SCIENCE

10 March 1967

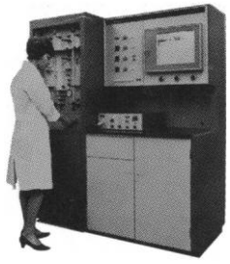
Vol. 155, No. 3767

AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE

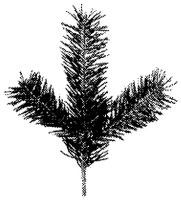
LEAD SMELTING

Gordon Research Conferences

With Beckman Amino Acid Analyzers

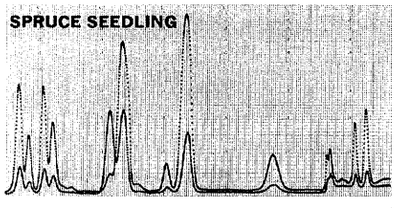


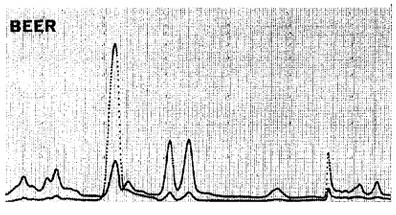
you can analyze anything from spruce seedlings



to suds

For proof here's a portion of each analysis:





Eight years ago you couldn't make a physiological fluid analysis automatically. Five years ago it took fifty hours. Today Beckman Analyzers and Beckman Custom Spherical Resins make amino acid analysis a practical tool in a host of new areas of investigation.

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SCIENCE

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COVER

Typical lead smelting operation of the 16th century. A radiochemical separation occurred during this operation wherein the radioactive equilibrium between radium-226 and lead-210 was disturbed. This separation is the basis for a method of discerning between old and modern white lead in paintings. See page 1238. [*De Re Metallica*, Dover Publications, New York]

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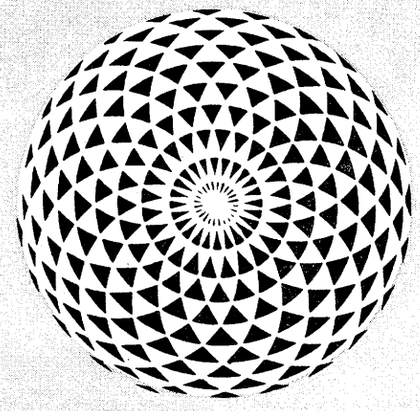

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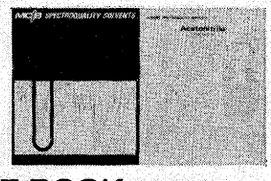

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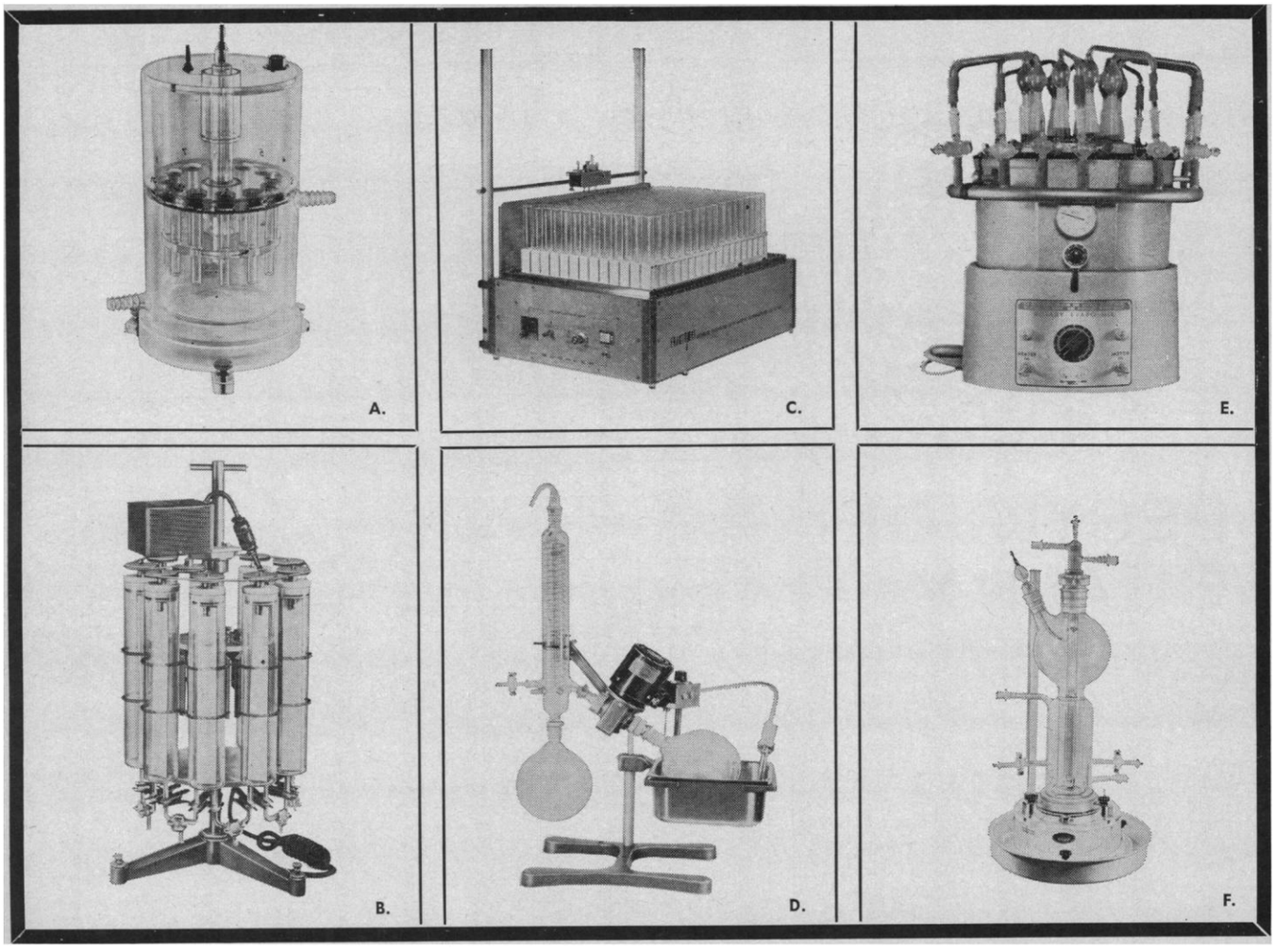

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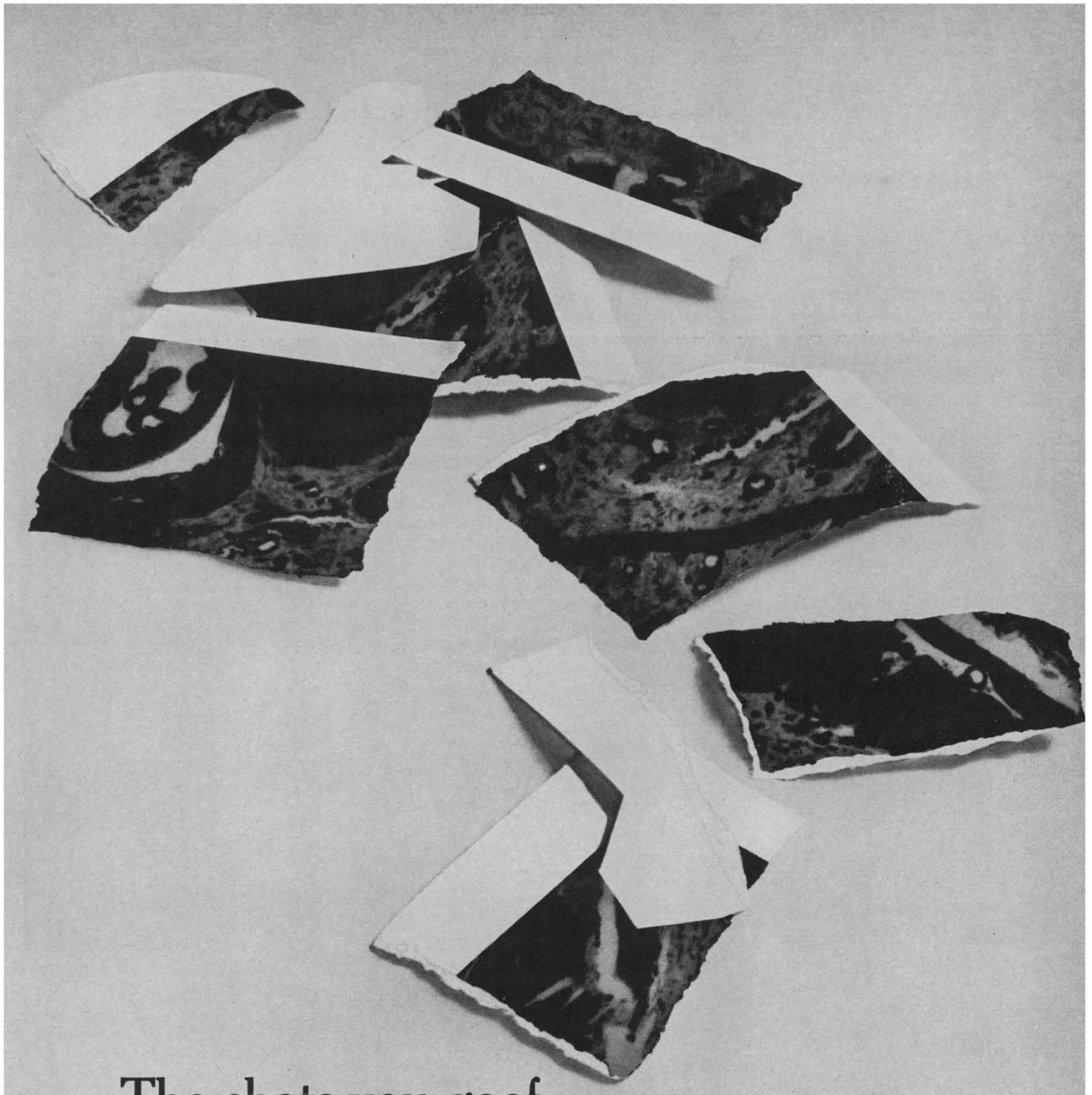

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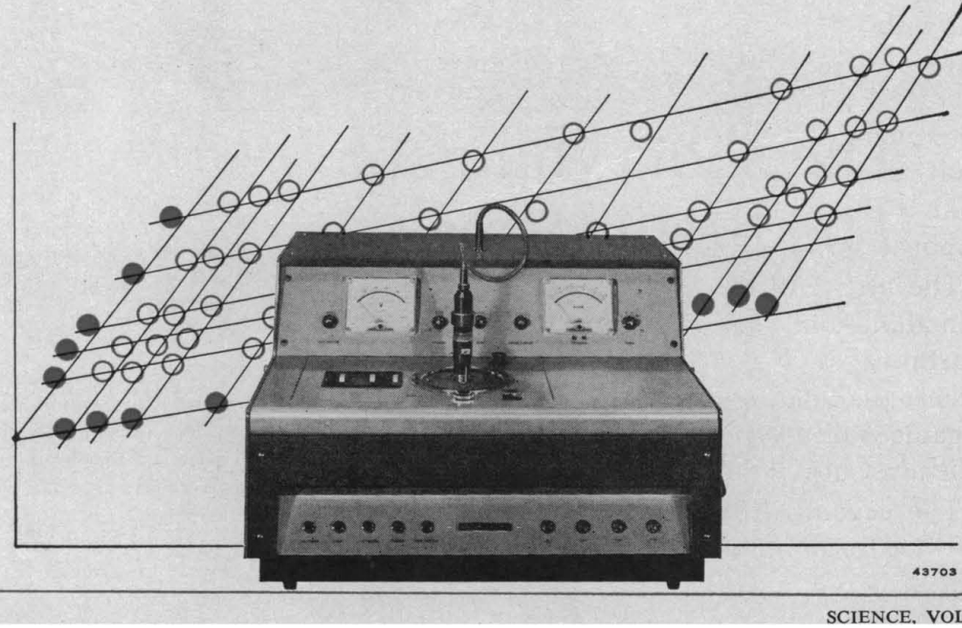

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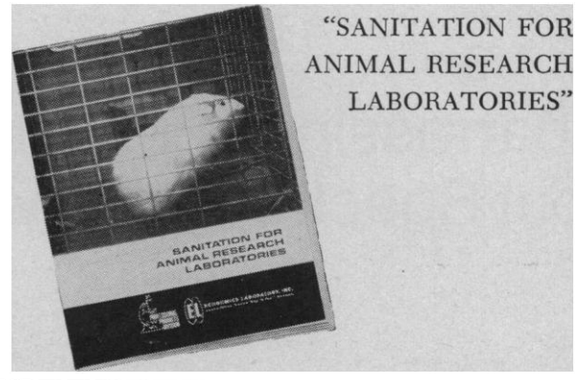

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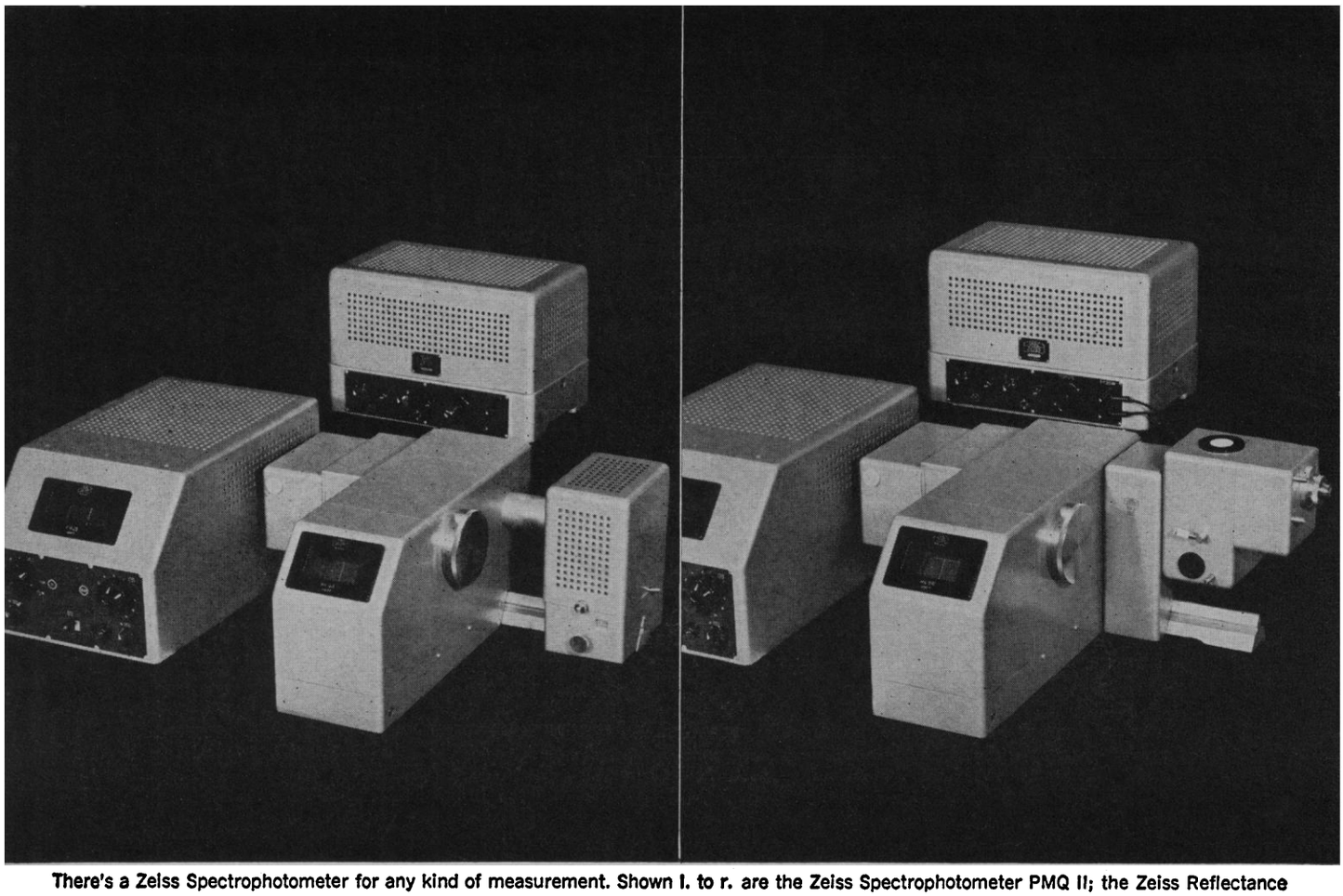

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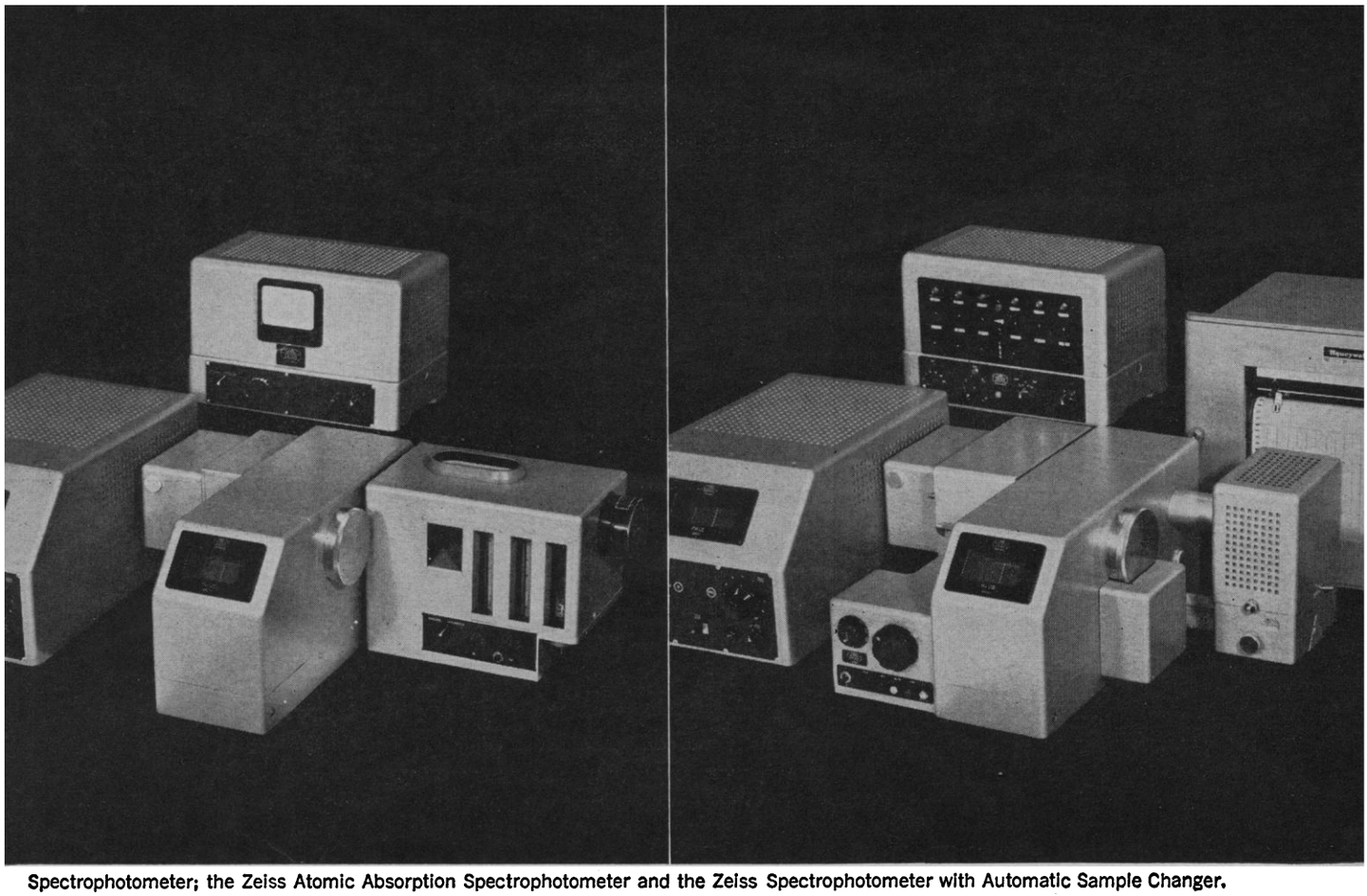

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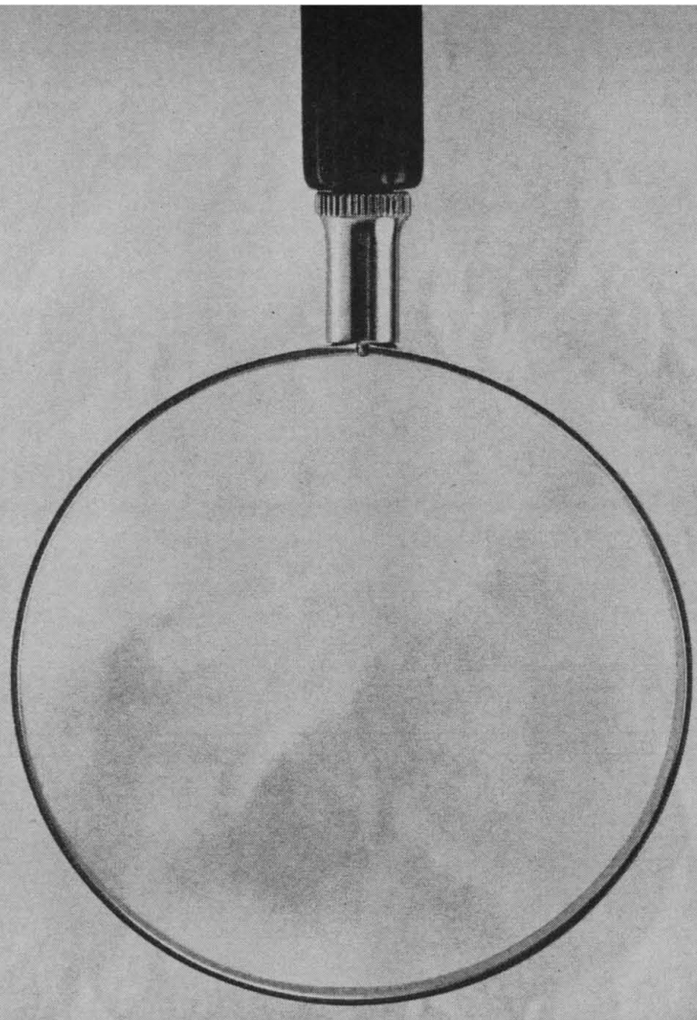

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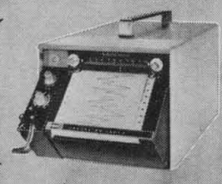

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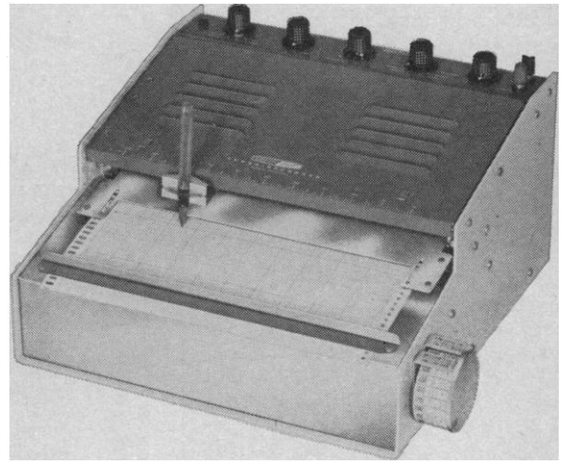

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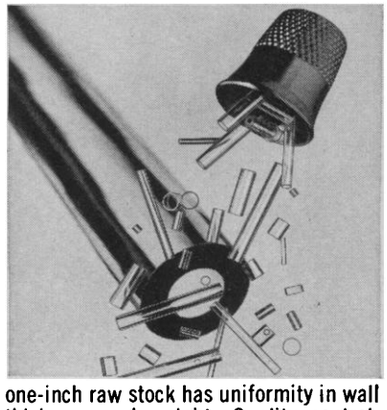
Discovering Q L G

QUARTZ · LUCALOX® · GLASS

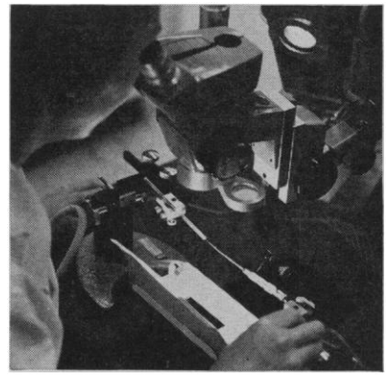
EXCITING NEW APPLICATIONS OF QUARTZ, LUCALOX® AND ELECTRONIC GLASS PROVIDE PROGRESS IN MEETING THE UNCOMMON CHALLENGE

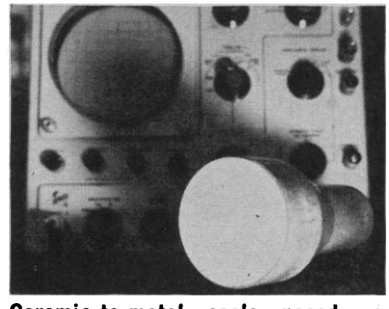
Drawing .010 inch tube from one-inch lead glass stock is the artistry performed by Hanibal Glass in Santa Ana. Hanibal produces about 100,000,000 assorted tubes monthly, used as seals for electronic circuitry components. Seals of G-E Type 012 lead glass are virtually inert, durable, stand up to heat and humidity and have excellent dielectric properties. Why does Hanibal use General Electric glass? Because tubing won't draw to .010 acceptably unless the



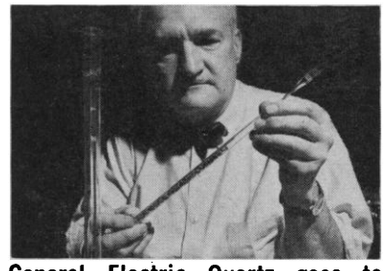
one-inch raw stock has uniformity in wall thickness and weight. Quality control, as delivered by the Lamp Glass Dept., turns out to be the key to this advanced application of a versatile material you might give more thought to. Electronic glass.

General Electric quartz battles cystic fibrosis at a leading Eastern medical school. Here, a study is underway to discover more about this dreaded hereditary disease via delicate analysis of perspiration abnormalities and characteristics. G-E quartz plays a critical role; ultra-micro "pipettes" are flame drawn from G-E quartz micro-bore tubing and the result is a pure, uncontaminating, non-leaching container for sweat samples. Sample size? Approximately one-millionth of a milliliter. Tubing size? From 5 to 10 microns. And most amazingly, it is necessary to draw even smaller pipettes for insertion into the original sample-containing pipettes. In this dramatic application, G-E quartz (Type 204) convincingly demonstrates a remarkable workability and proves once again that if purity is important in your operations, General Electric quartz is important to you.





Ceramic-to-metal seals posed no problems for RCA when G-E Lucalox® ceramic was selected as the faceplate material in its multiplier phototube. This Lucalox application, a unique development in scintillation counters, not only simplifies nuclear detection systems but also makes scintillation counting more accurate. Why? The answer is in the high purity of Lucalox; its freedom from radioactive elements. Elimination of conventional graded seals results in sturdier construction which in turn reduces tube failures. Perhaps this evidence of Lucalox's ability to meet demanding ceramic-to-metal seal requirements will point the way to solving one of your problems in your industry. Translucent Lucalox®, 99% alpha alumina, has unique transmission characteristics for numerous applications.



General Electric Quartz goes to college at Northwestern University's Technological Institute. Professor James F. Morris, head of NU's glass blowing department, recruited G-E quartz type 204 for some special educational duty, i.e., serve as an encapsulating material for metal samples being tested for high heat properties in a vacuum environment. Why G-E quartz type 204? Professor Morris singles-out its ability to be easily formed and its exceptional non-contaminating characteristics. What's being investigated is the metal, not the metal plus uninvited contaminants which could be leached from an encapsulating material any less pure than General Electric quartz. How about your laboratory? Can our quartz help you test only what you want to test and nothing more?

WORLDWIDE SERVICE. For sales and application assistance, contact your nearest regional office:

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ILLINOIS, Chicago 312 332-4712
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OHIO, Cleveland 216 266-4001
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INTERNATIONAL, International General Electric Co., Export Division, 159 Madison Avenue, New York, N. Y. Telephone.....212 751-1311

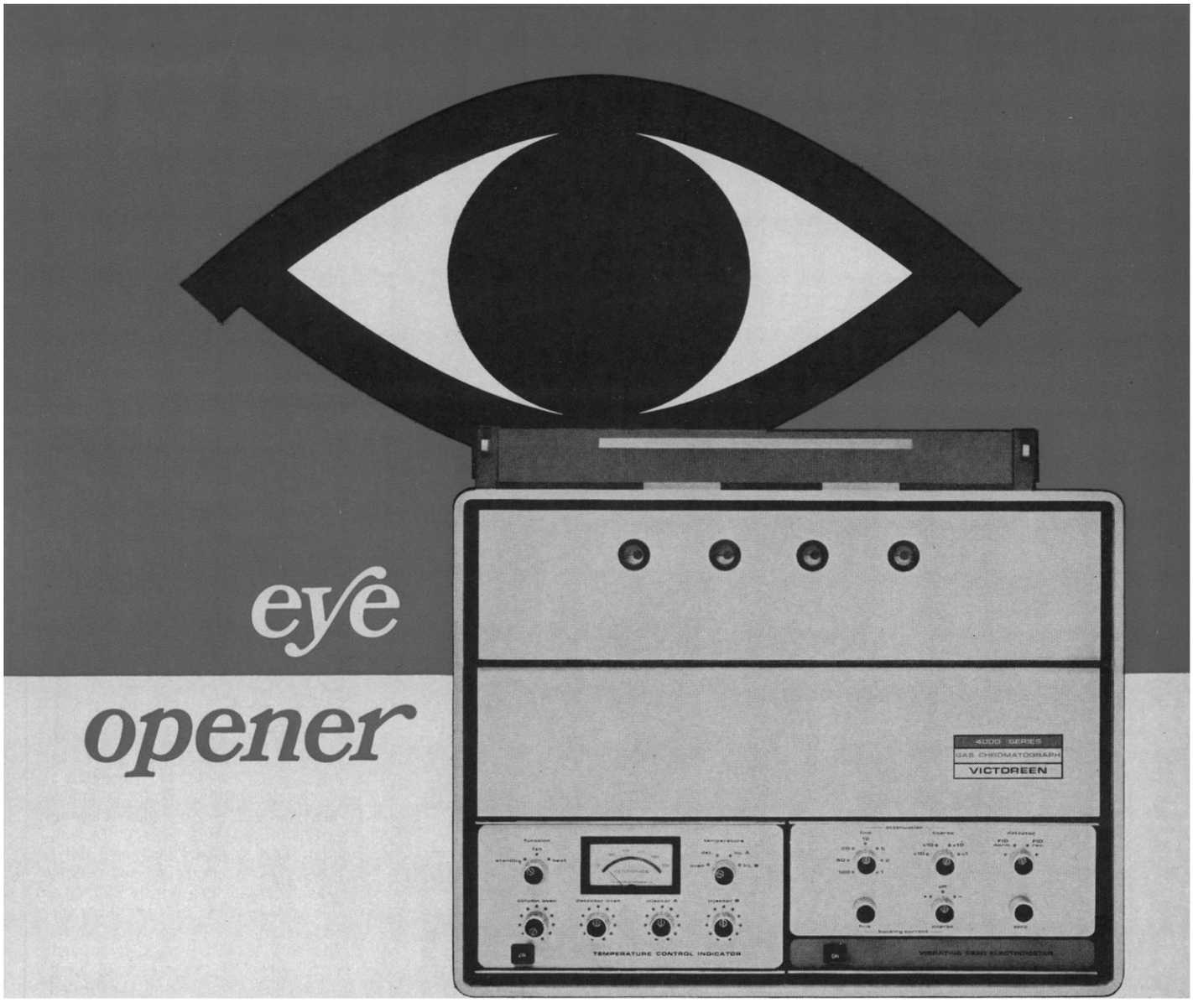
Write for illustrated technical literature

LAMP GLASS DEPARTMENT

GENERAL ELECTRIC

24400 Highland Road • Cleveland, Ohio 44121

MANUFACTURERS OF LUCALOX® CERAMIC — ELECTRONIC GLASSWARE — FUSED QUARTZ PRODUCTS—JET-TEMP® AND JET-B.O.P. THERMOCOUPLES.



for educational gas chromatography... VICTOREEN SERIES 4000

Victoreen Series 4000 Gas Chromatographs are opening the eyes of the teaching profession everywhere. For why should today's students become acquainted with less than tomorrow's most sophisticated chromatographs? This is a completely modern, fully professional line of gas chromatographs — yet realistically priced to match any budget requirements. ***Eye Opener for Performance.*** Victoreen Series 4000 Gas Chromatographs are a breakthrough in sensitivity (up to 10 times greater than others) . . . in linear dynamic range (flame ionization detector exceeds others by a factor of up to 10 times or more) . . . for stability (drift less than 1% per month). ***Eye Opener for Electronics.*** Only system to offer vibrating reed electrometer as standard. All-solid-state design. No batteries or tubes to fail. Virtually unaffected by shock or vibration. ***Eye Opener for Features.*** Large four-column oven allows unparalleled column-detector combination, all-glass or metal columns. Four universal injection ports for use with 1/16 to 3/4 inch columns. Up to four detector ovens, each individually temperature controlled. ***Priced from $2095.***

8765-A

Analytical Instrumentation Division
THE VICTOREEN INSTRUMENT COMPANY
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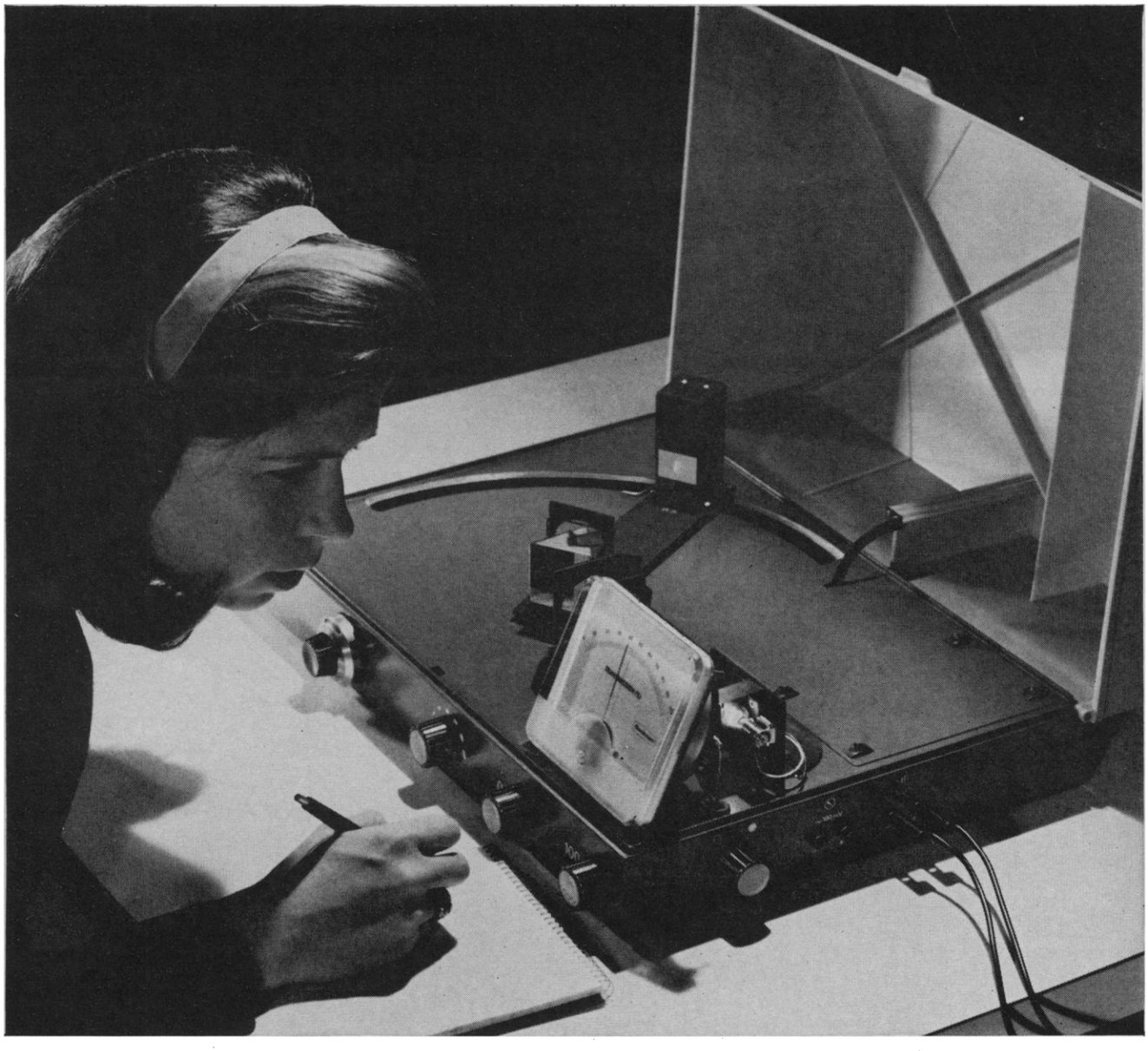
GROVE HOUSE, LONDON RD., ISLEWORTH, MIDDLESEX, ENGLAND

VICTOREEN



Beckman makes it. Macalaster sells it. Now a $295 educational spectrophotometer.

A Spectrophotometer designed for your classroom experiments by the famous Beckman Instruments, Inc. that doesn't require a large investment. Versatile, sturdy, simple enough for your students to use and understand the fundamentals of most optical and photometric principles in physics, chemistry, biology and industrial training courses.

Macalaster's MSC 7100 Spectrophotometer, made by Beckman Instruments of West Germany, was designed bearing in mind all possible educational requirements. It's distributed exclusively in the U.S. and Canada by Macalaster.

The 7100 will provide both qualitative and quantitative measurements on solid and liquid samples with a usable wavelength of 400-800 m/u. It is a prism photometer with transistorized electronics, direct readout, and can be operated with the cover open, thus enhancing demonstrations. The model can be adapted for various optical configurations, notably its conversion to a filter colorimeter. By using an external source such as a mercury lamp, line emission spectra may be observed.

At $295 doesn't it belong in your lab right away? For specific information on the new Beckman Spectrophotometer write for Bulletin 7100, Macalaster Scientific Corporation, Dept. S-4, 186 Third Avenue, Waltham Research and Development Park, Waltham, Mass. 02154.

RAYTHEON MACALASTER SCIENTIFIC CORPORATION
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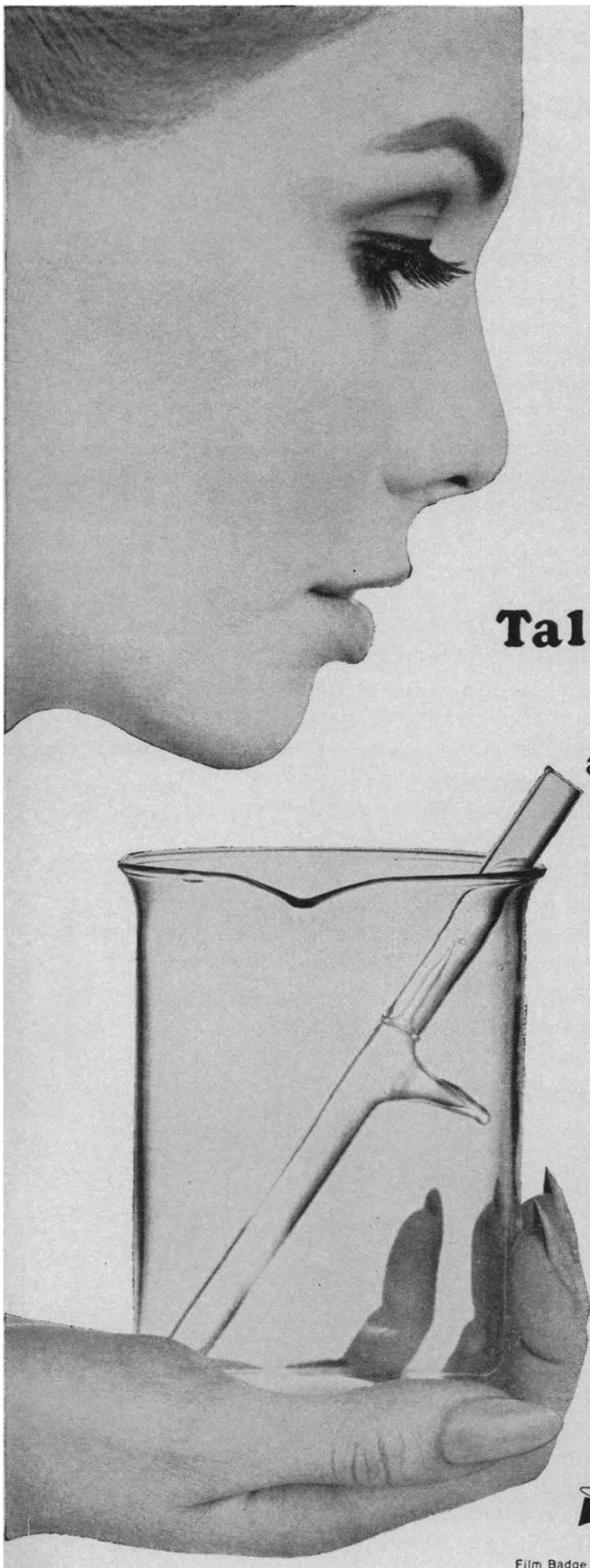

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Where radiochemicals and radioisotopes are concerned, you'll inevitably bring Tracerlab into the conversation.

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— more than 900 compounds in stock at last count. And every one is backed by dependable technical service teams.

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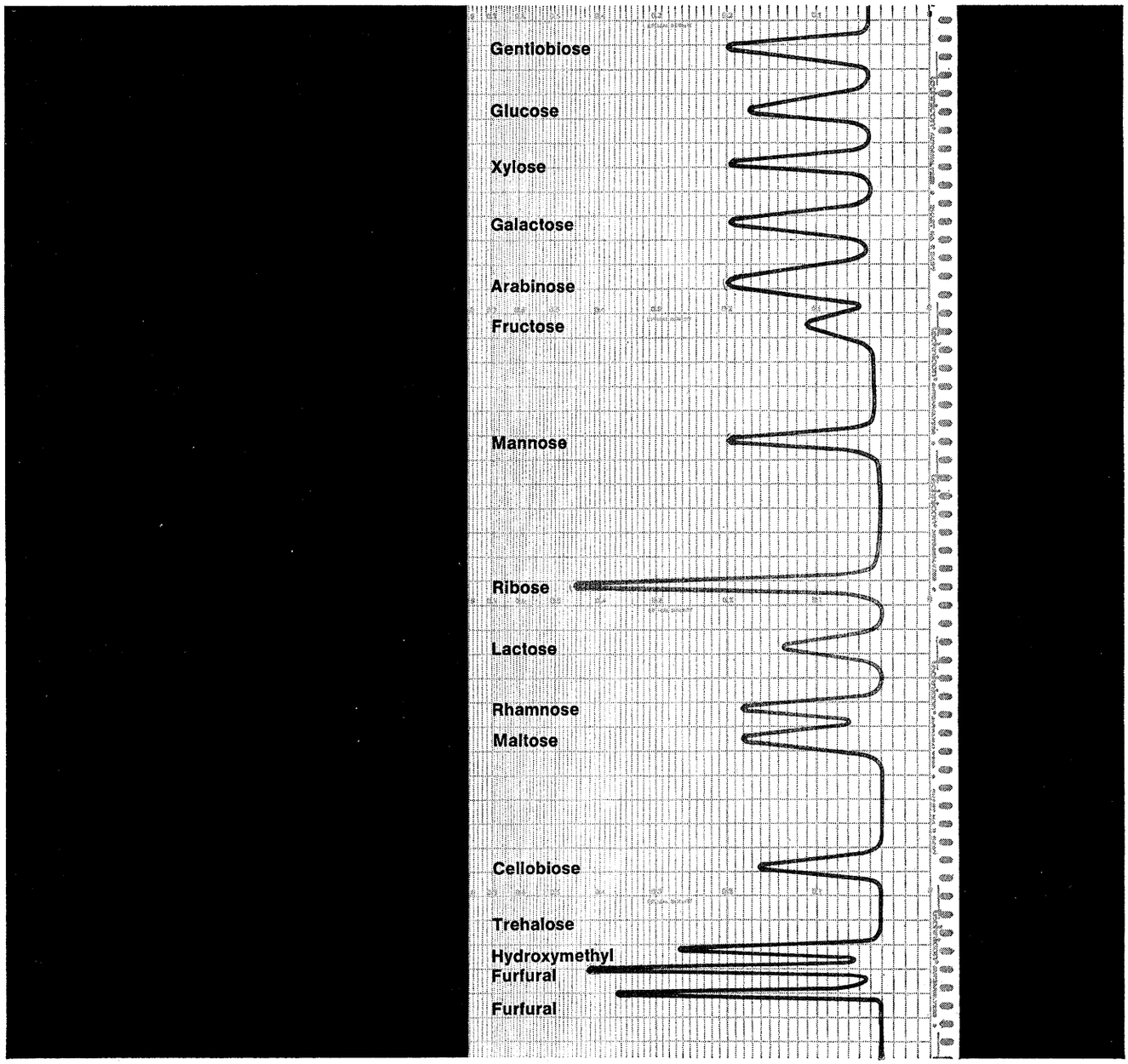
Carbohydrate chromatography... now automatic!



The 15-sugar chromatogram reproduced about one-sixth size above was produced on the new, automated Technicon® Sugar Chromatography System in 7½ hours. Notice that furfural, hydroxymethylfurfural, pentoses, hexoses, and disaccharides are well resolved.

This new system is uniquely sensitive (to 1 microgram of ribose, for example).

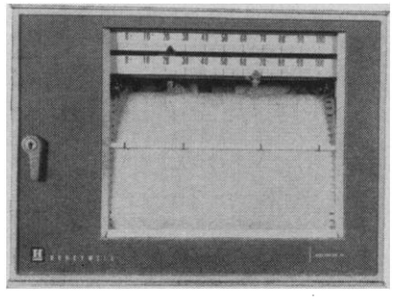
If the ability to quickly separate and quantitate a mixture of carbohydrates would help your work, please write for our 6-page booklet and a typical chromatogram.

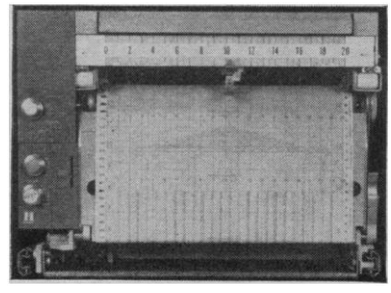
TECHNICON CHROMATOGRAPHY CORP. • Ardsley, New York 10502

What's the best way to handle one recording job? Two dozen?

Honeywell *ElectroniK 16* Recorders can handle them all

In the two-pen ElectroniK 16 *Recorder there are two independent servos, each available with options to satisfy your many needs. Pens operate over full scale width with displacement of 1/8-inch or less. Can operate on same time line over half-scale width*





ElectroniK 16 *multipoint recorder shown printing 24 points (bottom portion of chart); selected points, using* Select-O-Print *option (center portion of chart), and producing a continuous-line record with optional recording pen (top portion of chart).*

ElectroniK 16 Recorders come in one-pen, two-pen, and multipoint models. You can record from one to 24 points automatically. These rugged, dependable, versatile instruments feature:

- High impedance, high stray rejection.
- Solid state circuit reliability throughout.
- Easy chart changing in less than 30 seconds. For really fast (10-second) changing, get an optional pre-loaded chart transport.
- Up to eight chart speeds by simple front-knob selection.
- Rack, panel, or bench mounting.

One- and Two-Pen Recorders

- Excellent for chromatography, spectroscopy, or other chemical or physical analysis work.
- Speeds of 1.0 or 0.2 second full scale.
- One or two Disc integrators (one on each pen).
- Servo take-off shaft for driving switches, encoders, transmitting slidewires or other devices.
- Simplified inking. Remote reservoir is located in drawer easily accessible at front of instrument.

Multipoint Recorders

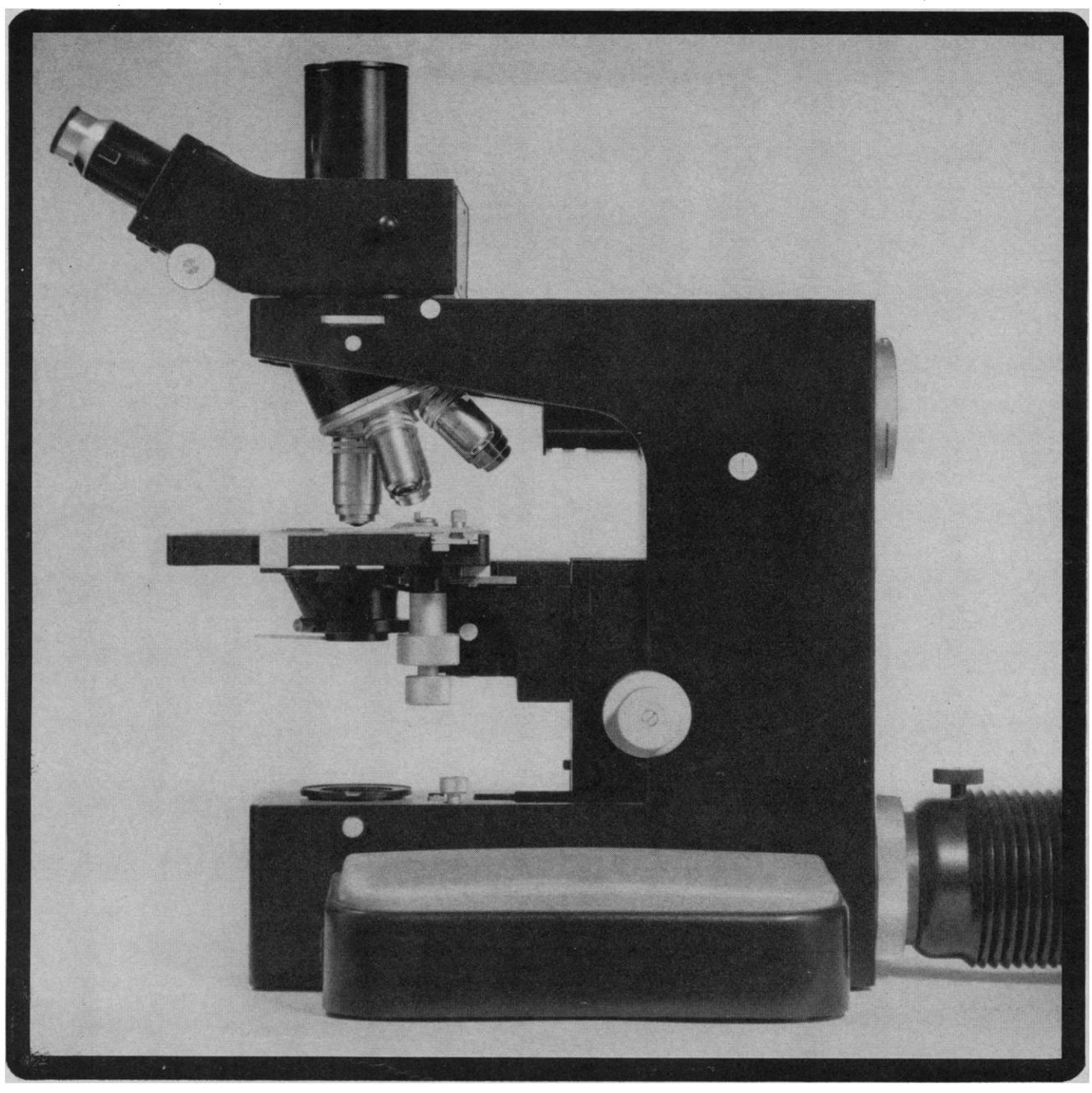
- Excellent for amino acid work, temperature and other monitoring applications.
- Record up to 24 points at 1 to 120 seconds per point.
- **Select-O-Print** option permits random selection of specific records for close attention, while skipping others, temporarily of less interest, at a fast speed.
- **Select-O-Print** Hold-on option with attachable recording pen provides continuous-line recording of a single point.
- **Select-O-Larm** option permits plug-in arrangement of alarm contacts to operate with desired records.

For complete data and ordering information, write Honeywell, Industrial Division, M.S. 440, Fort Washington, Pa. 19034 or USE READER SERVICE CARD.

Your Instrumentation Contractor from Planning Through Performance.

Honeywell

See the **ElectroniK 16** and other Honeywell instruments at the 51st Annual Meeting of the Federation of American Societies for Experimental Biology, Chicago, Illinois, April 16-20, 1967, or ask your local Honeywell Industrial salesman for a demonstration.



LEITZ ORTHOPLAN MICROSCOPE stimulates your zest for research

An image area up to 2½ times greater than that possible with conventional wide-field instruments, is only part of the exciting "Bonus" that is yours with the new Leitz ORTHOPLAN Research Microscope. Full advantage is taken of the Plano objectives pioneered by Leitz to provide apochromatic image quality—with *unequaled flatness* throughout the field.

The ORTHOPLAN is ideally functional. Modular interchangeability of units and accessories provides for unlimited research capabilities and *protects against obsolescence.* Modern facilities are provided for all forms of illumination, transmitted and reflected light, and photomicrography.

If you must have the finest research microscope in this world, only ORTHOPLAN can meet your need. You are buying a versatile precision instrument, not an integrated machine. Complete information on this new "standard" in microscopy will be sent on request. 61366

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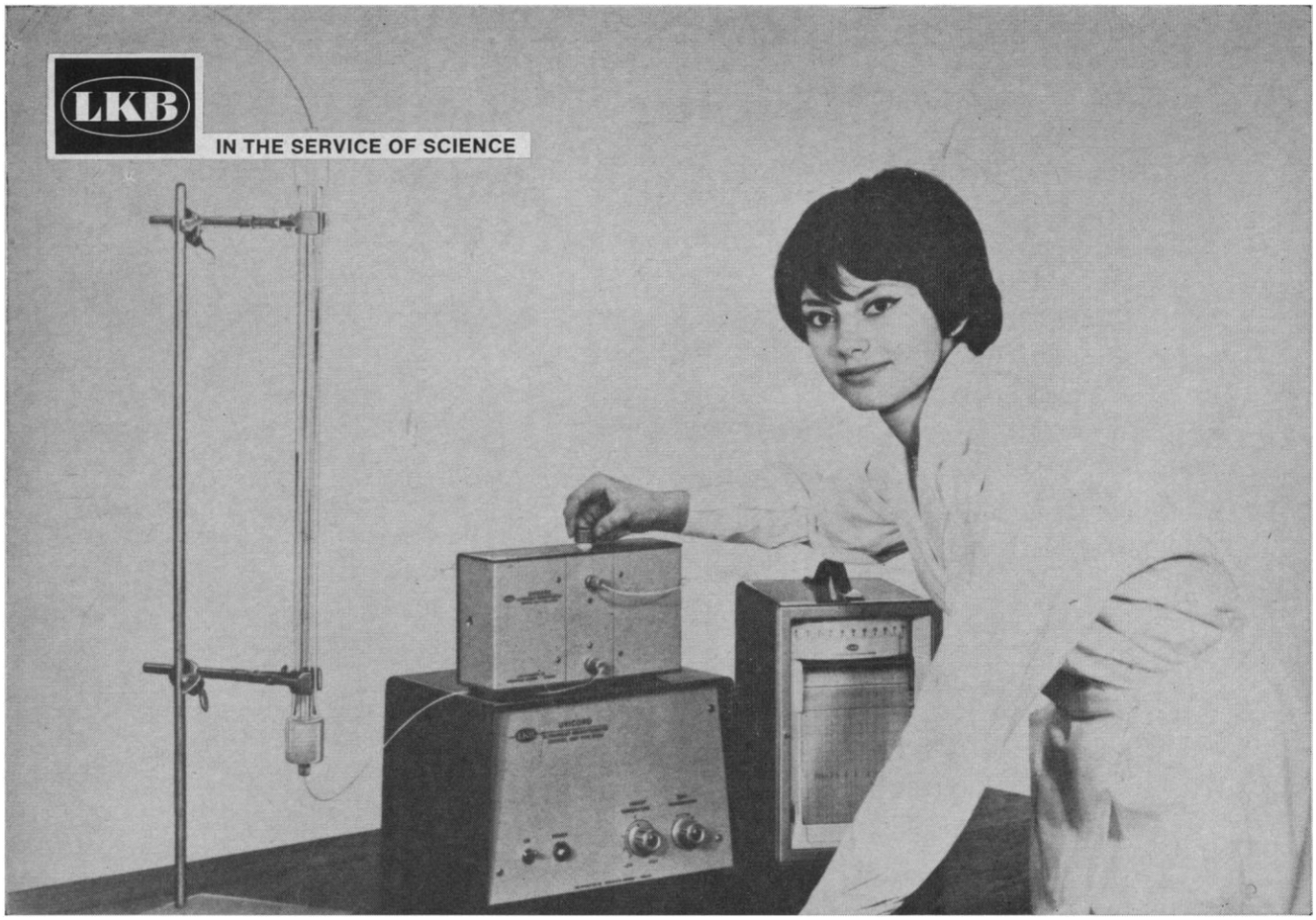

One good Uvicord deserves another So we made Uvicord II

Everyone who has used an LKB Uvicord knows that a highly efficient, dependable, simple to use flow analyzer is an economical investment.

The new Uvicord II, like the Uvicord I, is designed to detect, locate and quantitate interesting fractions of UV-absorbing compounds during chromatographic or electrophoretic separation.

The Uvicord II has some interesting additional features:

Protein chemists will be interested in its performance; at 280 mμ (proteins), and at 254 mμ (nucleic acids and their derivatives), it is often superior to much more expensive spectrophotometers.

Using a stable long-life, low-pressure mercury lamp as the primary source, providing radiation at 254 mμ, the new monitor is equipped with a unique light converter; the 254 mμ radiation excites a transparent rod which fluoresces strongly, emitting UV-light in a narrow band of mean wavelength 280 mμ. Unwanted radiation is eliminated by using high transmission, LKB interference filters, and a black glass filter.

High baseline stability (100 % T): heating coil and insulation of light source compartment compensate for normal ambient temperature fluctuations.

Of course we have made Uvicord II suitable for coldroom use but we have made it easy to operate with a built-in temperature control which allows adjustment over a range 0°C – 30°C.

Good electrical and light source stability provide clean curves even though the sample receives a minimum UV-dosage, and good optical properties give minimal stray light and high accuracy even where there is strong solvent absorption.

These specifications, combined with the superior flow properties of the low-volume measuring cells, give Uvicord II the reliability that has been proved the world over by Uvicord I. Request file 8300D3.

LKB

LKB INSTRUMENTS INC • 12221 PARKLAWN DRIVE • ROCKVILLE Md 20852

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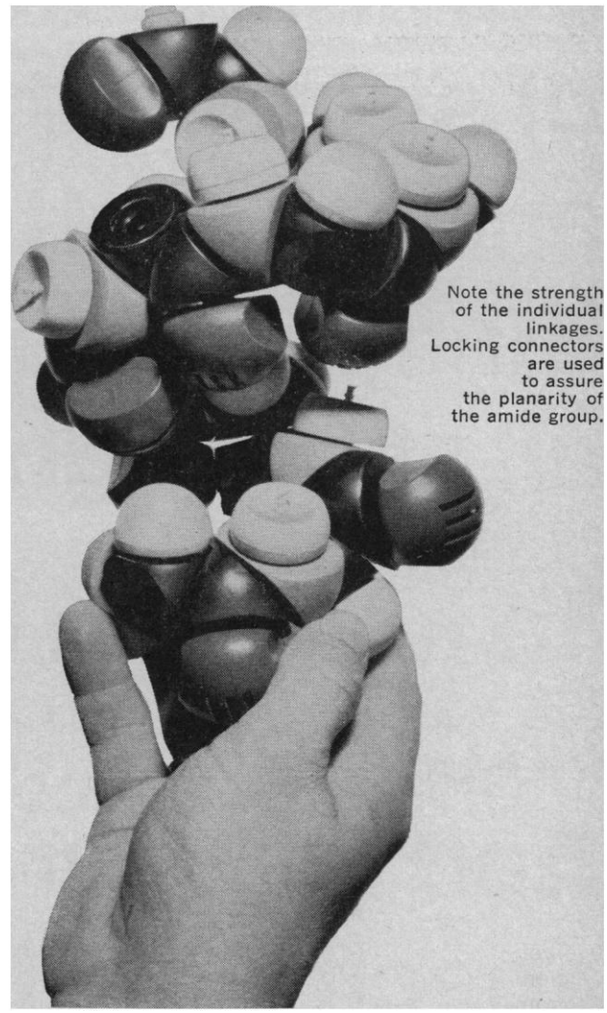
NOW AVAILABLE FOR THE FIRST TIME-THE LONG AWAITED, INEXPENSIVE

NEW COREY-PAULING SPACE FILLING ATOMIC MODELS WITH KOLTUN CONNECTORS



Note the strength of the individual linkages. Locking connectors are used to assure the planarity of the amide group.

These new CPK Models were designed by the Atomic Models Subcommittee of the Biophysics and Biophysical Chemistry Study Section of the National Institutes of Health, Washington, D.C. Over 40 scientists from more than two dozen research centers contributed to the work of this Committee.

The CPK designs which emerged have been implemented by the American Society of Biological Chemists with financial support from the United States National Science Foundation.

These new CPK Models are offered by Ealing for immediate delivery from stock:

—Individually

—as Research and Teaching Sets, Protein Sets, Nucleic Acids Sets and Steroid Sets each in heavy wooden storage boxes

—as 18 convenient pre-assembled structures

Get your free copy today of the new 32 page CPK catalog.

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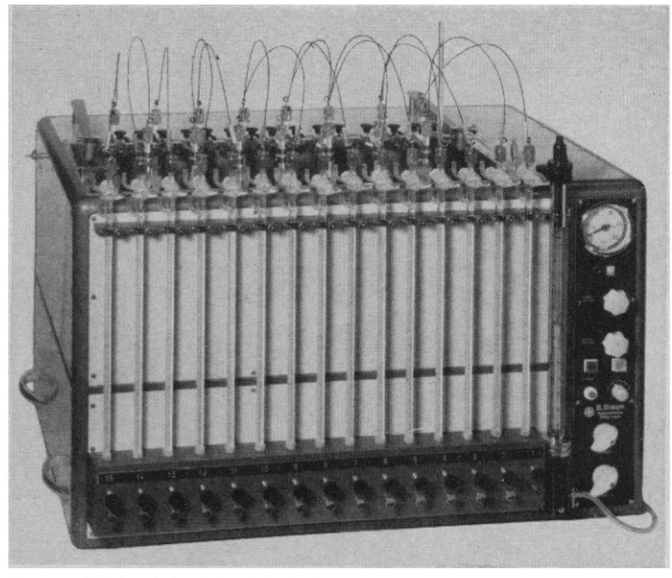
THE ULTIMATE WARBURG FROM BRONWILL SCIENTIFIC

- **Read Double-Capillary Manometers—while reaction flasks are shaking!**
- **Flexible Stainless Steel Capillaries, impermeable to *all* gases, couple fixed manometers to shaking flasks.**
- **All components of each manometric system INTERCHANGEABLE—and PRE-CALIBRATED (optional).**
- **Cold light provision for studies in photosynthesis.**
- **Shaking frequency and amplitude continuously variable.**
- **Unique temperature regulation maintains bath uniformity better than ±0.01°C.**
- **All controls, including contact thermometer, grouped at eye level.**



Bronwill No. 30—Model UFL Research Warburg Apparatus

Research Model UFL with 15 STATIONARY MANOMETERS

For optimum precision and convenience in respiration measurements, Bronwill offers the Model UFL Research Warburg Apparatus. Manometers are *stationary,* connected to the reaction flasks through flexible stainless steel capillary tubing. Readings can be made at any time . . . without interrupting the shaking of the sample . . . a feature long awaited by biologists, biochemists, physiologists alike.

In addition, the volumetric system at each station may be supplied factory PRE-CALIBRATED. Each of the four components (manometer, capillary, connector and reaction flask) is inscribed with its calibrated volume . . . and all components are interchangeable with those of other stations. Merely adding the four values gives the volume of the total system.

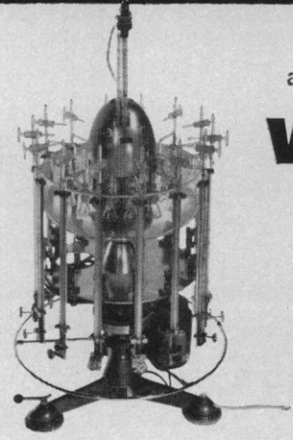
THERMOREGULATION . . .

An adjustable mercury-contact thermometer, sensitive to ±0.001°C., mounted adjacent to the front control panel, triggers a fully solid state system. Bath water, circulating through a separate heating-cooling chamber, flows through the unique thermometer bulb (shaped as a hollow double wall cylinder to give instant response) . . . and then is jetted simultaneously at all the immersed reaction flasks. This results in uniform turbulence and remarkably close temperature control throughout the bath.

COLD LIGHT ILLUMINATION . . .

The operator can use any type of illuminating source he prefers. Under the parallax-free glass bottom is a rectangular plano-mirror, adjustable to any angle. Coated mirror surface transmits over 80% of infrared radiation while reflecting 90% of the visible range up to the flasks.

Look First to Bronwill . . . for the latest in Warburg Apparatus



and the **MODEL UV WARBURG**

for routine measurements

COMPACT, LIGHTWEIGHT

- Light, circular, compact . . . designed for the modern lab
- 320° rotatable—brings any of 14 manometers into front reading position
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A DIVISION OF WILL SCIENTIFIC, INC.

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#8-4-66

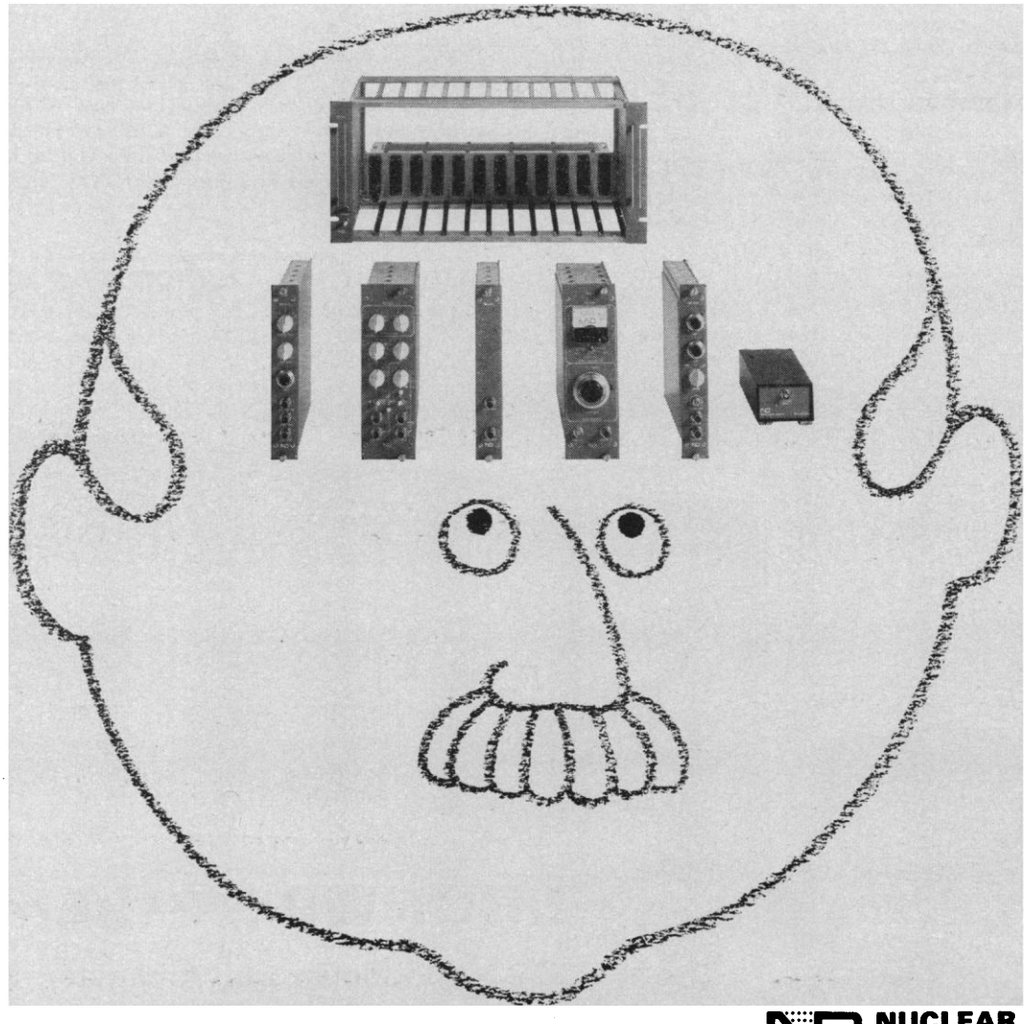
We leave you with this thought...

Keep us in mind for a growing line of modules to meet your current and future needs. For example, the ND-525 High Resolution Preamplifier; ND-526 Bias Power Supply; and the ND-524 LARC Linear Amplifier—designed to provide the linear amplification and R.C. pulse shaping required in high-resolution, multi-channel analysis.

Keep us in mind, too, for bins, power supplies, preamp-amp-discriminator combinations, single channel analyzer and mixer/rejector modules. All of them work perfectly with Nuclear Data analyzers (and others as well) and all are built to AEC specifications. But perhaps most important—these modules meet the high standards of craftsmanship researchers expect from Nuclear Data.

Good reasons, we suggest, to hold the thought: Nuclear Data for compatible nuclear instrument modules. (More details? Just write us.)

Compatible NIM modules for your Nuclear Data Analyzers



NUCLEAR DATA INC
120 West Golf Road, Palatine, Illinois 60067

Adage makes the best computer on the market for signal processing

...it's called Ambilog 200

Ambilog 200 is a computer which combines the best of both analog and digital techniques. Unlike conventional machines which were intended for manipulating numeric data, Ambilog 200 was designed right from the start for signal processing. Signal processing, which encompasses data acquisition, monitoring, editing, analysis, recording, and display, generally requires efficient handling and high-speed processing of analog as well as digital data. Ambilog 200 with its flexible analog/digital interface and powerful hybrid structure is ideal for such applications.

DIGITIZING AND RECORDING

Multiple inputs, from up to several hundred sources, are routed through multiplexer switches under stored program control. At no penalty in sampling rates over conventional systems, Ambilog 200 converts incoming data to engineering units for recording or monitoring. An analog-to-digital converter performs a complete 14-bit conversion in 4 microseconds for digital storage, recording or outputing.

REAL TIME WAVEFORM MEASUREMENT

Peak values, axis crossings, ratios of successive differences, and other characteristics of analog signals are measured in real time. Incoming signals are monitored for events of interest, using complex programmed detection criteria. In a typical biomedical application where "floods of data" are generated, the result is a 100-to-1 reduction in the bulk of magnetic tape output records.

RANDOM SIGNAL ANALYSIS

Parallel hybrid multiplication and summing, 2 microsecond 30-bit digital storage, and a flexible instruction format providing efficient list processing combine to make Ambilog 200 an extremely powerful tool for statistical signal analysis techniques. These include Fourier transformation, auto and cross correlation, power spectrum density analysis, and generation of histograms of amplitude spectra.

ON-LINE DISPLAY

CRT displays of incoming raw data, or of results derived by reduction and analysis, are generated at frame rates of about 30 per second using line-drawing elements. This "quick look" facility helps the user select those processing techniques which best apply to the problem on hand. Display systems include light pen selection of control parameters and processing subroutines to insure close interaction between the analyst and his computing equipment.

• • • •

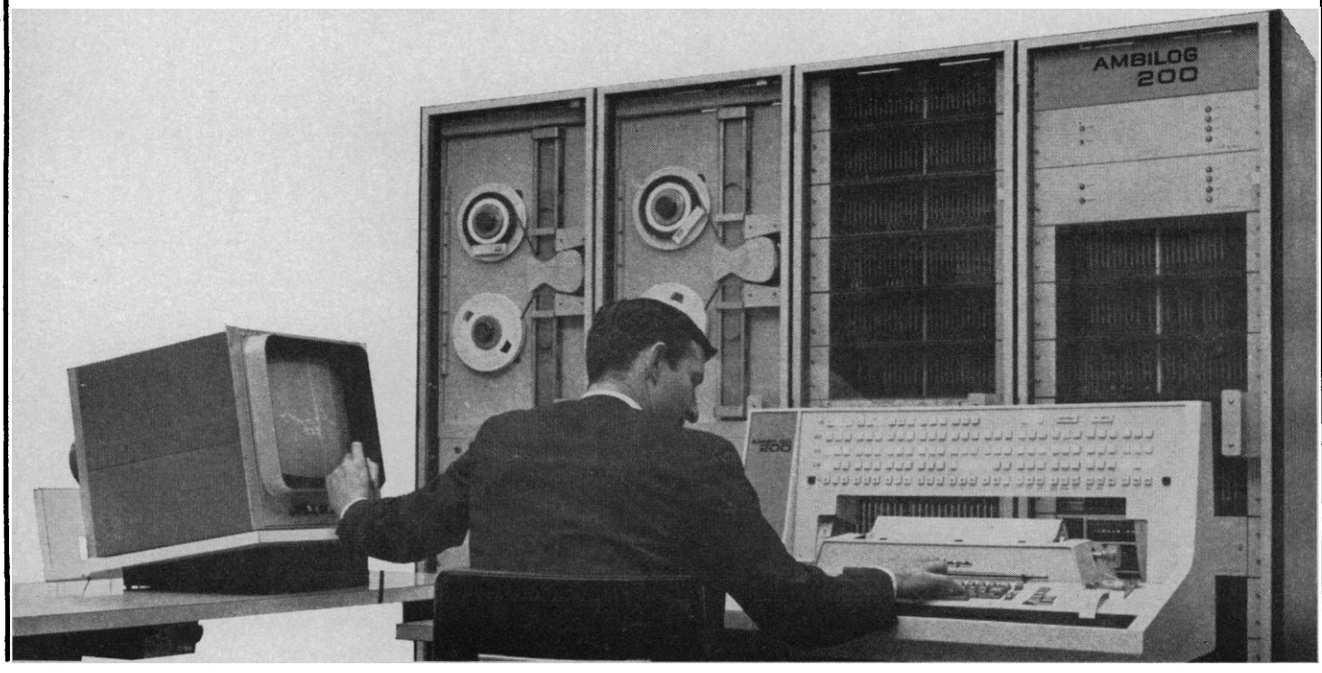
SOFTWARE

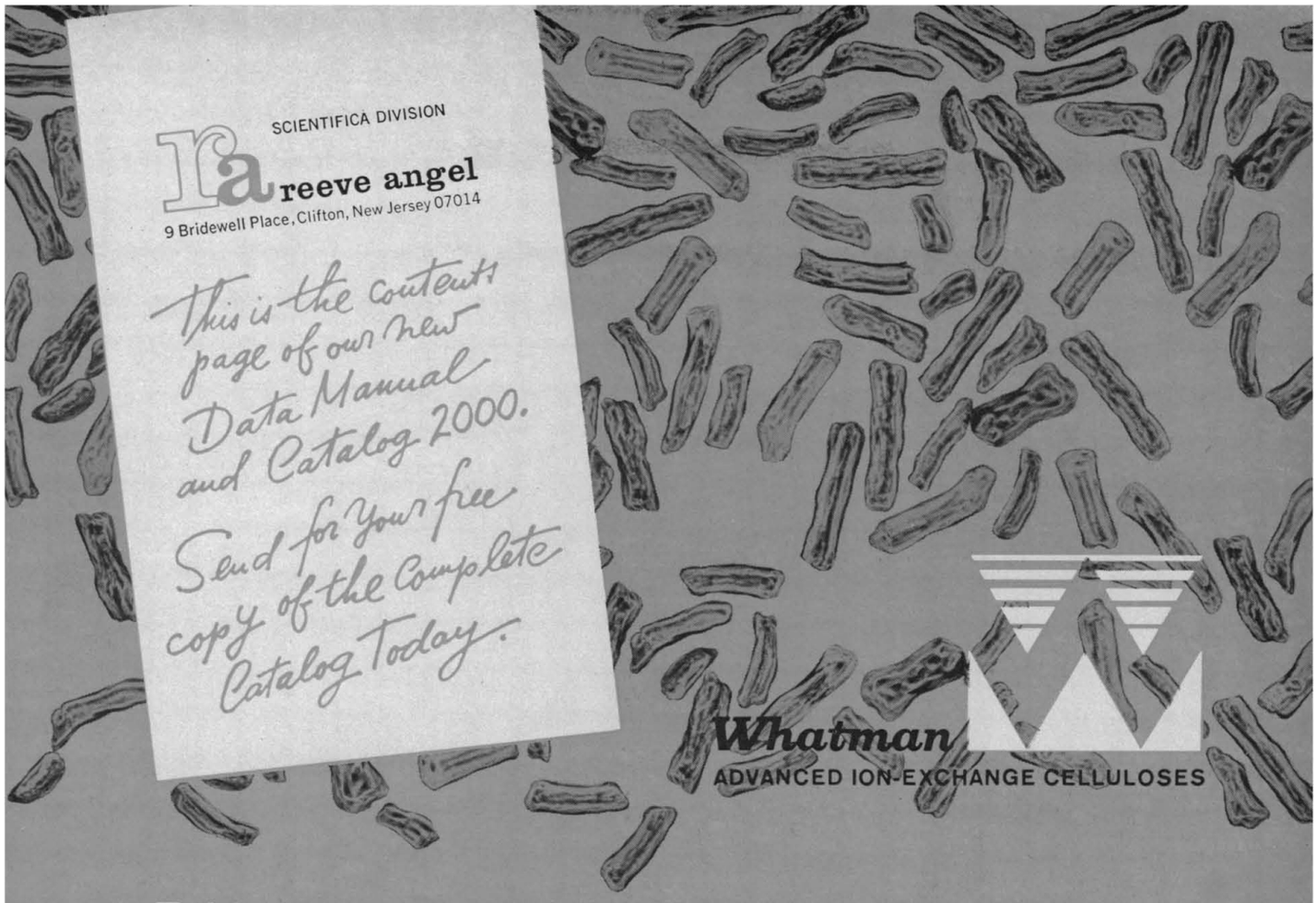
Programming aids for use with Ambilog 200 were designed as well to meet the specialized needs of signal processing tasks. An extensive program library includes an Adage assembly system, Fortran, programs for source language editing and on-line debugging and control, and a wide range of applications programs and subroutines. Comprehensive system documentation, and programming and maintenance training and services, are also available.

• • • •

Ambilog 200 signal processing systems are currently being used for seismic research, dynamic structural testing, sonar signal analysis, wind tunnel testing, speech research, and biomedical monitoring. For technical reports describing in detail these installations and other signal processing applications, contact M. I. Stein, Product Manager, Adage, Inc., 1079 Commonwealth Avenue, Boston, Mass. 02215, (617) 783-1100.

Adage INC





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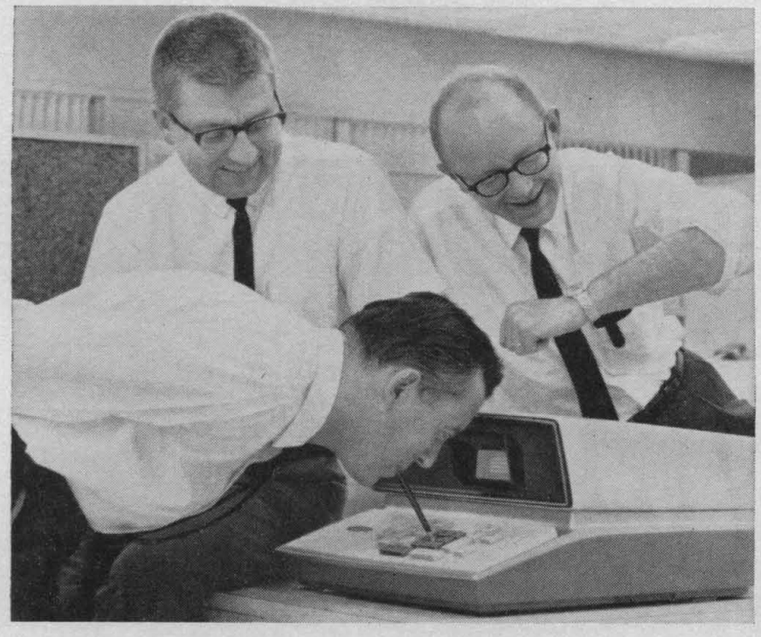
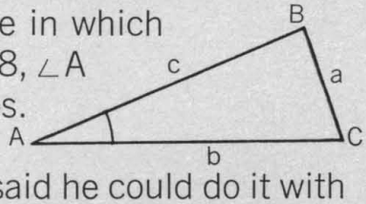
This engineer is winning a $5 bet.



Someone gave him the following problem:

Find the length of side "a" of the illustrated triangle in which b = 12.7, c = 10.8, ∠A = 31° 25′ 10″, Cos. A = .85337.



He laughingly said he could do it with his hands tied behind his back. Someone bet him $5 he couldn't.

He will win the bet in 30 seconds using the new 132 Electronic Calculator by Friden with automatic square root.

The Model 132 stores intermediate answers and displays them on a TV screen in four visible registers. As he works through the problem, these answers drop into the working register automatically.

There's nothing to write down.

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Care to take a crack at it yourself? For a demonstration of the Model 132, or the Model 130 without square root, call your nearest Friden representative. Or write Friden, Inc., San Leandro, California 94577. Sales and service throughout the world.

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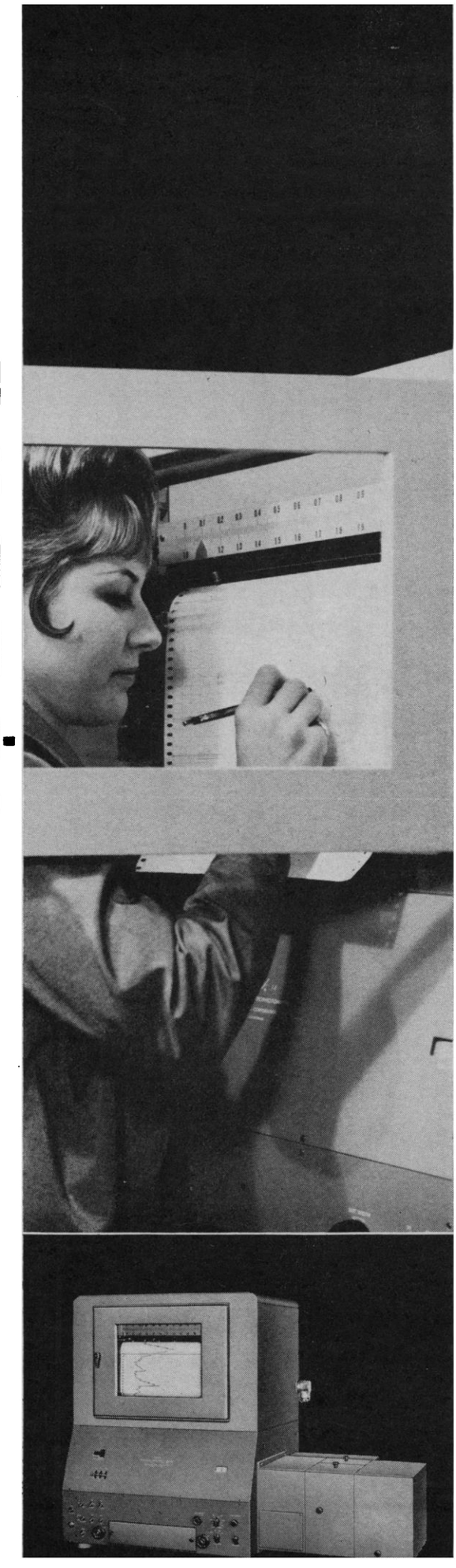

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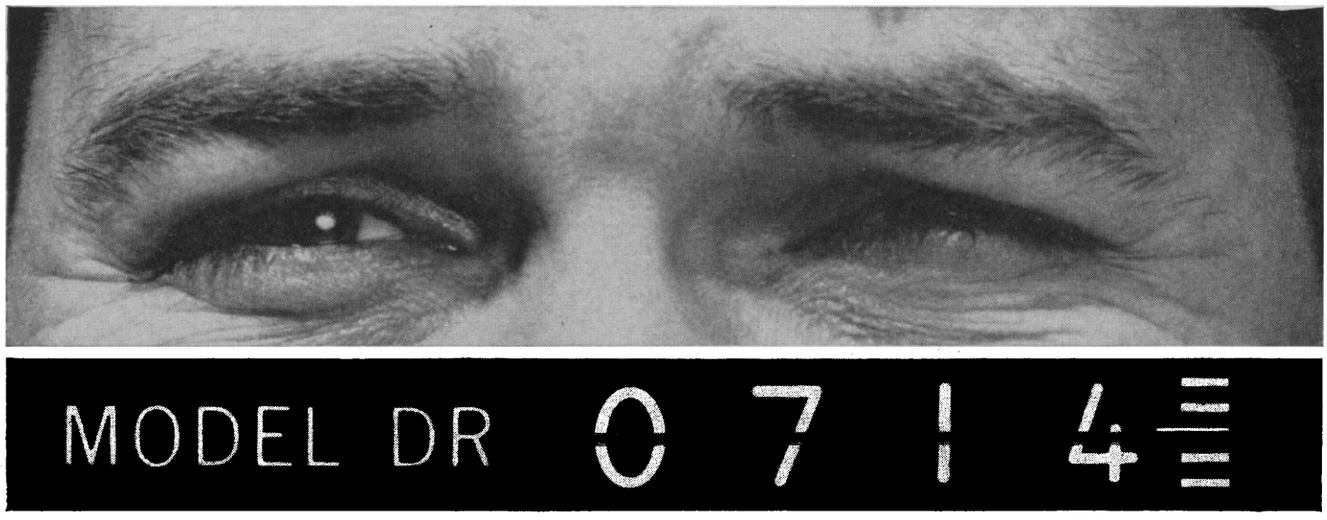


You can read Sargent's DR pH Meter to 0.001 pH at a glance.

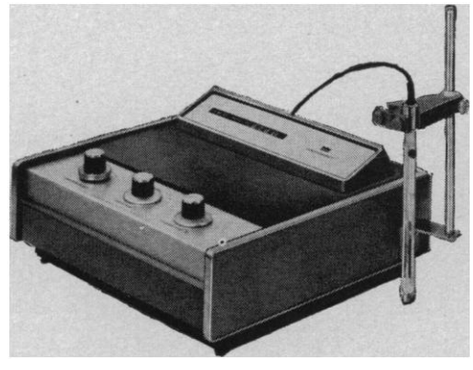
You'd need a pH scale 35 feet in length to get readability equivalent to that of our DR pH Meter. There's no switching or recalibration required to get a reading to 0.001 pH. The DR reads directly, in digits, to the second decimal; a graduated scale shows the third decimal.

The DR's relative accuracy is ± 0.002 pH (within 4 pH of buffer set point). This accuracy is unchanged by any mechanical or electrical wear in its automatic, self-balancing, measuring system. There's no drift, either. Restandardization is dictated only by the type of electrode used. Three controls are all it takes to realize the DR's full capability: one each for standardization, operating mode, and temperature compensation.

The DR's high input impedance lets you work with any commonly used electrode. And the automatic isopotential setting adapts to electrodes of any isopotential from 0 to 14 pH —without adjustment.

The Model DR pH Meter is designed and manufactured by E. H. Sargent & Co. So you know that it's made for dependable, trouble-free service. And that it's been carefully assembled and thoroughly tested.

This unique combination of readability, accuracy, and reliability is priced at $630.00 (with electrodes and solutions). If you'd like a demonstration of the Model DR pH Meter, just call your Sargent man or write directly to us. 7-212



Sargent Model DR Direct-Reading pH Meter

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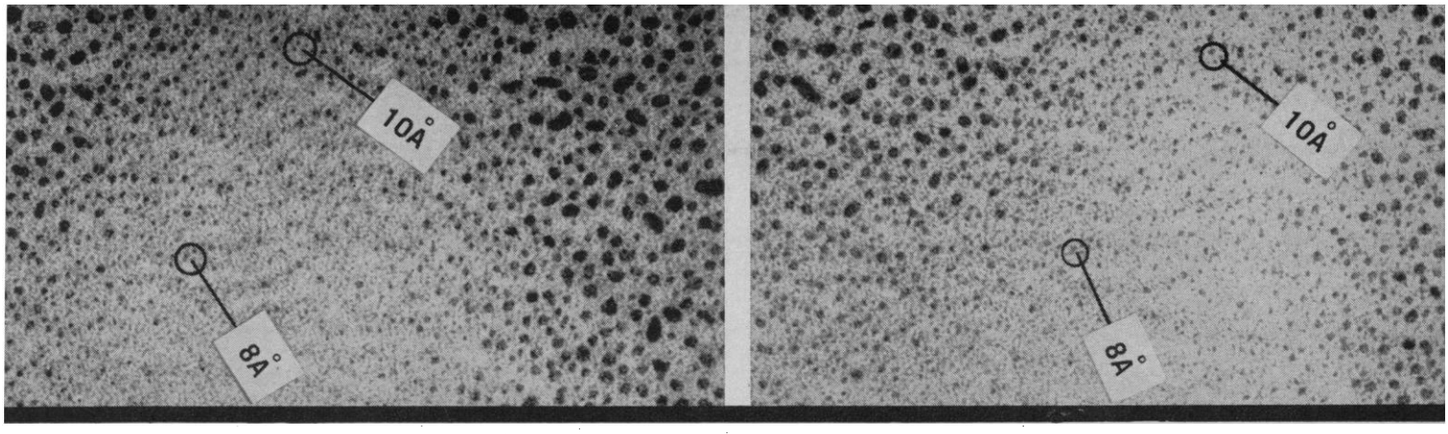

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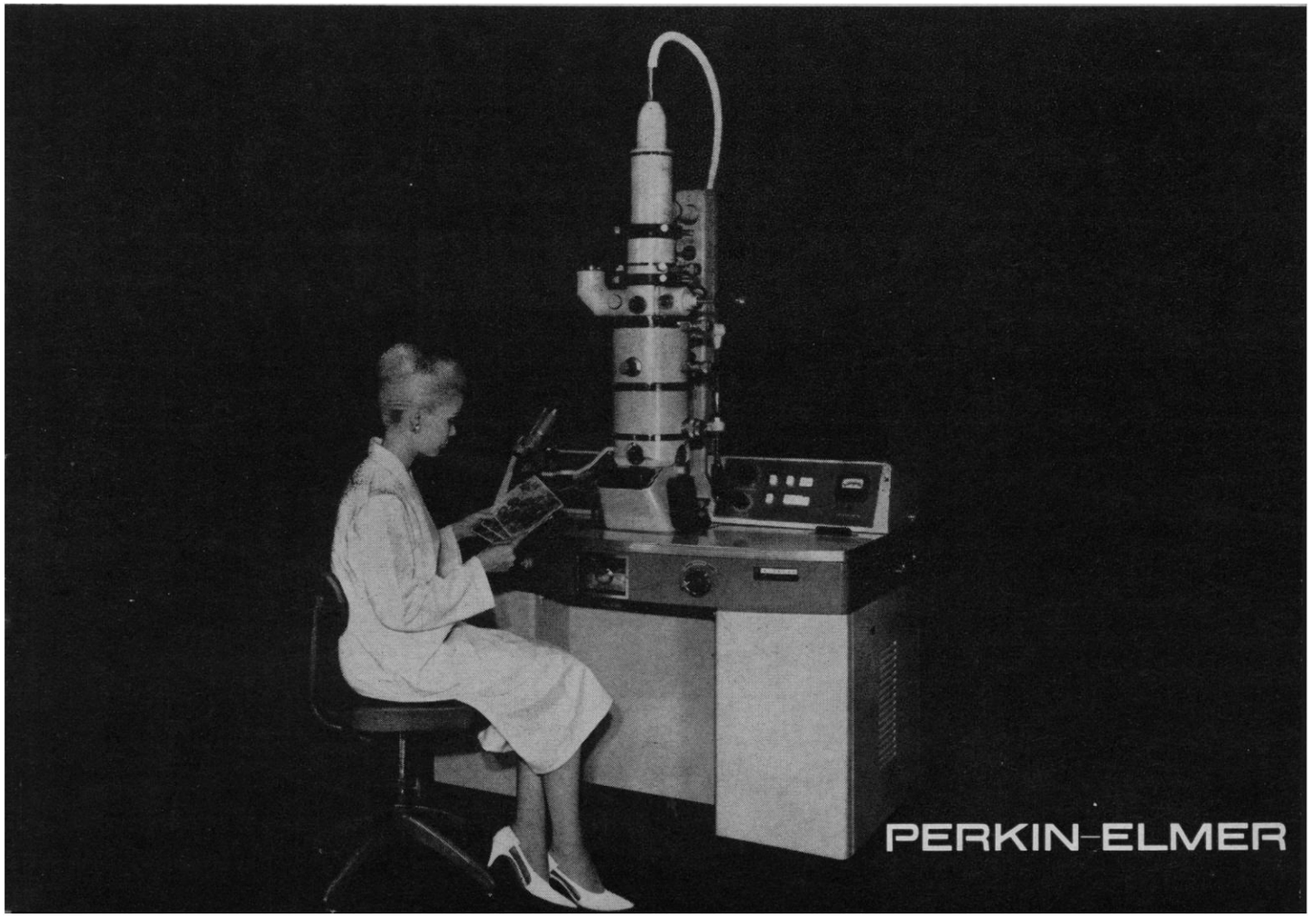
NEW FROM HITACHI: THE HS-7S--THE FIRST HIGH RESOLUTION COMPACT ELECTRON MICROSCOPE

Here are some of the important features of the HS-7S: High resolution: 8 Å guaranteed. Direct magnification 1000X to more than 80,000X, permitting final magnification to 1,000,000X. Binocular viewer (7X). Simple, fast and reliable operation. Click stop positioning of interchangeable condenser and objective apertures (four apertures each). Push button vacuum system including vacuum locked specimen and camera chambers. Takes 18 lantern slides (3¼"x4") per magazine load with additional 18 in prepump chamber. Double condenser lens for improved contrast (four micron spot diameter). Stigmator for objective lens. Step focusing. Built-in anticontamination device for specimen chamber. Built-in exposure meter. Full range of accessories available including the new TV image intensifier system. Compact: 49x32 inches floor space. Price $24,000 duty free. For further information contact Perkin-Elmer Corporation, Electron Microscope Department, 723 Main Avenue, Norwalk, Conn.

(Prices subject to change without notice.)



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The NEW ULTRORAC is the smallest fraction collector with a 200 standard test-tube capacity.

Having rugged precision it is as dependable as the world-famous RadiRac. Remove a ten-tube rack, it continues working – put it in the cold, it continues working – treat it roughly, it continues working – preset the run to end at 50 fractions and it stops at your command.

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- ✓ Designed for Standard test tubes
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They are right.
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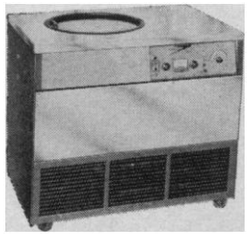

LOURDES Clini-Fuge 30-R
Combines low speed, super speed and ultra speed operations in one unit. Only one attachment is needed to increase maximum rpm from 6,000 to 25,000. Automatic, Refrigerated. Contains all safety features as in Beta-Fuge. The price is $2,775.00; high speed attachment only $385.00. Non-refrigerated model (No. 30)—$840.00.

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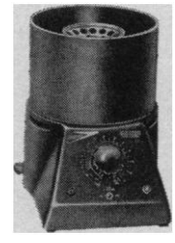
Capacity to 3,300 ml; forces to 41,300 X G. Automatic, Refrigerated. Temperature control ±1° C. Many safety features such as "Fail-Safe" brush life control to prevent motor damage, automatic imbalance trip to stop the unit if there is excessive vibration, double independent shafts so rotors cannot fly off, etc. The price is $2,570.00 with rotor.

LOURDES Series LC
Bench type Centrifuges, automatic and non-automatic, with speed, volume and force combinations for every requirement. Prices — $760.00 and $925.00.



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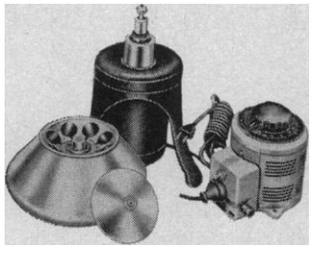
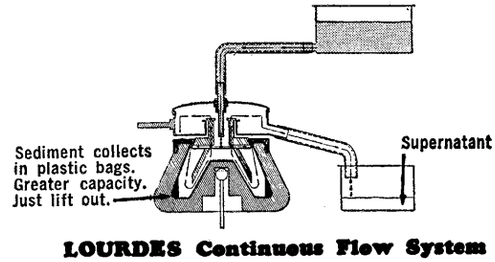


LOURDES Model AX
16,500 rpm with up to 400 ml; forces to 34,800 x G. Only $265.00.



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Here's an engineer's magazine even your wife will love

It's the *portable* chart paper magazine from our new Mark 250 Strip Chart Recorder. Now you can take the record home with you, or any place for that matter! Manual turning knobs let you roll the chart forward and back. Later, you can re-record on the same chart for side-by-side comparison. Chart take-up is automatic. And you can reload the magazine in seconds. (Many users get an extra magazine . . . study one while the other is in the recorder.)

But the world's slickest chart magazine is just one of the Mark 250's great new features. Step response over the full 4½-inch span (10% to 90%) is 40 milliseconds . . . records up to 100 cps . . . flat to 10 cps full scale! Choice of 21 interchangeable preamps. Pushbutton selection of 12 chart speeds. Crisp, clear, rectilinear presentation. Patented, pressurized inking system. Owners say there's no other strip chart recorder in the same league.

Words just don't do it. You have to *see* a Mark 250 to understand why it's called "the first strip chart recorder for the perfectionists of the world." A call to your local Brush Sales Engineer brings a Mark 250 right to your office or lab. Go ahead. Even *our* wives will love you for *that*. Clevite Corporation, Brush Instruments Division, 37th & Perkins, Cleveland, Ohio 44114.

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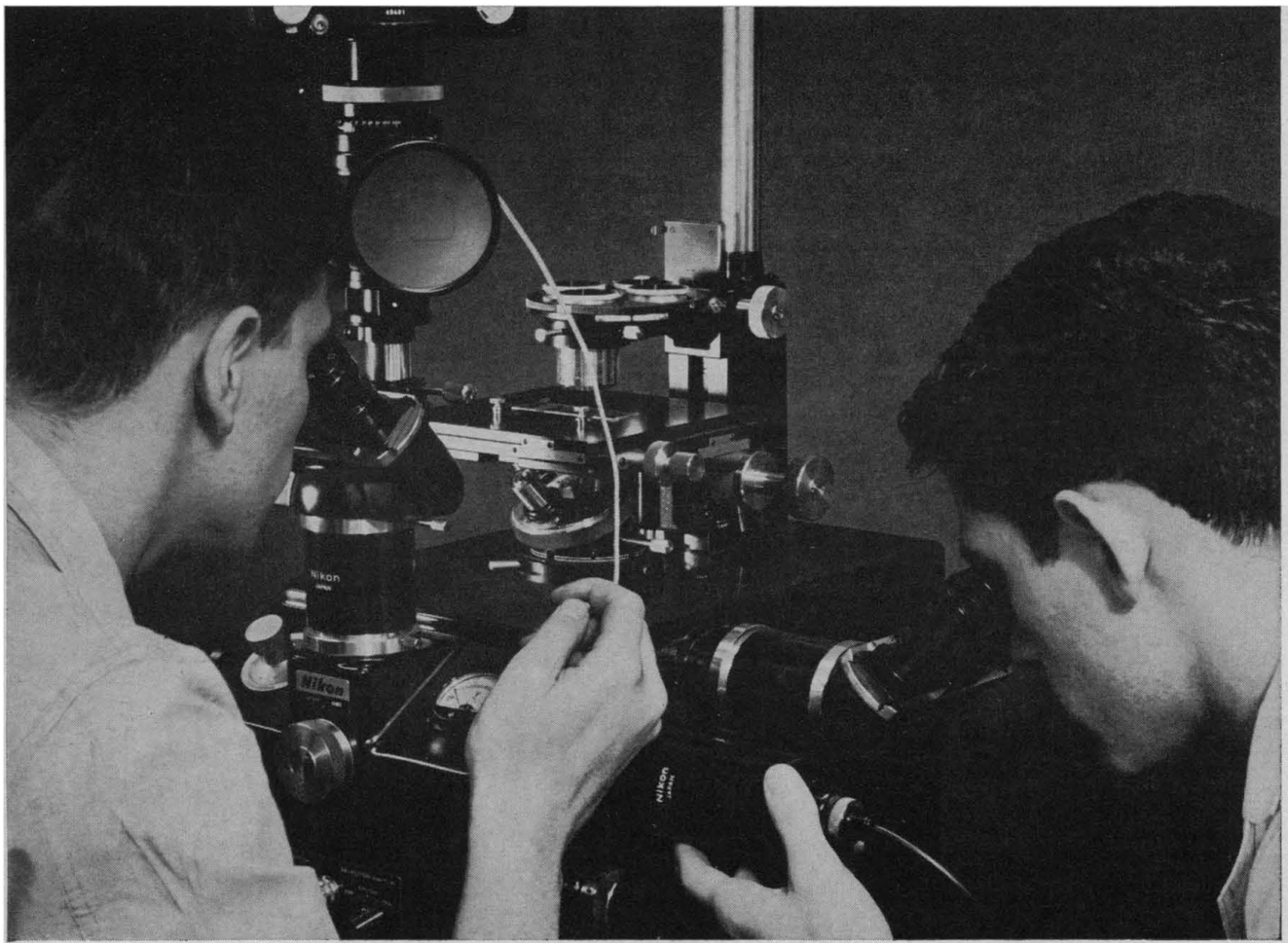
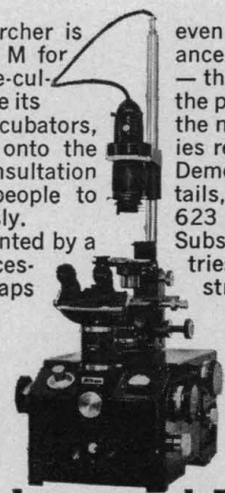


approaching the ultimate in versatility

The new Nikon M can be relied upon to deal with the most exacting demands arising in industrial, biological and medical research. Its capabilities are almost limitless, embracing every aspect of reflected- and transmitted-light microscopy, bright-field, dark-field, phase-contrast, interference-phase, fluorescence, and photomicrographic techniques.

Of significant interest to the researcher is the unique suitability of the Nikon M for time-lapse cinemicrography in tissue-culture studies. Of equal significance are its facilities for using petri dishes and incubators, for projecting superimposed data onto the field of view, and for meeting consultation requirements by permitting two people to observe the same field simultaneously.

All of this is still further implemented by a wide variety of interchangeable accessories and attachments. But perhaps even more important is the quality of performance the Nikon M brings to these applications — the ruggedness and stability of its design, the precise responsiveness of its controls, and the noticeable superiority of its optics. Inquiries regarding special applications are invited; Demonstrations arranged. For complete details, write to NIKON Instrument Division, 623 Stewart Ave., Garden City, N.Y., 11533 Subsidiary of Ehrenreich Photo-Optical Industries, Inc. In Canada: Anglophoto Ltd., Instrument Div., Rexdale, Ont.



Nikon M Inverted Microscope

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chemical and biological

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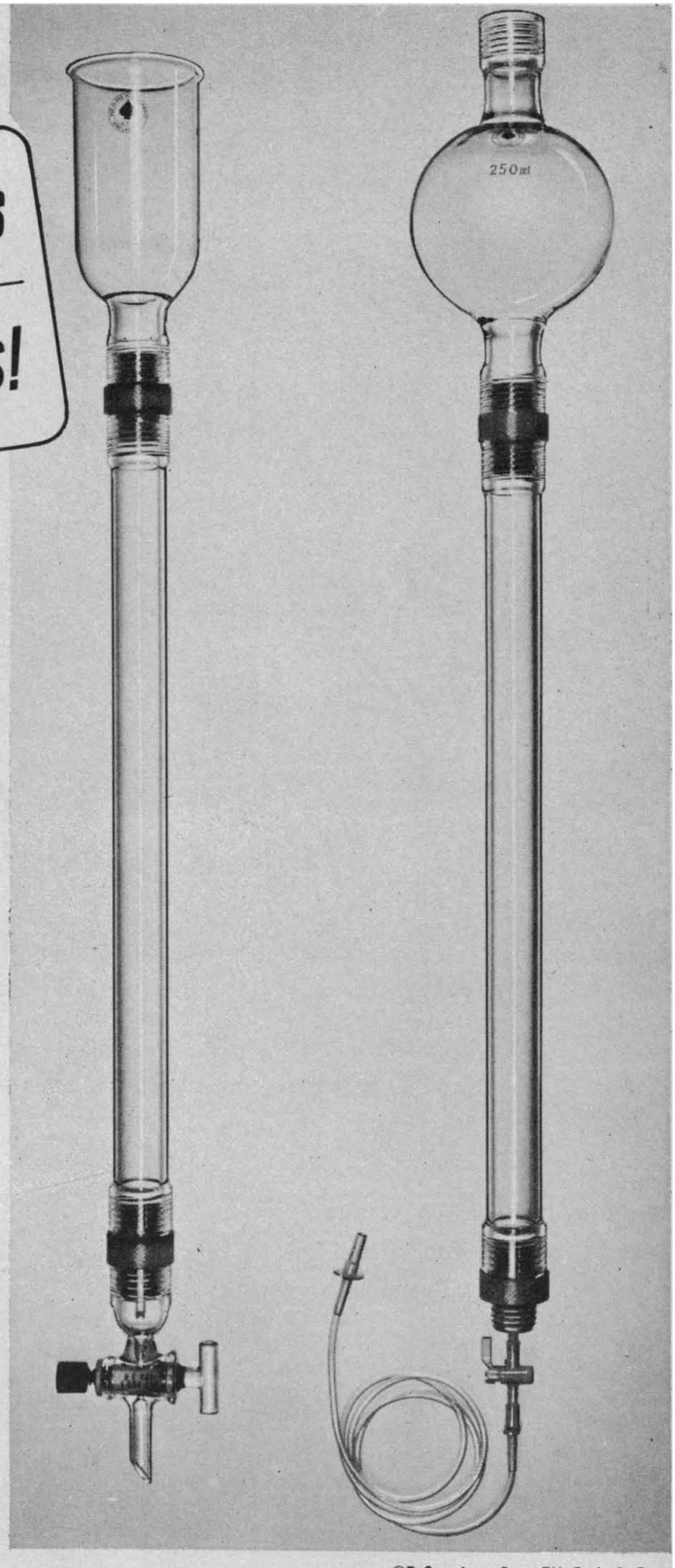
Easy assembly without springs or clamps. Internally threaded glass parts and nylon "O" ring couplings screw together in firm but not rigid engagement to make a positive seal at pressures far above those normally used for chromatography. The system features an unusual variety of end fittings which provide means for the introduction of controlled atmospheres or pressure drop controls. Syringe introduction of samples is possible through a septum side arm; eluent samples can be withdrawn by the same means. The septum can be removed and replaced with a side arm feed tube for dual or alternate flow. Platinum wire electrodes can be introduced. Adjustable height feed tubes allow various packing heights to be employed with one column. A polyethylene float receives the droplets and prevents agitation at the surface. The rapid flow porous polyethylene or Teflon® standard packing support has straight through holes which retard mixing. The stopcocks are Teflon clad and require no lubricant. All components are described in the Ace October bulletin—send for your copy.



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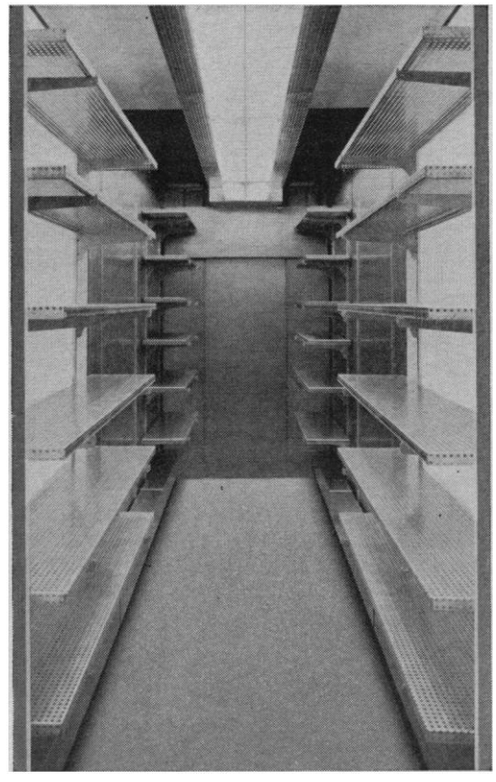

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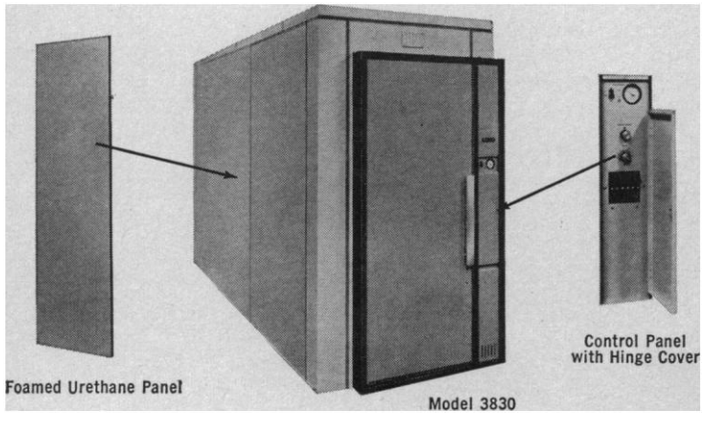

Want to know more?
Call, wire or write to any of the addresses below, or contact your franchised National dealer. A comprehensive folder is available for the asking. It tells all about National's sectionalized Walk-In Incubator, available in nine stock sizes and custom sizes up to 12′ x 12′ with a full 90″ height.

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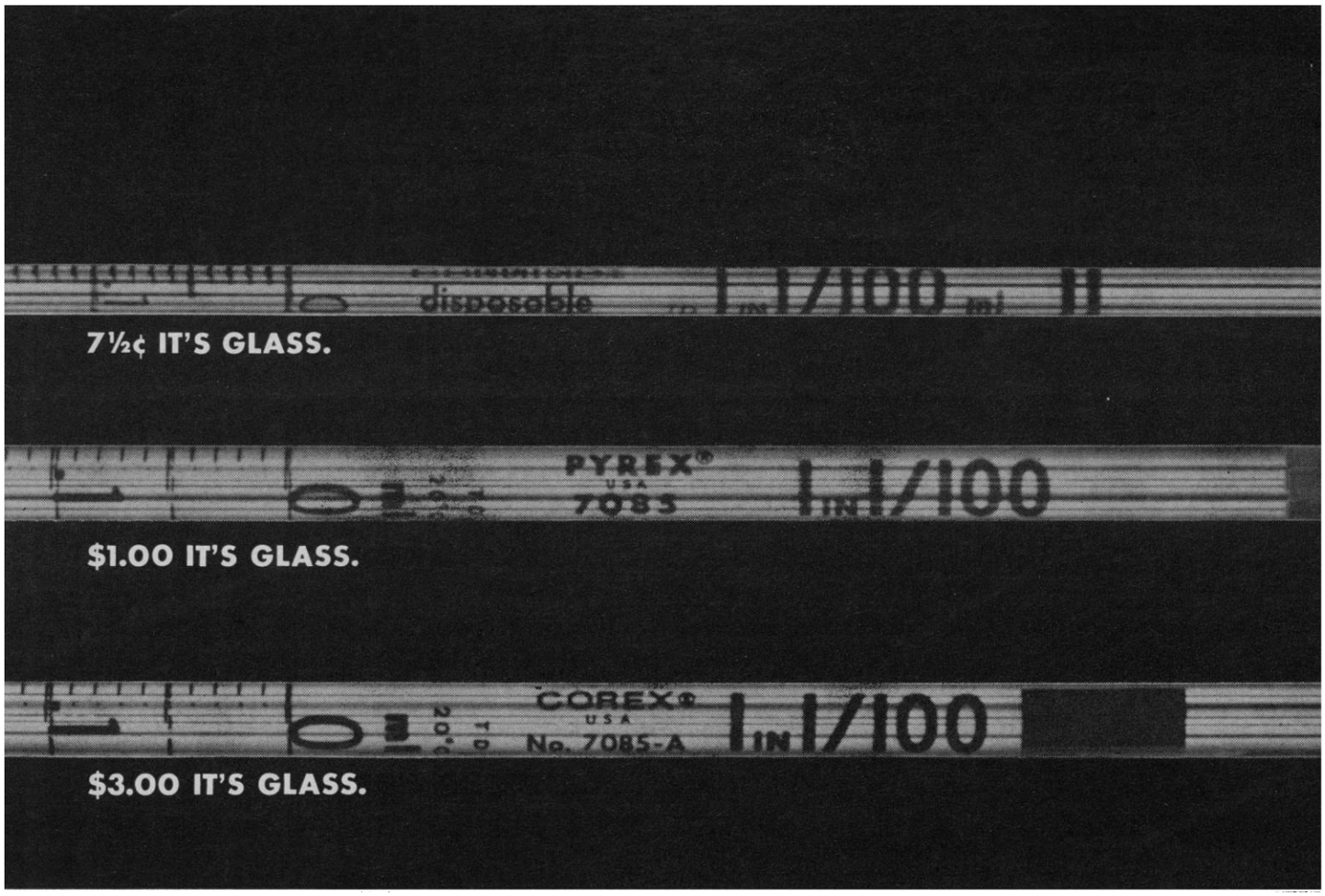

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These new standards in glass pipets from Corning give you a real choice, without compromise. Send for our new pipet bulletin to Corning Glass Works, 9303 Crystal St., Corning, N.Y.

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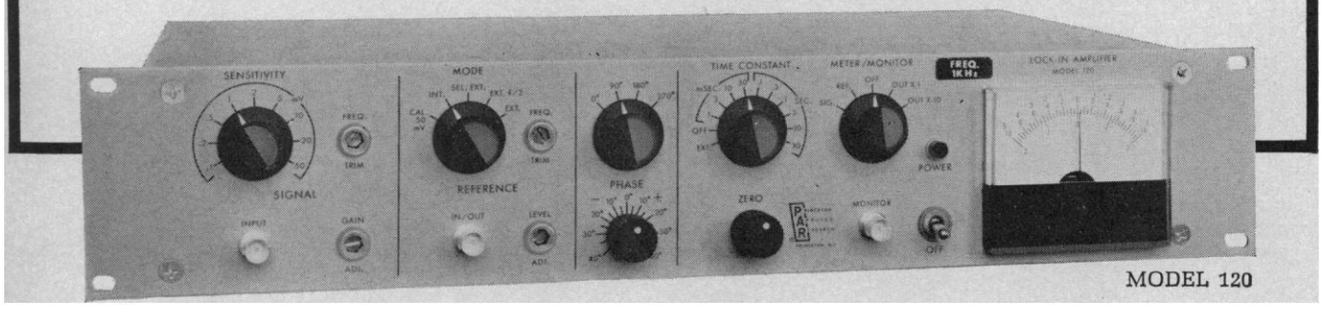
MODEL 121

New PAR Lock-In Amplifiers Recover Low-Level Signals from Noise



MODEL 120

Model 120 is a fixed frequency unit which allows the benefits of phase sensitive detection to be achieved at an economical price. Representative specifications are:

FREQUENCY RANGE: 5 Hz to 150 kHz. Frequency is determined by two plug-in circuit boards, each of which contains two or four (depending upon frequency) resistors and two capacitors. Plug-in frequency determining boards for any particular frequency in the above range can be ordered from PAR or the user can change frequency by changing the resistors and capacitors on the two plug-in circuit boards. A front panel vernier adjustment functions as a fine frequency control.

SIGNAL INPUT CHARACTERISTICS: Single-ended input of 10 Megohms shunted by 30 pF. Selectivity characteristic is that of a parallel resonant circuit with a Q of approximately 10.

SENSITIVITY: 100 μV to 50 mV rms full scale in a 1, 2, 5 sequence. Output X10 monitor position increases meter sensitivity by factor of 10 on any range.

FILTER TIME CONSTANT: 1 mS to 30 seconds in a 1, 3, 10 sequence and EXT position. 6 dB/octave roll-off rate.

OUTPUT: $\pm$ 10 volts full scale, single-ended with respect to ground.

PRICE: $765.00.

Export Prices approximately 5% higher, (except Canada).

Model 121 is continuously tunable throughout its entire operating frequency range. It provides the versatility required for use in many sophisticated research applications. Illustrative specifications are:

FREQUENCY RANGE: Continuously tunable from 1.5 Hz to 150 kHz in 5 ranges.

SIGNAL INPUT CHARACTERISTICS: Single-ended input of 10 Megohms, shunted by 20 pF. Adjustable Q from 5 to 25 over the entire frequency range.

SENSITIVITY: 10 μV to 500 mV in 1, 2, 5 sequence. Output X10 monitor position increases meter sensitivity by factor of ten on any range.

FILTER TIME CONSTANTS: 1 mS to 100 sec. in 1, 3, 10 sequence and EXT. position. 6 or 12 dB per octave roll-off.

OUTPUT: $\pm$ 10 volts full scale, single-ended with respect to ground.

VOLTMETER MODE: Internal demodulator reference signal derived from signal to be measured. Unit operates as average responding AC voltmeter with overall sensitivity unchanged.

PRICE: $1,600.00.

Export Prices approximately 5% higher, (except Canada).

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learn promptly of work by others that bears closely upon his own problems is increasingly insistent. The IEG's have provided such a means of rapid exchange of information among certain groups of workers with closely related interests; they also provided a forum for controversy and discussion, without the inhibiting influences that would attend formal publication. Scientists moving into new fields of research could make their activities known to others at an early stage, long before publication. All these purposes, and others, can be served by the IEG's, and by similar groups that may arise in the future.

By well-established practice many scientists circulate advance copies of manuscripts that have been accepted for publication to a limited group of colleagues who share their interests. This practice obviously serves the advancement of science, and no journal regards it as a violation of copyright if the number of copies so circulated is fairly small. Such manuscript copies may fail to reach other workers whose research might profit greatly if copies were available to them. Circulation of very brief notices of current research among members of an IEG or some similar group might serve to establish communication in cases of this sort.

As editors we recognize the responsibilities of the scientific journals for speeding the process of publication and the distribution of journals after publication. We wish to maintain high standards of careful but prompt reviewing before a paper is accepted; but the interval from acceptance to publication should be as short as possible. Some journals have reduced this interval to 2 months, sometimes even less, while maintaining high standards of publication; this of course requires the cooperation of authors in careful preparation of manuscripts and prompt return of proofs. We recognize the responsibility of the journals to make every effort to shorten publication time.

Distribution of published journals by air can make scientific findings available all over the world within a few days of publication, whereas journals sent by surface mail may take 2 months or more to reach Asia or Australia from Europe or America. The obstacles to circulation of journals by air are not technical but financial. IEG memoranda, as a result of being sent by air mail, reached investigators throughout the world almost simultaneously; this was one of the great merits of the IEG experiment. The overseas copies of some journals are already distributed by air; the editors of others are eager to follow their example, if they can solve the financial problems involved. We believe that the rather moderate costs of such rapid distribution will be far more than repaid by the resulting stimulus to the progress of science, and the strengthening of communication among the members of the worldwide scientific community. We believe that the International Scientific Unions should play an active part in promoting such rapid communication.

In summary: (i) We recognize the value of the IEG's and of similar groups that may be expected to arise in future among scientists with related interests, in promoting rapid communication of material not intended for publication. If the scientists themselves wish to form more such experimental groups, and to find ways of meeting the costs of operating them, such groups may well become more numerous and more varied in the future. (ii) The journals listed below will not consider manuscripts for publication if preprints, of essentially identical content, are to be distributed, in substantial numbers, by an agency independent of the author or of the publisher of the journal. (iii) We recognize that editors and publishers of scientific journals must make every effort to accelerate publication and distribution of accepted papers.

The following journals have subscribed to this general statement of policy: *Archives of Biochemistry and Biophysics, Biochemistry, Biochemical Journal, Biochimica et Biophysica Acta, Carbohydrate Research, Clinica Chimica Acta, European Journal of Clinical Investigation, Journal of Lipid Research, Journal of Molecular Biology, Journal of Nutrition,* and *Molecular Pharmacology.*

The following members of the Commission were present at the meeting in Vienna and voted to approve these policies: J. T. Edsall (*J. Biol. Chem.*), J. C. Kendrew (*J. Mol. Biol.*), H. Neurath (*Biochem.*), E. C. Slater (*Biochim. Biophys. Acta*), W. V. Thorpe (*Biochem. J.*).

W. V. THORPE
Department of Physiological Chemistry, University of Birmingham, P.O. Box 363, Birmingham 15, England

Chemical and Biological Warfare: Is Propriety the Issue?

What is the issue concerning University of Pennsylvania research on Army and Air Force Chemical and Biological Warfare projects? (News and Comments, 13 Jan., p. 174). The issue is muddy in my mind. The more I ponder it, the muddier it becomes. Is the research illegal? Is it immoral? Is it unsportsmanlike? From time to time, the issue of the propriety of certain research at universities does arise, and although I find CBW and spy-related work personally distasteful, my personal tastes don't determine right or wrong. Other factors have to be considered.

In any country, the scholars and scientists (they may not be mutually exclusive) depend on the wealth of that country for support. Actually, the emergence of an urban population superstructure (innovators, scholars, scientists, military, merchants, financiers,

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government) is related to the ability of the farmers and the production workers to provide a surplus and, conversely, the ability of the farmers and production workers to provide surpluses is related to the ability of the urban population superstructure to provide innovation, new developments, order, and protection.

At times, a country's military defends the country from aggression. Other times, it may aggress. But the action taken by the military may not reflect the actual intent. If we were a nation of pacifists, the entire issue would be quite clear. But then again, if we were pacifists, we very likely wouldn't be here now. Occam's razor doesn't seem to apply here. Why the protests? Do the protesters object to war; to the war in Vietnam; only to the University working on war-related projects; or to others receiving the research contracts? How do we rationalize the fact that comparable scientists were mobilized very effectively on equally repugnant projects, such as the atom bomb, during World War II? Even Archimedes consulted for the military.

Somewhere in the issue at Pennsylvania, and perhaps at Michigan State too, is a broader issue that could stand some airing. We are not pacifists. We need a military. But the introduction of weapons-related projects into the University seems to be distaseful. Why?

BERNARD ALPERT

School of Business,
San Francisco State College,
San Francisco, California 94132

As a practicing forester, I use herbicides routinely in my work. They are an excellent aid in the conversion of low-quality hardwood stands to higher valued and more productive pine stands. . . . I am still in the age group which could be recalled to active duty in case this limited war gets worse. With this in mind, I oppose the petition signed by some of our leading scientists whose motives were humanitarian. As an ex-troop commander, I would not want to be deprived of what I know to be an excellent weapon for reducing the dangers of ambush and guerrilla warfare. Perhaps, when I am older and cannot be sent to a battle area, I will have a different opinion concerning the use of herbicides in warfare. I have not yet reached that philosophical age. Therefore I urge the continued use of herbicides as defoliants or even against crops to reduce the food supply, as this will help to get our troops out of a

rather unfavorable situation in a difficult area of the world.

By using herbicides we ruin a very rich biological area and very definitely change the ecology. But isn't the sacrifice of this biological area preferable to the increased sacrifice of American lives, whose loss may be traced to the withholding of an effective weapon of war?

HOWARD H. HANDORF
608 Third Avenue,
Farmville, Virginia 23901

Langer implied that scientists engaged in defense research have betrayed humanity and science. I feel that we who are engaged in such research either directly, as consultants, or under grants and contracts have no cause for guilt. It is unfortunate that in all the years of human existence we have not yet learned how to synthesize plowshares from swords. Since we have not, defense research remains a legitimate and honorable career. The facts of life are as they are. No one can rationally believe that we alone are engaged in such studies. Nor if we abandon such studies, is it likely that others will follow. Whether BW or CW is ever used in warfare is really immaterial. The very possibility of their use requires any sane people to learn of their potential and of defense against them.

I wonder why BW and CW are singled out as particularly heinous. All types of weapons are horrible be they fists, stones, bullets, or nuclear bombs. Why is it more horrible to be ill (even acutely ill for a period of time) than to be mangled or dead for all time? Why is it more horrible to expose the enemy's routes of travel by defoliants than by bombing? Certainly both effectively alter the ecology of the area. Does not the destruction by bombs exceed that of defoliants? BW and CW are not alone weapons of so-called mass casualties. No war has ever been limited to the confines of the battlefield; all have been as devastating for civilians as for the warriors.

If my colleagues are a fair sample, there is probably no one in defense research who would not be happier if the wealth of nations and the efforts of its scientists were spent on Great Societies both at home and abroad. But as long as the world is as it is what nation will abandon its defense research?

SIDNEY J. SILVERMAN
Watkins Acres, 1 D,
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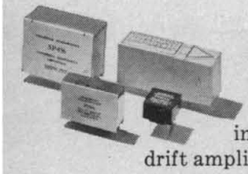

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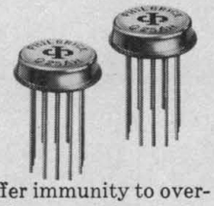

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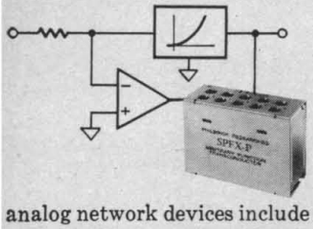

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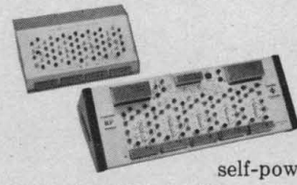

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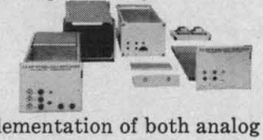

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Technological Innovation

In some of the discussions of regional economics, it seems to be assumed that a faster rate of growth would follow automatically if the level of research and development were raised. On a national scale it is clear that recent economic growth has come in substantial measure from new technology. Consider electronics, the zipper, jet aircraft, air conditioning, digital computers, xerography, and other success stories. None of these new ideas and inventions became a success, however, until it was followed by product design and engineering, tooling up, initial manufacture, and the opening of a new market. These later stages, it has been estimated, typically cost 10 to 20 times as much as the original research or invention. A new idea lies at the base, but it lies fallow unless venture capital and the skills of the entrepreneur, product engineer, marketing specialist, and manager successfully translate the new idea into the market economy.

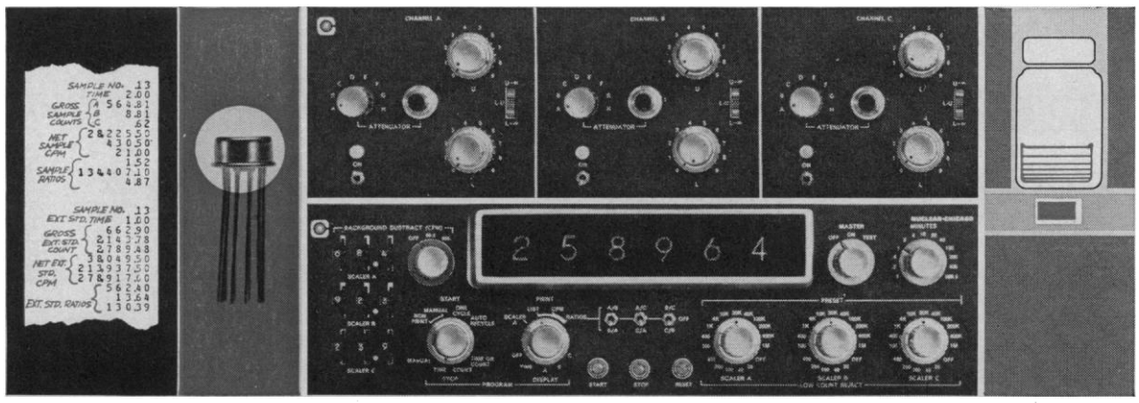
The interrelation of these several elements, the factors that foster or inhibit innovation, and the recurring refrain that we know too little about them, are the theme of *Technological Innovation*, a report recently published by the Department of Commerce, which is reviewed more fully in the News and Comment section of this issue of *Science*, where some of the recommendations for fostering innovation are also given.

The report raises some interesting puzzles. Why, for example, should it be that when the Federal Reserve Bank of Philadelphia questioned the founders of a number of research-oriented firms in the Boston area, all answered that the universities played an important role in stimulating new science-based firms and that local banks were helpful, while every founder of a similar firm in the Delaware Valley replied that the universities played a small role and that bankers were unreceptive to the idea of putting venture capital into such firms?

Those who are worried, from an economic point of view, by the current geographic distribution of research and development funds and those who are concerned with building a base for the technological development of the poorer nations of the world will endorse the conclusion of *Technological Innovation* that is emphasized over all of its more specific recommendations: "Major effort should be placed on getting more managers, executives, and other key individuals—both in and out of government—to *learn, feel, understand,* and *appreciate* how technological innovation is spawned, nurtured, financed, and managed into new technological businesses that grow, provide jobs, and satisfy people."

Perhaps we will understand these matters better in a few years, for the interrelations of the factors involved are being studied. In the literature of economics, the contributions of education and knowledge are being analyzed along with those of capital and labor as factors that contribute to growth. The President has proposed changes in patent law. The Patent Policy Committee of the Federal Council on Science and Technology is studying the conditions that aid or inhibit commercial exploitation of government-owned patents. The State Technical Services Act is being tried out. And the National Aeronautics and Space Administration is encouraging universities with major NASA support to explore and improve their relations with industry in an effort to foster the translation of new knowledge into industrial practice and products.

—DAEL WOLFLE



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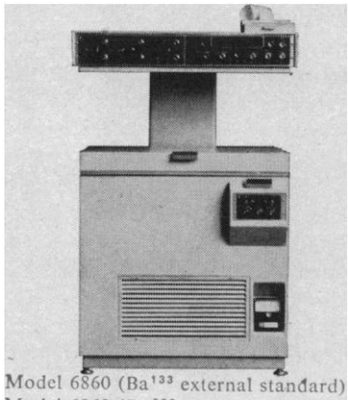

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Edited by E. G. CUTTER, *University of California, Davis.*

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7 August. (R. Srinivasan, chairman): G. Quinkert, "Photochemical production of reactive intermediates from cyclic ketones"; H. M. Frey, "Photochemistry of diazirines."

8 August. (P. J. Kropp, chairman): K. W. Schaffner, "Recent results in the photochemistry of carbonyl compounds"; D. I. Schuster, "Stereochemical aspects and characterization of excited states"; H. E. Zimmerman, "Recent photochemical developments at Wisconsin."

9 August. (A. M. Trozzolo, chairman): E. Fischer, "Some aspects of reversible photochemical reactions"; J. Heicklen, "Mercury photosensitized reactions of perfluoro olefins"; K. E. Wilzbach and L. Kaplan, "Photochemical reactions of benzenes."

10 August. (G. M. Wyman, chairman): L. M. Dorfman, "Molecular ions and triplet states of aromatic molecules in radiation chemistry"; T. Mukai, "Photochemistry of tropanoid compounds"; E. Chandross, "Excimers."

11 August. (R. Srinivasan, chairman): D. R. Arnold, "Photocycloaddition reactions of substituted styrenes"; N. J. Turro, "A model for the $n \rightarrow \pi$ states of simple ketones."

Photonuclear Reactions

Paul F. Yergin and Stavros Iallieros are chairman and vice chairman, respectively.

14–18 August. J. S. Levinger, "Prolegomena"; Frank W. K. Firk, "New experimental methods"; D. Drechsel, "Collective correlations and the structure of giant resonances"; W. Greiner, "The dynamic collective theory"; J. O'Connell, "Electromagnetic aspects of the three-nucleon problem"; W. Turchinetz, "Polarization studies"; T. DeForest, "Electron scattering"; L. Katz, "New facilities in operation"; J. Leiss, "New facilities in operation."

Thin Films—Structure Sensitive Properties

R. W. Hoffman and M. H. Francombe are chairman and vice chairman.

21 August. Basic growth mechanisms (D. S. Campbell, discussion leader): J. B. Hudson, "Nucleation and growth by mass spectrometric techniques"; M. J. Stowell, "The influence of diffusion controlled processes in thin film growth." (K. H. Behrndt, discussion leader): R. B. Marcus, "Recrystallization and phase change of tantalum films."

22 August. Recrystallization and phase changes (R. D. Heidenreich, discussion leader): R. W. Vook, "Low temperature recrystallization of thin films"; C. J. Mogab, "Structural rearrangements in noncrystalline silicon carbide films." (T. E. Hutchinson, discussion leader): M. H. Francombe, "Two-phase structures in oxide and metal films."

23 August. Mechanical properties (R. W. Hoffman, discussion leader): E. Klokholm, "Strains in evaporated metal films"; D. S. Campbell, "Stresses in the initial stages of thin film growth." (C. Weaver, discussion leader): P. F. Schmidt and R. J. Jaccodine, "Oxide films on silicon"; H. D. Keith, "Crystal growth and crystalline morphology of high polymers."

24 August. Dielectric and semiconductor properties (M. H. Francombe, discussion leader): T. W. Hickmott, "Conduction and electroluminescence in oxide films"; J. E. Davey, "Growth and properties of gallium arsenide films (C. Feldman, discussion leader): C. Weaver, "Dielectric loss mechanisms."

25 August. Transport properties (C. A. Neugebauer, discussion leader): H. J. Juretschke and S. Soffer, "Electron scattering near surfaces"; D. C. Larsen, "Resistance and magnetoresistance of metal films."

Glass

C. R. Kurkjian and F. M. Ernsberger are chairman and vice chairman.

Structure and Properties of Simple Glass-Formers

28 August. B. E. Warren, "Present-day possibilities for x-ray determination of glass structure"; R. Kaplow, "Structure of crystalline and amorphous B_2O_3"; H. A. Robinson, "A model for the structure of amorphous SiO_2."

29 August. P. Dean, "Atomic vibra-

tions and structure of glasses"; A. J. Leadbetter, "Low temperature heat capacity and related properties of some simple glasses"; R. A. Weeks, "Paramagnetic resonance of oxygen vacancies in crystalline and glassy oxides"; J. T. Krause, "Low temperature acoustic and thermal expansion measurements in simple glasses"; S. P. S. Porto, "Laser excitation of the Raman effect in simple glasses"; P. H. Gaskell, "Vibrational spectra of simple glasses."

30 August. R. Brückner, "Structure-specific investigations and properties of glasses"; D. B. Fraser, "Acoustic properties of fused SiO_2"; T. A. Litovitz, "Laser spectroscopy of viscous liquids"; P. Macedo, "Viscoelastic relaxation in simple glasses."

31 August. P. Jorgensen, "Hydrogen permeation through fused SiO_2"; A. Bishay, "Libyan desert sand glass"; I. Burn, "Water in fused SiO_2."

1 September. Short contributions and summary.

Proctor Academy

Lasers in Medicine and Biology

Jude R. Hayes and Myron L. Wolbarsht are co-chairmen.

19–23 June. Physical and engineering aspects of laser biomedical research: M. Stein, F. Johnson, "Physical properties of tissues"; D. A. McSparron, "Problems in characterizing laser performance"; R. J. Rockwell, Glen Hardway, "Methods and effects of controlled laser parameter variations for biomedical research." Irradiation damage at the molecular level: F. Barnes, C. Lun-Hu, L. Lauridson, "Thermal-chemical laser damage"; E. Cohen, "In vitro laser-induced changes in gamma globulin"; J. R. Feick, "Photoflash-induced enzyme denaturation in artifically pigmented human leukocytes"; F. Johnson, J. Helsper, D. E. Rounds, "Selected biochemicals as chromospheres." Laser irradiation damage in simple organisms: J. Griffin, "Laser irradiation effects in *Physarum* mold"; N. M. Saks, "Inhibition of chloroplast replication in *Nitella*"; W. H. Wilde, R. Kobylnyk, "Laser effects on arthropod life stages." Phenomenologic studies of laser injury in mammals: E. Klein, S. Fine, "Effects of laser irradiation in mammals"; T. Brown, R. McLaurin, C. True, R. Rockwell, R. Schooley, "Argon laser: biologic studies in neural tissue and hemophiliac beagles"; R. Ritter, L. Goldman, "Application of the argon laser

in hemangioma studies"; R. W. Bull, A. S. Brownell, A. J. Luzzio, W. Parr, "Skin and organ injury and related immunologic effects." The pathology of laser injury: R. C. Hoye, L. B. Thomas, G. Riggle, A. S. Ketchum, "The histopathology of interaction of high energy neodymium laser and tissue"; R. C. Rosan, M. Flocks, "Retinal pathology of laser irradiation"; B. Fine, W. Geeraets, S. Fine, "Light and electron microscopic retinal pathology of laser irradiation"; Y. Laor, L. Simpson, S. Fine, E. Klein, "Pathology of abdominal viscera after laser irradiation", G. Faith, "Ultrastructural pathology of laser irradiated liver." Laser effects in mineralized tissues: J. Adrian, M. Stein, "Minimal pulpal damage from enamel laser irradiation"; R. W. Ebbers, D. F. Buxton, W. C. Kaufman, T. L. Rodriquez, "Destructive effects of laser beams through various thicknesses of bone"; R. H. Stern, F. Goodman, H. L. Renger, "Laser effects on oral hard tissues." Occular effects of laser injury: H. Rose, "The minimal chorioretinal lesion"; A. Vassiliadis, H. C. Zweng, R. Peabody, R. Honey, M. Flocks, "Minimal spot size threshold retinal lesions produced by long, Q-switched, and mode-locked laser pulses"; W. Ham, W. Geeraets, R. C. Williams, R. G. King, "In vivo and in vitro studies of ocular effects of laser radiation"; C. J. Campbell, M. C. Rittler, C. H. Swope, C. J. Koester, "Some effects of Q-switched laser radiation on ocular tissue"; W. Parr, G. R. Peacock, "Corneal and severe retinal damage from laser radiation in the visible and infrared"; R. Smith, M. Stein, "Effects of trans-scleral laser irradiation"; R. Peabody, N. Peppers, M. Flocks, H. C. Zweng, A. Vassiliadis, "Corneal damage thresholds from CO_2 laser irradiation"; H. Spekreyse, M. Wolbarsht, J. Hayes, "Mathematical models in laser injury"; J. J. Vos, "Mathematical model of retinal burn"; G. Grosoff, "Mathematical model of laser injury." Effects of laser irradiation on integrated retinal functions: M. Yarczower, "Behavioral assessment of retinal damage"; A. J. Welch, "EEG and ERG responses to argon laser flashblindness"; H. Sperling, "Effects of intense light on spectral sensitivity of the eye"; G. M. Wilkening, "Laser safety in a large laboratory"; F. Huppe, "Laser safety at duPont"; F. A. L'Esperance, E. F. Labuda, A. M. Johnson, "The argon laser in ophthalmology"; H. C. Zweng, R. Peabody, "Further clinical experience with laser ocular photocoagulation."

Lipid Metabolism

Konrad E. Bloch and DeWitt S. Goodman are chairman and vice chairman, respectively.

26–30 June. C. Freeman Allen, "Lipid metabolism of algae"; A. A. Benson, (subject to be announced); P. P. M. Bonsen, (subject to be announced); H. E. Carter, "Plant glycolipids"; H. Goldfine, "Chemistry and metabolism of bacterial lipids"; T. W. Goodwin, "Biosynthesis of terpenes and sterols in plants"; G. G. Holz, "Lipid metabolism in protists"; A. T. James, (subject to be announced); M. Kates, "Lipids of halophilic bacteria"; E. P. Kennedy and N. Stanacev, "Phospholipid biosynthesis in *E. coli*"; S. C. Kinsky, "Studies in lytic mechanisms with membrane models"; J. H. Law, "Biosynthesis of branched-chain and cyclopropane fatty acids"; W. J. Lennarz, "Biosynthesis of aminoacyl phospholipids"; W. R. Nes, "Sterol alkylations in plants"; D. H. Nugteren, "Conversion of essential fatty acids into prostaglandins"; P. W. Robbins, "The role of lipids in the biosynthesis of *O*-antigens"; A. Rosenberg, "Metabolism of glycolipids in algae"; M. R. J. Salton, "Bacterial membrane lipids"; W. Stoffel, "Biosynthesis and β-oxidation of polyunsaturated fatty acids"; P. K. Stumpf, "Fatty acid biosynthesis in higher plants."

Lysosomes

Christian de Duve is chairman.

Biochemical and Structural Aspects of Self-Degradative Processes in Cells

3 July. Introduction: C. de Duve, "Lysosomal and nonlysosomal mechanisms in cellular self-degradation." Mechanism and control of cellular autophagy: A. B. Novikoff, "Biological significance and cellular mechanisms of autophagy"; B. Trump, "Observations on metabolic control of autophagy in the nephron." J. L. E. Ericsson, "Mechanisms of cellular autophagy"; M. Locke, "Changes in insect cells during molting and metamorphosis"; D. Brandes, "Autophagia during hormonally induced prostatic involution."

4 July. Turnover of mitochondria: L. M. Birt, "Some aspects of the turnover of mitochondria"; S. B. Koritz; N. Gregson; M. V. Simpson; D. R. Sanadi. Turnover of membranes and other particulate components: G. E. Palade, "Turnover of endoplasmic reticulum

membrane"; Z. A. Cohn, "Turnover of lysosomal hydrolases"; Th. Peters, "Turnover of catalase and serum albumin."

5 July. Turnover of soluble proteins: D. Schlessinger, "Polyribosome metabolism and the regulation of turnover in *Escherichia coli*"; S. Grisolia, "Substrate-induced enzyme inactivation. Stress and the plasticity hypothesis at the molecular level"; R. T. Schimke, "Studies on the inactivation and breakdown of soluble liver proteins"; H. Munro, "Ferritin turnover." Turnover of ribosomes and RNA: H. Munro, "Liver RNA stability and amino acid supply"; J. Loeb, "Turnover of ribosomal RNA."

6 July. Involution and related processes: J. F. Woessner, "Lysosomes in uterine involution and tissue resorption"; R. Lockshin, "Degradative processes in insect metamorphosis"; M. Farquhar, "Disposal of secretory products by lysosomes"; (Speaker and subject to be announced).

7 July. Pathological aspects of self-degradation: H. G. Hers, "Genetic pathology of lysosomes"; I. M. Weinstock, "The acid hydrolases in muscular dystrophy and atrophy"; H. Swift, (subject to be announced).

Biomathematics

G. D. McCann and John H. Milsum are chairman and vice chairman, respectively.

10 July. Population dynamics (Herbert Landahl, chairman): Richard Lewontin, "Simulation of population genetics"; Prof. Kojiva, "Mathematical models of natural selection." (Speaker and subject to be announced); summary and discussions by chairman and speakers.

11 July. Critique of information processing for nervous system research (G. D. McCann, chairman): W. J. McGill, "Decision theory and pattern recognition in life science data"; D. G. Keehn, "Computers and data analysis for visual nervous system research." Ira Richer, "Plexius—a structural modeling concept for the nervous system." Summary and discussions by chairman and speakers.

12 July. Neuromuscular models (John H. Milsum, chairman): G. Melvill Jones, "Man; the incredible neuromuscular system"; D. A. Robinson, "The muscular mechanics of the oculomotor system." L. D. Partridge, "Dynamic aspects of the stretch reflex." Summary and discussions by chairman and speakers.

13 July. Models of the human operator in adaptive systems (D. H. Fender, chairman): Glenn A. Jackson, "Measuring human performance with a parameter tracking version of the cross-over model"; Jerry I. Elkind, "Decision and control theory model for human controller adaptive response." Michael A. Barone, "A methodology to analyze and evaluate critical human performance." Summary and discussions by chairman and speakers.

14 July. (Chairman to be announced): J. T. Apter, "Advances in biological viscoelastic theory"; K. N. Leibovic, "Model of information transfer in the visual pathway."

Chemistry and Metallurgy of Semiconductors

Raymond C. Sangster and **J. W.** Faust, Jr., are chairman and vice chairman, respectively.

17 July. B. A. Joyce, "The growth of silicon on foreign substrates"; W. Salmre, "Dielectric isolation for integrated circuits"; E. E. Loebner, "Deep lying multivalence impurities in silicon: phenomena and models."

18 July. E. F. de Haan, "Semiconductors for vidicons"; J. B. Goodenough, "Conduction processes in oxides"; E. Felty, "Vitreous semiconductors for xerography."

19 July. O. Jantsch, "Slow surface states"; T. L. Estle, "Electron paramagnetic resonance studies of defects in II-VI compounds"; D. B. Wittry, "Semiconductor investigations with electron microprobe instruments."

20 July. R. C. Keezer, "Growth of single crystals of (inorganic) polymers"; W. A. Tiller, "Crystal growth kinetics"; W. R. Field, "Lure and science of diamonds."

21 July. B. C. DeLoach, "Material properties for oscillator structures"; J. J. Tietgen, "The preparation of $GaAs_{1-x}P_x$ alloys for optical and microwave applications."

Chemistry and Physics of Paper

Vivian T. Stannett and Bengt Råånby are chairman and vice chairman, respectively.

24 July. E. Adler, "Lignin, its structure and its reactions in pulping"; N. Thompson, "Recent work in hemicellulose chemistry"; D. Atack, "Fundamentals of mechanical pulping."

25 July. A. J. Stamm, "Water-cellu-

losic material relationships"; B. Rånby, "NMR studies of water in cellulose"; K. Sarkanen, "Recent work in wood chemistry."

26 July. G. Jacquelin and J. F. Lafaye, "Cellulose-fiber surface properties; streaming potential and other means of investigation"; A. A. Robertson, "The sorption of polymers onto cellulose"; J. W. Swanson, "The role of additives in paper making."

27 July. K. W. Britt, "Fiber-to-fiber bonding in paper"; B. Leopold, "Remarks on the role of single fiber properties on paper strength"; J. K. Craver, "Paper and the hydrogen bond."

28 July. Kyle Ward, "Improvement of paper strength by hydroxyethylation and similar treatments."

Chemistry and Physics of Liquids

Marshall Fixman and Cornelius J. Pings are chairman and vice chairman, respectively.

31 July–4 August. Berni Alder, "Computer study of molecular dynamics"; George Benedek, "The spectrum of light scattered from a fluid near its critical point"; P. A. Egelstaff, "Microscopic transport phenomena in liquids"; Roy Gordon, "Angular correlations in molecular gases and liquids"; Leo P. Kadanoff, "Theory of λ transitions (critical region)"; Neil R. Kestner, "Additivity of intermolecular potentials"; Joel Lebowitz, "Theory of metastability"; P. L. Fehder, G. W. Robinson and R. P. Futrelle, "Molecular dynamics studies of Lennard-Jones particles with emphasis on microscopic structure and problems of chemical interest"; J. S. Rowlinson, "Status report: fluids in equilibrium"; L. K. Runnels, "Lattice statistics"; Loup Verlet, "Computer study of molecular dynamics"; Ben Widom, "Interfacial tension in the critical region"; W. W. Wood, "Monte Carlo study of liquids."

Crystal Inn

Environmental Sciences: Air

E. R. Hendrickson and Walter J. Weber, Jr., are chairman and vice chairman, respectively.

Oxides of Nitrogen

3–7 July. (Speakers to be announced.) "Theory of production, sources, original forms, and control of NO_x emissions (stationary and mobile)";

"Identification and measurement of atmospheric and source concentrations"; "Oxidation and photochemical reactions of NO_x in the atmosphere (omit meteorological aspects at this time)"; "Meteorological aspects of the problem, especially dispersion from mobile sources and the meteorological factors related to the photochemistry"; "Health and other biological effects of various oxides of nitrogen and important nitrogenous reaction products"; "Socio-economic effects (including materials damage and visibility interference) resulting from NO_x emissions"; "Development of air quality criteria"; "Specific research needs." Summary.

Chemistry and Physics of Isotopes

Max Wolfsberg and A. J. Kresge are chairman and vice chairman, respectively.

10–14 July. Condensed phase isotope effects (A. Van Hook, chairman); Physical chemistry of isotopes (W. Spindel, chairman); Kinetic isotope effects in "Non-Boltzmann" systems (F. S. Rowland, chairman); Stable isotope geochemistry (J. R. O'Neil, chairman); Heavy atom isotope effects (A. Fry, chairman); Isotope effects and nature of transition states (A. N. Bourns, chairman); Hydrogen isotope effects in hydrogen (proton) transfer (F. A. Long, chairman); Secondary hydrogen isotope effects (S. Seltzer, chairman); Contributed papers.

Molecular Pathology

Wilbur A. Thomas and Earl P. Benditt are chairman and vice chairman, respectively.

17 July. Energy relationships in cells and their disturbances (Abel L. Robertson, chairman): Alexander Leaf, "Hormonal regulation of membrane transport"; Vincent T. Marchesi, "The localization of enzymes and structural proteins in mammalian cell membrane." (Winfield S. Morgan, chairman): Morris J. Karnovsky, "Ultrastructural study of capillary permeability"; Abel L. Robertson, "Transport of lipids across mammalian cell membrane."

18 July. (R. Foster Scott, chairman): Lars Ernster, "Structural and functional organization of mitochondria"; Godfrey S. Getz, "The response of some mitochondrial components during the early aerobic adaptation of anaerobi-

cally grown yeast cells." (Wilbur A. Thomas, chairman): David E. Green, "Membrane ultrastructure with particular reference to the mitochondrion and the theory of membranes."

19 July. (Earl P. Benditt, chairman): Charles R. Hackenbrock, "Energy-linked ultrastructural transitions in mitochondria"; Dante G. Scarpelli, "Observations on the chronic effects of 2,4-dinitrophenol on mitochondrial structure and function." (Edward A. Smuckler, chairman): Lars Ernster, "Mitochondrial energy metabolism: mechanism and regulation"; R. Foster Scott, "Lipid composition, function and ultrastructure of mitochondria in rats fed high fat thrombogenic diets."

20 July. Ultrastructural and biochemical aspects of viruses and virus-infected cells (Erwin R. Rabin, chairman): Richard Franklin, "Molecular properties of viral ribonucleic acids"; Heather D. Mayor, "Morphology of viral particles and subviral components." (Robert M. O'Neal, chairman): Councilman Morgan, "Studies on the development of herpes simplex virus."

21 July. (Heather D. Mayor, chairman): Samuel Dales, "Participation of membranes in virus infection"; Erwin R. Rabin, "Morphologic studies of in vivo viral infections."

Dynamics of Quantum Solids and Liquids

Pierre C. Hohenberg and John Wheatley are chairman and vice chairman, respectively.

24–28 July. Solid helium and liquid helium under pressure: N. R. Werthamer, "~ theory"; H. Fairbank and H. Meyer, "~ experiments on solid He^3, He^4, He^3-He^4 mixtures." Liquid He II: B. Johnson, "Theoretical introduction"; R. Donnelly, "The film, fine channels and orifices"; D. Brewer, "Helium films and two dimensional phenomena"; J. Reppy, "Helium in rotation"; G. Chester, "Theoretical problems." Liquid He^3 and He^3-He^4 solutions: G. Baym, "Theory"; D. Edwards, "Experiment." Long-range phase coherence in He II and superconductors: D. Scalapino "Theoretical introduction"; J. Mercereau, "Experimental demonstration." Application to construction of devices: W. Fairbank, "~ using quantized flux"; J. Zimmerman, "~ using weak superconductivity." The physics of very low temperatures: J. Wheatley, "Methods"; P. W. Anderson, "Theory and experiments."

Medicinal Chemistry

Armin G. Wilson and Murray Weiner are chairman and vice chairman, respectively.

31 July–4 August. Insect attractants and repellents: Martin Jacobson; Michael Martin, "The chemistry of fungus-growing ants." Enzyme interactions: Hans Hirchmann, George Hein, "The specificity of chymotrypsin—a model for protein-small molecular interactions." Sterol and terpene synthesis: E. E. van Tamelen. Effect of adrogenic steroids on sterol metabolism: Erwin Mossbach. The classification of strong analgesics: E. Hay, "Chemistry"; J. E. Villareal, "Pharmacology"; W. R. Martin, "Clinical." Membrane transport: Elwood Titus. The use of substituent in drug design: Corwin Hansch. Hormonal mechanisms: Martin Sonenberg. Thyrocalcitonin: Philip Hirsch. Approaches to anti-fertility: Alan F. Guttmacher, Gregory Pincus, Harry W. Rudel. Weightlessness: Edward C. Knoblock.

Plasma Physics

Abraham Bers and Norman Rostoker are chairman and vice chairman, respectively.

Instabilities and Turbulence in Plasmas

7–11 August. T. Dupree, "General theory"; (speaker to be announced), "Laboratory plasmas"; P. Sturrock, "Space plasmas"; R. Post, "Fusion plasmas."

Laser Interaction with Matter

Alexander J. Glass and Abraham Herzberger are co-chairmen.

14–18 August. Topics to be discussed: "Laser sources for plasma generation," "Laser breakdown of gases," "Laser interaction with surfaces," "Production of plasmas in vacuum," "External field effects," and "Application to controlled thermonuclear research." Participants include P. V. Avizonis, A. H. Guenther, A. F. Haught, R. E. Kidder, A. C. Kolb, R. W. Minck, A. V. Phelps, K. D. Pyatt, Jr., S. A. Ramsden, and R. G. Tomlinson.

Forthcoming Events

March

20–22. **Physical Electronics**, annual conf., Cambridge, Mass. (Research Lab. of Electronics, Massachusetts Inst. of Technology, Cambridge)

22–24. American **Astronautical** Soc., Rocky Mountain Section, mtg., New Mexico State Univ., University Park, N.M. (A. Vick, Box 996, Las Cruces, N.M.)

22–24. **Astrogeology**, symp., University of Michigan, Ann Arbor, Mich. (E. W. Heinrich, Dept. of Geology and Mineralogy, Univ. of Michigan, Ann Arbor 48104)

22–24. **Modern Optics**, intern. symp., New York, N.Y. (J. Fox, Polytechnic Inst. of Brooklyn, 333 Jay St., Brooklyn, N.Y. 11201)

23–24. **Seismological** Soc. of America, Santa Barbara, Calif. (D. Tocher, U.S. Earthquake Mechanism Lab./ESSA, 390 Main St., San Francisco, Calif. 94105)

23–24. **Social Facilitation and Imitation Behavior**, symp., Miami Univ., Oxford, Ohio. (E. C. Simmel, Dept. of Psychology, Miami Univ., Oxford 45056)

23–25. American **Ethnological** Soc., mtg., San Francisco, Calif. (J. M. Collins, Div. of Social Sciences, Southern Illinois Univ., Edwardsville)

23–25. Institute of **Mathematical Statistics**, central regional mtg., Columbus, Ohio. (G. E. Nicholson, Jr., Dept. of Statistics, Univ. of North Carolina, Chapel Hill 27515)

23–25. Society of **Toxicology**, Atlanta, Ga. (C. S. Weil, Mellon Inst., 4400 Fifth Ave., Pittsburgh, Pa. 15213)

23–25. **Underwater Archaeology**, 3rd conf., Miami, Fla. (S. Schnier, News Bureau, Univ. of Miami, Coral Gables, Fla. 33124)

24–26. **Image Detection** and **Processing**, conf., Royal Radar Establishment, Great Malvern, Worchestershire, England. (Meetings Officer, Inst. of Physics and Physical Soc., 47 Belgrave Sq., London, S.W.1, England)

26–30. Association of American **Geographers**, 63rd annual mtg., St. Louis, Mo. (Executive Officer, 1146 16th St., NW, Washington, D.C. 20036)

27–30. American **Physical** Soc., Chicago, Ill. (R. G. Sachs, P.O Box 344, Argonne, Ill.)

27–30. Canadian Inst. of **Mining and Metallurgy**, 69th annual mtg., Ottawa, Ont., Canada. (Secretary, 121 Richmond St. W., Toronto 1, Ont.)

28–30. Engineering Aspects of **Magnetohydrodynamics**, Stanford, Calif. (R. H. Eustis, Stanford Univ., Stanford)

April

1–5. American Soc. of **Planning Officials**, natl. planning conf., Houston, Tex. (The Society, 1313 E. 60 St., Chicago, Ill. 60637)

1–7. American **Concrete Inst.**, intern. symp., concrete bridge design, Toronto, Ont., Canada. (Shu-t'ien Li, South Dakota School of Mines and Technology, Rapid City 57701)

2–6. American Assoc. of **Cereal Chem-**

ists, annual mtg., Los Angeles, Calif. (AACC, 1955 University Ave., St. Paul, Minn. 55104)

2–6. **Lister Centenary Conf.**, London, England. (Miss M. E. Douglas, Conf. Secretary, Royal College of Surgeons of England, Lincoln's Inn Fields, London, W.C.2)

2–8. European Soc. of **Radiology**, 1st congr., Barcelona, Spain. (Prof. Fros, Hospital Civil, Strasbourg, France)

2–8. International Symp. on **Tropical Root Crops**, St. Augustine, Trinidad. (Symp. Secretary, Dept. of Agriculture and Crop Production, Univ. of West Indies, Trinidad)

2–8. Latin Federation of **Medical Electro-Radiological** Soc., Barcelona, Spain. (F. Manchon, Aragon 290, Barcelona 9)

2–8. Seventh World **Petroleum** Congr., Mexico City, Mexico. (Amer. Petroleum Inst., 1271 Avenue of the Americas, New York 10020)

3–4. **Rubber** and **Plastics Industry**, 18th technical conf., Akron, Ohio. (Office of Technical Activities Board, 345 E. 47 St., New York 10017)

3–5. American Acad. of **Pediatrics**, spring session, San Francisco, Calif. (E. H. Christopherson, Executive Secretary, 1801 Hinman Ave., Evanston, Ill. 60204)

3–5. American **Hospital** Assoc., Boston, Mass. (E. J. Lanigan, 840 N. Lake Shore Dr., Chicago, Ill. 60611)

3–5. American Soc. of **Mechanical Engineers**, Washington, D.C. (Meetings Manager, The Society, 345 E. 47 St., New York 10017)

3–5. **Metals Engineering**, conf., Amer. Soc. of Mechanical Engineers, Houston, Tex. (Meetings Manager, The Society, 345 E. 47 St., New York 10017)

3–5. **Biometric** Soc., Eastern North American regional, Atlanta, Ga. (E. L. LeClerg, 6804 40th Ave., University Park, Hyattsville, Md. 20782)

3–5. British **Hydromechanics Research** Assoc., 3rd intern. conf., Cambridge, England. (H. Stephens, Information Officer, Cranfield, Bedford, England)

3–5. European Soc. of **Ballistocardiography** and **Cardiovascular Dynamics**, 6th congr., London, England. (D. C. Deuchar, Guys Hospital, London)

3–5. European Soc. of **Experimental Surgery**, Louvain, Belgium. (J. J. Haxhe, c/o Laboratoire de Chirurgie Experimentale, Univ. de Louvain, 69, rue de Bruxelles, Louvain)

3–5. Resistive and Dielectric **Properties of Thin Films**, Inst. of Physics and Physical Soc., Nottingham, England. (Meetings Officer, Inst. of Physics and Physical Soc., 47 Belgrave Sq., London, S.W.1, England)

3–5. Society for **General Microbiology**, 49th general mtg., London, England. (The Society, 19 Albermarle St., London, W. 1)

3–6. **Chemical Society**, anniversary mtg., Exeter, England. (The Society, Burlington House, Piccadilly, London, W.1, England)

3–7. **Education** for **Scientific Information Work**, intern. conf., London, England. (Aslib, 3 Belgrave Sq., London, S.W.1)

3–7. **Nonlinear Function Analysis and Computation Methods**, Atlanta, Ga. (Director, Dept. of Continuing Education, Georgia Inst. of Technology, Atlanta)

3–7. Containment and Siting of **Nuclear Power Plants**, symp., intern. **Atomic Energy**

Agency, Vienna, Austria. (J. H. Kane, Chief, Conf. Branch, Div. of Technical Information, Atomic Energy Commission, Washington, D.C. 20545)

4–6. Strong Tough Structural Steels, British **Iron** and **Steel Research** Assoc., Scarborough, Yorkshire, England. (The Association, 24 Buckingham Gate, London, S.W.1, England)

4–6. Conference on **Molecular Sieves**, London, England. (Soc. of Chemical Industry, Honorary Sec., 14 Belgrave Sq., London, S.W.1)

4–6. Combustion in Advanced **Gas Turbine** Systems, intern. symp., Cranfield, Bedfordshire, England. (I. E. Smith, Dept. of Aircraft Propulsion, College of Aeronautics, Cranfield)

4–6. **World Meteorological** Organization, 5th congr., Geneva, Switzerland. (WMO, 41 Avenue Giuseppe Motta, Geneva)

4–7. American Assoc. of **Anatomists**, Kansas City, Mo. (R. T. Woodburne, Executive Secretary, East Medical Bldg., Univ. of Michigan, Ann Arbor 48104)

4–7. International Conf. of **Chest** and **Heart** Assoc., Sussex, England. (Miss H. Walsh, Conf. Secretary, Tavistock House North, Tavistock Sq., London, W.C.1, England)

4–8. French Inst. of **Fuels** and **Energy**, 7th intern., Paris. (Institut Français des Combustibles et de l'Energie, 3, rue Henriheine, Paris 16e)

5. Institute of **Textile Science**, annual mtg., Montreal, P.Q., Canada. (J. E. Currah, c/o Millhaven Fibres Ltd., P.O. Box 10, Montreal)

5. **Nursing School Librarians of Midwest**, mtg., Chicago, Ill. (Medical Library Assoc., Inc., 919 N. Michigan Ave., Chicago)

5–6. First Rock Island Arsenal **Biomechanics** Symp., Rock Island, Ill. (RIA Biomechanics Symp., 1967, c/o J. E. Ekbald, Augustana College, Rock Island 61201)

5–7. **Ocean from Space**, symp., Amer. Soc. for Oceanography, Houston, Tex. (The Society, P.O. Box 53600, Houston 77052)

5–7. German **Concrete** Conf., Berlin. (Dilp.-Ing. Misch, Geschaftefuhrer, Deutscher, Beton-Verein, Bahnhofstr. 61, Postfash 543, 6200 Wiesbaden, West Germany)

5–7. Institute of **Electrical** and **Electronics Engineers**, 5th intern. conf., Washington, D.C. (Office of Technical Activities Board, 345 E. 47 St., New York 10017)

5–7. Institute of **Management Sciences**, Boston, Mass. (L. White, Sloan School, Massachusetts Inst. of Technology, Cambridge)

5–7. **Spark Discharges**, Inst. of Physics and Physical Soc., conf., Liverpool, England. (Meetings Officer, Inst. of Physics and Physical Soc., 47 Belgrave Sq., London S.W.1, England)

5–7. **Textile Research** Inst., 37th annual mtg., New York, N.Y. (H. J. Jansen, Textile Research Inst., Princeton, N.J.)

6–7. American Soc. for **Metals**, New York, N.Y. (C. R. Cupp, International Nickel Co., Inc., Paul D. Merica Research Laboratory, Sterling Forest, Suffern, N.Y.)

6–7. **Industrial Mineral Development**, Univ. of Kansas, Lawrence. (R. G.

Hardy, Mineral Resources Section, State Geological Survey, Lawrence)

6–7. Society for **Biological Rhythm**, 9th intern. conf., Wiesbaden, West Germany. (W. Menzel, Amalie-Sieveking-Krankenhaus, Farmsener Landstrasse 73, Hamburg-Volksdorf, West Germany)

6–9. **Germfree Life Research**, intern. conf., Nagoya, Japan. (M. Miyakawa, Dept. of Pathology, Nagoya Univ. School of Medicine, Showa-ku, Nagoya)

7–8. Pennsylvania **Acad. of Science**, mtg., Selinsgrove, Pa. (B. Fried, Dept. of Biology, Lafayette College, Easton, Pa. 18042)

7–9. **American Psychosomatic** Soc., 24th annual mtg., New Orleans, La. (The Society, 265 Nassau Rd., Roosevelt, N.Y. 11575)

7–9. American Soc. of **Internal Medicine**, annual, San Francisco, Calif. (A. V. Whitehall, 3410 Geary Blvd., San Francisco 94118)

8. New Mexico **Acad. of Science**, Socorro. (E. L. Cleveland, New Mexico State Univ., Las Cruces 88001)

8–9. **Arizona Chest Disease** Symp., Tucson. (L. D. Hudson, Arizona Chest Disease Symp., P.O. Box 6067, Tucson 85716)

8–13. **Stereology**, 2nd intern. congr., Chicago, Ill. (H. Elias, 2020 W. Ogden Ave., Chicago 60612)

9–13. **Aerospace Medical** Assoc., 38th annual, Washington, D.C. (Exec. Vice Pres., The Assoc., c/o Washington Natl. Airport, Washington, D.C. 20001)

9–14. American **Pharmaceutical** Assoc., 114th annual mtg., Las Vegas, Nev. (The Association, 2215 Constitution Ave., NW, Washington, D.C. 20037)

9–15. **Cryogenic Engineering**, intern. conf., Kyoto, Japan. (K. Oshima, Dept. of Nuclear Engineering, Univ. of Tokyo, Bunkyo-Ku, Tokyo, Japan)

9–16. Inter-American Inst. of **Agricultural Sciences**, mtg., Rio de Janeiro, Brazil. (The Institute, Apt. 4359, San Jose, Costa Rica)

10. **Blood Group Nomenclature**, mtg., New York, N.Y. (A. S. Wiener, Office of Chief Medical Examiner of New York City, 520 First Ave., New York 10016)

10–12. Methods and Techniques for **Hospital Volunteers**, American Hospital Assoc., Pittsburgh, Pa. (E. J. Lanigan, 840 N. Lake Shore Dr., Chicago, Ill. 60611)

10–12. American Soc. of **Mechanical Engineers**, conf., Detroit, Mich. (Meetings Manager, ASME, 345 E. 47 St., New York 10017)

10–12. European Federation of **International College of Surgeons**, congr., Barcelona, Spain. (Secretary, Intern. Congr., 1516 Lake Shore Dr., Chicago, Ill. 60610)

10–12. **Great Lakes Research**, 10th conf., and Intern. Assoc. for Great Lakes Research, 1st mtg., Toronto, Ont., Canada. (Mrs. J. S. Seddon, Great Lakes Inst., Univ. of Toronto, Toronto 5)

10–12. Institute of **Environmental Sciences**, Washington, D.C. (R. P. Jones, Admiral Corp. 3800 W. Cortland, Chicago, Ill. 60647)

10–13. American Assoc. of **Petroleum Geologists**, 52nd annual conv., Los Angeles, Calif. (E. W. Ellsworth, AAPG, 1444 S. Boulder, Box 979, Tulsa, Okla. 74101)

10–14. American **College of Physicians**,

48th annual session, San Francisco, Calif. (E. C. Rosenow, Jr., 4200 Pine St., Philadelphia, Pa.)

10–14. **Hospital Librarianship**, American Hospital Assoc., Birmingham, Ala. (E. J. Lanigan, Conv. and Mtg. Bureau, AHA, 840 N. Lake Shore Dr., Chicago, Ill. 60611)

10–14. **Management for Engineers**, Atlanta, Ga. (Director, Dept. of Continuing Education, Georgia Inst. of Technology, Atlanta 30332)

10–14. **Inorganic Reaction Mechanisms**, intern. conf., Cork, Ireland. (E. N. Mulcahy, Chemistry Dept., University College, Cork)

10–14. **P.A.L. Colour Television System**, conf., Nottingham, England. (J. L. Regan, Inst. of Electrical Engineers, Savoy Pl., London, W.C.2, England)

10–15. Budapest Festival of **Technical Films**, Budapest, Hungary. (Festival of Technical Films, Szabadsag ter 17, Budapest)

10–15. French Inst. of **Electrical and Electronic Engineers**, intern. conf., Paris. (Colloque Intern. sur l'Electronique et de l'Espace, 16 rue de Presies, Paris 15e)

10–15. Seminar on **Nutrition**, Santo Domingo, Dominican Republic. (Inter-American Children's Inst., Health Section, Ave. 8 de Octubre 2882, Montevideo, Uruguay)

11–13. **Hospitals and Rehabilitation**, American Hospital Assoc., Denver, Colo. (E. J. Lanigan, Conv. and Mtg. Bureau, AHA, 840 N. Lake Shore Dr., Chicago, Ill. 60611)

11–13. **Nursing Service and Hospital Administration**, American Hospital Assoc., Chicago, Ill. (E. J. Lanigan, Conv. and Mtg. Bureau, AHA, 840 N. Lake Shore Dr., Chicago 60611)

11–13. British **Biophysical** Soc., Oxford, England. (A. R. Peacocke, St. Peter's College, Oxford)

11–13. Cleveland **Electronics** Conf., Cleveland, Ohio. (Office of Technical Activities Board, 345 E. 47 St., New York 10017)

11–13. **Faraday Soc.**, Exeter, England. (Faraday Soc., 6 Gray's Inn Sq., London, W.C.1, England)

11–13. **Decision Making in National Science Policy**, symp., London, England. (Ciba Foundation, 41 Portland Pl., London, W.1)

12–13. **Point Defects on Metals**, Inst. of Physics and Physical Soc. and Inst. of Metals, conf., Reading, England. (Meetings Officer, Inst. of Physics and Physical Soc., 47 Belgrave Sq., London, S.W.1, England)

12–14. **Electronic Information Handling**, 2nd natl. conf., Pittsburgh, Pa. (A. Kent, Knowledge Availability Systems Center, Univ. of Pittsburgh, Pittsburgh, Pa. 15213)

12–14. **Optical Soc.** of Amer., Columbus, Ohio. (Miss M. Warga, OSA, 1155 16th St., NW, Washington, D.C. 20036)

12–14. **Shock Tube** Symp., 6th intern., Freiburg, West Germany. (R. G. Fowler, Dept. of Physics, Univ. of Oklahoma, Norman 73069)

13–15. American Assoc. for **Cancer Research**, 48th annual mtg., Chicago, Ill. (Secretary-Treasurer, The Association, 7701 Burholme Ave., Philadelphia 11, Pa.)

13–14. **Teaching of Mathematics to Physicists**, Inst. of Physics and Physical

Soc. and Inst. of Mathematics and Its Applications, conf., Exeter, England. (Meetings Officer, Inst. of Physics and Physical Soc., 47 Belgrave Sq., London, S.W.1, England)

13–16. **British Medical Assoc.**, annual clinical conf., Londonderry, Northern Ireland. (Secretariat, Tavistock Sq., London, W.C.1, England)

14–21. **French Physical Soc.**, 61st exhibition, Paris. (The Society, 33 rue Croulebarbe, Paris 13e)

15–16. American Soc. for **Artificial Internal Organs**, annual mtg., Atlanta, Ga. (P. M. Galletti, Dept. of Physiology, Emory Univ., Atlanta)

15–16. **Histochemical** Soc., 18th annual mtg., Chicago, Ill. (G. M. Lehrer, Div. of Neurochemistry, Mount Sinai School of Medicine, 11 E. 100 St., New York 10029)

15–16. **Nucleic Acids** Symp., Santa Monica, Calif. (M. S. Dunn, 9325 Venice Blvd., Culver City, Calif.)

16–21. American **Physiological** Soc., spring mtg., Chicago, Ill. (The Society, 9650 Rockville Pike, Bethesda, Md. 20014)

16–21. Federation of American Societies for **Experimental Biology**, annual mtg., Chicago, Ill. (FASEB, Convention Office, 9650 Rockville Pike, Bethesda, Md. 20014)

16–21. International **Cartographic** Assoc., general assembly and technical conf., Amsterdam, Netherlands. (F. J. Ormeling, Secretary-Treasurer, Bachlaan 39, Hilversum, Netherlands)

16–21. Society of **Motion Picture** and **Television Engineers**, 101st semiannual conv., New York, N.Y. (Executive Secretary, 9 E. 41 St., New York 10017)

17–19. **Elementary Particles**, Inst. of Physics and Physical Soc., conf., London, England. (Meetings Officer, Inst. of Physics and Physical Soc., 47 Belgrave Sq., London, S.W.1)

17–19. Technical Assoc. of **Pulp** and **Paper Industry**, 4th annual water conf., Philadelphia, Pa. (Technical Secretary, 360 Lexington Ave., New York 10017)

17–19. Institute of **Electrical** and **Electronics Engineers**, Jackson, Miss. (J. E. May, 1120 Auburn Dr., Jackson)

17–20. American **Geophysical Union**, annual mtg., Washington, D.C. (F. R. Boyd, Eastern Natl. Mtg. Committee, AGU, 1145 19th St., NW, Washington, D.C. 20036)

17–21. American Assoc., of **Immunologists**, Chicago, Ill. (Executive Secretary, Massachusetts General Hosp., Boston)

17–21. American Inst. of **Nutrition**, annual mtg., Chicago, Ill. (Secretary, The Institute, Dept. of Foods and Nutrition, Michigan State Univ., East Lansing)

17–21. American Soc. of **Biological Chemists**, Chicago, Ill. (Secretary, The Society, c/o Harvard Univ., 12 Oxford St., Cambridge, Mass.)

17–21. Central **Service Management**, American Hospital Assoc., Miami Beach, Fla. (E. J. Lanigan, Conv. and Mtg. Bureau, 840 N. Lake Shore Dr., Chicago, Ill. 60611)

17–21. Use of Isotopes and Radiation in **Plant Pathology** Studies, Intern. Atomic Energy Agency and Food and Agriculture Organization, symp., Vienna, Austria. (J. H. Kane, Chief, Conf. Branch, Div. of Technical Information, Atomic Energy Commission, Washington, D.C. 20545)

NEW BOOKS

(Continued from page 1237)

Martin Levey, Ed. Univ. of Pennsylvania Press, Philadelphia, 1967. 365 pp. Illus. $8.50. Fifteen papers; most of the papers are in English, others are in German or French.

The Biochemistry of Copper. Proceedings of the Symposium on Copper in Biological Systems (Harriman, N.Y.), September 1965. Jack Peisach, Philip Aisen, and William E. Blumberg, Eds. Academic Press, New York, 1966. 606 pp. Illus. $23.50. Thirty-seven papers.

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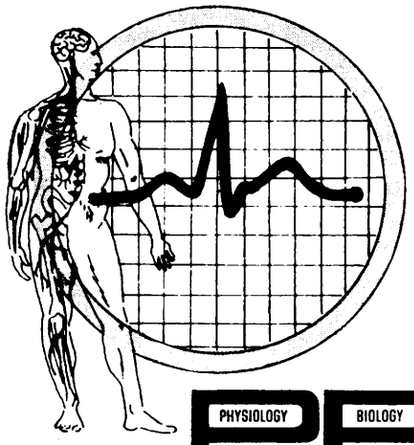

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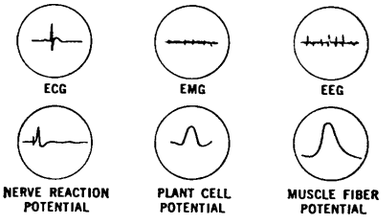

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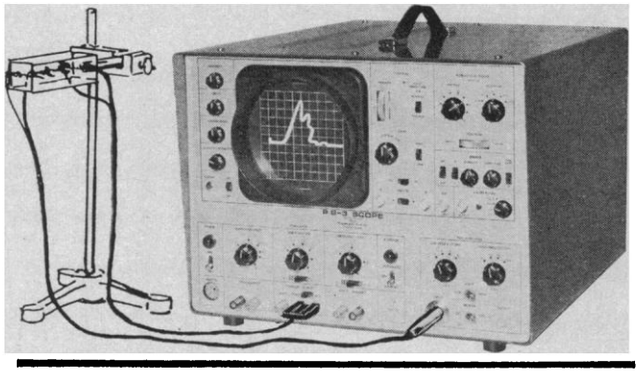

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Mixing: Theory and Practice. vol. 1. Vincent W. Uhl and Joseph B. Gray, Eds. Academic Press, New York, 1966. 350 pp. Illus. $15.50. Five papers.

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