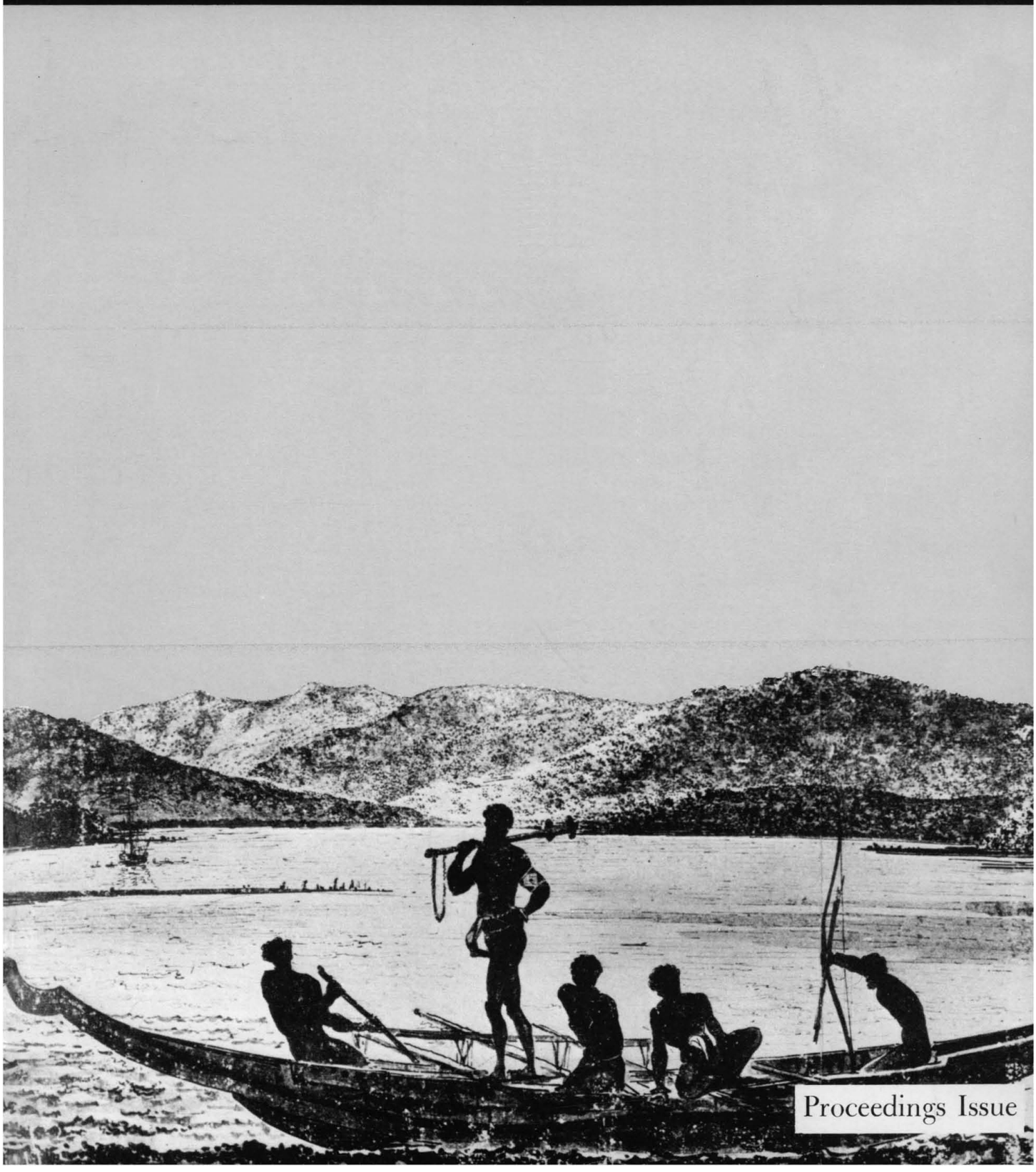
SCIENCE

20 February 1970

Vol. 167, No. 3921

AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE



Proceedings Issue

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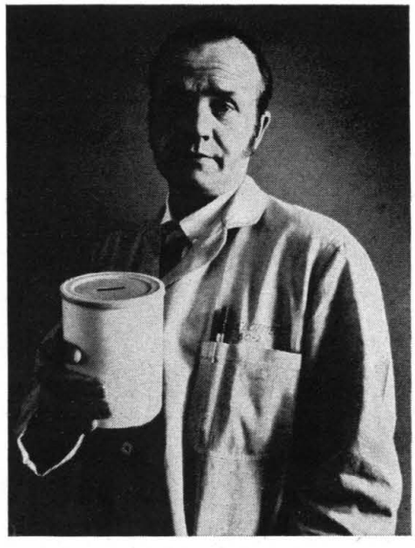
The new Cary 61. The CD spectropolarimeter that lets you save the money you probably don't have.



We've come up with a way to let you make the most of a tight budget without compromising quality. The new Cary 61 is an all solid-state, high performance CD-only instrument that costs less than $30,000 and can handle any research or routine CD spectropolarimeter problem.

THE BASIC 61

Practical design considerations make the new Cary 61 one of the easiest-to-operate instruments of its kind. Simplified controls allow rapid adaption of operating parameters to sample needs and permit savings in instrument set-up time. Built-in features include: dynode voltage recording for deriving the sample's absorption properties; provision for interfacing computer readout and control; and a specially designed, very spacious sample compartment which accommodates a super-conducting magnet for MCD studies, or other sample handling equipment.

The performance-proven double monochromator and special optical design features of the Cary 61: minimize stray light, reduce the occurrence of artifacts, allow penetration into the ultraviolet with complete confidence, and sharply define small spectral details over its entire 185-800 nm range.

As for CD performance, if the 61 can't do it, nothing else can.

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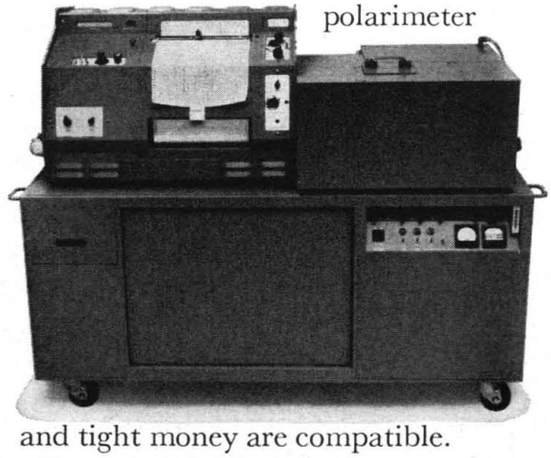
Simply add our unique "folded beam" optical accessory and you're set to perform CD difference measurements with extremely high sensitivity. All the while keeping additional expenses to a minimum.

The new Cary 61. Working proof that a good, versatile CD spectropolarimeter



and tight money are compatible.

For complete details or a demonstration, write Cary Instruments, a Varian subsidiary, 2724 South Peck Road, Monrovia, California 91016.

Ask for data file E007-20.

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20 February 1970
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SCIENCE

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ASSOCIATION AFFAIRS

COVER

The critical evaluation of the early historical estimates of the size of a nonliterate population newly contacted by literate people discourages the acceptance of much of the information recorded, and even that which is acceptable raises more questions than can now be answered. See page 1097. ["View of Malekula, New Hebrides," from *Voyages of Captain James Cook*, vol. 2, Cambridge University Press. Wash drawing by William (James) Hodges, courtesy of British Museum]

If everyone were easily satisfied,

Zeiss microscopes are made for the microscopist who demands the best. Regardless of what Zeiss microscope you buy, you get the world's finest optics. And you get the ultimate in mechanical precision. Simply to look through the optics and to touch the focusing knobs on any Zeiss instrument is proof enough.

Our Universal Microscope is exactly what its name states—it is universal, and universally accepted for all applications. But we also offer another instrument, the WL, that for many applications is in the same class. Even if you normally find satisfaction hard to come by, you'll find it easily with one of these microscopes. Which one depends upon what you want to do.

The Zeiss WL Microscope

The WL is an outstanding instrument for most transmitted-light applications, including: brightfield, darkfield, phase contrast, Nomarski interference contrast, fluorescence, polarization, microprojection, photomicrography.

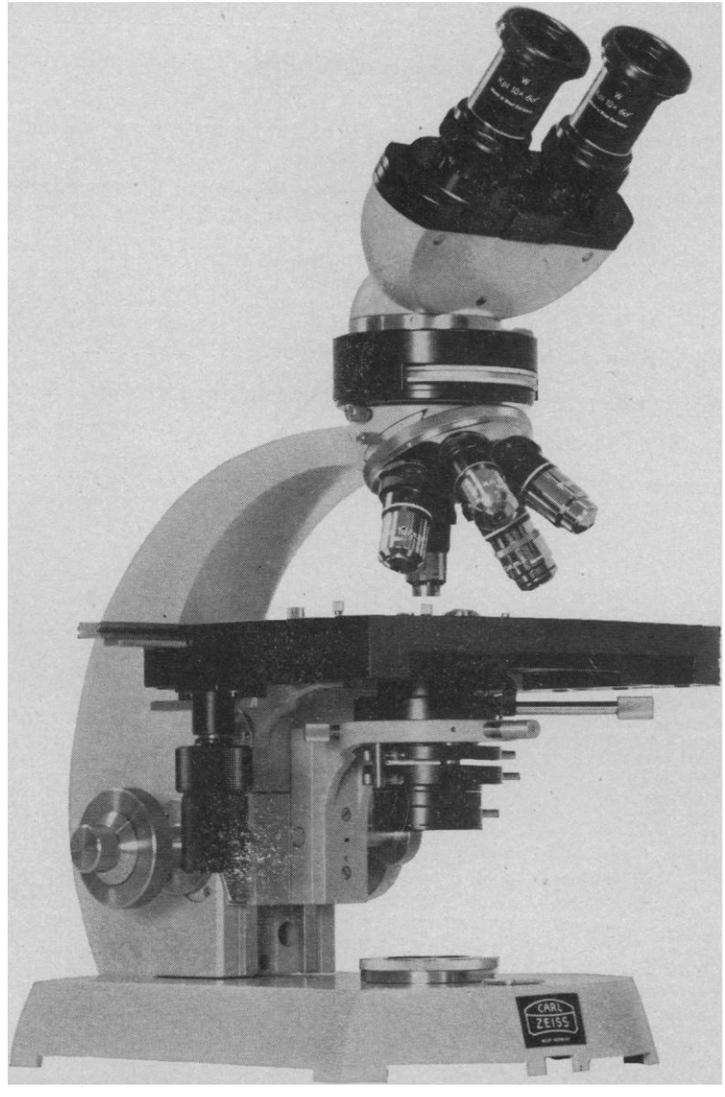
A look at just a few of its key features will give you an idea of its excellence:

1. Objectives—the most essential component of any microscope. Zeiss objectives are world-famous for their quality. Available for the WL is a complete line of Planapochromats from 4/0.16 to 100/1.3—and *only* Zeiss can offer so many. Complete lines, too, of Neofluars, Planachromats and Achromats. Each, in its class, is the world's best.

2. Brightfield—Phase Contrast—Nomarski Interference Contrast without changing condensers or objectives. And there's no need for a centering telescope either, because the exclusive OPTOVAR Magnification Changer has an auxiliary lens for centering the light ring on the phase ring. The OPTOVAR also lets you easily change magnifications without changing eyepieces.

3. Stages—Rotating and Centering, Mechanical and Gliding, Polarizing—the most versatile, the sturdiest and smoothest made. Even if you exert pressure on these stages, they won't slip .

4. Attachments—There are cameras (35mm, 4 x 5, Polaroid®, motion picture and video), auxiliary binocular and monocular tubes, projection screens, drawing attachments, a refractometer, etc., etc.—just about anything you might ever want.



The Zeiss WL Microscope

there would be no need for Zeiss.

The Zeiss Universal Microscope
With the Universal, you can do all the things in transmitted light you can do with the WL—plus a few others. What's more, this is a truly great instrument for reflected light. Perhaps its outstanding feature (aside from the magnificent optics and extra-sturdy stand) is the fact that you can switch from reflected to transmitted light, or vice-versa, just by flipping a lever, *without changing light sources.*

Let's take a closer look at the Zeiss Universal Microscope:

1. Objectives—the same great objectives as the WL has. And, in addition, a full line of Epiplans for reflected light work, and famous LUMINARS for photomacrography.

2. The Microscope Stand—the sturdiest stand of any desk-top microscope. This extra stability allows use of the Microscope Photometer for both reflected and transmitted light, and is of benefit if a great deal of 4 x 5 or motion picture photography is employed.

For reflected light, more intense light, or fluorescent illumination (including phase-fluorescence), the special illuminators, rather than being accessories, become *part* of the instrument, contributing to its ease-of-operation, compactness and sturdiness.

3. Attachments—The same cameras, projection screens, drawing attachments, etc., as for the WL—plus the Microscope Photometer and the Microhardness Tester.

To sum up, the Universal is the instrument to buy when your applications are truly *universal,* when you have to switch from one mode to another during your work. The WL is superb if you are mainly concerned with transmitted-light microscopy. But no matter which Zeiss microscope you choose, we know you'll be satisfied. Because both are made specifically for the microscopist who is *hard* to satisfy.

For more information on the WL or Universal (or on any of the others in our line) write Carl Zeiss, Inc., 444 Fifth Avenue, New York, New York 10018.

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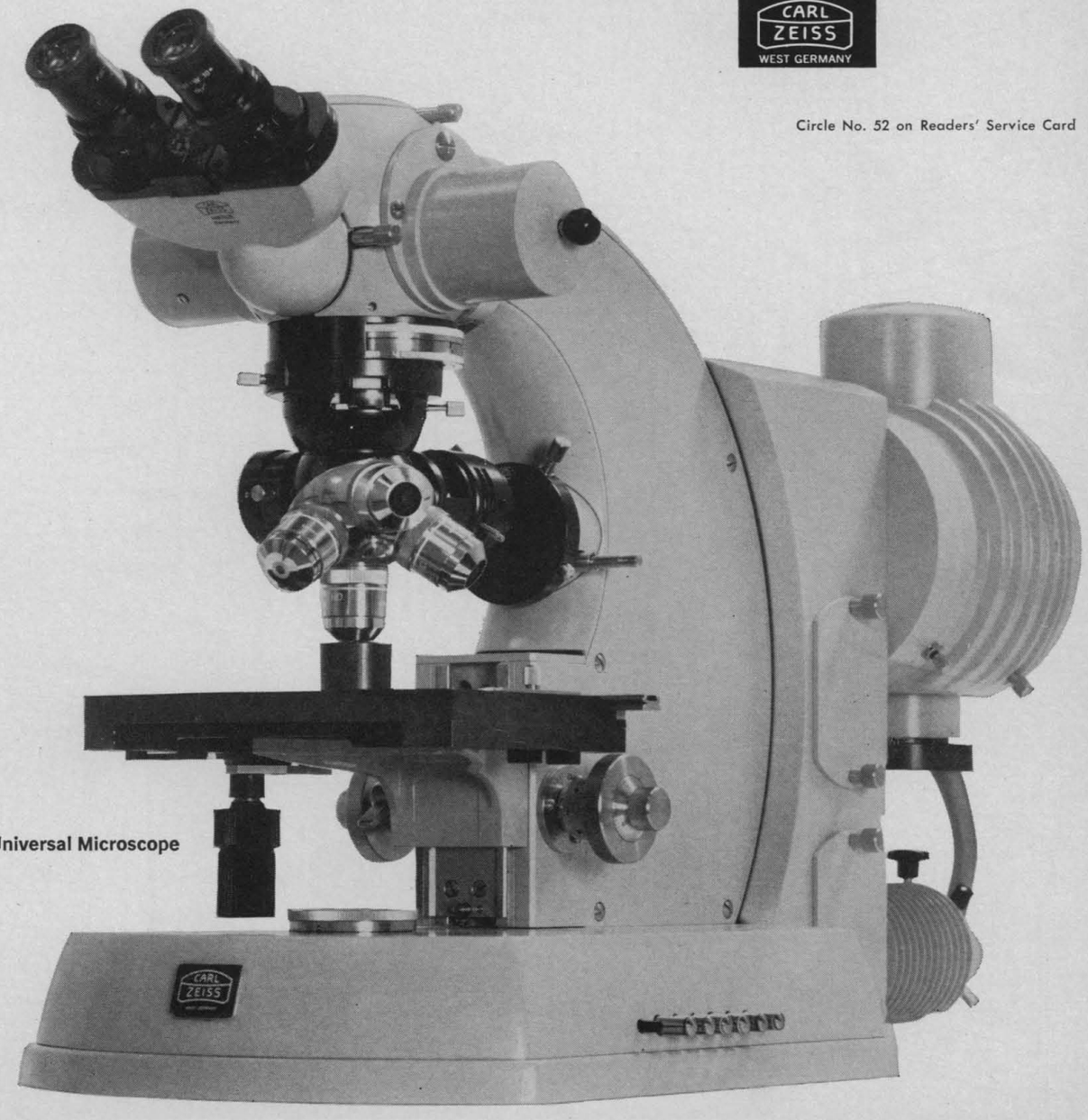

The Zeiss Universal Microscope

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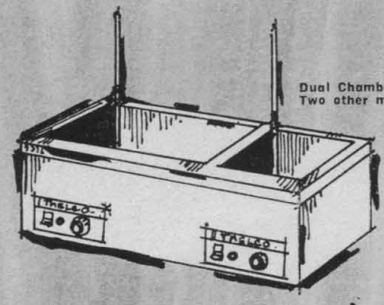
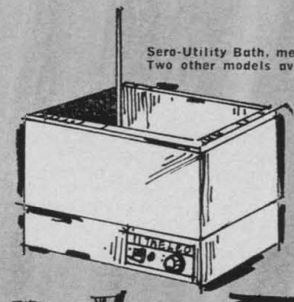
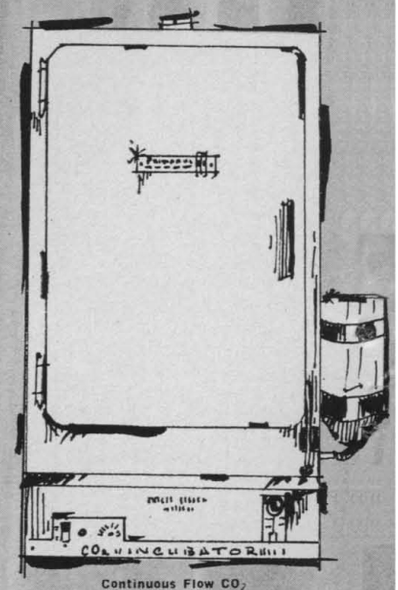


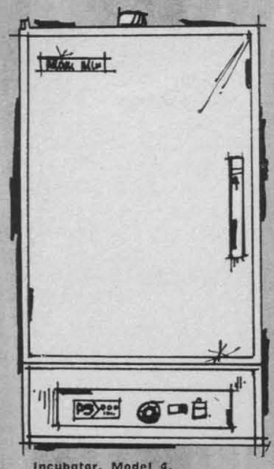
Dual Chamber Serological Bath
Two other models available.



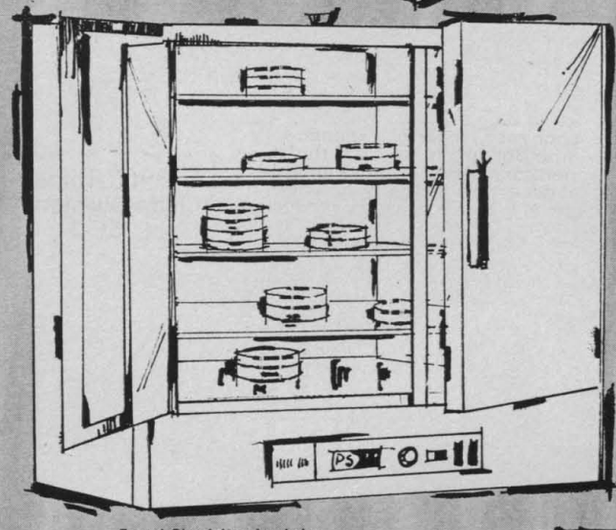
Sero-Utility Bath, medium size.
Two other models available.



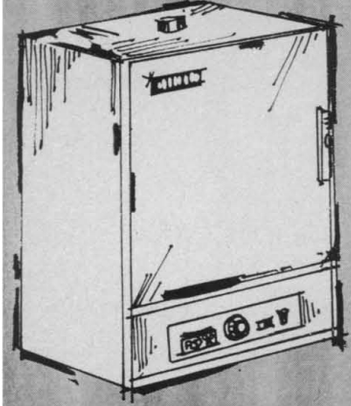
Continuous Flow CO_2 Incubator.



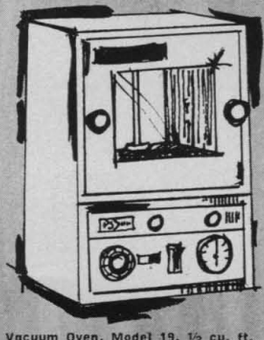
Incubator, Model 4.
Two other models available.



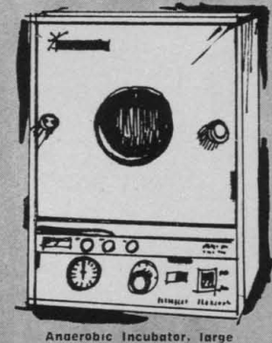
Forced Circulation Incubator, Model 6M.



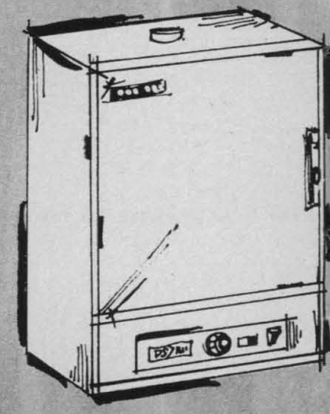
Forced Circulation Oven, Model 18.
Two other models available.



Vacuum Oven, Model 19. ½ cu. ft. capacity, 1½ cu. ft. model also available.



Anaerobic Incubator, large size, smaller model available.

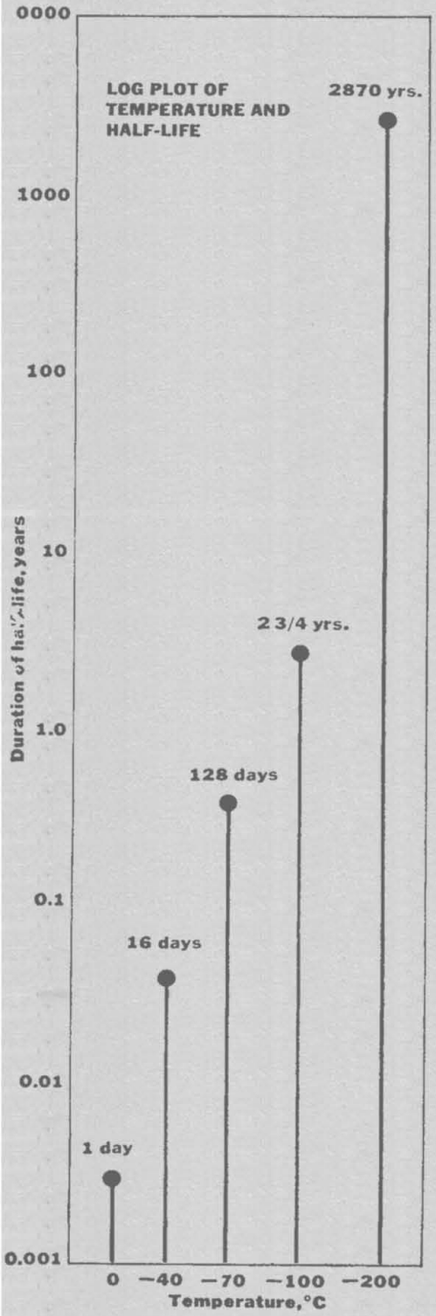


Gravity Convection Oven, Model 17.
Two other models available.

1920-Golden Anniversary of Service to Science-1970

How cryogenic storage can be a lifesaver for the bioscientist

The gradual erosion of a biological property that is being maintained as a preservative measure in the frozen state at a temperature of −70°C or higher is an occurrence with which workers in the biosciences inevitably become familiar. Often marvels of ingenuity are exercised in preparing a system for the potentially dangerous phase transition. The bioscientist is able to show that, as the temperature of the basically aqueous medium is lowered, enzyme activity, membrane integrity, or cellular morphology has survived the excursion from +15°C to −70°C and back. The system, perhaps with the addition of a protective additive, has presumably been well prepared not only for a passage to and from the solid state but also for a storage period in that state. Yet, if the return to +15°C is delayed for weeks, or months or years, these or other desirable and essential properties may be irretrievably lost. What has happened? Why?



The precise mechanisms by which entities of biological origin undergo degradation with time in a frozen environment have not been delineated in terms of their chemistry. The nonfunctioning enzyme system, the infertile sperm cell, the hemolyzed erythrocyte, and other biological disasters nevertheless attest to their reality. Clearly, as the cryobiologists probe the basics of their field, one can expect definition of reactions of great interest, conceivably of wholly new concepts in chemistry. There are portents, perhaps, in Wang's dimerization of 1,3 dimethyl thymine in frozen environments, a photoreaction that proceeds at a negligible rate in the liquid state.

At present known only by their workings, a loss of activity or other form of biological integrity, these degradative reactions are temperature dependent, and it is on this relationship that the success or failure of a frozen storage operation may depend For over a century we have known that a decline in temperature of 10°C decreases the reaction velocity by approximately 1/2 or 2/3, but those of you who remember your problems in chemical kinetics will recall the awe-inspiring influence of temperature on the specific reaction rate as expressed by Arrhenius:

$$K = A\,e^{-\Delta E/RT}$$

The effect of temperature on K, the specific reaction rate, is exerted exponentially through the Boltzmann factor. If the storage temperature used permits significant biological decay, that is to say, an undesirably high degradative reaction velocity, one can slow the process effectively. How effectively can be seen in almost any text of physical chemistry. Daniels, for example, cites a first-order reaction in which the half-life is increased by a factor approaching 10,000 as the temperature is lowered from −75°C to −100°C. Such considerations are necessarily important when materials of biological origin, many of which are intrinsically unstable, are to be stabilized for indefinitely prolonged periods at reduced temperatures. Remember, too, that the frequency factor, A, diminishes with decreasing temperature.

Among the procedures by which the scientist may capitalize on the relationships inherent in the Arrhenius equation to provide maximum stability to systems of biological interest, the use of cryogenic fluids in appropriate storage equipment offers a relatively simple solution. Liquid nitrogen, abundantly available, is a boiling liquid, −196°C, at atmospheric pressure. An idea of its potential effectiveness as a refrigerating agent can be seen from the diagram below. Here we postulate a reaction with a half-life of one day at 0°C and a reduction of reaction rate by one half for each 10°C decline in temperature.

REFERENCES:

Daniels, F.: Outlines of Physical Chemistry, New York, John Wiley & Sons, Inc., 1948, p. 367.

Wang, S. Y.: Photochemical Reactions in Frozen Solutions. Nature *190*:690-4, 1961.

See also: Wang, S.Y.: Photochemical Reactions of Nucleic Acid Components in Frozen Solutions. Fed. Proc. *24*(2) Part III:S-71-9, Mar.-Apr., 1965.

Is a cryogenic refrigerator a biological necessity?

Some bioscientists find cryogenic preservation an indispensable tool for storing many materials of biological origin in a potentially viable or functional state for prolonged periods. For instance, tissue cultures may be so stored without the risk and expense attendant on subculture.

LINDE cryogenic refrigerators come in all shapes and sizes

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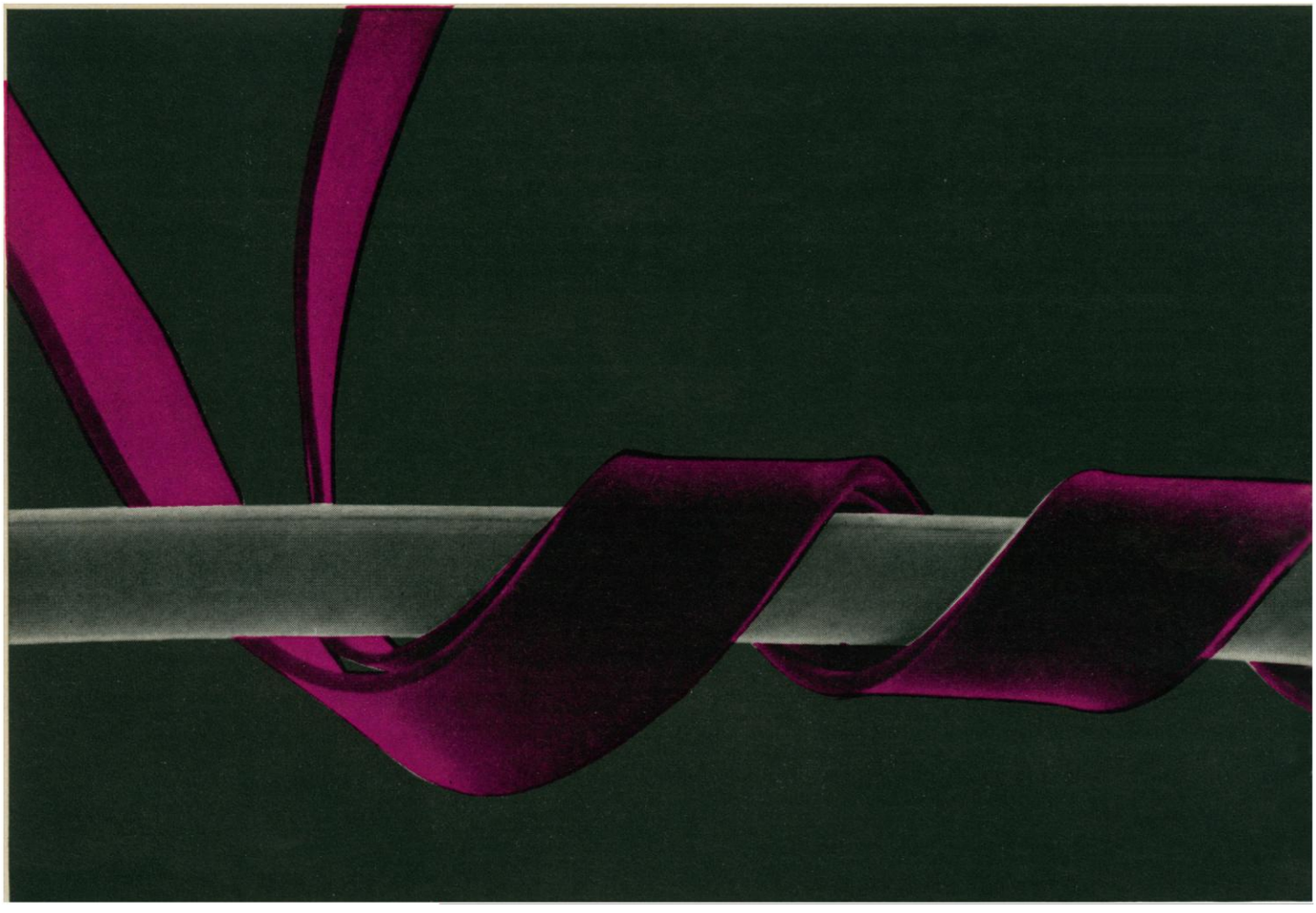

Customizing a magnetic alloy

Bell Laboratories scientists have custom tailored a magnetic alloy for the "piggyback twistor," a memory device used in electronic switching systems.

In this device, metal tapes (enlarged 225 times above) are wound into a tight spiral—subjecting them to considerable mechanical stress. The magnetic properties of the alloys must be essentially independent of such stress. That is, they must have low magnetostriction. In addition, the outer tape must be magnetically "hard"—with high coercive force (resistance to change in direction of magnetization). And finally, it must be ductile enough to be formed into tape. No known alloy had this combination of properties. So, E. A. Nesbitt, G. Y. Chin, and D. Jaffe of Bell Laboratories made one to order.

Tailoring the new alloy for the outer tape required a precise knowledge of the relationship between the magnetic behavior of materials and their structure. So, the Bell Laboratories scientists began with 90% cobalt and 10% iron, a composition they knew had the necessary ductility and low magnetostriction—two of the essential requirements. But, since the coercive force of the composition was inadequate, they were faced with another knotty problem.

To solve it, they went back again to a basic principle—a precipitate in an alloy impedes the motion of magnetic domain walls when a field is applied to reverse the magnetic polarity. With that foundation, the scientists formulated a composition of 4% gold, 84% cobalt, and 12% iron. (The gold is the precipitate.)

When this new alloy was cold-drawn to produce a 97.5% reduction in cross section and then heat treated, its coercive force increased to the point required for piggyback twistors.

By simplifying the manufacture of piggyback twistors for use in the electronic switching systems now being built by Western Electric, the new magnetic alloy puts basic research in metallurgy at the service of telephone customers.

From the Research and Development Unit of the Bell System—

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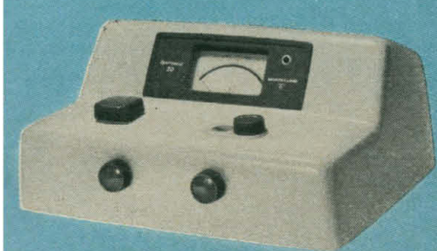

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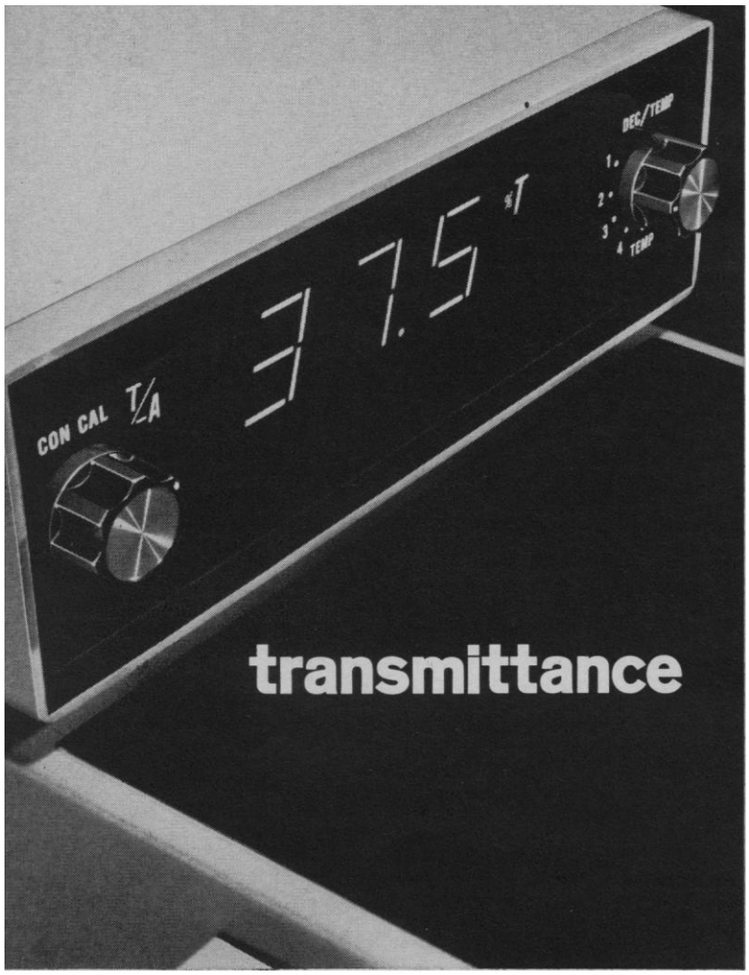
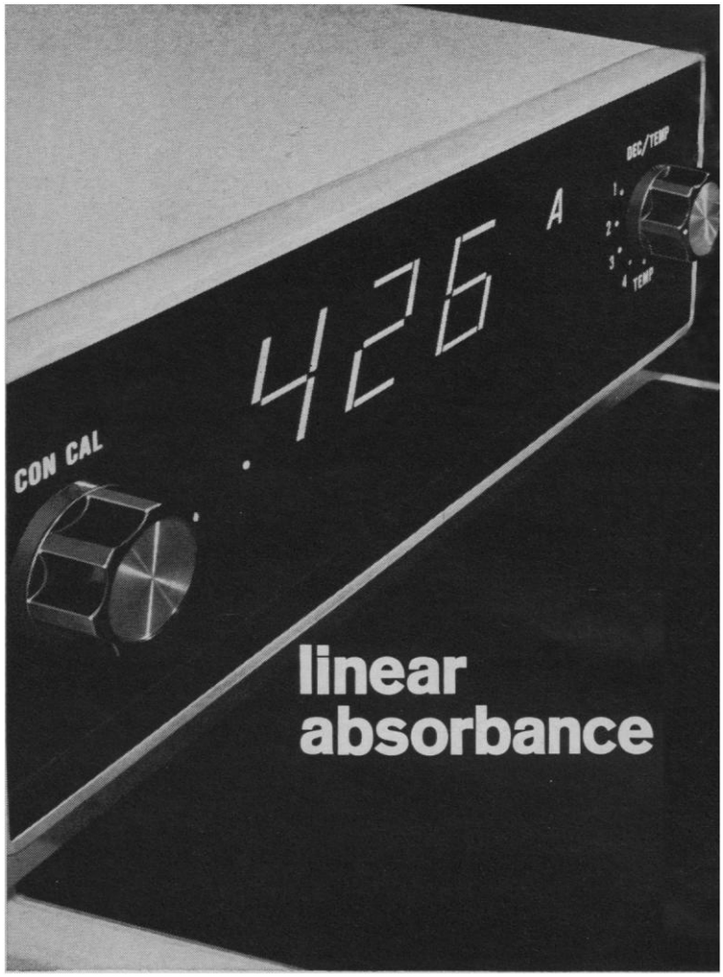
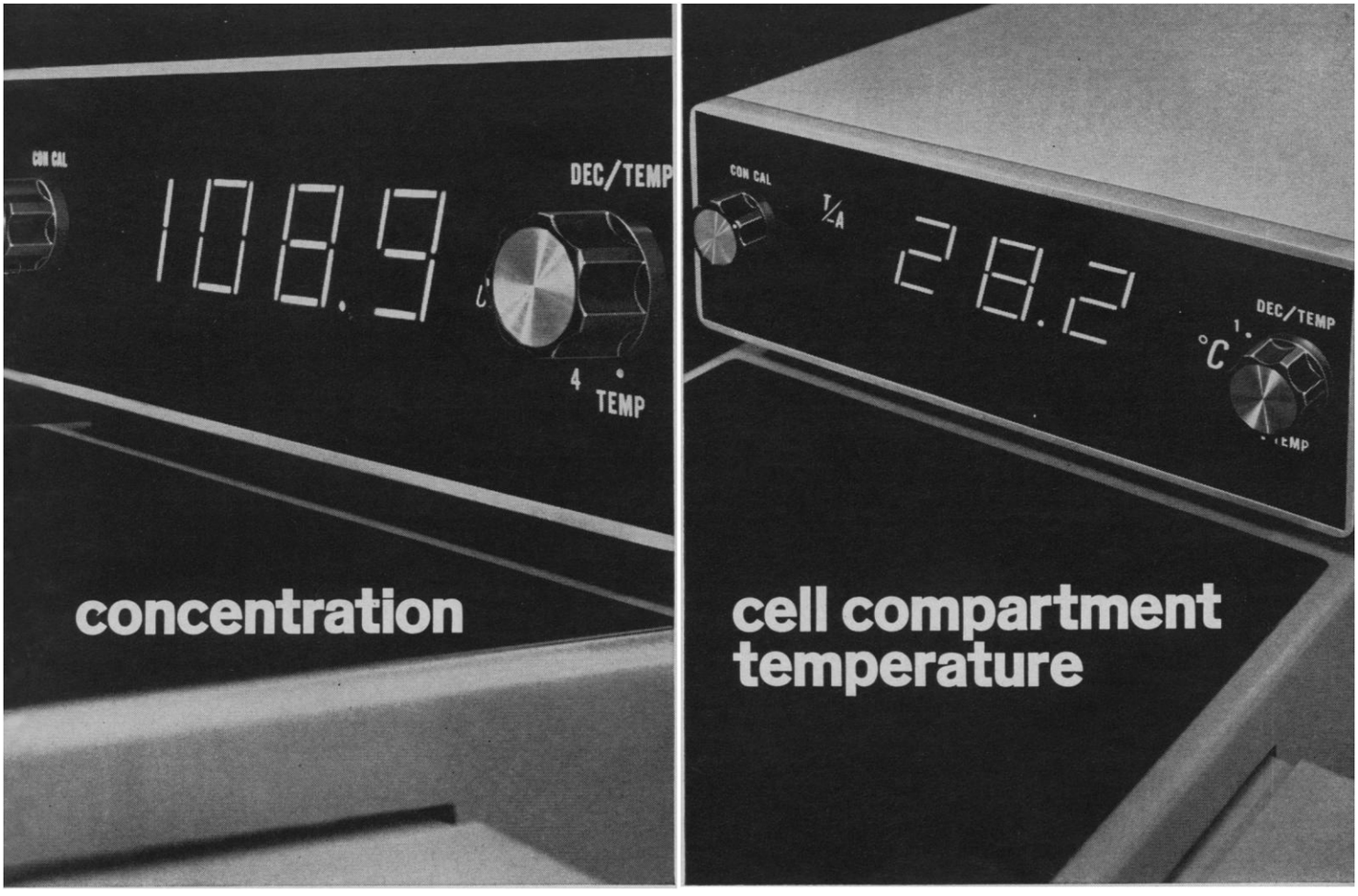




introducing the total information spectrophotometer

Coleman
Model 46



new, direct digital presentation spectrophotometer opens new areas of analytical information

TOTAL INFORMATION

Combining proven optics with the most recent advances in solid-state electronics, Coleman Model 46 is the modern TOTAL INFORMATION spectrophotometer. Highly visible, 7-bar electronic digital display presents transmittance, linear absorbance or concentration over the entire spectral range of 195 to 800 nm. A new photodetector, especially selected for wide range, high sensitivity, and low noise levels, eliminates problems of marginal response at either end of the spectrum. Cell compartment temperature is continuously monitored and displayed at the turn of a switch.

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Operation in all modes is straightforward. Simply turning the selector changes modes from %T to A with exact correlation. In the concentration mode, a sample of known concentration value is inserted and the value is set with the concentration calibration control. Unknown samples from 0.000 to 1999 may then be read directly on the digital presentation. Readings are exact, eliminating charts or mathematical conversion; this makes the Model 46 ideal for routine as well as research laboratory use.

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For detailed application data and specs, request Bulletin H20E. For information on analyticals which are less exotically applied, write for our general analytical balance Catalog M-1023.

TITRATIONS THE EASY "WEIGH"

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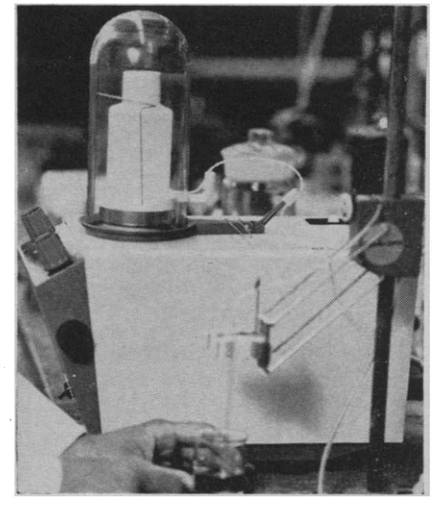

The DP11 is a joy to use. Simply place the burette containing the titrant on the balance pan and carry out your titration. The quantity of titrant you dispense by a remotely controlled pinch valve is continuously displayed on the digital readout panel of the balance.

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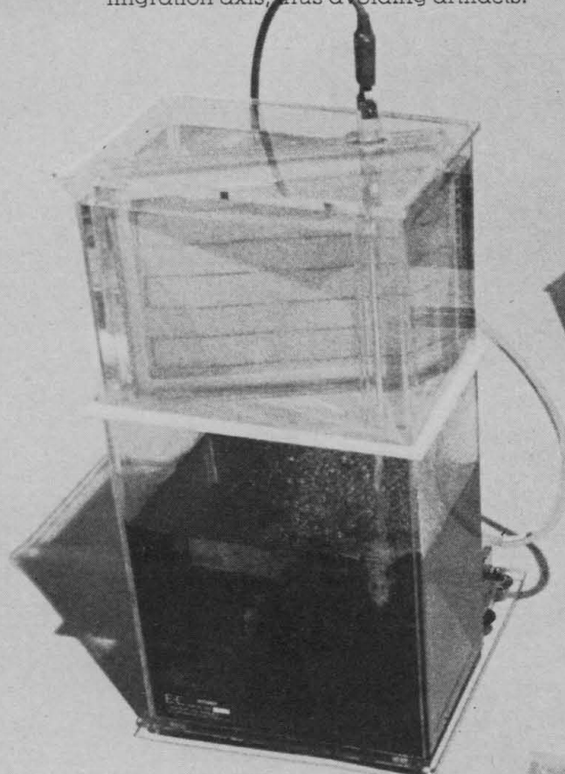

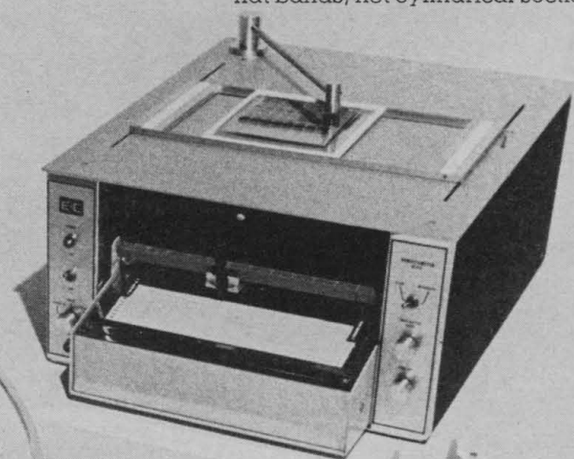

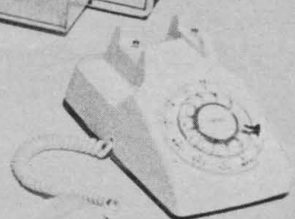

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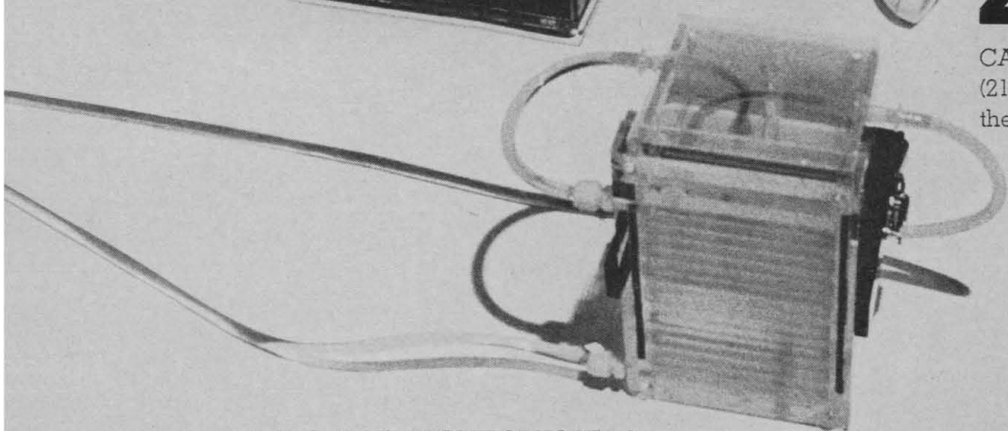

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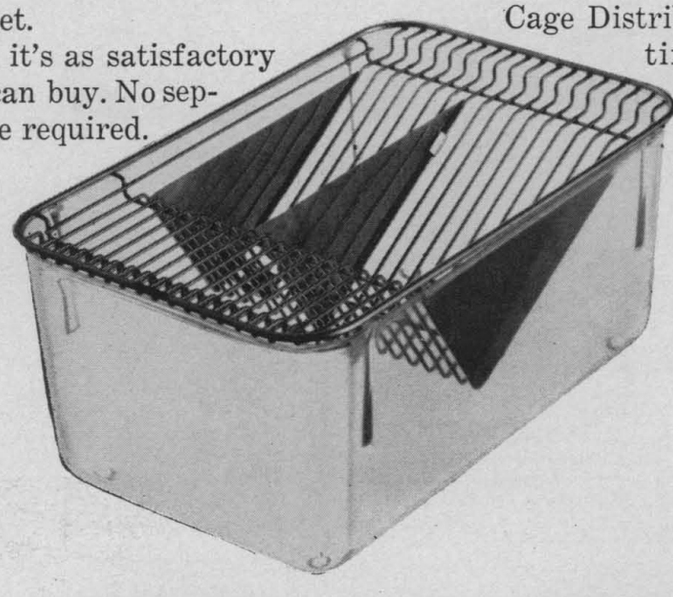

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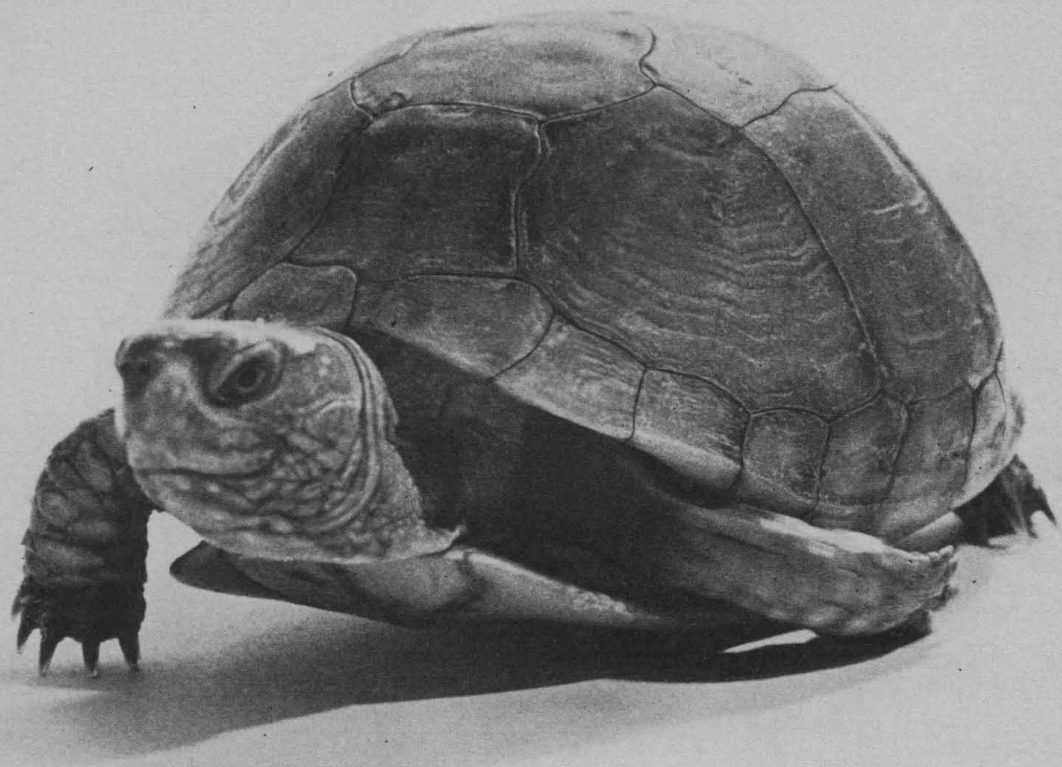

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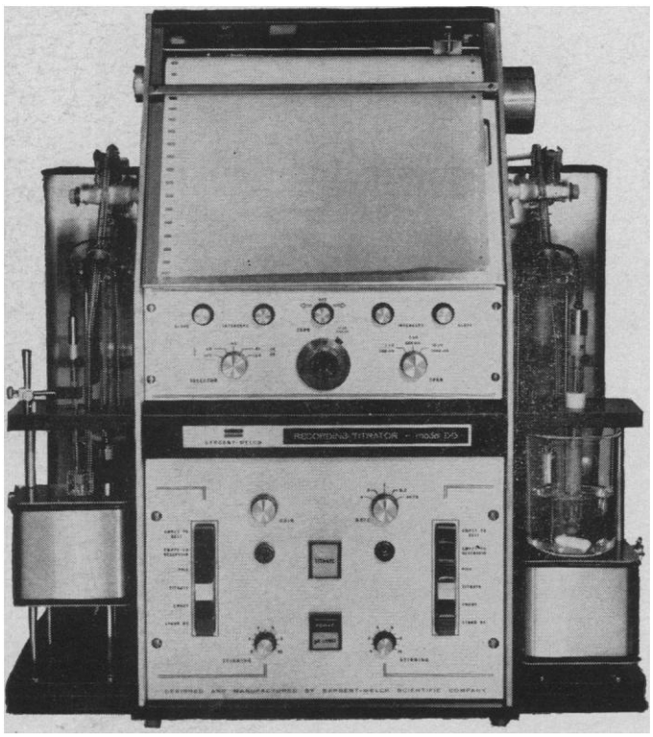

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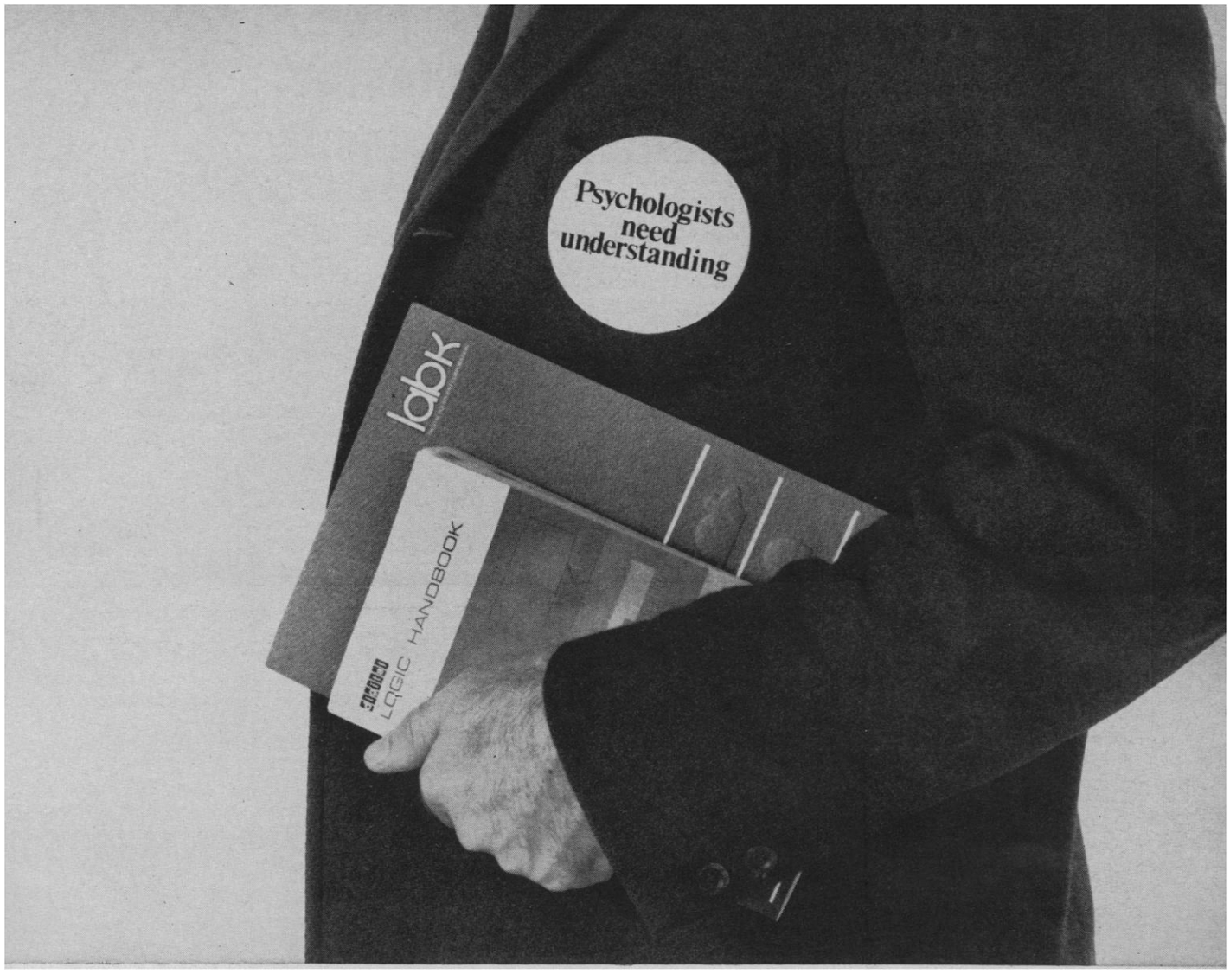

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Neurobiology of Cerebellar Evolution and Development

First International Symposium of the Institute for Biomedical Research

Edited by R. Llinás, M.D., Ph.D.

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Comparative aspects of cerebellar morphology—E. C. CROSBY.

Physiological and morphological organization of the cerebellar circuits in various vertebrates—R. LLINÁS and D. E. HILLMAN.

SECTION II / FISH

General morphology of the fish cerebellum—H. N. SCHNITZLEIN and J. R. FAUCETTE.

A survey of the general morphology, the fiber connections, and the possible functional significance of the gigantocerebellum of mormyrid fishes—R. NIEUWENHUYS and C. NICHOLSON.

Aspects of the histology of the cerebellum of mormyrid fishes—R. NIEUWENHUYS and C. NICHOLSON.

Fine structural studies of the cerebellar cortex in a mormyrid fish—I. R. KAISERMAN-ABRAMOF and S. L. PALAY.

Influence of electric organ control system on electrosensory afferent pathways in mormyrids—M. V. L. BENNETT and A. B. STEINBACH.

Neural elements of the cerebellum in elasmobranch fishes: Structural and functional characteristics—C. NICHOLSON, R. LLINÁS and W. PRECHT.

Electrophysiological studies on parallel fibers of the corpus cerebelli of the dogfish *Scyliorhinus canicula*—D. H. PAUL.

Electrophysiological study of cerebellar nucleus neurones in the dogfish *Mustelus canis*—N. TSUKAHARA.

Cerebellar and vestibular control of fish oculomotor neurones—Y. KIDOKORO.

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Spontaneous and evoked discharges of cerebellar Purkinje cells in the frog—A. C. NACIMIENTO.

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Cerebellar organization in the light of cerebellar nuclear morphology and cerebellar corticogenesis—H. K. KORNELIUSSEN.

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Synaptic organization of the mammalian cerebellum—K. UCHIZONO.

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Some aspects of the ontophylogenesis of the cerebellum—L. B. VERBITSKAYA.

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On cerebellar evolution and organization from the point of view of a morphologist—J. JANSEN

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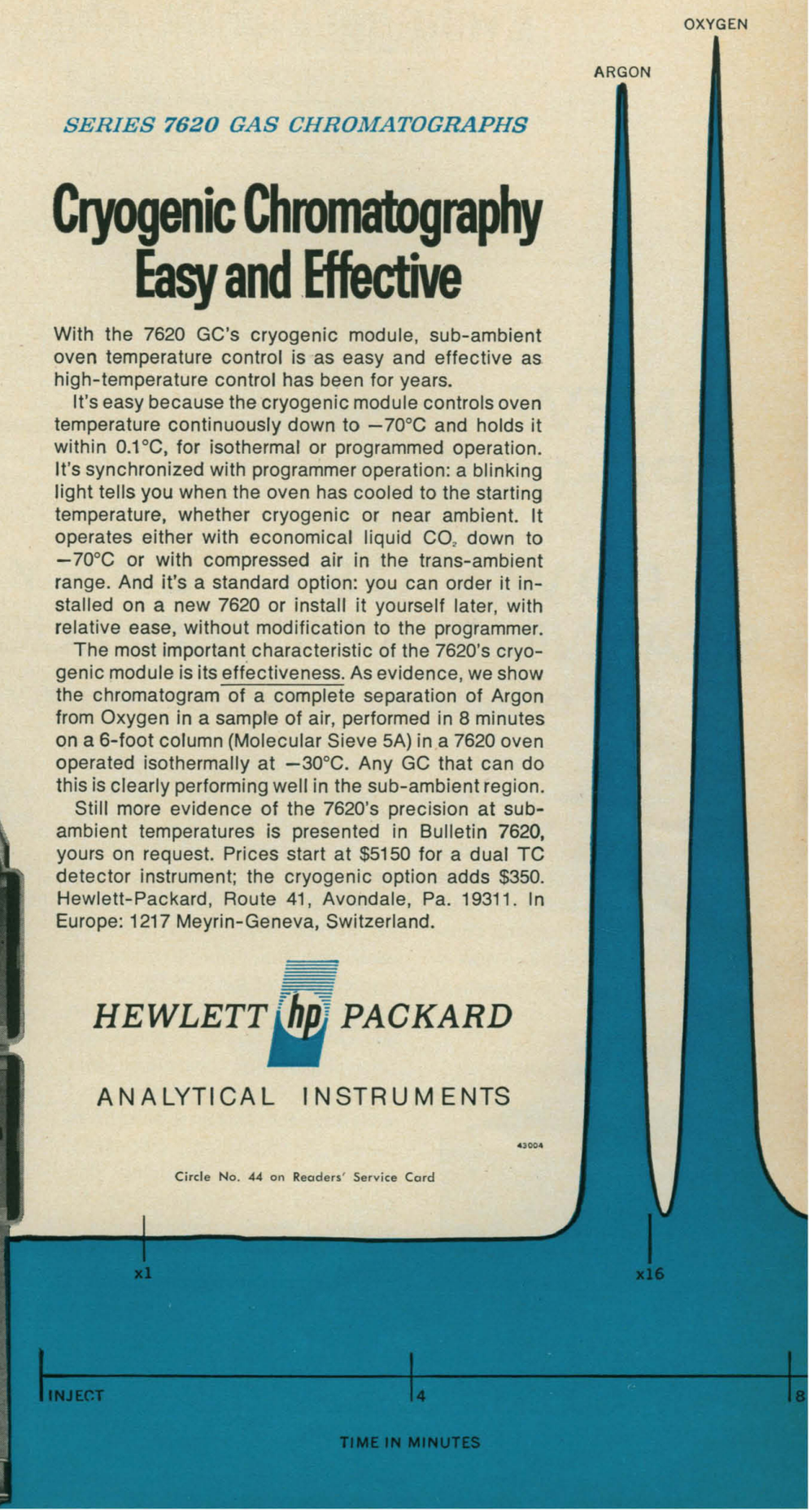

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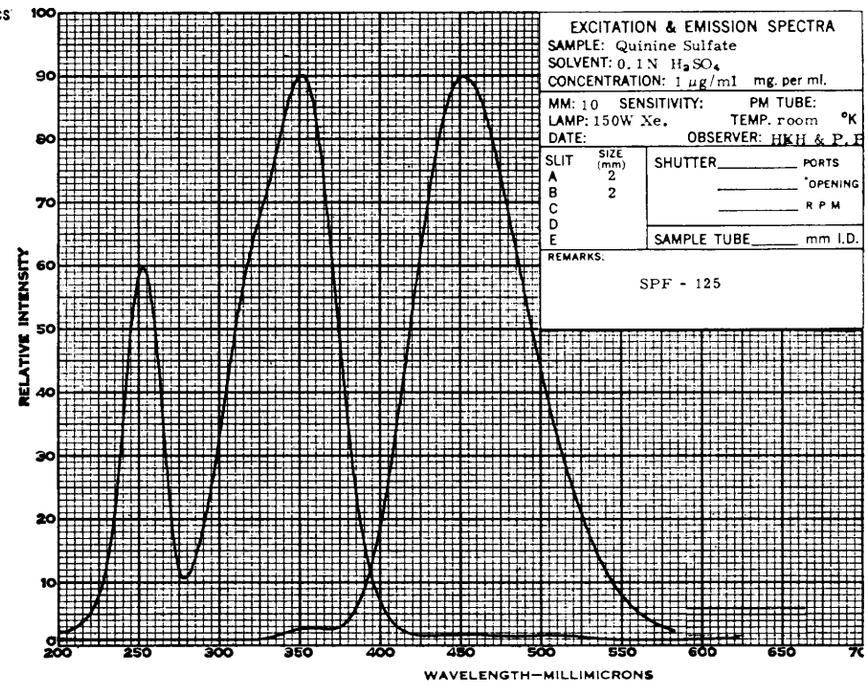

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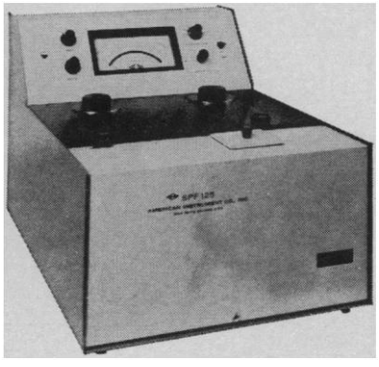

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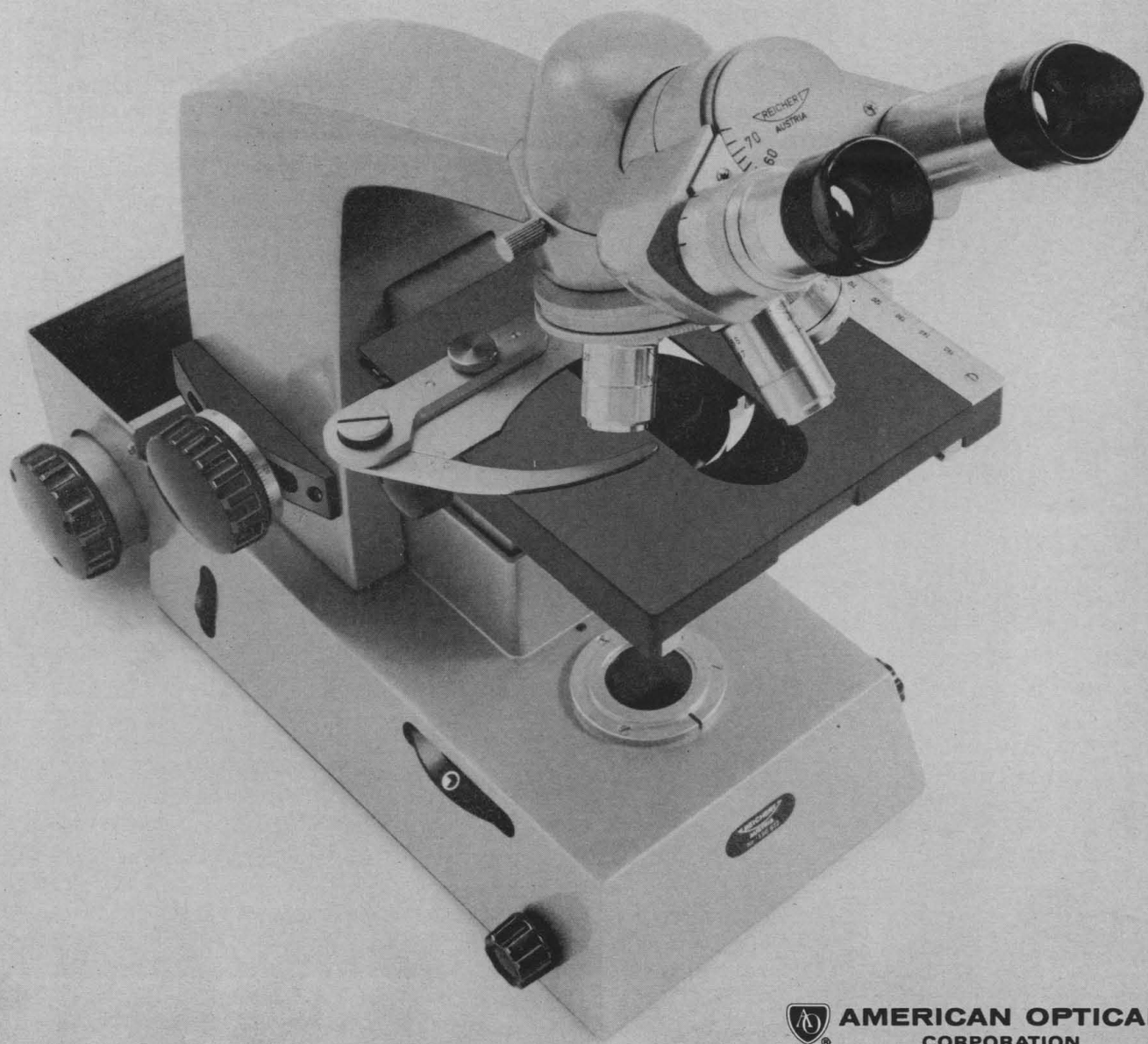

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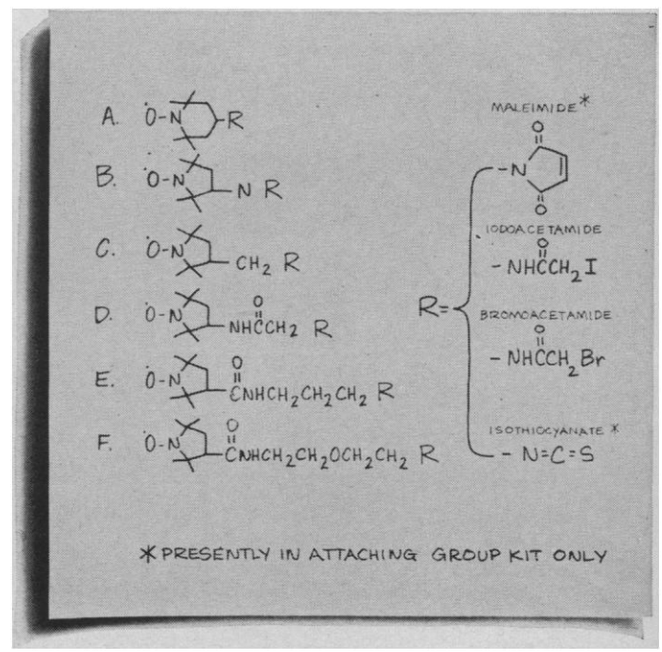

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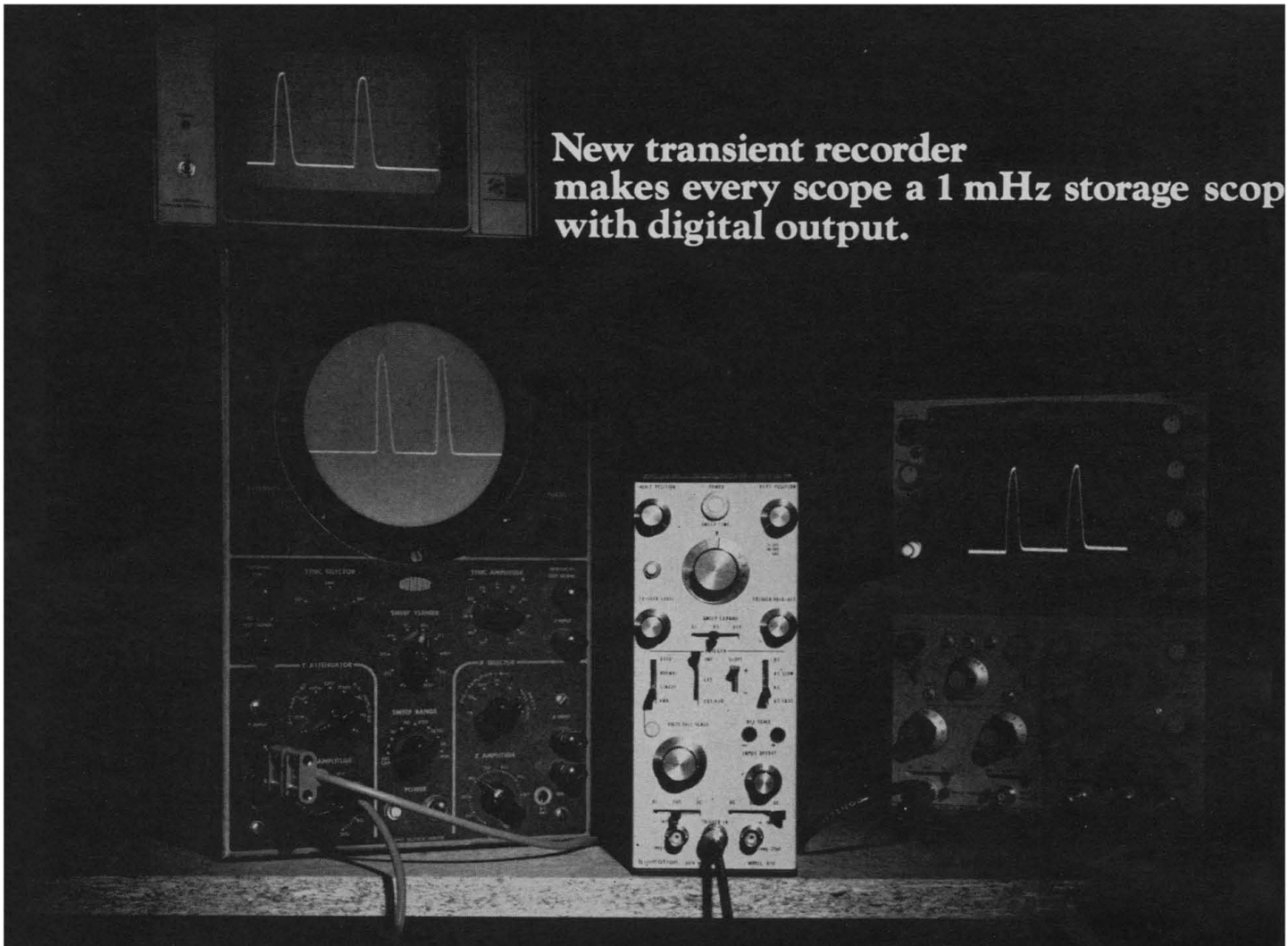

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Applications include observing and recording single shot or repetitive signals wherever they occur in Electronics, Physics, Chemistry, and Life Sciences As a computer peripheral unit, the 610 combines a very high speed ADC with a buffer memory to allow data gathering at very high rates with asynchronous transfer to a computer.

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Continuous-flow zonal ultracentrifugation: A beautiful technique awaiting a practical, non-temperamental research instrument.

(Wait no more: you're looking at it.)

Background
Continuous-flow zonal ultracentrifugation was a major development of Dr. N. G. Anderson and co-workers in the AEC-NIH Molecular Anatomy Program at Oak Ridge National Laboratory. And because this technique combined high resolution, high capacity, and high practicality, a production-scale centrifuge is now being used by major pharmaceutical companies for the production purification of influenza virus vaccine. The high resolution of this device is now providing vaccine up to 10X purer than any previously available commercially. (Electro-Nucleonics, Inc., is the only company making this ultracentrifuge—the Model K —available commercially.)

Now announcing the Model RK: the research and pilot-plant version of the Model K.
The high capacity of the Model K is beyond the requirements of many research and pilot-plant applications. The obvious need, then, has been for a simple, non-temperamental continuous-flow zonal ultracentrifuge as dependable and versatile as the production-oriented Model K, but designed for the smaller volumes of material typical of the research laboratory and the pilot plant. Enter the Model RK.

The Model RK
Oversimplifying somewhat: the Model RK is a smaller Model K. Accordingly, it too features continuous flow capability over the entire speed range. And, most importantly, the design, engineering, and construction aspects of the Model K—the elements responsible for its simplicity and dependability—are retained by the RK. Example: the RK has the K's unique single-pass rotating seal design and operates to 60,000 RPM completely eliminating fussing with complex temperamental demountable seal systems for loading and unloading the rotor.

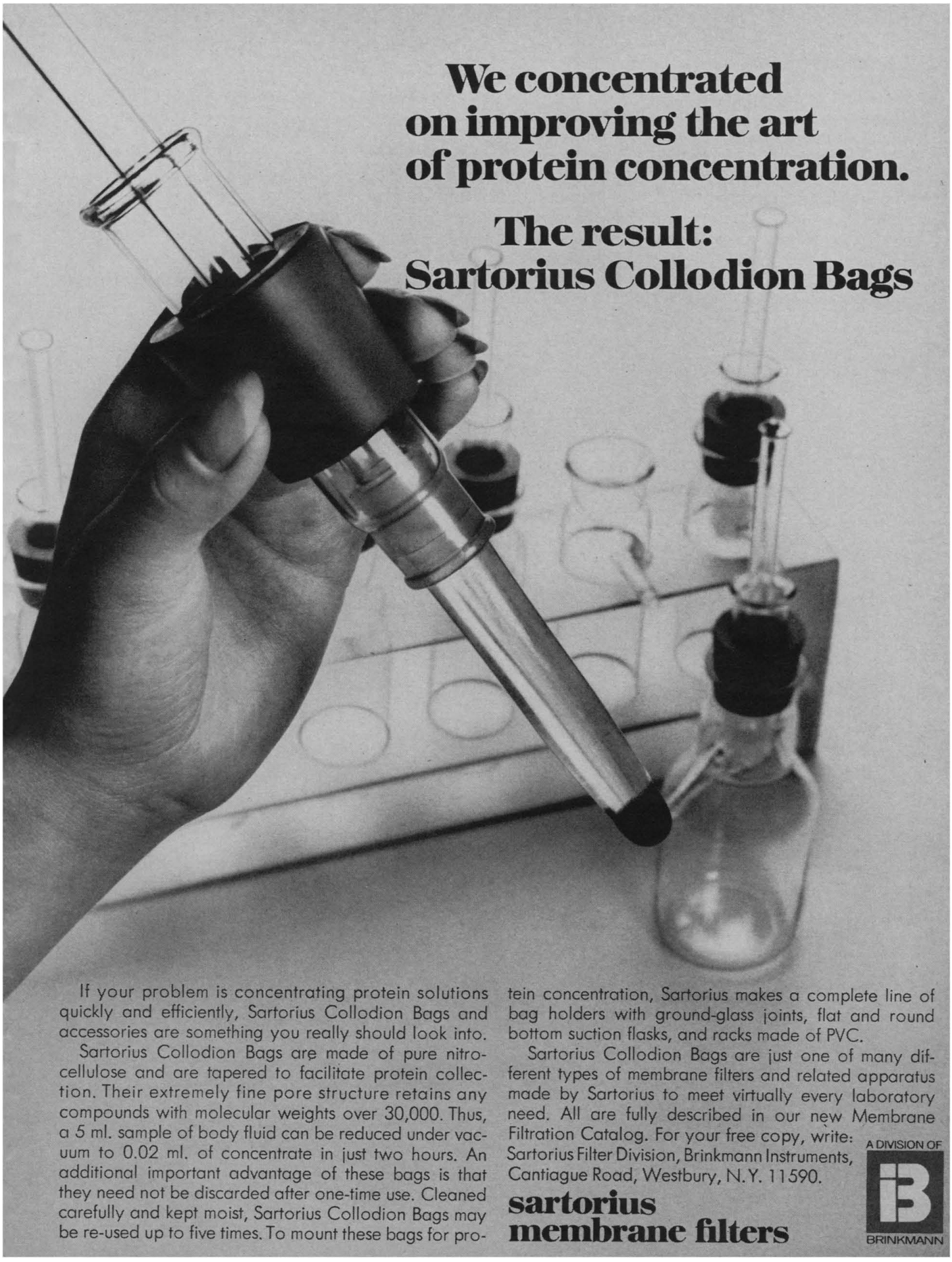
Now specifications, briefly. The currently available aluminum and titanium RK rotors provide speeds of 35,000 RPM and gravitational forces in excess of 90,000 g. (Subsequent rotors—fully compatible with the RK system—will provide even higher gravitational fields at the RK's full speed of 60,000 RPM.) The RK rotor volume is typically 1.7 liters and the sample flow rate may be 500 ml/min or higher.

The RK is a safety-oriented instrument with a monitoring system which constantly scans the critical operating conditions and forecasts problem areas in sufficient time to correct them. Result: the RK monitoring system protects both your run *and* your instrument.

Applications of continuous-flow zonal ultracentrifugation
This technique has been most effectively used to isolate viruses, bacteria, mitochondria, polysomes, ribosomes, ribosomal subunits, macroglobulins, microsomes, and other sub-cellular particles. It has wide application wherever high-resolution separation of such components is desired. (For background information see: "The Development of Zonal Centrifuges and Ancillary Systems for Tissue Fractionation and Analysis," National Cancer Institute Monograph 21, GPO, Washington, D.C. 20402. $4.75)

For further details
We'll be happy to send further information on the new Model RK and/or the production-scaled Model K. Write Tom Guerin (or call collect 201-227-6700), Electro-Nucleonics, Inc., Fairfield, New Jersey 07006.

ELECTRO-NUCLEONICS



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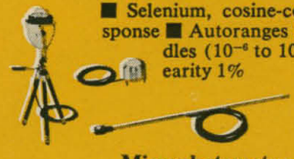

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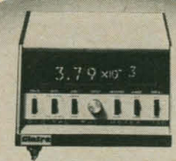

Model 150 Digital Photometer

■ Measures footcandles and footlamberts ■ Digital readout ■ 0.1% long term stability ■ Seven decade autoranging ■ Reliable silicon IC design ■ "Sample and Hold" remote programming ■ Precalibrated plug-in probes and wide range of accessories ■ Binary coded decimal and analog outputs for printer, recorder, etc.

Make true visible photometric measurements with this versatile plug-in digital photometer even in the presence of considerable non-visible radiation. Instrument parameters are permanently set to within 0.1%. Select any precalibrated probe shown, plug it in and read directly in absolute units.

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Photometric Plug-In Probes

Probes with Standard Observer CIE photopic response – both with and without cosine correction –are precalibrated to measure directly in units of footcandles, footlamberts and lumens traceable to NBS. Special calibrations for other units are available. Different probes automatically compensate for specific measurement conditions. Fast accurate "brightness" measurements of lamps, light emitting diodes, instrument panels, CRT displays, streetlighting levels, lasers and other light sources become simple routines. Match the probe to your application and measure with confidence.

Photometric Photomultiplier Probe, 5686

■ Ultra sensitive photometric measurements – 10^{-11} to 10^{-1} footcandles[1] ■ CIE photopic response–fast AC output–interchangeable filter compartment ■ Adjustable iris–1⅜″ maximum aperture ■ Ultra low current operation assures 1% linearity – low hysteresis – magnetic shielding ■ Repeatability 2% per hour, 5% per month

Price 5686 (S-20 corrected) $920.00

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■ Ultra high resolution – measures the difference between two 25 watt lamps one foot apart and a mile away ■ Selectable field of view – focal plane iris ■ Resolves 10^{-10} footcandles – 3½″ diameter front surface optics ■ Includes: telescope, Model 5586 PM probe (CIE response) and Model 100 PM power supply

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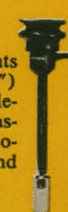
4 π Emission Adapter, 3000

■ Ellipsoidal reflective collector has 10 to 100 times the sensitivity of an integrating sphere ■ Measures total hemispherical or spherical candlepower from small sources ■ Useable with interchangeable filters ■ can be ordered calibrated with Model 5396 or most other CINTRA probes

Price (without probe) $250.00

Contact Microphotometer, 3002



■ Fast accurate "see and scan" surface measurements ■ Resolves 10^{-3} footlamberts from 0.005″ (or 0.010″) diameter sources ■ Built-in superimposed Rotatable-scale reticle shows source dimensions in mils ■ Measures emitted or reflected light ■ Includes microphotometer adapter, Model 5686 PM probe, light pipe and Model 100 PM power supply

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■ Permits operation of up to four different CINTRA probes with a single Model 150 photometer ■ Probe readout is sequenced either automatically, manually or by external triggering ■ Direct readout in absolute units on all probes ■ Gain corrections for filters, lenses, etc. can be made on one channel

Price $490.00

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■ Enables "sample and hold" measurements of single pulses in total footcandle-seconds ■ Measures nanosecond to millisecond pulses with most CINTRA probes for pulses typically below 10^7 footcandles peak[3] ■ Can be triggered externally or can trigger an external source

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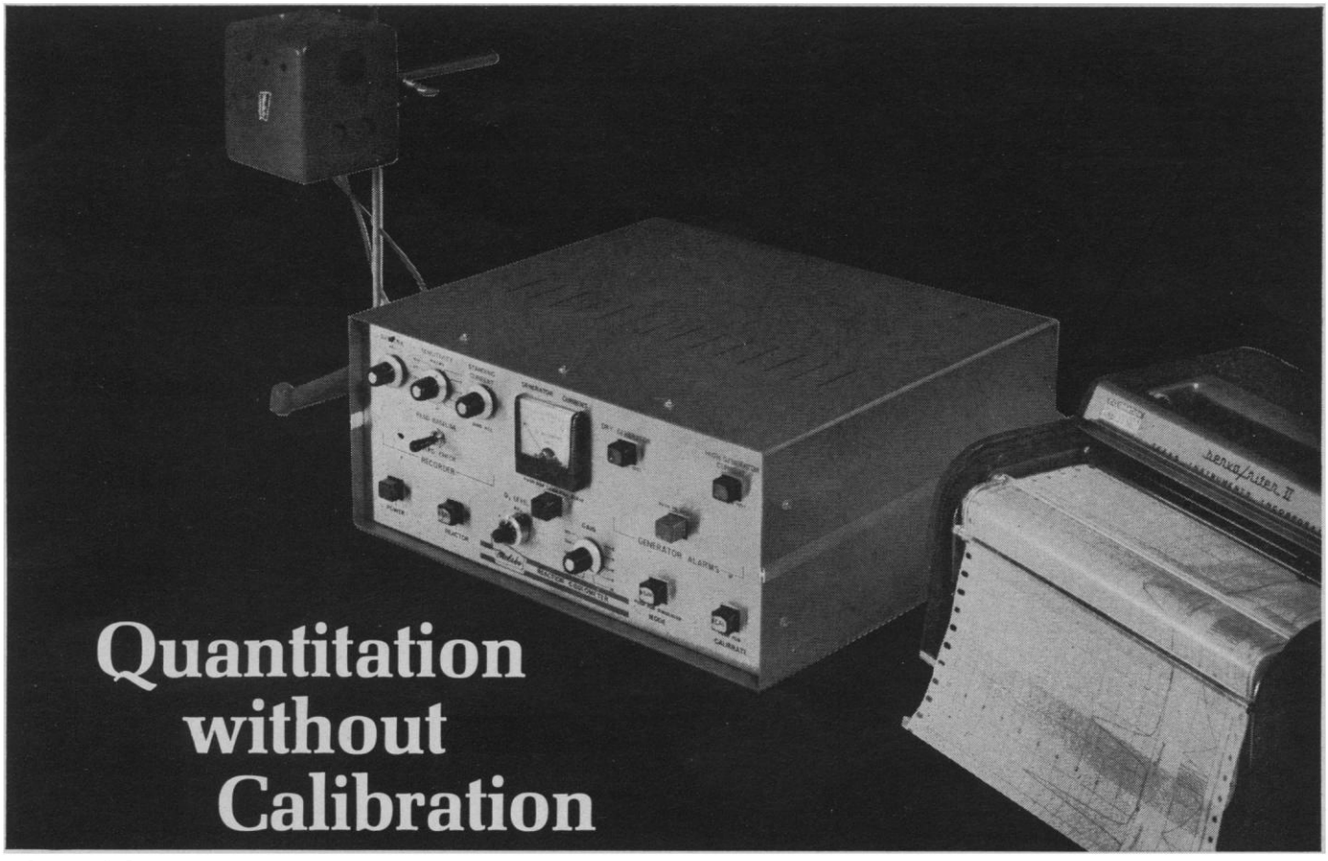

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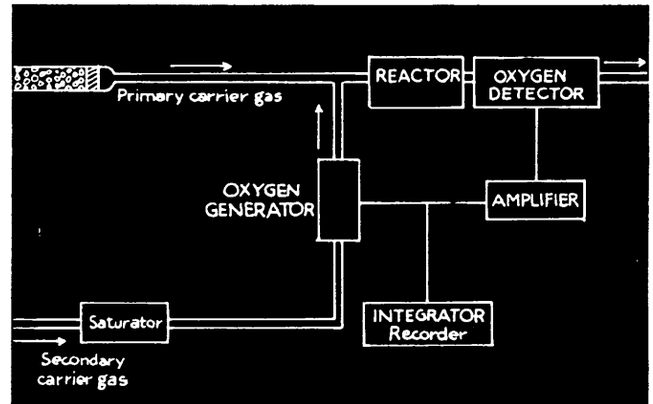
[1]Burton, G., Littlewood, A.B., and Wiseman, W. A., "A Sensitive Quantitative Detector for Gas Chromatography using Electrochemical Measurement of Oxygen." **Gas Chromatography 1966,** *Proceedings of the 6th Int'l. Symposium on Gas Chromatography and Associated Techniques,* Rome, Sept., 1966, pp 193-207, Institute of Petroleum, London, 1967, Elsevier, Amsterdam (agent).



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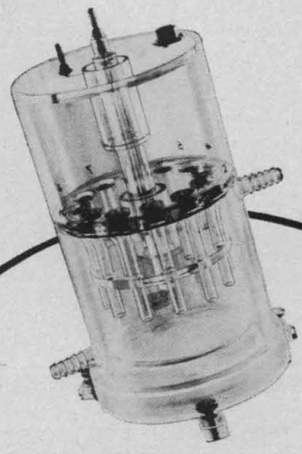

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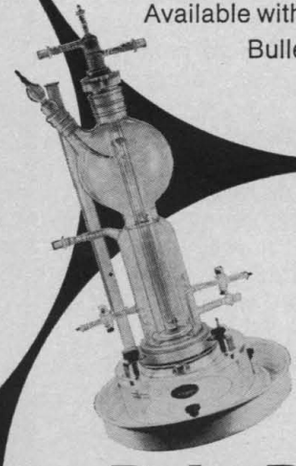

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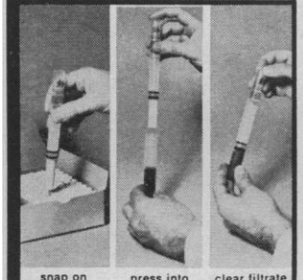

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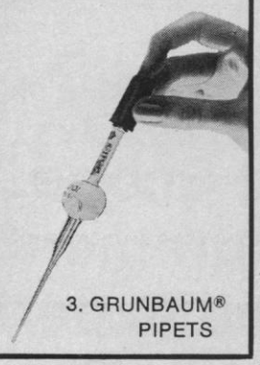

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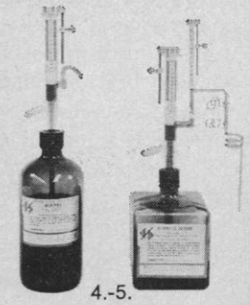

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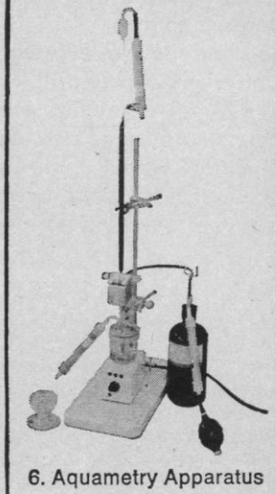
4.-5. Automatic REPIPETS® and Dilutors. These unique instruments pipet, dilute and dispense with a *guaranteed* accuracy of 1% and a reproducibility of 0.1%. **PYREX® L/I REPIPETS** and Dilutors are of one-piece fused glass construction with no connections—eliminating any chance for leaks. L/I's instruments fit directly on your reagent bottles, ½ ounce and larger. Any reagent can be handled. All amber instruments are supplied for your labile reagents. Use L/I **LAMBDA-DIALS®** to increase precision to 1% at 10 lambdas! L/I stocks **REPIPETS** and Dilutors in ½, 1, 5, 10, 20, and 50 ml sizes, each adjustable from zero to full capacity. Square amber liter bottles optional at N/C.

Prices: REPIPETS, $52.50; Dilutors, $99.50. Micro and Macro Teflon® tips included.



6. Aquametry Apparatus

6. Aquametry Apparatus. L/I's inexpensive Karl Fischer Aquametry Apparatus precisely determines water content of most materials in 4 minutes (1 ppm to 100% water). L/I's versatile apparatus uses the original stock K-F reagent bottle as a reservoir. The "reaction vessel" is an ordinary 4 oz., commonly available, disposable "cream" jar. It is interchangeable with a micro-reaction vessel requiring less than 2 cc total reaction volume for micro-aquametry applications.

No false end points are possible with L/I's color-coded meter indicator. A two-lambda excess of K-F reagent in a 100 ml reaction volume is detectable. The apparatus includes a 1 and 25 ml dual buret with .01 ml divisions in the micro range for high accuracy.

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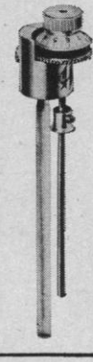

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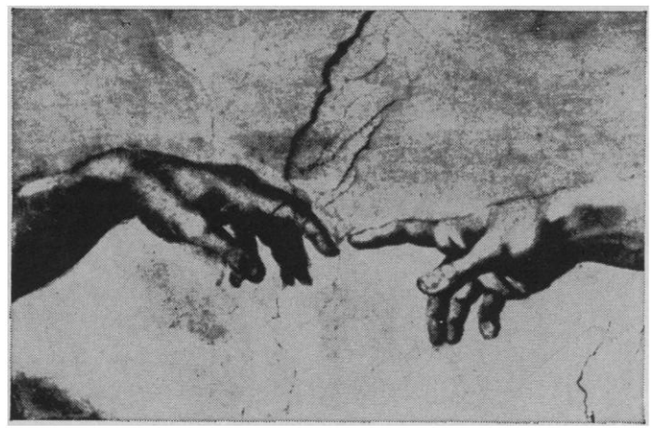

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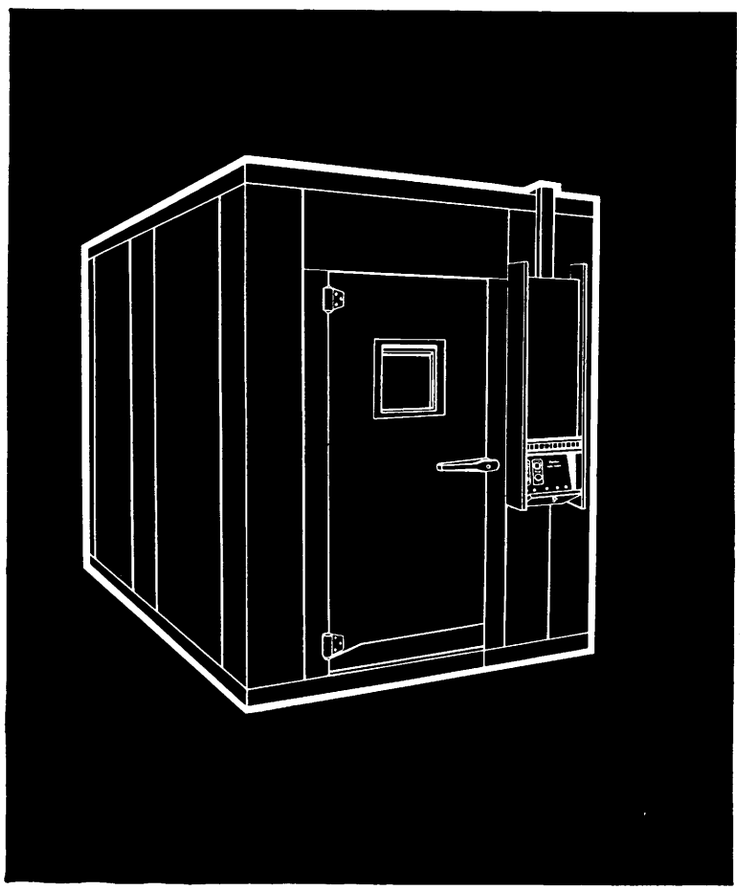

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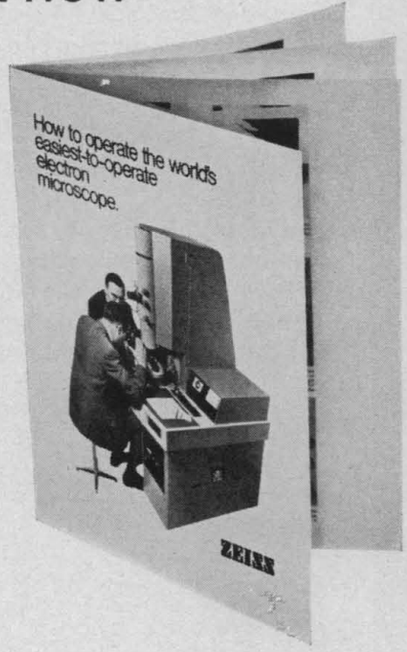

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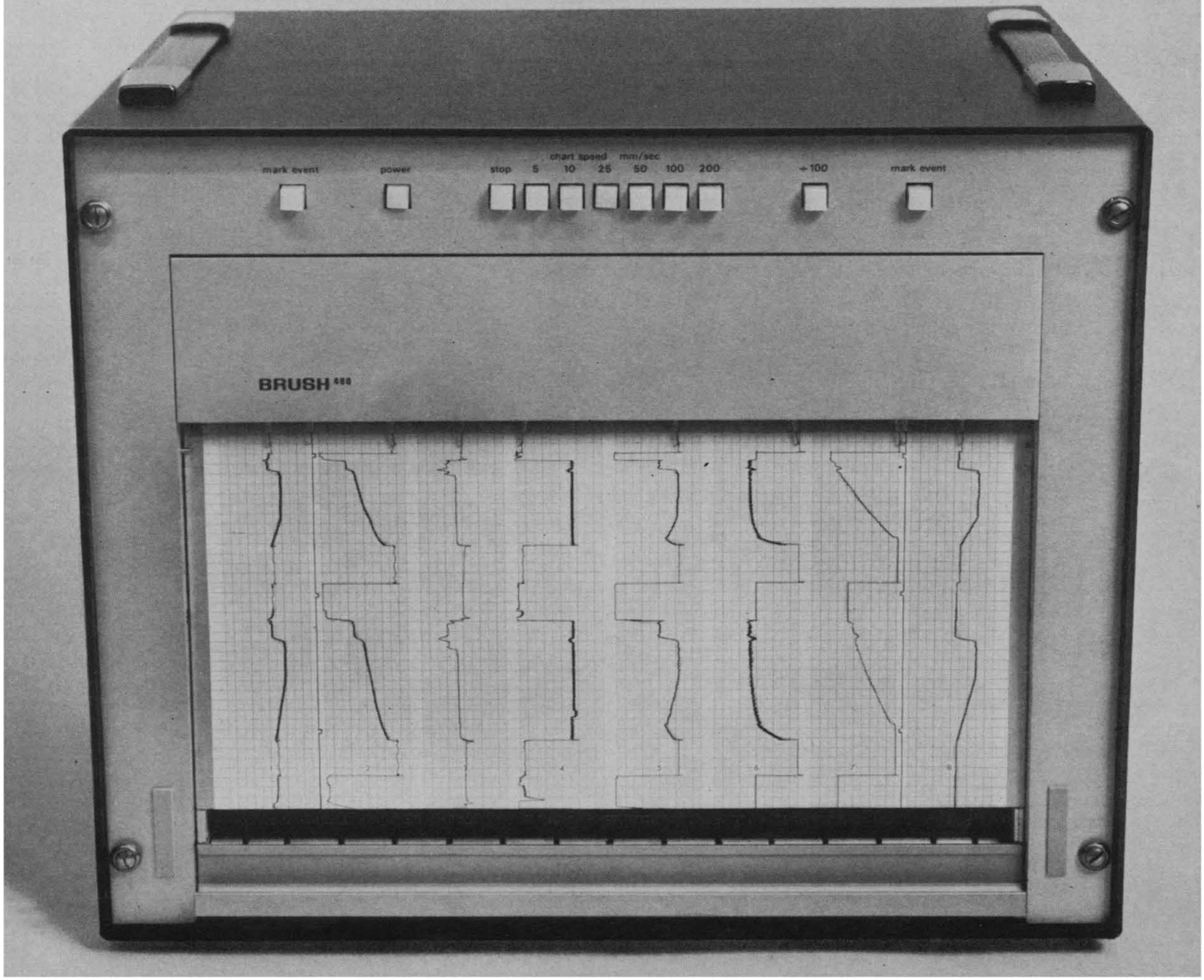

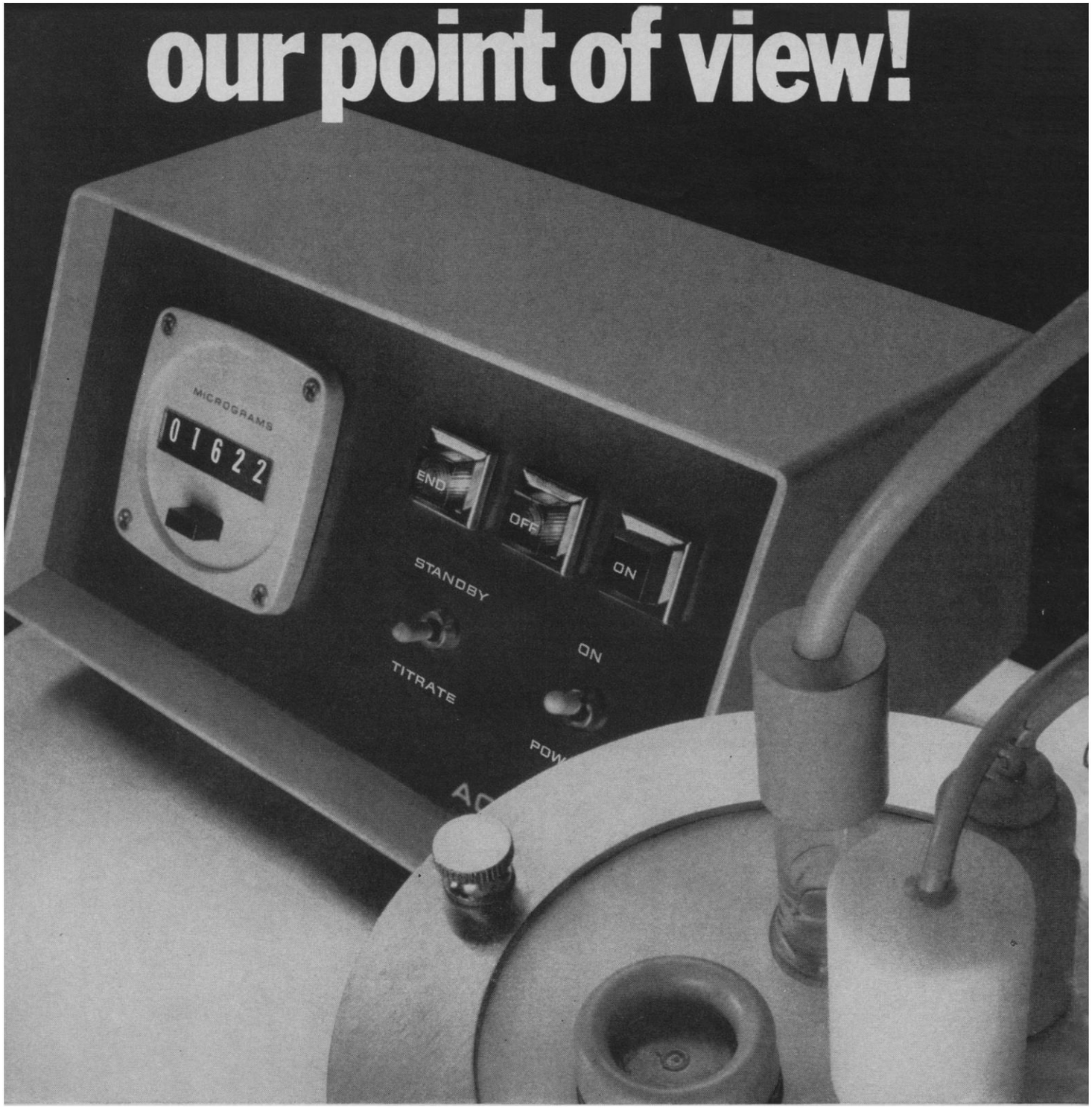

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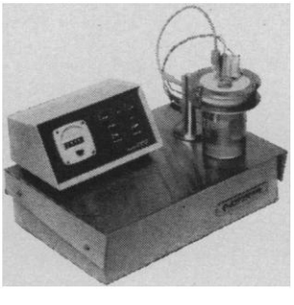

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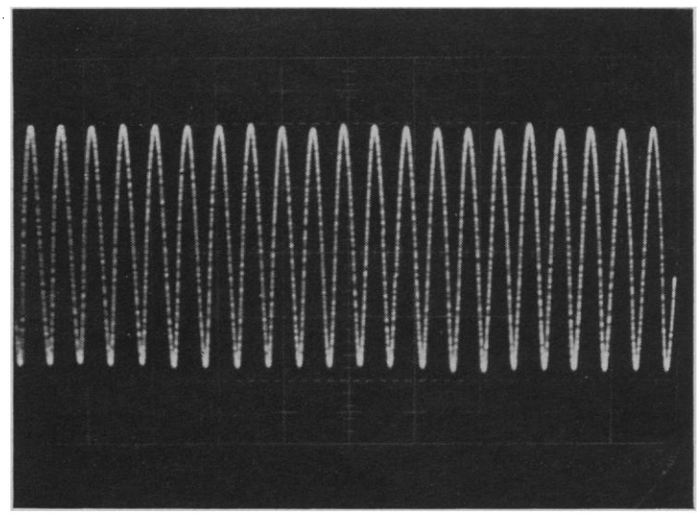

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The photographic record illustrates exceptional precision for scanning electrophoresis gels in either the UV or VIS, using the new Gilford Model 2410-S Linear Transport.

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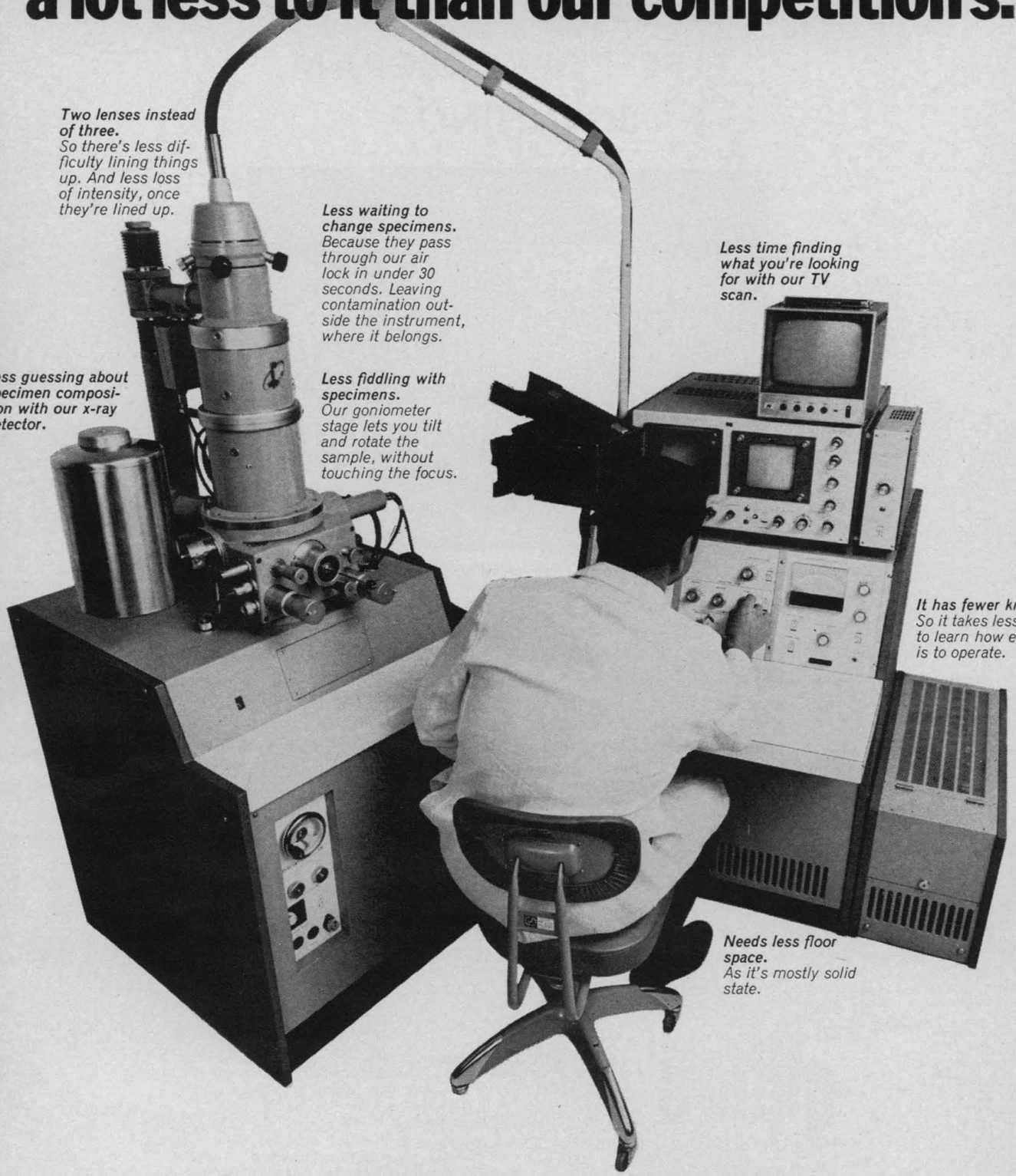

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So it takes less time to learn how easy it is to operate.

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Grammarians assure us that something is either round or it is not, not more nor less. But what is so in the world of grammar may not be necessarily so in the world of dynamics. Take an ordinary automobile tire for example. At rest it may look round, measure round, and, indeed be round. But at 60 MPH, it is subject to enormous stresses of centrifugal force as 87.5 feet of tread-face whip past a given point in a second's time. How now, round tire? How round? How imbalanced? The time to answer these fair and important questions is not after the fact but during the manufacture. And that is just what a solid-state control system engineered by EAI is doing daily for a number of tire manufacturers. Result: a superior product with a much lower reject rate, a faster manufacturing cycle, and added peace of mind for grammarians and others travelling at 60 MPH.

If you're concerned with making things that must maintain their geometry under dynamic as well as static conditions you'd be well advised to see what we have for you. Write and request "Tire", Dept. 206E. Please mention what you want to measure and control, too.

GC PEAKS AND THE SOFTWARE DEMON

As with motherhood and the flag, consensus holds that computerized data reduction is with us to stay. But, in practice, it all gets a bit hairy. Take data from an analytical instrument like a GC. A few giants in the industry continue to stumble over problems in GC like noise, signal processing, or really useful software. EAI is still the pioneer here in its PACE III analytical data system. One seemingly small thing is a software technique for resolving complex GC peaks. It consistently and accurately apportions complex areas, ranging from overlapping components to poorly resolved shoulder peaks. Part of the technique accommodates the usual "skew" in component elution to give consistent improvement in accuracy of quantitative analysis. (Our research people gave a paper on it at the 158th National ACS meeting.) It's all part of the whole PACE III system--a turnkey data system for many analytical instruments--GC, mass spec, and the like.

For a copy of the paper and a detailed booklet on PACE III write to Dept. 206E.

IMITATION POLLUTION CAN BE A SOLUTION

A topic destined to polarize the citizenry these days is pollution--any kind of pollution. Take a simple thing like free oxygen in water. Overload the water with oxygen-hungry chemicals--no oxygen. Or develop too many organisms--plant life prospers (called eutrophication) and no oxygen. Either way, no fish. And with no fish, you've upset the water ecology. Pragmatic scrutiny tells us we can't shut down our industries to bring back pristine, airy waters. Fortunately, we can imitate these conditions by computer simulation, and get a grip on the ameliorative aspects of a solution.

Recently, EAI provided the HEW with a hybrid-computer simulation of the Delaware River Estuary. From this simulation engineers can tell where to best locate stand-by reservoirs, what flow rates to employ, and when to do it. We've written this one up. A request to "Delaware", Dept. 206E. will get you a copy, and get us both cracking on another solution.

KINETIC DATA MEANINGFULLY SHAPED BY COMPUTER

In olden times petrochemical process design involved finding rate and equilibrium constants for several reactions required a trial-and-error method. Much trial. Much error.

Most process designs involve the solution of ordinary differential equations --in a lumped-parameter system where changes are taking place in time but not space. With the use of analog computers, solutions poured forth. However, distributed parameter systems involve changes in time and space simultaneously--expressed by partial differential equations. Many approaches to PDE solution have evolved for digital computers. But such solutions consume more and more hardware, with ever-present error creeping back in as problem complexity increases.

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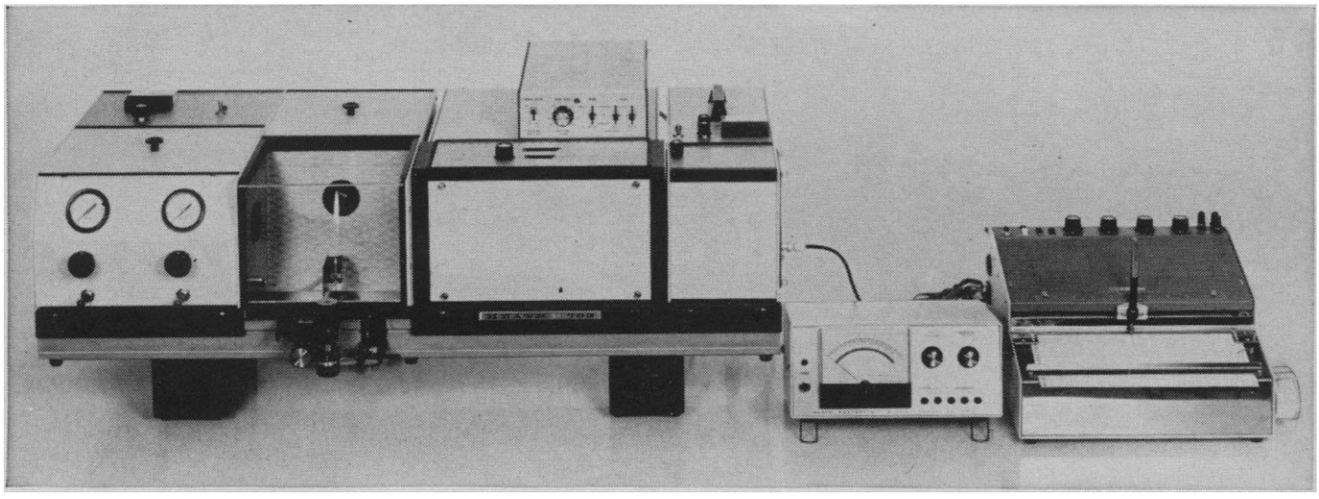

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EU-700 Monochromator . . . the widely accepted Heath "700" monochromator provides the very high resolution, wavelength accuracy, low scattered light, and versatile wavelength drive that make it ideal as the wavelength isolation device for atomic absorption, emission and fluorescence spectrophotometry. The wavelength scan is by a stepper motor that is adaptable to computer control. Fixed scan rates vary from 0.05 to 20 angstroms/sec. The scan rate is also programmable by an external signal generator.

EU-703-70 Flame Module. Mounted on the front panel of the Flame Module are the needle valves, gauges & controls for the burner system and quick shutoff controls for both fuel and oxidant. A total consumption burner is standard but the large flame compartment will accommodate virtually all types of total consumption and laminar flow burners with the brackets supplied. A precision micrometer adjustment system provides accurate and repeatable X-Y, Y-Z positioning of the flame for optimum performance. Four hollow-cathode lamps can be mounted in the precision rotating turret, and other lamps easily interchange. The hollow-cathode power supply provides optical stability to 0.1% and is designed to handle all high-intensity lamps and most multi-element types. A chopper is built-in for discrimination against background radiation.

EU-701-30 PM Module. One compartment in this module contains a very stable, programmable power supply with output adjustable from 150-1500 volts. The other compartment contains a highly sensitive 1P28A PM tube and shutter assembly. Other photomultiplier tubes can be interchanged for the 1P28A because of the versatile PM tube mounting system used.

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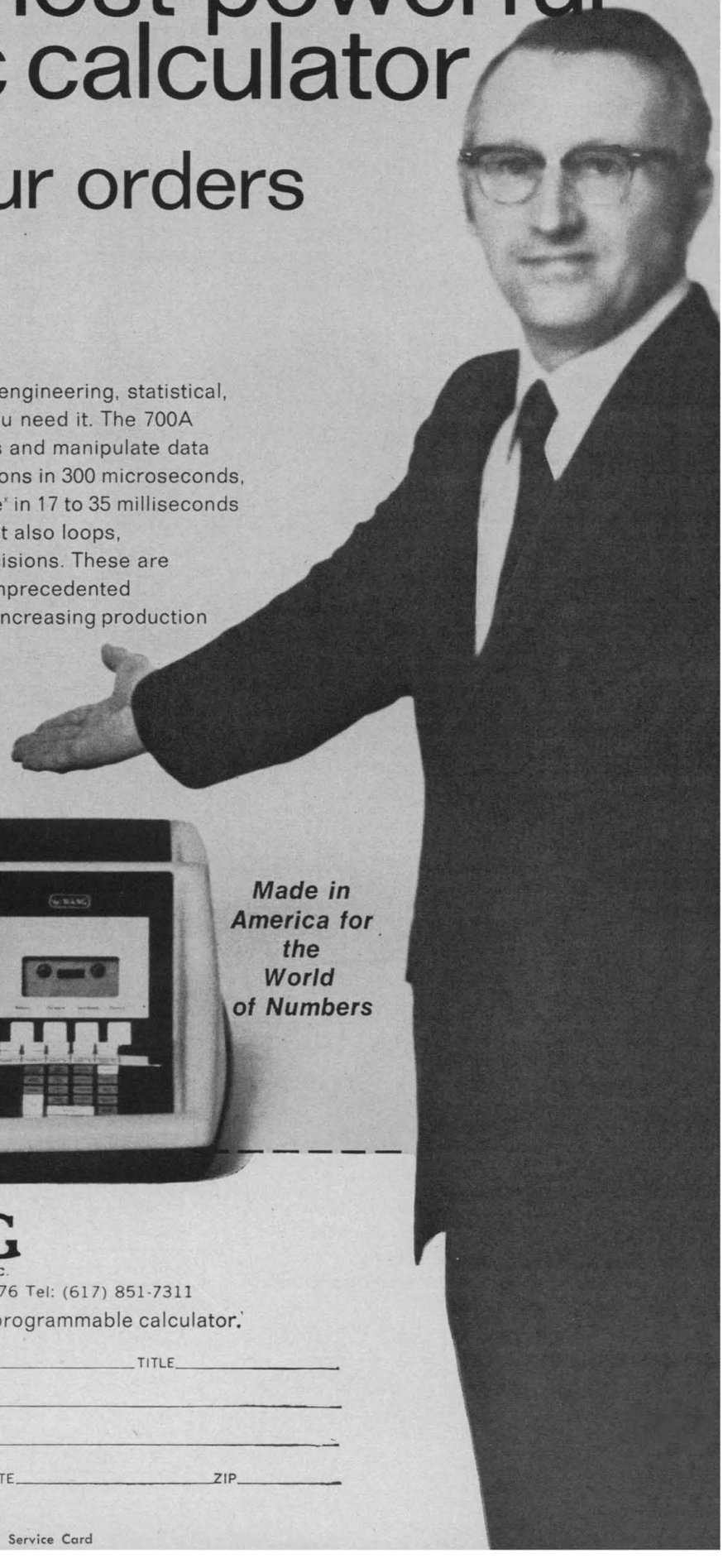

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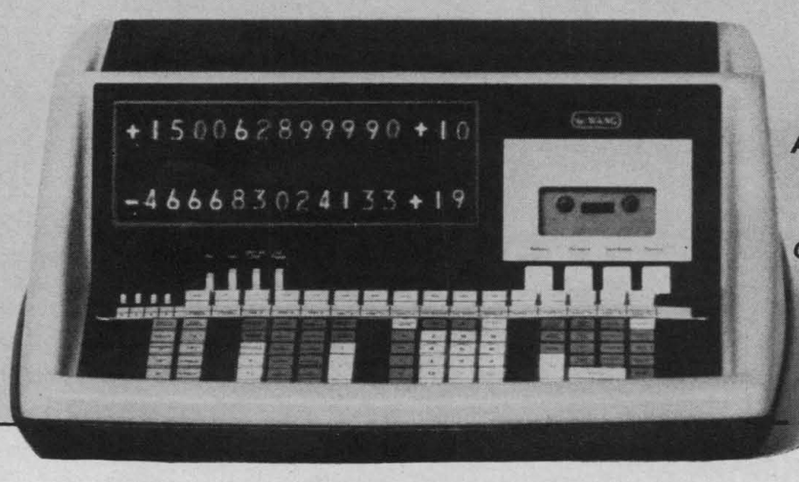

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admissions process itself: Some colleges employ such high standards of admissions that even the poorest performers do not "deserve" low grades. (A much better solution to this problem, it seems to me, would be for colleges to abandon the use of local, relative grading schemes and to employ comparable, absolute standards of performance.) In short, rather than obviating the need for evaluation, the use of an open or lottery system in admissions should create a need for more elaborate and improved methods of measuring the student's performance.

The surest way for colleges to avoid any responsibility for *educating* the student is to employ selective admissions: If only the brightest students are admitted at one end, then the high quality of the final product at the other end is virtually guaranteed. What happens in between—the quality of the educational experience itself—need not be of concern since the secondary schools are suitably impressed with the college's high admissions standards, and the employers and graduate schools are suitably impressed with the "high quality of the graduate."

My impression is that professors support selective admissions because they feel that bright kids are more fun (and easier?) to teach. Alumni, legislators, faculty, administrators, and probably many students support it because having only bright students enhances the prestige of the institution. Furthermore, the secondary schools support the track system that results from selective admissions because they see it as a reward or incentive system for motivating their students: "study hard so you can get into a 'good' college." While each of these arguments may have merit, none really has much to do with the *educational* mission of the college. If the principal function of the college is to educate, then the admissions process ought to be designed to sort the students so as to maximize their educational development. Currently, we are woefully ignorant as to how best to do this sorting. If nothing else, even a partial lottery would permit us as scientists to explore the possible advantages of many student-environment combinations other than those that result from current selective admissions policies.

ALEXANDER W. ASTIN
American Council on Education,
1 Dupont Circle,
Washington, D.C. 20036

Element 104: What's in a Name?

In regard to the reported hassle between Berkeley and Dubna physicists over the discovery and nomenclature of element 104 (5 Dec., p. 1254), it seems to me that the Berkeley group would have been wiser and more mature in suggesting that element 104's name remain kurchatovium, the Soviet choice, and in congratulating the Dubna group for *envisioning,* albeit mistily, the element and in turn allowing themselves to be congratulated for *proving the element's existence.*

Arguments over nomenclature are often children's arguments, colored with pettiness, jealousy, or politics. To solve the patronymics problem among the nuclear physicists, I would suggest that each reputable nuclear physics group around the world throw into a world hat the names of two persons deserving the honor of having an element named after them, have a supervised drawing (after eliminating duplicates), and thereby determine the name and the order of naming of any newly discovered element.

L. A. PAGE
National Animal Disease Laboratory,
U.S. Department of Agriculture,
Post Office Box 70, Ames, Iowa

Civil Defense

I wish to protest against the political tone of the review (28 Nov., p. 1131) of the book *Survival and the Bomb—Methods of Civil Defense.* As its title indicates, the book is mainly concerned with the possibilities and methods of civil defense, and these subjects—the ones which justify the review of the book in *Science*—are dealt with very cursorily by the reviewer. As a matter of fact, he disclaims being an expert on them. Instead, the reviewer devotes more than half his discussion to the first chapter, dealing with the rationale of civil defense. The purpose of the review seems to be to demolish the conclusions of this chapter.

It would be inappropriate to attempt, in *Science*, a detailed refutation of the reviewer's objections to the first chapter (written by the undersigned). I may be permitted, though, to make two points, the first general and the second specific. The first point is that practically all of the reviewer's objections to civil defense apply equally well to all defense measures. In fact, if we listen

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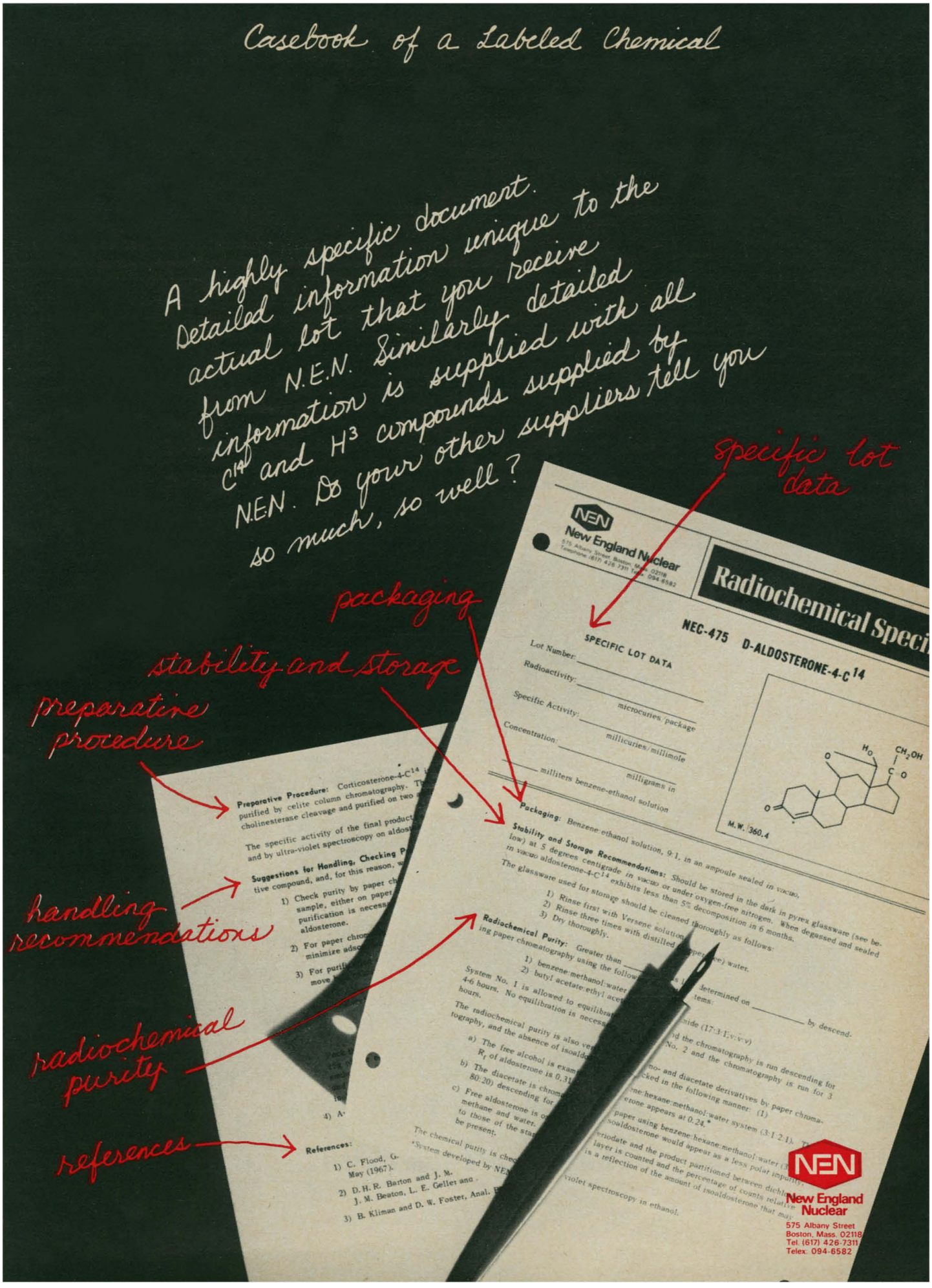

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to Kosygin, we learn that they apply *less* to civil defense than to most other defense measures. He said, in the early days of the missile defense debate, "I believe that defensive systems, which prevent attack, are not the cause of arms race. . . ."

The specific point which I wish to make expresses surprise that the reviewer considers it incredible that the U.S.S.R. would use nuclear blackmail to force us to evacuate Berlin or to withdraw our protection of the Philippine Islands, and thus risk nuclear retaliation, but he does consider it possible that *we* might risk nuclear retaliation by interfering in Eastern Europe. As the chapter criticized by the reviewer points out, even when we had a monopoly of nuclear weapons, and no risk of retaliation was involved, we stood by when Czechoslovakia was occupied soon after the conclusion of the Second World War, when the Hungarian peace treaty was broken, Berlin was blockaded, and so on. If, in the 1860's, a book on railroading was to be reviewed, would the editors have chosen someone unfamiliar with railroading methods but passionately opposed to rapid transportation?

EUGENE P. WIGNER
Princeton University,
Princeton, New Jersey

Open Inspection of CBW

An open letter to President Nixon has been signed by 35 participants in the Conference on Cellular Aspects of Growth and Differentiation in the Nervous System. In it, we urge members of the academic and scientific professions to join us in requesting (i) prompt deployment of the President's directive concerning destruction of offensive chemical and biological warfare weapons, (ii) open inspection of governmental defensive CBW research facilities, and (iii) rapid unclassified publication of defensive CBW investigations. Strong support by scientists for these requests will undoubtedly influence public opinion and the news media toward advocating the destruction of existing CBW stocks. Also, we hope that open publication and inspection of CBW laboratories will provide progress toward multilateral disarmament.

HARVEY R. HERSCHMAN
20774 East Hillside Drive,
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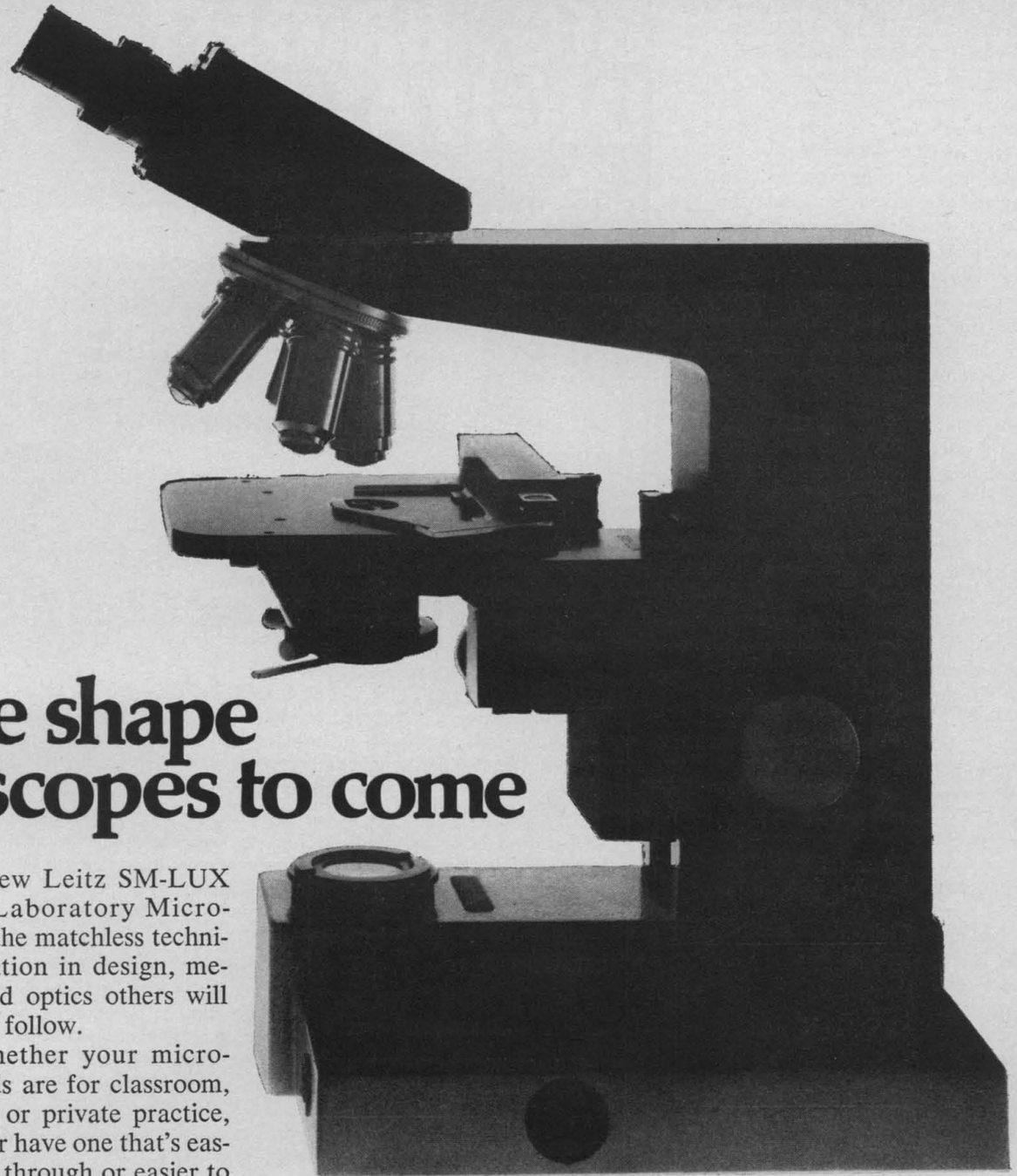

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20 February 1970, Volume 167, Number 3921

SCIENCE

Long-Term Efforts To Clean the Environment

During the past few months many leaders, ranging from student activists to top industrialists, have spoken in behalf of restoring the environment. In response President Nixon has called for vigorous action and increased expenditures. His recommendations represent a substantial victory for those working for a livable environment. Nevertheless, this is no time to relax, for the fight to attain a decent environment must go on for a long time.

A cursory analysis of efforts to control water pollution illuminates some of the problems. These are both technological and political. Until a few years ago, little effort was devoted to achieving a substantial improvement in methods of treating municipal wastes. The techniques employed were those of 50 years ago. Primary treatment of sewage consisted of mechanical removal of solids. This was followed by a secondary treatment essentially biological which accelerated the oxidation of organic matter. The result was a reduction in "biochemical oxygen demand" by 80 to 95 percent. However, the processes were less effective in reducing the levels of fixed nitrogen, phosphate, and intractable organic chemicals. During the last decade we have come to realize that in many instances reductions in biochemical oxygen demand are not enough. To combat eutrophication, we must also reduce nitrate and especially phosphate. In addition there has been growing concern about the numerous organic chemicals that are finding their way into streams and lakes.

At long last some imaginative engineers have turned their attention to the problem. What can be done under favorable circumstances is illustrated by a new plant at Lake Tahoe.* Processing there results in the reduction by 99.3 percent of biochemical oxygen demand and the removal of 94 percent of phosphate and 99.99+ percent of coliform bacteria. Included among the steps are a flocculation at *p*H 11.5 to 12.0, with lime; adjustment of *p*H with carbon dioxide; and a final polishing of the effluent with activated charcoal. The effluent is pumped from the Tahoe basin into another valley where it is stored, for irrigation, in a man-made lake in which trout thrive.

The citizens at Lake Tahoe were highly motivated and were willing to spend heavily to save their beautiful lake. However, citizens elsewhere have not been so effective. Communities have refused to tax themselves to provide benefits for downstream users. Authorities have been reluctant to interfere with industrial pollution, fearing loss of local industry.

The federal government has functioned poorly. After more than 15 years the federal water pollution program has not yet brought about significant improvement in any major water course. A recent government report† states:

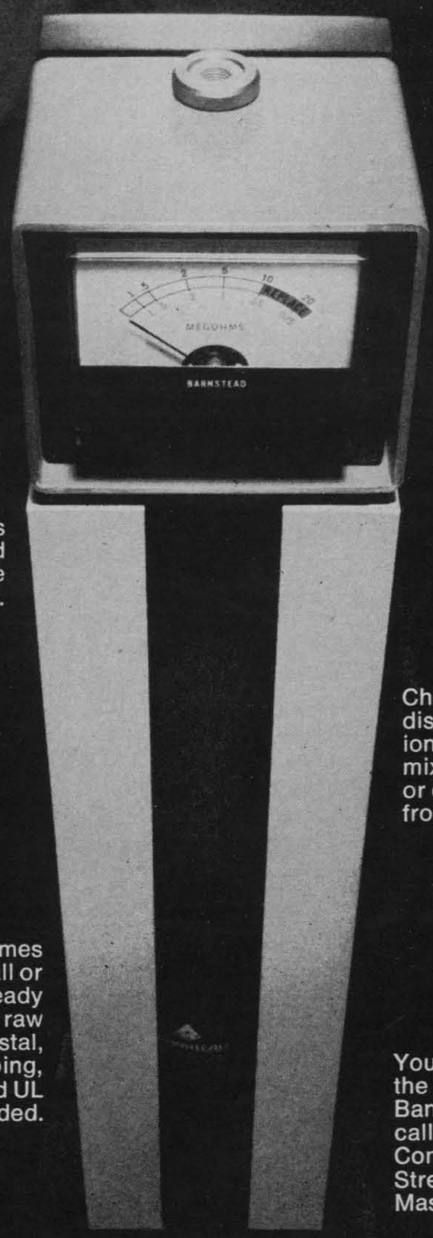
> Federal grants have been awarded for construction of facilities which provided treatment for only part of the pollutants being discharged into waterways . . . nearby municipalities or industries have continued to discharge untreated or inadequately treated wastes.

With a great show of unanimity and self-praise a Democrat-controlled Congress passed the Federal Water Pollution Control Act of 1965. The act authorized substantial appropriations for grants for cleanup. However, Congress neglected to appropriate more than trifling sums until last year. These funds cover only roughly half the costs of projects and much local foot-dragging can be expected.

Cleaning up the rivers and lakes of this country will require good technology and good politics. It is to be hoped that some of the current fervor about the environment will be channeled into insuring that the needed actions are taken.—PHILIP H. ABELSON

* R. Culp, "Water reclamation at South Tahoe," *Water and Wastes Engineering* (April 1969), pp. 36–39. † *Administration of the Construction Grant Program for Abating, Controlling, and Preventing Water Pollution*," Report to the Subcommittee on Air and Water Pollution of the Committee on Public Works, U.S. Senate, 91st Congress, 1st Session (U.S. Government Printing Office, Washington, D.C., 1969).

The Informer



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Calendar of Events

Courses

Workshop in Developmental Biology, La Jolla, Calif., 6 July–2 August. This workshop is designed for those engaged in developmental research who wish to become proficient in the use of various molecular and cellular techniques. Applications are invited from established investigators and from pre- and postdoctoral trainees. The participants are limited to 20. The workshop is sponsored by the National Science Foundation which will defray the cost of travel and subsistence for each participant. Persons interested in the program should write for application forms. *Deadline for applications*: 1 April. (Dr. Herbert Stern, Department of Biology, University of California, San Diego, P.O. Box 109, La Jolla 92037)

Research Instrumentation, Brooklyn, N.Y., 25 July–15 August. Is intended for educators, engineers, and scientists from all technical fields who need a working knowledge of electronic instrumentation as applied to problems in research. It will be supported in part by the National Science Foundation under its College Teacher Programs. Attending free of charge will be 26 U.S. college teachers who will receive a stipend from NSF for 3 weeks plus travel allowance. Applicants from business and industry will be accepted on a tuition basis at $550, covering all laboratory fees and textbooks. The course is open to industrial and academic scientists and engineers from all disciplines. Medical research workers will also find the course valuable. There are no specific prerequisites beyond a basic understanding of college physics. Applicants should secure a place in the course as soon as possible. The final date for consideration of applications for NSF support is *20 April*. Industrial participants must file their applications by *15 June*. (Prof. Kenneth Jolls, Office of Special Programs, Polytechnic Institute of Brooklyn, 333 Jay St., Brooklyn, N.Y. 11201)

Industrial Applications of Modern Magnet Technology, Cambridge, Mass., 22 June–3 July. This course will attempt to close the technology gap between the art of generating magnetic fields and their application to new areas such as biology, medicine, ore separation, pollution control, fusion containment, power generation, transmission, and conversion. The course will include a review of magnetism and superconductivity and cover such topics as solenoid design, magnetic circuits, cryogenic engineering, superconducting magnets, and their application to practical needs. (Director of the Summer Session, Room E19-356, Massachusetts Institute of Technology, Cambridge 02139)

Physics and Chemistry of Solids under High Pressure, Delft, Netherlands, 2–14 August. This is an advanced study institute under the sponsorship of NATO. Topics to be covered include high-pressure studies on band structure of semiconductors, electron transfer processes, magnetic properties, phonons, equation of state, phase transitions, sound propagation, metals, dielectrics, superconductors, and various high-pressure techniques. (Prof. S. S. Mitra, Department of Electrical Engineering, University of Rhode Island, Kingston 02881)

Nuclear Magnetic Resonance, Gainesville, Fla., 6–10 April. Designed for those with experience in magnetic resonance, the program aims to provide advanced training and instruction in the mathematical and theoretical aspects of magnetic resonance for individuals working actively in the area. The topics to be covered include analysis of high-resolution spectra, double resonance experiments, relaxation times in high-resolution spectroscopy, NMR spectra of radicals, superconducting magnet spectrometers, rate processes, techniques for spectroscopy of "other nuclei," dynamic nuclear polarization, and molecular conformation in relation to NMR parameters. Enrollment will be limited to about 50 participants. The program will include lectures, exercise sessions, and practice in use of the computer. Laboratory sessions with a Varian 100-Mhz spectrometer with 15-inch magnet system, as well as multiple resonance and noise decoupling accessories, will be conducted as part of the course. Registration fee for academic participants, $50; for industrial participants, $125. (Dr. Wallace S. Brey, Jr., NMR Workshop Director, Department of Chemistry, University of Florida, Gainesville, Fla. 32601)

Forthcoming Events

March

16–19. International Assoc. for **Dental Research**, 48th session, New York, N.Y. (A. R. Frechette, Executive Secretary, 211 East Chicago Ave., Chicago, Ill. 60611)

16–20. Symposium on **Fourier Spectroscopy**, Aspen, Colo. (G. Vanasse, Air Force Cambridge Research Laboratory, L. G. Hanscom Field, Bedford, Mass. 01730)

18–19. **Mineral Waste Utilization**, 2nd symp., Chicago, Ill. (M. A. Schwartz, IIT Research Inst., 10 W. 35 St., Chicago, Ill. 60616)

18–21. American **Fertility** Soc., annual mtg., Washington, D.C. (H. H. Thomas, 944 S. 18 St., Birmingham, Ala. 35205)

19. **Kinetics and Thermodynamics in High Temperature Gases** (attendance by invitation only), Cleveland, Ohio. (R. Mather, NASA Lewis Research Center, Cleveland 44135)

19–22. American Assoc. of **Dental Schools**, New York, N.Y. (B. F. Miller III, AADS, 211 E. Chicago Ave., Chicago, Ill.)

19–24. American **Dermatological** Assoc., Boca Raton, Fla. (B. Kennedy, Louisiana State Univ., School of Medicine, 1542 Tulane Ave., New Orleans, La.)

20–22. American **Psychosomatic** Soc., 27th annual, Washington, D.C. (J. W. Mason, 265 Nassau Rd., Roosevelt, N.Y. 11575)

20–22. National **Wildlife** Federation, Chicago, Ill. (T. L. Kimball, The Federation, 1412 16th St., NW, Washington, D.C.

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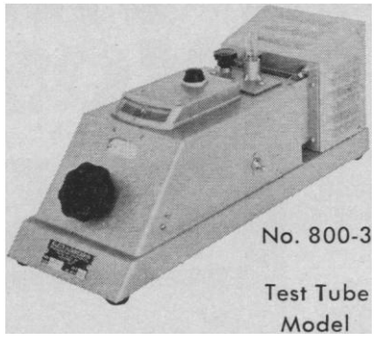

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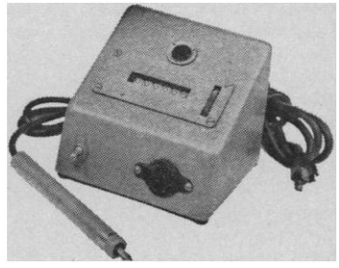

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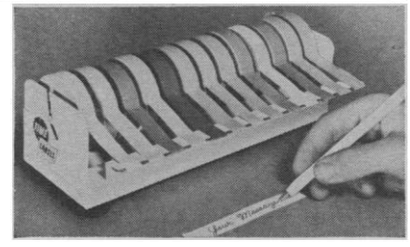

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22–25. **Environmental Mutagen** Soc., 1st annual, Washington, D.C. (E. Freese, Chairman, Program Committee, EMS, Building 36, Room 3D02, National Inst. of Health, Bethesda, Md. 20014)

23–26. American **Orthopsychiatric** Assoc., 4th annual, San Francisco, Calif. (M. F. Langer, 1790 Broadway, New York 10019)

23–26. American **Physical** Soc., Dallas, Tex. (W. W. Havens, 335 E. 45 St., New York 10019)

24–25. British **Biophysical Soc.**, Brighton, England. (E. M. Bradbury, Biophysics Lab., College of Technology, Portsmouth, PO1 2DZ, England)

24–26. **Engineering Aspects of Magnetohydrodynamics**, 11th symp., Pasadena, Calif. (L. G. Hays, Jet Propulsion Lab., California Inst. of Technology, 4800 Oak Grove Dr., Pasadena 91103)

24–26. National **Industrial Solid Wastes Management** Conf., Houston, Tex. (H. N. Myrick, Univ. of Houston, 3801 Cullen Blvd., Houston 77004)

25–27. Fundamental and Practical Aspects of **Pest Management**, Raleigh, N.C. (F. E. Guthrie, Dept. of Entomology, North Carolina State Univ., Raleigh)

26–28. Southern Soc. for **Philosophy and Psychology**, Durham, N.C. (W. Blackstone, Dept. of Philosophy, Univ. of Georgia, Athens)

26–28. **Seismological** Soc. of America, Hayward, Calif. (D. Tocher, P.O. Box 826, Berkeley, Calif. 94705)

26–29. American **Philosophical** Assoc., Berkeley, Calif. (A. Pasch, 117 Lehigh Rd., Univ. of Maryland, College Park 20742)

27–28. Northwest **Scientific** Assoc., Corvallis, Ore. (G. H. Deitschman, Intermountain Forest and Range Experiment Sta., P.O. Box 469, Moscow, Idaho 83843)

30–4. American College of **Radiology**, Dallas, Tex. (W. C. Stronach, ARC, 20 N. Wacker Dr., Chicago, Ill. 60606)

31–2. **Microwave Research**, intern. symp., New York, N.Y. (J. Fox, Polytechnic Inst. of Brooklyn, 333 Jay St., Brooklyn, N.Y.)

31–3. American Assoc. of **Anatomists**, Chicago, Ill. (R. T. Woodburne, Dept. of Anatomy, Univ. of Michigan, East Medical Bldg., Ann Arbor 48104)

31–3. Applications of **Walsh Function in Communications**, Washington, D.C. (H. F. Harmuth, Dept. of Electrical Engineers, Univ. of Maryland, College Park 20742)

April

1. Arkansas **Acad. of Science**, Russellville. (G. E. Templeton, Div. of Plant Pathology, Univ. of Arkansas, Fayetteville 72701)

1–3. National **Pollution Control** Conf. and Exposition, San Francisco, Calif. (Natl. Pollution Control Conf. and Exposition, P.O. Box 13116, Houston, Tex. 77019)

1–4. International Conf. on **Combinatorial Mathematics**, New York, N.Y. (L. R. Neville, New York Acad. of Sciences, 2 E. 63 St., New York 10021)

1–4. National Council of **Teachers of Mathematics**, 48th annual, Washington, D.C. (J. D. Gates, Executive Secretary,

1201 16th St. NW, Washington, D.C. 20036)

1–4. International Conf. on **Thermodynamics**, Cardiff, Wales. (Meetings Officer, Inst. of Physics and the Physical Society, 47 Belgrave Sq., London, S.W.1, England)

2–4. Michigan **Acad. of Science, Arts, and Letters**, 74th annual, Detroit, Mich. (T. G. Overmire, MASAL, 1721 Washtenaw, Ann Arbor, Mich. 48104)

2–4. Eastern **Psychological** Assoc., Atlantic City, N.J. (W. W. Cumming, 353 Schermerhorn Hall, Columbia Univ., New York 10027)

2–4. Association of **Southeastern Biologists**, Lakeland, Fla. (D. C. Bliss, Box 278, Randolph Macon Woman's College, Lynchburg, Va. 24504)

5–10. International **Anesthesia Research** Soc., 44th congr., Las Vegas, Nev. (B. B. Sankey, 3645 Warrensville Center Rd., Cleveland, Ohio 44122)

6–8. **Mineralogical** Soc. of Great Britain and Ireland, London, England. (P. Wilkinson, Dept. of Geology, Univ. of Sheffield, Sheffield–S1 3JD, England)

7–8. Society for **Experimental Biology**, Leicester, England. (A. P. M. Lockwood, Dept. of Oceanography, Univ. of Southampton, Southampton, England)

7–10. American **Optical** Soc., Philadelphia, Pa. (M. E. Warga, The Society, 2100 Pennsylvania Ave., NW, Washington, D.C. 20006)

8–10. United States **Pharmacopoeial** Conv., Washington, D.C. (Z. A. Hoffman, 4630 Montgomery Ave., Bethesda, Md. 20014)

8–11. American Acad. of **Oral Pathology**, San Diego, Calif. (S. M. Standish, c/o Indiana Univ. School of Dentistry, Indianapolis 46202)

9–10. **Metabolism and Biological Functions of Polyamines** Conf., New York, N.Y. (L. R. Neville, New York Acad. of Sciences, 2 E. 63 St., New York 10021)

9–10. **Metal Cleaning** Symp., Cleveland, Ohio. (W. M. Mueller, American Soc. for Metals, Metals Park, Ohio 44073)

9–10. National Conf. on **Rural Health**, 23rd, Milwaukee, Wis. (B. L. Bible, Council on Rural Health, 535 N. Dearborn St., Chicago, Ill. 60610)

9–11. American Assoc. for **Cancer Research**, Philadelphia, Pa. (H. J. Creech, The Association, 7701 Burholme Ave., Philadelphia 19111)

10–12. American Soc. of **Internal Medicine**, Philadelphia, Pa. (E. E. Daieske, 525 Hearst Bldg., 3rd at Market, San Francisco, Calif. 94103)

12–17. **Biomedical Engineering** Soc., 2nd annual, Atlantic City, N.J. (D. S. Gann, Case Western Reserve Univ., Cleveland, Ohio 44106)

12–17. Federation of American Societies for **Experimental Biology**, Atlantic City, N.J. (J. F. A. McManus, FASEB, 9650 Rockville Pike, Bethesda, Md. 20014)

12–17. American Soc. of **Hospital Pharmacists**, Washington, D.C. (J. A. Oddis, ASHP, 4630 Montgomery Ave., Bethesda, Md. 20014)

12–17. American Inst. of **Nutrition**, Atlantic City, N.J. (J. Waddell, 9650 Rockville Pike, Bethesda, Md. 20014)

12–17. American **Pharmaceutical** Assoc., Washington, D.C. (G. B. Griffenhagen, Div. of Communications, 2215 Constitution Ave., NW, Washington, D.C. 20037)

13–15. International Symp. on **Very Long Baseline Interferometry**, Charlottesville, Va. (J. W. Findlay, Natl. Radio Astronomy Observatory, Edgemont Rd., Charlottesville 22901)

13–16. American **Industrial Health** Conf., Chicago, Ill. (H. N. Schulz, AIHC, 55 E. Washington St., Chicago 60602)

13–16. American Acad. of **Pediatrics**, Washington, D.C. (G. E. Hughes, 1801 Hinman Ave., Evanston, Ill. 60204)

13–17. American **Physiological** Soc., Atlantic City, N.J. (R. G. Daggs, APS, 9650 Rockville Pike, Bethesda, Md. 20014)

13–18. World Congr. of the Intern. Federation of **Gynecology and Obstetrics**, New York, N.Y. (H. C. Taylor, Jr., 630 W. 168 St., New York 10032)

14–16. **Computer Graphics** Intern. Symp., London, England. (M. L. V. Pitteway, Computer Science Dept., Brunel Univ., Uxbridge, Middlesex, England)

14–16. Conference on **Nondestructive Evaluation**, Los Angeles, Calif. (J. A. Fellows, American Soc. for Metals, Metals Park, Ohio 44073)

14–17. International **Geoscience Electronics** Symp., 2nd annual, Washington, D.C. (R. Bernstein, IBM Corp., 18100 Frederick Pike, Gaithersburg, Md. 20760)

15. Idaho **Acad. of Science**, Pocatello. (M. J. Bigelow, Chemistry Dept., Idaho State Univ., Pocatello 83201)

16–18. Symposium of Intern. **Geochemical Exploration**, Toronto, Canada. (R. W. Boyle, Geological Survey of Canada, 601 Booth St., Ottawa, Ont.)

16–18. **Nature of the Solid Earth**, Francis Birch Symp., Cambridge, Mass. (E. C. Robertson, U.S. Geological Survey, 8001 Newell St., Silver Spring, Md. 20910)

16–18. Ohio **Acad. of Science**, Wittenberg Univ., Springfield. (J. H. Melvin, 505 King Ave., Columbus, Ohio 43201)

16–18. **Population** Assoc. of America, Atlanta, Ga. (A. F. Ferriss, Russell Sage Foundation, 1755 Massachusetts Ave., NW, Washington, D.C. 20036)

17–19. **Discoveries in Biological Psychiatry** Symp., Baltimore, Md. (Symposium Secretary, Taylor Manor Hospital, Ellicott City, Md. 21043)

19–23. American Assoc. of **Cereal Chemists**, Minneapolis, Minn. (R. J. Tarleton, 1821 University Ave., St. Paul, Minn. 55104)

20–22. Society of **Operations Research**, Washington, D.C. (H. Berger, The Pentagon, Washington, D.C. 20301)

20–23. Southwestern **Surgical** Congr., Dallas, Tex. (J. A. Barney, 301 Pasteur Medical Bldg., Oklahomo City, Okla. 73103)

20–24. American **Geophysical** Union, Washington, D.C. (W. E. Smith, AGU, 2100 Pennsylvania Ave., NW, Washington, D.C. 20037)

20–24. **Metals Engineering** Conf., Cleveland, Ohio. (A. B. Conlin, Jr., 345 E. 47 St., New York 10017)

21–23. **Aerospace Nuclear Applications**, Huntsville, Ala. (A. D. Smith, American Nuclear Soc., 10102 Redland St., Huntsville 35802)

21–23. Conference on **Stress Corrosion Cracking**, Los Angeles, Calif. (J. A. Fellows, American Soc. for Metals, Metals Park, Ohio 44073)

22–25. American Assoc. for **Child Care in the Hospital**, San Francisco, Calif. (H. H. Glaser, Stanford Children's Convalescent Hospital, Palo Alto, Calif. 94304)

23–25. Illinois State **Acad. of Science**, Chicago, Ill. (K. Harmet, Dept. of Biology, Northern Illinois Univ., De Kalb)

23–26. Association of **Clinical Scientists**, Detroit, Mich. (R. P. MacFate, ACS, 125 N. Rutledge St., Pentwater, Mich. 49449)

24–25. Mississippi **Acad. of Sciences**, Clinton. (C. Q. Sheely, Drawer CQ, State College, Miss. 39762)

24–25. Nebraska **Acad. of Science**, Lincoln. (C. B. Schultz, Univ. of Nebraska, Lincoln 68508)

24–25. South Carolina **Acad. of Science**, Columbia. (L. H. Stevenson, Biology Dept., Univ. of South Carolina, Columbia 29208)

25–30. American **Ceramic** Soc., Inc., 72nd annual mtg., Philadelphia, Pa. (The Society, 4055 N. High St., Columbus, Ohio 43214)

26–30. **Group Medicine**, 1st intern. congr., Winnipeg, Canada. (R. E. Beamish, Manitoba Clinic, 790 Sherbrook St., Winnipeg 2, Man., Canada)

26–1. American Soc. for **Microbiology**, Boston, Mass. (R. W. Sarber, 1913 I St., NW, Washington, D.C. 20006)

27–29. **Frequency Control** Symp., 24th annual, Atlantic City, N.J. (J. M. Stanley, Electronics Components Lab., Fort Monmouth, N.J. 07703)

27–29. American **Surgical** Assoc., White Sulphur Springs, W. Va. (C. G. Shires, 5323 Harry Hines Blvd., Dallas, Tex. 75235)

27–30. National **Telemetering** Conf., Los Angeles, Calif. (A. V. Balakrishnan, Dept. of Engineering, Univ. of California, Los Angeles 90024)

27–2. American Acad. of **Neurology**, Miami Beach, Fla. (S. A. Nelson, Executive Director, The Academy, 4005 W. 65 St., Minneapolis, Minn. 55435)

28–30. **Blood Coagulation and Hemostasis**, Sherbrooke, P.Q., Canada. (R. Losito, Dept. of Medicine, Univ. of Sherbrooke, Sherbrooke)

28–30. Conference on the **Fatigue Problem**, Los Angeles, Calif. (J. A. Fellows, American Soc. for Metals, Metals Park, Ohio 44073)

28–30. **Pi Gamma Mu**, Denver, Colo. (E. B. Urquhart, 1719 Ames St., Winfield, Kan. 67156)

29–1. **Instrument** Soc. of America, 2nd education symp., Montreal, Canada. (C. M. Skillern, The Foxboro Co., Foxboro, Mass.)

30–1. Kansas **Acad. of Science**, Wichita. (R. J. Robel, Div. of Biology, Kansas State Univ., Manhattan 66502)

May

1. Missouri **Acad. of Science**, Warrensburg. (E. A. McGinnes, Jr., 1-31 Agriculture, Univ. of Missouri, Columbia 65201)

1–2. North Dakota **Acad. of Science**, Grand Forks. (B. G. Gustafson, Secretary-Treasurer, Univ. of North Dakota, Grand Forks 58201)

1–2. Society for **Pediatric Research**, Atlantic City, N.J. (R. E. Greenberg, Dept. of Pediatrics, Stanford Univ., Stanford, Calif. 94305)

2–3. American Federation of **Clinical Research,** Atlantic City, N.J. (J. E. Brown, 2011 Eye St., NW, Washington, D.C. 20006)

3–6. European Federation of **Chemical Engineering,** 93rd, Vienna, Austria. (W. F. De Geest, Lijsenstraat 24 Berchem-Antwerp, Belgium)

3–6. Society of Professional **Well Log Analysts,** symp., 11th annual, Los Angeles, Calif. (J. D. Clark, 13507 Tosca, Houston, Tex. 77024)

3–8. International **Radiation Protection** Assoc., 2nd, Brighton, England. (B. Godbold, Central Electricity Generating Board, 20 Newgate St., London, E.C.1, England)

4–5. **Industrial Electronics** and **Control Instrumentation Transducer** Conf., 2nd annual, Gaithersburg, Md. (R. B. Spooner, IMPAC Instrument Service, 201 E. Carson St., Pittsburgh, Pa. 15219)

4–6. Instrument Soc. of America, 8th **Biomedical Sciences Instrumentation** Symp., Denver, Colo. (L. J. Brannick, E. R. Squibb & Sons, Inc., New Brunswick, N.J. 08901)

4–8. American **Nurses** Assoc., Miami, Fla. (Mrs. A. R. Warner, Dept. 10, Columbus Circle, New York 10019)

4–8. Society of **Plastics Engineers,** New York, N.Y. (J. H. Hyden, SPE, 656 W. Putnam Ave., Greenwich, Conn. 06830)

4–8. **Veterinary** Conf. and **Wildlife Disease** Assoc., joint biennial mtg., Atlanta, Ga. (W. G. Winkler, Program Chairman, Veterinary Science Dept., Univ. of Wisconsin, Madison 53706)

5–6. Institute of **Electrical and Electronics Engineers Appliance Technical** Conf., 21st annual, Mansfield, Ohio. (W. H. Lynn, Registration Chairman, Tappan Co., 250 Wayne St., Mansfield, Ohio 44906)

5–6. Association of American **Physicians,** Atlantic City, N.J. (J. B. Hickman, Indiana Univ. Medical Center, 1100 W. Michigan St., Indianapolis 46202)

5–7. **Biometric** Soc., eastern North American regional, Chapel Hill, N.C. (D. G. Gosslee, P.O. Box 713, Oak Ridge, Tenn. 37830)

5–7. Purdue **Industrial Waste** Conf., 25th, Lafayette, Ind. (D. E. Bloodgood, School of Civil Engineering, Purdue Univ., Lafayette 47907)

5–7. Institute of **Mathematical Statistics,** Chapel Hill, N.C. (L. Katz, Statistical Lab., Michigan State Univ., East Lansing 48823)

5–7. Modern **Welding Techniques** Conf., Los Angeles, Calif. (J. A. Fellows, American Soc. for Metals, Metals Park, Ohio 44073)

5–8. Virginia **Acad. of Science,** Richmond. (R. C. Berry, The Academy, P.O. Box 9211, Richmond 23227)

6–8. Society of **Mining Engineers,** Socorro, N.M. (P. H. Johnson, New Mexico State Bureau of Mines and Mineral Resources, Campus Sta., Socorro 87801)

6–9. American Inst. of **Industrial Engineers,** Cleveland, Ohio. (J. J. Jericho, AIIE, 345 E. 47 St., New York 10017)

7–8. National **Information Retrieval** Colloquium, 7th annual, Philadelphia, Pa. (P. Bagley, Information Engineering, 3401 Market St., Philadelphia)

7–9. Northeastern **Anthropological** Conf., Ottawa, Ont., Canada. (F. G. Vallee, Carleton Univ., Ottawa)

7–9. International **Communication** Assoc. Conf., 18th annual, Minneapolis, Minn. (R. W. Pace, Communication Program, Univ. of Montana, Missoula 59801)

8–10. Society of **Biological Psychiatry**, San Francisco, Calif. (C. Shagass, Eastern Pennsylvania Psychiatric Institute, Henry Ave. and Abbottsford Rd., Philadelphia 19129)

8–11. American **Psychoanalytic** Assoc., San Francisco, Calif. (H. Fischer, Executive Secretary, APA, 1 E. 57 St., New York 10022)

10. Association for the Advancement of **Psycotherapy**, Inc., 9th natl. conf., San Francisco, Calif. (S. Lesse, 15 W. 81 St., New York 10024)

10–12. American Assoc. of **Plastic Surgeons**, Colorado Springs, Colo. (C. W. Monroe, 715 Lake St., Oak Park, Ill. 60301)

10–14. **Metallurgical** Soc., Las Vegas, Nev. (J. V. Richard, Secretary, The Society, 345 E. 47 St., New York 10017)

10–15. **Chemical Vapour Deposition**, 2nd intern. conf., Los Angeles, Calif. (W. W. Smeltzer, Dept. of Metallurgy and Metallurgical Engineering, McMaster Univ., Hamilton, Ont., Canada)

10–15. **Electrochemical** Soc., Los Angeles, Calif. (E. G. Enck, Executive Secretary, The Society, 30 E. 42 St., New York 10017)

11–12. Council of **Biology Editors**, Ottawa, Ont., Canada. (K. Heumann, 9650 Rockville Pike, Bethesda, Md. 20014)

11–13. Instrument Soc. of America, 16th **Aerospace Instrumentation** Symp., Seattle, Wash. (J. M. Taylor, 3246 116th S.E., Bellevue, Wash. 98004)

11–13. American Soc. for **Quality Control** Technical Conf. and Exhibit, 24th annual, Pittsburgh, Pa. (R. W. Shearman, Administrative Secretary, The Society, 161 W. Wisconsin Ave., Milwaukee, Wis. 53203)

11–13. **Television Measuring Techniques** Conf., London, England. (R. Larry, Institution of Electronic and Radio Engineers, 8-9, Bedford Sq., London, W.C.1, England)

11–14. International **Microwave** Symp., Newport Beach, Calif. (R. H. Duhamel, Granger Assoc., 1601 California Ave., Palo Alto, Calif. 94304)

11–15. **High Pressure**, 3rd intern. conf., Aviemore, Invernesshire, Scotland. (J. Schoeffer, Institution of Mechanical Engineers, 1 Birdcage Walk, London, S.W.1, England)

11–15. American **Industrial Hygiene** Assoc., Detroit, Mich. (G. D. Clayton, AIHA, 25711 Southfield Rd., Southfield, Mich. 48075)

11–15. American **Psychiatric** Assoc., San Francisco, Calif. (B. W. Hogan, APA, 1700 18th St., NW, Washington, D.C. 20009)

12–14. **Metal Matrix Composites** Conf., San Francisco, Calif. (J. A. Fellows, American Soc. for Metals, Metals Park, Ohio 44073)

13–15. **Electronics Components** Conf., Washington, D.C. (D. Burks, Sprague Electric Co., North Adams, Mass. 01247)

14. Modern Methods of **Analyses of Surfaces** Symp., Murray Hill, N.J. (J. D. Levine, Symp. Chairman, RCA Labs, Princeton, N.J.)

14–15. **Materials Selection** Symp., Cleveland, Ohio. (W. M. Mueller, American Soc. for Metals, Metals Park, Ohio 44073)

14–15. Southern **Textile Research** Conf., 10th annual, Hilton Head Island, S.C. (D. W. Snyder, Crompton Shenandoah Co., Drawer 907, Waynesboro, Va. 22980)

14–16. **Cardiovascular Diseases,** 6th annual symp., Hartford, Conn. (R. M. Jeresaty, Section of Cardiopulmonary Medicine, St. Francis Hospital, Hartford)

14–16. American Inst. of **Chemists,** Pittsburgh, Pa. (P. B. Slawter, 79 Madison Ave., New York 10016)

15–19. International Assoc. of Professional **Numismatists,** 19th general assembly, Scheveningen, The Hague, Netherlands. (A. Cronheim, Director, Holland Organizing Centre, 16 Lange Voorhout, The Hague)

17–20. American Inst. of **Chemical Engineers** and Puerto Rican Inst. of Chemical Engineers, 3rd joint mtg., San Juan, Puerto Rico. (P. Santiago, Caribbean Gulf Refining, San Juan)

17–30. International **Electrotechnical** Commission, Washington, D.C. (D. Hogan, U.S.A. Standards Inst., 10 E. 40 St., New York 10016)

18–20. National **Aerospace Electronics** Conf., Dayton, Ohio. (Inst. of Electrical and Electronics Engineers, Dayton Office, 134 E. Monument St., Dayton 45402)

18–20. American **Gastroenterological** Assoc., Boston, Mass. (H. D. Janowitz, Mt. Sinai Hospital, 11 E. 100 St., New York 10029)

18–20. **Neonatal Enteric Infections** Caused by *Escherichia coli,* Conf., New York, N.Y. (L. R. Neville, New York Acad. of Sciences, 2 E. 63 St., New York 10021)

18–20. Instrument Soc. of America, **Power Instrumentation** Symp., 13th, Kansas City, Mo. (R. A. Russell, Box 8405, Kansas City 64114)

18–20. **Steels for Dynamic Loading,** Cleveland, Ohio. (W. M. Mueller, American Soc. for Metals, Metals Park, Ohio)

18–22. **Air Force Materials** Symp. '70, Miami Beach, Fla. (J. Shipp, Executive Director, AFMS '70, P.O. Box 38, Dayton, Ohio 45420)

18–22. **Medical Library** Assoc., New Orleans, La. (H. B. Schmidt, Executive Secretary, MLA, 919 N. Michigan Ave., Chicago, Ill. 60611)

19–20. International Conf. on **Magnet Technology,** Hamburg, Germany. (W. Jentschke, German Hamburg Electron Synchrotron, Notkeskieg 1, D-2, Hamburg 52)

19–22. Society for **Experimental Stress Analysis,** Huntsville, Ala. (B. E. Rossi, 21 Bridge Sq., Westport, Conn. 06880)

20–22. Conference on **Fracture Control:** Theory and Application, Chicago, Ill. (A. M. Mueller, American Soc. for Metals, Metals Park, Ohio 44073)

20–22. **Teratology** Soc., 10th annual, Annapolis, Md. (R. W. Miller, 402 Wisconsin Bldg., Bethesda, Md. 20014)

22–29. International **Cancer** Congr., 10th, Houston, Tex. (M. M. Copeland, Univ. of Texas, P.O. Box 20465, Houston 77025)

24–28. Institute of **Food Technologists,** San Francisco, Calif. (C. L. Willey, IFT, 221 N. LaSalle St., Chicago, Ill. 60601)

24–28. International Congr. of **Social and Preventive Medicine**, 3rd, Venice, Italy. (S. Vanasia, General Secretary, The Congress, 71, via M. Macchi, Milan, Italy)

24–29. Chemical Inst. of Canada/Canadian Soc. for **Chemical Engineering**, Toronto, Ont. (W. M. Campbell, Ontario Research Foundation, Sheridan Park, Ontario, Canada)

25–26. Symposium on **Biochemistry of Brain and Memory**, Kenosha, Wis. (S. P. Datta, Univ. of Wisconsin-Parkside, Kenosha 53140)

25–29. European Conf. on **Psychosomatic Research**, 8th, Knokke, Belgium. (M. E. Houben, Universitaire St. Jozeikliniek voor Psychiatrie, 3070 Kortenberg, Belgium)

26–29. **Textile** Institute Conf., 5th annual, London, England. (Textile Inst., 10 Blackfriars St., Manchester 3, England)

27–29. **Alcohol and Drug Addiction** Foundation Symp., Toronto, Canada. (R. M. Gilbert, Addiction Research Foundation, 344 Bloor St. W., Toronto 179, Ont.)

30–1. Pan American **Cancer Cytology** Congr., Jamaica, B.W.I. (J. E. Ayre, Westbury Quadrangle, 113 S. Service Rd., Jericho, N.Y. 11753)

June

1–5. Symposium on Use of **Computers for Automatic Control of Traffic**, Versailles, France. (G. Ruppel, Intern. Federation of Automatic Control, Postfach 1139, Dusseldorf 1, Germany)

1–6. International **Mineral Processing** Congr., 9th, Prague, Czechoslovakia. (U. P. Vyskus Rud, Modranska 23, Prague 4)

1–6. World **Mining** Congr., 6th, Madrid, Spain. (A. G. Readett, Natl. Coal Board, Hobart House, Grosvenor Pl., London, S.W.1, England)

1–6. World Congr. of **Occupational Therapists**, 5th, Zurich, Switzerland. (G. Stauffer, Kraftstr 22, 8044, Zurich)

2–4. Conference on **Stress Corrosion Cracking**, New Orleans, La. (J. A. Fellows, American Soc. for Metals, Metals Park, Ohio 44073)

2–5. Mid-American Symp. on **Spectroscopy**, 22nd, Chicago, Ill. (W. A. Loseke, IIT Research Inst., 10 W. 35 St., Chicago 60616)

3–5. American **Chemical** Soc., Central regional, 2nd, Columbus, Ohio. (R. W. Bird, 2540 Olentangy River Rd., Columbus 43210)

4–5. **Environmental and Water Resources Engineering** Conf., 9th annual, Nashville, Tenn. (E. L. Thackston, Vanderbilt Univ., Box 133, Sta. B, Nashville 37203)

4–5. **Molecular Biology**, 4th intern. symp., New York, N.Y. (E. G. Bassett, Research Products Div., Miles Laboratories, Inc., Elkhart, Ind. 46514)

7–9. **Computer Applications in the Earth Sciences**, 8th colloquium, Lawrence, Kans. (D. F. Merriam, Kansas Geological Survey, Univ. of Kansas, Lawrence 66044)

7–10. American Soc. of **Mechanical Engineers**, Boston, Mass. (A. B. Conlin, Jr., 345 E. 47 St., New York 10017)

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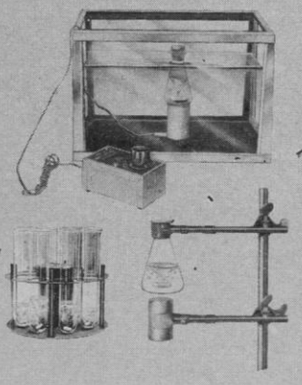

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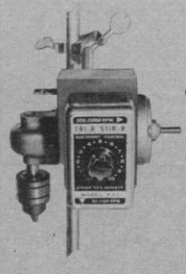

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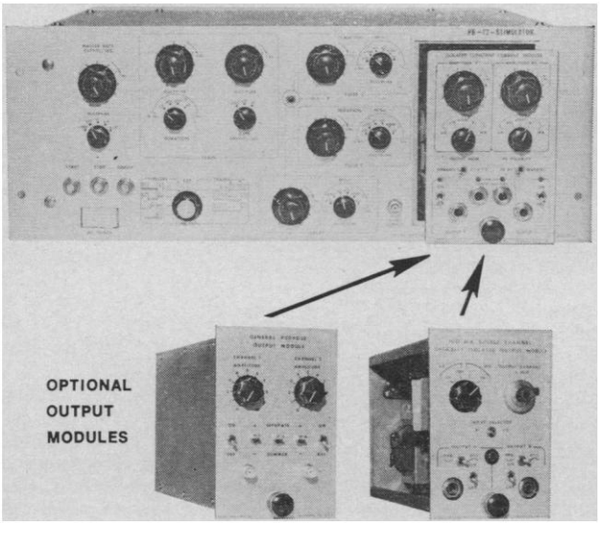

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Systems for Estuarine Resources Conf., Charleston, S.C. (J. C. Hite, Dept. of Agricultural Economics, Clemson Univ., Clemson, S.C. 29631)

8–10. International Conf. on **Communications,** San Francisco, Calif. (A. M. Peterson, Stanford Research Inst., Menlo Park, Calif. 94025)

8–10. Association for **Gnotobiotics,** Notre Dame, Ind. (M. Pollard, Dept. of Microbiology, Univ. of Notre Dame, Notre Dame 46556)

8–10. Conference on **Power Metallurgy,** Detroit, Mich. (J. A. Fellows, American Soc. for Metals, Metals Park, Ohio 44073)

8–12. International **Gas** Conf., 11th, Moscow, U.S.S.R. (R. H. Tonwaide, General Secretary, Intern. Gas Union, 4 Av. Palmerston, Brussels 4, Belgium)

8–12. International Symp. on **Plant Protein:** Their Improvement through the Application of Nuclear Techniques, Vienna, Austria. (J. H. Kane, U.S. Atomic Energy Commission, Washington, D.C. 20545)

9–12. American **Astronomical** Soc., Boulder, Colo. (H. M. Gurin, 211 Fitz Randolph Rd., Princeton, N.J. 08540)

9–12. Canadian Federation of **Biological** Societies, 13th annual, Montreal. (K. K. Carroll, Dept. of Biochemistry, Univ. of Western Ontario, London 72, Canada)

10–12. **Low Energy X- and Gamma Ray Sources and Applications,** 3rd symp., Boston, Mass. (J. W. Hitch, Div. of Isotopes Development, U.S. Atomic Energy Commission, Washington, D.C. 20545)

11–13. **Endocrine** Soc., St. Louis, Mo. (N. L. Mattox, Suite 304, 1211 N. Sharel, Oklahoma City, Okla. 73103)

12–14. Society of **Biological Psychiatry,** Atlantic City, N.J. (G. N. Thompson, 2010 Wilshire Blvd., Los Angeles, Calif. 90057)

13–14. American **Diabetes** Assoc., St. Louis, Mo. (J. R. Connelly, 18 E. 48th St., New York, N.Y. 10017)

14–18. American **Nuclear** Soc., Los Angeles, Calif. (O. J. Du Temple, 244 E. Ogden Ave., Hinsdale, Ill. 60521)

14–18. National **Plastics** Exposition and Conf., Cleveland, Ohio. (L. P. Williams, 250 Park Ave., New York 10017)

14–19. **Air Pollution Control** Assoc., 63rd annual, St. Louis, Mo. (A. Arch, 4400 Fifth Ave., Pittsburgh, Pa. 15213)

14–19. **Mass Spectrometry** and Allied Topics, 18th annual conf., San Francisco, Calif. [J. M. McCrea, Applied Research Lab. (73), U.S. Steel Corp., Monroeville, Pa. 15146]

14–19. Canadian Assoc. of **Pathologists,** Winnipeg, Man. (C. W. Penner, Winnipeg General Hospital, Winnipeg 3)

15–16. **Catalytic Hydrogenation and Analogous Pressure Reactions,** 3rd conf., New York, N.Y. (L. R. Neville, New York Acad. of Sciences, 2 E. 63 St., New York 10021)

15–17. American **Neurological** Assoc., 95th annual, Atlantic City, N.J. (S. A. Trufant, Cincinnati General Hospital, Cincinnati, Ohio 45229)

15–18. American Soc. for **Engineering Education,** Columbus, Ohio. (W. L. Collins, 2100 Pennsylvania Ave., NW, Washington, D.C. 20037)

15–18. American **Meteorological** Soc. Symp., Boulder, Colo. (J. London, Dept. of Astro-Geophysics, Univ. of Colorado, Boulder 80302)

15–18. **Tissue Culture** Assoc., 21st annual, Washington, D.C. (V. P. Perry, American Foundation for Biological Research, 11125 Rockville Pike, Rockville, Md. 20853)

15–19. International Symp. on **Information Theory**, Noordwijk, Netherlands. (P. E. Green, Jr., M.I.T. Lincoln Lab., Lexington, Mass. 02173)

15–19. **Nuclear Data for Reactors**, 2nd intern. conf., Helsinki, Finland. (J. H. Kane, Div. of Technical Information, U.S. Atomic Energy Commission, Washington, D.C. 20545)

15–19. **Vacuum Metallurgy**, intern. conf., Anaheim, Calif. (E. L. Foster, Battelle Memorial Inst., 505 King Ave., Columbus, Ohio 43201)

16–18. Conference on **Cold Forming of Metal Parts**, Cleveland, Ohio. (J. A. Fellows, American Soc. for Metals, Metals Park, Ohio 44073)

16–18. American **Helicopter** Soc., 26th annual natl. forum, Washington, D.C. (H. M. Lounsbury, 30 E. 42 St., New York 10017)

16–19. Canadian **Psychiatric** Assoc., 20th annual, Winnipeg, Man. (W. A. Blair, 225 Lisgar St., Ottawa, Ont., Canada)

17–18. European **Dialysis and Transplant** Assoc., 7th annual, Barcelona, Spain. (W. Drokker, 75 de Lairessestraat, Amsterdam, Netherlands)

17–19. **Cyrogenic Engineering** Conf., Boulder, Colo. (J. L. Smith, Jr., Rm. 41-204, Massachusetts Inst. of Technology, Cambridge, Mass. 02130)

17–20. American **Rheumatism** Assoc., Detroit, Mich. (M. M. Walsh, 1212 Avenue of the Americas, New York 10036)

17–21. American **Therapeutic** Soc., Chicago, Ill. (R. T. Smith, 37 Narbrook Pk., Narberth, Pa. 19072)

17–24. **Chemical Engineering** and Congr. of **Chemical Engineers**, Frankfurt-am-Main, Germany. (J. Dohent, Natl. Chemical Exposition, 86 E. Randolph St., Chicago, Ill. 60601)

18–20. **Bibliographical** Soc. of America, Philadelphia, Pa. (W. H. Bond, Houghton Library, Harvard Univ., Cambridge, Mass. 02138)

18–20. American Assoc. of **Bioanalysts**, New York, N.Y. (D. Birenbaum, 802 Ambassador Bldg., St. Louis, Mo. 63101)

20–25. American Soc. of **Radiologic Technologists**, Miami Beach, Fla. (G. J. Eilert, 527 S. Main St., Fond du Lac, Wis. 54935)

21–24. American **Dairy Science** Assoc., 65th annual, Gainesville, Fla. (C. Cruse, 903 Fairview Ave., Urbana, Ill. 61801)

21–24. American **Leather Chemists** Assoc., Lake Placid, N.Y. (M. T. Roddy, c/o Tanners Council Research Laboratories, Univ. of Cincinnati, Cincinnati, Ohio 45221)

21–25. American **Medical** Assoc., Chicago, Ill. (W. E. Burmeister, 535 N. Dearborn St., Chicago, Ill. 60610)

21–25. American **Veterinary Medical** Assoc., Las Vegas, Nev. (D. A. Price, 600 Michigan Ave., Chicago, Ill. 60605)

21–26. American Soc. for **Testing and Materials**, Toronto, Ont., Canada. (T. A. Marshall, Jr., ASTM, 1916 Race St., Philadelphia, Pa. 19103)

22–24. International Conf. on the Role of **Tryptophan Metabolism in Biochem-**

istry and Pathology, Madison, Wis. (T. C. Meyer, Univ. of Wisconsin, Madison 53706)

22–25. Canadian Soc. of **Agronomy,** Ottawa, Ont. (R. Loiselle, Ottawa Research Sta., Central Experimental Farm, Ottawa)

22–25. Symposium on **Bioinorganic Chemistry,** Blacksburg, Va. (R. E. Dessy, Dept. of Chemistry, Virginia Polytechnic Inst., Blacksburg 24061)

22–25. Canadian Soc. of **Horticultural Science,** Ottawa, Ont. (E. C. Lougheed, Dept. of Horticulture, Univ. of Guelph, Guelph, Ont.)

22–25. American Assoc. of **Petroleum Geologists,** Calgary, Canada. (J. M. Browning, Tenneco Oil and Minerals, P.O. Box 1051, Calgary, Alta.)

22–25. Canadian Soc. of **Soil Science,** Ottawa, Ont. (A. R. Mack, Central Experimental Farm, Ottawa)

22–25. **Thyroid** Conf., 6th annual, Vienna, Austria. (R. Hofer, c/o Wiener Medizinische Akademie, Alserstrasse 4, A-1090, Vienna)

22–26. American Assoc. of **Avian Pathologists,** Inc., Las Vegas, Nev. (G. H. Snoeyenbos, Univ. of Massachusetts, Amherst 01002)

22–27. **Mathematical Statistics and Probability,** 6th, Berkeley, Calif. (E. L. Scott, Dept. of Statistics, Univ. of California, Berkeley 94720)

23–26. State of the Art in **Corrosion Testing Methods** Symp., Toronto, Canada. (W. H. Ailor, American Soc. for Testing and Materials, Reynolds Metals Co., 4th and Canal Sts., Richmond, Va. 23218)

24–26. American **Automatic Control** Conf., Atlanta, Ga. (D. Lyons, Dept. of Textiles, Clemson Univ., Clemson, S.C. 29631)

24–26. Canadian **Wood Chemistry** Symp., 3rd, Vancouver, B.C. (D. A. I. Goring, Pulp and Paper Research Inst. of Canada, 570 St. John's Rd., Pointe Claire, P.Q.)

24–27. **Drugs and Cerebral Function** Symp., 2nd annual, Denver, Colo. (M. L. Smith, Suite 1120, 2045 Franklin, Denver 80205)

24–27. **Hydrobiology,** natl. symp., Miami Beach, Fla. (J. C. Warman, Water Resources Research Inst., Auburn Univ., Auburn, Ala. 36830)

24–1. International Symp. on **Mechanical Properties and Processes of the Mantle,** Flagstaff, Ariz. (L. R. Sykes, Columbia Univ., Palisades, N.Y. 10964)

25–27. Conference of **Immunologists,** San Diego, Calif. (W. O. Weigle, Scripps Clinic and Research Foundation, La Jolla, Calif. 92037)

25–27. **Leukocyte Culture** Conf., 5th, Ottawa, Canada. (J. Harris, Ottawa General Hospital, Ottawa 2)

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