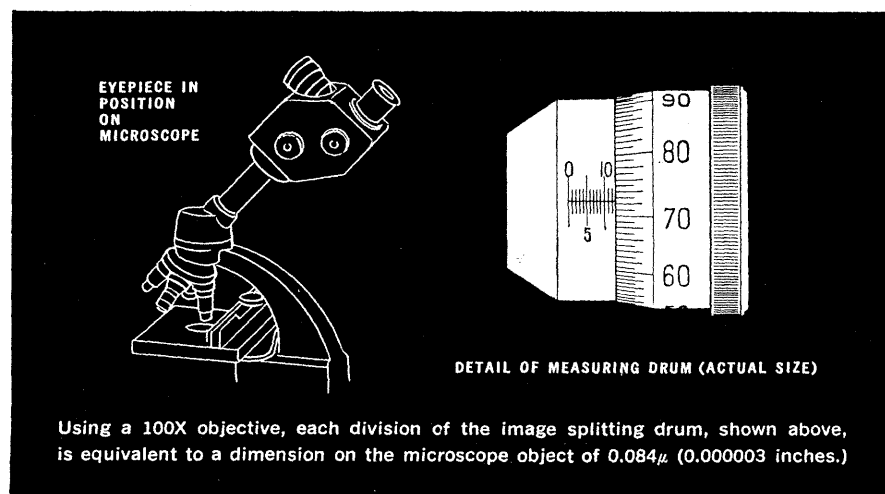


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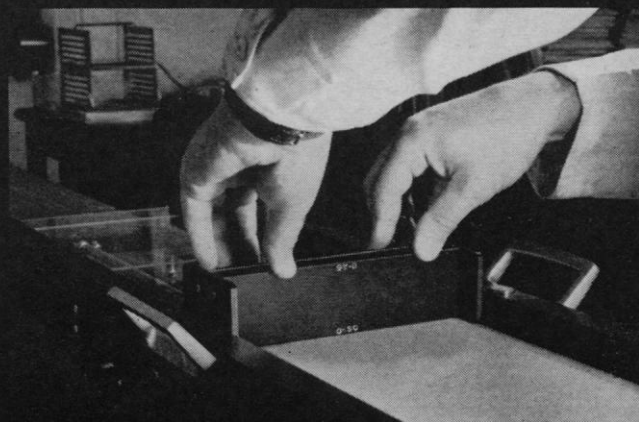
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| BOTTLES, VARNISH | <input type="checkbox"/> | MORTARS AND PESTLES | <input type="checkbox"/> |
| BOTTLES, ZEISS | <input type="checkbox"/> | PERCOLATORS | <input type="checkbox"/> |
| CHAMBERS, HEMACYTOMETER | <input type="checkbox"/> | PIPETTES, DISPOSABLE, PASTEUR | <input type="checkbox"/> |
| CYLINDERS, GRADUATED | <input type="checkbox"/> | SLIDES, CONCAVITY | <input type="checkbox"/> |
| DESICCATORS | <input type="checkbox"/> | SLIDES, MICROSCOPE | <input type="checkbox"/> |
| DISHES, CRYSTALLIZING | <input type="checkbox"/> | THERMOMETERS | <input type="checkbox"/> |
| DISHES, DAPPEN | <input type="checkbox"/> | TUBES, TEST | <input type="checkbox"/> |
| DISHES, EVAPORATING | <input type="checkbox"/> | TUBES, CULTURE | <input type="checkbox"/> |
| DISHES, PETRI | <input type="checkbox"/> | URINALS | <input type="checkbox"/> |
| DISHES, PREPARATION | <input type="checkbox"/> | URINOMETERS | <input type="checkbox"/> |
| DISHES, STAINING | <input type="checkbox"/> | VIALS, APPLICATOR | <input type="checkbox"/> |
| DISHES, STENDER | <input type="checkbox"/> | VIALS, CAPSULE | <input type="checkbox"/> |
| DROPPERS, MEDICINE | <input type="checkbox"/> | VIALS, DROPPER | <input type="checkbox"/> |
| FUNNELS | <input type="checkbox"/> | VIALS, PATENT LIP | <input type="checkbox"/> |
| | | VIALS, SCREW CAP | <input type="checkbox"/> |
| | | VIALS, SHELL | <input type="checkbox"/> |

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