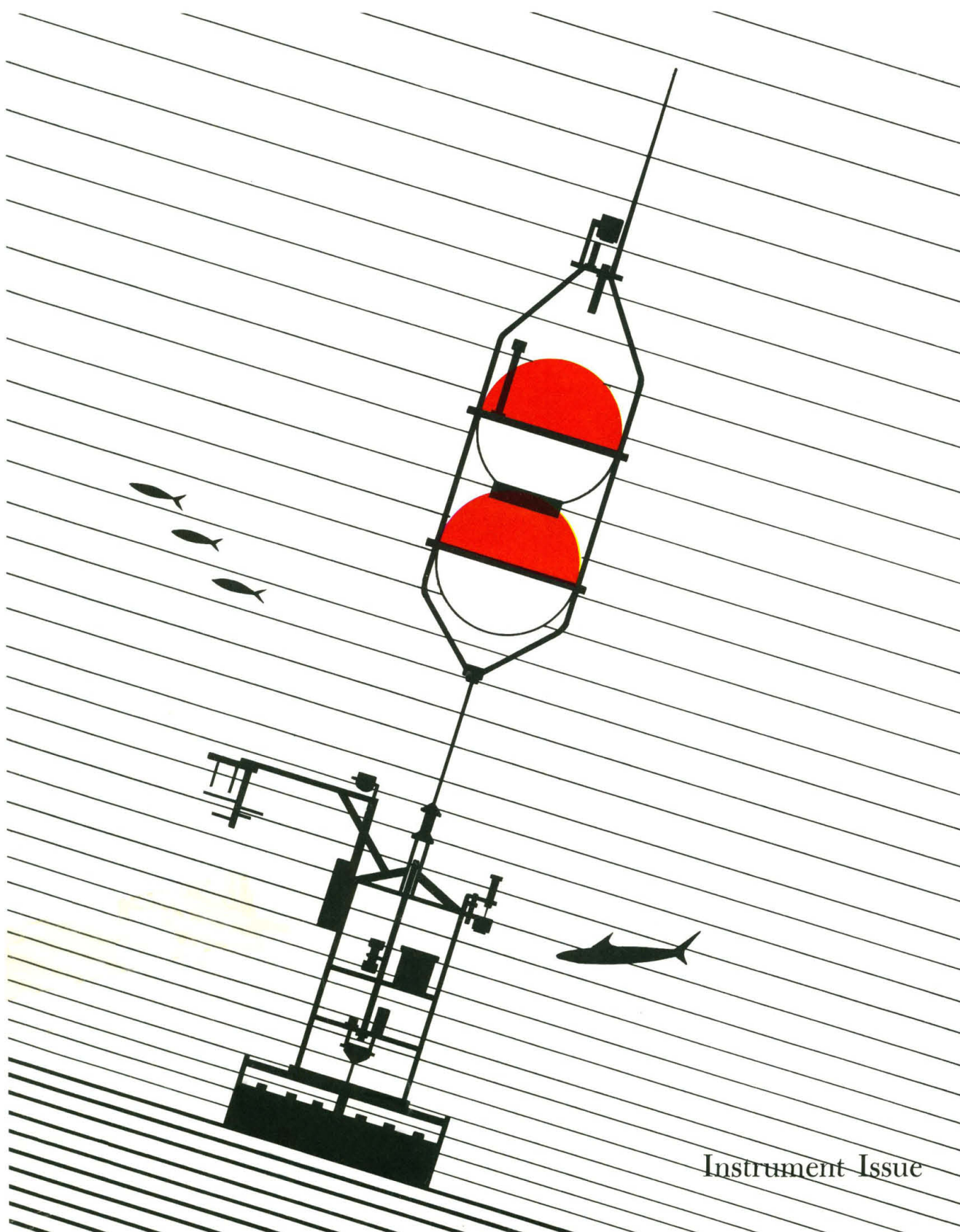


# SCIENCE

4 October 1968

Vol. 162, No. 3849

AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE



Instrument Issue






## Take another look... at Kimble's new plastic labware

Worth looking into, because this new Kimble line of reusable plastic laboratory ware reflects the same high standards of technology, craftsmanship and functional design identified with Kimble glass scientific ware. Produced with effective economy, too, in our ultramodern plastics facilities.

Looked-for innovations: calibration scales printed in permanent bright blue for clear, easy reading; beakers and graduated cylinders with dual pour-outs for convenient, accurate pouring with either hand.

For complete information write for Catalog K68P, or see your lab supply dealer for a selection of both reusable and disposable Kimble plastic items.

**OWENS-ILLINOIS**

maker of Kimble Products  
Toledo, Ohio 43601 

# Mettler guide to the budget balance

Low cost, a fair consideration in any purchase, is only one of several compelling benefits resulting from Mettler's thoughtful re-design of its classic substitution balance.

Mettler's objective was to produce five new weighing instruments providing the ultimate in balance performance for the user, whether he be researcher or technician or student. To this end, Mettler applied the latest in design, manufacturing and human engineering concepts.

## SIMPLICITY IS THE KEY

Mettler began by simplifying the balance mechanism.

- Individual molded parts were substituted for multi-part assemblies.
- Mettler's exclusive concentric ring weights were used, cutting in half the number of weights needed.
- Optical and mechanical control systems were simplified by placing them at the operator's eye level.

From this re-design comes better balances that are faster and easier to make . . . and they cost considerably less than the instruments they replace.

## IMPROVED PERFORMANCE, NEW CAPACITIES

The five new balances range from an economical student model through standard analytical models to a semi-micro balance. All have capacities of 160 grams or greater.

Their new beam designs and pan brakes make them far more stable and permit faster weighings than conventional balances.

Their precision-to-capacity relationships are exceptional. The Model H20, for example, combines the 160.1-gram capacity of an analytical balance with the  $\pm 0.01$  mg precision of a semi-micro instrument.

## READING DIGITS IS EASIER

The new Mettlers are available with either digital or vernier readout of weighing data.

Vernier reading costs less and sometimes is preferred by those who want to read that last numeral without adjusting a digital control knob. Digital readout is preferred by most users because of its speed and convenience. Human factors research has shown digital readout to be twice as fast and three times as accurate as reading dials or scales.



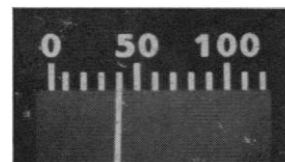
Clear, aligned digital readout

Mettler's digital readout has all numerals grouped and clearly aligned. Even an inexperienced technician or student can obtain highest levels of accuracy in weighing after only a few minutes of instruction.

All controls are clearly labeled and the readout has directional indicators, arrows on the readout panel to tell which way to dial the weight set.

## PRE-WEIGHING UNLIMITED

One balance, the Mettler H10W, is equipped with an advanced pre-weighing feature. Pre-weighing gives an immediate indication of approximate weight with no intermediate dialing step. The new Mettler pre-weighing feature operates over the full range of the balance, avoiding the delay of a second dialing step if the sample exceeds 100 grams.



High-speed filling guide

## ONCE AGAIN, WITH FILLING

All five have the exclusive Mettler filling guide. This lets you do one of the most common and time-consuming weighing jobs—filling to a target weight—in less than half the usual time. There are no repeated interruptions to the work. You proceed in orderly manner, filling to within the last few milligrams.



## OPTICAL RANGE TARING

Taring across the optical range enables you to return the balance scale to zero to compensate for odd or fractional weights of the container. It goes a long way toward eliminating arithmetic calculations from the weighing operation.

## BELOW-BALANCE ACCESSORY

Weighing objects below the balance, as in specific gravity measurements, is a simple job with the new Mettlers. An accessory kit which attaches directly to the balance pan provides the means.

## TRY ONE NOW

Call any major laboratory supply dealer. Or write us for descriptive literature. We are Mettler Instrument Corporation, 20 Nassau Street, Princeton, New Jersey 08540.

**Mettler**®

Instrument	Capacity	Precision	Readout
H8 Semi-analytical	160 grams	$\pm 0.3$ mg	Vernier
H10 Analytical	161 grams	$\pm 0.05$ mg	Digital
H10W Analytical pre-weighing	161 grams	$\pm 0.05$ mg	Digital
H18 Analytical	160.1 grams	$\pm 0.03$ mg	Vernier
H20 Semi-micro	160.1 grams	$\pm 0.01$ mg	Digital



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## COVER

Unmanned instrument capsules dropped to the sea floor record pressure, temperature, and currents on digital tape for the study of deep sea tides. A two-way acoustical link provides control recovery and monitoring by a ship on the surface. See page 78. [Robert Winsett, Institute of Geophysics and Planetary Physics, University of California, San Diego]

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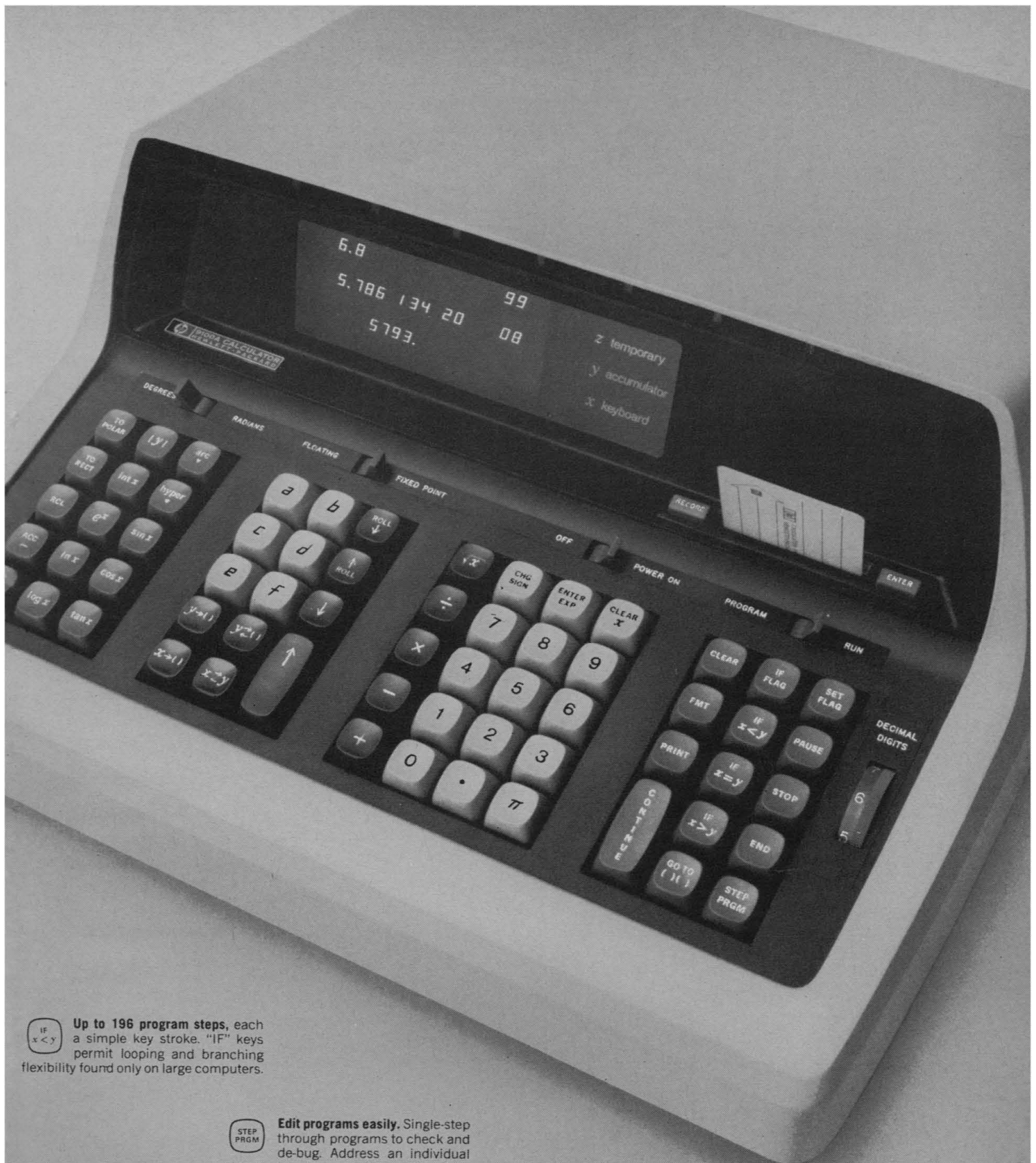


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prints out graphs of density vs. position on the specimen. Information about brightness, physical density, thickness, temperature, or *any* phenomena that you can record as a variation of photographic density can now be measured and recorded. The reliable double-beam, null balance design makes the Joyce, LoebI Microdensitometer unusually stable and repetitive. It is clearly established as the leading instrument of its kind, for such diverse applications as measuring mountains on the moon — radiography — cell research — high resolution mass spectrography —

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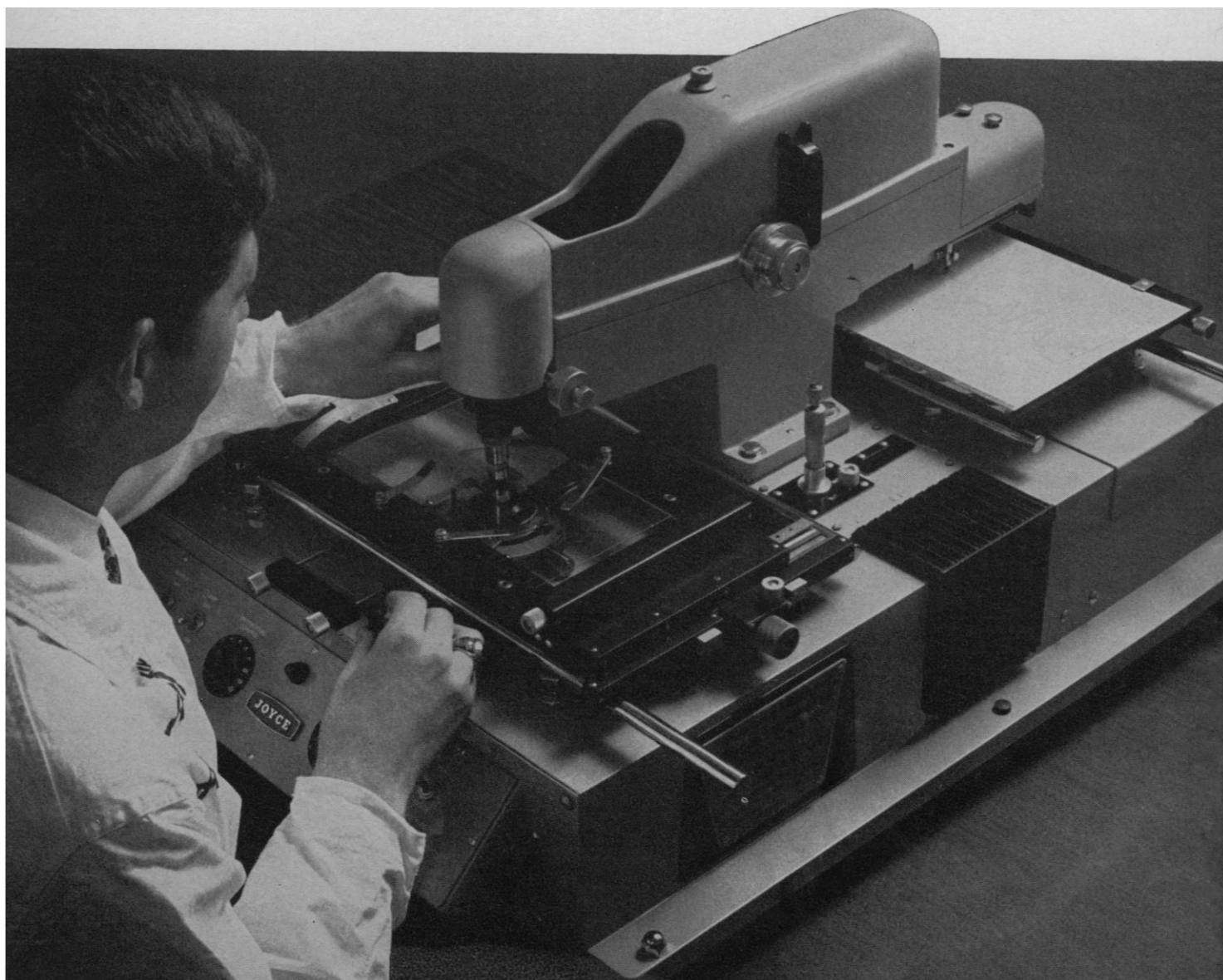
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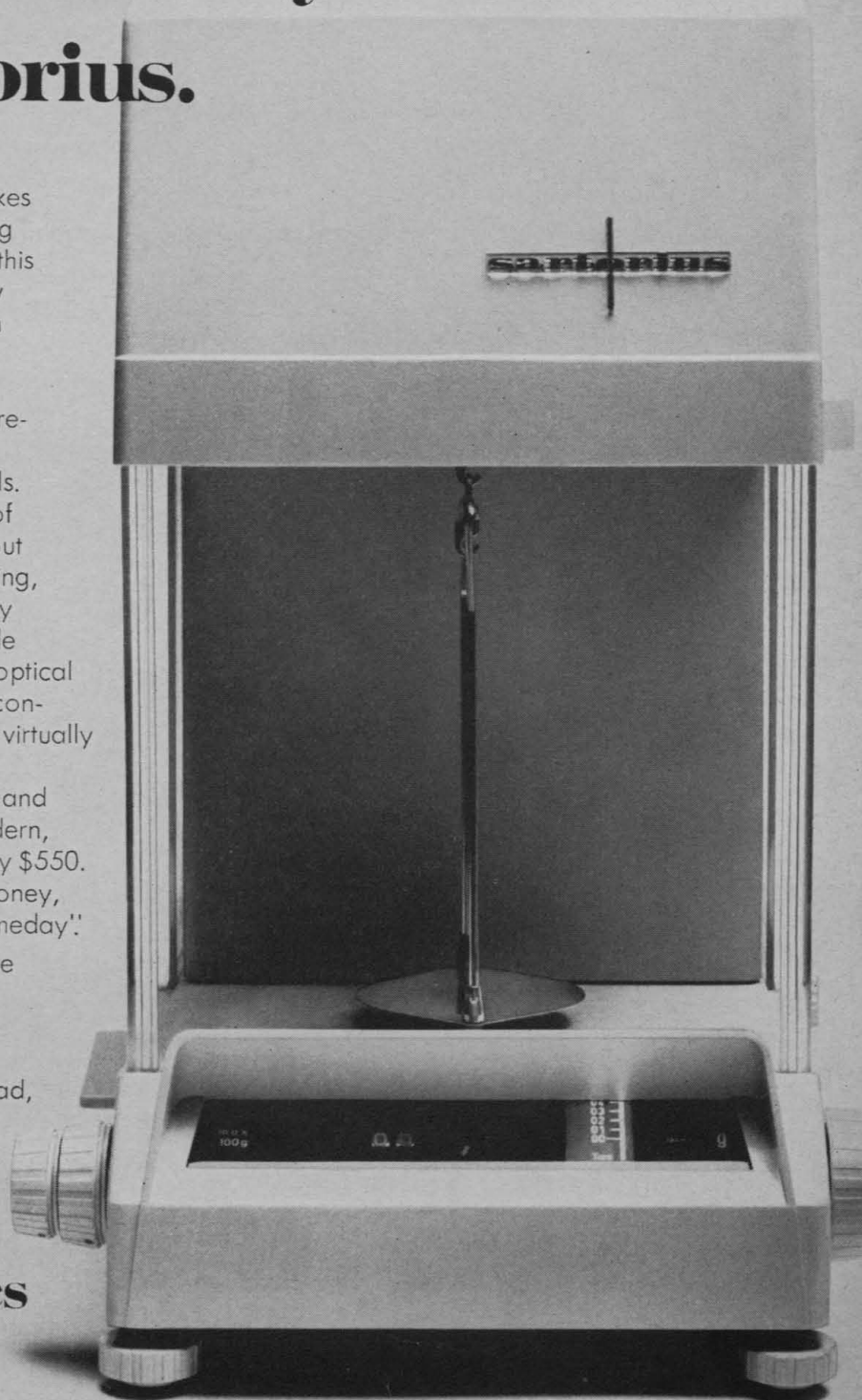
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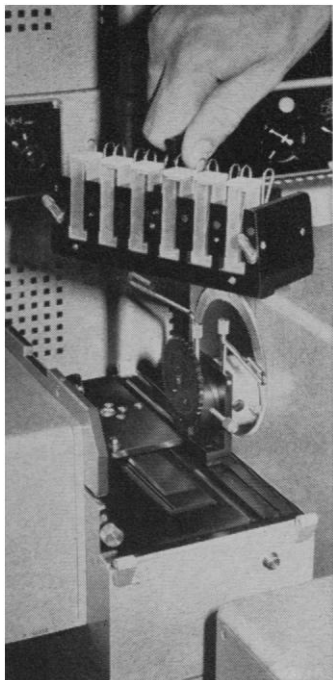
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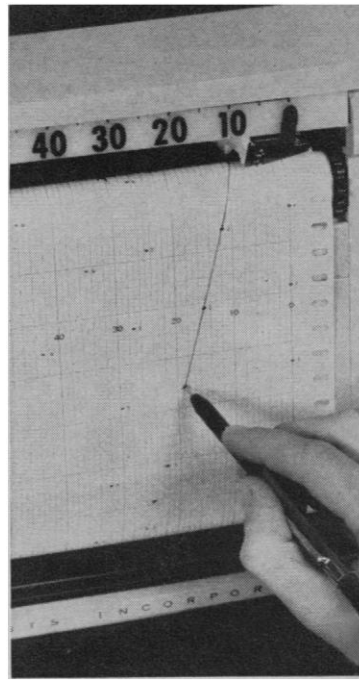
#### Set control unit.

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The UDI features convenient fast cycling on slow time bases, unique summing function for continuous summation without display reset, memory starts new count scaling before previous count has cleared, variable display time from 0.1 s to 30 s, 6 digit read-out plus over-range.

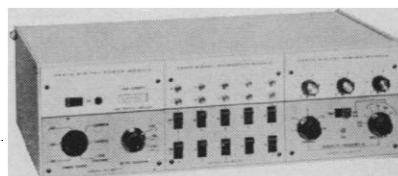
The two identical high-sensitivity (10 mV) input comparators provide 1 MΩ impedance, complete range of trigger controls (including Automatic Mode), oscilloscope monitoring of triggering point and

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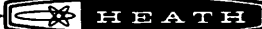
DVM section has Automatic Polarity Indication,  $5 \times 10^9$  ohm input impedance on separate 1 V range (10 MΩ on the others) four ranges from 1 to 1000 V, 10  $\mu$ V resolution, 0.1 second to 10 second integrating time and V-F output available at rear panel.

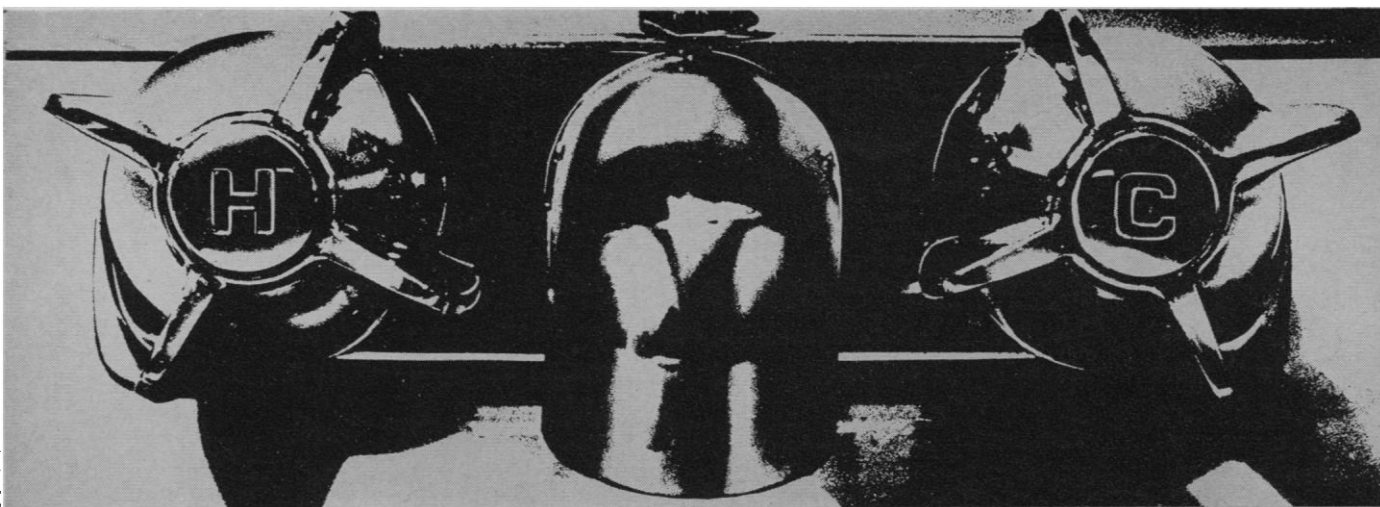
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With the Liquimat 220 you do get four independent analysis channels, two for beta counting and two for external standardization.

With the Liquimat 220 you do get the most flexible and useful automatic standardization system available.

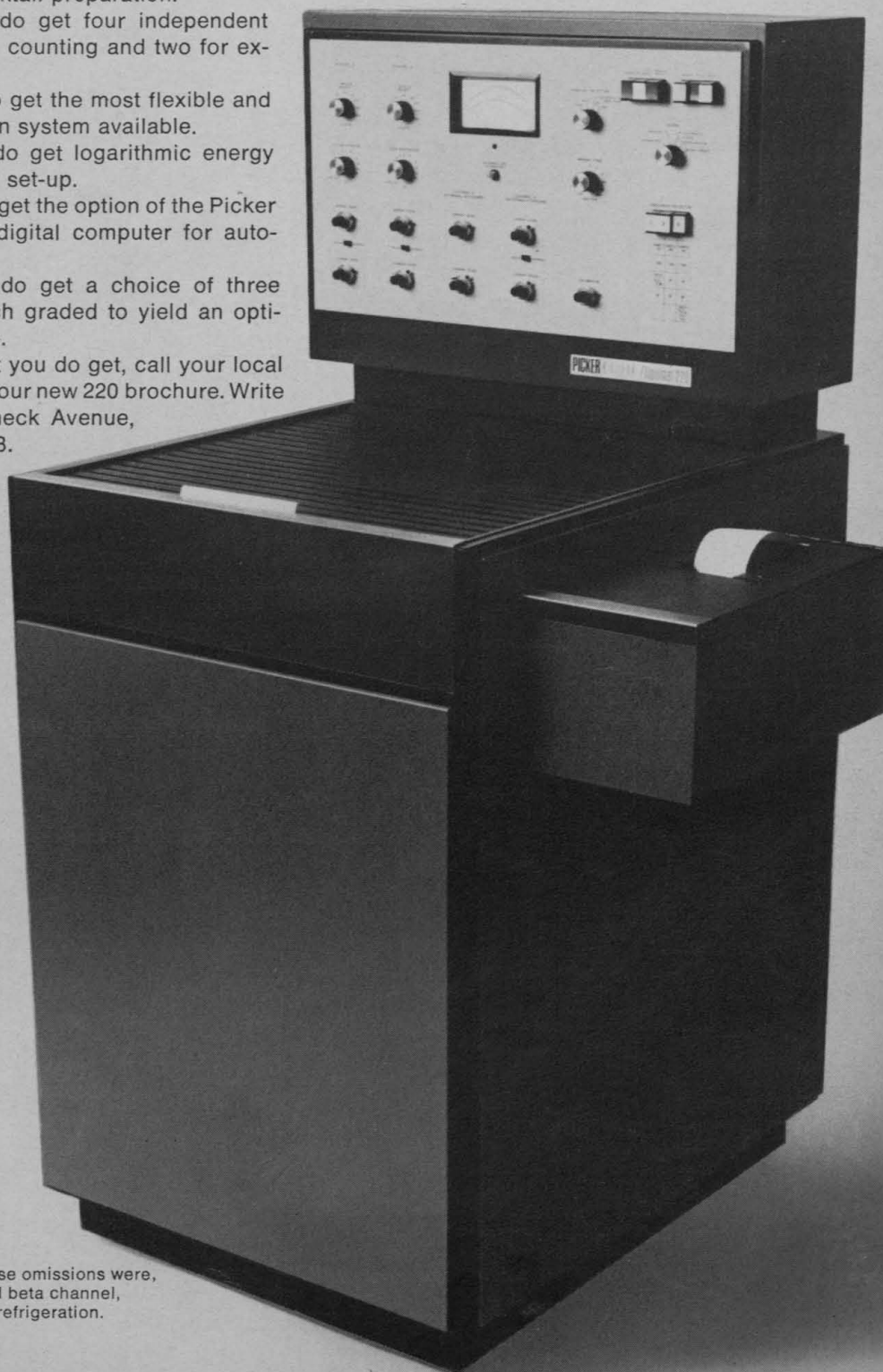
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**PICKER**



\*If you're curious as to what some of these omissions were, here are examples: a seldom-used third beta channel, expensive digital display, unnecessary refrigeration.

# Automatic Exposure Accuracy

There's no longer any need to measure, calculate and time each photomicrographic exposure. The Nikon AFM, with its light sensor and computer-control unit, does it for you automatically.

You simply preset the ASA film rating on the control unit and press the cable release. That's all you need to do to be certain of a correctly exposed photomicrograph, whether in color or black-and-white. And, if you wish to vary image density, a simple adjustment enables you to increase or decrease the programmed exposure in fixed multiples. You can also select shutter settings manually, and you can use conventional illumination or synchronized electronic flash.

The Nikon AFM accepts a variety of camera bodies and film backs ranging from 35mm to 4x5, including Polaroid, and fits any standard microscope (it is shown with Nikon M-35 camera body on a Nikon S-Ke microscope). Two interchangeable viewfinders are supplied: a focusing eyepiece telescope for high-power work and a ground-glass screen with 7x magnifier for low-power microscopy. The latter also serves for group observation. Price of the AFM, less camera back, is \$795. For details, write.

Nikon Inc., Instrument Division, Garden City, N.Y. 11530  
subsidiary of Ehrenreich Photo-Optical Industries, Inc.  
In Canada: Anglophoto Ltd., Ont.)

## Nikon Auto-Microflex AFM



140A Plug-in Oscilloscope  
 141A Variable Persistence Oscilloscope  
 185 CHN Analyzer  
 310A, 312A Wave Analyzers  
 313A Tracking Oscillator  
 340B Noise Figure Meters  
 400E AC-to-DC Converter  
 400EL High-Accuracy AC Voltmeter  
 410C Electronic Voltmeter  
 411A RF Millivoltmeter  
 412A Voltmeter, Ammeter, Ohmmeter  
 415B, 415E, 416B Standing Wave Ratio Meter  
 419A DC Null Voltmeter  
 428B Clip-on DC Milliammeter  
 431C Microwave Power Meter  
 500B Frequency Meter  
 562A Digital Recorder  
 581A D/A Converter  
 675A Sweeping Signal Generator  
 775, 776 Automatic Preparative Gas Chromatograph  
 780-7 Patient Monitor  
 8551B/851B Spectrum Analyzer  
 1416A Swept Frequency Oscilloscope Indicator  
 1782A Oscilloscope Display Scanner  
 2010A, 2012A Data Acquisition Systems\*  
 2116A, 2115A, 2114A Computers\*  
 2801A Quartz Thermometer  
 3300A Function Generator  
 3400A RMS Voltmeter  
 3406A Broadband Sampling Voltmeter  
 3430A DC Voltmeter\*  
 3439A, 3440A Plug-in Digital Voltmeters\*  
 3460B Digital Meter  
 3461A AC/Ohms Converter, DC Preamplifier  
 4815A RF Voltmeter  
 5211A, 5212A Electronic Counters\*  
 5214L Preset Counter\*

5275A Time Interval Counter\*  
 5280A Reversible Counter\*  
 5400A Nuclear Multichannel Analyzer  
 5552A Spectrum Scanner  
 5751B Research Gas Chromatograph  
 8051A Loudness Analyzer  
 7561A, 7562A  
 8405A

HEWLETT-PACKARD/MOSELEY DIVISION  
 9270-1004  
 FOR USE ON AUTOGRAF RECORDERS  
 10 UNITS/DIVISION

**These are some of  
 the HP instruments that  
 provide recorder outputs**

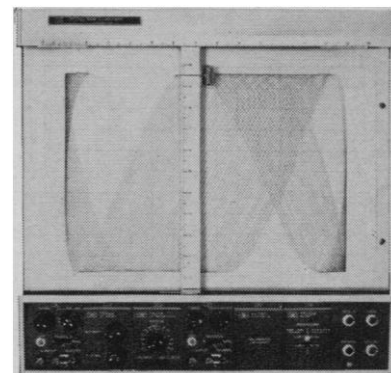
\*with D-A converter

## Wouldn't a graphic recorder make your job easier?

It probably would. Because Hewlett-Packard X-Y and strip-chart recorders connect to a wide variety of precision measuring instruments to give you a permanent graphic display of your measurements. Plots and graphs let you analyze your results more thoroughly, give you permanent records for later reference and allow you to make comparison studies of several measurements.

You might be surprised how many measurements can be recorded by a simple connection to your instrument.

To find out how a graphic recorder can improve the information value of your measurements, call your local HP field engineer or write Hewlett-Packard, Palo Alto, Calif. 94304; Europe: 54 Route des Acacias, Geneva.



**GRAPHIC RECORDERS**

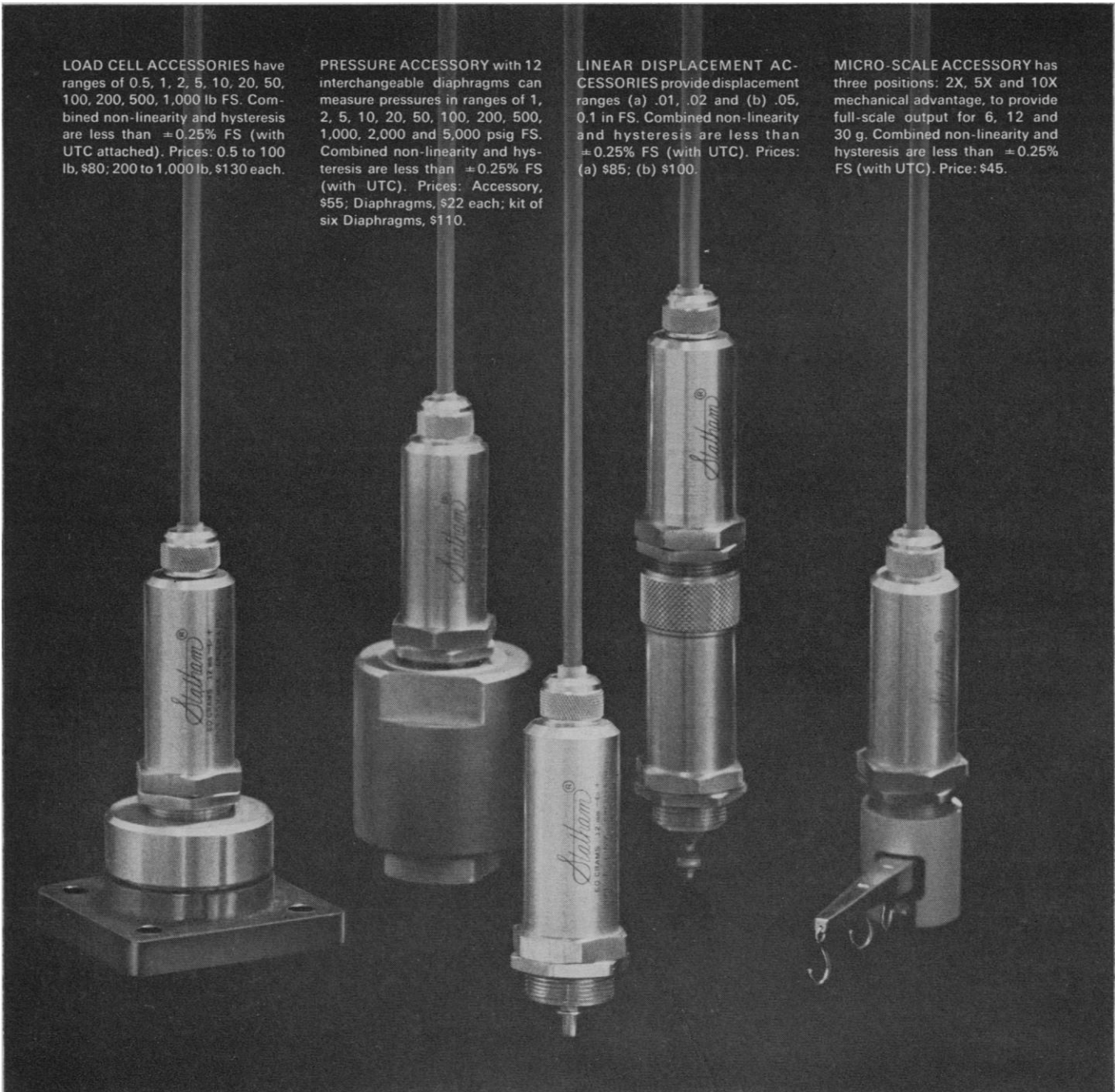


LOAD CELL ACCESSORIES have ranges of 0.5, 1, 2, 5, 10, 20, 50, 100, 200, 500, 1,000 lb FS. Combined non-linearity and hysteresis are less than  $\pm 0.25\%$  FS (with UTC attached). Prices: 0.5 to 100 lb, \$80; 200 to 1,000 lb, \$130 each.

PRESSURE ACCESSORY with 12 interchangeable diaphragms can measure pressures in ranges of 1, 2, 5, 10, 20, 50, 100, 200, 500, 1,000, 2,000 and 5,000 psig FS. Combined non-linearity and hysteresis are less than  $\pm 0.25\%$  FS (with UTC). Prices: Accessory, \$55; Diaphragms, \$22 each; kit of six Diaphragms, \$110.

LINEAR DISPLACEMENT ACCESSORIES provide displacement ranges (a) .01, .02 and (b) .05, 0.1 in FS. Combined non-linearity and hysteresis are less than  $\pm 0.25\%$  FS (with UTC). Prices: (a) \$85; (b) \$100.

MICRO-SCALE ACCESSORY has three positions: 2X, 5X and 10X mechanical advantage, to provide full-scale output for 6, 12 and 30 g. Combined non-linearity and hysteresis are less than  $\pm 0.25\%$  FS (with UTC). Price: \$45.



## Statham's quick-change artist

It's Statham's Universal Transducing Cell, a precision transducer for measuring small forces and small displacements. With special quick-change accessories it becomes the basic element in a versatile, modular system capable of measuring a wide variety of parameters, including force, weight, pressure, and displacement.

The Basic Cell, Model UC3, is a Statham zero-length strain gage device with a full-scale output of 16 mv/v. Combined non-linearity and hysteresis are less than 0.25% full scale.

You'll find Statham's Universal Transducing Cell adaptable to an infinite variety of uses with modest additional cost for accessories. Companion readouts are available for either battery or

115/220-volt AC operation. New accessories are added from time to time, and owners will be kept advised. Your measurement problems can be solved with an introduction to Statham's "quick-change" artist. It costs only \$160.

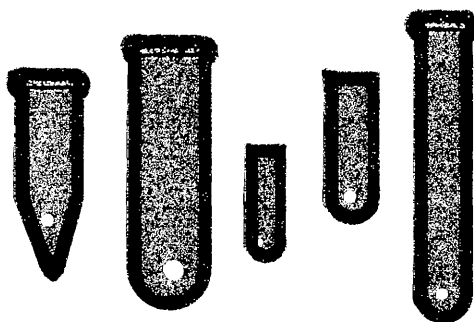
For more information, please write: Tom Culhane, Honeywell, Test Instruments Division, P.O. Box 5227, Denver, Colo. 80217.

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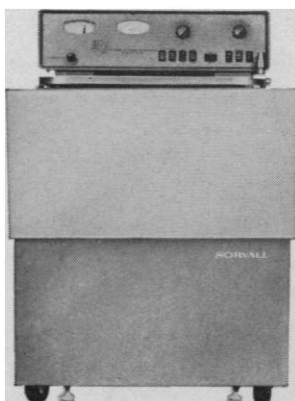
***SORVALL'S RC-3 is a centrifuge with a purpose...***

**...A  
GENERAL  
PURPOSE**



The RC-3 has justly been described as the finest general-purpose refrigerated centrifuge on the market. It can produce up to 6,975 x G with the SORVALL HG-4 Swinging Bucket Rotor. This Rotor has a maximum capacity of 2,600 ml. The RC-3's Gyro-Action Direct Drive accepts no fewer than eleven other SORVALL Angle and Horizontal Rotors, all of which can expand their application versatility through the use of many different tubes and reducing adapters. Controls include programmed acceleration and braking, and an exclusive speed selector that permits automatic acceleration from 500 RPM to 5,000 RPM. The drive motor and refrigeration systems are of heavy-duty design for reliability in performance, and the rotor chamber has large, full-access convenience. If you have need for versatility and dependability in laboratory centrifuge separations, just write: Ivan Sorvall, Inc., Norwalk, Connecticut 06852.

**SORVALL®**



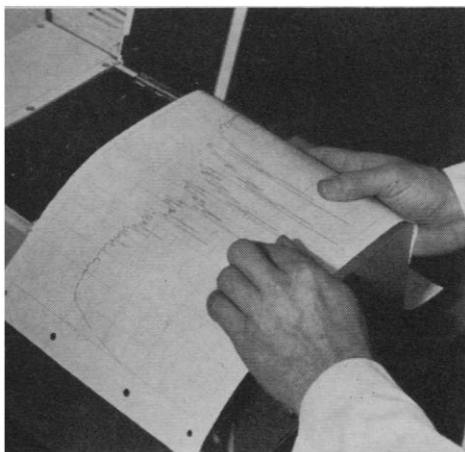
For additional information, ask  
for Bulletin SC-10-GPC-3.

# New Coleman UV-VIS-NIR spectrophotometer. So good, we'll let its charts do the talking.

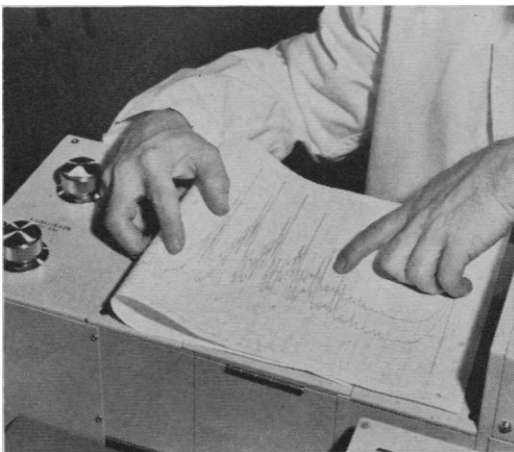
New Coleman Model EPS-3T Hitachi Spectrophotometer is the first all-solid-state instrument of its kind. It's a double-beam, ratio-recording instrument

that yields sophisticated data throughout the 170 to 2600  $m\mu$  range. It has 12 features not found on any other spectrophotometer in its price class.

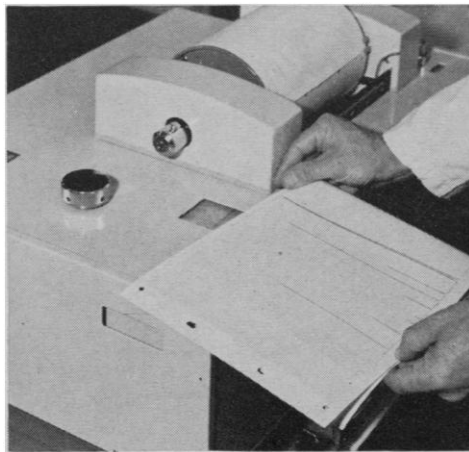
Here are some examples of its work:



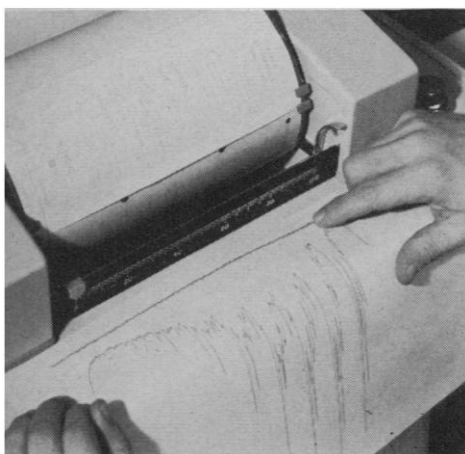
The chart above shows the remarkable resolution of Coleman Model EPS-3T. Critical adjacent peaks on the complex benzene vapor profile are clearly delineated.



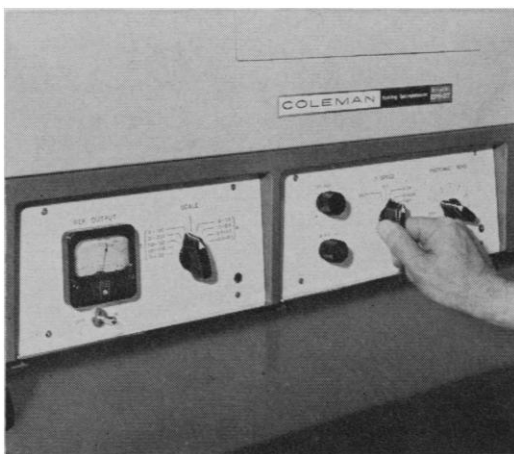
To demonstrate repeatability, the instrument overprints the same chart from the same sample. Note that chart presentations are all linear, not logarithmic.



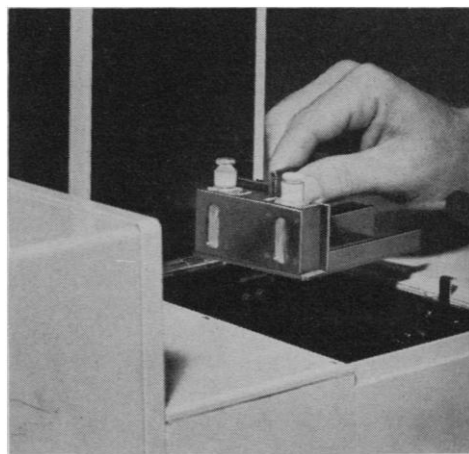
A significant mercury spike, perfectly centered at 253.7  $m\mu$ . Wavelength accuracy is not affected by changes in ambient temperature. Photometric accuracy is 0.3%T.



Above, the 100% T line of the Coleman Model EPS-3T at maximum sensitivity. The line is demonstrably flatter than that of any similar spectrophotometer.



Model EPS-3T offers a wide choice of operating parameters. Nine scale modes. Six scanning rates, from 1.5 to 60 minutes. Any member of your staff can easily operate it.



You open the sample compartment and insert cells without touching any of the controls. With this safety shuttering feature, you leave operating parameters set, while you run test, after test, after test.

Sorry, there's no room left for a picture of Model EPS-3T. But we've saved this, and a number of other pleasant surprises for you. Call Coleman for the name of the nearest dealer and a demonstration.

Send for Bulletin S-306

Write to Coleman Instruments Division,  
The Perkin-Elmer Corporation,  
42 Madison St., Maywood, Illinois 60153

**PERKIN-ELMER**

Circle No. 156 on Readers' Service Card



## We've mixed up a batch of jelly you'd never put on toast.

It does things grape jelly never could.

It's an electrolytic jelly we use to improve the manufacture of electronic communications circuits.

For example, in making thin film circuits, we raise the value of tantalum nitride resistors, 400 atom layers thick, by oxidizing part of the metal with an electrolyte and direct current. Because of the small size, extreme thinness and close

proximity of resistor patterns, the electrolyte must be applied just so.

Add gel to the electrolyte and it becomes viscous. Apply the jelly through a silk screen and it stays right where it belongs. Then anodize the surface resistor by resistor, until the prescribed resistance is reached.

Today we can trim thin film resistors to within 0.1% of desired values. There is no danger of the electrolyte spreading. And any unevenness in the substrate surface doesn't affect the anodizing process.

Sounds simple doesn't it?

The process is. But the engineering research that made the process possible was far from simple.

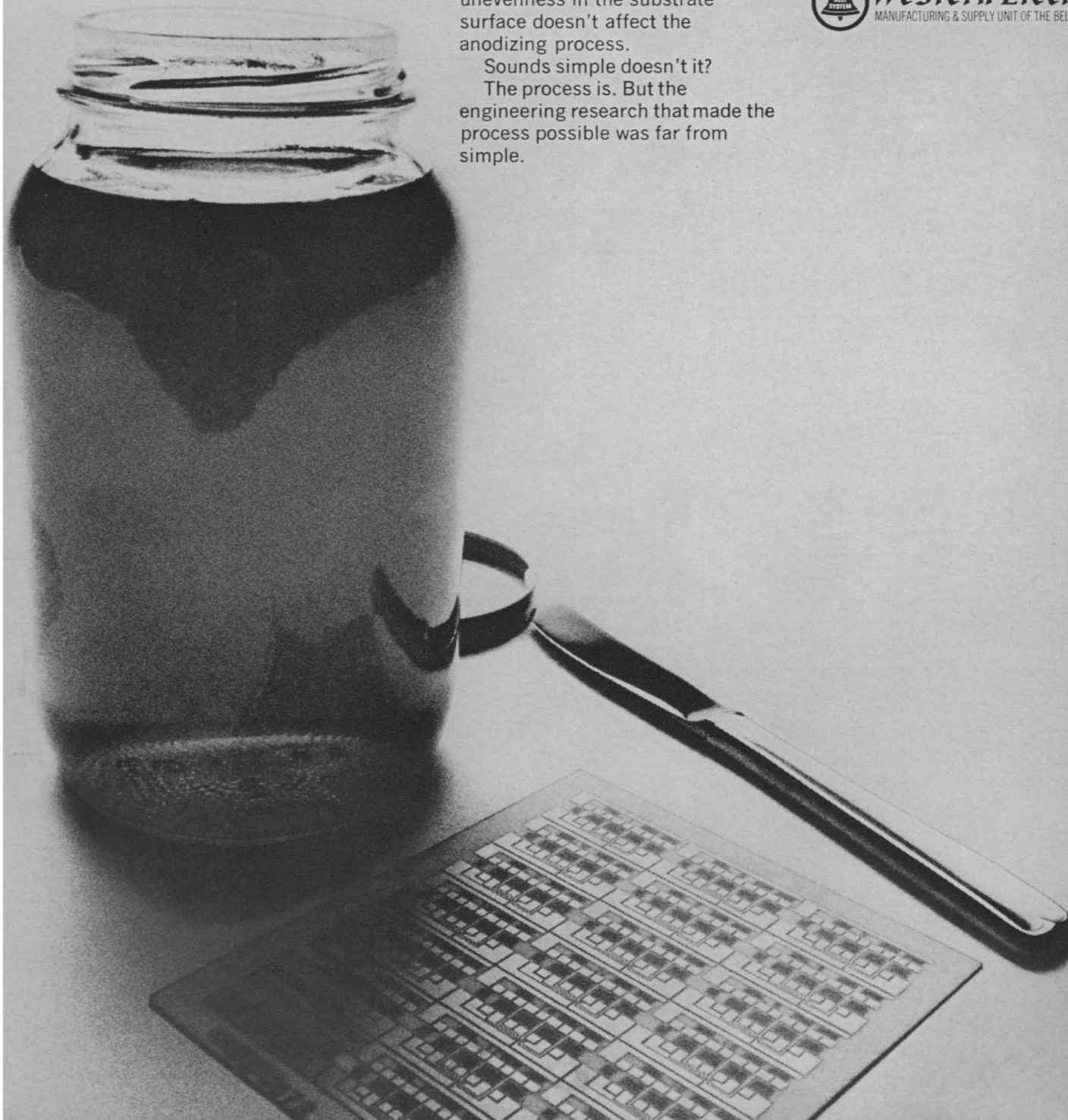
But this is the kind of thinking we come up with routinely. We must, to manufacture critical communications components within precise dimensions.

Making an electronic jelly sandwich is just one of a million ways we accomplish our task.

Which is to help supply the Bell System with what it needs at low cost.



**Western Electric**  
MANUFACTURING & SUPPLY UNIT OF THE BELL SYSTEM



# If the color on your film doesn't match the color of your specimen, it might as well be black and white.

You can't get accurate color unless your illumination matches the color balance of your film. There's a meter built into the Olympus Photomax that tells you when it does.

With any other photo-microscope, you have to shuffle a handful of filters, shoot some test rolls, keep accurate notes and pray a little before you know whether or not your color is right. With the Photomax, you know **before you shoot** whether your light's too red, too blue or right on the button—no matter what color film you're using.

And, since you can't get good color (or black-and-white, either) without accurate exposure, the Photomax automatically reads the light and sets your exposure. You don't have to read meters or adjust your shutter speed.

Even if you just shoot black-and-white, look into the Photomax. It costs a lot less than you think. And it might even start you shooting color.

Olympus Photomax. The only photo-microscope with a built-in color temperature regulator and meter.

## Olympus Photomax



OLYMPUS CORPORATION  
OF AMERICA

PRECISION INSTRUMENT DIVISION

2 Nevada Drive (N.H.P.-P.O.)  
Lake Success, New York 11040

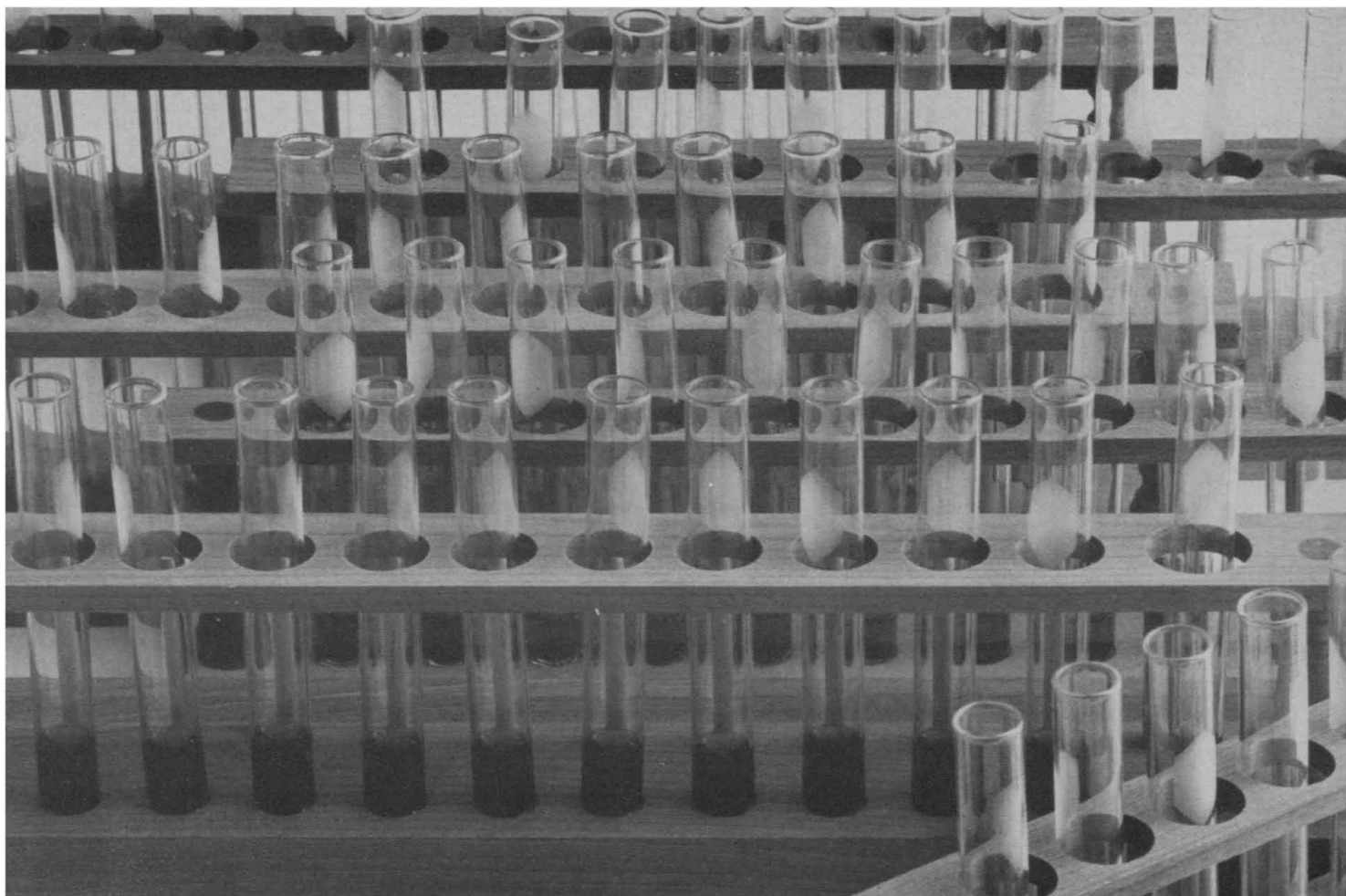
Send information on ☐ The  
Olympus Photomax, ☐ Olympus  
research and medical micro-  
scopes. My applications include:

Name \_\_\_\_\_  
Title \_\_\_\_\_  
Organization \_\_\_\_\_  
Address \_\_\_\_\_  
City \_\_\_\_\_  
State \_\_\_\_\_ Zip \_\_\_\_\_

Circle No. 7 on Readers' Service Card

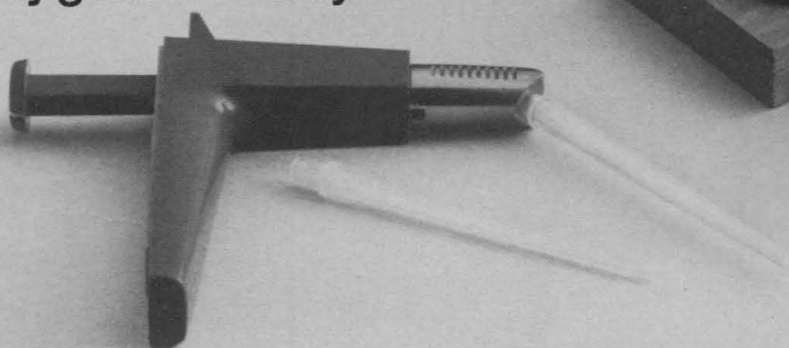






**Aliquots were pipetted into all of these tubes with the same automatic pipette in 3 minutes, 18 seconds.**

**Nobody washed anything.  
Nobody contaminated anything.  
Nobody got bored silly.**



The trick is this: all of the measured aliquot is held in the disposable plastic tip. None of it gets into the housing of the BIOPETTE automatic pipette. So we were able to switch from the first sample liquid to the second *just* by inserting a new plastic tip. No washing. No contamination.

The BIOPETTE is fast (about 2 seconds for both filling and discharging) and consistent ( $\pm 1\%$  using the same instrument) and easy (no meniscus myopia). Repetitive pipetting with minimum boredom. And the BIOPETTE is safe: liquid does not come in contact with operator.


The BIOPETTE automatic pipette boasts a ten-year war-

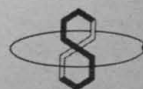
ranty. In the unlikely event that trouble develops, we will immediately send you a replacement while we fix yours for you. Comforting.

Now send for the detailed brochure that we enjoy sending to interested parties. Just write "Biopette Brochure" on a postcard with your name and address and zipcode, please.

**Schwarz BioResearch**

Orangeburg, New York 10962

A Division of Becton, Dickinson and Company 

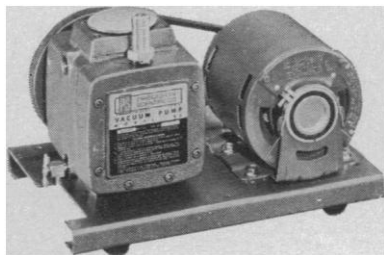


Biopette is a Trademark of Becton, Dickinson and Company



# What else is new at Precision Scientific?

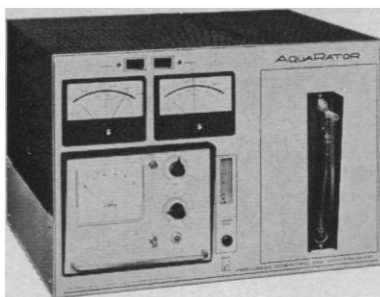
A great many things! These are but a few of the new and improved products designed to help you solve basic problems faster, more efficiently and with more positive results. Keep an eye on "Precision"... a variety of significant developments are in the making. And, keep in touch with your nearby Precision Scientific Distributor for fast, dependable service. Consult him on these products, or write us for the Bulletins mentioned below.



## PRECISION VACUUM PUMPS

Select the pump that's performance matched to your job—7 two-stage models, in capacities from 25 to 1500 liters/minute, at prices from \$150 to \$1600. Quieter, more compact, more efficient, yet less expensive than anything on the market today. Easy to service too—right on the spot! And they do a better pumping job! Compare published performance curves and you'll find Precision pumps are more efficient at actual working pressures—up to a remarkable 79% at one micron. Guaranteed ultimate vacuum runs to 0.1 micron of mercury— $1 \times 10^{-4}$  Torr. Request Bulletin 650-B, a 24-page catalog of complete pump data.

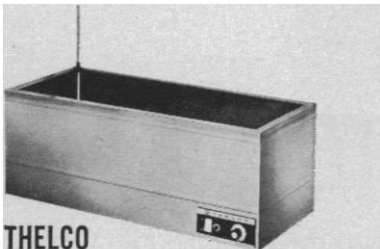
Circle No. 139 on Readers' Service Card



## PRECISION AquaRator™

Two-minute COD determinations! Gives repeatable data—to  $\pm 3\%$  or better—on water quality in time to take immediate corrective action. Low operating cost—uses inexpensive  $\text{CO}_2$  and saves hours in personnel time. Results are easily correlated with those of the standard COD method prescribed by the APHA, and are much more consistent than BOD tests. Applicable for rapid detection of process upset or product loss. Designed to measure oxygen demand in the range of 10 to 300 mg per liter, higher ranges by simply diluting. Request Bulletin 644.

Circle No. 140 on Readers' Service Card

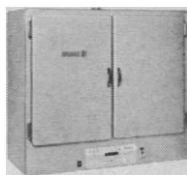


## THELCO CONSTANT TEMPERATURE BATHS

Thelco baths have been known to serve for 20 years and more. Why? Because only gravity convection is used. No moving parts to wear out or become noisy. Temperature uniformity is an excellent  $\pm 0.3$  or better at  $56^\circ\text{C}$ .

Lo-Drift heaters respond promptly, and their rapid heat transfer insures quick warm-up and long heater life. Heaters will not burn out should bath go dry. Temperatures from ambient to  $100^\circ\text{C}$ . Ask for Bulletin 617.

Circle No. 141 on Readers' Service Card



## THELCO 6M FORCED CIRCULATION INCUBATOR

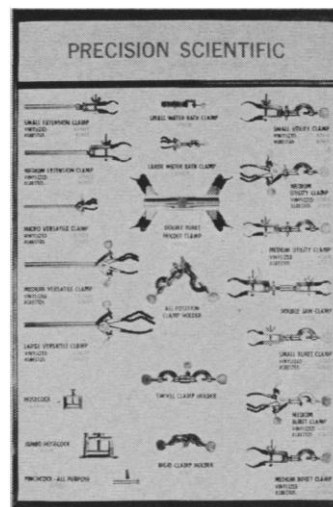
Four shelves give you 18 sq. ft. of work space in a cabinet only 42" w x 38" h x 21" d. Double the work space of comparable units! Guaranteed uniformity  $\pm 0.25^\circ\text{C}$  at  $37^\circ\text{C}$ ! Low velocity turbo-blower provides forced circulation with no hot spots, no cold spots! Request Bulletin 315.

Circle No. 142 on Readers' Service Card

## THELCO 32 CU. FT. INCUBATOR

Six shelves give you 30 sq. ft. of work space. Room for over 500 standard 300 ml BOD bottles. Takes only 31" x 37" floor space. Two models: Standard—ambient plus  $5^\circ$  to  $70^\circ\text{C}$ ; Low Temperature— $5^\circ$  to  $70^\circ\text{C}$ . Request Bulletin 322.

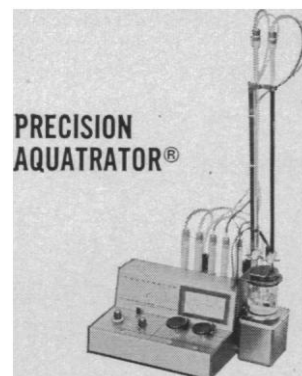
Circle No. 143 on Readers' Service Card



## LABORATORY CLAMPS

A complete line with the right clamp for your every laboratory need. Extension clamps, utility clamps, buret and double buret clamps and supports, support clamps, double jaw clamps, bath clamps, hose clamps and clamp holders. You name it... Precision's got it! Plus unique Lab-Frames® for sturdy, versatile lab set-ups. Constructed of PS Alloy® for unsurpassed strength, durability and corrosion resistance. Ask for Bulletin 641.

Circle No. 144 on Readers' Service Card



Accurate water determinations, reproducible to  $\pm 0.025$  ml of titrant, using standard Karl Fischer methods. Handles organics or inorganics, clear or opaque solutions, suspended solids, materials with high end point resistance. Selector switch gives you "direct" or "back" titrations without interchange of solution bottles. The budget-priced AquaRator offers the same level of accuracy and reproducibility as the—

## PRECISION AUTO-AQUATRATOR™

Automates standard KF methods for time-saving ease and convenience when running diversified samples of high or low water content. The last word in automatic water determinations. For complete details on both instruments, request Bulletin 657.

Circle No. 145 on Readers' Service Card



3737 W. Cortland St., Chicago, Illinois 60647  
Local Offices: New York • Chicago • Los Angeles

Circle No. 16 on Readers' Service Card →

# New Gamma / Guard GGA-150

The automatic gamma well scintillation counting system  
you'd have designed for yourself

- 1, 2 or 3 simultaneous scaler spectrometer channels for multi-peak studies
- accepts an additional sample changer for simultaneous multi-purpose counting without addition of electronics, for example: another GAMMA/GUARD or a LIQUID SCINTILLATION or a PLANCHET sample changer
- background subtract (1-999 cpm), low activity sample reject (10-1000 cpm or cps)
- choice of data presentation: lister, calculator, type-writer/tape punch readout plus numeric visual display
- accepts 25 and 16mm x 150mm test tubes and vials interchangeably in 2" or 3" detectors
- lowest background of any system available . . . 321 cpm for integral counting from 100 keV to  $\infty$  with 3" detector
- lowest background variation of any system available . . . 0.10 cpm per  $\mu$ c of Cs-137 for 100 KeV to  $\infty$  for 3" detector
- statistical accuracy can be verified with multiple sample repeat . . . counting samples 1-7 times
- 150 radioactive sample capacity

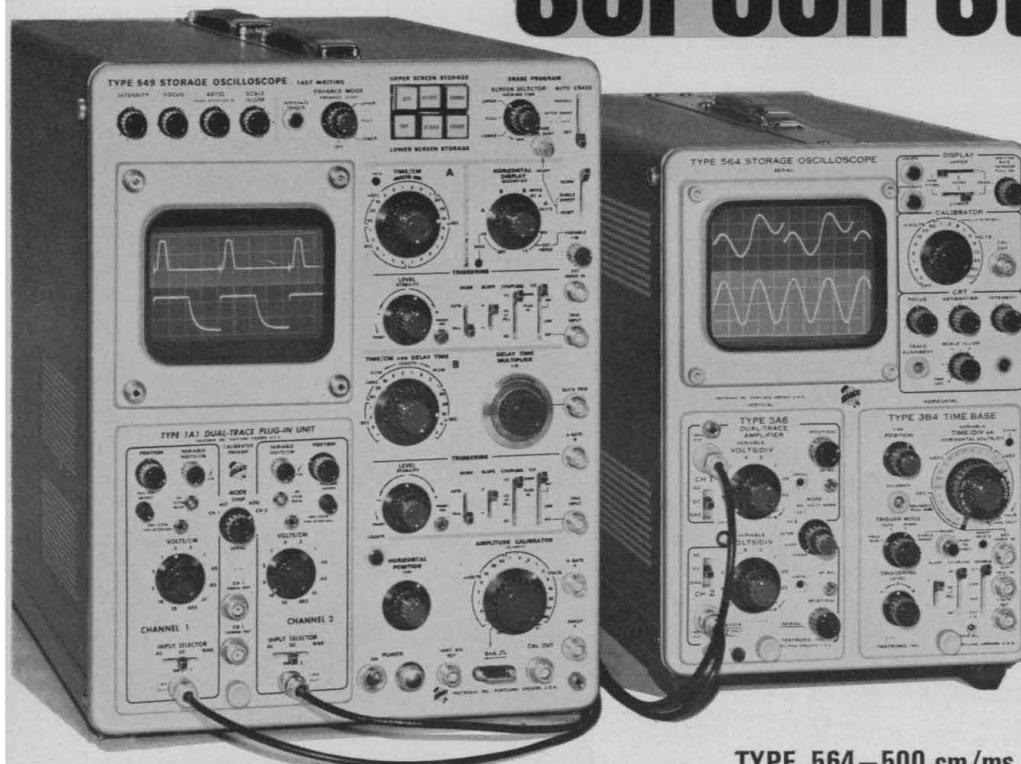


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or call your nearest Tracerlab office today.

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A Division of Laboratory For Electronics, Inc.  
Tel: (617) 894-6613 Waltham, Mass. 02154

# split-screen storage



with either  
of these  
**Tektronix**  
oscilloscopes

## TYPE 549—5000 cm/ms STORED WRITING SPEED

The exclusive Tektronix split-screen storage feature is available in two oscilloscopes, the Type 549 and the Type 564.

You can use these oscilloscopes for storage or conventional operation—simultaneously—through use of their unique split-screen display capabilities. Either half of the screen can be used for up to one hour of continuous visual storage, the other half for nonstored displays, or the entire area can be used for conventional or storage displays. Each half of the screen can be independently controlled. Erase time is less than one-quarter of a second.

Variable viewing time—an outstanding feature of the Type 549—allows you to automatically store displays, view them for a selected time, then automatically erase them on either or both halves of the screen. Two modes of operation are possible. In the After-Sweep Automatic Erase Mode, the selectable viewing time of 0.5 s to 5 s begins at the end of each complete sweep. After the viewing time, the display is automatically erased and the cycle begins again when the next sweep is triggered by a signal.

In the Periodic Automatic Erase Mode, the sequence of storing, viewing time and erasure is continuous and independent of the sweep or signal. In this mode, the viewing time can also be varied from 0.5 s to 5 s.

There is no degradation of stored traces during the selected viewing time, in either mode, and you can retain or erase displays manually whenever desired.

The Type 549 uses letter and 1-series plug-ins for vertical deflection. Bandwidth in nonstored operation extends from DC to 30 MHz, depending upon the plug-in used. Two integral time bases provide calibrated delayed-sweep operation.

For a demonstration, contact your nearby Tektronix field engineer or write: Tektronix, Inc., P. O. Box 500, Beaverton, Oregon 97005.

## TYPE 564—500 cm/ms STORED WRITING SPEED

With bistable storage oscilloscopes, such as the Type 564 and Type 549, the contrast ratio and brightness of stored displays are constant and independent of the viewing time, writing and sweep speeds, or signal repetition rates. This also simplifies waveform photography. Once initial camera settings are made for photographs of one stored display, no further adjustments are needed for photographs of subsequent stored displays.

Tektronix bistable storage cathode ray tubes are not inherently susceptible to burn-damage and require only the ordinary precautions taken in operating conventional oscilloscopes.

The Type 564 uses 2- and 3-series plug-ins for vertical and horizontal deflection. Bandwidth in nonstored operation extends from DC to 15 MHz, depending upon the plug-in used.

Multi-trace, differential, sampling and spectrum analysis are among the displays possible with either oscilloscope.

Type 549, without plug-in units . . . . . \$2475

Type 1A1 Dual-Trace Plug-In Unit . . . . . \$ 625  
DC to 30 MHz at 50 mV/cm, to 23 MHz at 5 mV/cm. 2 Hz to 14 MHz at 500  $\mu$ V/cm, single channel.

Type 564, without plug-in units . . . . . \$ 925

Rack-Mount RM564, 7" high . . . . . \$1025  
Similar electrical specifications to Type 564.

Type 3A6 Dual-Trace Plug-In Unit . . . . . \$ 525  
DC to 10 MHz, 10 mV/div to 10 V/div. Signal delay. 5 display modes.

Type 3B4 Time Base Unit . . . . . \$ 425  
Sweep speeds from 0.2  $\mu$ s/div to 5 s/div. Single sweep. Up to X50 direct-reading magnifier extends fastest sweep to 50 ns/div.

U.S. Sales Prices FOB Beaverton, Oregon

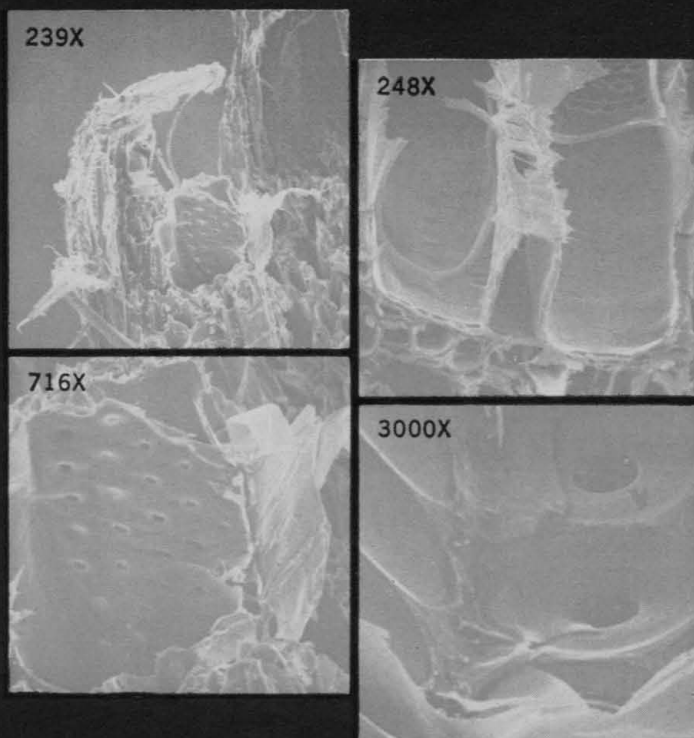



Depth and breadth of product line



... part of the Tektronix commitment  
to continuing customer service





examination is a snap  using a  
JSM scanning electron microscope.

To produce the micrographs above, a match was broken, coated and placed in the JSM, permitting direct observation without tedious replication processes. The extreme depth of field as shown above is far greater than that achievable on optical or transmission electron microscopes.

The JSM can accommodate specimens as large as 25 mm x 10 mm. Its flexibility permits studies of surface topography, cathodeluminescence, electromotive force, absorbed current, even *transmission electron microscopy*.

The JSM is currently being employed in the following areas: Fractology, Semiconductors, Geology, Fibers, Biology, Particle Analysis, Metallurgy, Coatings, Paper, Plastics.

With direct experience in these areas, JEOLCO Applications Centers welcome your inquiries — whatever your interests.



JEOLCO (U.S.A.), Inc.

Electron Optics Division • 477 Riverside Avenue  
Medford, Massachusetts 02155 • (617) 396-6021

Filter plus clear, durable polycarbonate frame. As simple as that. The Econo-Filter System comes with a choice of two filters. A disposable filter insert which can be used for an experiment and thrown away. Or a reusable autoclavable nonwoven filter cover that's good for extended use in a number of experiments.

Because the Econo-Filter System is so remarkably simple in design, so completely practical, it's low in cost

as well as effective. As effective as any general filtration system can be. It protects laboratory animals from airborne contaminants such as viruses, insects and dust and helps prevent infantile diarrhea. It also provides protection against sudden temperature changes and drafts.

The Econo-Filter System fits all standard plastic mouse cages without special adaptors. With ample room for a full-size water bottle. And full visibility on all four sides.

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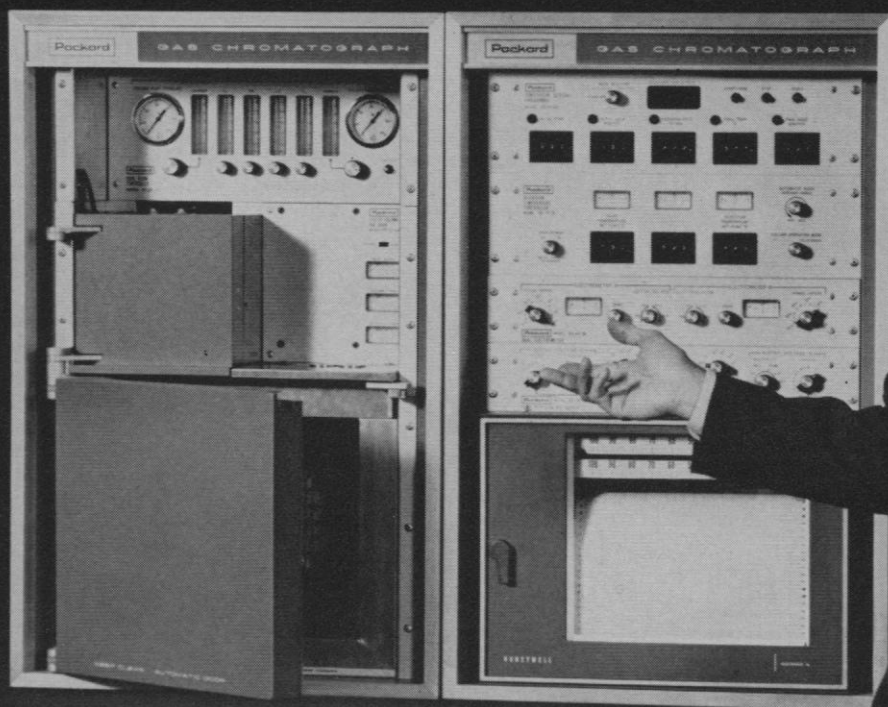
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1. A. Walsh, Appl. Opt. 7, 1259 (1968) lists total annual world-wide AA instrument sales. We know ours.

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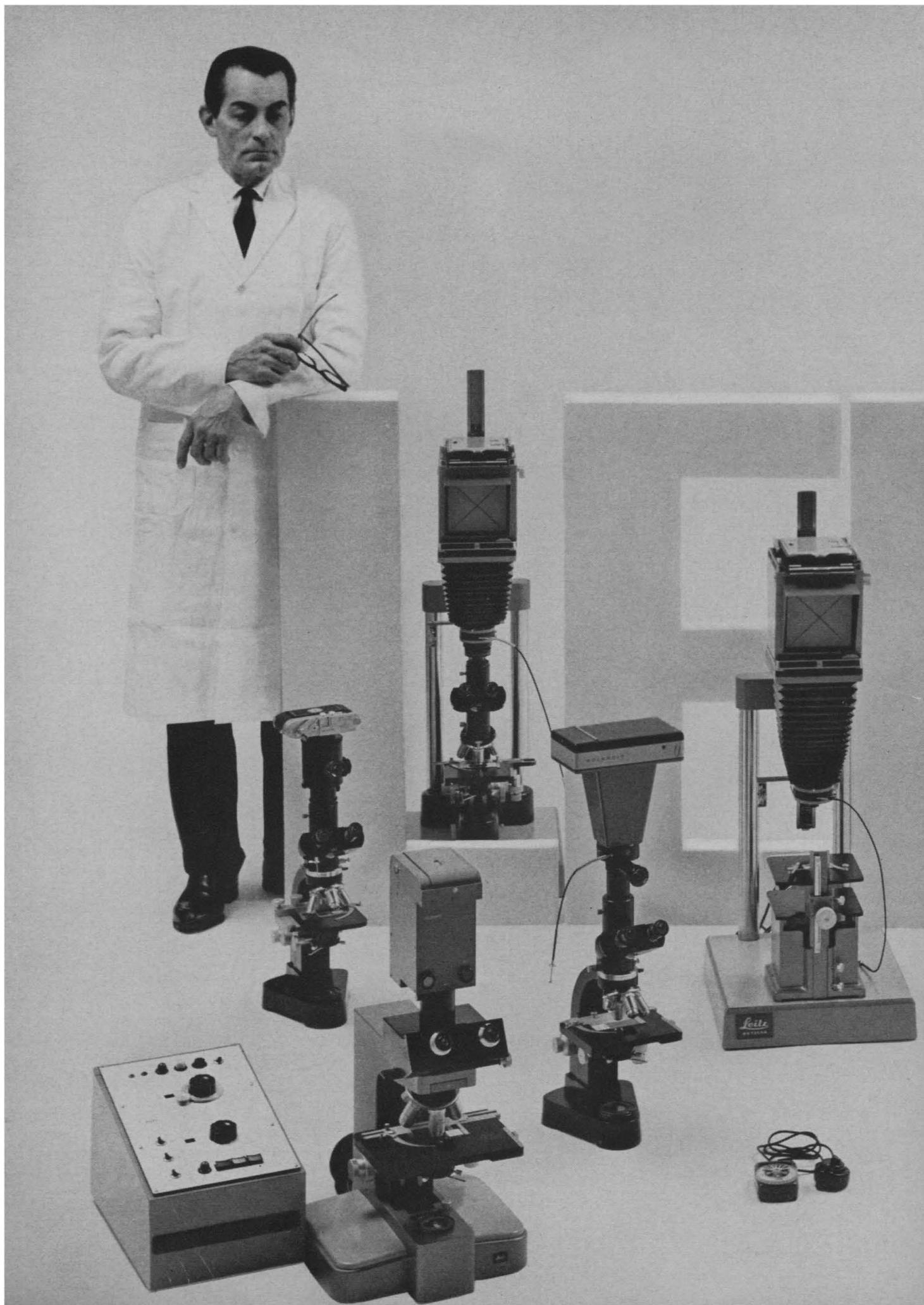
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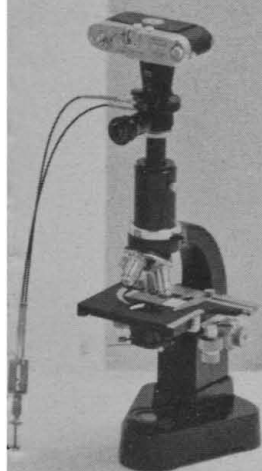
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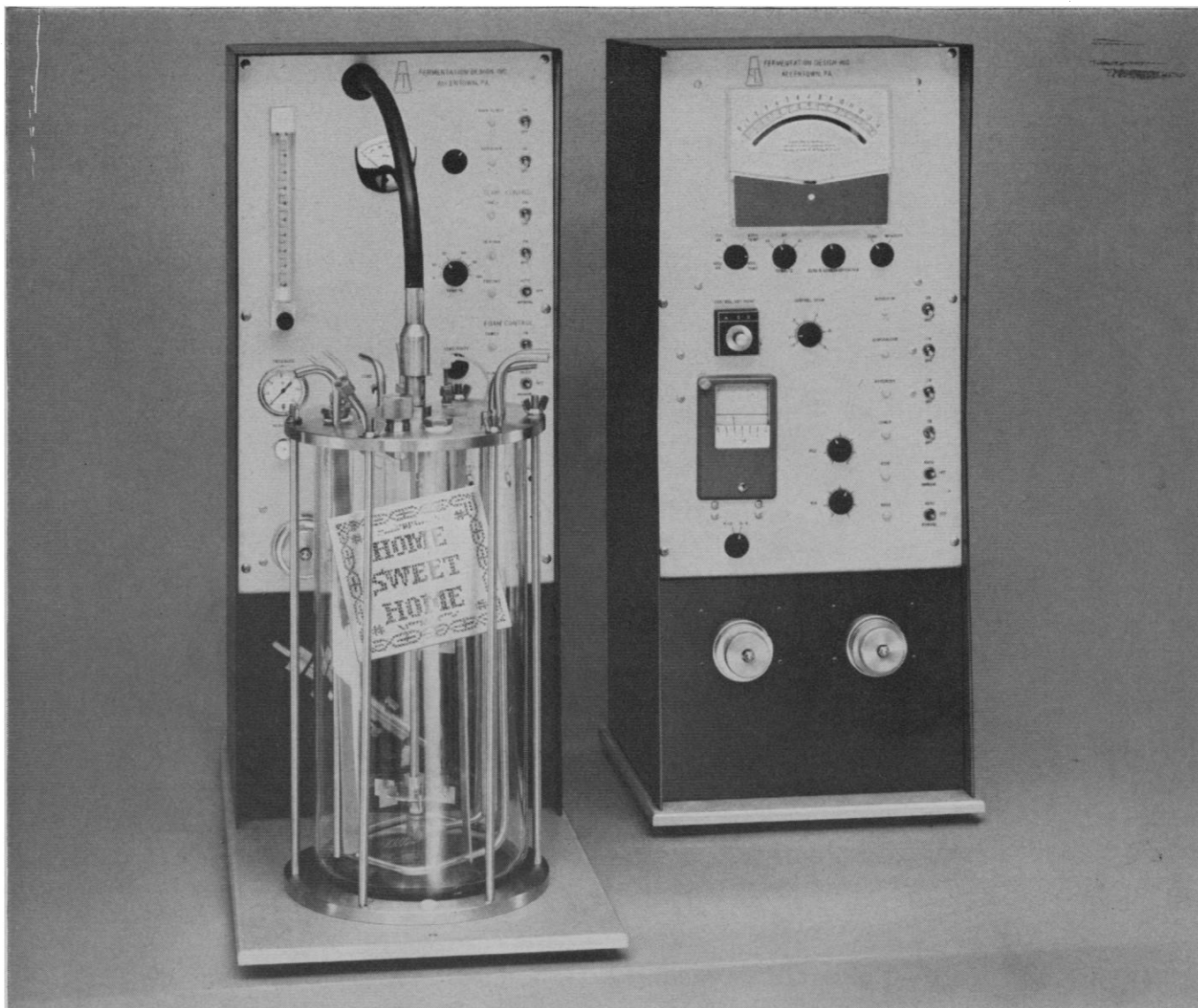
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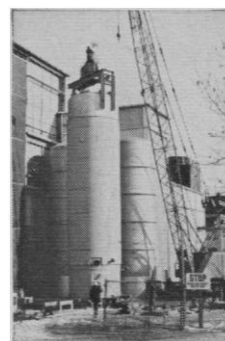
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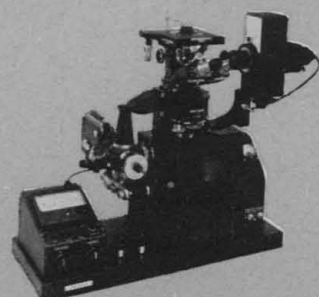
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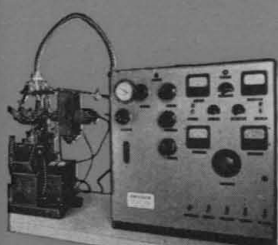


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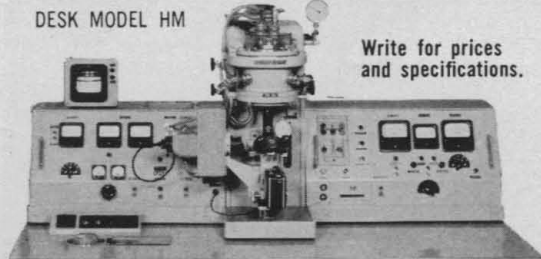
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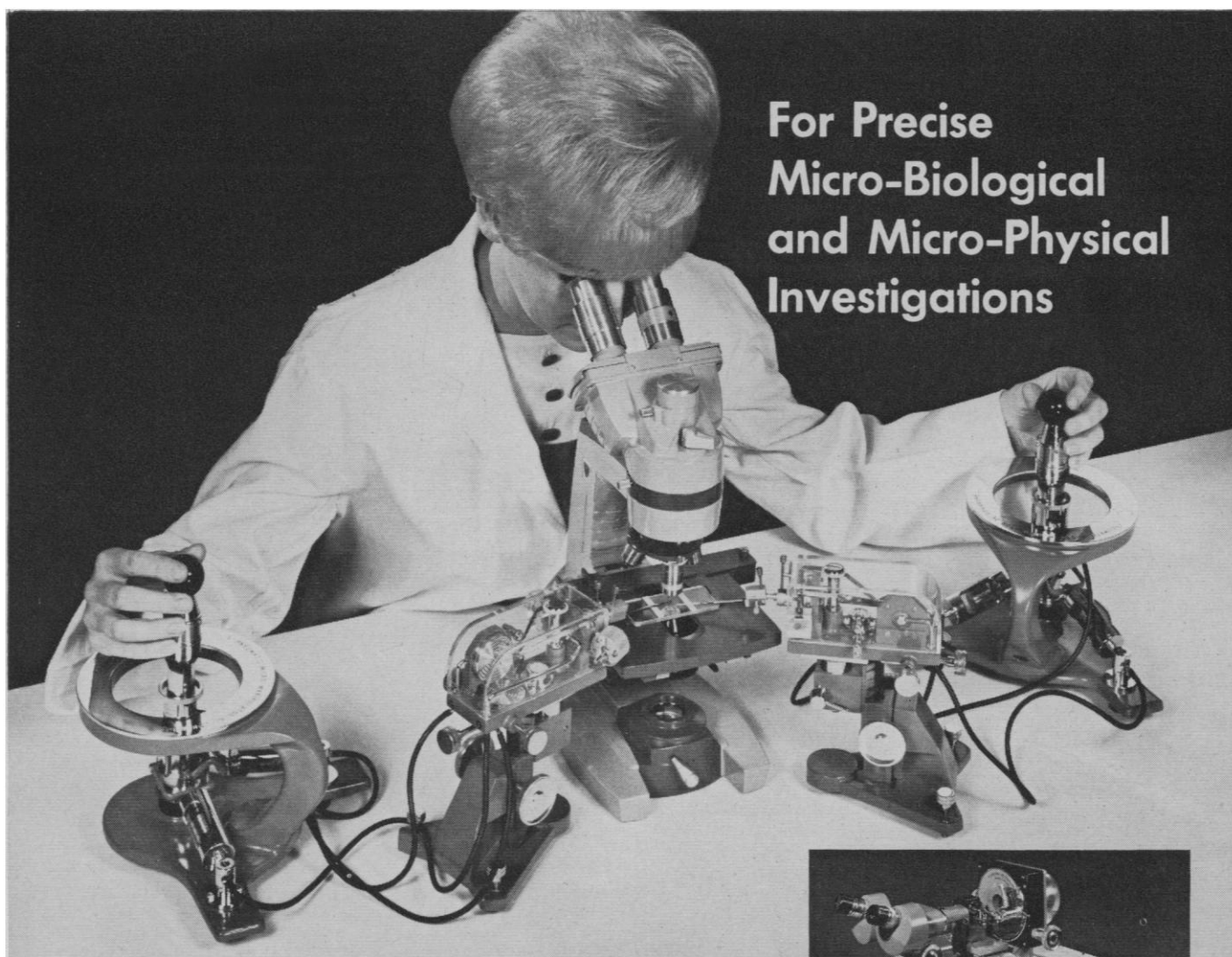
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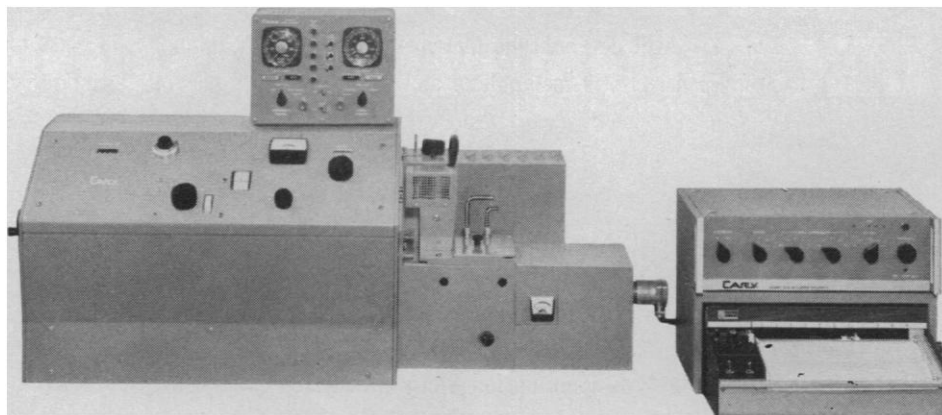
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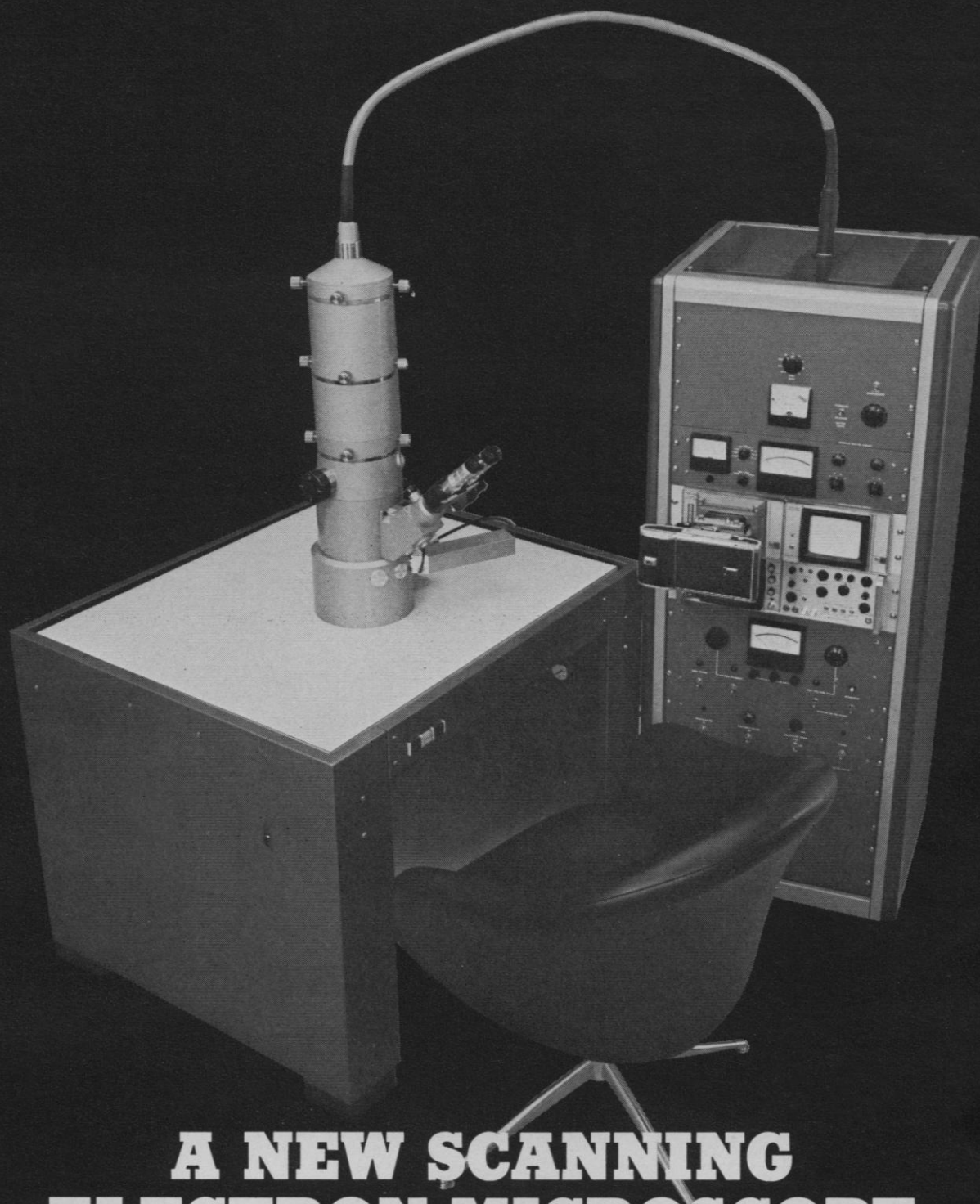
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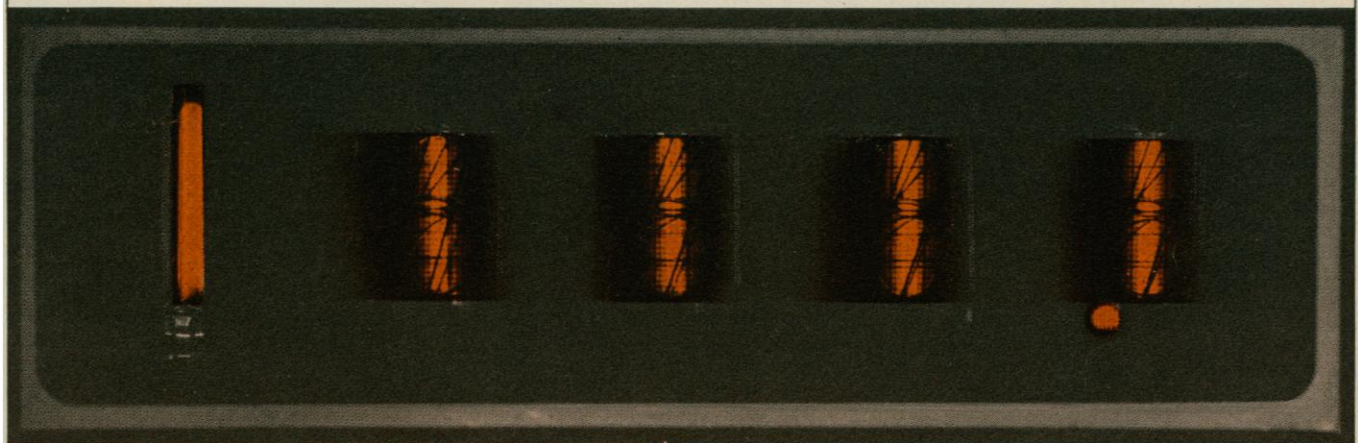
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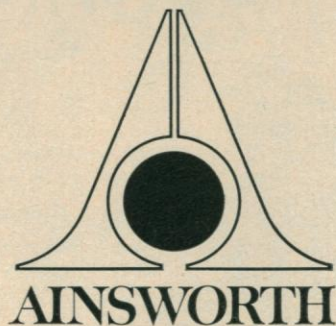
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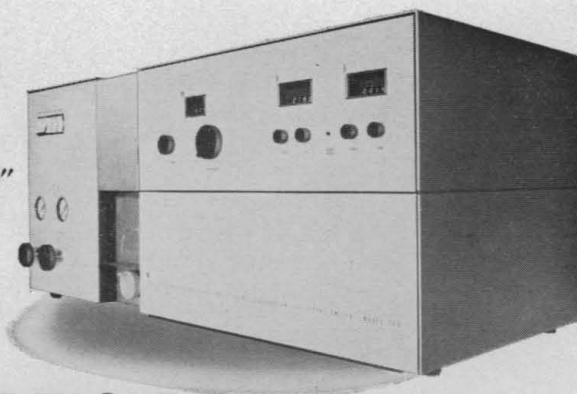
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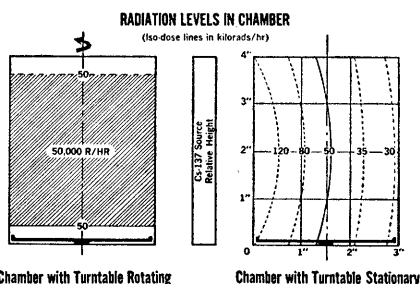
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The Hasselblad System not only has multiple lenses and magazines, it also consists of multiple Hasselblads. The standard Hasselblad is the 500C. It accepts all 8 Hasselblad lenses, and has a ground glass reflex viewing screen which shows your 3-dimensional pictures in 2 dimensions. And naturally, the lens, magazine, focusing hood, and winding knob of the 500C are instantly interchangeable.

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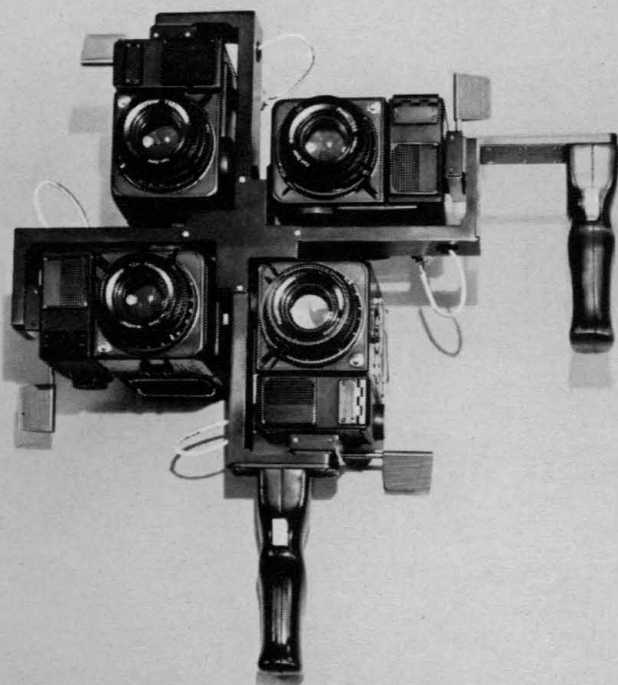
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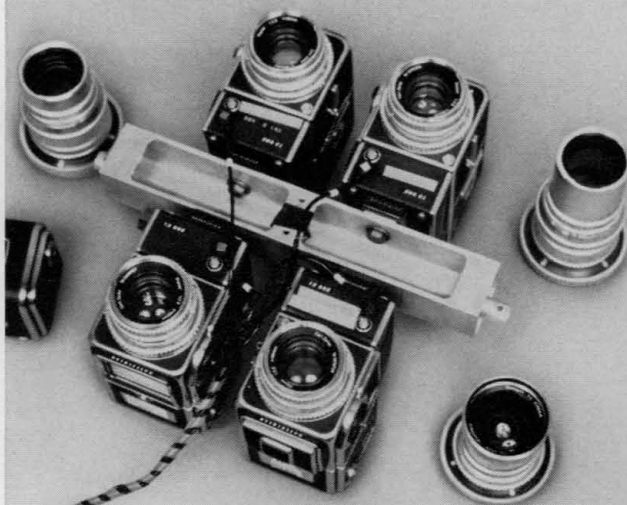


**The Hasselblad System**

Shown is the NASA ganged Hasselblad Electric Camera array, designed for Experiment S065 (Multiband Terrain Photography-Hand Held), proposed for use in the Apollo Man-to-the-Moon Program. Photo courtesy of NASA.



Pictured is the U.S. Army's Hasselblad 4-camera system for the photographic interpretation of multi-emulsion studies contributing to environmental analysis. Photo courtesy of the U.S. Army Cold Regions Research and Engineering Laboratory.



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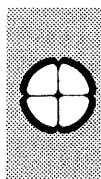
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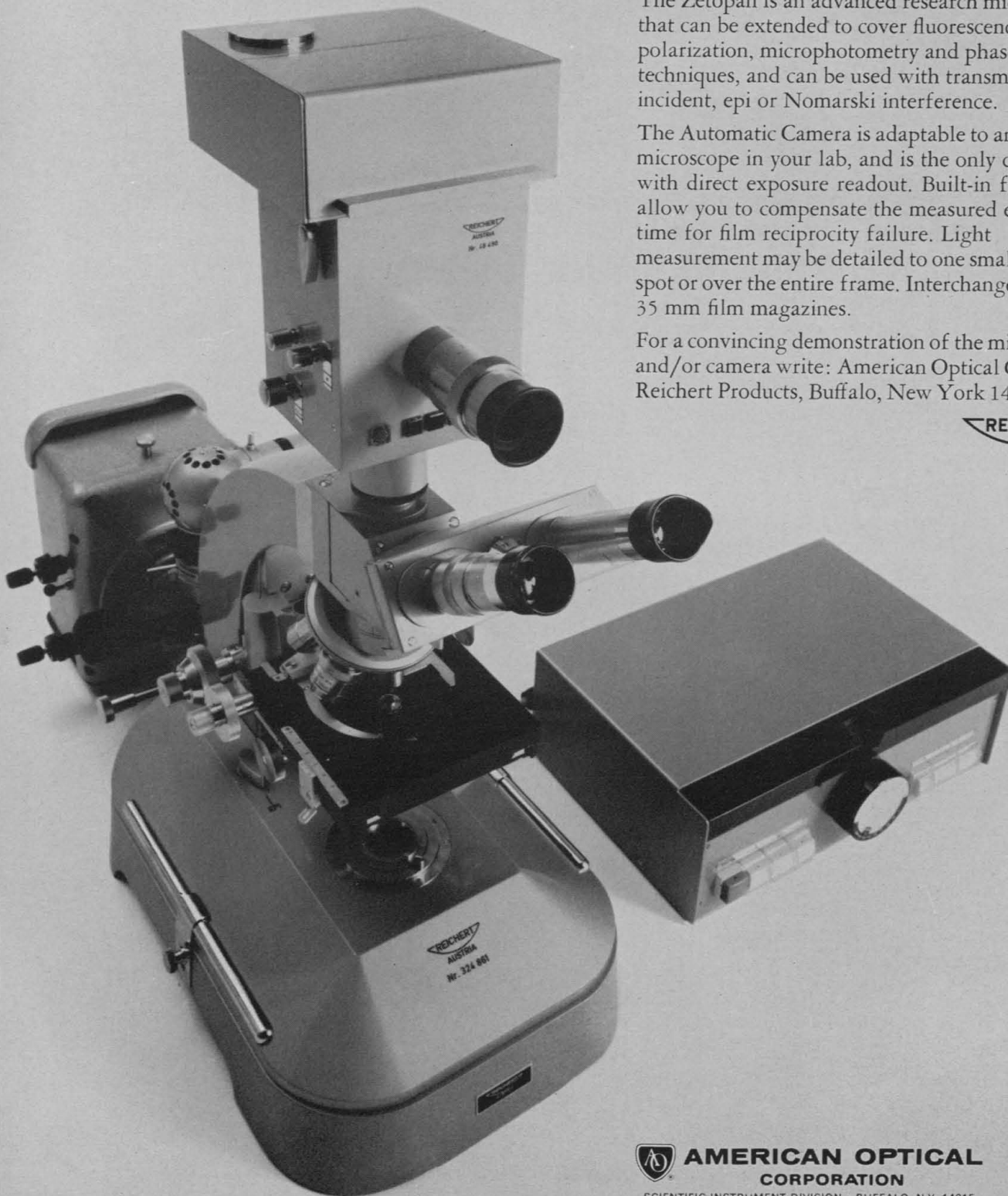
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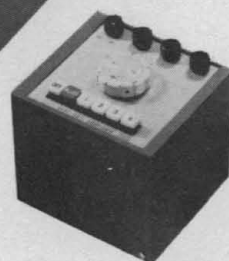
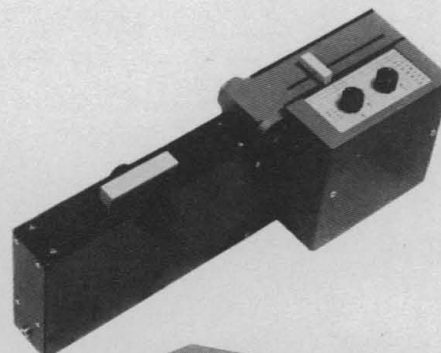
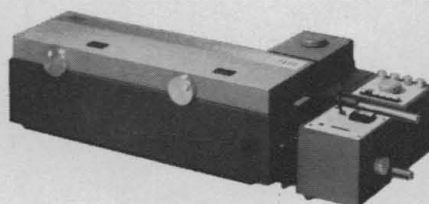
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# 2 NEW AAAS SYMPOSIUM VOLUMES

## • Biology of the Mouth • Folk Song Style and Culture

### Biology of the Mouth

**Editor: Philip Person, Chief, Special Research Laboratory for Oral Tissue Metabolism, Veterans Administration Hospital, Brooklyn.**

320 pp., electron micrographs and other illustrations, bibliog., index, 1968.

Price: \$10.00. AAAS members' cash orders: \$8.75.

A collection of comprehensive, multi-disciplinary articles dealing with problems of the biology of the mouth and of oral disease and also the borderlands where fundamental approaches and investigations in physics and chemistry relate to, and can be brought to bear on, such problems. Among the disciplines represented are comparative anatomy and histology (light and electron microscopy), comparative molecular biochemistry, anthropology, paleontology, neuroanatomy and neurophysiology, zoology, botany, solid-state physics, and chemical physics. An attempt is made to integrate these varied contributions, to provide a broad perspective in which important mutual interests are identified and explored. This perspective includes the classical disciplines of Darwinian biology and the more recent disciplines of molecular and quantum biology, as well as their relationships to diseases of the mouth and oral structures. A feature of the volume is a highly original and significant contribution by Professor J. Z. Young dealing with the influence of the mouth upon the evolution of the brain.

#### Contents

Foreword: Place of Dentistry in Science.

Biology of Oral Tissues and Oral Disease: Darwin and Quantum.

Influence of the Mouth on the Evolution of the Brain.

Bone, Dentin, and Enamel and the Evolution of Vertebrates.

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Biological Significance of Water Structure.

Water and Electrolyte Balance in Cells and Tissues.

Molecular Evolution of Connective Tissue.

Comparative Ultrastructure and Organization of Inorganic Crystals and Organic Matrices of Mineralized Tissues.

### Folk Song Style and Culture

**A Report on Cantometrics by the Staff of the Cantometrics Project of Columbia University, Alan Lomax, Project Director.**

384 pp., 80 illus., 87 tables, bibliog., index, 1968.

Price: \$16.75. AAAS members' cash orders: \$14.50.

Working with a large sample of recorded songs and filmed dances from

all culture areas of the world, the Cantometrics Project has discovered some of the ways in which song and dance style vary by culture area. Strong statistical relationships have been established between a set of basic factors of social and economic structure and performance style. The book reports on an imaginative yet rigorous exploration of the paralinguistic and parakinesic realms and a thoroughgoing test of the hypothesis that factors of cultural style are primary forces in shaping all human behavior. Performance style here becomes a psychocultural indicator, and, for the first time, the social and cultural import of the expressive act is firmly established.

#### Contents

The Stylistic Method; The Cantometrics Experiment; The Cantometric Coding Book; The World Song Style Map.

Consensus on Cantometric Parameters: A. Consensus Testing; B. The Paralinguistic Framework.

Song as a Measure of Culture; Social Solidarity; Self-Assertion, Sex Role and Vocal Rasp; Effects of Infantile Stimulation on Musical Behavior.

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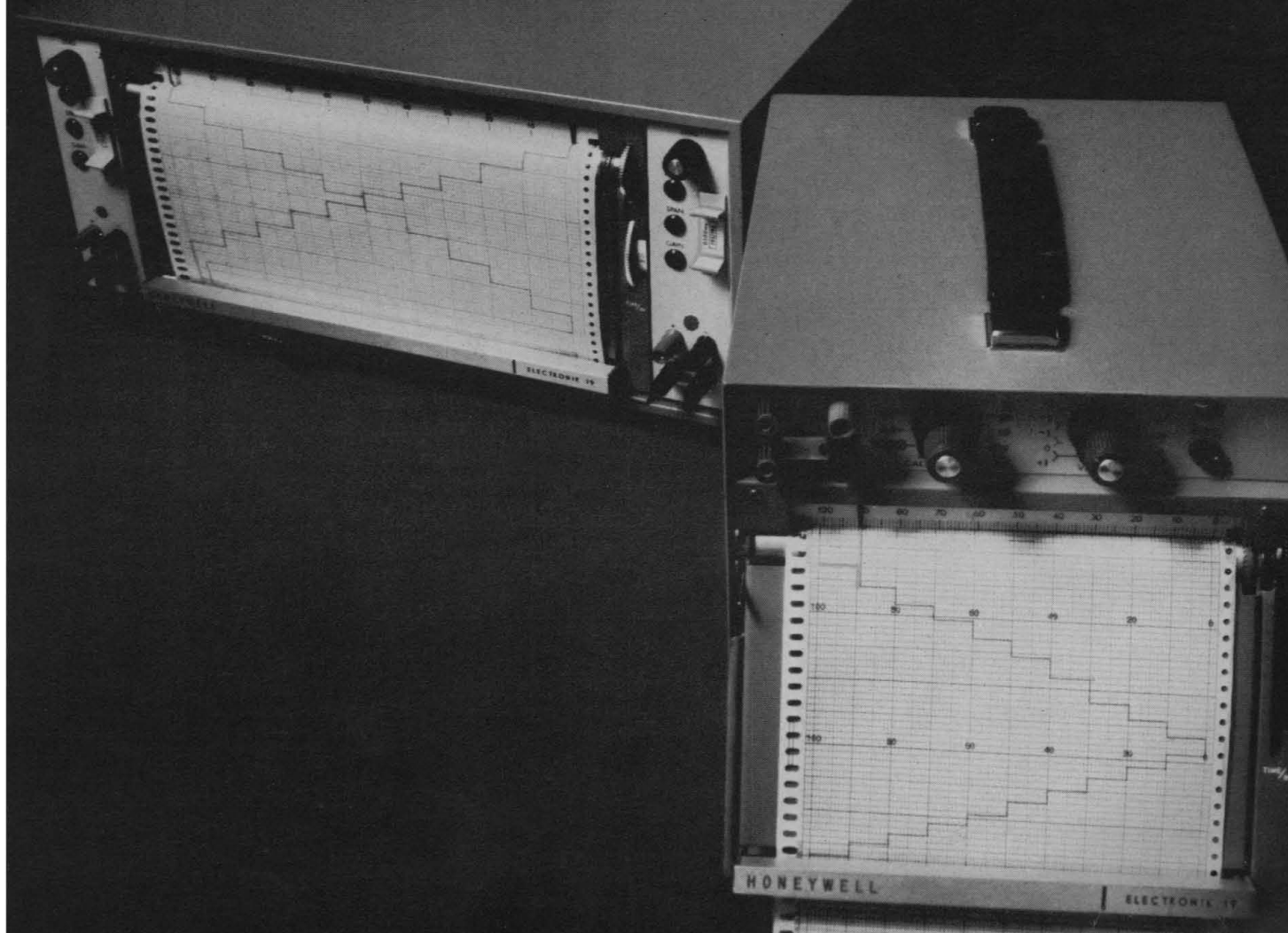
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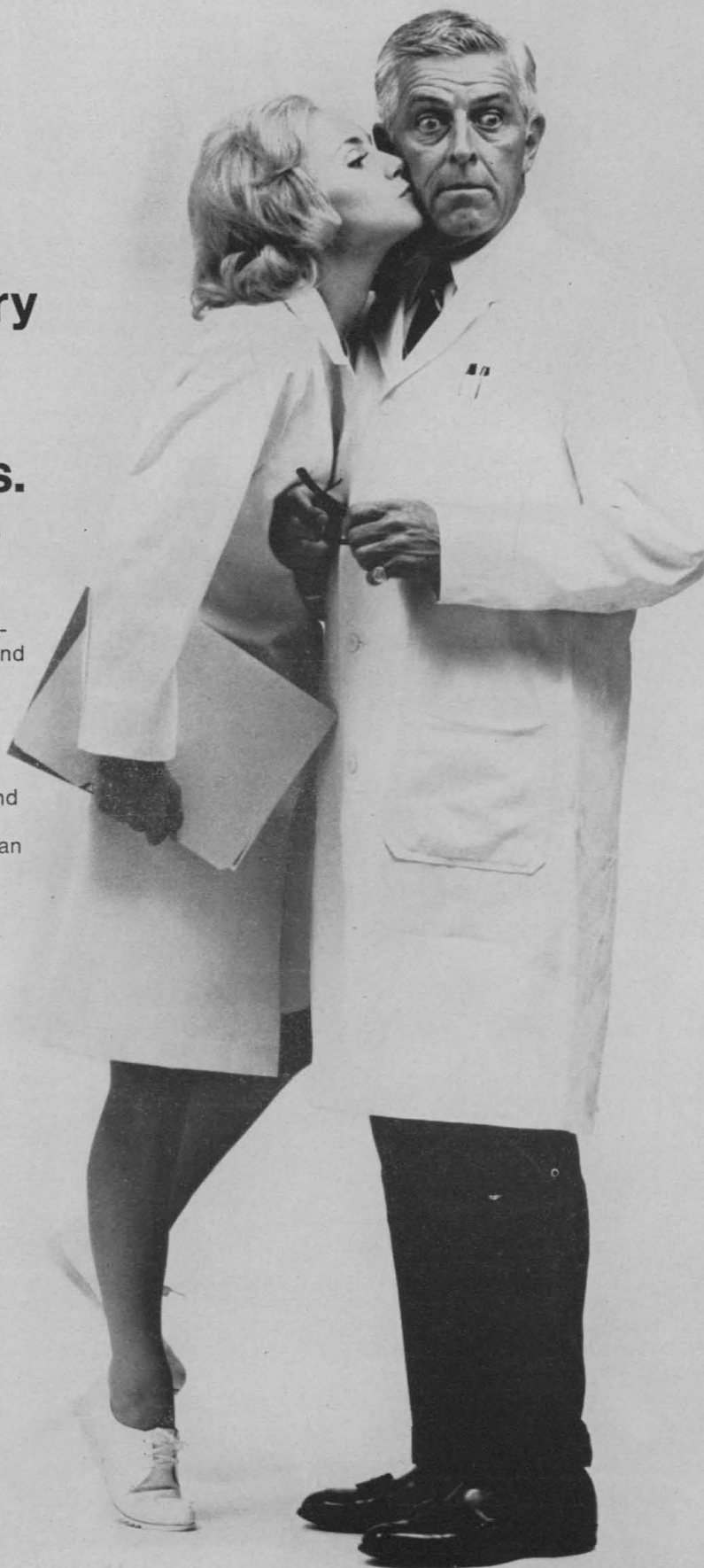
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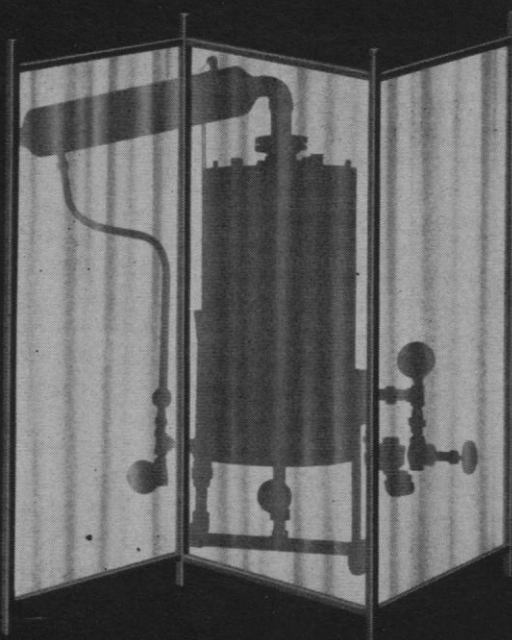
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are clean and well cared for, and I can't believe that animals are shipped under poor conditions, for the death of even one animal means a loss of several dollars.

Perhaps the depletion of Amazonian fauna in the Leticia area cannot be justified. I just don't know. But I feel that, in this case at least, human lives are more important than the lives of lower animals. The fact is that a substantial local industry centers around "the honorary U.S. Consul." Hundreds of families leading a marginal existence have been uplifted by the opportunity to work. No one has so far suggested a better way of earning a living there. Virtually all industries along the Amazon depend upon "exploitation" of the natural resources in some way.

ALAN MARK FLETCHER

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There exists in the Organization of American States a Convention on Nature Protection and Wild Life Preservation in the Western Hemisphere which became effective 1 May 1942. Colombia was a signatory country but unfortunately has not yet ratified the Convention, although the United States has, as well as Argentina, Brazil, Costa Rica, Dominican Republic, Ecuador, El Salvador, Guatemala, Haiti, Mexico, Nicaragua, Peru, and Venezuela. The Convention calls for each government

... to take the necessary measures to control and regulate the importation, exportation and transit of protected fauna or flora, or any part thereof, by the following means: (1) the issuing of certificates authorizing the exportation or transit of protected species of flora or fauna, or parts thereof; (2) the prohibition of the importation of any species of flora or fauna, or any part thereof, protected by the country of origin unless accompanied by a certificate of lawful exportation...

During the past 2 years the Department of Scientific Affairs has compiled a list of endangered species in the OAS member countries. We have received such lists from the United States, Argentina, Bolivia, Costa Rica, Ecuador, El Salvador, Guatemala, Panama, Peru, Uruguay, and Venezuela. Colombia has stated that it would make such a list available; so far this has not been received.

Since Colombia has not yet ratified the Convention and has not furnished a list of endangered species, it is clear that even those countries that ratified



the Convention can import, subject only to national legislation of the importing country, the materials mentioned by Quaintance.

JESSE D. PERKINSON

*Department of Scientific Affairs, Pan American Union, Washington, D.C.*

### **Census Data: A Necessity in Antipoverty Planning**

The letters of Irving Crespi and Congressman Jackson E. Betts (31 May), regarding the 1970 Census give the views of those who employ census data for secondary analysis and of the public servant who is concerned with individual privacy and a simple headcount of the population for apportionment purposes.

In the Office of Economic Opportunity, the geographic allocation of funds for supporting antipoverty programs is dependent on headcounts of the population in poverty, using information from surveys about each person's family living arrangements and income. In the so-called "small areas," which are census tracts in large communities or administrative areas and minor civil divisions in smaller communities, similar data are needed for planning and evaluating neighborhood-based activities in areas of concentrated poverty. Without such data, how can these substantial and expensive programs be responsibly administered? Social statistics for these "small areas" on a national basis are available only when an extremely large survey, such as a decennial census, is taken because the data required are comprised, as it were, of the results of thousands of surveys of localities and small places taken simultaneously throughout the country.

As of now, it is 8 years since we've had up-to-date small area data. If Betts proposes as an alternative, say, a national 25-percent sample survey every 2 years (for which 50 million people would be surveyed), that would be an adequate substitute for purposes of securing data. However, before any attempt is made to reduce the number of questions in the 1970 Census, I propose that a clearly adequate alternative be developed which satisfies the small area data needs of public and private agencies.

GORDON F. SUTTON

*U.S. Office of Economic Opportunity,  
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## Expenditure Ceilings

In exchange for approving the increase in income taxes requested by the President, Congress has insisted that federal expenditures be decreased by \$6 billion in the 1969 fiscal year. Congress refused, however, to decide where all of the reductions should be made. The President must therefore decide, within appropriation ceilings, how much money can actually be spent during the year for each of a wide variety of activities and programs approved by Congress. In this way Congress has given the President (partially) a power it has steadily refused him in the past: the power to veto individual items within a bill.

All the science-supporting agencies must plan to reduce expenses this year. Their plans take different forms. The National Science Foundation has computed an expenditure ceiling for each of its grantee institutions and has delegated authority to the institution to decide how funds, within that ceiling, will be allocated among its NSF grants.

These changes, beginning with Congress, can be thought of as examples of the practical political principle: when budgets are expanding, take the credit for yourself; when budgets are contracting, make someone else take the blame. But there is more to look for than that. Authority to allocate funds within a ceiling amount is not wholly equivalent to an institutional grant, for the funds can be used only for projects and programs that NSF has approved, but there is a great shift in the locus of authority, and each grantee institution must decide how to use its new authority.

(The National Institutes of Health, which involves many different institutes and appropriations, has not found it feasible to establish ceilings for each grantee institution, and plans to negotiate reductions individually with its grantees.)

Universities are adopting different methods of reducing expenses under NSF grants to the ceilings set. Some have asked a faculty committee or an administrative body to decide how the ceiling amount can best be used. This procedure will give the institution added experience in corporate responsibility, but the responsible central body is likely to get much of the blame from disappointed project personnel.

Other universities are apportioning their ceiling amounts among individual departments (or other organizational units) in proportion to last year's expenditures of NSF funds. If the shortage of funds is brief, and if the institution can defer some major new expense (such as a building), apportioning available funds by departments will permit many activities to be kept alive while everyone involved hopes for more normal funding in a year or two. But if the shortage continues for longer, dividing the available money on a department-by-department basis is an invitation to mediocrity, for the money will be scattered too thinly, and the poorer projects may fare relatively as well as the more brilliant ones.

Moreover, if the actions of this year presage a permanent shift in emphasis from a budget expressed in terms of appropriations or obligations to one expressed in terms of expenditures, we must expect substantial further changes in grant management at both agency and grantee levels.

All in all, if there were an annual prize for the greatest impact on national science policy, this year's winner would be Wilbur Mills, chairman of the Committee on Ways and Means and chief advocate of the budget reduction.—DAEL WOLFLE





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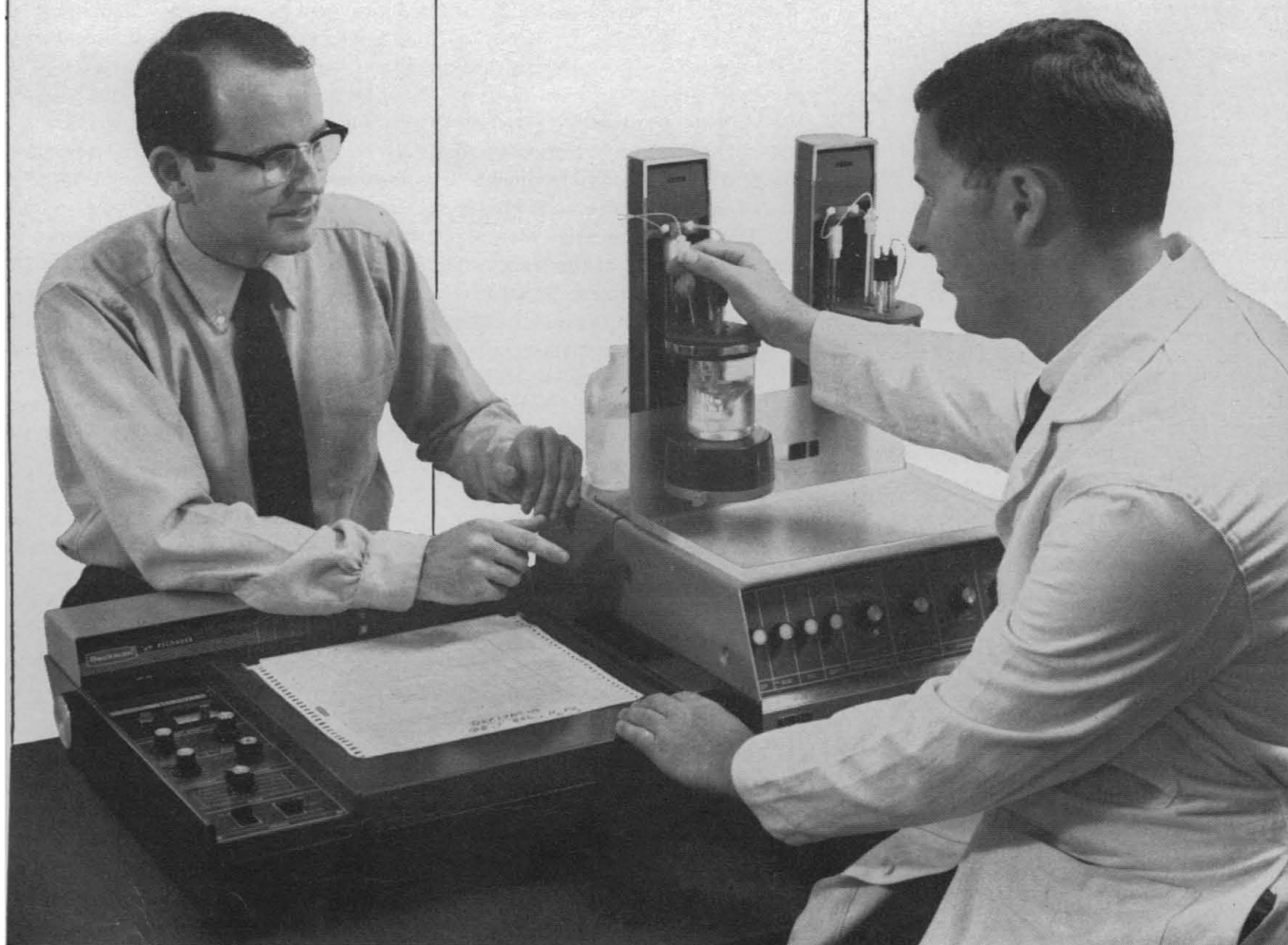
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Arctic. It may well be ready for the next meeting of INQUA and should be translated into English to give a greater percentage of arctic scientists a better idea of the impressive integrative results of our Soviet colleagues.

The symposium left, however, one basic question unanswered. How did the ice cover of the Arctic Ocean fluctuate since the Late Tertiary? This problem became a basic issue of the symposium discussions. However, the discussions pointed out only that the Soviet colleagues are presently divided into two camps, one for, and one against the open Arctic Ocean at interglacial times. The evidence from mathematical calculations based on climatic models, from stratigraphic, and from marine and terrestrial biological data seems to remain inconclusive, although each camp has strong adherents. Perhaps a greater number of corings in the Arctic Ocean and the paleomagnetic analysis of the cores will solve this problem.

In contrast to western scientists, who are now in the great majority adhering to some version of continental drift, the Soviet colleagues seem about equally divided into "drifters" and adherents of other explanations—for example, the expanding earth, and the oceanization or subsidence theory.

It may have been necessary to hold the symposium only for scientists of the Soviet Union, as already this amounted to a mammoth effort for the organizers. The participants, of whom only a minute fraction will be able to attend the next INQUA meeting or other conferences abroad, would certainly have benefited greatly, however, from an up-to-date review of, for example, the Canadian Polar Shelf Project or the work of the U.S. Geological Survey on Beringia.

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*Queen's University, Kingston,  
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## Calendar of Events

### National Meetings

#### October

28-30. **Hybrid Microelectronics Symp.**, Chicago, Ill. (J. English, Cozzens and Cudahy, 9501 W. Devon Ave., Rosemont, Ill. 60018)

28-31. **American Assoc. of Blood Banks**, Washington, D.C. (L. J. James, 30 N. Michigan Ave., Chicago, Ill. 60602)

28-31. **Instrument Soc. of America**, New

York, N.Y. (H. S. Kindler, The Society, 530 William Penn Pl., Pittsburgh, Pa. 15219)

28-1. **Society for Experimental Stress Analysis**, San Francisco, Calif. (The Society, 21 Bridge Sq., Westport, Conn.)

29-31. **Conference and Workshop on Applied Climatology**, Asheville, N.C. (H. T. Harrison, Route 1, Box 266, Weather-ville, N.C. 28787)

31-1. **Educational Conf.**, 33rd, New York, N.Y. (W. S. Litterick, Educational Records Bureau, 21 Audubon Ave., New York 10032)

31-1. **Entomological Soc. of America**, 40th, Philadelphia, Pa. (J. P. Johnson, Connecticut Agricultural Experiment Sta., Box 1106, New Haven 06504)

31-1. **American Soc. for Microbiology**, 8th, New York, N.Y. (R. W. Sarber, 115 Huron View Blvd., Ann Arbor, Mich.)

31-1. **Symposium on Social Behavior**, 2nd, Oxford, Ohio. (R. A. Hoppe, Dept. of Psychology, Miami Univ., Oxford)

31-1. **American Soc. of Tropical Medicine and Hygiene**, Atlanta, Ga. (G. M. Jeffery, P.O. Box 295, Kensington, Md.)

31-2. **Gerontological Soc.**, Denver, Colo. (The Society, 660 S. Euclid, St. Louis, Mo. 63110)

31-2. **Society of Photographic Scientists and Engineers**, Washington, D.C. (R. A. Jones, Papers Chairman, Mail Sta. 68, Perkin-Elmer Corp., Norwalk, Conn. 06852)

### November

1-2. **Central Soc. for Clinical Research**, Chicago, Ill. (J. Eckstein, Dept. of Internal Medicine, Univ. of Iowa Hospitals, Iowa City 52240)

1-3. **National Council for Geographic Education**, 54th, Kansas City, Mo. (E. Eiselen, The Council, Room 1532, 111 W. Washington St., Chicago, Ill. 60602)

1-4. **Research in Medical Education**, 7th conf., Houston, Tex. (P. J. Sanazaro, Assoc. of American Medical Colleges, 2530 Ridge Avenue, Evanston, Ill. 60201)

6-8. **Conference on Composition and Dynamics of the Upper Atmosphere**, El Paso, Tex. (J. E. Morris, P.O. Box 26065, El Paso 79925)

6-8. **Diffraction Conf.**, 26th, Pittsburgh, Pa. (S. Diamond, U.S. Steel Corp., Applied Research Lab., Monroeville, Pa. 15146)

6-8. **Northeast Electronics Research**, Mtg., Boston, Mass. (A. Uhler, Inst. of Electrical and Electronics Engineers, NEREM-68, 31 Channing St., Newton, Mass. 02158)

6-8. **International Spi Cellular Plastics Conf.**, New York, N.Y. (S. Steingiser, Monsanto Research Corp., Station B, Box 8, Dayton, Ohio 45407)

6-9. **American Ceramic Soc.**, Pittsburgh, Pa. (The Society, 4055 N. High St., Columbus, Ohio 43214)

6-9. **Operations Research Soc. of America**, 34th, Philadelphia, Pa. (J. H. Engel, c/o Center for Naval Analysis, 1401 Wilson Blvd., Arlington, Va. 22209)

6-9. **Conference on Respiratory Therapy**, Boston, Mass. (M. J. Nicholson, 605 Commonwealth Ave., Boston 02215)

7-9. **American Soc. of Cytology**, Cleveland, Ohio. (W. R. Lang, 1025 Walnut St., Philadelphia, Pa. 19107)

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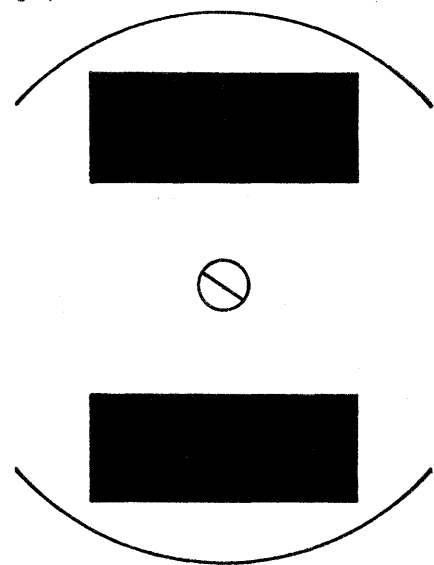
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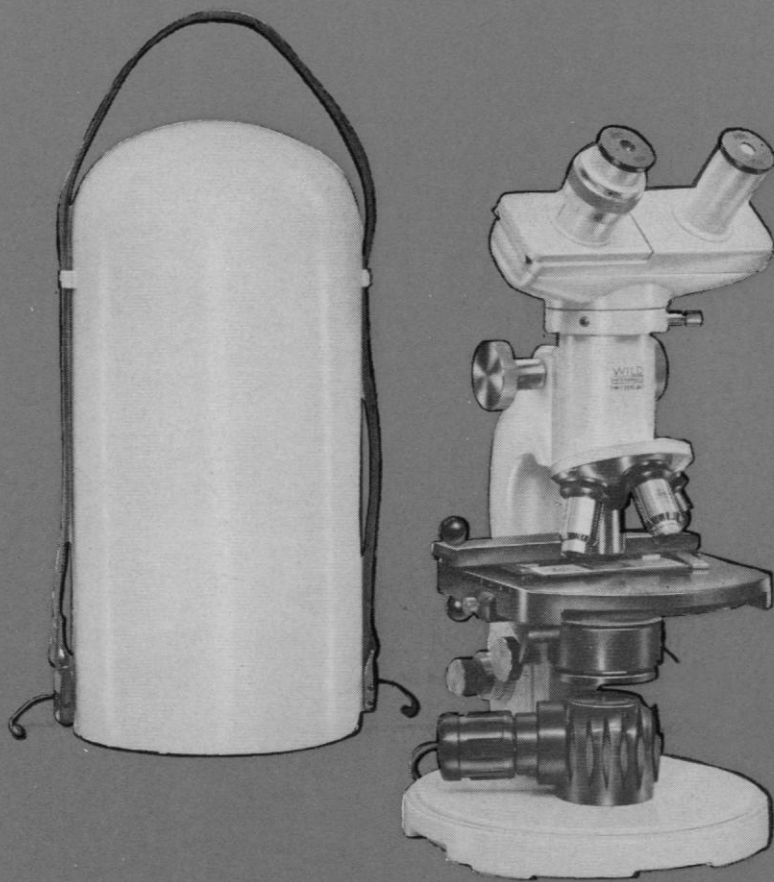


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7-10. Association of Clinical Scientists, Washington, D.C. (R. P. MacFate, 300 N. State St., Chicago, Ill. 60610)

8-11. American Physical Soc., Plasma Physics Div., Austin, Tex. (W. E. Drummond, Physics Bldg. 330, Univ. of Texas, Austin 78712)

10-15. American Soc. of Agronomy, New Orleans, La. (M. Stelly, c/o The Society, 677 S. Segoe Rd., Madison, Wis. 53711)

10-15. Crop Science Soc. of America, New Orleans, La. (Secretary, 677 S. Segoe Rd., Madison, Wis.)

10-15. American Assoc. for Inhalation Therapy, Houston, Tex. (M. T. Bowers, 4075 Main St., Riverside, Calif. 92501)

11-13. Soc. of Engineering Science, 6th technical mtg., Princeton, N.J. (A. C. Eringen, Dept. of Aerospace and Mechanical Sciences, Engineering Quadrangle, Princeton Univ., Princeton 08540)

11-13. Genetics Soc. of America, Boston, Mass. (B. Wallace, Dept. of Genetics, Cornell Univ., Ithaca, N.Y.)

11-14. American Nuclear Soc., Washington, D.C. (Executive Secretary, 244 E. Ogden Ave., Hinsdale, Ill. 60521)

11-15. American College of Preventive Medicine, Detroit, Mich. (E. A. Piszczek, 6410 N. Leona Ave., Chicago, Ill. 60646)

11-15. American Public Health Assoc., 96th, Detroit, Mich. (Executive Director, 1790 Broadway, New York, N.Y.)

13-15. Eastern Analytical Symp., New York, N.Y. (L. M. Brancone, Lederle Labs., Pearl River, N.Y. 10965)

13-16. National Easter Seal Soc. for Crippled Children and Adults, Boston, Mass. (Natl. Easter Seal Soc., 2023 W. Ogden Ave., Chicago, Ill. 60612)

14-16. Southern Thoracic Surgical Assoc., San Juan, Puerto Rico. (H. H. Seiler, 517 Bayshore Blvd., Tampa, Fla. 33606)

15-16. American Psychiatric Assoc., Chicago, Ill. (L. Rudy, Illinois Psychiatric Inst., 1601 W. Taylor St., Chicago 60612) land, Ohio. (W. R. Lang, 1025 Walnut St., Ill. (The Institute, P.O. Box 1485, Pompano Beach, Fla. 33061)

17-20. Academy of Pharmaceutical Sciences, 5th, Washington, D.C. (S. W. Goldstein, 2215 Constitution Ave., NW, Washington, D.C. 20037)

18-20. Institute of Electrical and Electronics Engineers, 7th, Cocoa Beach, Fla. (L. E. Williams Aerospace Corp., P.O. Box 4007, Patrick Air Force Base, Fla. 32925)

18-20. American Petroleum Inst., Chicago, Ill. (Secretary, Program Commission, 1271 Avenue of the Americas, New York 10020)

18-21. Symposium on Basic Mechanisms of the Epilepsies, Colorado Springs, Colo. (J. K. Penry, Section on Epilepsy, Room 8A-03, Bldg. 31, National Inst. of Neurological Diseases and Blindness, National Institutes of Health, Bethesda, Md. 20014)

18-21. Conference on Engineering in Medicine and Biology, Houston, Tex. (W. T. Maloney, Suite 620, 6 Beacon St., Boston, Mass. 02108)

18-21. Conference on Magnetism and Magnetic Materials, 14th, New York, N.Y. (D. T. Teaney, IBM Thomas J. Watson Research Center, Box 218, Yorktown Heights, N.Y. 10598)

18-22. Society of the **Plastics Industry**, Inc., Chicago, Ill. (The Society, 250 Park Ave., New York 10017)

18-22. **American Water Resources Conf.**, 4th, New York, N.Y. (P. Cohen, U.S. Geological Survey, 1505 Kellum Place, Mineola, N.Y. 11501)

19. **Air Pollution Control**, Columbia, Mo. (Extension Div., Whitten Hall, Univ. of Missouri, Columbia)

19-20. Council on **Arteriosclerosis** of the American Heart Assoc., Bal Harbour, Fla. (Dept. of Councils and International Program, American Heart Assoc. Natl. Office, 44 E. 23 St., New York 10010)

19-20. **Systems Symp.**, 4th, Case Western Reserve Univ., Cleveland, Ohio. (P. Schneider, Systems Research Center, Case Western Reserve Univ., Cleveland)

19-21. **Photovoltaic Specialists Conf.**, 7th, Pasadena, Calif. (R. E. Fischell, Applied Physics Lab., Johns Hopkins Univ., 8621 Georgia Ave., Silver Spring, Md. 20910)

19-22. **Acoustical Soc. of America**, Cleveland, Ohio. (The Society, 133 E. 45 St., New York 10017)

20-22. National Soc. for the **Prevention of Blindness**, Inc., New York, N.Y. (J. W. Ferree, 79 Madison Ave., New York 10016)

20-22. **Microelectronic Packaging and Interconnection Conf.**, Palo Alto, Calif. (D. H. O'Neill, Soc. of Automotive Engineers, 485 Lexington Ave., New York 10017)

20-24. Society for **Clinical and Experimental Hypnosis**, 20th, Chicago, Ill. (The Society, 353 W. 57 St., New York 10019)

21-22. **Chemical Kinetics Symp.**, Chapel Hill, N.C. (L. Pedersen, Dept. of Chemistry, Univ. of North Carolina, Chapel Hill 27514)

21-24. **American Anthropological Assoc.**, Seattle, Wash. (Executive Secretary, 1530 P St., NW, Washington, D.C. 20005)

25-27. **American Physical Soc.**, Miami, Fla. (Executive Secretary, 538 W. 120 St., New York 10027)

29-30. **Membrane Proteins Symp.**, New York, N.Y. (J. Newkirk, New York Heart Assoc., 2 E. 64 St., New York 10021)

29-30. National Federation of Catholic **Physicians' Guild**, Miami Beach, Fla. (R. H. Herzog, 2825 N. Mayfair Rd., Gelman, Wiley, New York, 1968. xiv + Milwaukee, Wis. 53222)

#### December

1. **Medical Aspects of Sports**, 10th, Miami Beach, Fla. (F. Hein, American Medical Assoc., Dept. of Health Education, 535 N. Dearborn St., Chicago, Ill. 60610)

1. **American Acad. of Oral Medicine**, New York, N.Y. (S. Conrad, 133-28 228th St., Laurelton, N.Y. 11413)

1-4. **American Medical Assoc.**, Miami Beach, Fla. (F. J. L. Blasingame, 535 N. Dearborn St., Chicago, Ill. 60610)

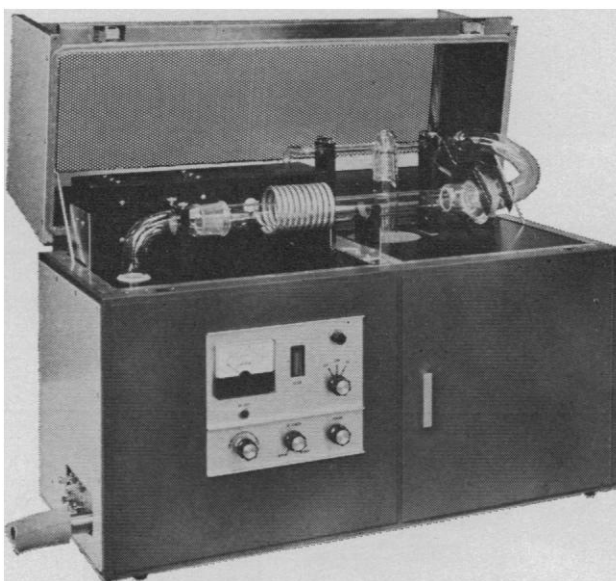
1-4. **Reticuloendothelial Soc.**, 5th, New York, N.Y. (F. J. DiCarlo, Warner-Lambert Research Inst., Morris Plains, N.J. 07950)

1-5. **American Inst. of Chemical Engineers**, 61st, Los Angeles, Calif. (Secretary, 345 E. 47 St., New York 10017)

1-6. **Radiological Soc. of North Amer-**

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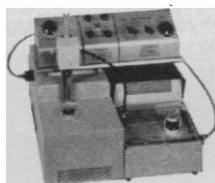


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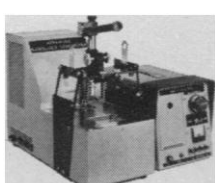
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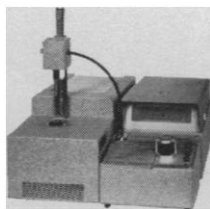
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ica, Chicago, Ill. (M. D. Frazer, 1744 S. 58 St., Lincoln, Neb. 68506)

2. **Quantum Chemistry**, 9th winter inst., Gainesville, Fla. (Winter Institute, 525 Nuclear Sciences Bldg., Univ. of Florida, Gainesville 32601)

2-3. **Applications of Simulation**, 2nd conf., New York, N.Y. (A. Ockene, IBM Corporation, 112 E. Post Road, White Plains, N.Y. 10601)

2-4. **New England Conf. on Air Pollution**, Waterville, Maine. (Director, Colby News Bureau, Colby College, Waterville 04901)

2-4. **Western National Geophysical Union**, San Francisco, Calif. (J. C. Harrison, Dept. of Geophysical Sciences, Univ. of Colorado, Boulder 80302)

2-6. **Greater New York Dental Mtg.**, 44th, New York, N.Y. (M. Purdy, Room 106A, Statler Hilton, New York 10001)

3. **American Soc. of Therapeutic Radiologists**, Chicago, Ill. (J. A. del Regato, Penrose Cancer Hospital, 2215 N. Cascade, Colorado Springs, Colo. 80907)

3-4. **Vehicular Technology Conf.**, San Francisco, Calif. (W. G. Chaney, Lenkurt Electric, 1105 Country Rd., San Carlos, Calif. 94070)

3-5. **Entry Vehicle Systems and Technology Conf.**, Williamsburg, Va. (M. H. Bloom, Polytechnic Inst. of Brooklyn, Graduate Center, Route 110, Farmingdale, N.Y. 11735)

4-6. **Optical Character Recognition in Computerized Management of Information in the Next Decade**, Hollywood, Fla. (International Business Forms Industries, 20 Chevy Chase Circle, NW, Washington, D.C. 20015)

4-6. **Academy of Psychosomatic Medicine**, Miami Beach, Fla. (E. Dunlop, 150 Emory St., Attleboro, Mass. 02703)

4-7. **American Assoc. of Physicists in Medicine**, Chicago, Ill. (R. O. Gorsop, Stein Research Center, Jefferson Medical College, 920 Chancellor St., Philadelphia, Pa. 19107)

5-6. **American Rheumatism Assoc.**, Tucson, Ariz. (M. M. Walsh, 1212 Avenue of the Americas, New York 10036)

6-7. **American Federation for Clinical Research**, Boston, Mass. (H. J. Levine, New England Medical Center Hospitals, 171 Harrison Ave., Boston 02111)

7-12. **American Acad. of Dermatology and Syphilology**, 27th, Chicago, Ill. (S. E. Huff, 1636 Church St., Evanston, Ill.)

8-13. **American Soc. of Agricultural Engineers**, Chicago, Ill. (P. L. Bellinger, Technical Coordinator, 420 Main St., St. Joseph, Mich. 49085)

8-15. **Symposium of Analogue and Digital Computers in Hydrology**, Tucson, Ariz. (American Federation of Information Processing Societies, 211 E. 43 St., New York 10017)

9-11. **Computer Conf.**, San Francisco, Calif. (R. H. Glaser, 1968 Joint Computer Conf., P.O. Box 2309, Stanford, Calif. 94305)

9-12. **Electrical Insulation Conf.**, Los Angeles, Calif. (Secretary, 3600 Wilshire Blvd., Los Angeles 90005)

9-12. **National Electronics Conf. and Exhibition**, 24th, Chicago, Ill. (E. C. Jones, Electrical Engineering Dept., Iowa State Univ., Ames)

11-13. **National Oceanography Conf.**, Portland, Ore. (J. H. Jorgenson, National

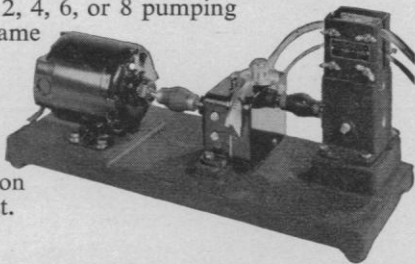


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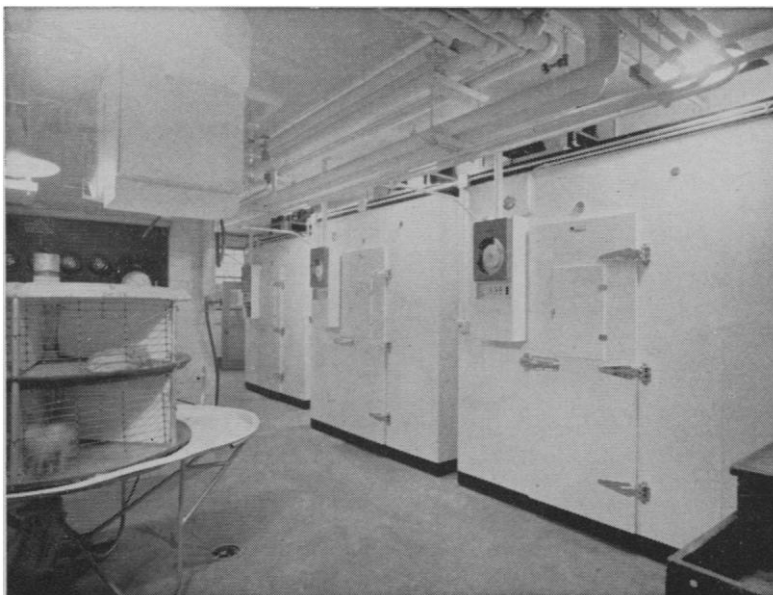
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15-17. New York State Soc. of Anesthesiologists, New York, N.Y. (E. C. Sinisi, 30 E. 42 St., New York, 10017)

16-18. Symposium on Adaptive Processes, 7th, Univ. of California Los Angeles. (J. M. Mendel, Advance Flight Mechanics, Douglas Aircraft Co., Inc. 3000 Ocean Park Blvd., Santa Monica, Calif. 90406)

16-20. Texas Symp. of Relativistic Astrophysics, 4th, Dallas. (I. Robinson, South West Centre for Advanced Studies, P.O. Box 30365, Dallas 75230)

18-20. American Physical Soc., San Diego, Calif. (W. Whaling, California Inst. of Technology, 1201 East California St., Pasadena 91109)

20-22. American Psychoanalytic Assoc., New York, N.Y. (American Psychoanalytic Assoc., 1 E. 57 St., New York 10022)

23-25. International Electron Devices Mtg., Washington, D.C. (D. A. Chisholm, Bell Telephone Labs., Murray Hill, N.J. 07974)

#### International and Foreign Meetings

##### November

3-8. Israel Surgical Soc., 8th congr., Jerusalem. (Organizing Committee, 8th Congr. of the Israel Surgical Soc., P.O. Box 7276, Jerusalem)

4-8. Symposium on the Use of Nuclear Techniques in the Prospecting and Development of Mineral Resources, Lima, Peru. (S. Eklund, Intern. Atomic Energy Agency, Karntner Ring 11, A-1010 Vienna, Austria)

4-9. Canadian Heart Foundation, Canadian Cardiovascular Society, Vancouver, B.C. (Secretary, Canadian Heart Foundation, 1130 Bay St., Toronto 5, Ont.)

11-13. Geochemical Soc., Mexico City, Mexico. (E. C. T. Chao, c/o U.S. Geological Survey, Washington, D.C.)

11-13. Geological Soc. of America, Mexico City, Mexico. (R. C. Becker, The Society, Colorado Bldg., P.O. Box 1719, Boulder, Colo. 80302)

11-13. Society of Economic Geologists, Mexico City, Mexico. (R. A. Laurence, P.O. Box 1549, Knoxville, Tenn. 37901)

11-13. Mineralogical Soc. of America, Mexico City, Mexico. (I. J. Holmes, Dept. of Geology, Columbia Univ., New York, 10027)

11-13. Paleontological Soc., Mexico City, Mexico. (R. L. Langenheim, Dept. of Geology, Univ. of Illinois, Urbana)

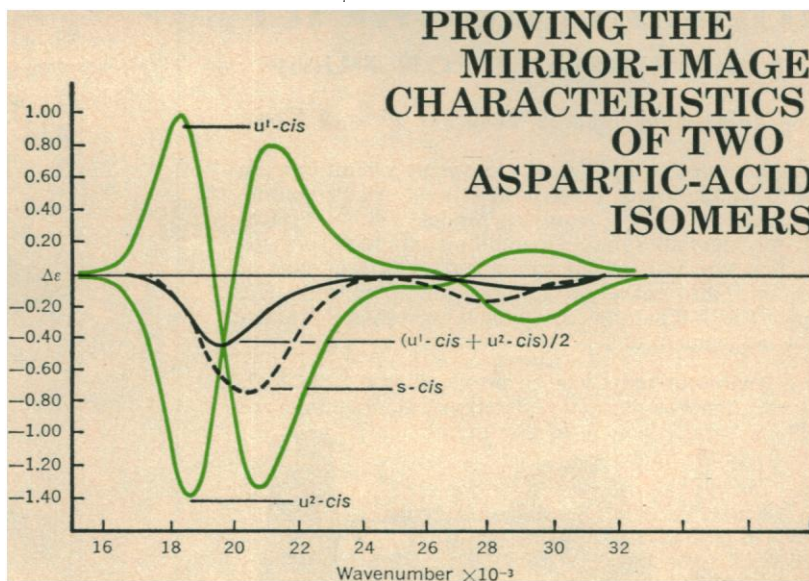
13-15. International Reinforced Plastics Conf., London, England. (British Plastics Federation, Reinforced Plastics Group, 47-48 Piccadilly, London, W.1)

18-23. International Seed Testing Assoc., 15th, Palmerston, New Zealand. (The Association, Binnenhaven 1, Wageningen, Netherlands)

19-20. Symposium on Tribology in Railways, London, England. (Public Relations Officer, Institution of Mechanical Engineers, 1, Birdcage Walk, Westminster, S.W.1, London)

## CHEMICAL PROFILES

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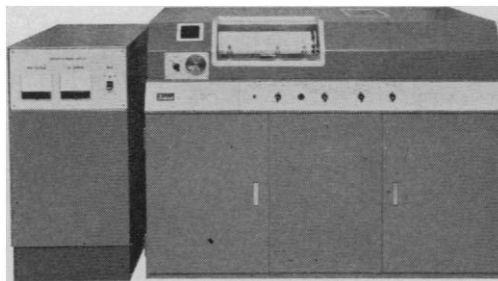


Aspartic acid, with its three donor sites, can form a variety of hard-to-identify chelate isomers. The circular-dichroism profiles drawn here, plotted from data gathered by a Durrum-Jasco CD recorder, are typical of the molecular detective work\* that can be achieved with this versatile instrument.

The steric requirements of aspartic acid indicate that in a cobalt-diethylenetriamine complex, three isomers will predominate: one *s-cis* (symmetrical), shown as a dashed-line profile in the drawing above, and two *u-cis* (unsymmetrical) isomers, shown in color. The latter are essentially mirror images of each other, and the Durrum-Jasco instrument provides a way to identify one from the other.

The configurational contributions to the CD traces of the two mirror-image isomers should, in theory, cancel out, leaving an "average" trace that approximates that of the *s-cis* isomer where there are no configurational contributions. As seen here, a very close correlation is achieved, proving that the two *u-cis* isomers are indeed pseudo-mirror images and providing clues as to their specific forms.

The Durrum-Jasco CD recorder is a powerful analytical tool, used throughout the world to classify and identify complex organic and biochemical compounds. In addition to detailing the conformation and configuration of such substances as steroids, alkaloids, proteins, nucleic acids and synthetic polymers, the instrument can serve to measure their concentrations, kinetic properties, and stereochemical characteristics. Durrum-Jasco CD prices start at \$29,600.



\*AS REPORTED BY J. IVAN LEGG AND DEAN W. COOKE IN THE DECEMBER 20, 1967 ISSUE OF JOURNAL OF THE AMERICAN CHEMICAL SOCIETY.

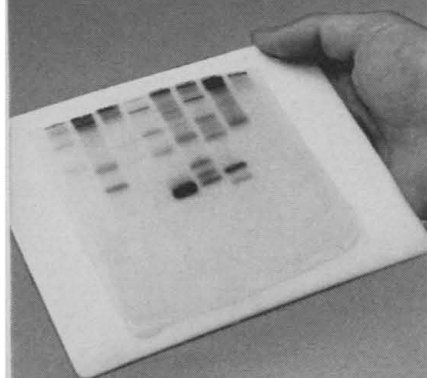
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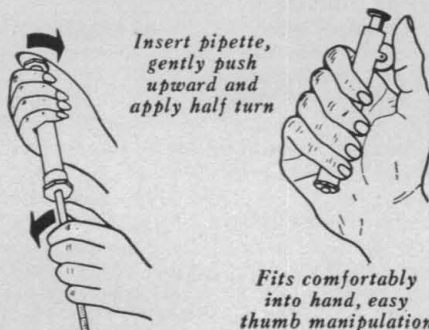
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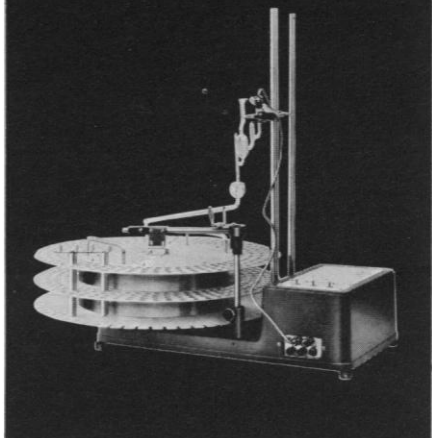
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## BOOKS RECEIVED

(Continued from page 113)

**Aggregation and Averaging.** Irving H. Siegel. Upjohn Institute for Employment Research, Kalamazoo, Mich., 1968. vi + 33 pp., illus. Paper. Methods for Manpower Analysis, No. 1.

**Alchemy.** E. J. Holmyard. Penguin Books, Baltimore, 1968. 288 pp., illus. Paper, \$1.65. Reprint of the 1957 edition.

**Alcoholism.** The Total Treatment Approach. Ronald J. Catanzaro, Ed. Thomas, Springfield, Ill., 1968. xix + 508 pp., illus. \$22.50.

**Algebraic Theory of Automata.** Abraham Ginzburg. Academic Press, New York, 1968. x + 165 pp., illus. \$9. Association for Computing Machinery Monograph Series.

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**Analysis of Geologic Structures.** John M. Dennison. Norton, New York, 1968. xii + 209 pp., illus. Paper, \$5.75.

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**Analytical Chemistry of Beryllium.** A. V. Novoselova and L. R. Batsanova. Translated from the Russian edition (Moscow, 1966) by J. Schmorak. Israel Program for Scientific Translations, Jerusalem, 1968 (distributed in the U.S. by Davey, Hartford, Conn.). vi + 220 pp., illus. \$12.75. Analytical Chemistry of Elements.

**Animal Behavior in Laboratory and Field.** Allen W. Stokes, Ed. Freeman, San Francisco, 1968. iv + 198 pp., illus. Paper, \$4.75; individual exercises, 25¢ each. A Series of Books in Psychology.

**Animal Locomotion.** James Gray. Norton, New York, 1968. xiv + 479 pp., illus. \$15. The World Naturalist.

**Annual Review of Astronomy and Astrophysics.** Vol. 6. Leo Goldberg, David Layzer, and John G. Phillips, Eds. Annual Reviews, Palo Alto, Calif., 1968. viii + 528 pp., illus. \$8.50.

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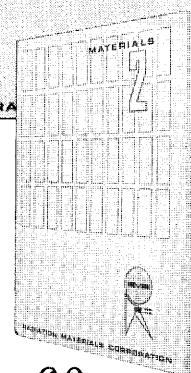
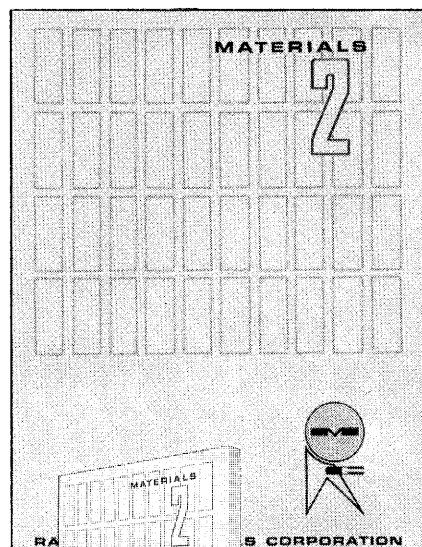
**Antenna Engineering.** W. L. Weeks. McGraw-Hill, New York, 1968. xi + 370 pp., illus. \$13.50. McGraw-Hill Electronic Sciences Series.

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**Applications Related Phenomena in Titanium Alloys.** A symposium, Los Angeles, April 1967. American Society for Testing and Materials, Philadelphia, 1968. 298 pp., illus. \$20; 30 percent discount to members. ASTM Special Technical Publication, No. 432.

**Applied Spectroscopy Reviews.** Vol. 1.

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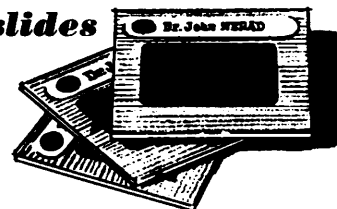
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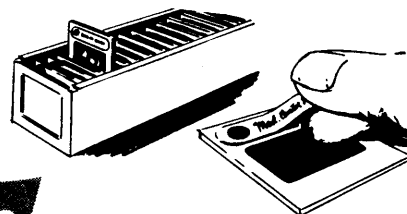
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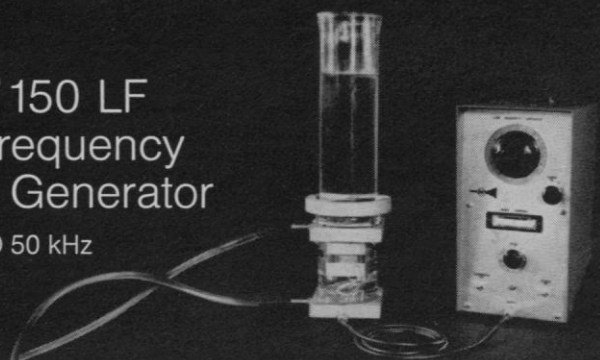


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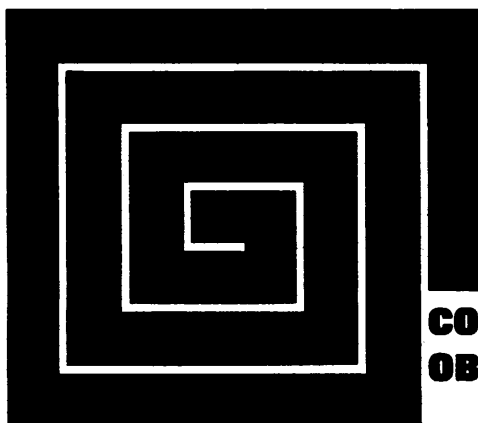
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Edward G. Brame, Jr., Ed. Dekker, New York, 1968. viii + 455 pp., illus. \$16.50.

**Appointment on the Moon.** The Inside Story of America's Space Venture. Richard S. Lewis. Viking, New York, 1968. xiv + 434 pp., illus. \$10.

**L'Arsenic et Ses Composés.** Roger Doli-que. Presses Universitaires de France, Paris, 1968. 128 pp., illus. Paper, 18 F. Que Sais-je? No. 1290.

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**Australian Tertiary Deposits Containing Terrestrial Mammals.** R. A. Stirton, R. H. Tedford, and M. O. Woodburne. Univer-sity of California Press, Berkeley, 1968. ii + 30 pp., illus. Paper, \$1.50. Publica-tions in Geological Sciences, vol. 77.

**Automated Analyzers and Quality Con-trol for the Petroleum Industry.** A Sym-posium, Houston, Tex., Dec. 1966. Ameri-can Society for Testing and Materials, Philadelphia, 1968. iv + 67 pp., illus. Paper, \$3.50; 30 percent discount to mem-bers. ASTM Special Technical Publication No. 428.

**Basic Concepts of Relativity.** R. H. Good. Reinhold, New York, 1968. xiv + 152 pp., illus. Paper, \$3.50. Reinhold Physics Textbook Series.

**Behavioral Pharmacology.** Travis Thompson and Charles R. Schuster. Pren-tice-Hall, Englewood Cliffs, N.J., 1968. xvi + 297 pp., illus. \$14. Prentice-Hall Psychology Series.

**Bevezetés a Hullámmechanikába és Alkalmazásai.** Gombás Pál and Kisdi Dávid. Akadémiai Kiadó, Budapest, 1967. 225 pp., illus.

**The Biological Time Bomb.** Gordon Rat-tray Taylor. World, New York, 1968. 240 pp. \$5.50.

**Biology.** William L. Smallwood and Edna R. Green. Silver Burdett (General Learning Corp.), Morristown, N.J., 1968. xii + 740 pp., illus.

**The Biology of Animal Viruses.** Vol. 2, The Pathogenesis and Ecology of Viral In-fections. Frank Fenner. Academic Press, New York, 1968. xvi + 879 pp., illus. \$18.50.

**The Biology of Estuarine Animals.** J. Green. University of Washington Press, Seattle, 1968. x + 401 pp., illus. \$9.50. Biology Series.

**Bio-Organic Chemistry.** Readings from *Scientific American*. With introductions by Melvin Calvin and Margaret J. Jorgenson. Freeman, San Francisco, 1968. 317 pp., illus. Cloth, \$10; paper, \$4.95.

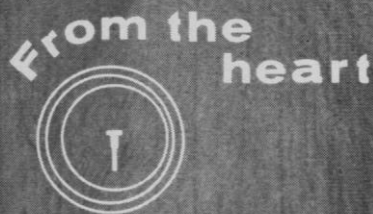
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**The Birth of the Ego.** A Nuclear Hy-pothesis. Edward Glover. International

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Universities Press, New York. 1968. 125 pp., illus. \$3.50.

**Bombers.** Patrol and Reconnaissance Aircraft, 1914-1919. Kenneth Munson. Illustrated by John W. Wood *et al.* Macmillan, New York, 1968. 180 pp. \$2.95. The Pocket Encyclopedia of World Aircraft (in color).

**The Borderline Syndrome.** A Behavioral Study of Ego-Functions. Roy R. Grinker, Sr., Beatrice Werble, and Robert C. Drye. Basic Books, New York, 1968. xiv + 274 pp., illus. \$7.95.

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**Le Calcul Analogique.** Jean-Jacques Gleitz. Presses Universitaires de France, Paris, 1968. 128 pp., illus. Paper, 18 F.

**Le Catabolisme Auxinique.** P. E. Pilet and Th. Gaspar. Masson, Paris, 1968. 148 pp., illus. Paper, 30 F. Monographies de Physiologie Végétale, No. 1.

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**Cell and Molecular Biology.** Ernest J. DuPraw. Academic Press, New York, 1968. xii + 739 pp., illus. \$12.50.

**Cell Physiology.** Arthur C. Giese. Saunders, Philadelphia, ed. 3, 1968. xx + 671 pp., illus. \$11.75.

**Cellular Differentiation.** J. Richard Whitaker. Dickenson, Belmont, Calif., 1968. xiv + 112 pp., illus. Paper, \$2.50. Dickenson Series on Contemporary Thought in Biological Science.

**Changing Man: The Threat and the Promise.** Five Scientists and Five Theologians on Christian Faith and Evolutionary Thought. Kyle Haselden and Philip Hefner, Eds. Doubleday, Garden City, N.Y., 1968. viii + 184 pp., \$4.95.

**Characterization of Macromolecular Structure.** Proceedings of a conference, Warrenton, Va., April 1967. National Academy of Sciences, Washington, D.C., 1968. x + 410 pp., illus. \$15. NAS Publication No. 1573.

**Chemical Principles.** A Programmed Text. Olaf Runquist, Clifford J. Creswell, and J. Thomas Head. Burgess, Minneapolis, Minn., 1968. Part 1, iv + 228 pp., illus. Part 2, iii + 462 pp., illus. Spiral bound, \$9.75.

**The Chemistry of the Amino Group.** Saul Patai, Ed. Interscience (Wiley), New York, 1968. xiv + 813 pp., illus. \$26.50. The Chemistry of Functional Groups.

**Children of Their Fathers.** Growing up among the Ngoni of Malawi. Margaret Read. Holt, Rinehart and Winston, New York, 1968. xii + 97 pp., illus. Paper, \$2.25. Case Studies in Education and Culture.

**Children's Understanding of Social Interaction.** Dorothy Flapan. Teachers College Press, New York, 1968. x + 86 pp. Paper, \$1.95. A Publication of the Horace Mann-Lincoln Institute Teachers College, Columbia University.

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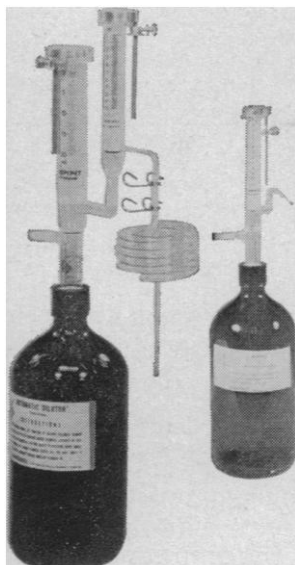


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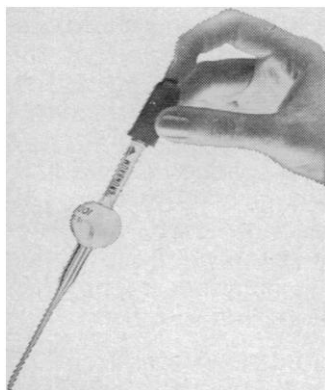


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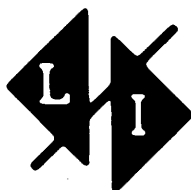
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**The Coconut Palm.** Yan Frémond, Robert Ziller, and M. de Nucé de Lamothé. Translated from the French edition (Paris, 1966). International Potash Institute, Berne, 1968. 225 pp., illus. S. Fr. 13.

**College Chemistry.** A Survey. Richard D. Campbell. Harcourt, Brace and World, New York, 1968. xvi + 559 pp., illus. \$8.95.

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**Colloque sur l'Éocène.** Paris, May 1968. Bureau de Recherches Géologiques et Minières, Paris, 1968. 742 pp., illus. Paper. Mémoires du BRMG, No. 58.

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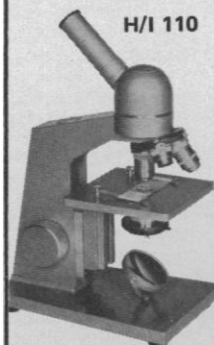
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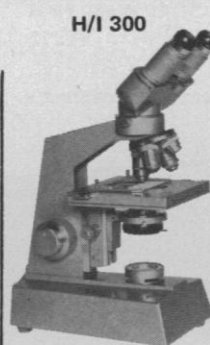
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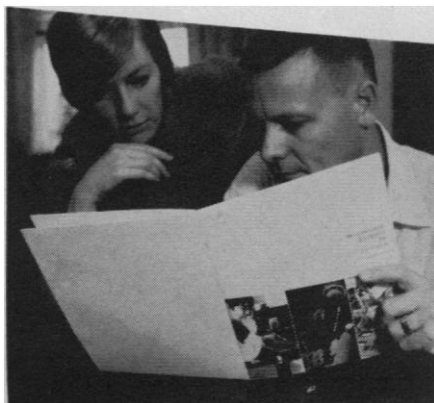
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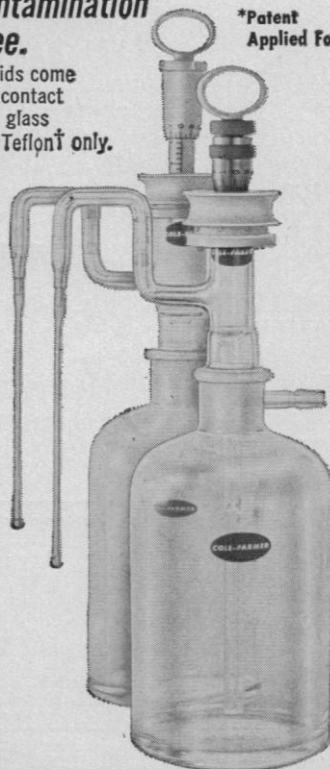
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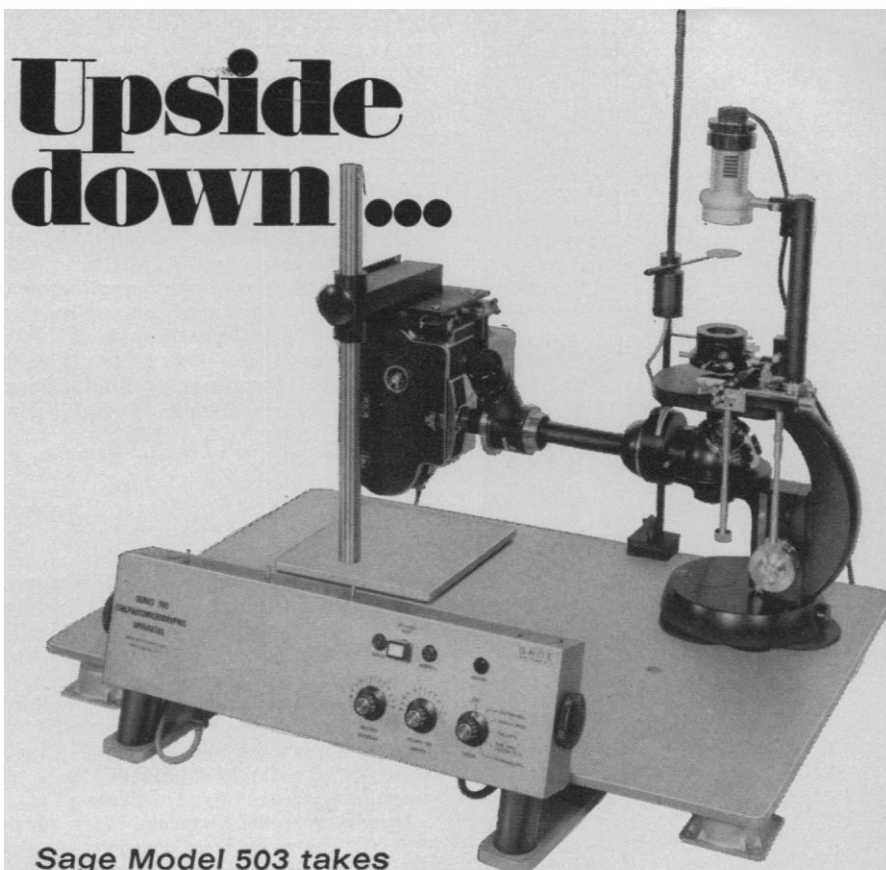
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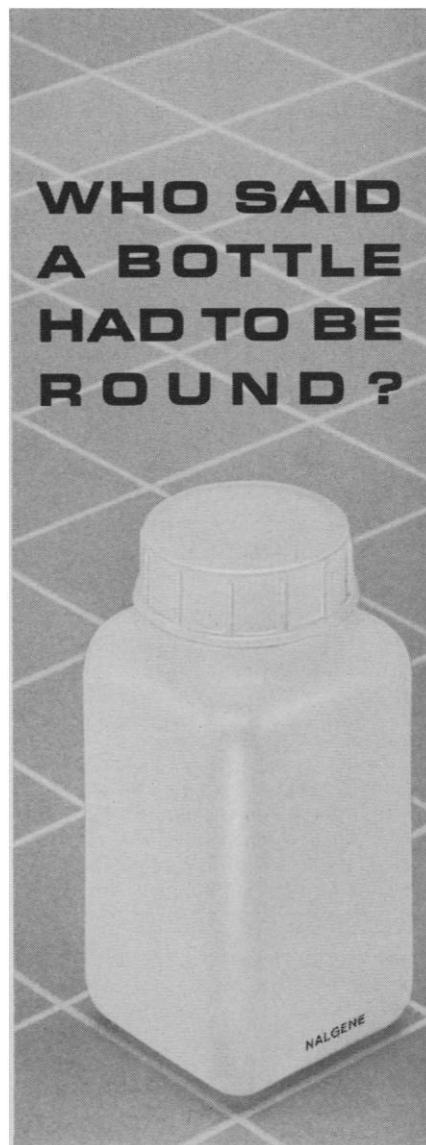
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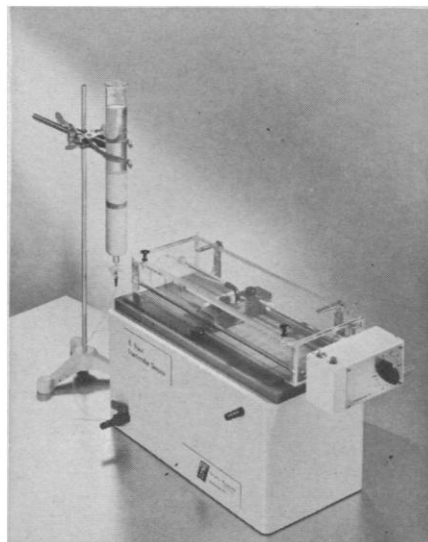
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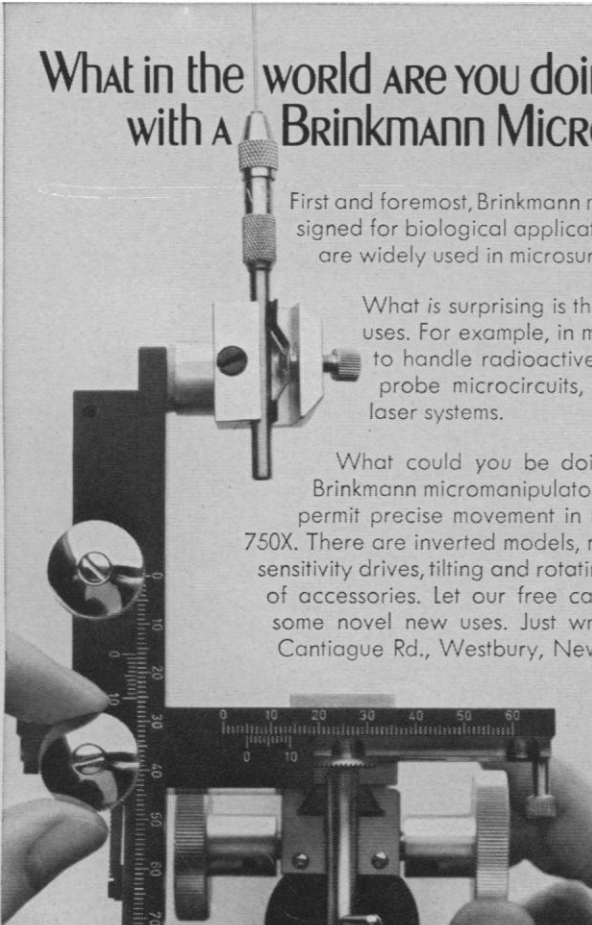


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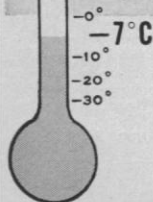
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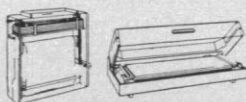
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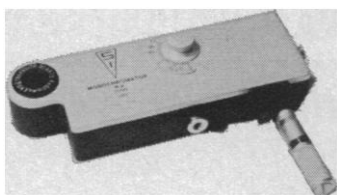
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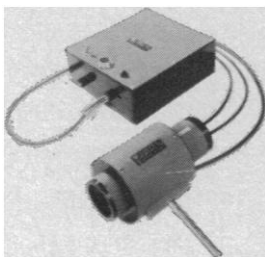
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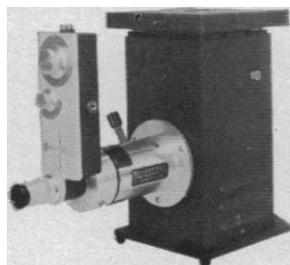
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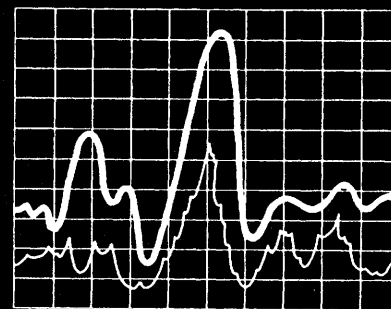
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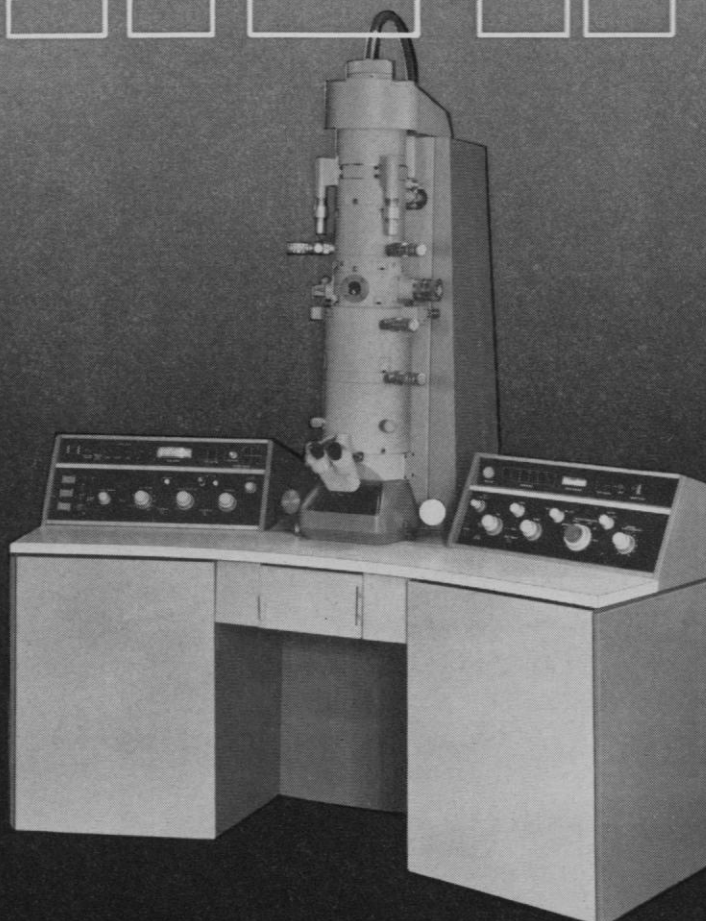
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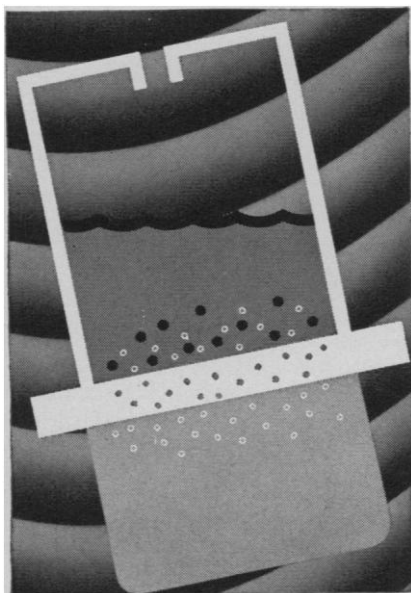
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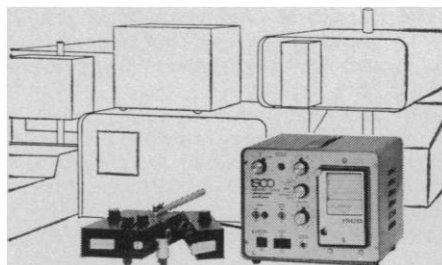
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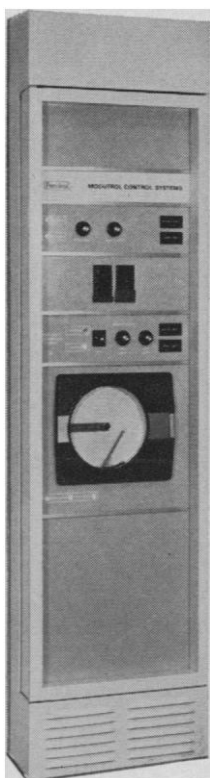
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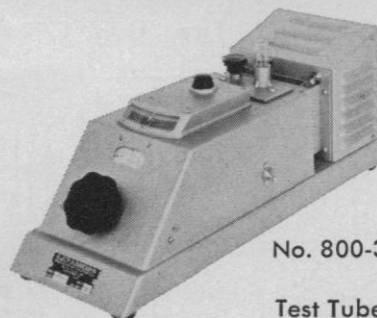
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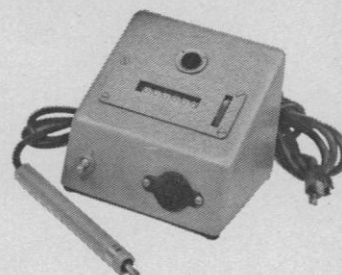


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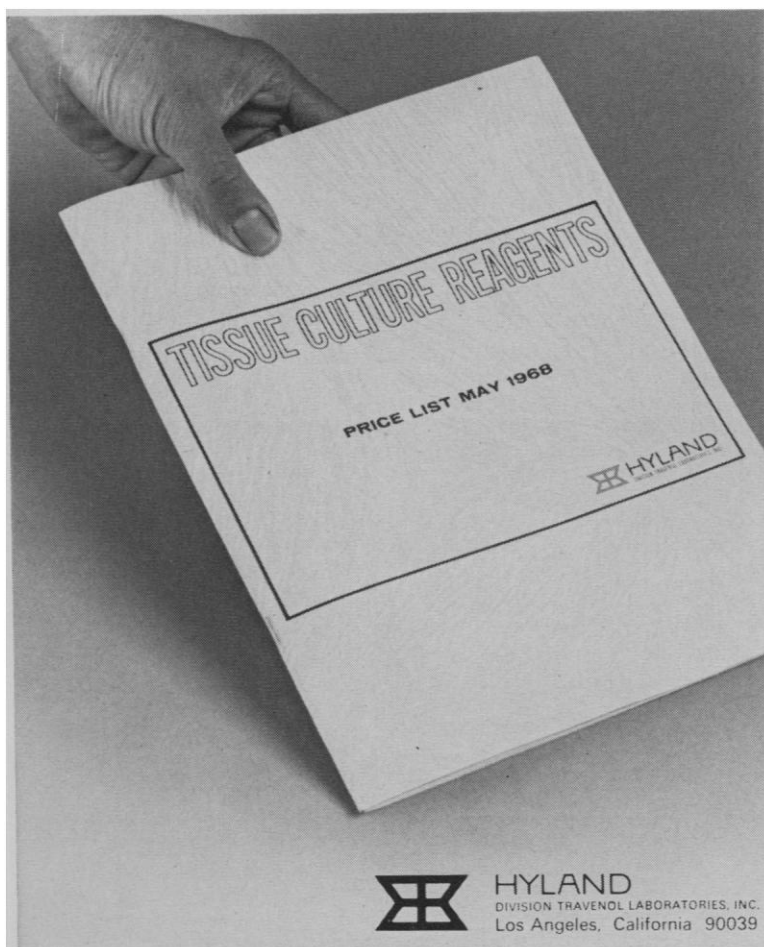
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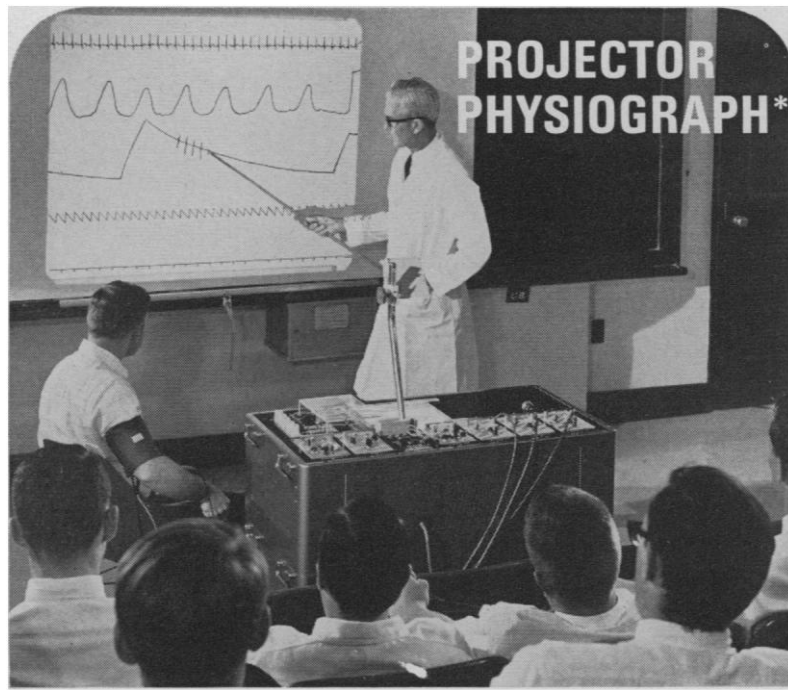
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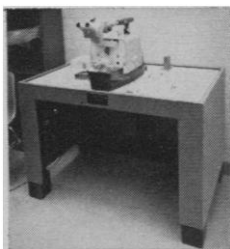
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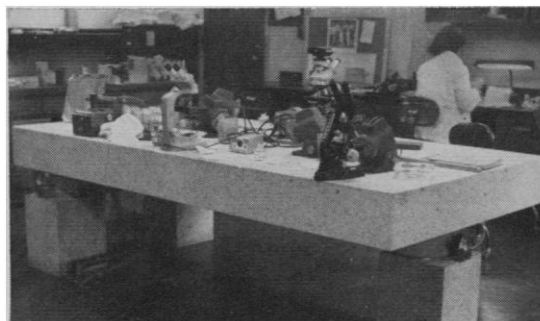
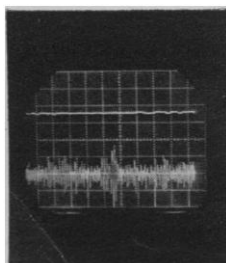
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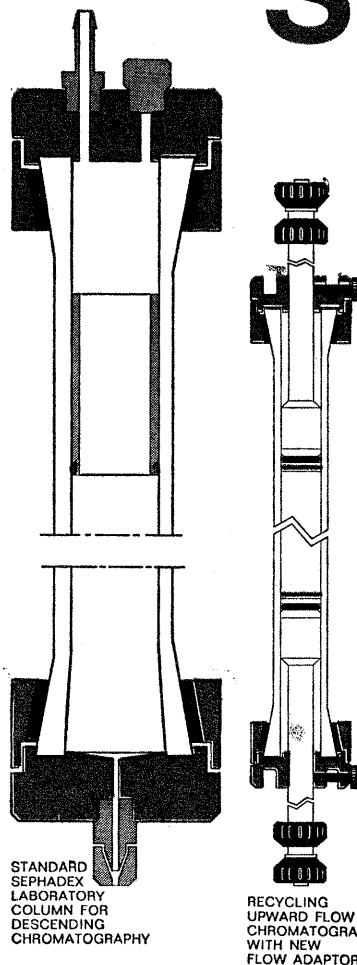
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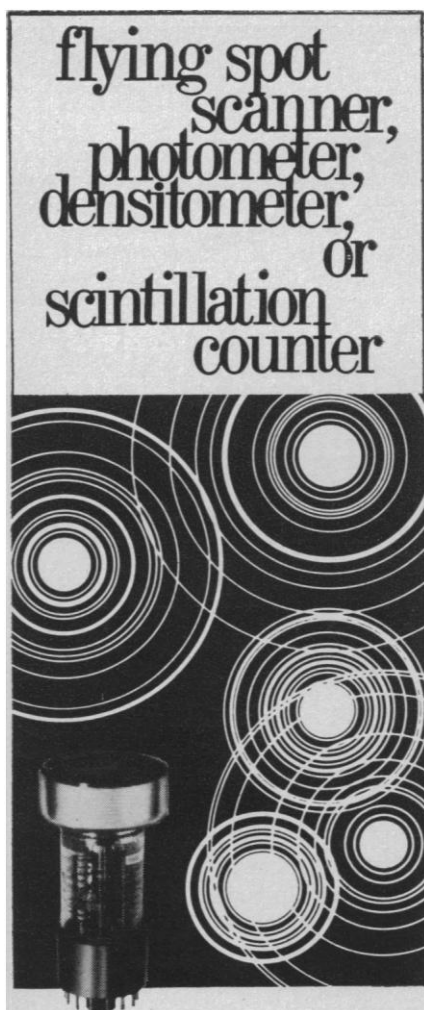
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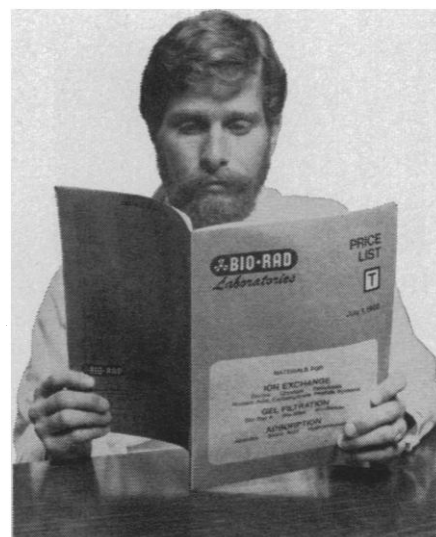
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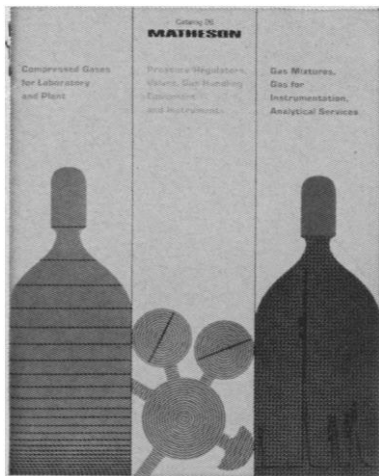
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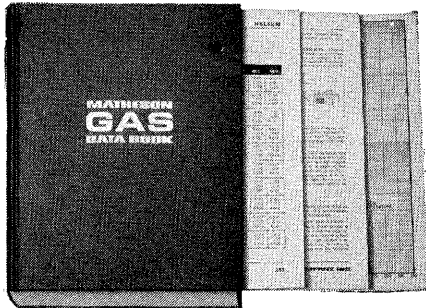
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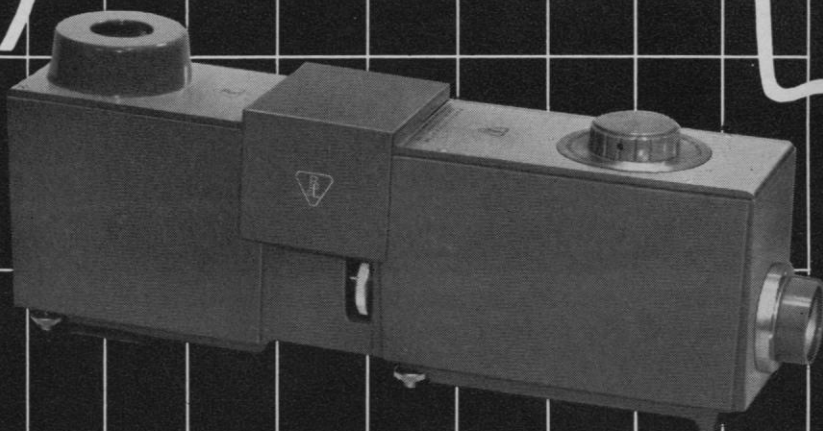
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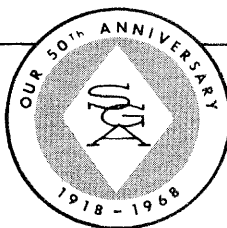
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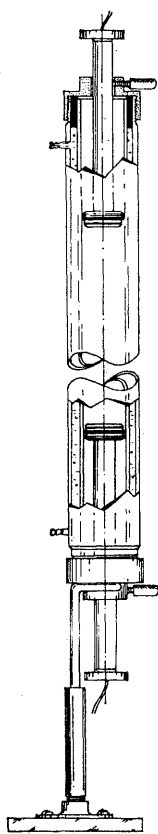
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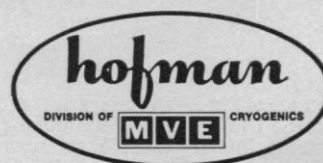
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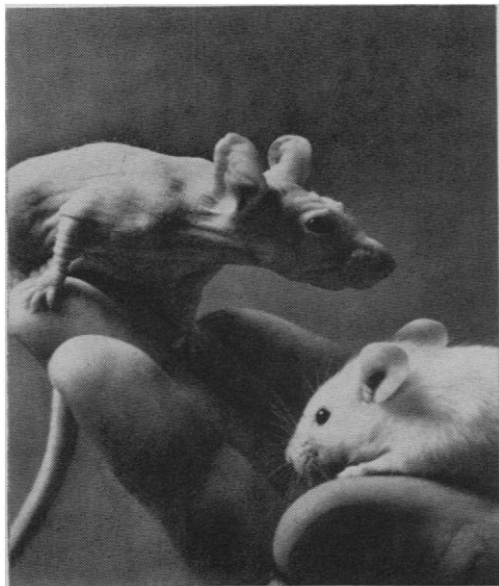
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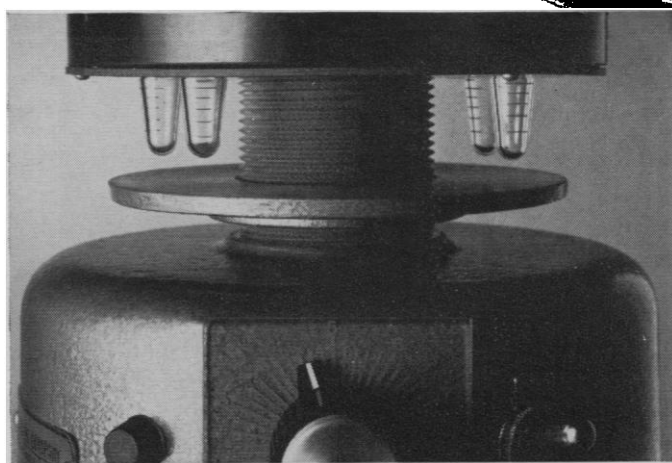
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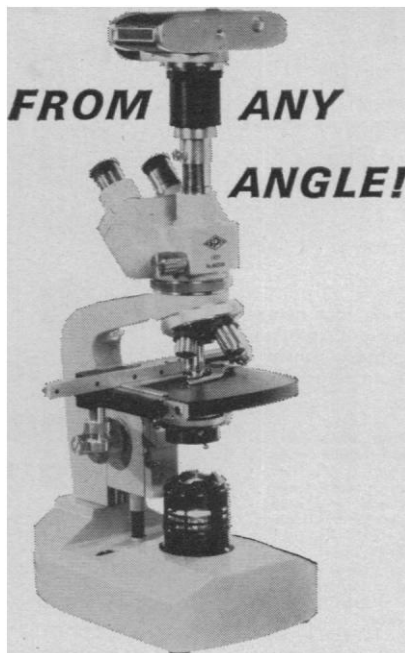
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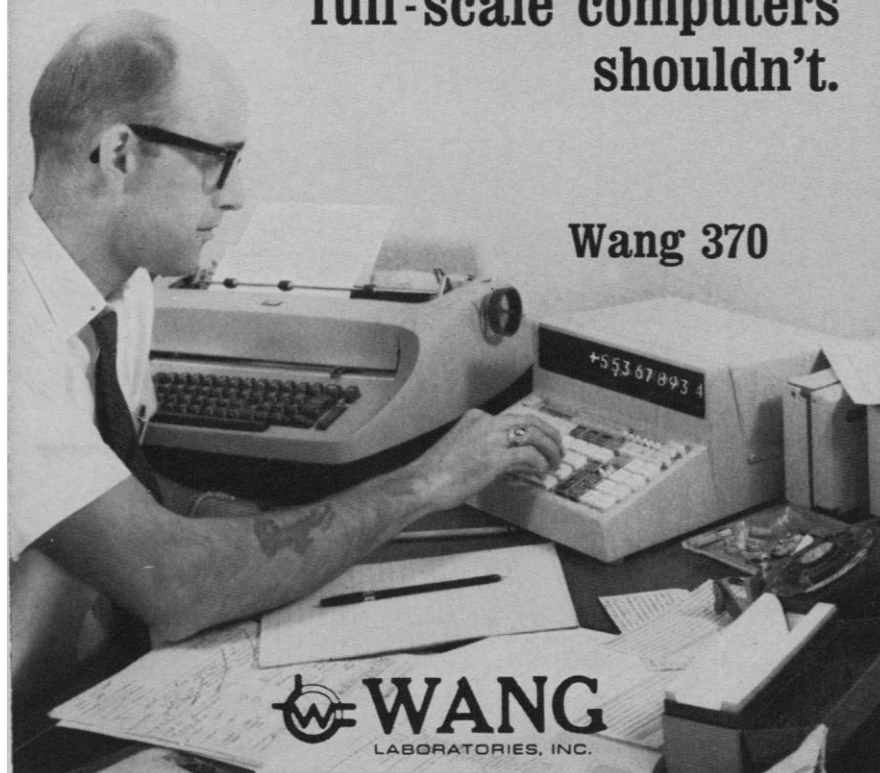
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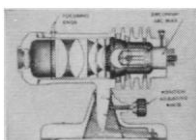
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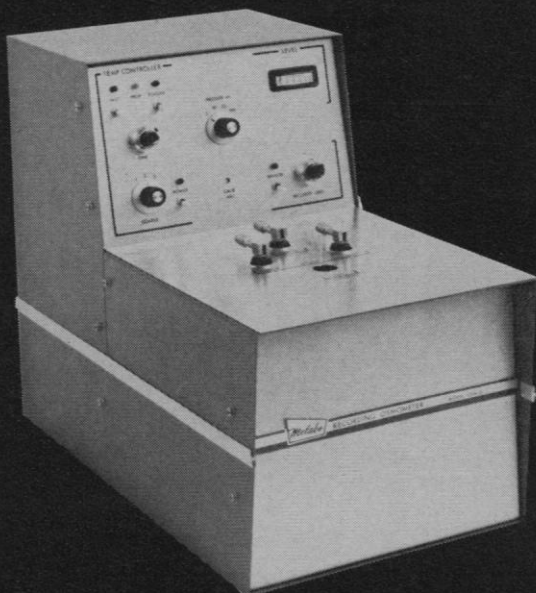
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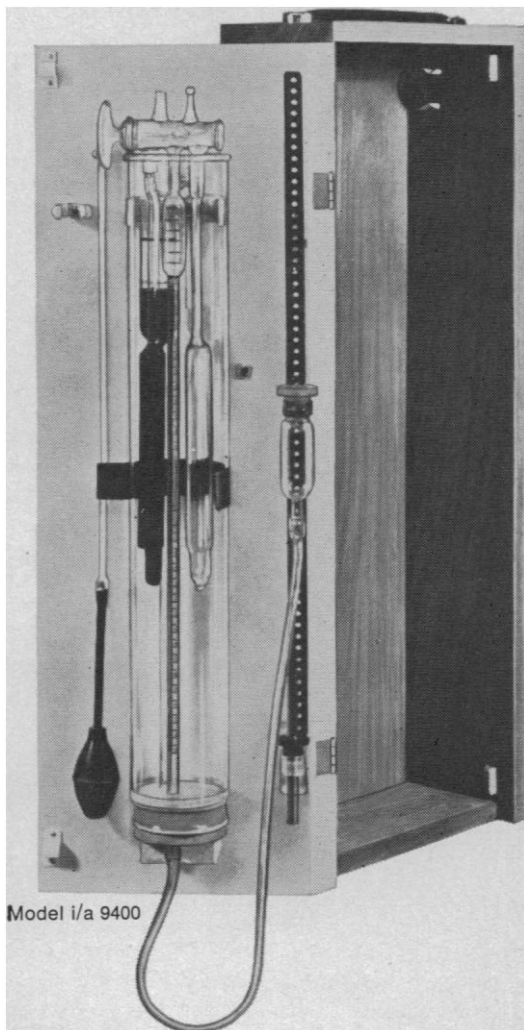
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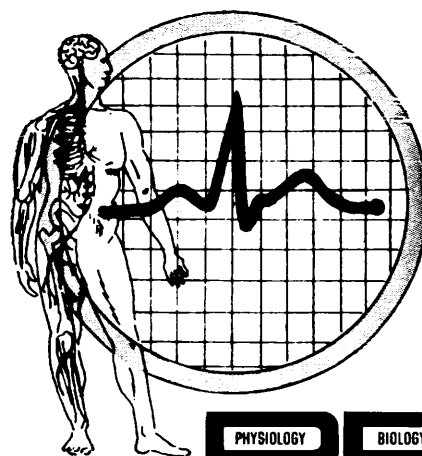


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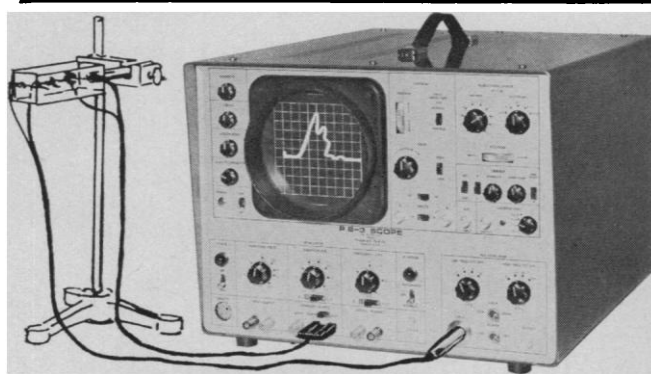
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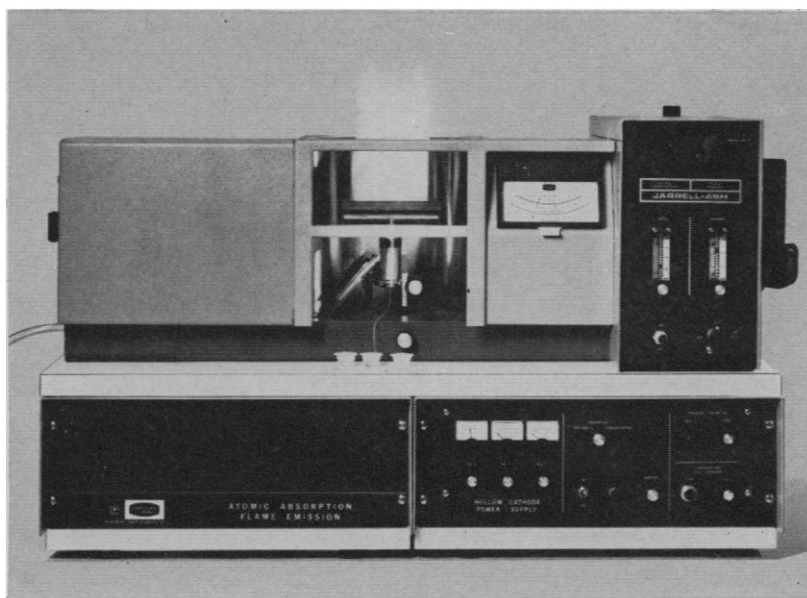
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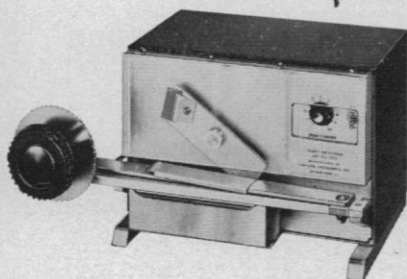
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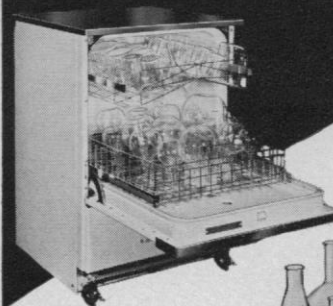
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