

SCIENCE

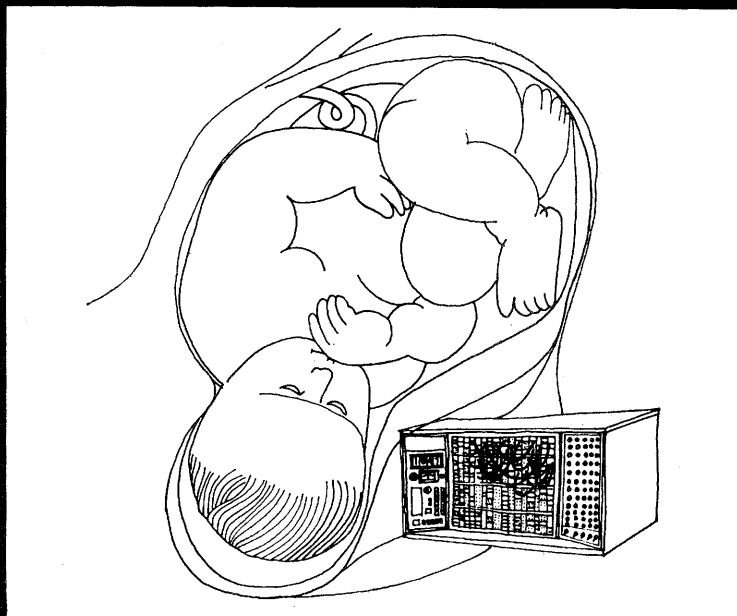
9 July 1965
Vol. 149, No. 3680

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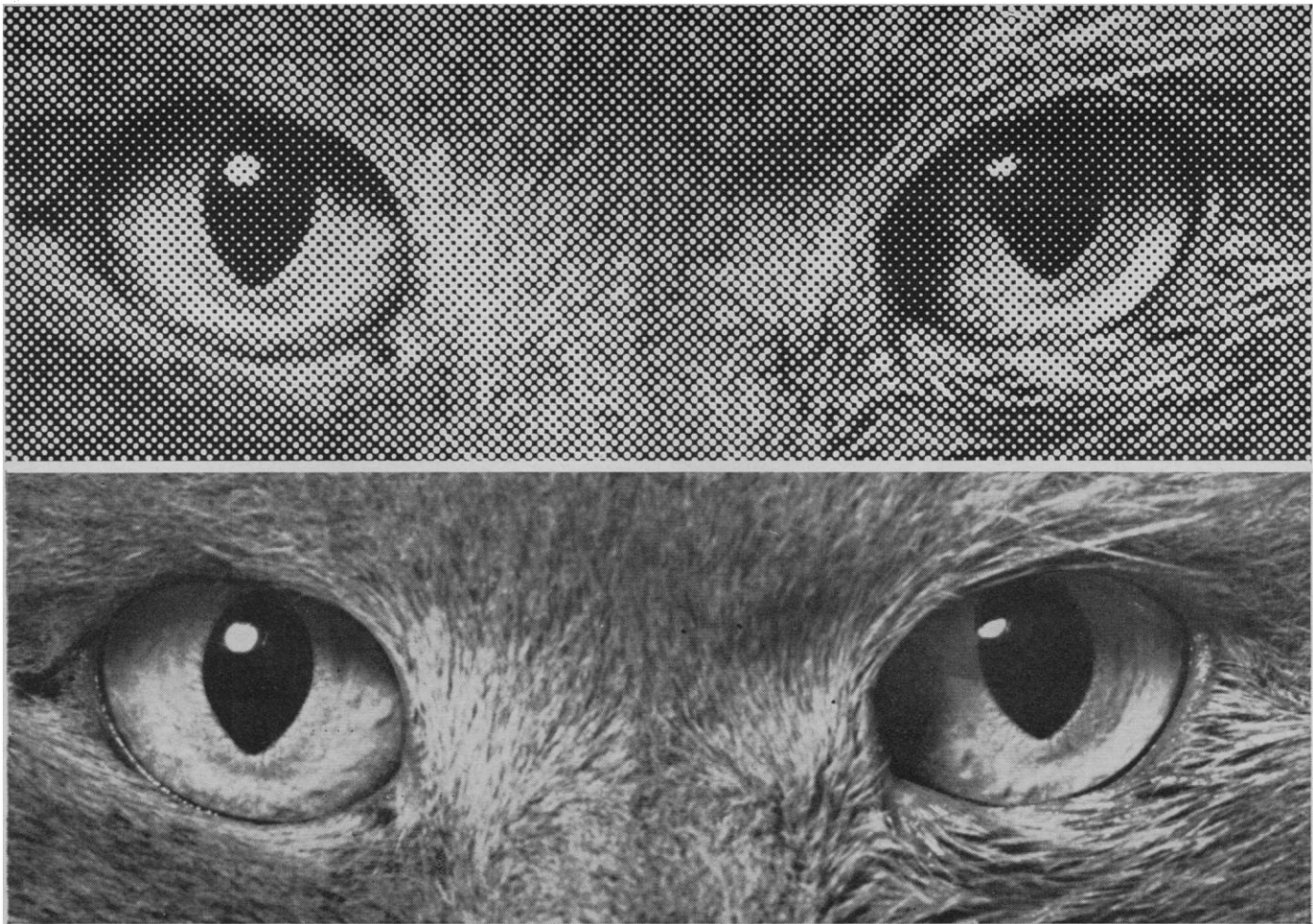
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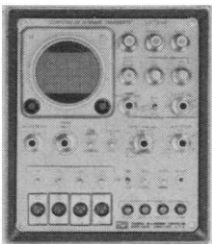
COVER

Canyon on the Middle Fork, near its confluence with the Salmon River, Idaho. The Salmon, a part of the Columbia River system, figures prominently in discussions of solutions to regional water problems. See page 133. [Richard Norgaard, courtesy of American River Touring Association]

The American Association for the Advancement of Science was founded in 1848 and incorporated in 1874. Its objects are to further the work of scientists, to facilitate cooperation among them, to prove the effectiveness of science in the promotion of human welfare, and to increase public understanding and appreciation of the importance and promise of the methods of science in human progress.



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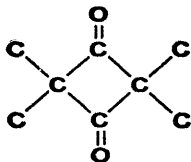


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Tetramethyl-1,3-cyclobutanedione

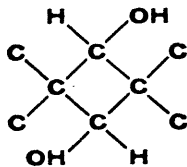


Form.....solid
Melting point.....115-116°C.
Boiling point, 760 mm.....159°C.
Purity.....99.5%

This compound resembles camphor and menthol only in odor and volatility. Reactions are those you'd expect, with the qualification that some can proceed to yield heterocyclic derivatives.

Eastman Chemical Products, Inc.
Kingsport, Tennessee **B14**

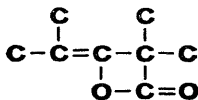
2,2,4,4-Tetramethyl-1,3-cyclobutanediol



Form.....white solid
Melting point.....124-135°C.
Boiling range, 760 mm.....220-225°C.
Isomer composition (approx.)...50% cis, 50% trans

The symmetry and high degree of substitution of this lineal descendant of B14 impart unusual thermal and hydrolytic stability to its diesters. They could be of more than passing interest as plasticizers and lubricants.

Eastman Chemical Products, Inc.
Kingsport, Tennessee **B15**

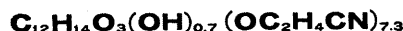


2,2,4-Trimethyl-3-hydroxy-3-pentenoic acid, β -lactone

Form.....liquid
Specific gravity, 20/4°C.....0.946
Boiling point, 730 mm.....170°C.

Thiol esters are obtained in the base- or acid-catalyzed reaction of this lactone with mercaptans. Reaction in the presence of a free radical catalyst produces intermediates which decarboxylate to give alkyl (1-isopropyl-2-methylpropenyl) sulfides.

Eastman Chemical Products, Inc.
Kingsport, Tennessee **B42**



Cyanoethyl sucrose

Form.....clear, viscous liquid
Dielectric constant (100 cy @ 25°C.).....37.0
Volume resistivity (ohm-cm @ 25°C.)..... 5×10^{11}

What an intriguing compound this one is! Apart from its versatility in electrical applications, it offers people (from ablation specialists to zoologists) a means of violently affecting the electrical properties of many substrates.

Eastman Chemical Products, Inc.
Kingsport, Tennessee **B45**



Crotyl alcohol

Form.....colorless liquid
Specific gravity, 20°/20°C.....0.855
Boiling point, 760 mm.....121-122°C.

This alcohol offers a means of introducing moderate reactivity into addition polymers. It also finds utility as an herbicide and a soil fumigant. Do you know that we have been responsible for cutting its market price by a factor of sixteen?

Eastman Chemical Products, Inc.
Kingsport, Tennessee **B55**

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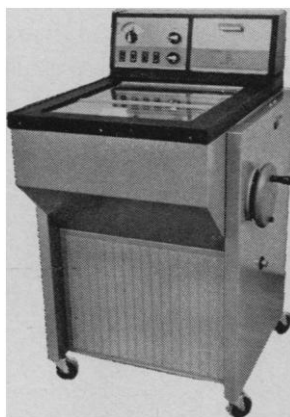
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Panel Discussion

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Panel Discussion

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Panel Discussion

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8 papers on beer, tobacco, tea, dairy products, yeast, sugars, including chromatographic analyses and the latest digester techniques.

Panel Discussion

KIDNEY/IN-VIVO TECHNIQUES

3 papers describing In-Vivo analyses in kidney studies, including blood urea nitrogen, urea extraction, and renal blood flow.

ENZYME ANALYSES

12 papers on new and modified enzyme procedures and kinetic studies, including uric acid, polynucleotide phosphorylase, lactic dehydrogenase and cholinesterase.

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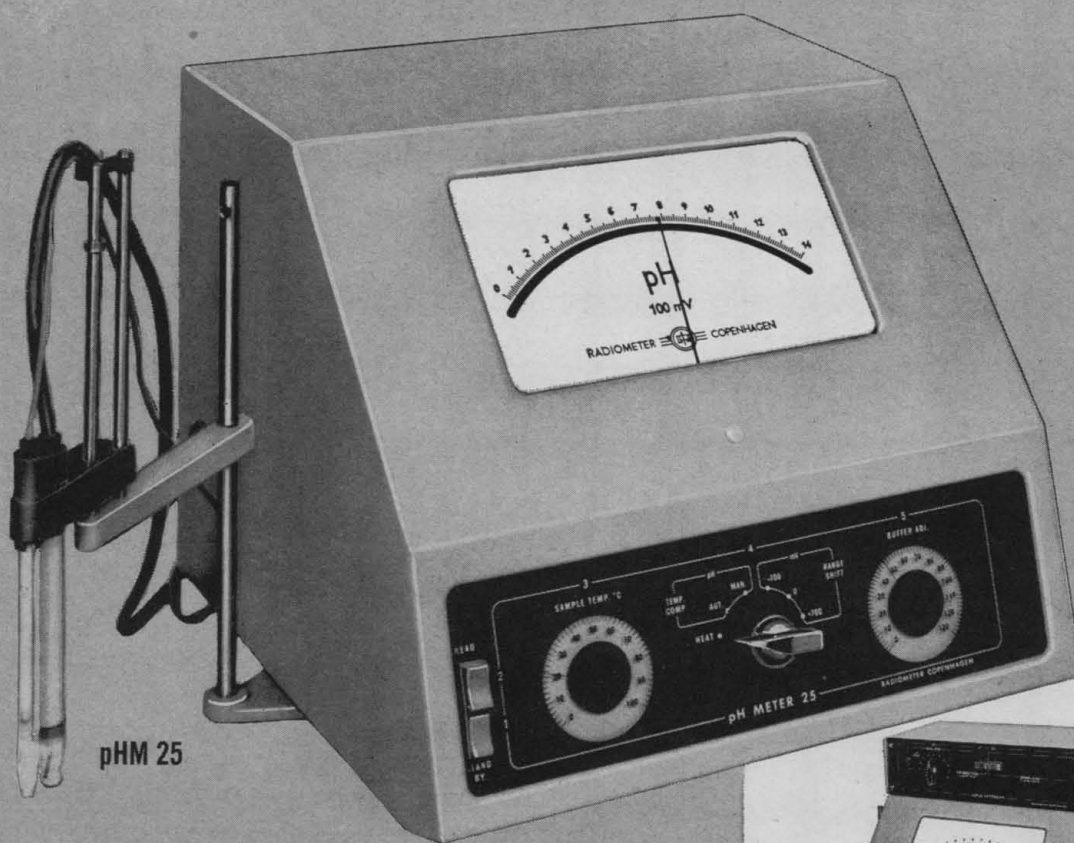
9 papers devoted to pesticides determinations and analyses of calcium, phosphorus, nitrate, and magnesium in soils, plants and fertilizers.

Panel Discussion

pH

new!

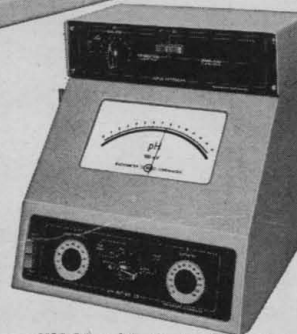
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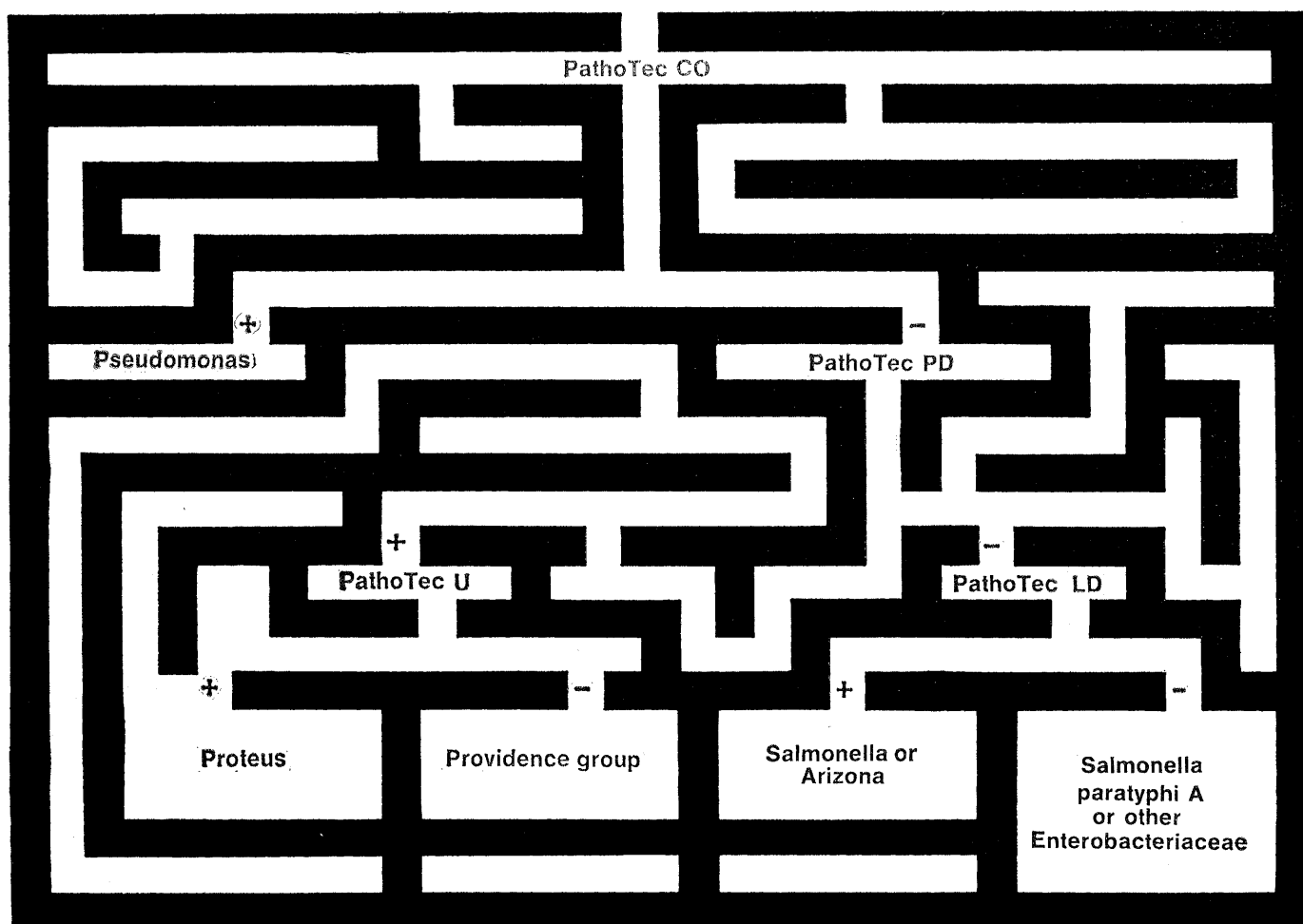


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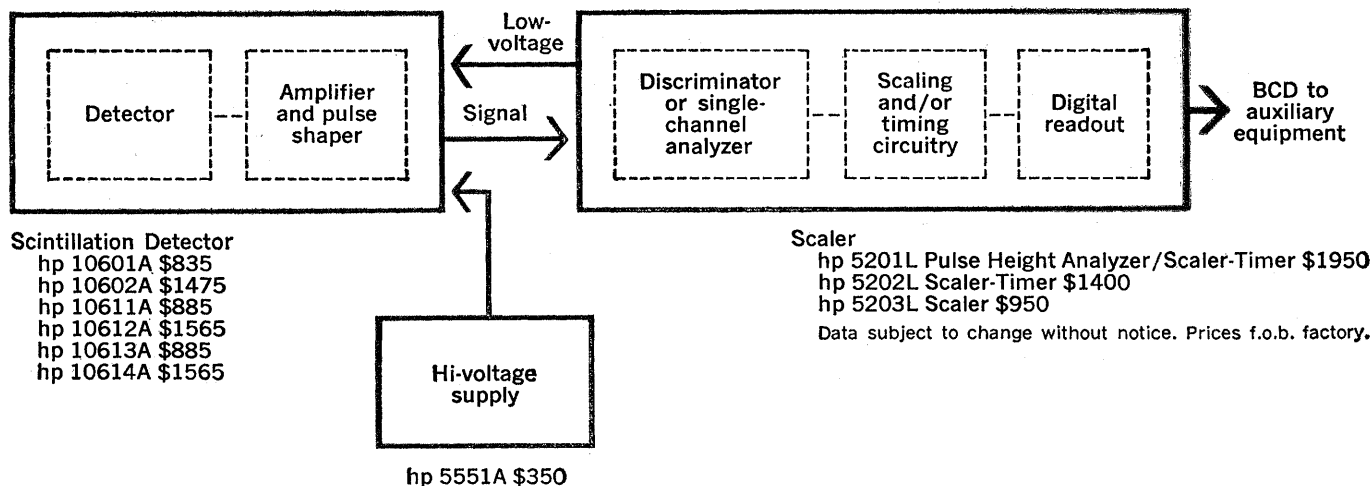
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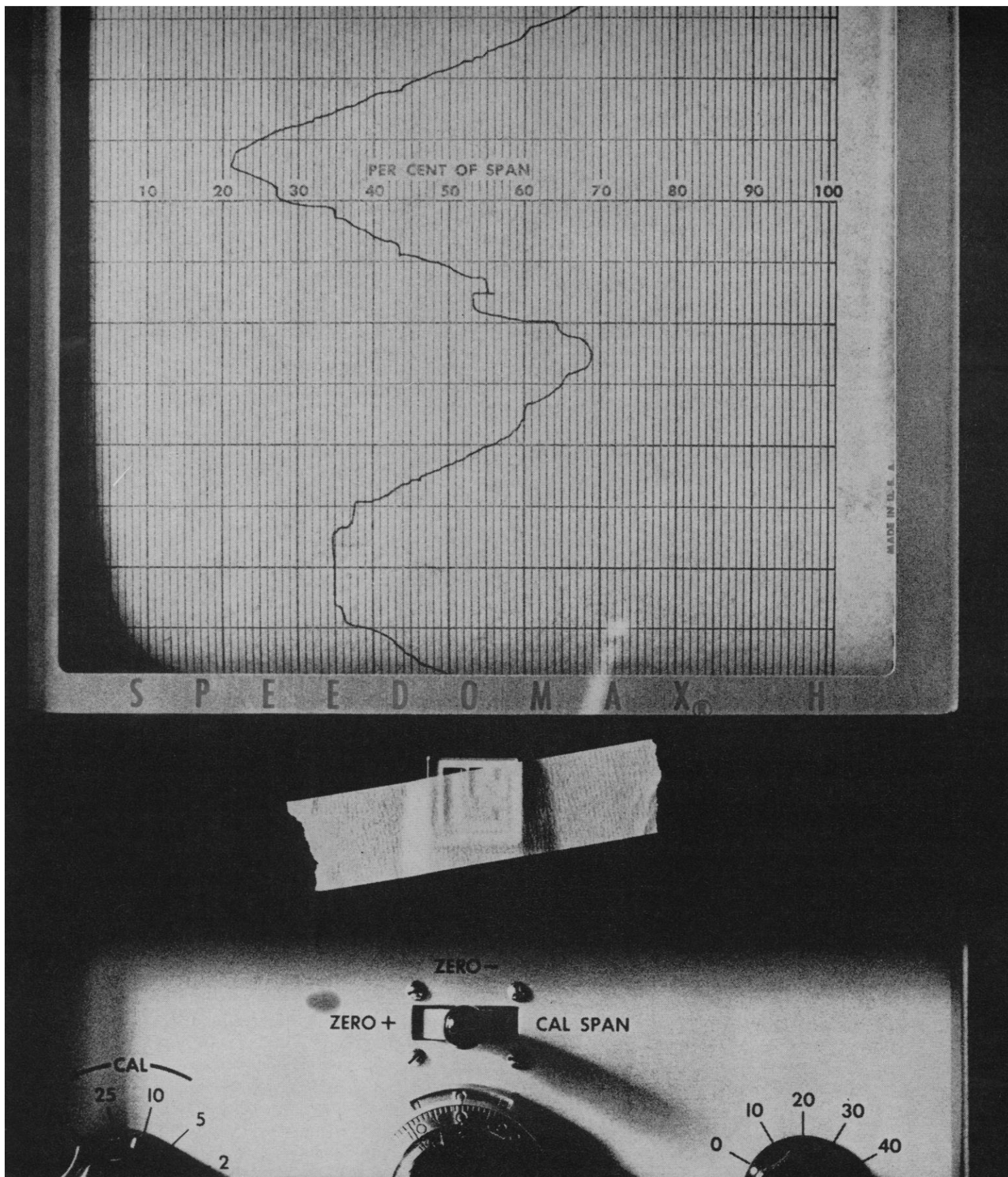
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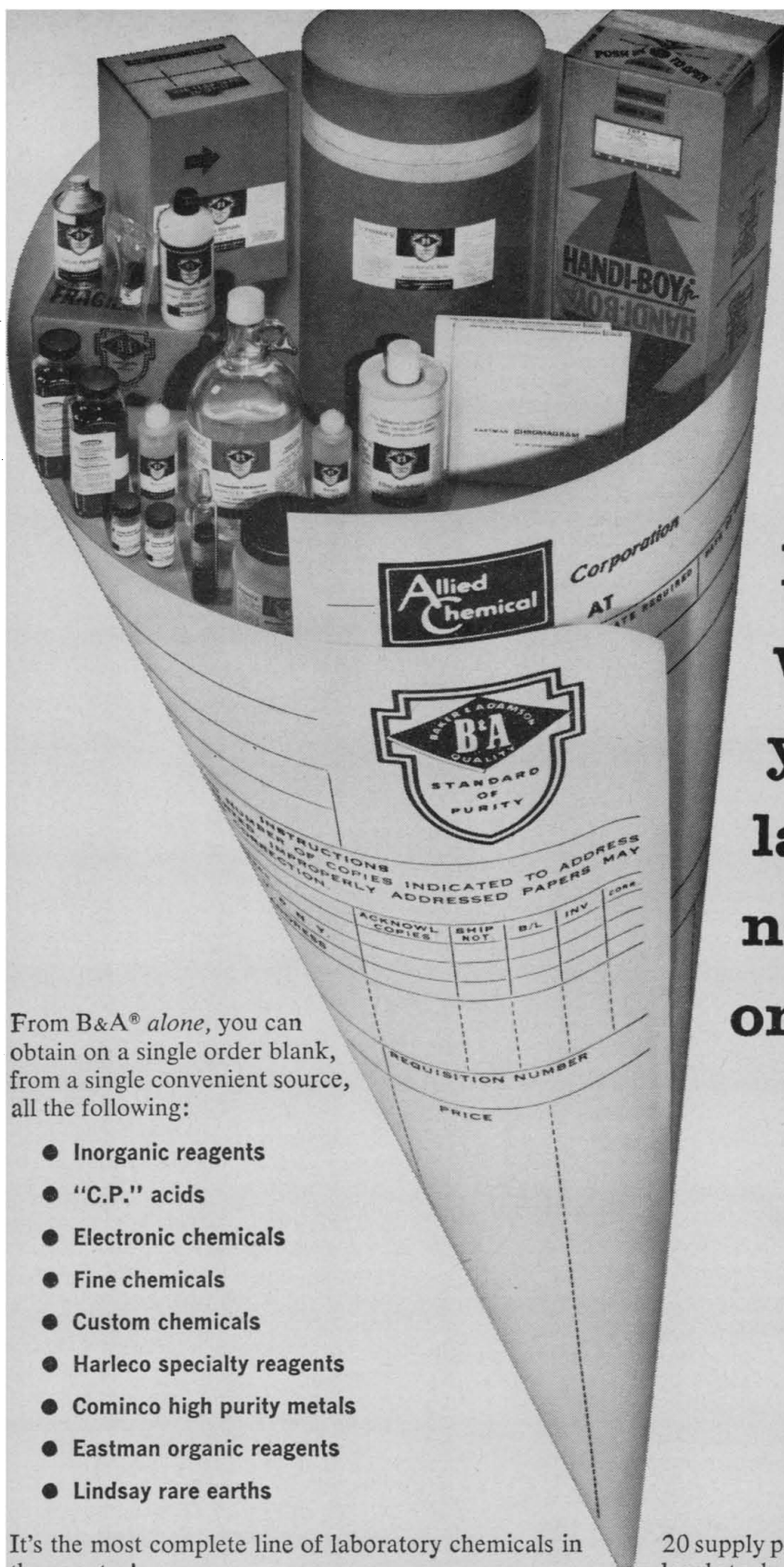
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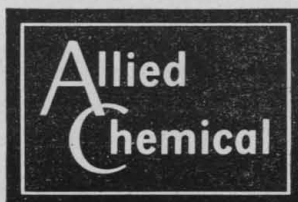
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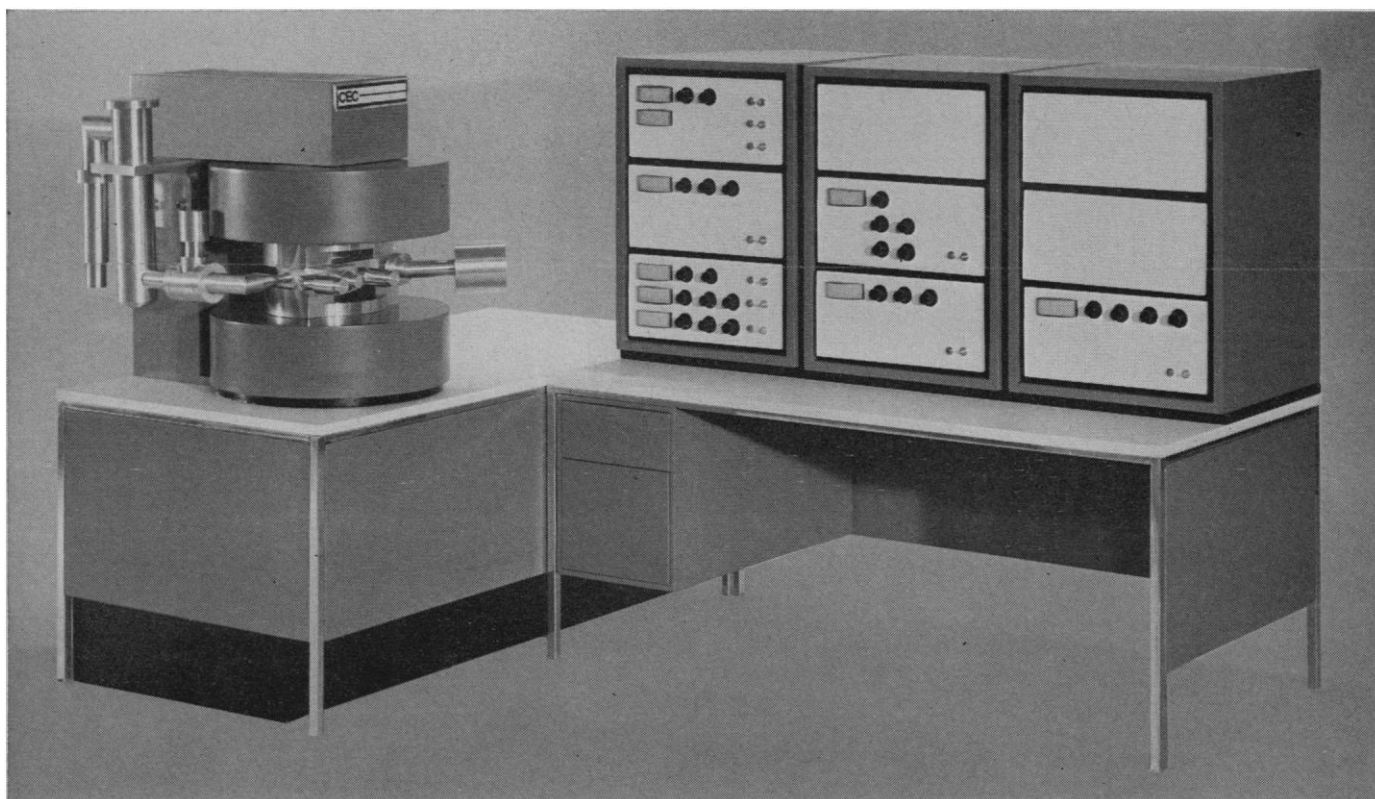
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unmatched by any other mass spectrometer.

The construction features of the 21-104 are equally impressive:

■ 5-inch mass spectrometer of Dempster Geometry.

■ Pull-out/tilt-up chassis for immediate accessibility.

■ "C"-shaped magnet provides maximum accessibility to both source- and collector-end of the analyzer.

■ All-metal pumping system uses polyphenylether fluid.

■ 24-hour liquid N_2 cold trap.

■ Externally adjustable collector slit, variable from 0.2 to 20 mils.

Who will have particular need for the 21-104? Virtually everyone involved in advance work in mass spectrometry. Included, of course, are organic chemists; university researchers; analytical groups in petroleum, petrochemical and chemical plants; manufacturers of pharmaceuticals, flavors and fragrances; and developers of life support systems for aerospace projects.

Equally important, CEC's full line of mass spectrometer accessories is compatible with the 21-104.

These accessories include: mass spectrum digitizers; a wide variety of inlet systems (room temperature, all-metal, direct solids introduction probe, high temperature $350^\circ C$ all-glass inlet and gas chromatograph effluent inlet systems); total ionization circuitry; alternate ion pumping systems; automatic liquid nitrogen filler; micromanometers; and CEC Recording Oscillographs.

For all the important facts about the 21-104, call your CEC Sales and Service Office, or write for Bulletin CEC 21104-X1.

CEC

Analytical & Control Division

CONSOLIDATED ELECTRODYNAMICS

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New lightweight aluminum nitrogen storage container costs less, increases holding time...



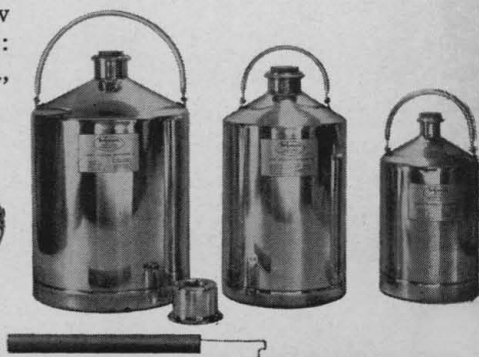
**and doubles as a nitrogen refrigerator.
It's revolutionary!**

Now greater flexibility and economy with Hofman's new 10 liter *aluminum* nitrogen storage container. Thermal-conductivity is reduced considerably with new plastic inner neck design, allowing increased liquid retention. Through use of a separate neck connection the 10 liter container converts to a refrigerator with room for five sample storage canisters.

Also available in 2½ liter and 5 liter sizes for storage and transfer (these units not inter-

changeable). All three models are lighter and smaller in overall size than the standard steel units cutting storage space and handling effort to an absolute minimum.

For complete specs and prices, write or call today. Hofman Laboratories, 225 Parkhurst Street, Newark, New Jersey. West Coast: 6750 Caballero Blvd., Buena Park, Calif.



New PAR Lock-In Amplifier Measures Signals in the Presence of Noise by Crosscorrelation



The PAR Model HR-8 Lock-In Amplifier represents a significant advance in signal processing equipment for experimentalists who must measure low-level signal intensities in the presence of noise. It employs the theoretically optimum technique for signal recovery, and can be incorporated into a large class of experiments in which the signal of interest is, or can be made periodic, and in which a reference voltage related in frequency and phase to the signal can be obtained. The Model HR-8 first amplifies and bandlimits the input signal and then crosscorrelates it with the reference signal, suitably phase shifted and shaped. The crosscorrelation of input and reference signals yields a DC output voltage proportional to the signal of interest, while the crosscorrelation of the reference and noise results in no net DC voltage. The system can also be described as a continuously integrating, highly sensitive, phase conscious voltmeter, the response of which is "locked" to that particular frequency and phase at which the signal information has been made to appear.

Technical Features:

Frequency Range: 1.5 cps to 150 KC continuously tunable in 5 ranges.

Time Constants: 11 values in 1-3 sequence extending from 0.001 to 100 seconds. Single or double section RC filtering.

Pre-Amplifiers: Interchangeable low-noise pre-amplifiers, operable either within the HR-8 or remotely, are used.

Type A: Differential 10 megohm input.

Type B: Low impedance transformer input for low source impedances.

Sensitivity: 21 calibrated full scale ranges in 1-2-5 sequence.

With Type A Pre-Amplifier: 100 nanovolts to 500 millivolts rms.

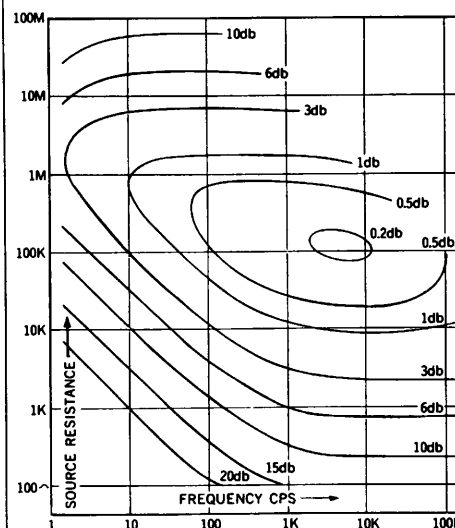
With Type B Pre-Amplifier: 1 nanovolt to 5 millivolts rms.

Output: ± 10 volts full scale, single-ended with respect to ground. Will drive galvanometric and servo recorders.

Frequency Selective Amplifiers: Notch network in negative feedback loop used in both signal and reference channel tuned amplifiers. Reference channel Q of 10. Signal channel Q adjustable from 5 to 25 with calibrated dial (no gain change with Q adjustment).

Phase Adjustment: Calibrated 360° phase shifter, providing continuous rotation as well as a four position quadrant switch which shifts phase in 90° increments.

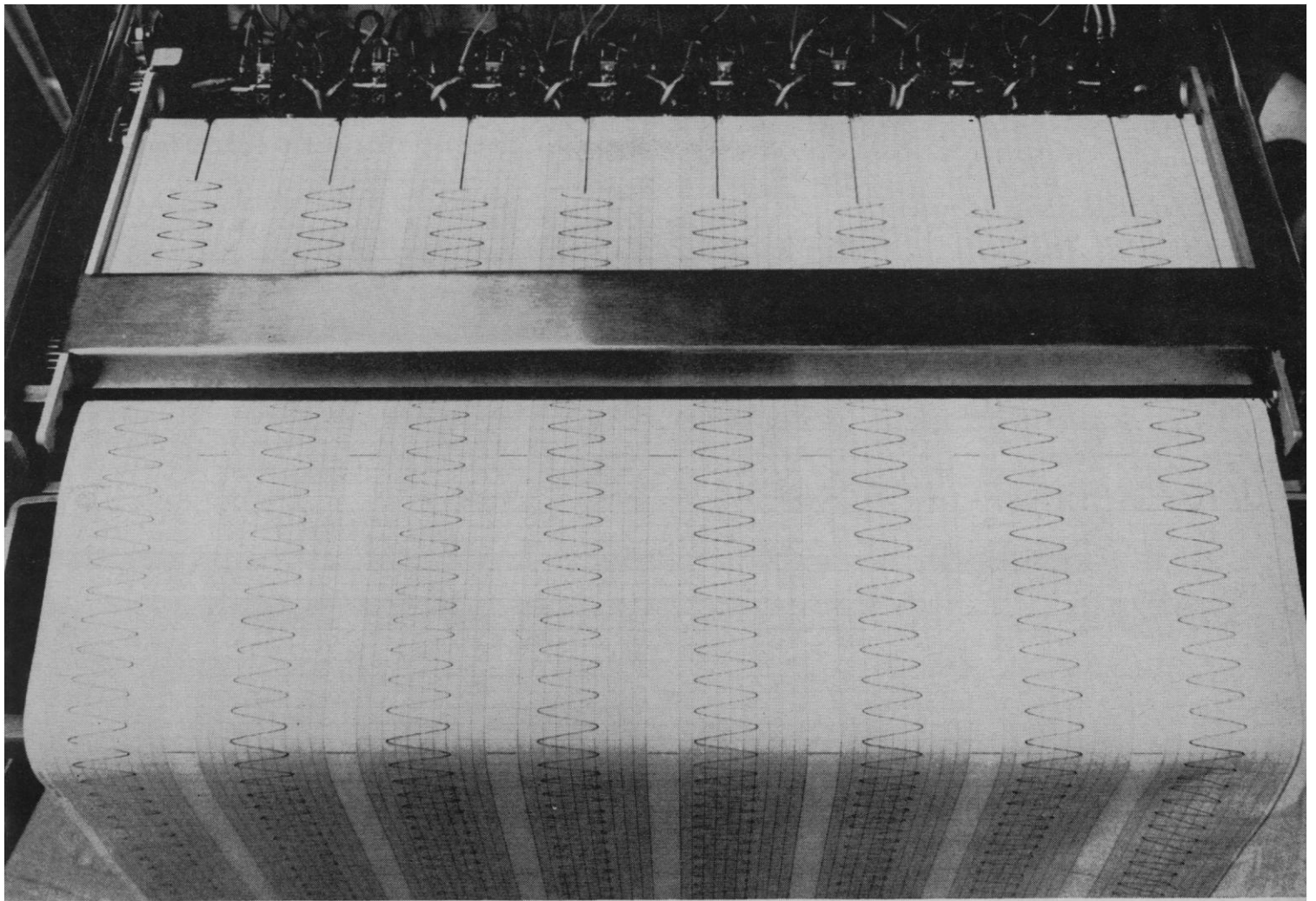
Price: \$2,100 with either Type A or Type B Pre-Amplifier.



Contours of constant noise figure for a typical PAR Type A preamplifier plotted to show dependence on frequency and source resistance at 300° K. Amplifier operated single-ended.

Write for bulletin No. 120 on the HR-8 or ask for information on PAR's complete line of Lock-In Amplifiers and accessories.

PAR PRINCETON APPLIED RESEARCH CORP.
Dept. G
Box 565, Princeton, N. J., Tel. (609) 799-1222

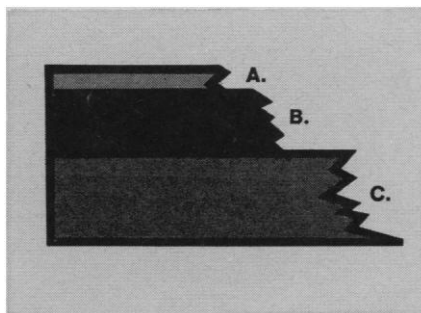


A few lines worth repeating...

Graphic Controls' thermal recording oscillograph charts produce distinct, black, clearly legible trace lines everytime.

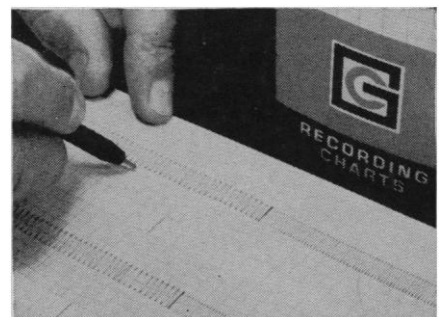
The reason is the unique construction of our paper. We start with a specially processed, high-density undercoating that provides the blackest possible trace. To this we add an unusually sensitive, completely compatible surface coating that lets the stylus glide evenly and smoothly. Many critical areas that are blurred or indistinct on other papers become clear and precise with GC's oscillograph charts. Even the most complex functions and inputs are recorded easily.

Because the surface coating is applied by a new process, there's no variance in thickness from edge-to-edge. The caliper of the paper is constant. Creep is eliminated and uniform paper flow is assured. And at the same cost as the paper you are now using.



A. Thermal-reactant coating
B. Contrast undercoat
C. Substrate

In addition, GC's thermal recording charts are water resistant, durable, yet extremely lightweight. Their con-



sistent performance has been proved in major aerospace, industrial, and scientific research applications.

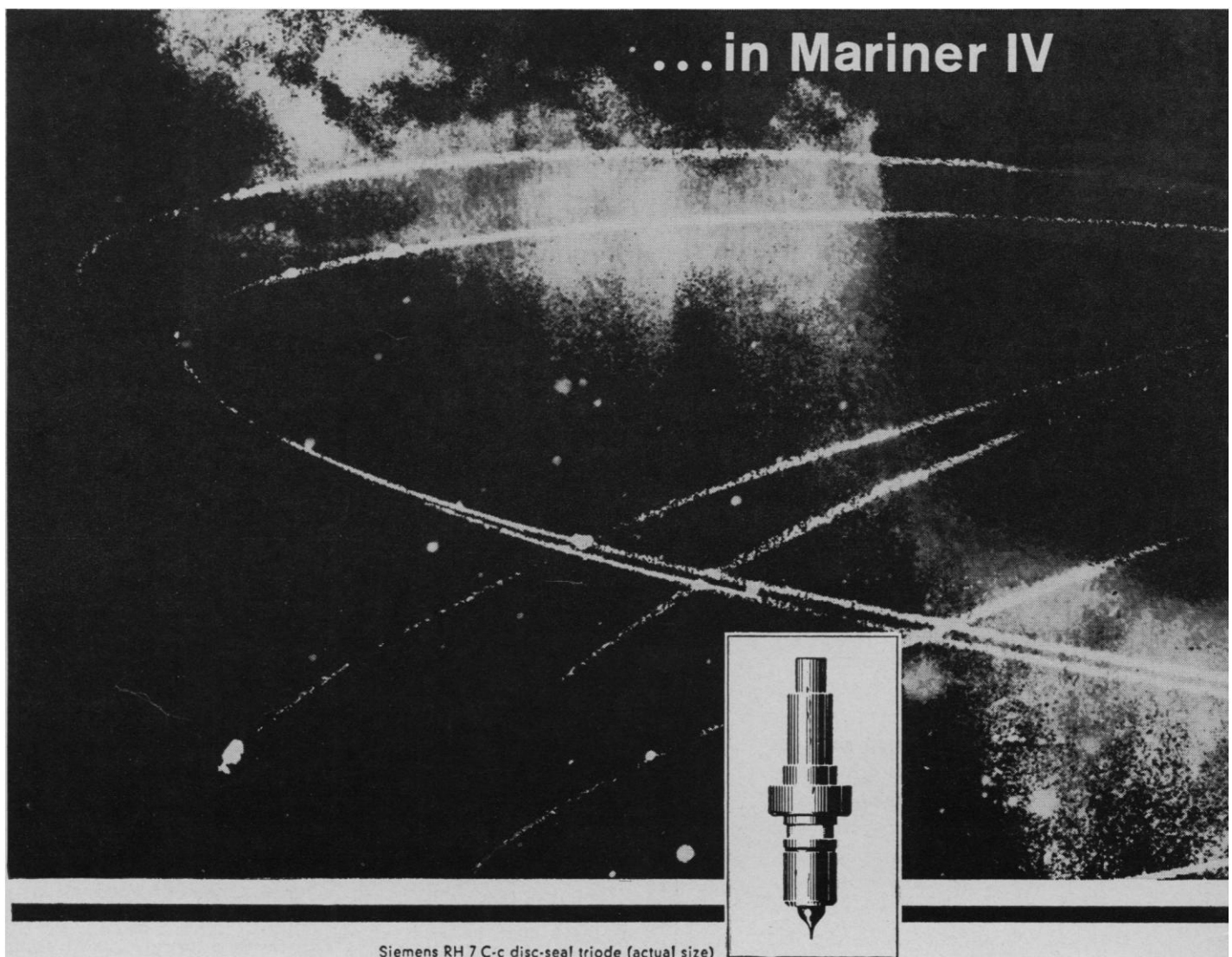
Check the performance of GC's charts for yourself...and compare them with your present papers. For complete information, contact:



RECORDING CHART DIVISION
GRAPHIC CONTROLS CORPORATION
189 VAN RENSSELAER STREET, BUFFALO, NEW YORK 14210

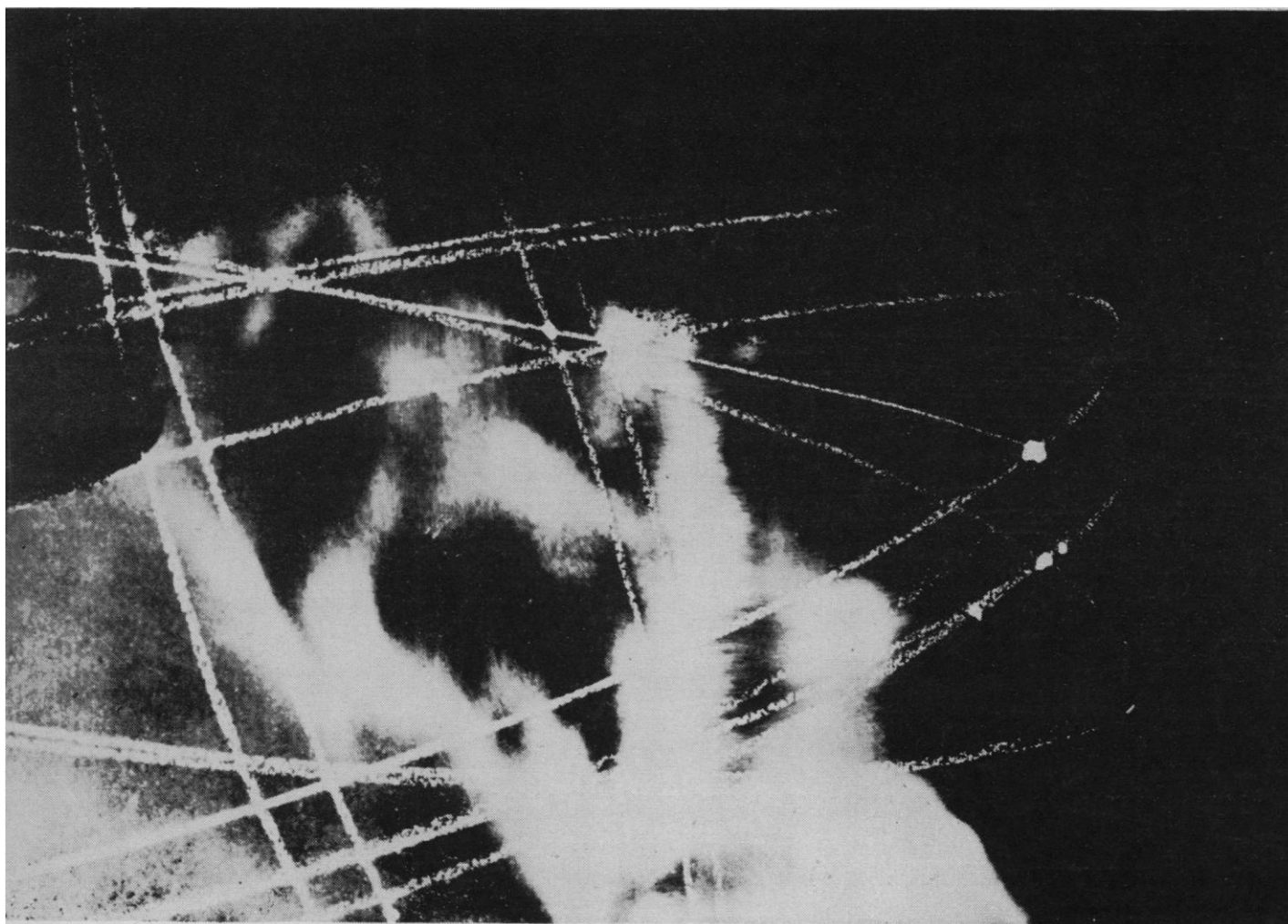
This is Siemens

On July 14, Mariner IV will reach Mars after some 230 days of flight through space. If successful, this most daring space adventure to date will yield pictures of the surface of the planet transmitted over 135 million miles by a transmitter tube half the size of a cigarette. Siemens' RH 7C-c planar triode has already been at work during the flight, transmitting data about the position of the probe—the most vital criterion for possible in-flight course corrections. When it has passed Mars, the triode will be transmitting pictures and data to earth for several days. The triode must withstand shocks of 200 times the acceleration of the earth's gravity and a static acceleration 14 times that of the earth.



To produce such a tube, Siemens' engineers developed production and testing methods which approach the limits of today's technology. All triodes were x-rayed before and after a 500-hour trial burn-in and the x-ray images compared in a weeding-out process only the most perfect specimens could survive. The components selected were taken to Pasadena by courier so as to be under the strictest surveillance even during transportation.

The Siemens RH 7C-c planar triode is only one example of the type of work with which we are concerned. Our line of products extends from solid-state devices to giant power plants, and from electric motors to electronic computing centers.



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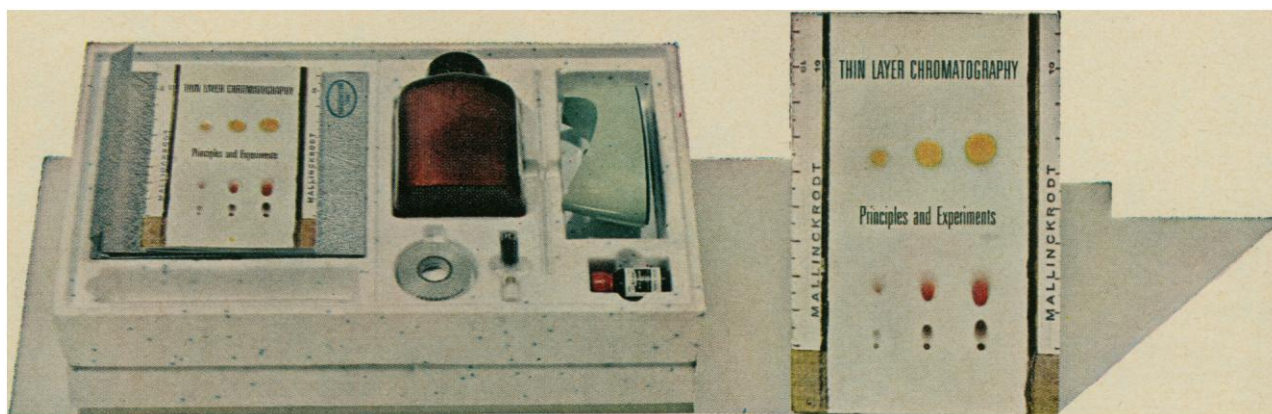
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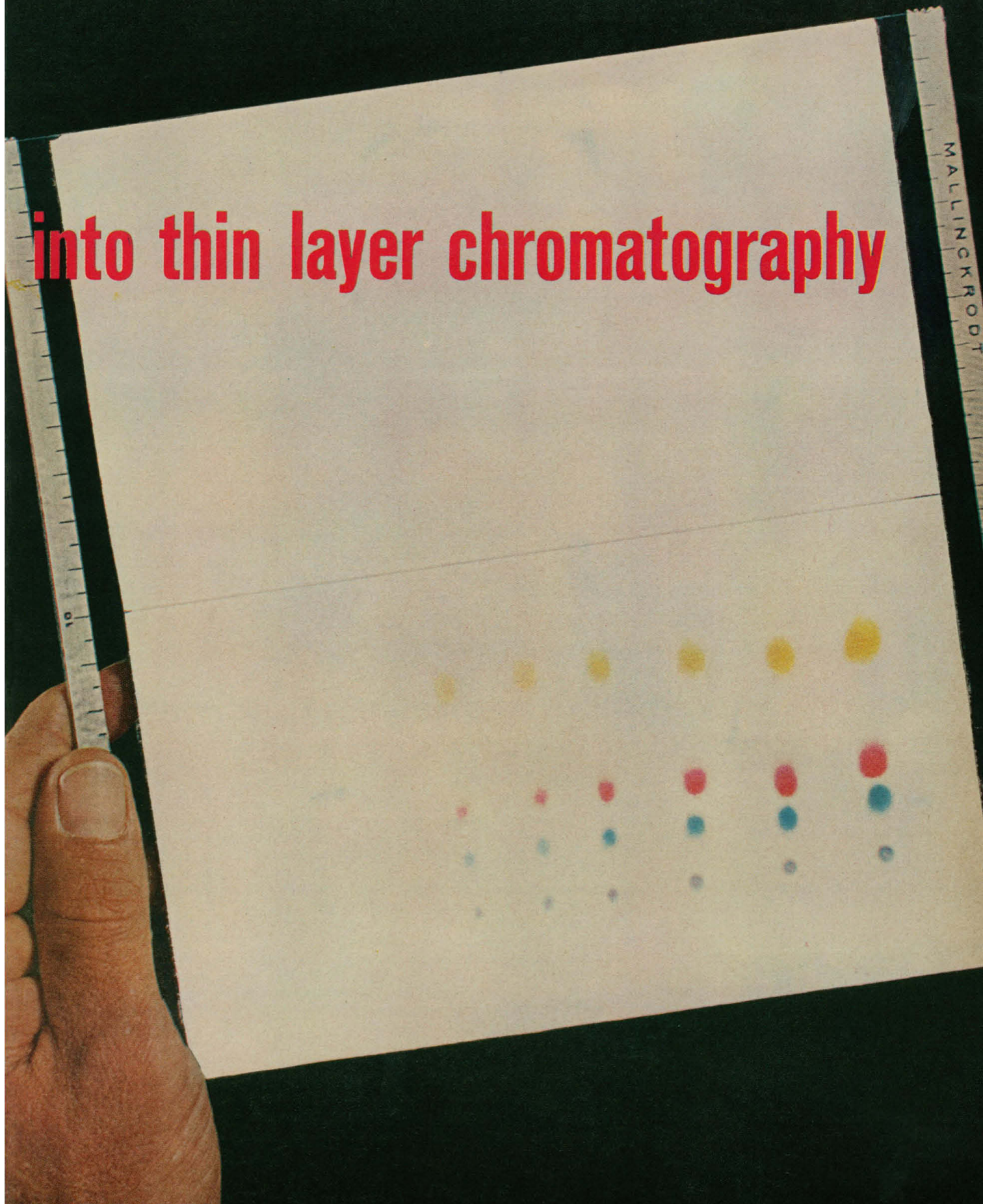
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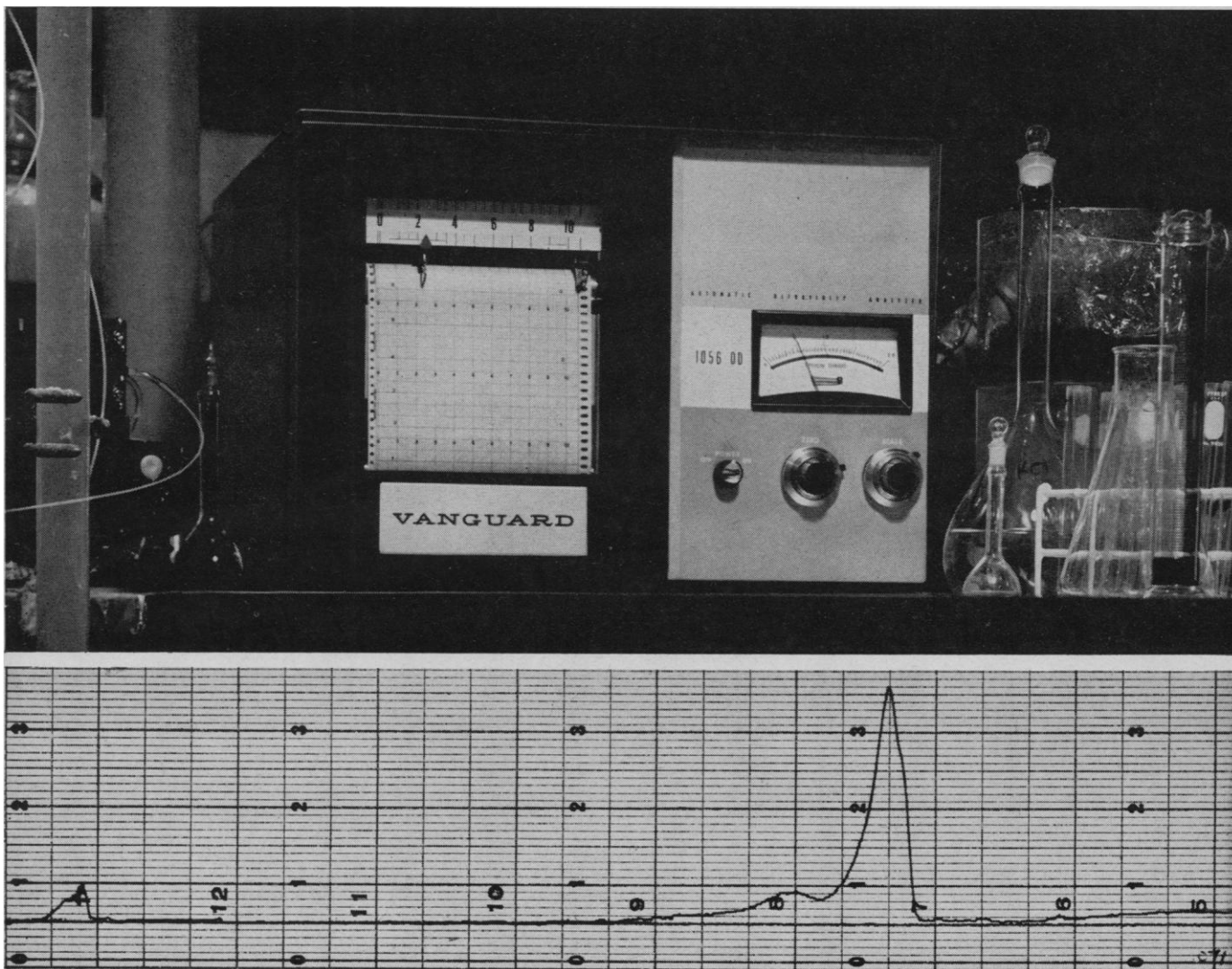
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into thin layer chromatography





Typical chromatogram of a mixture of unknown proteins from a DEAE cellulose column. O.D. vs. Volume. Full scale is 2 O.D. units.

Reliable way to run UV analysis automatically at any absorption band you select

The TMC-Vanguard Model 1056-OD is an automatic ultra-violet analyzer, designed for extreme versatility and reliability. It has two independent logarithmic converters which provide a chart recording of the optical density of effluent from a chromatographic column, the ordinate of which is linear with optical density. A plane diffraction grating monochromator makes a continuous energy range available from 200 millimicrons well into the visible spectrum. Wave length settings can be made to an accuracy of 1 mu by

means of a simple dial control. This makes it possible to run each experiment at a wave length setting providing best chart resolution for the sample of interest.

Split-beam operation of the 1056-OD, utilizing sample and reference cuvettes, provides continuous base line compensation for gradient elutions or other applications where the optical density of the eluent may change.

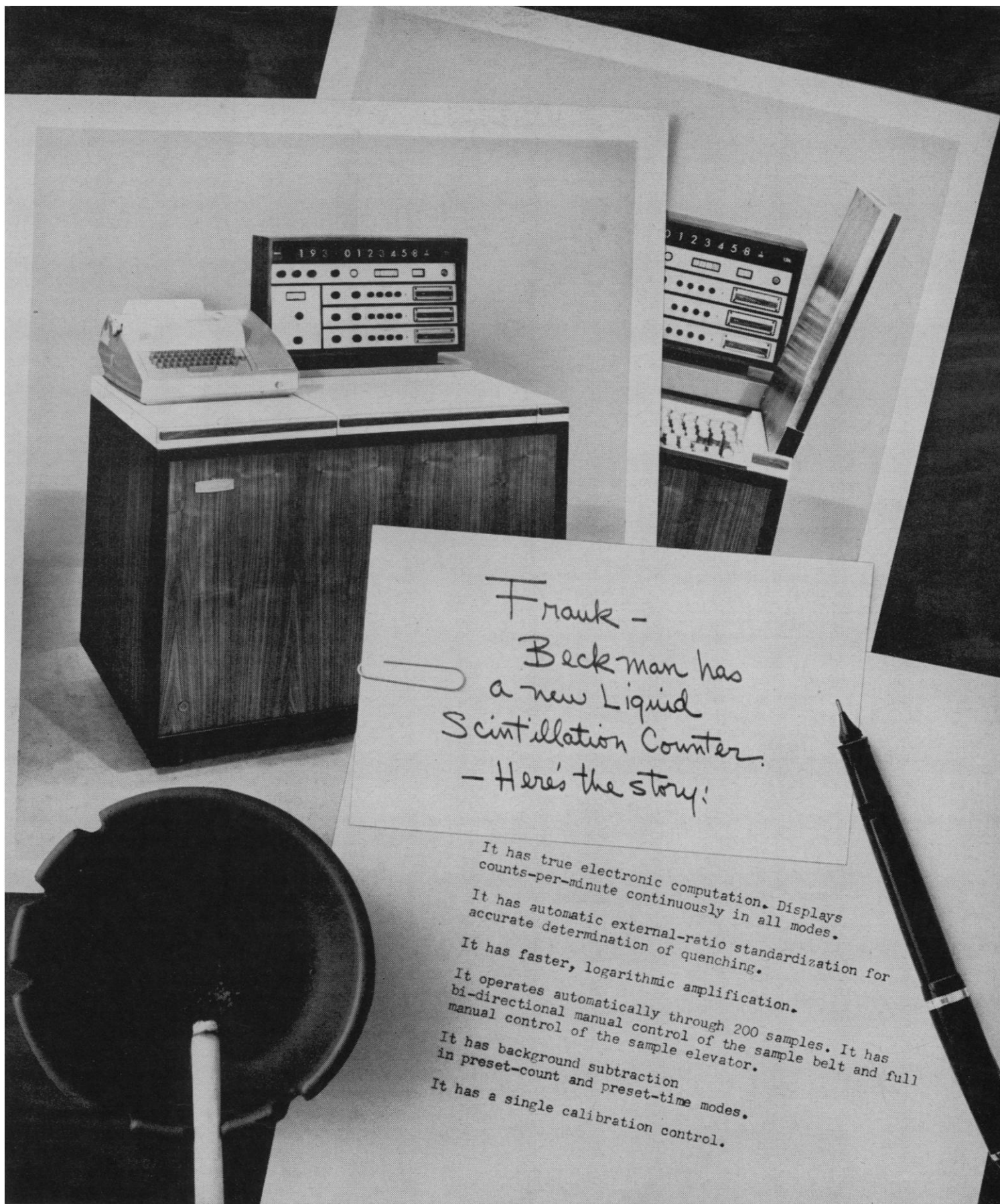
The location and identification of test

tubes containing ultra-violet absorbing fractions is speeded by an automatic chart-marking system. Of course, the detection system is completely self-contained and light-shielded. Solid-state electronics are used throughout. Application assistance and field service are assured by TMC's world-wide facilities.

For complete specifications on the Model 1056-OD, contact nearest office or write: Vanguard Instrument Corporation, 441 Washington Ave., North Haven, Conn.



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Beckman has
a new Liquid
Scintillation Counter.
- Here's the story:

It has true electronic computation. Displays counts-per-minute continuously in all modes.
It has automatic external-ratio standardization for accurate determination of quenching.
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It operates automatically through 200 samples. It has bi-directional manual control of the sample belt and full manual control of the sample elevator.
It has background subtraction in preset-count and preset-time modes.
It has a single calibration control.

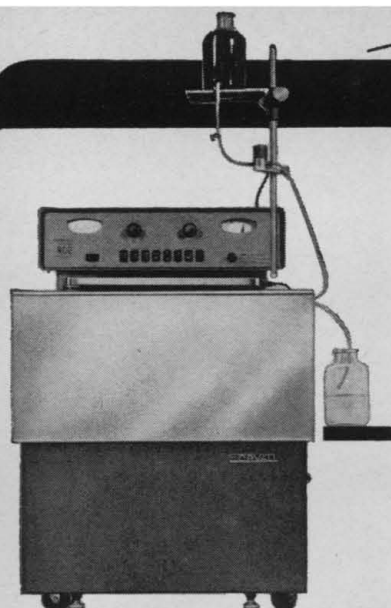
All of these features make this the most advanced Liquid Scintillation Counter.
Ask your local Beckman Sales Engineer, or write for Data File Number LSC-165.

Beckman

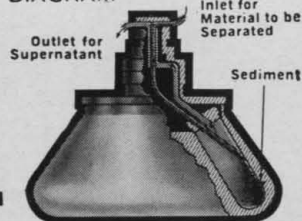
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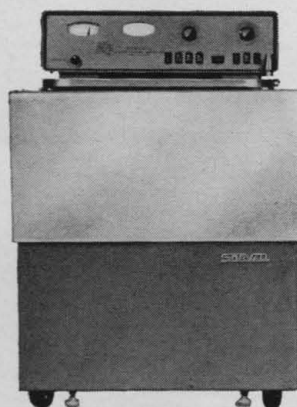
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TUBE-TYPE CONTINUOUS FLOW
SYSTEMS (as shown on RC-2)—
Available for SS-1, SS-1A, SS-3,
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achieved in 8, 4, or 2 Tubes
speedily and conveniently.

†RC-2 AUTOMATIC SUPERSPEED REFRIGERATED CENTRIFUGE — 20,000 rpm —
48,200 x G. — Capacity to 1,890 ml. Six Angle and Horizontal Rotors available.
Shown set up for unique SORVALL Continuous Flow centrifugation.

†THE RC-2, RC-3 AND SS-3 are now equipped with a new exclusive SORVALL
Speed Selector (patent applied for) featuring rapid automatic acceleration
to all speeds from 500 rpm to maximum, and capable of accurately main-
taining preset speed with all rotors regardless of fluctuation in line voltage.



†RC-3 GENERAL PURPOSE AUTOMATIC
REFRIGERATED CENTRIFUGE — 5,000 rpm
— 6,975 x G (with HG-4). 11 Angle and
horizontal rotors — accepts wide selec-
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650 ml. Rapid acceleration and deceler-
ation.

BR-4, BR-4T, & HG-4 Rotors
for use only with RC-3

The following catalogs
plus individual product
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- PRODUCT GUIDE for
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- PRICE LIST & ORDER-
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- CATALOG of TUBES,
ADAPTERS and ACCES-
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BR-4 Two-Liter General-
Purpose Rotor (with stainless
steel cups & screw covers)
Up to 5,000 rpm — 5,140 x G

BR-4T Blood Bag Rotor
(with Teflon-lined cups)
Up to 5,000 rpm — 5,140 x G



HG-4 Swinging Bucket
4 x 650 ml Compartments
Up to 5,000 rpm
6,975 x G



Types M & SP/X Rotors also for use with RC-3

ROTORS FOR SORVALL SS-3, SS-4, RC-2 AND RC-3

SS-34 — 8 x 50 ml
Superspeed. Adapts
to Continuous Flow.
To 20,000 rpm
48,200 x G

GSA — Large-Capacity.
1,890 ml (operating).
6 Compartments.
To 10,000 rpm
16,300 x G

SM-24 —
24 x 15 ml
Superspeed.
To 16,000 rpm
31,550 x G

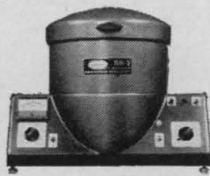
HB-4 — Swinging Bucket 4 x
50 ml — Wide range of Tubes
and Accessories. Also for
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To 20,000 rpm
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SU — SORVALL-Sharp
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counting. 8 cells.
To 20,000 rpm — 31,500 x G
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SS-1 SUPERSPEED ANGLE CENTRIFUGE
— 16,000 rpm — 31,000 x G. The original
concept in Superspeed Angle Centri-
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†SS-3 AUTOMATIC SUPERSPEED
CENTRIFUGE — 17,000 rpm —
34,800 x G. Easily the most
advanced table-top centrifuge
available today.



SS-4 MANUAL SUPERSPEED
CENTRIFUGE — 17,000 rpm
— 34,800 x G. The modern
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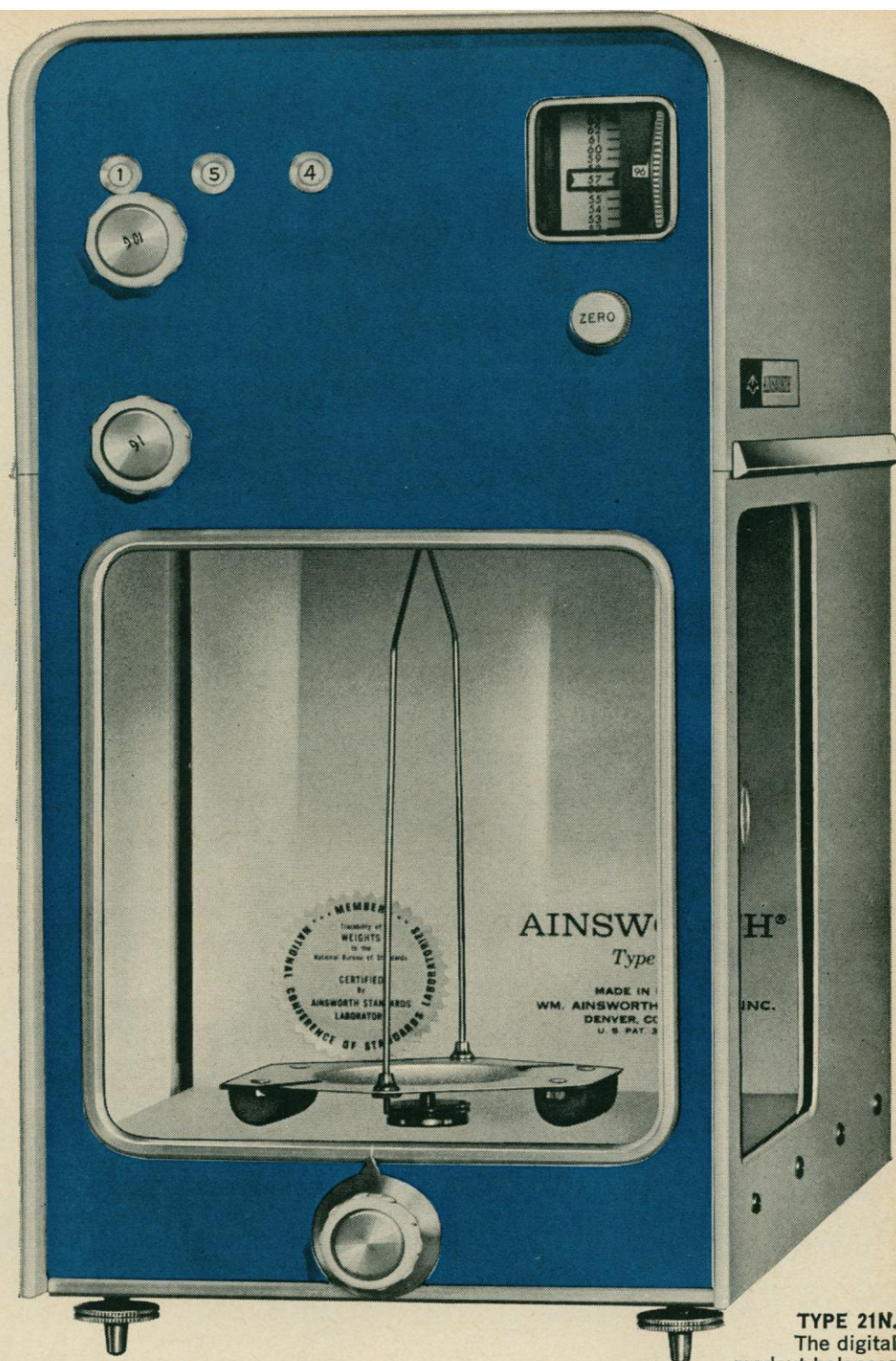
Basic Unit with
Micro Attachment
0.5 ml to 5.0 ml
capacity — speeds
up to 50,000 rpm

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complete
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of
all new
all digital,
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type
balances

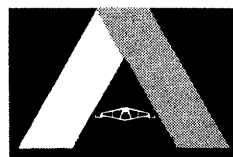


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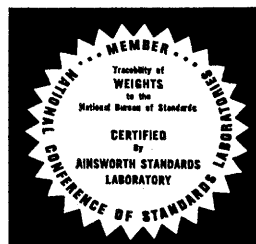
TYPE 21N.
The digital
readout balances
are completely new in appearance,
including color.

A type and price for every need write for bulletin 665

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Total Capacity	200 g	120 g	220 g	160 g	160 g
Sensitivity 1 digit in last place	0.1 mg	0.01 mg	0.1 mg	0.1 mg	1.0 mg
Color	Brown Hammerstone	Brown Wood Grain	Blue	Green	Red
Price	\$895	\$875	\$670	\$550	\$530

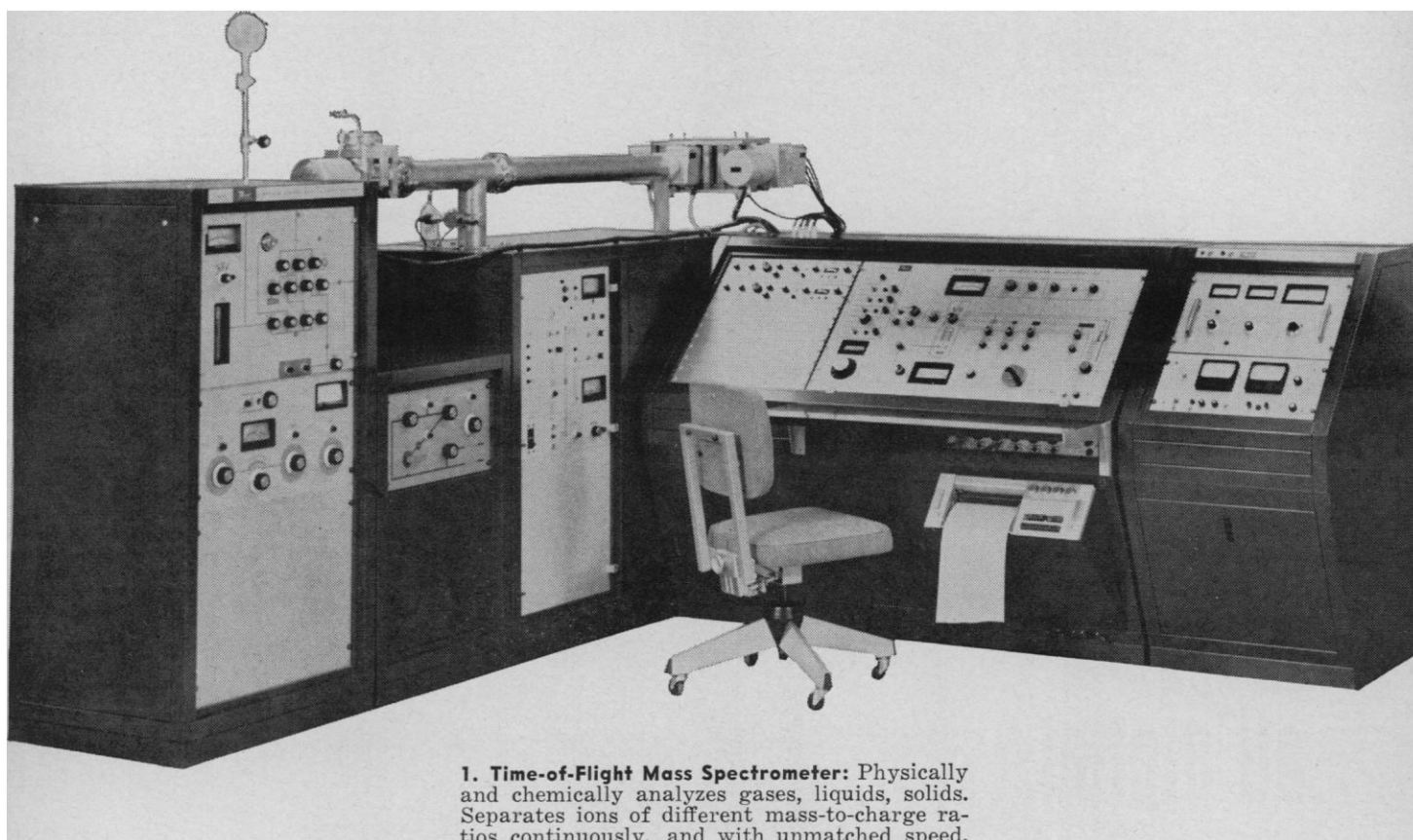


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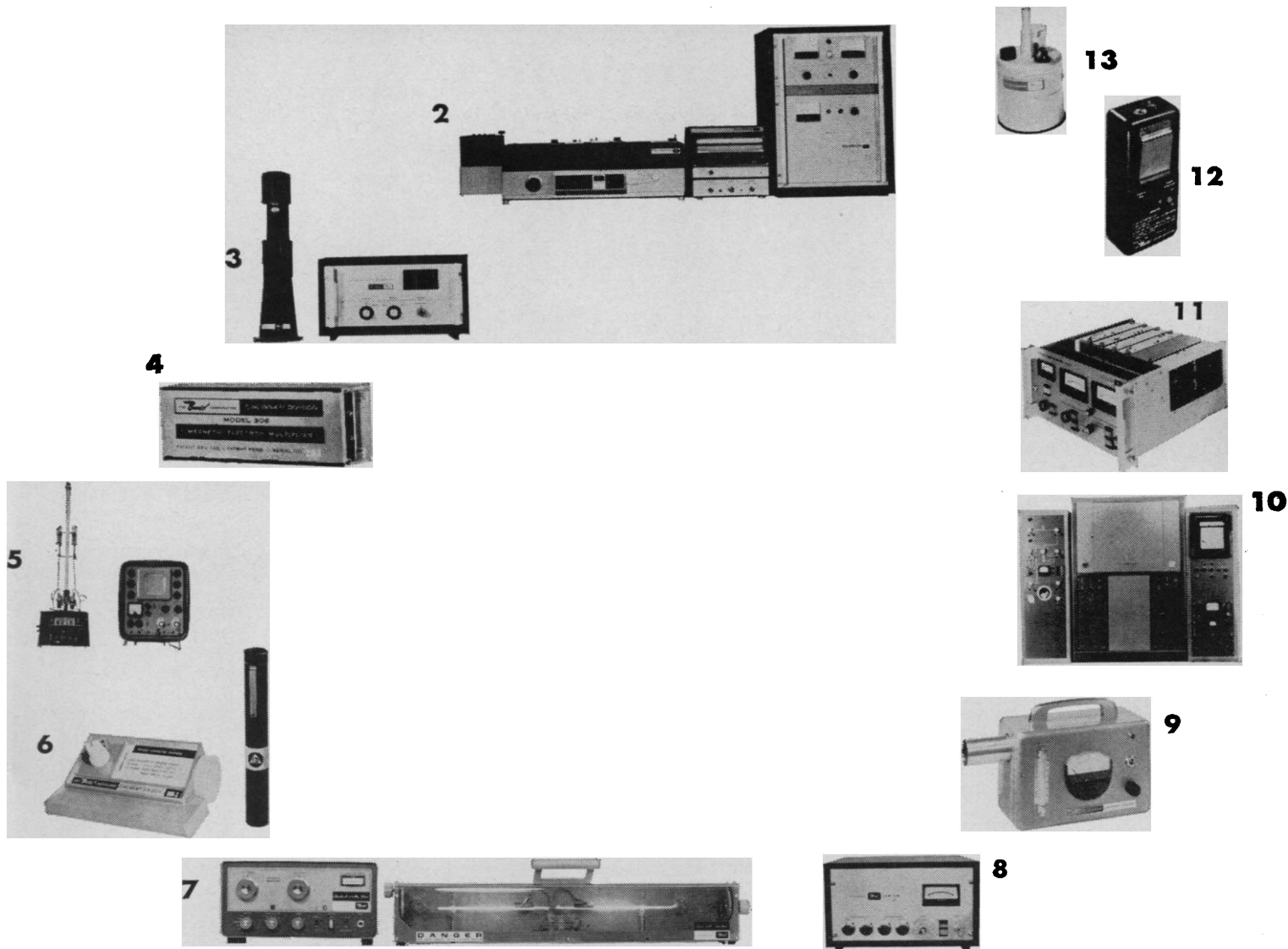
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2. Polarmatic Spectropolarimeter: Plots optical rotation of solutions as a function of wavelength, simultaneously recording the optical transmission.

3. Automatic Polarimeter: Rapidly measures rotation of monochromatic plane-polarized light passing through a liquid, with angular sensitivity of 0.0002 degree of arc.

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7. Helium-Neon Gas Laser: Inexpensive portable tool that demonstrates basic properties of lasers. Highly monochromatic light source.

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9. Electrostatic Air Sampler: Light, compact and portable kit for rapidly sampling

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(By the time you write for our literature, we may have 14 or 15. Or more.)

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We make chemical analysis instruments and equipment, nuclear instruments and equipment, medical laboratory instruments and equipment, and educational demonstration

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And we'll be happy to use these capabilities (including our new, larger quarters) to design and build any new or unique instruments you might need, too. For details and free literature, write us at 3625 Hauck Rd., Cincinnati, Ohio 45241.

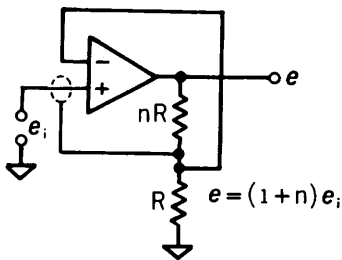
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Need a follower-amplifier? Choose the appropriate all-silicon solid-state Philbrick Operational amplifier; use it in this circuit to provide isolation and impedance transformation with precise programmable gain.

APPLICATIONS

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FOLLOWER WITH GAIN CIRCUIT

GENERAL

All of the following amplifiers are available from stock. The first three types utilize premium grade, hermetically sealed semiconductors. All are all-silicon, all solid state.

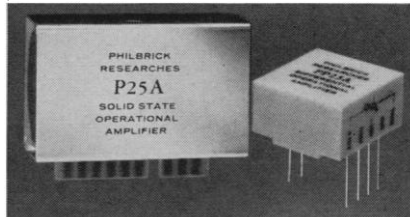
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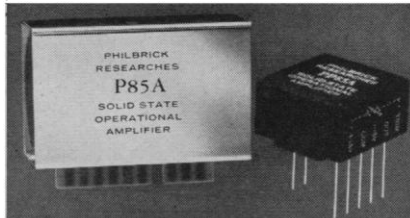
CANADA: Quebec: Montreal 482-9750, Ontario: Toronto RU 9-4325.



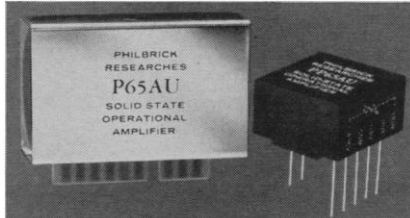
SP2A....price (1-4) \$227.00



P25A, PP25A....price (1-4) \$154.00



P85A, PP85A....price (1-4) \$95.00



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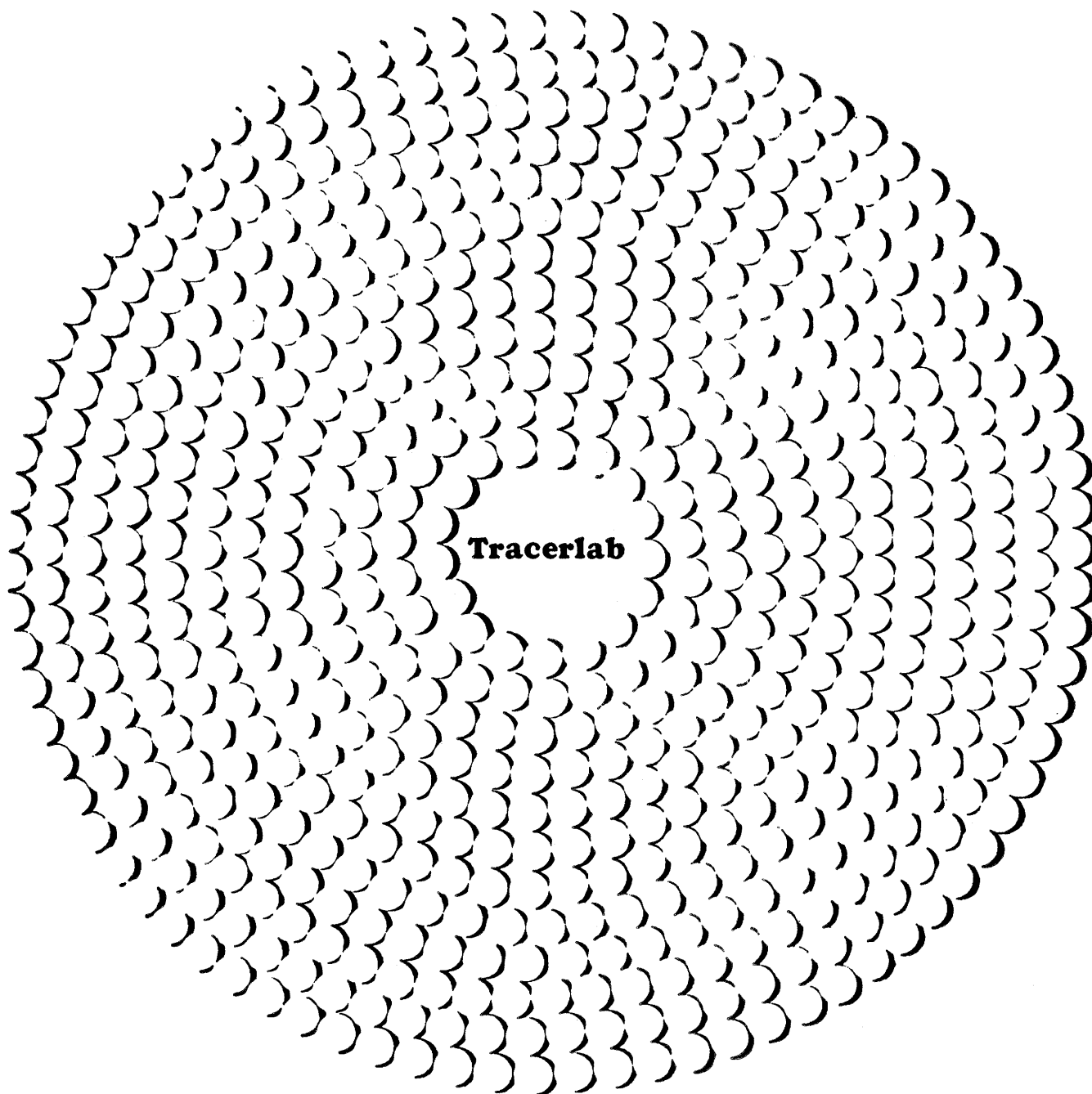
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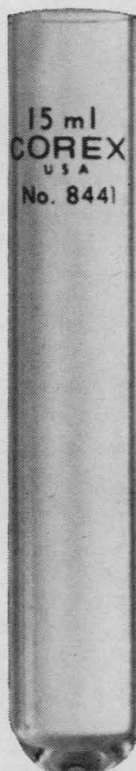


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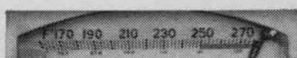


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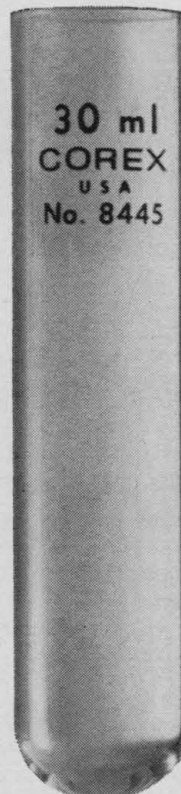
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		SP/X		
		GSA	—	—

it might make sense to attempt to control birth rate by reducing death rate. But it is the number of people requiring food which already overtakes the world's food supply. General increase in longevity is clearly no solution to the problem of overpopulation.

FELIX CHAYES

*Geophysical Laboratory,
2801 Upton Street, NW,
Washington, D.C. 20008*

Shutterbugs

I would like to call attention to the growing annoyance at scientific meetings caused by shutterbugs in the audience who want to take everything in the way of illustrations home with them. It seems to me that a much more extensive and informal exchange of information would obtain if such picture-taking were prohibited. The time between the deadline for submission of abstract and presentation of material at a meeting often permits accumulation of many additional data. It is quite likely that more of the preliminary data would be presented if such photographic recording were prevented. Material appearing in print, such as in the abstracts of meetings, is available to the public and can be freely used and quoted. But it may or may not be the desire of the author to have additional data which are presented orally used in such a manner.

In my opinion, it would serve a very useful purpose to curtail the use of cameras in scientific sessions unless it is officially permitted and announced by the program chairman.

PAUL M. NEWBERNE

*Department of Nutrition and Food
Science, Massachusetts Institute of
Technology, Cambridge*

Completion of the Yellow Triplet of the Monopoly Map

The meetings of the Federation of American Societies for Experimental Biology have long offered biologists the opportunity to explore the relationship between the Atlantic City and Monopoly maps (1). The facility with which seven of the eight codons in the Monopoly map were fully elucidated has caused increasing perplexity concerning an apparent deletion in the Yellow Triplet. We wish

to announce the removal of this deletion by the mapping of Marvin Gardens, and hence the completion of the Monopoly map.

In our study of the problem, we noted as significant that of the 21 determined transformations between the Monopoly and Atlantic City maps, Ventnor Avenue alone was in fact not wholly within Atlantic City, but was located in part on the adjacent Ventnor City map. Since Ventnor Avenue, which is adjacent to Marvin Gardens on the Monopoly map, was seen to originate as a branch from the Atlantic Avenue strand, it was hypothesized that Marvin Gardens was located at the free end of the Ventnor Avenue strand in Margate.

This has now been confirmed. Marvin Gardens has been determined to be a housing development near the interface of Ventnor City and Margate, bound to the Ventnor Avenue strand. Several independent determinations were made, and the obvious controls were performed, such as going to random locations in the area and asking, "Is this Marvin Gardens?" Control results were all negative. These were felt to be important since the absence of any *in situ* labeling at Marvin Gardens prevents presentation of any morphological evidence to verify identification, and this is undoubtedly the reason that this problem has remained unsolved for so long (2).

Owing to its unique nature and location, we make the radical proposal that Marvin Gardens, rather than the long-accepted GO site, represents the singular closure point in the Monopoly map. The significance of the circularity of the map and of the combined doublet-triplet codon patterns is obvious in the light of recent advances in molecular biology.

ALBEY M. REINER

*Biological Laboratories,
Harvard University,
Cambridge, Massachusetts*

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*Scientific Engineering Institute,
Waltham, Massachusetts*

References and Notes

1. Parker and Parker, 1935. For a recent review, see *Sports Illus.* 19, 52 (2 Dec. 1935).
2. Because of the incomplete understanding of the nature of the GO TO JAIL moiety known to be closely associated with Marvin Gardens, caution is urged in attempts to verify this report.
3. We are grateful for information kindly supplied by E. P. Parker, and acknowledge a helpful discussion with the attendant of the Baltic Avenue Mobilgas Station. This research was supported from funds obtained by periodically passing GO.



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3. 2.0 μA analyzed dc beam of He^- ions. The previous maximum current routinely available has been 0.1 μA with the EN source.

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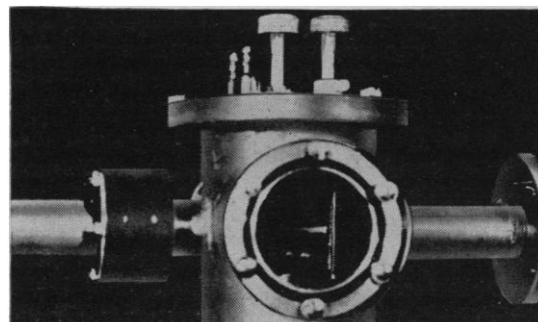
Components are now available for converting 3, 4 and 5 MeV machines to produce He^{++} ions at higher energies. Specifications: 30 μA at 5.0 MeV; 10 μA at 7.0 MeV; 5 μA at 10.3 MeV. More than double this current performance has been demonstrated but with some loss in stability and reliability. Multiple-charge states (2, 3 and 4) of neon, oxygen

and nitrogen have also been produced with the new kit installed in a 3 MeV Van de Graaff. Beam energies from 5.04 MeV to 9.8 MeV and beam currents from 0.1 to 10 μA were observed. For details on the new He^{++} kit and experimental results, write for Technical Note #13.

Optical Spectroscopy of Excited Atomic States

When an energetic beam of ions is passed through a thin foil, the charge state of the ion may change, either up or down. The emitted particles may be left in states of electronic excitation from which visible light is subsequently emitted during de-excitation. The emitted light spectrum is characteristic of the excited ion. When particle beams of approximately 0.4 μA or more are used, the light is sufficiently intense for spectroscopic analysis.

The refinement and application of this technique promises to be of major importance in the theory of atomic structure, in measuring hot plasma temperatures, and in acting for the means of energy loss in fast fission fragments in an absorber. Perhaps most importantly, it will help determine the relative abundance of the elements in the sun and other stars, which is the basis for theory of stellar evolution, the origin of the chemical elements, the age



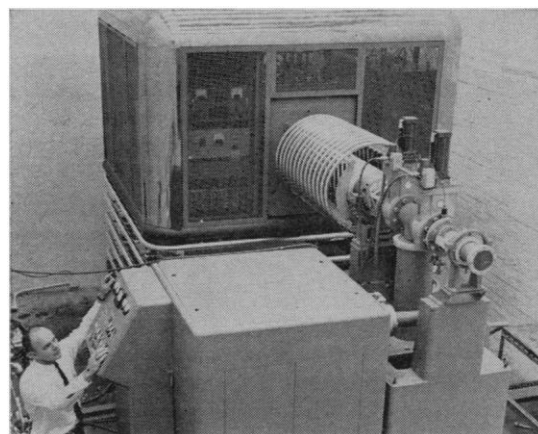
A nitrogen beam, 0.8 μA at 2 MeV, passes from right to left through a carbon foil approximately $9\mu\text{g}/\text{cm}^2$ thick.

of astronomical objects and the nature of the stellar energy. For further details, ask for Technical Note #10.

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Adoption of the Metric System

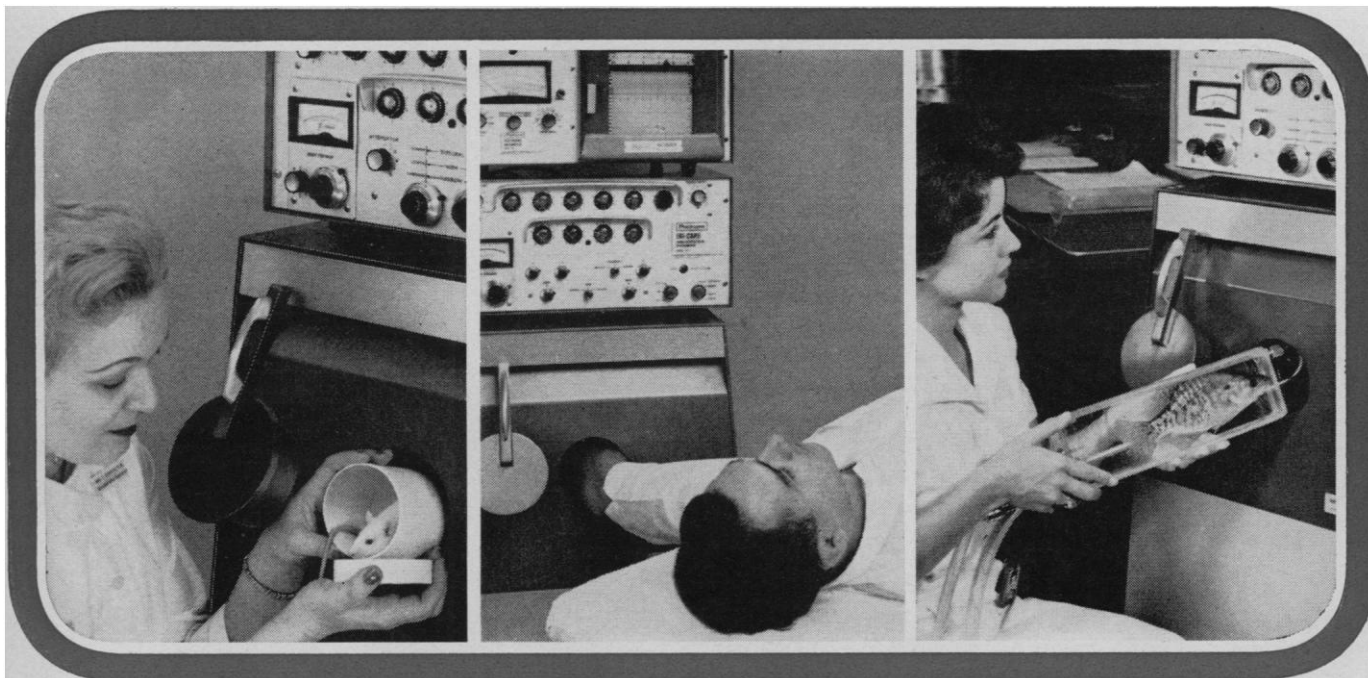
The time has come to face squarely the question of whether the U.S. will switch from the yardstick to the meter stick and from the pound and quart to the kilogram and liter. In 1866 Congress made the metric system legal in the U.S. It is generally used in scientific work and has become standard practice in some branches of industry; its advantages over the inch/pound system are widely recognized. Pressure for general adoption is increased by the fact that India, China, Japan, the U.S.S.R., and other countries have converted or are in the process of converting, and now the United Kingdom has decided to make the same move.

The British action follows on a series of studies of the costs and advantages of conversion, of which one of the major ones was a joint report by the British Association for the Advancement of Science and the Association of British Chambers of Commerce. More recently, recommendations of the British Standards Institution (following consultations with industry), the Federation of British Industries, and the Minister of Technology led the British Government, on 25 May, to announce plans for conversion to the metric system over the next 10 years. Most press and industry reactions have been favorable. Some have been enthusiastic and some reluctant, but the prevailing attitude seems to be that a changeover is both desirable and inevitable, and that the sooner the job gets started the lower will be the cost and the better it will be for all concerned.

The advantages and disadvantages of a change to metric units are essentially the same in the U.S. as in the U.K. That it is easier to learn and use metric units is generally accepted. Foreign trade would be facilitated. Some branches of industry have already gone over to metric standards. World-wide agreement is obviously desirable.

On the other hand, those who prefer to continue with inch/pound units can muster some strong arguments for their position. The cost of conversion would be substantial. Machines, replacement parts, and machine tools cannot suddenly be scrapped and replaced with new ones built to a different set of measures. Conversion costs would fall more heavily on some branches of industry than on others. Complete conversion is probably unattainable; land titles in feet or acres might remain unchanged for generations, and some generally used international units are based on the inch. Although foreign trade would probably be helped, foreign purchases are more dependent upon quality and cost than upon the units in which goods are measured.

A precipitate change would lead to much confusion and probably to unnecessary cost. A decision not to change would leave us, in the words of the *London Times*, as "odd man out among the [world's] major producers." The immediate step to take is a detailed analysis and evaluation by the Department of Commerce of the costs of conversion, the methods that might be used by government in a free-market economy, the incentives that might be necessary to aid some branches of industry, the alternative routes that could be followed in accomplishing the change, and the consequences of not changing. Hearings will soon be held on bills, authorizing such a study, that have been introduced by Senator Claiborne Pell and Congressman George Miller. These bills have been endorsed by the U.S. Chamber of Commerce and the Department of Commerce. They should be passed so that the Department of Commerce can get started.—DAEL WOLFE



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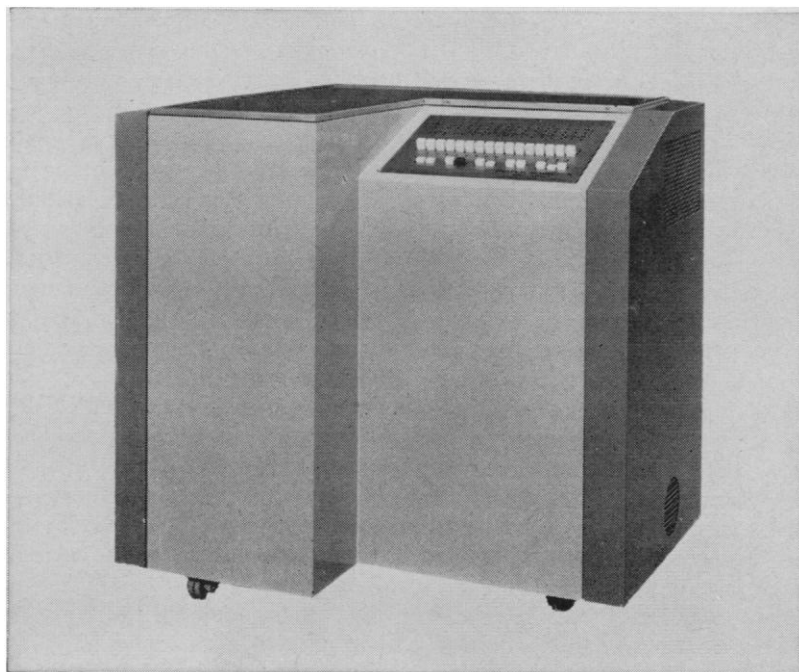
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approach involving pfaffians and hafnians, was suggested by N. R. Ranganathan and R. Vasudevan (Matscience, Madras). M. Gourdin (Orsay, France) gave a compact formula for covariant calculation of the matrix element of electron scattering from a target of arbitrary spin. K. Venkatesan (Matscience, Madras) explained how the notion of a group representation breaks down for certain values of the group parameter in the case of complex angular momentum.

There were several discussions on the many-body problem and on mathematical topics. C. de Dominicis (Saclay, France) dealt with the quasi-particle formulation of quantum statistics, which is based on partial summations in diagrammatic expansions, and discussed the relation with the Landau theory of Fermi liquids. P. T. Landsberg (University College of Cardiff, Wales) reported on a method for obtaining sum rules for any system, given the Hamiltonian of the system and the main variables desired to appear in the sum rules. Alf Sjolander (Göteborg, Sweden) gave an account of the concept of lattice waves, or phonons, and described in detail the inelastic neutron-scattering technique and theory, which are the only methods presently used in experimental determination of phonon-dispersion curves and polarization directions.

Marshall H. Stone (University of Chicago) emphasized the need for inquiry into the techniques of model construction in the various mathematical sciences and the role of the mathematician in this respect. Harish Chandra (Institute for Advanced Study, Princeton, New Jersey) told how to solve the difficult problem of constructing the characters for noncompact, semi-simple Lie groups. S. K. Srinivasan (Indian Institute of Technology, Madras) briefly outlined some recent developments in stochastic point processes. In his concluding remarks, Alladi Ramakrishnan evaluated the various topics discussed at the symposium.

The symposium proceedings will be published later this year by Plenum Press, New York, as volume 4 of *Matscience Symposia on Theoretical Physics*. This is part of a continuing series of the proceedings of both the Matscience Summer School lectures and the Matscience Winter Anniversary Symposia.

ALLADI RAMAKRISHNAN
*Institute of Mathematical Sciences,
Madras, India*

Forthcoming Events

July

18-24. **Dental**, 2nd intern. congr., Rio de Janeiro, Brazil. (P. F. Reis Filho, Associacao Brasileira de Odontologia, Rua da Baia 570, 5.º Andar, C. Postal 2357, Minas Gerais, Brazil)

18-24. **International Ophthalmic-Optical Congr.**, Dublin, Ireland. [E. Pemberton, Assoc. of Ophthalmic Opticians (Ireland), 11 Harrington St., Dublin]

19-21. **Surgery of the Hand**, 1st intern. congr., Rio de Janeiro, Brazil. (Sociedade Brasileira de Mão, Rio de Janeiro)

19-21. **Swine in Biomedical Research**, intern. symp., Richland, Wash. (L. K. Bustad, Biology Dept., Battelle-Northwest, P.O. Box 999, Richland 99352)

19-22. **Association of Food and Drug Officials of the U.S.**, 69th annual, New York, N.Y. (The Association, P.O. Box 9095, Austin, Tex.)

19-22. **Space**, 5th European symp., Munich, Germany. (Executive Secretary, British Interplanetary Soc., 12, Bessborough Gardens, London, S.W.1, England)

19-23. **Study of Nuclear Structure with Neutrons**, intern. conf., Antwerp, Belgium. (M. Neve de Mevergnies, Neutron Physics Dept., CEN-CSK, Mol, Belgium)

19-23. **Society for Analytical Chemistry**, conf., Nottingham, England. (C. A. Johnson, 14 Belgrave Sq., London, S.W.1, England)

20-23. **American Malacological Union**, Wagner College, New York, N.Y. (J. J. Parodiz, Carnegie Museum, Pittsburgh, Pa.)

21-31. **Mental Health**, 5th Caribbean conf., Fort-de-France, Martinique, French West Indies. (Caribbean Federation for Mental Health, Mme. Charles Saint-Cyr, Ravine Vilaine, Fort-de-France)

22-24. **International Assoc. for Dental Research**, 43rd general meeting, Toronto, Ont., Canada. (G. H. Rovelstad, U.S. Navy Dental School, Natl. Naval Medical Center, Bethesda, Md.)

22-26. **Rorschach and Projective Methods**, 6th intern. congr., Paris, France. (A. Morali-Daninos, 7 avenue Trudaine, Paris 9e)

22-27. **Thermodynamics of Nuclear Materials and Atomic Transport in Solids**, Vienna, Austria. (C. E. Holley, Jr., Div. of Research and Laboratories, Intern. Atomic Energy Agency, Kärntnerring 11, Vienna 1)

24-4 Sept. **Organism-Sediment Interrelationships**, NSF seminar, Bermuda Biological Station. (K. E. Chave, Marine Science Center, Lehigh Univ., Bethlehem, Pa. 18015)

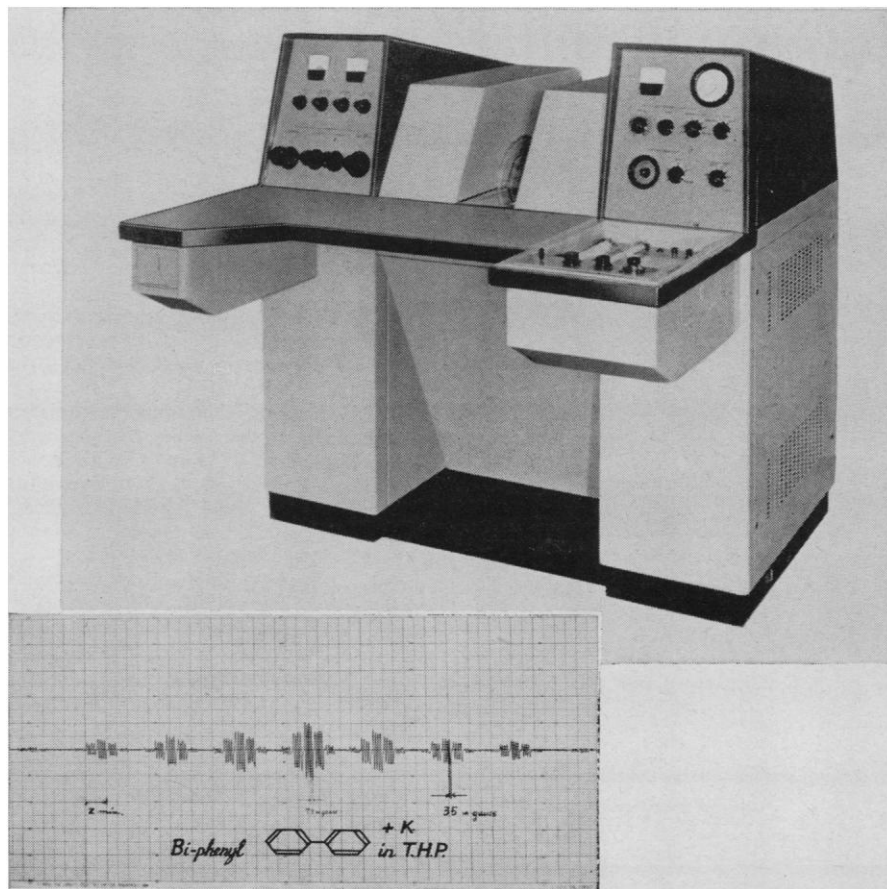
25-28. **American Assoc. of Dental Schools**, Toronto, Canada. (C. V. Rault, Georgetown Univ., Washington, D.C.)

25-29. **Pacific Dermatologic Assoc.**, Portland, Ore. (G. MacDonald, 4294 Orange St., Riverside, Calif.)

25-30. **Neurochemical**, intern. conf., Oxford, England. (J. N. Cummings, Dept. of Chemical Pathology, Natl. Hospital, Queen Sq., London, W.C.1, England)

25-30. **International Psycho-Analytical Assoc.**, 24th congr., Amsterdam, Nether-

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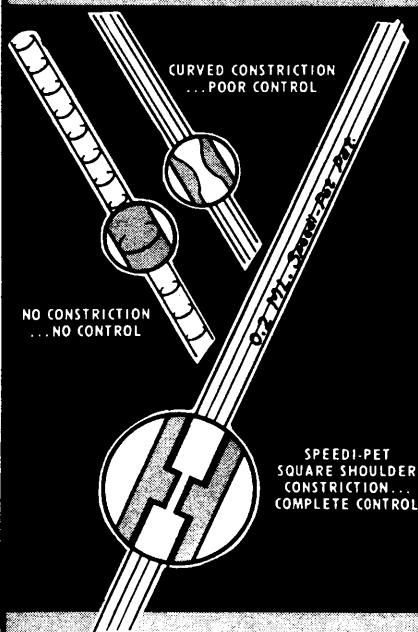
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lands. (R. P. McKnight, Austin Riggs Center, Stockbridge, Mass.)

26-29. American Inst. of **Aeronautics and Astronautics**, 2nd annual, San Francisco, Calif. (D. L. Raymond, 1290 Sixth Ave., New York 10019)

26-30. Interpretation and Therapy of **Cardiac Arrhythmias**, conf., Hahnemann Medical College and Hospital, Philadelphia 2, Pa. (L. S. Dreifus, Dept. of Medicine, Hahnemann Medical College and Hospital, 230 North Broad St., Philadelphia)

27-29. **Positron Annihilation**, conf., Wayne State Univ., Detroit, Mich. (A. T. Stewart, Physics Dept., Univ. of North Carolina, Chapel Hill)

27-29. **Research Program Effectiveness**, Washington, D.C. (Secretary, Research Conf. Committee, Room 808, Old Post Office Bldg., 12th St. and Pennsylvania Ave., NW, Washington, D.C. 20368)

28-30. **Library Science**, symp., Syracuse Univ., Syracuse, N.Y. (D. Bergen, School of Library Science, Syracuse Univ., Syracuse 13210)

28-30. **Reactor Operating Experience**, Jackson Lake Lodge, Wyo. (F. Schroeder, Phillips Petroleum, Idaho Falls, Idaho)

28-30. **Reliability and Maintainability**, 4th annual conf., Los Angeles, Calif. (J. de S. Coutinho, 32 Dartmouth St., Garden City, N.Y.)

28-31. **Spanish Biochemists**, 3rd meeting, Oviedo, Spain. (J. R. Villanueva, Centro de Investigaciones Biológicas, Velázquez 138, Madrid 6, Spain)

29-2. **Microcalorimetry**, intern. symp., Marseille, France. [E. Calvert, Institut de Microcalorimétrie et de Thermogénèse, 26, rue du 1414 RIA (3^e), Marseille]

29-5. **Protozoology**, 2nd intern. conf., London, England. (R. S. Bray, London School of Hygiene and Tropical Medicine, Keppel St., London, W.C.1)

30-31. **Animal Reproduction**, 7th biennial symp., Michigan State Univ., East Lansing. (W. Hansel, Dept. of Animal Husbandry, Cornell Univ., Ithaca, N.Y.)

31-7. **Universala Medicina Esperanto-Asocio**, meeting, during the 50th intern. esperanto congr., Tokyo, Japan. (H. Shinoda, Kasumicho, Yamagata, Japan)

August

1-5. American Soc. of **Animal Science**, Michigan State Univ., East Lansing. (J. E. Oldfield, Dept. of Animal Science, Oregon State Univ., Corvallis)

1-8. **Chemistry**, 9th Latin American congr., San Juan, P.R. (Secretary, 9th Latin American Chemical Congr., Box 2647, Rio Piedras, P.R.)

2-4. Society for **Cryobiology**, 2nd annual, Madison, Wis. (G. Rapatz, American Foundation of Biological Research, RFD 1, Madison 53716)

2-5. **Comparative Endocrinologists**, 3rd European conf., Copenhagen, Denmark. (C. Barker-Jørgensen, Universitets Zoofysiologiske Laboratorium Juliane Maries Vej 32, Copenhagen Ø)

2-6. **High Pressure**, intern. conf., Saône et Loire, France. (B. Vodar, Centre National de la Recherche Scientifique, B.P. 30, Bellevue, Seine et Oise, France)

2-6. **Instrumentation Science**, 2nd research conf., Instrument Soc. of America,

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Geneva, N.Y. (K. B. Schnelle, Jr., ISA, 539 William Penn Pl., Pittsburgh, Pa.)

3-7. **Acta Endocrinologica**, 5th congr., Hamburg, Germany. (A. Jores, 2 Medizinische Klinik, Eppendorfer Krankenhaus, Hamburg 20)

3-7. **Poultry Science Assoc.**, Univ. of Georgia, Athens. (C. B. Ryan, Texas A&M Univ., College Station 77843)

4-6. **Space and Ballistic Missile Technology**, 10th symp., U.S. Naval Training Center, San Diego, Calif. (C. T. Morrow, Aerospace Corp., Box 95085, Los Angeles, Calif. 90045)

4-7. **Genetics**, G. Mendel memorial symp., Brno, Czechoslovakia. (M. Sosna, G. Mendel Memorial Symp., Na cvicisti 2, Prague 6, Czechoslovakia)

5-12. **EEG and Neurophysiology**, 6th intern. congr., Vienna, Austria. (K. Pateisky, Wiener Medizinische Akademie, Alserstr. 4, Vienna 9)

8-11. **Heat Transfer**, 8th natl. conf., Los Angeles, Calif. (K. O. Beatti, Jr., Dept. of Chemical Engineering, North Carolina State College, Raleigh)

8-14. **Anatomists**, 8th intern. conf., Wiesbaden, Germany. (M. Watzka, Anatomisches Institut der Universität, Mainz, West Germany)

8-27. **Fracture Mechanics**, workshop, Denver Research Inst., Denver, Colo. (D. L. Wells, University Technology Corp., P.O. Box 7, Dayton, Ohio 45449)

9-11. **Mutation Process**, symp., Prague, Czechoslovakia. (M. Sosna, Na cvicisti 2, Prague 6)

9-13. **Meteor Orbits and Dust**, intern. symp. (invitation only), Cambridge, Mass. (G. S. Hawkins, Smithsonian Astrophysical Observatory, 60 Garden St., Cambridge 02138)

9-15. **Nordic Entomology Congr.**, Oslo, Norway. (Norwegian Natl. Travel Office, 290 Madison Ave., New York 10017)

9-20. **Electromagnetic Measurements and Standards**, Natl. Bureau of Standards, Boulder, Colo. (Bureau of Continuation Education, University Memorial Center, Univ. of Colorado, Boulder)

10-20. **Theory of Groups**, intern. conf., Intern. Mathematical Union, Canberra, Australia. (L. G. Kovacs, Dept. of Mathematics, Australian Natl. Univ. Inst. of Advanced Studies, Box 4, G.P.O., Canberra)

11-13. **Calorimetry**, 20th conf., Ames, Iowa. (R. Hultgren, Univ. of California, Berkeley)

11-15. **European Malacological Union**, 2nd congr., Copenhagen, Denmark. (G. Høpner Peterson, c/o Zoologisk Museum, 5 Afdeling, Universitetsparken 15, Copenhagen)

12-21. **Veterinary Education**, 2nd intern., Copenhagen, Denmark. (Inter. Agency Liaison Branch, Office of the Director General, Food and Agriculture Organization, Via delle Terme di Caracalla, Rome, Italy)

14-20. **Australian Medical Assoc.**, 2nd medical congr., Perth, Western Australia. (O. R. Corr, 8 King's Park Rd., West Perth, Western Australia)

14-20. **Molecular Spectroscopy**, 8th European congr., Copenhagen, Denmark. (The Congress, Universitetsparken 5, København Ø, Denmark)

14-6. **Digital Computers for College Teachers of Science, Mathematics, and Engineering**, Univ. of Southwestern Lou-

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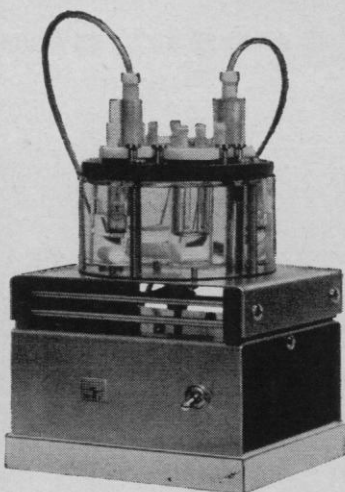
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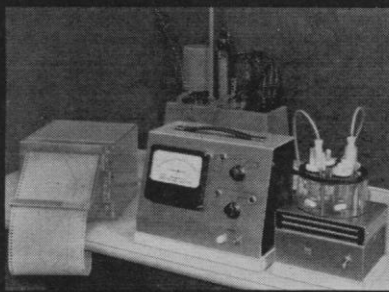
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14-19 Sept. International Assoc. for Quaternary Research, 7th congr., Boulder and Denver, Colo. Field conf., 14-29 Aug. and 5-19 Sept.; general assembly, 30 Aug.-5 Sept. (G. M. Richmond, Room 2462, Bldg. 25, Denver Federal Center, Denver 80225)

15-20. American Inst. of Biological Sciences, Urbana, Ill. (AIBS, 3900 Wisconsin Ave., NW, Washington, D.C. 20016)

The following societies will meet in conjunction with the AIBS. Unless otherwise indicated, the local chairmen are at the University of Illinois, Urbana.

American Bryological Soc. (G. N. Jones, Dept. of Botany)

American Fern Soc. (G. N. Jones, Dept. of Botany)

American Fisheries Soc. (G. Bennett, Aquatic Biology Section)

American Genetic Assoc. (S. Price, Room 210 S. Bldg., Plant Industry Station, Beltsville, Md.)

American Microscopical Soc. (L. J. Thomas, Dept. of Zoology)

American Soc. for Horticultural Science. (C. J. Birkeland, Dept. of Horticulture)

American Soc. of Limnology and Oceanography. (W. Larrimore, Illinois Natural History Survey, Urbana)

American Soc. of Plant Physiologists. (J. B. Hanson, Dept. of Agronomy)

American Soc. of Plant Taxonomists. (W. Payne, Dept. of Botany)

American Soc. of Zoologists. (L. Ingle, Dept. of Zoology)

Animal Behavior Soc. (G. P. Waldbauer, Dept. of Entomology)

Botanical Soc. of America. (D. J. Paolillo, Dept. of Botany, 302 Natural History Bldg.)

Ecological Soc. of America. (L. C. Bliss, Dept. of Botany)

Mycological Soc. of America. (D. P. Rogers, Dept. of Botany)

National Assoc. of Biology Teachers. (H. Weaver, Dept. of Recreation and Municipal Park Administration)

Nature Conservancy. (L. J. Stannard, Illinois Natural History Survey, Urbana)

Phycological Soc. of America. (L. Hoffman, Dept. of Botany)

Society for Industrial Microbiology. (L. D. Witter, Food Science Dept.)

Society for the Study of Development and Growth. (D. L. Nanney, Dept. of Zoology)

Society for the Study of Evolution. (L. J. Stannard, Illinois Natural History Survey, Urbana)

Society of Nematologists. (D. P. Taylor, 106 Horticulture Field Laboratory)

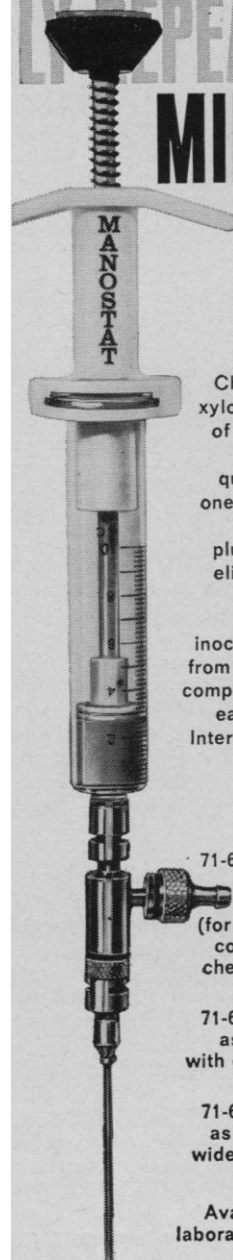
Tomato Genetics Cooperative. (A. Thompson, Dept. of Horticulture)

15-20. **Energetics**, American Soc. of Mechanical Engineers, conf., Rochester, N.Y. (ASME, 345 E. 47 St., New York)

15-21. **Ophthalmology**, 8th Pan American congr., Rio de Janeiro, Brazil. (W. D. Estrada, Praca Cardea, Arcoverde 25, Copacabana, Rio de Janeiro)

16-18. **Guidance and Control**, conf., Minneapolis, Minn. (D. L. Mellen, Mail Station 677, Military Products Group,

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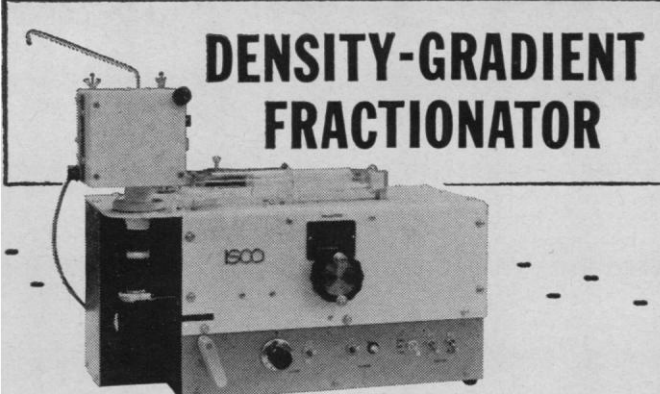
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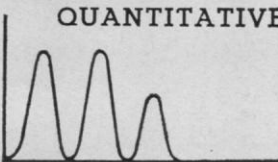
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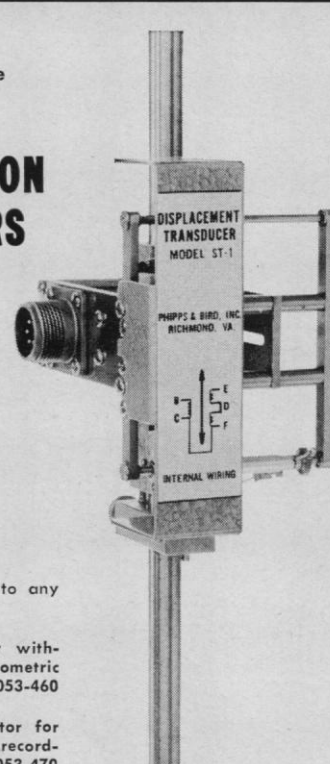


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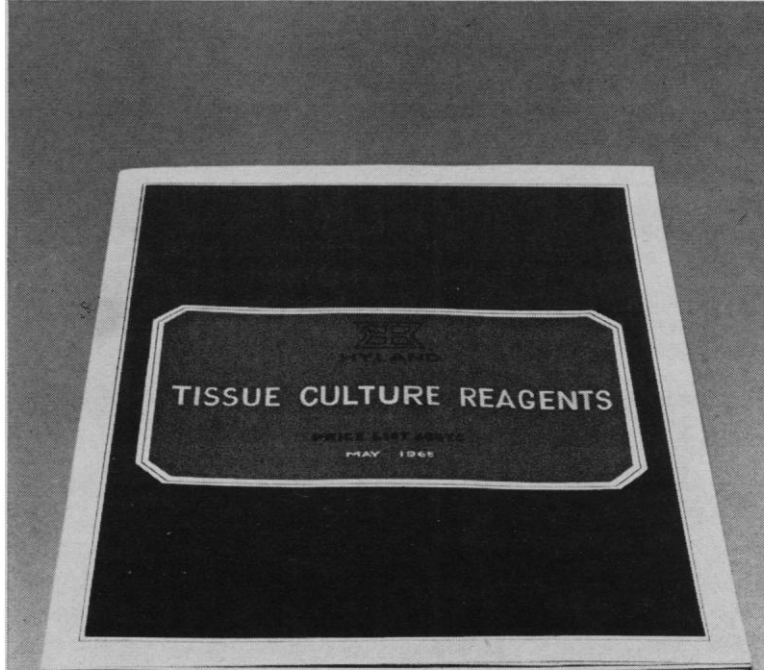
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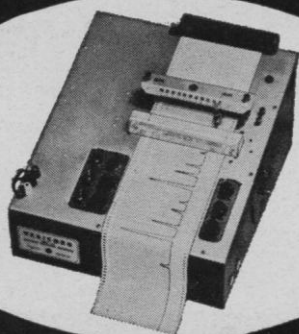
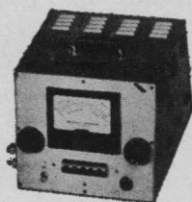
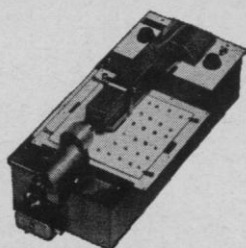
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16-20. Australian-New Zealand Assoc. for the Advancement of Science, Univ. of Tasmania, Hobart, Tasmania, Australia. (K. D. Nicolls, Div. of Soils, CSIRO, Stowell Ave., Hobart)

16-20. Liquid Crystals, conf., Kent State Univ., Kent, Ohio. (G. H. Brown, Dept. of Chemistry, Kent State Univ., Kent)

16-20. American Soc. for Pharmacology and Experimental Therapeutics, fall meeting, Univ. of Pennsylvania, Philadelphia. (E. B. Cook, 9650 Wisconsin Ave., Washington, D.C. 20014)

16-21. Electron Diffraction and the Nature of Defects in Crystals, intern. conf., Melbourne, Australia. (R. I. Garrod, Astronautical Research Laboratories, Box 4331, G.P.O., Melbourne)

16-3. Kinematical and Chemical History of the Galaxy, NATO inst., Sussex, England. (R. Wooley, Herstmonceux Castle, Sussex)

16-3. Radiation Trapped in the Earth's Magnetic Field, NATO institute, Bergen, Norway. (B. M. McCormac, Geophysics Div., IIT Research Inst., 10 W. 35 St., Chicago, Ill. 60515)

17-20. Anesthesiology, symp., Czechoslovak Medical Soc., Prague. (J. Hoder, Unemocnice 2, Prague 2)

17-20. Atmospheric Pollution, 2nd Clean Air Conf., Sydney, Australia. (J. L. Sullivan, New South Wales Dept. of Health, P.O. Box 31, George St. North Post Office, Sydney)

17-27. Infrared Spectroscopy, 16th annual inst., Fisk Univ., Nashville, Tenn. (Director, Fisk Infrared Inst., Fisk Univ., Nashville 8)

18-20. American Astronautical Soc., natl. meeting, San Francisco, Calif. (J. N. Nielsen, P.O. Box 642, Los Altos, Calif.)

18-25. Upper Atmosphere Chemistry Circulation and Aerosols, symp., Intern. Assoc. of Meteorology and Atmospheric Physics, Visby, Sweden. (The Association, Commission of Atmospheric Chemistry and Radioactivity, c/o Natl. Center for Atmospheric Research, Boulder, Colo.)

20-21. American Inst. of Ultrasonics in Medicine, 1st Pan American meeting, Lima, Peru. (C. Bustamante Ruiz, Dept. of Physical Medicine and Rehabilitation, Hospital Obrero, Lima)

21. American Assoc. of Electromyography and Electrodiagnosis, annual, Philadelphia, Pa. (M. K. Newman, 16861 Wyoming Ave., Detroit, Mich. 48221)

21. Spectroscopy, 5th, Intern. Union of Pure and Applied Physics commission, Copenhagen, Denmark. (W. Price, Dept. of Physics, Kings College, Univ. of London, London, W.C.2, England)

21-25. Insect Endocrinology, symp., Prague, Czechoslovakia. (F. Hrabal, Foreign Relations Dept., Czechoslovak Acad. of Sciences, Narodni tr. 3, Prague 1)

22-25. Soil Conservation Soc. of America, Philadelphia, Pa. (H. W. Pritchard, 7515 Ankeny Rd., Ankeny, Iowa)

22-27. Medical Electronics and Biomedical Engineering, Tokyo, Japan. (K. Suhara, Japan Soc. of Medical Electronics and Biological Engineering, Old Toden Bldg., 1-1 Shiba-tamura-cho, Minato-ku, Tokyo)

22-27. Microchemical Techniques, intern. symp., Pennsylvania State Univ.,



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22-27. American Acad. of **Physical Medicine and Rehabilitation**, Philadelphia, Pa. (M. K. Newman, 16861 Wyoming Ave., Detroit, Mich. 48221)

22-28. **Physiology of Giant Algal Cell**, conf., Australian Acad. of Science, Canberra, Australia. (The Academy, Gordon St., Canberra)

22-28. **Industrial Research**, 16th annual conf., Tuxedo, N.Y. (R. T. Livingston, School of Engineering and Applied Science, Columbia Univ., New York, N.Y.)

22-28. **Lunar Geology**, intern. field conf., Bend, Ore. (L. Staples, Dept. of Geology, Univ. of Oregon, Eugene)

23-25. **Cryogenic Engineering**, conf., Houston, Tex. (K. D. Timmerhaus, Engineering Research Center, Univ. of Colorado, Boulder 80304)

23-25. American Soc. of **Human Genetics**, Seattle, Wash. (J. B. Graham, Dept. of Pathology, Univ. of North Carolina, Chapel Hill)

23-25. **Plant Phenolics** Group of North America, annual, Albany, Calif. (V. C. Runeckles, Imperial Tobacco Co. of Canada, P.O. Box 6500, Montreal, Quebec)

23-26. **Clay Minerals** Soc., 2nd annual, Univ. of California, Berkeley. (J. A. Pask, Dept. of Mineral Technology, Univ. of California, Berkeley 94720)

23-26. **Quantum Chemistry**, Physical Chemistry Div., Chemical Inst. of Canada, Edmonton, Alta. (The Institute, 48 Rideau St., Ottawa 2, Ont.)

23-27. Control Procedures in **Drug Production**, seminar, Univ. of Wisconsin, Madison. (W. Blockstein, Extension Services in Pharmacy, Univ. of Wisconsin, Madison)

23-27. **Neurological Surgery**, 3rd intern. congr., Copenhagen, Denmark. (DIS Congress Service, Sankt Peders Straide 19, Copenhagen K)

23-27. American **Ornithologists** Union, Ohio State Univ., Columbus. (R. Mewaldt, San Jose State Teachers College, San Jose, Calif.)

23-27. **Space**, 5th annual conf., Virginia Polytechnic Inst., Blacksburg. (M. L. Collier, Jr., Virginia Polytechnic Inst., Blacksburg)

23-29. European Soc. of **Haematology**, 10th congr., Strasbourg, France. (R. Waitz, Faculté de Médecine, Inst. d'Hématologie, 1, Pl. de l'Hôpital, Strasbourg, Bas-Rhin, France)

23-29. **Logopaedics and Phoniatics**, 13th intern. congr., Vienna, Austria. (Mrs. A. M. Jorg, Vienna Acad. of Medicine, Alserstr. 4, Vienna 9)

23-30. **Limnology**, 16th intern. congr., Warsaw, Poland. (G. E. Hutchinson, Yale Univ., New Haven, Conn.)

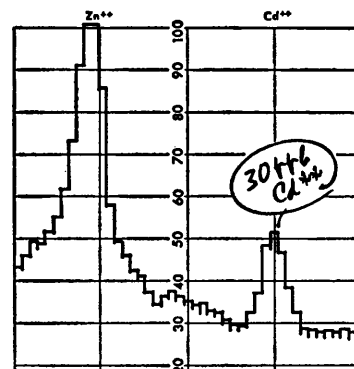
24-26. Association for **Computing Machinery**, 20th natl. conf., Cleveland, Ohio. (G. J. Moshos, P.O. Box 4741, Cleveland)

24-26/28-29. **History of Science**, 11th intern. congr., Warsaw and Krakow, Poland. (W. Voisé, Inst. of the History of Science and Technology, Polish Acad. of Sciences, Nowy Swiat 72, Room 19, Warsaw 1)

24-27. Western **Electronic** Conv. (WESCON), San Francisco, Calif. (E. L. Rogers, Wescon, Suite 203, 780 Welch Rd., Palo Alto, Calif.)

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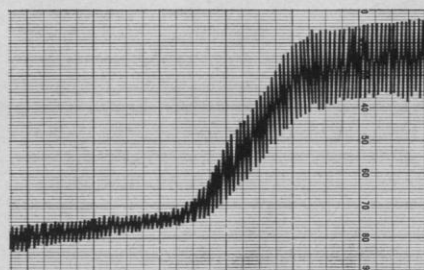
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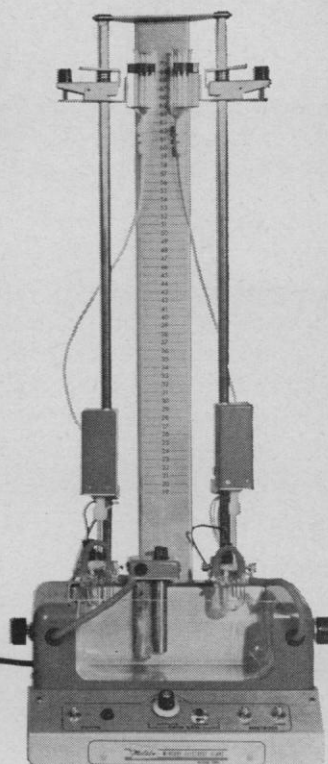
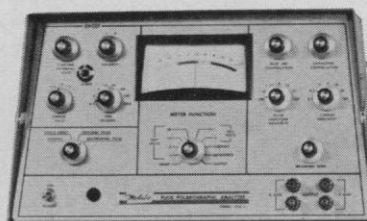
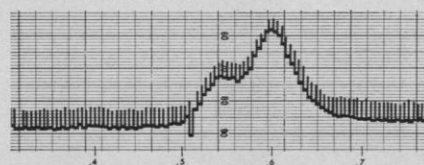
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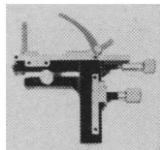
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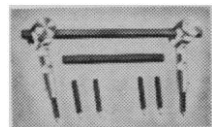
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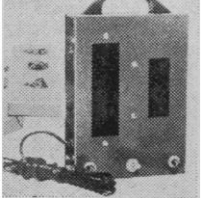
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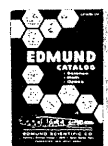
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24-28. **American Physiological Soc.**, Univ. of California, Los Angeles. (R. G. Daggs, 9650 Wisconsin Ave., Washington, D.C. 20014)

25-27. **Gas Dynamics**, 6th biennial conf., Evanston, Ill. (A. B. Cambel, Gas Dynamics Symp., Northwestern Univ., Evanston 60201)

25-27. **Thymus**, Ciba Foundation symp., Melbourne, Australia. (Ciba, 41, Portland Place, London, W.1, England)

25-27. **X-Ray Analysis**, 14th annual conf., Denver, Colo. (Metallurgy Div., Denver Research Inst., Univ. of Denver 80210)

25-28. **Systems Engineering for Control System Design**, Tokyo, Japan. (H. M. Paynter, Mechanical Engineering Dept., Massachusetts Inst. of Technology, Cambridge 39)

25-28. **Photochemistry**, intern. conf., Tokyo, Japan. (I. Tanada, Laboratory of Physical Chemistry, Tokyo Inst. of Technology, Ookayama, Meguro-ku, Tokyo)

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29-2. **American Assoc. of Clinical Chemists**, 17th natl., Chicago, Ill. (M. E. Hanke, 8424 Rhodes Ave., Chicago 60619)

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29-3. **AAAS, Laurentian Hormone Conf.**, Mont Tremblant, Quebec, Canada. (J. C. Foss, Laurentian Hormone Conf., 222 Maple Ave., Shrewsbury, Mass.)

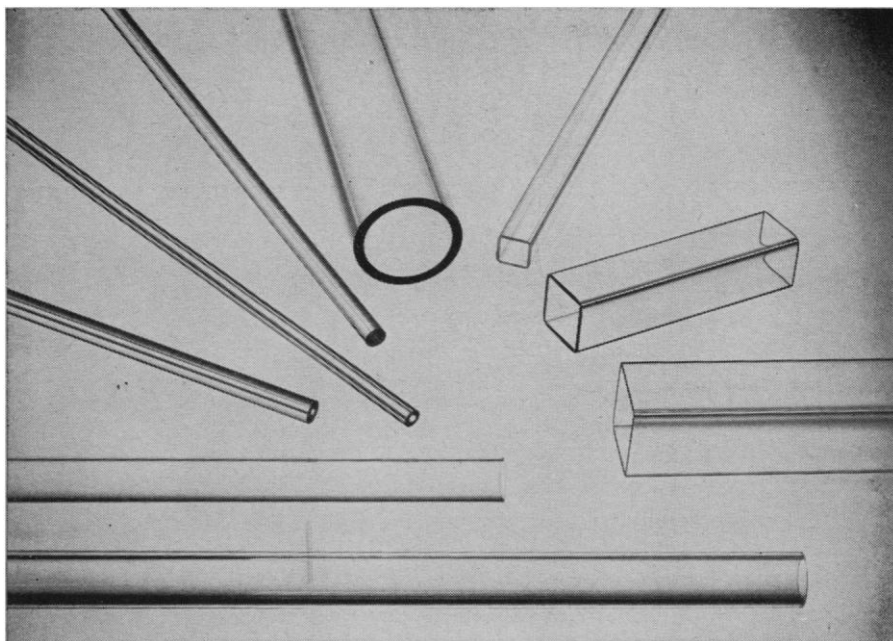
29-10. **Forest Hydrology**, intern. symp., Pennsylvania State Univ., University Park. (W. E. Sopper, School of Forestry, Pennsylvania State Univ., University Park)

30-31. **Past and Future of Science**, symp., Krakow, Poland. (B. Suchodolski, Polish Acad. of Sciences, Palace of Culture and Sciences, Warsaw)

30-1. **Antennas and Propagation**, intern. symp., Washington, D.C. (R. J. Adams, Code 5330, U.S. Naval Research Laboratory, Washington 20390)

30-1. **Applied Mechanics**, West Coast conf., Univ. of California, Los Angeles. (P. M. Naghdi, Div. of Applied Mechanics, Univ. of California, Berkeley 94720)

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AGRICULTURAL SCIENCES FOR THE DEVELOPING NATIONS

Editor: A. H. Moseman
AAAS Symposium Volume No. 76
Published October 1964

232 pages, illustrations, references, index.

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Based on a symposium presented at the Cleveland AAAS Meeting, December, 1963.

Sponsors: AAAS Section on Agriculture, American Society for Microbiology, and AAAS Committee on Desert and Arid Zones Research.

The symposium was devoted to the role of agricultural science and technology in the acceleration of economic progress in newly developing nations. The 12 chapters of this volume comprise an informed summary of the problems and opportunities of technical, economic, and educational assistance in agriculture. The book should also be helpful in furnishing some background experience for the use of agricultural planners in the newly emerging countries.

The viewpoint of the book is that although methods and materials from agriculturally advanced nations can seldom be transferred directly, the developing nations can be aided through the isolation and employment of the principles and procedures which have contributed to agricultural progress in the advanced nations.

Contributors include officers of the Agency for International Development, the U.S. Department of Agriculture, Purdue University, The Ford Foundation, Ohio State University, Cornell University, the University of Chicago, and The Rockefeller Foundation.

CONTENTS

Characteristics of Agricultural Systems in Emerging Nations: "Institutional factors limiting progress in the less developed countries" by Erven J. Long; "Animal agriculture in the emerging nations" by Ralph W. Phillips; and "Plant agriculture in the emerging nations" by J. B. Peterson and R. D. Frazier.

Research to Devise and Adapt Innovations: "Research to improve production of corn in Asia" by Ernest W. Sprague; "Animal and veterinary science programs in developing countries" by Frederick N. Andrews; and "Interactions and agricultural research in emerging nations" by Charles E. Kellogg.

Education and Development of Human Resources: "The role of educated people in agricultural development" by Richard Bradfield; "The rural people of developing countries: Their attitudes and levels of education" by Harold R. Capener; and "The development of effective academic programs for foreign students: Curricular, work experience and social aspects" by David B. Williams.

Establishing Indigenous Institutions to Serve Advancing Agriculture: "Developing agricultural institutions in underdeveloped countries" by F. F. Hill; "New patterns of agricultural research and education in India" by Albert H. Moseman; and "Economic growth from traditional agriculture" by Theodore W. Schultz.

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30-1. **Structural Dynamics and Aeroelasticity**, conf., Boston, Mass. (F. C. Hung, Space Information Systems Div., North American Aviation, Inc., Downey, Calif.)

30-2. **Fluorine Chemistry**, 3rd intern. symp., Munich, Germany. (F. Weygand, Inst. für Organische Chemie, Technische Hochschule München, Arcisstr. 21, 8 Munich 2)

30-2. **Mathematical** Assoc. of America, 46th summer, Cornell Univ., Ithaca, N.Y. (H. M. Gehman, State University of New York at Buffalo, Buffalo 14214)

30-2. **Regional Science** Assoc., 5th European congr., Krakow, Poland. (H. Wood, Dept. of Regional Science, Univ. of Pennsylvania, Philadelphia 19104)

30-2. **American Sociological** Assoc., Chicago, Ill. (G. M. Sykes, ASA, 1755 Massachusetts Ave., NW, Washington, D.C.)

30-3. **Neuropathology**, 5th intern. congr., Zurich, Switzerland. (O. T. Bailey, 912 S. Wood St., Chicago, Ill. 60612)

30-3. **Nuclear Materials Management**, intern. symp., Vienna, Austria. (J. H. Kane, Div. of Special Projects, U.S. Atomic Energy Commission, Washington, D.C.)

30-3. **Society for Applied Spectroscopy**, 4th natl., Denver, Colo. (M. W. Skougstad, 215 Hewitt Bldg., Denver 80202)

30-4. **Ionization Phenomena in Gases**, 7th intern. conf., Belgrade, Yugoslavia. (Organizing Committee, Studentski trg. 16/C/IV, P.O.B. 699, Belgrade)

30-4. **Macromolecular Chemistry**, intern. symp., Prague, Czechoslovakia. (O. Wichterle, 1888 Petřín, Prague 6)

30-4. **Organometallic Chemistry**, 2nd intern. symp., Madison, Wis. (R. West, Dept. of Chemistry, Univ. of Wisconsin, Madison)

30-10. **Population**, 2nd world conf., Belgrade, Yugoslavia. (United Nations Population Commission, United Nations, New York)

30-10. **International Inst. of Refrigeration**, symp., Prague and other cities, Czechoslovakia. (Organizing Committee, Prague 5-Smíchov, Ostrovského 34, Czechoslovakia)

31-11. **Information Theory**, Statistical Decision Functions and Random Processes, 4th conf., Prague, Czechoslovakia. (F. Hrabal, Foreign Relations Dept., Czechoslovak Acad. of Sciences, Narodní tr. 3, Prague 1)

September

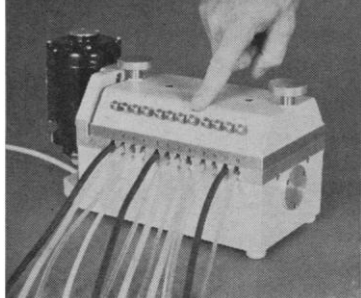
1-3. **American Geophysical Union**, 5th western natl. mtg., Dallas, Tex. (AGU, 1145 19th St., NW, Washington, D.C.)

1-3. **Metallurgists**, 4th annual conf., Ottawa, Ont. (Canadian Inst. of Mining and Metallurgy, 906 Drummond Bldg., 117 St. Catherine St., W., Montreal, Que.)

1-3. **Biomedical Aspects of Shock and Vibration Technology**, symp., Denver, Colo. (E. R. Wilson, 5745 S. Huron St., Littleton, Colo. 80120)

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1-4. Immunological Methods, symp., Chantilly, France. (R. H. Regamey, Intern. Assoc. of Microbiological Societies, Inst. d'Hygiene, 1200 Geneva, Switzerland)

1-4. Society of General Physiologists, 20th annual, Marine Biological Laboratory, Woods Hole, Mass. (R. Milkman, Dept. of Zoology, Syracuse Univ., Syracuse, N.Y. 13210)

1-5. Regional Science Assoc., 5th European congr., Warsaw, Poland. (H. Wood, Dept. of Regional Science, Univ. of Pennsylvania, Philadelphia 19104)

1-8. History of Pharmacy, intern. congr., London, England. (A. L. Short, Pharmaceutical Soc. of Great Britain, 17 Bloomsbury Sq., London W.C.1)

1-9. Physiological Sciences, 23rd intern. congr., Tokyo, Japan. (G. Kato, Dept. of Physiology, Keio Univ. School of Medicine, Shinjuku-ku, Tokyo)

1-14. Cosmical Gas Dynamics, 5th symp., Nice, France. (M. Roy, Intern. Union of Theoretical and Applied Mechanics, 55, boul. Malesherbes, Paris 8)

1-17. Algebraic Number Theory, instructional conf., Brighton, England. (R. R. Laxton, Mathematics Div., Physics Bldg., Univ. of Sussex, Brighton)

2-4. American Physical Soc., Honolulu, Hawaii. (K. K. Darrow, The Society, Columbia Univ., New York 10027)

2-5. International Medical Assoc. for the Study of Living Conditions and Health, 4th world congr., Karlovy Vary, Czechoslovakia. (Secretariat, Apolinářská 18, Prague 2)

2-9. German Mineralogical Soc., 43rd, Hanover, Germany. (F. Buschendorf, Mineralogisches Inst., Technische Hochschule Hanover, Welfengarten 1, 3 Hanover)

3-7. American Psychological Assoc., 73rd annual, Chicago, Ill. (The Association, 17th and Rhode Island Ave., NW, Washington, D.C.)

5-7. Water Pollution, 3rd intern. conf., Munich, Germany. (B. B. Berger, P.O. Box 1907, Washington, D.C.)

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5-8. Mathematics, 7th Canadian congr., Quebec, Canada. (The Congress, 985 Sherbrook St. W., Montreal, Que.)

5-9. Allergology, 6th European congr., Stockholm, Sweden. (S. Kraepelin, Sachs Children's Hospital, Stockholm)

5-9. Biochemistry of Lipids, 9th intern. congr., Noordwijk, Netherlands. (J. Boldingh, Unilever Research Laboratory, Mercatorweg 2, Vlaardingen, Netherlands)

5-9. Luminescence, symp., Munich, Germany. (N. Riehl, Arcisstr. 21, 8 München, Germany)

5-9. International League Against Rheumatism, 11th congr., Buenos Aires, Argentina. (A. Caruso, Juncal 1875, Planta Baja, Depto. 2, Buenos Aires)

5-9. Physics and Chemistry of Scintillators, intern. luminescence symp., Munich, Germany. (H. Kallman, Radiation and Solid State Laboratory, Dept. of Physics, New York Univ., New York 3)

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Cholesterol-26-C14 [Benzene solution]	15-25
Cholesteryl linoleate-1-C14 [Benzene solution]	2-20
Cholesteryl-4-C14 linoleate [Benzene solution]	15-35
Cholesteryl oleate-1-C14 [Benzene solution]	2-20
Cholesteryl-4-C14 oleate [Benzene solution]	15-35
Cholesteryl palmitate-1-C14 [Benzene solution]	2-20
Cholesteryl-4-C14 palmitate [Benzene solution]	15-35
Cortisol-4-C14 [Hydrocortisone-4-C14] [Benzene 10% ethanol solution]	15-25
Cortisone-4-C14 [Benzene 2% ethanol solution]	20-30
Cortisone-4-C14 acetate [Benzene solution]	15-25
Dehydroepiandrosterone-4-C14	15-30
Diethylstilboestrol-(monoethyl-1-C14) [Benzene solution]	5-20
DL-Epinephrine-(carbinol-C14) DL-bitartrate	2-15
DL-nor-Epinephrine-(carbinol-C14) DL-bitartrate	2-15
Estradiol-4-C14 [Benzene 2% methanol solution]	20-40
Estrone-4-C14 [Benzene 5% methanol solution]	20-40
17 α -Hydroxyprogesterone-4-C14 [Benzene solution]	10-40
Δ^5 -Pregnenolone-4-C14 [Benzene solution]	15-25
Progesterone-4-C14 [Benzene solution]	15-25
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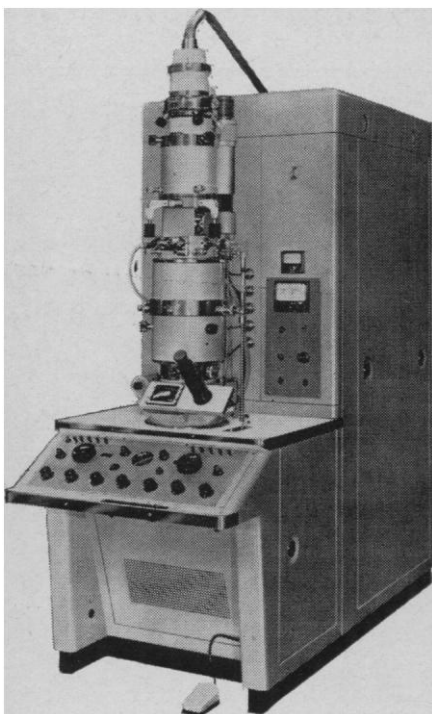
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6-10. **Plasma Physics and Controlled Nuclear Fusion Research**, 2nd conf., Abingdon, England. (H. H. Storhaug, Div. of Scientific and Technical Information, Intern. Atomic Energy Agency, Kärntner Ring 11, Vienna 1, Austria)

6-10. European Organization for **Quality Control**, 9th conf., Rotterdam, Netherlands. (Secretariat, Weena 700, Rotterdam 3)

6-10. International Union of Directors of **Zoological Gardens**, annual, Berlin, Germany. (E. M. Lang, Zoologischer Garten, Basel, Switzerland)

6-11. **Electromagnetic Distance Measurement**, symp., London, England. (R. C. A. Edge, Field Survey, Ordnance Survey, Leatherhead Rd., Chessington, Surrey)

6-11. **Electromagnetic Wave Theory**, Intern. Scientific Radio Union, symp., Delft, Netherlands. (R. Timman, Technological Univ., Julianalaan 132, Delft)

6-11. **Polarization Phenomena of Nucleons**, 2nd intern. conf., Karlsruhe, Germany. (H. Schopper, Institut für Experimentelle Kernphysik, Kernforschungszentrum Karlsruhe, Postfach 947, 75 Karlsruhe)

6-11. **Basic Problems in Thin Film Physics**, intern. symp., Clausthal-Göttingen, Germany. (R. Nossek, Physikalisches Institut, Technische Hochschule, Clausthal)

6-12. International Soc. for Research on **Nutrition and Vital Substances**, Salzburg, Austria. (H. A. Schweigart, The Society, Bemeroderstr., 61, Hanover-Kirchrode, Germany)

6-12. **Photosynthesis**, Western European conf., Zeist, Netherlands. (J. C. Goedheer, Physica Inst., State Univ., Bijlhouwerstraat 6, Utrecht, Netherlands)

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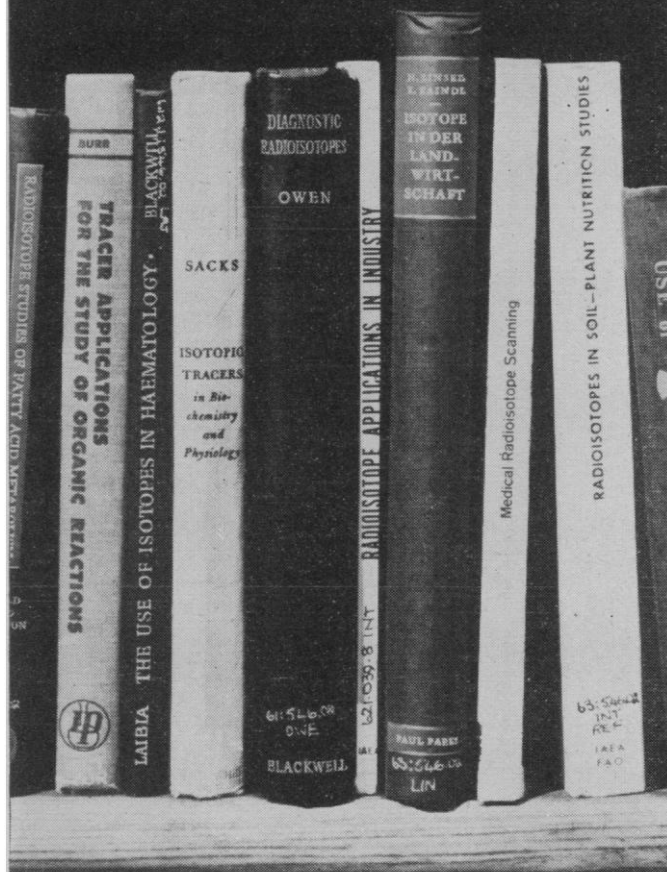
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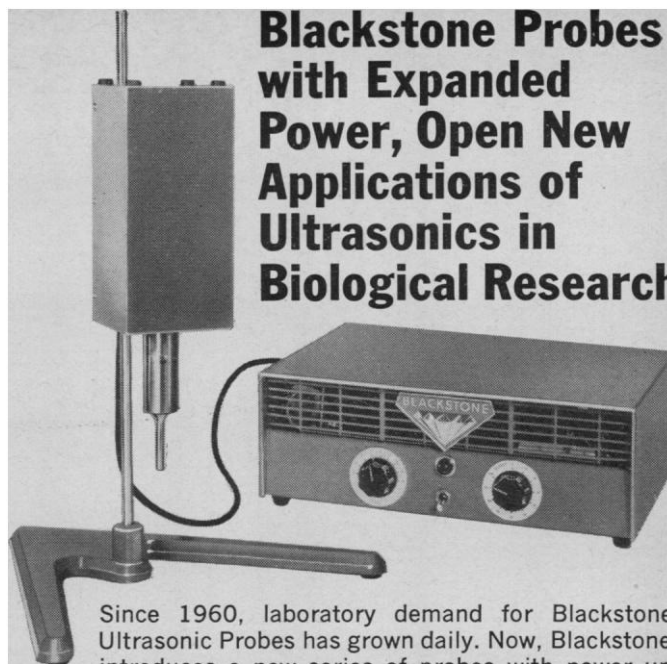


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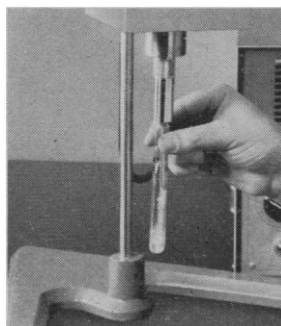
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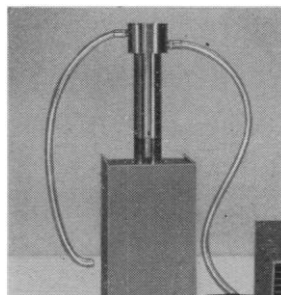
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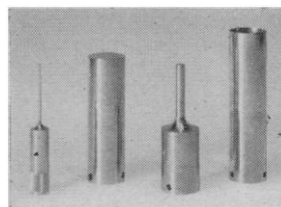
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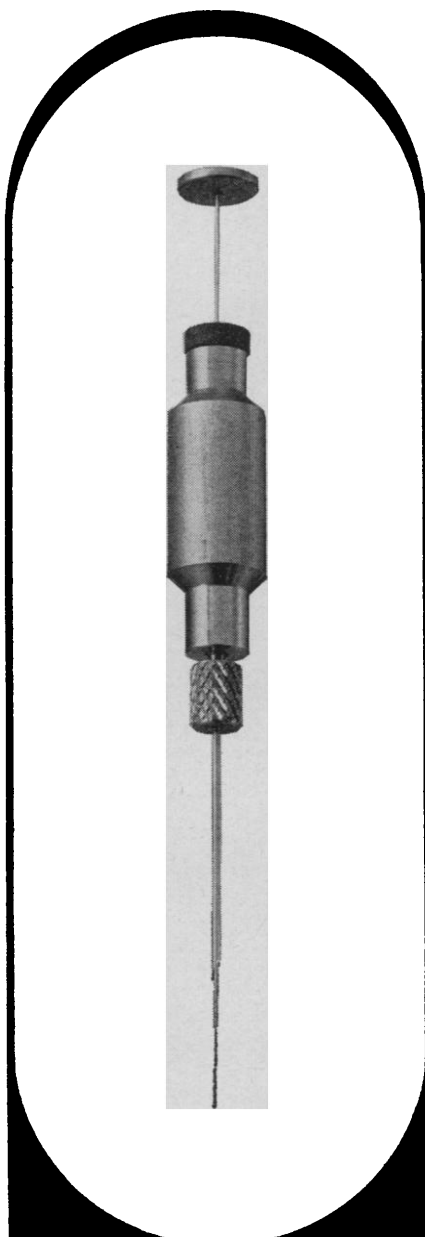


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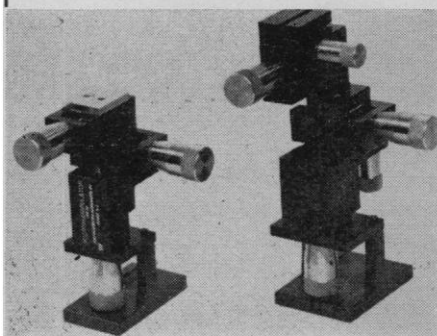
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Eight Lectures on Mathematical Analysis. A. Ya. Khinchin. Translated from the third Russian edition (1948) by Irena Zygmund. Heath, Boston, 1965. 239 pp. Illus. Paper, \$4.95.

Electrical Coronas: Their Basic Physical Mechanisms. Leonard B. Loeb. Univ. of California Press, Berkeley, 1965. 714 pp. Illus. \$14.

Elements of Cloud Physics. Horace Robert Byers. Univ. of Chicago Press, Chicago, Ill., 1965. 201 pp. Illus. \$7.50.

The Elements of Computational Mathematics. S. B. Norkin, Ed. Translated from the Russian edition (Moscow, 1960) by G. J. Tee. A. D. Booth, Translation Ed. Pergamon, London; Macmillan, New York, 1965. 206 pp. Illus. \$6.

Elements of Physics. For students of science and engineering. George Shortley and Dudley Williams. Prentice-Hall, Englewood Cliffs, N.J., ed. 4, 1965. 976 pp. Illus. \$11.75.

Elevated-Temperature Testing of Metals. A. M. Borzdyka. Translated from the second Russian edition (Moscow, 1962) by Adolph Wald. Israel Program for Scientific Translations, Jerusalem; Davey, New York, 1965. 424 pp. Illus. \$16.50.

Excitons. D. L. Dexter and R. S. Knox. Interscience (Wiley), New York, 1965. 147 pp. Illus. \$6.50. Interscience Tracts on Physics and Astronomy, edited by R. E. Marshak.

The Feynman Lectures on Physics. vol. 3, *Quantum Mechanics*. Richard P. Feynman, Robert B. Leighton, and Matthew Sands. Addison-Wesley, Reading, Mass., 1965. Unpaged. Illus. \$6.75 (exercises, \$1).

Field-Effect Transistors. Leonce J. Sevin, Jr. McGraw-Hill, New York, 1965. 140 pp. Illus. \$10. Texas Instruments Electronics Series.

The Foundations of Astrodynamics. Archie E. Roy. Macmillan, New York, 1965. 399 pp. Illus. \$10.95.

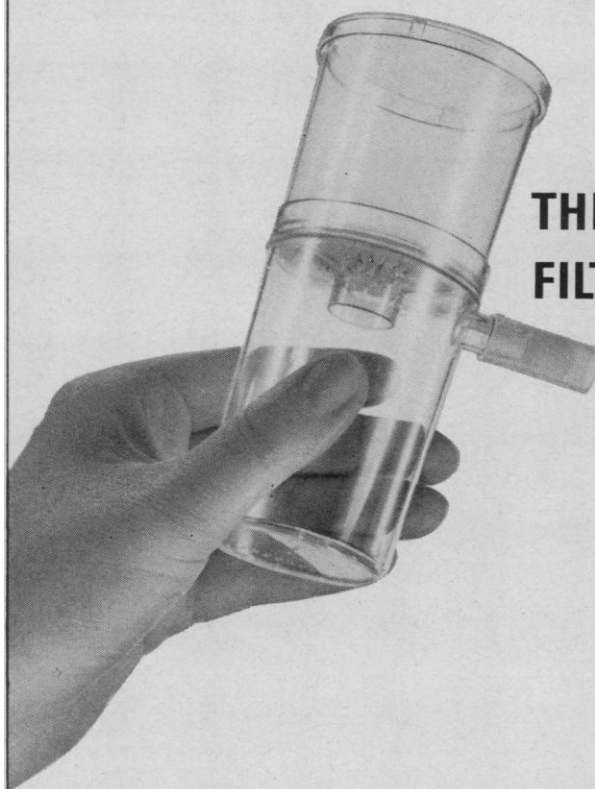
General Chemistry Laboratory Operations. Lawrence E. Conroy and R. Stuart Tobias. Macmillan, New York, 1965. 199 pp. Illus. Paper, \$3.50. Concepts of Chemistry Series.

General Relativity and Cosmology. G. C. McVittie. Chapman and Hall, London, 1965. 253 pp. Illus. 50s. International Astrophysics Series, vol. 4, edited by Sir Bernard Lovell and Zdeněk Kopal.

Geochemistry of Sediments: A Brief Survey. Egon T. Degens. Prentice-Hall, Englewood Cliffs, N.J., 1965. 352 pp. Illus. \$13.25.

Handbook for Engineers. vol. 1, *Mathematics and Physics*. K. P. Yakovlev, Ed. Translated from the Russian edition (Moscow, 1960) by G. O. Harding. W. A. Sutherland and H. V. Pilling, Translation Eds. Pergamon, London; Macmillan, New York, 1965. 641 pp. illus. \$7.

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Introductory Engineering Statistics. Irwin Guttman and S. S. Wilks. Wiley. New York, 1965. 356 pp. Illus. \$7.95.

Lectures on Modern Mathematics. vol. 3. T. L. Saaty, Ed. Wiley. New York, 1965. 331 pp. Illus. \$11.75. Six papers: "Topics in classical analysis" by Einar Hille; "Geometry" by H. S. M. Coxeter; "Mathematical Logic" by Georg Kreisel; "Some recent advances and current problems in number theory" by Paul Erdős; "On stochastic processes" by Michel Loève; and "Random integrals of differential equations" by J. Kampé de Fériet.

Lie Groups for Pedestrians. Harry J. Lipkin. North-Holland. Amsterdam; Interscience (Wiley), New York, 1965. 172 pp. Illus. \$6.

Management of Radioactive Wastes. C. A. Mawson. Van Nostrand. Princeton, N.J., 1965. 206 pp. Illus. \$6.95. Van Nostrand Nuclear Science Series. edited by Frank R. Ward.

Matter, Earth, and Sky. George Gamow. Prentice-Hall. Englewood Cliffs, N.J., ed. 2, 1965. 640 pp. Illus. \$11.65.

The Measurement of Mechanical Parameters in Machines. N. P. Rayevskii. Translated from the second Russian edition by D. P. Barrett. L. Maunders. Translation Ed. Pergamon. New York, 1965. 230 pp. Illus. \$15.

Mechanical Behavior. Wayne Hayden, William G. Moffatt, and John Wulff. Wiley. New York, 1965. 259 pp. Illus. Paper, \$2.95. Structure and Properties of Materials series, vol. 3.

Mechanical System Design. W. E. Eder and W. Gosling. Pergamon. New York, 1965. 240 pp. Illus. Paper. Commonwealth and International Library. Applied Mechanics Division, edited by Sir Robert Robinson and Athelstan Spilhaus.

Modern College Algebra. Daniel E. Dupree and Frank L. Harmon. Prentice-Hall, Englewood Cliffs, N.J., 1965. 260 pp. Illus. \$5.95.

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The Nature of Induction Machines. Philip L. Alger. Gordon and Breach, New York, 1965. 530 pp. Illus. \$25. Revised edition of *The Nature of Polyphase Induction Machines* (Wiley, 1951).

Nodes and Weights of Quadrature Formulas. Sixteen-place tables. Aleksandr Semenovich Kronrod. Translated from the Russian edition (Moscow, 1964). Consultants Bureau, New York, 1965. 151 pp. \$12.50.

Organic Chemistry for General Degree Students. vol. 1. *Fundamental Aliphatic Chemistry*. P. W. G. Smith and A. R. Tatchell. Pergamon. London, 1965. 300 pp. Illus. Paper, 25s. The Commonwealth and International Library series, edited by Sir Robert Robinson and Athelstan Spilhaus.

Photoelectronic Materials and Devices. Simon Larach, Ed. Van Nostrand. Princeton, N.J., 1965. 446 pp. Illus. \$12. Contributors are James A. Amick, Richard H. Bube, A. G. Fischer, Simon Larach, E. E. Loebner, G. A. Morton, F. H. Nicoll, Paul Rappaport, A. Rose, M. L. Schultz, R. E. Shrader, W. E. Spicer, A. H. Sommer, and J. J. Wysocki.

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Principles of Physical Chemistry. Samuel H. Maron and Carl F. Prutton. Macmillan, New York, ed. 4, 1965. 896 pp. Illus. \$9.95.

Principles of Physics. F. Bueche. McGraw-Hill, New York, 1965. 680 pp. Illus. \$9.75.

Principles of Physical Geology. Arthur Holmes. Ronald, New York, ed. 2, 1965. 1304 pp. Illus. \$12.

Probability and Its Engineering Uses. Thornton C. Fry. Van Nostrand, Princeton, N.J., ed. 2, 1965. 478 pp. Illus. \$5. Bell Telephone Laboratories Series.

Probability and Statistics. Hans Freudenthal. Elsevier, New York, 1965. 147 pp. Illus. \$5.

Progress in Solid State Chemistry. vol. 2. H. Reiss, Ed. Pergamon, London; Macmillan, New York, 1965. 483 pp. Illus. \$17.50. Twelve papers: "Metallic diamonds: Pressure-produced metals" by A. J. Darnell and W. F. Libby; "The doping of semiconductors by the injection of energetic ions" by J. O. McCaldin; "Low-energy electron diffraction and surface structural chemistry" by J. J. Lander; "Nucleation in deposition from the vapor" by S. J. Hruska and G. M. Pound; "The structure of a precipitate as determined by the interplay of nucleation, growth, and ageing" by M. Kahlweit; "Defect interactions and precipitation in semiconductors" by R. A. Swalin and R. D. Weltzin; "Nonstoichiometry in chemical compounds" by G. G. Libowitz; "Point defects in ternary ionic crystals" by H. Schmalzried; "Chemical reactions of radiation-produced electrons in ice and in organic solids" by L. Kevan; "The bond description of semiconductors: polycompounds" by F. Hulliger and E. Mooser; "Lattice energies and related topics" by M. F. C. Ladd and W. H. Lee; and "Configurational ordering of defects in solids" by G. W. Lehman and W. G. Gehman.

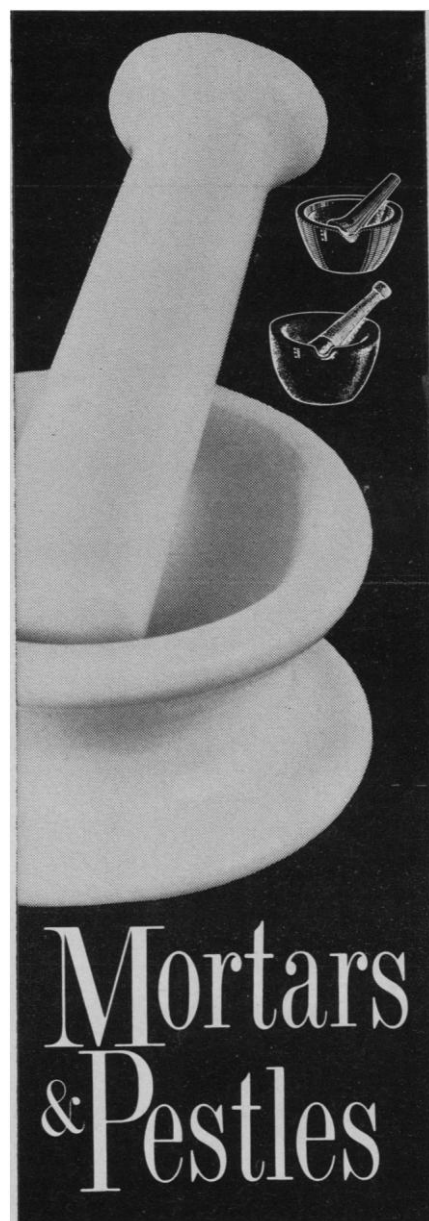
Rectifier Circuits: Theory and Design. Johannes Schaefer. Wiley, New York, 1965. 367 pp. Illus. \$13.50.

The Riemann Hypothesis and Hilbert's Tenth Problem. S. Chowla. Gordon and Breach, New York, 1965. 135 pp. Illus. \$6.50. Mathematics and Its Applications Series, edited by Jacob T. Schwartz.

Rodd's Chemistry of Carbon Compounds. vol. 1, pt. C, *Monocarbonyl Derivatives of Aliphatic Hydrocarbons: Their Analogues and Derivatives.* S. Coffey, Ed. Elsevier, New York, ed. 2, 1965. 448 pp. Illus. \$27. Four Papers: "Aldehydes and ketones" by J. G. Buchanan, N. A. Hughes, F. J. McQuillin, and G. A. Swan; "Monobasic carboxylic acids" by M. F. Ansell and R. H. Gigg; "Carbon monoxide, isocyanides and fulminic acid" by M. F. Ansell; and "Carbonic acid and its derivatives" by R. Howe.

Skin-Freeze Casting. G. F. Balandin. Translated from the Russian edition (Moscow, 1962) by A. Baruch. D. Alster, Translation Ed. Israel Program for Scientific Translations, Jerusalem, 1964; Davey, New York, 1965. 240 pp. Illus. \$11.50.

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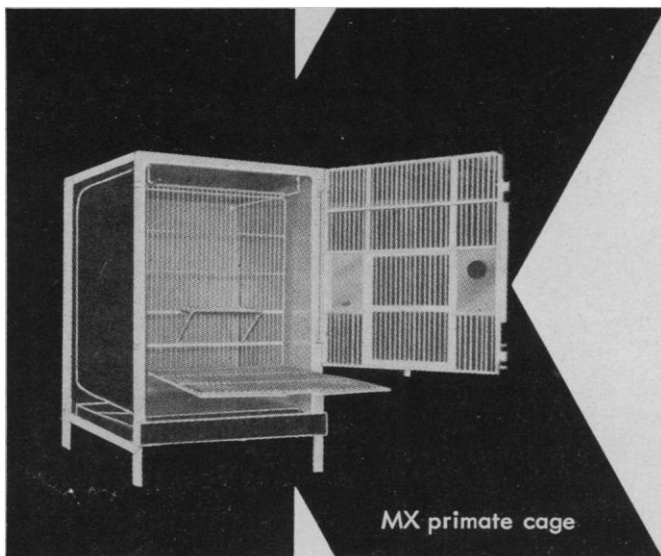


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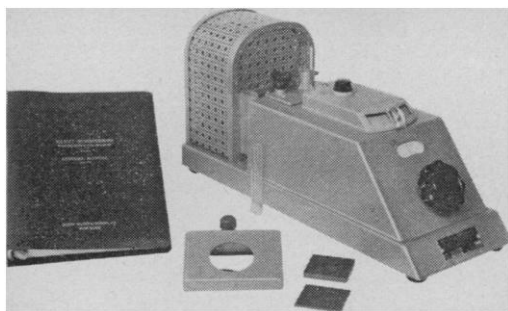
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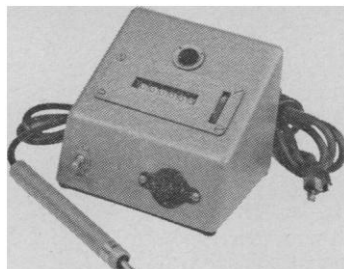


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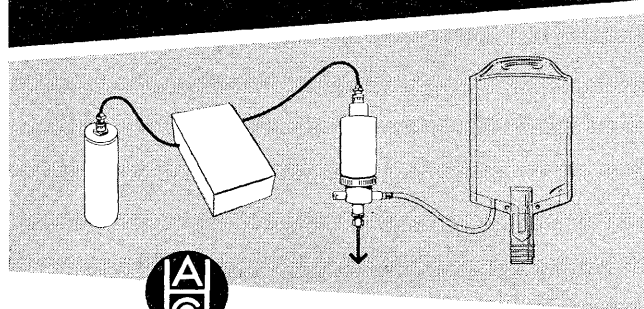
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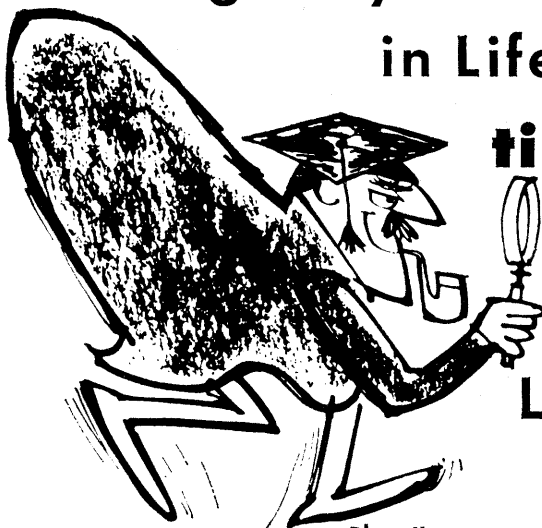
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