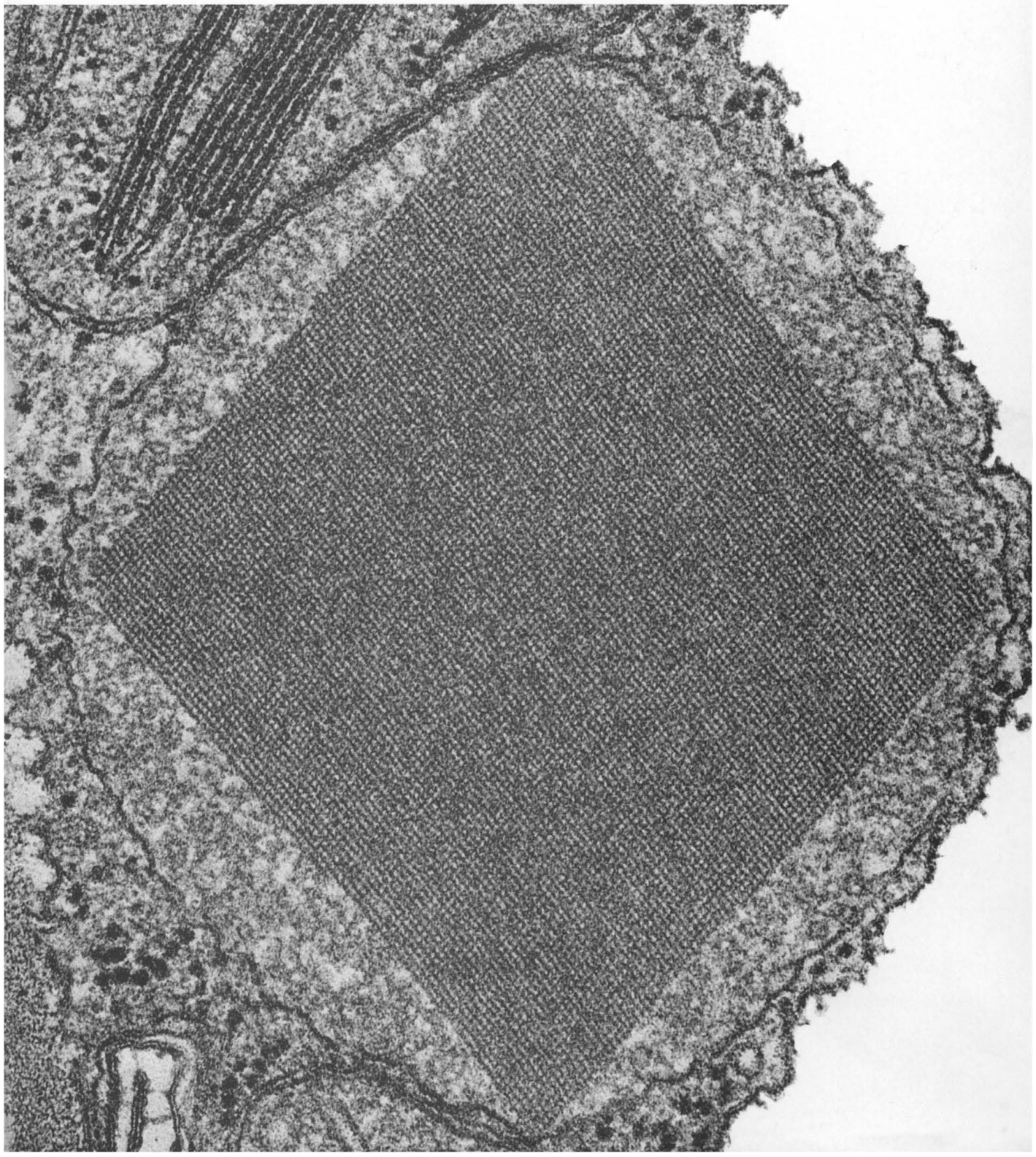
SCIENCE

21 March 1969
Vol. 163, No. 3873

AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE



meet the new PDP-12

Talk to a computer? How?

JUST GIVE ME ENGLISH THROUGH THE KEYBOARD, I'LL TALK BACK THROUGH MY 7" x 9" SCOPE.

O.K. Now, tell me about yourself.

I'M A COMPLETE LABORATORY SYSTEM WITH A BIG NEW DISPLAY, 16-CHANNEL A/D CONVERTER, 2 TAPE UNITS, AND A 1.6 μSEC COMPUTER WITH 43 BASIC INSTRUCTIONS.

What can you do?

CONTROL EXPERIMENTS. ACQUIRE, ANALYZE, STORE, AND DISPLAY DATA IN ANY FORMAT YOU WANT.

Haven't I met you somewhere before?

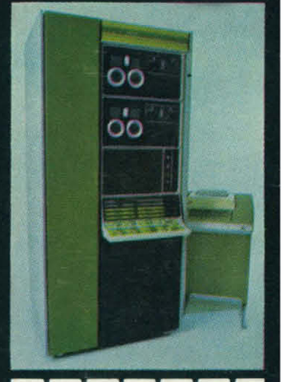
I'M BRAND NEW. YOU MUST BE THINKING OF MY PREDECESSOR, LINC-8.

What makes you different from the LINC-8?

I'M FASTER AND MORE POWERFUL, YET $10,600 LESS. I HAVE COMPLETELY BUFFERED I/O, INCLUDING AN ALL-NEW MAG-TAPE PROCESSOR. AND MY NEW DISPLAY-BASED PROGRAMMING SYSTEM IS A CINCH TO USE. FOR YOUR OWN PROGRAMS, FOR LINC-8 PROGRAMS, FOR PDP-8 PROGRAMS, AND THEN SOME.

You're too much, PDP-12.

NO. JUST $27,900.



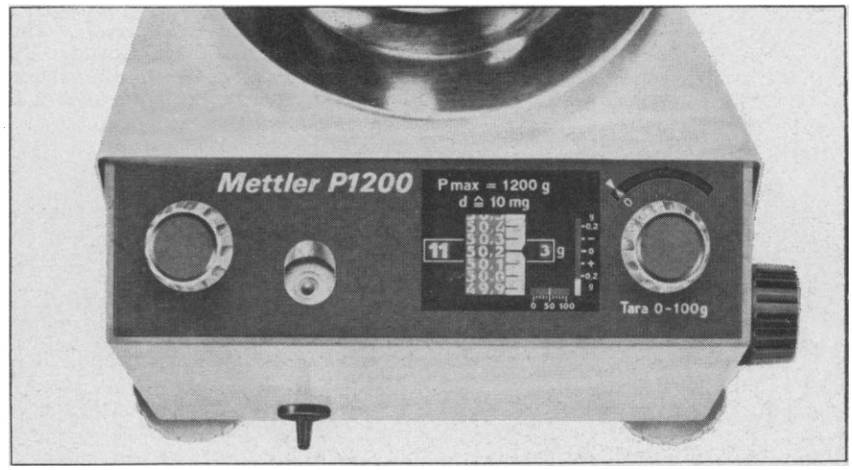
digital

Maynard, Mass.

Circle No. 5 on Readers' Service Card

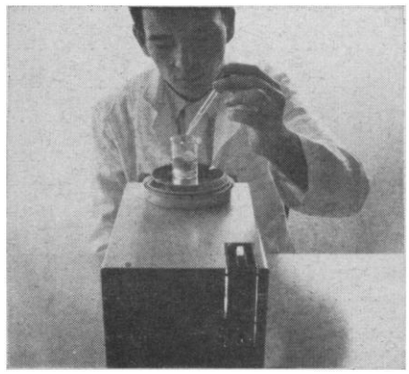
WEIGHT WATCHERS:
These Mettler balances can help reduce your weighing problems

If you have weight problems, chances are they can be solved with one of these three Mettler balances. Two are top-loaders, one an analytical. Collectively, they solve virtually any weighing problem in the laboratory. Individually, they perform their special jobs with unique speed, ease and precision.



Weight Watching Has Never Been Easier

The Mettler P1200, a well established and versatile top-loading balance, now has digital readout. This feature permits even relatively unskilled operators to obtain accurate results without misinterpretation or reading errors.



The P1200 will tackle weighings to 1200 grams (plus 100-gram tare), and give you a precision of ±5 mg. That's better than one part in 250,000. But despite its capabilities for handling the bigger weighing jobs, the P1200 will also complete a weighing in just three seconds. It will also checkweigh to plus or minus values as fast as you can place an object on the scale, and without referring to scale readout. Powdery, granular or liquid substances can be filled rapidly by the use of a filling guide which shows the approximate weight on the pan throughout the entire weighing operation. This eliminates time-consuming interruptions for reading the balance.

Remove Grams — Positively

The P160, another top-loader, weighs unknowns to 160 grams with a precision of ±1 mg. In addition to having all the features of the P1200, it is ideally suited for weight loss studies. It has a reverse scale which gives a positive reading as weight decreases in drying, evaporation and residue determination studies. This feature eliminates time-consuming calculations and the possibility of arithmetical errors. It also simplifies gravimetric titrations (for more information on the advantages of gravimetric titrimetry, write for Bulletin M-1014A).

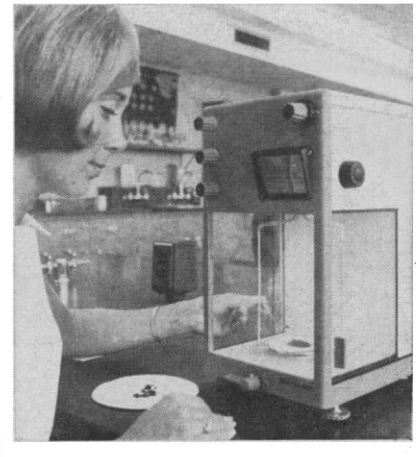
A Well-Balanced Balance

Slight changes in the balance level of the P1200 and the P160 (as in all Mettler top-loaders) are automatically compensated for by a zero point restoration feature. We call it Mettler Levelmatic. If your balance is out of plumb beyond its compensation range, you won't be able to make a weight reading because the readout is automatically obscured. Because Levelmatic automatically compensates for most shifts in zero position, it is rarely necessary to re-zero the balance before weighing.

Have Your Cake and Eat It

If you need an analytical balance to watch your weight, consider the Mettler H20 . . . it's really two balances in one. It gives you the 160.1-gram capacity of a macro-analytical balance, and the ±0.01 mg precision of a semi-micro instrument. The H20 readout, like the P1200 and P160, is digital. It also has a high-speed filling guide, and an optional accessory will let you weigh objects below the balance; for example, to make specific gravity measurements by weighing objects submerged in liquids.

Because of the unrestricted optical taring feature of the H20, you can tare off the weight of your container in seconds, and begin weighing-in with readout at zero. You can't make a weighing mistake. If you're adding several components, you can dial back to zero for each one.



Some Food For Thought

In case you have a weighing requirement that can't be solved by one of these three balances, Mettler has 35 more models ranging from top-loaders that weigh to 13 kilos all the way through analyticals to ultra micro instruments with precision of ±0.1 μg. We'll bet a gram-cracker that one of these will fill the bill. To arrange for a free demonstration or trial, or for further particulars, write to Mettler Instrument Corporation, 20 Nassau Street, Princeton, New Jersey 08540.

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Mettler®

21 March 1969
Vol. 163, No. 3873

SCIENCE

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AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE

COVER

Organelle with a large inclusion of crystalline protein in a parenchyma cell of a tobacco leaf. (Upper left) The bounding membrane of the organelle is in contact with the outer membrane of a chloroplast. This and similar organelles without crystals probably correspond to particles which have been isolated recently by biochemists and shown to be capable of metabolizing a product of chloroplast activity (× 220,000). See page 1353. [S. F. Frederick and E. H. Newcomb, University of Wisconsin]

Powerful Computing Genie: $4900

READY, WILLING AND ABLE.

Ready—to relieve you of waiting to get on the big computer.
Constantly available. At your fingertips whenever you need it.
Ready to abolish tedium from scientific and engineering computation.
Ready to slash through long routines
and come up with answers in milliseconds.
The new Hewlett-Packard 9100A personal computer.

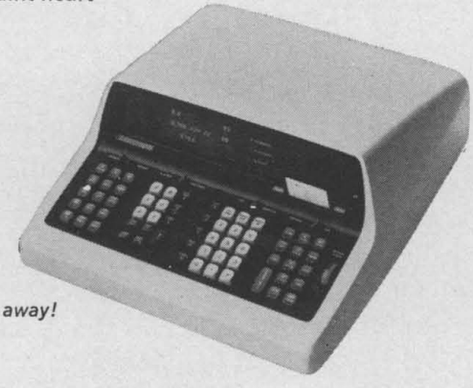
Willing—to perform log and trig functions,
even hyperbolics and coordinate transformations,
at the touch of a key. Willing to work
with extremely large and small numbers simultaneously.
Willing to take your programming commands
in mathematical language.
No computer language or programming specialist required.
Willing to communicate with you on *your* terms.
The new Hewlett-Packard 9100A computing marvel.

Able—to take on the most complex problems:
roots of a fifth-degree polynomial...
solutions to three simultaneous equations...
Bessel functions... Fourier analysis... elliptic integrals...
real and complex polynomial evaluation...
coordinate geometry... regression analysis...
numerical integration... vector analysis...
and many, many more!
Able to be your fast, responsive mathematical servant.
The new Hewlett-Packard 9100A electronic genie.

This major computing capability
is compressed into one 40 pound package.
Its only moving parts are the keys, the switches
and one decimal wheel.
No noise.

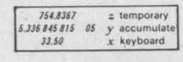
The 9100A computing genie is being delivered *NOW,*
with an extensive—and growing—program library
that puts you in control.

Examine the keyboard, question every key and switch.
Then decide to command the computing genie.
A telephone call or purchase order directed to any
HP Sales and Service Office
(in principal cities throughout the world)
will start the executive process.
If you are still skeptical, or of faint heart
ask for a demonstration.
It will affirm, assure
(and only slightly delay)
your entry into the solid-state
of personal computing power.
Be a Master.
Hewlett-Packard, Box 301,
Loveland, Colorado, 80537;
Europe: 1217 Meyrin-Geneva,
Switzerland.



9100A puts answers just a touch away!

HEWLETT hp PACKARD

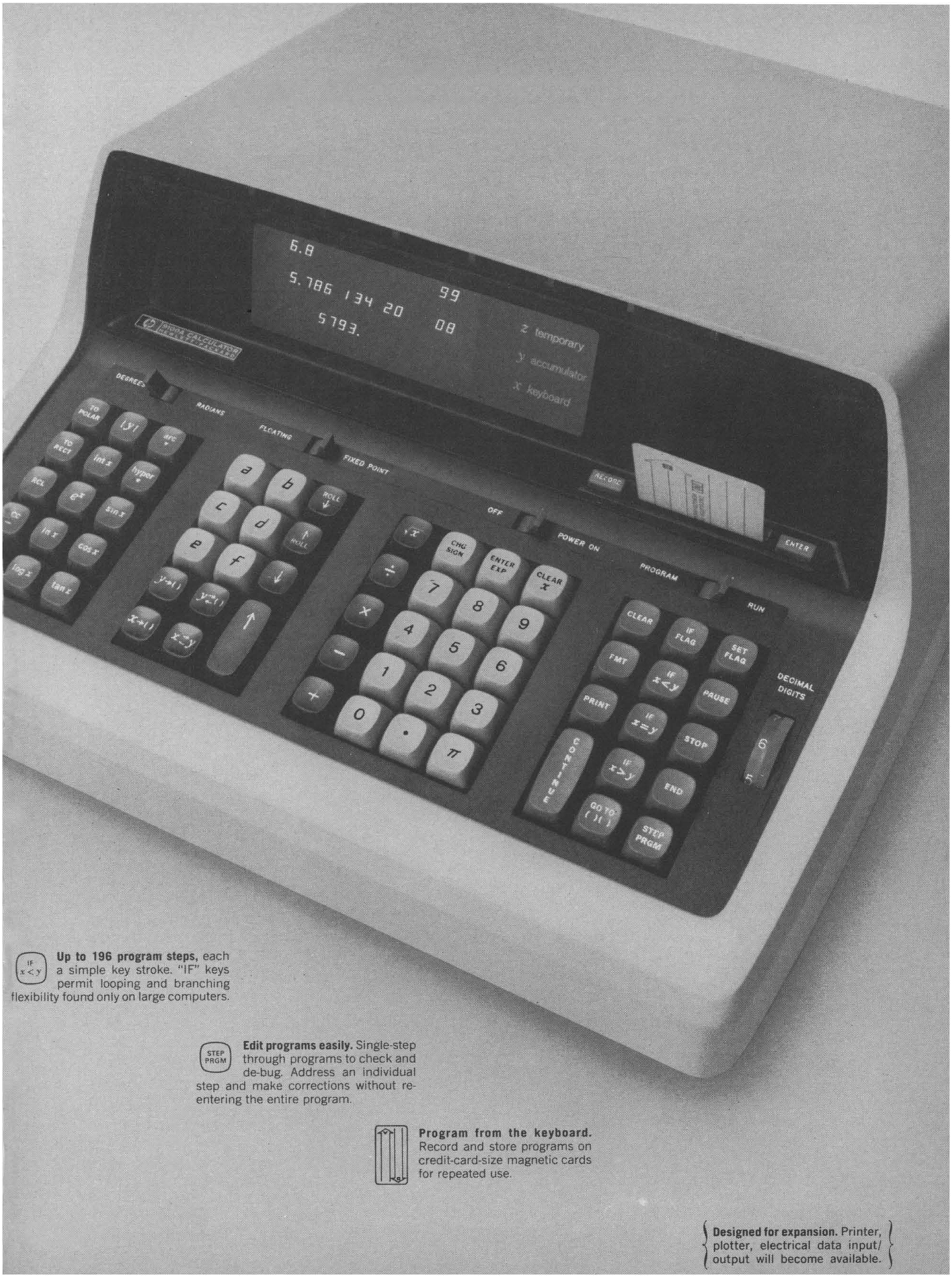


Dynamic range 10^{-98} to 10^{99}, nearly 200 decades. Observation of math operations on 3 displayed registers. Up to 16 more registers for data storage.

TO POLAR **Complex and vector arithmetic** simplified with coordinate transformation keys, rectangular-to-polar and vice-versa, in milliseconds.

tan x **Trig functions** covering all quadrants and any size angle in degrees or radians.

098/21



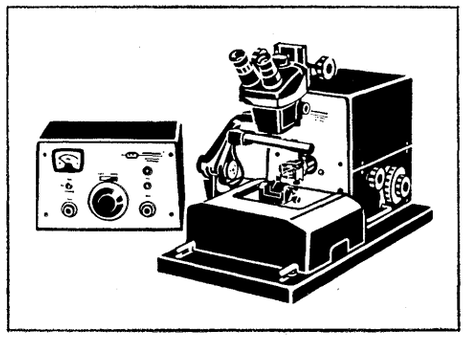
Up to 196 program steps, each a simple key stroke. "IF" keys permit looping and branching flexibility found only on large computers.

Edit programs easily. Single-step through programs to check and de-bug. Address an individual step and make corrections without re-entering the entire program.

Program from the keyboard. Record and store programs on credit-card-size magnetic cards for repeated use.

Designed for expansion. Printer, plotter, electrical data input/output will become available.

The Ultrotome III, specifically designed to meet the demands for measuring knife angle, and clearance angle and maintaining the correct sectioning speed and smooth continuous specimen feed.



LKB IN THE SERVICE OF SCIENCE

LKB INSTRUMENTS INC. • 12221 PARKLAWN DRIVE • ROCKVILLE Md. 20852

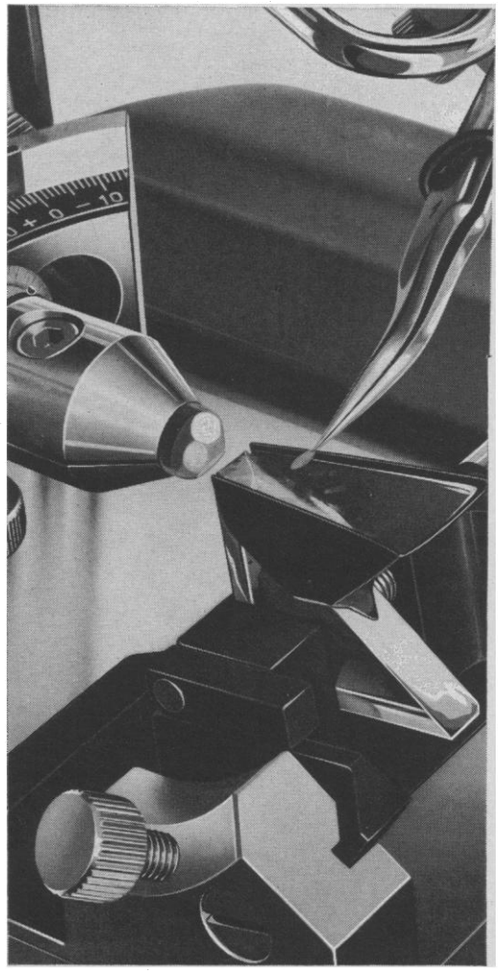
SALES AND SERVICE THROUGHOUT THE WORLD: STOCKHOLM, THE HAGUE, COPENHAGEN, ROME, VIENNA, LONDON

ASK US ABOUT CRYO-ULTRAMICROTOMY TOO!

Difficult Specimens are no Problem

Not if you have an LKB Ultrotome III. This universal instrument combining precision and utmost convenience with unmatched versatility enables the toughest sectioning problems to be quickly, confidently and reliably tackled.

The Ultrotome III has the broadest range of cutting speeds of any marketed ultramicrotome, from 60 mm per sec. to 0.1 mm per sec. Real knife angle can be measured to an accuracy of 1°. Three feeds allow reproducible production of ultrathin, thin and thick sections of uniform thickness.



All sizes of glass knives, from 4—10 mm thick, and with 30°—60° scoring angles, and diamond knives from all the leading makers can be used. The orientation head and knife holder have universal movement, to make transversal, longitudinal and radial sectioning of the same specimen block a routine operation. Sections can be quickly and efficiently collected with the unique LKB section collector.

It is **DIFFICULT** to tell you all about it here, we can only provide a **SPECIMEN,** write for the LKB fully illustrated brochure for the **ANSWER.**

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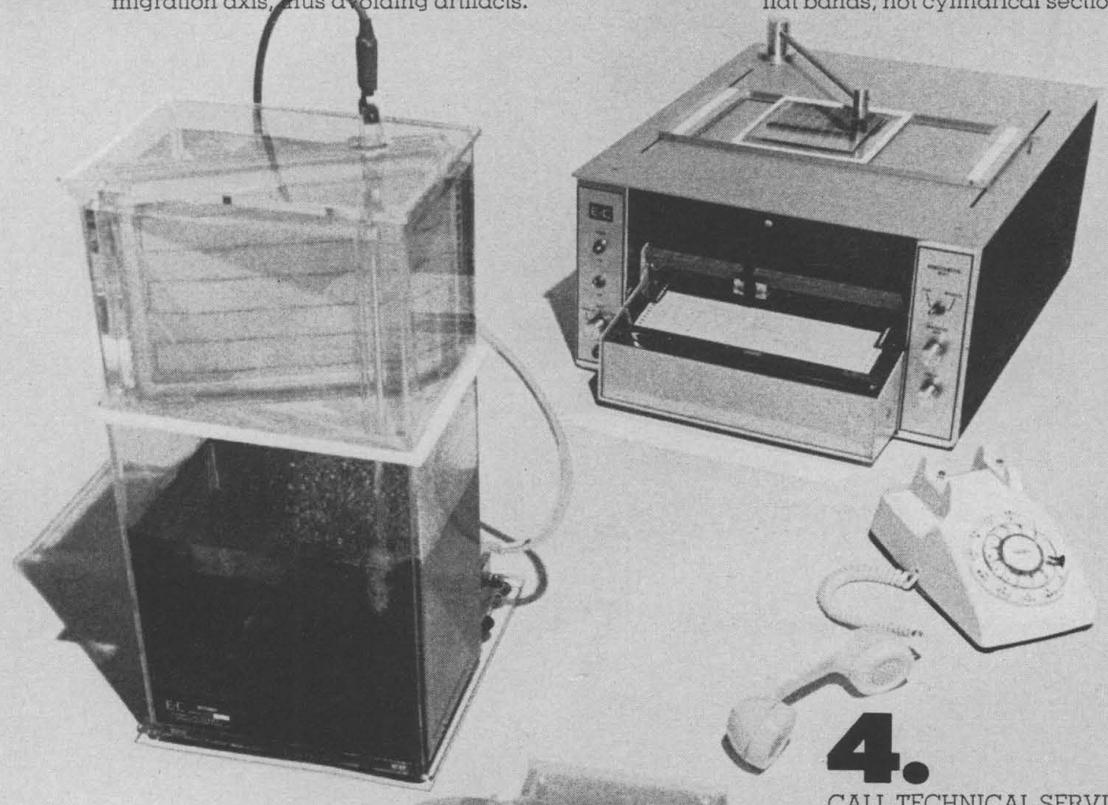
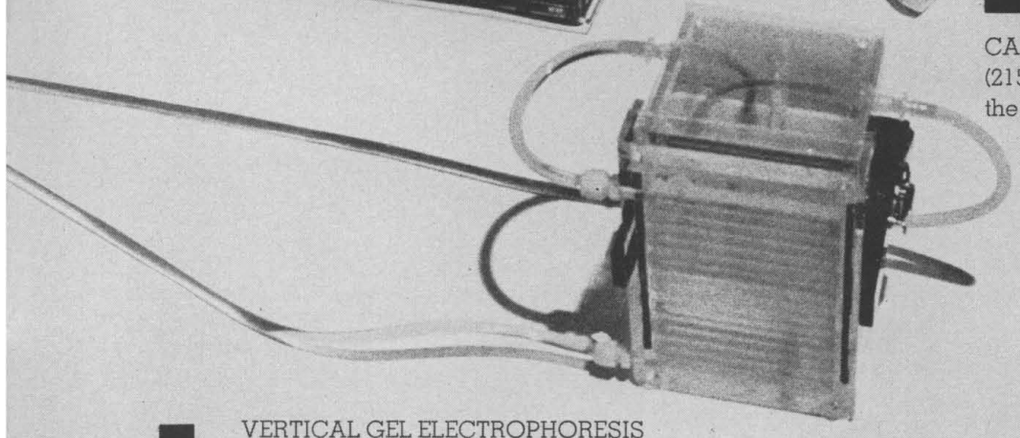
Fight protein deficiency four ways!

2. ELECTROPHORETIC DESTAINER EC 489 Draws stain out perpendicular to migration axis, thus avoiding artifacts.

3. DENSITOMETER WITH ELECTRONIC INTEGRATOR EC 810 Less complicated —and less expensive—because it views flat bands, not cylindrical sections.



4. CALL TECHNICAL SERVICE COLLECT (215) 382-9100 for further details. Or send the coupon.



1. VERTICAL GEL ELECTROPHORESIS CELL EC 470 Flat gel slabs, giving uniform conditions for all samples.

E-C

E-C helps you sort things out.

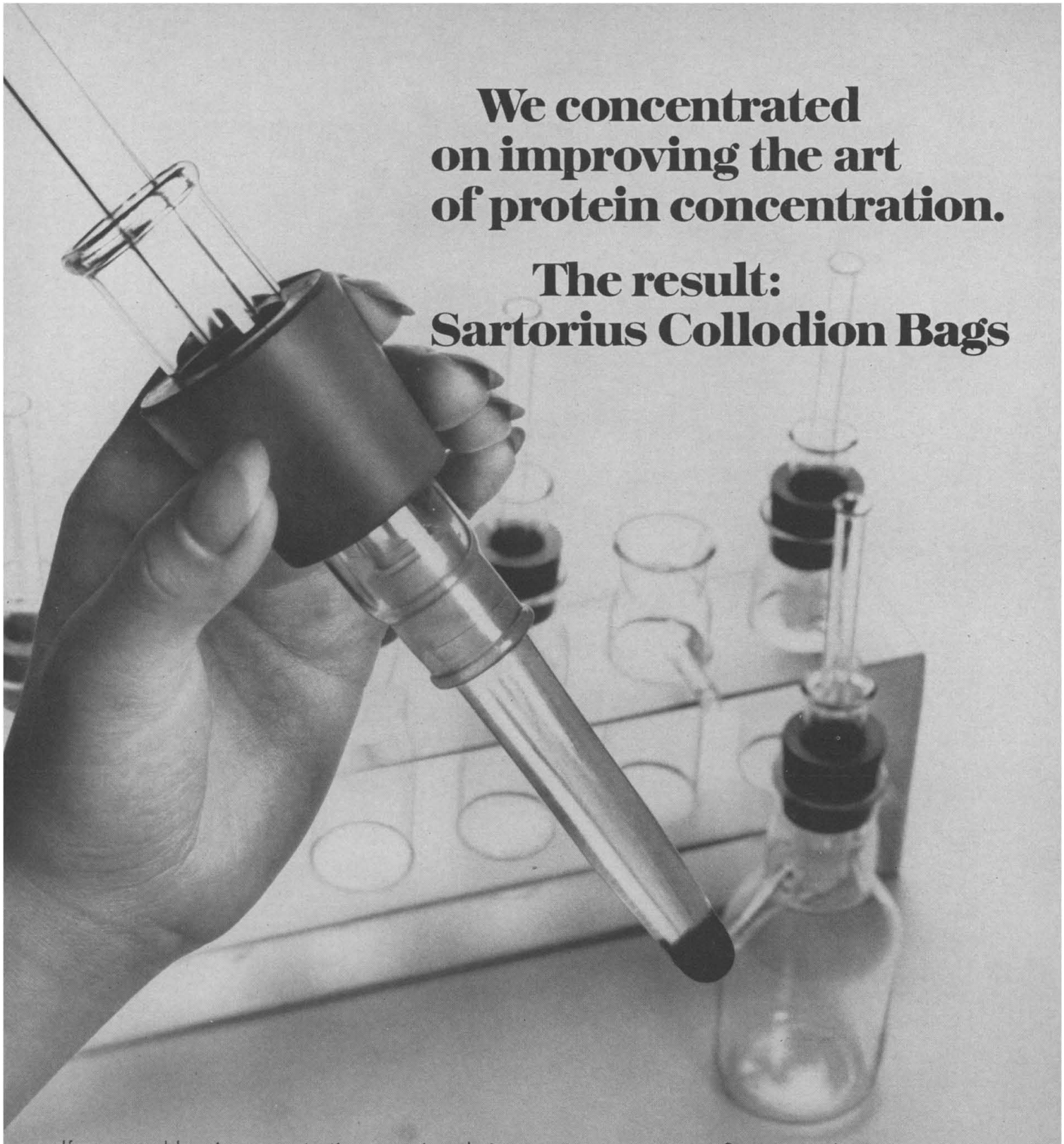
Please rush details about Vertical Gel Electrophoresis.

Name

Address

City State Zip

Or telephone our Technical Service collect at (215) 382-9100. E-C Apparatus Corporation, 755 St. Marks Street, University City, Philadelphia, Pa. 19104.



We concentrated on improving the art of protein concentration.

The result: Sartorius Collodion Bags

If your problem is concentrating protein solutions quickly and efficiently, Sartorius Collodion Bags and accessories are something you really should look into.

Sartorius Collodion Bags are made of pure nitrocellulose and are tapered to facilitate protein collection. Their extremely fine pore structure retains any compounds with molecular weights over 30,000. Thus, a 5 ml. sample of body fluid can be reduced under vacuum to 0.02 ml. of concentrate in just two hours. An additional important advantage of these bags is that they need not be discarded after one-time use. Cleaned carefully and kept moist, Sartorius Collodion Bags may be re-used up to five times. To mount these bags for protein concentration, Sartorius makes a complete line of bag holders with ground-glass joints, flat and round bottom suction flasks, and racks made of PVC.

Sartorius Collodion Bags are just one of many different types of membrane filters and related apparatus made by Sartorius to meet virtually every laboratory need. All are fully described in our new Membrane Filtration Catalog. For your free copy, write: Sartorius Filter Division, Brinkmann Instruments, Cantiague Road, Westbury, N.Y. 11590.

sartorius membrane filters

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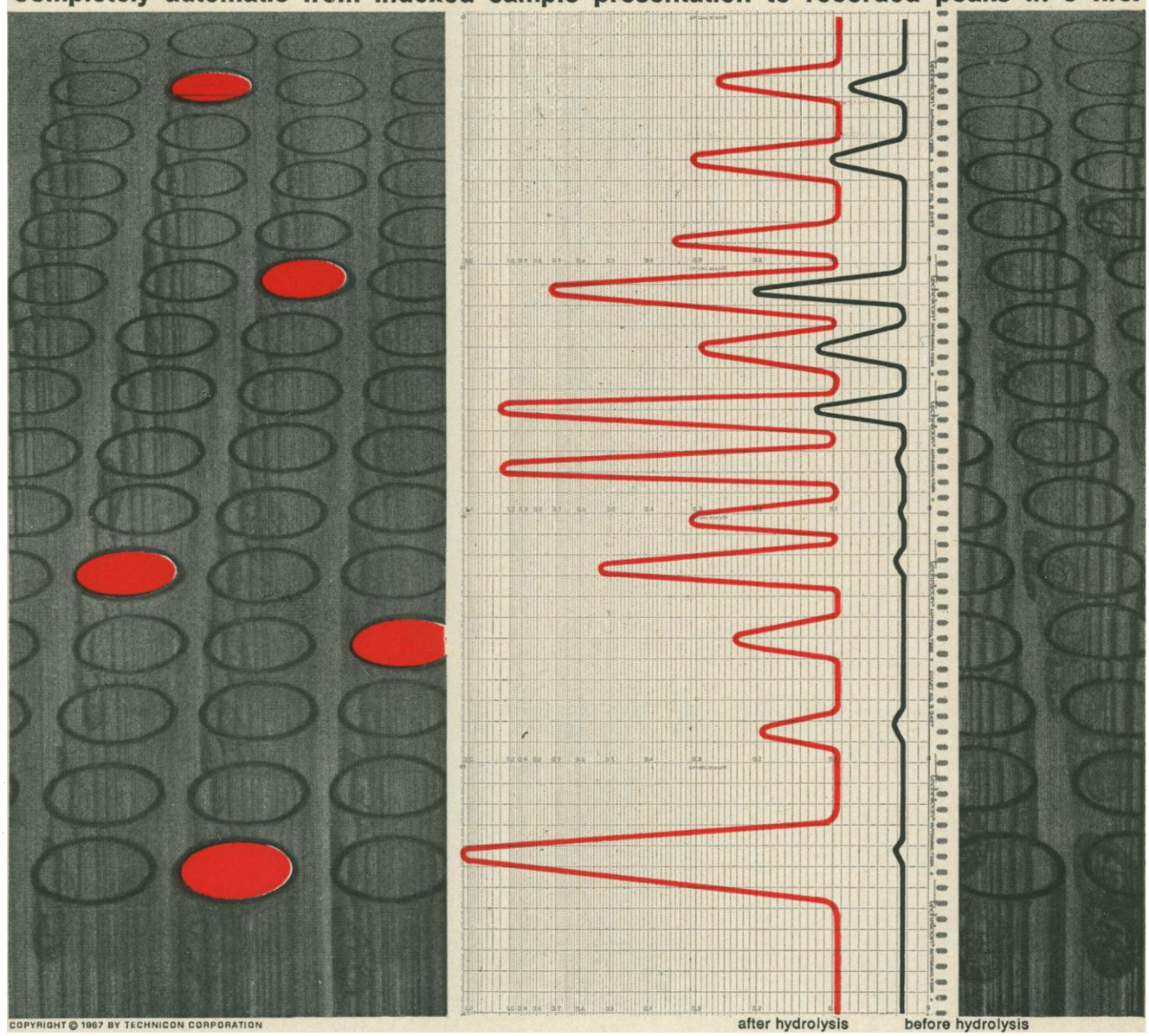
Rapid automatic peptide identification

Completely automatic from indexed sample presentation to recorded peaks in 5 hrs.



■ Now you can quantitate hydrolyzed versus non-hydrolyzed peaks with maximum sensitivity using our exclusive automatic alkaline hydrolysis feature. Even ninhydrin negative peptides are detected because of total residues reaction. ■ For more complete characterization you can single out peptides containing specific Amino Acids by the addition of analysis streams for Arginine, Tyrosine, Histidine, Hydroxyproline, Lysine, etc., and record them simultaneously with the hydrolyzed-non hydrolyzed peaks. ■ Flexibility of the system also permits complete, high speed Amino Acid analysis merely by changing columns and reaction streams. For details write Dept. B, Technicon Corporation, Tarrytown, N.Y. 10591

TM

1247

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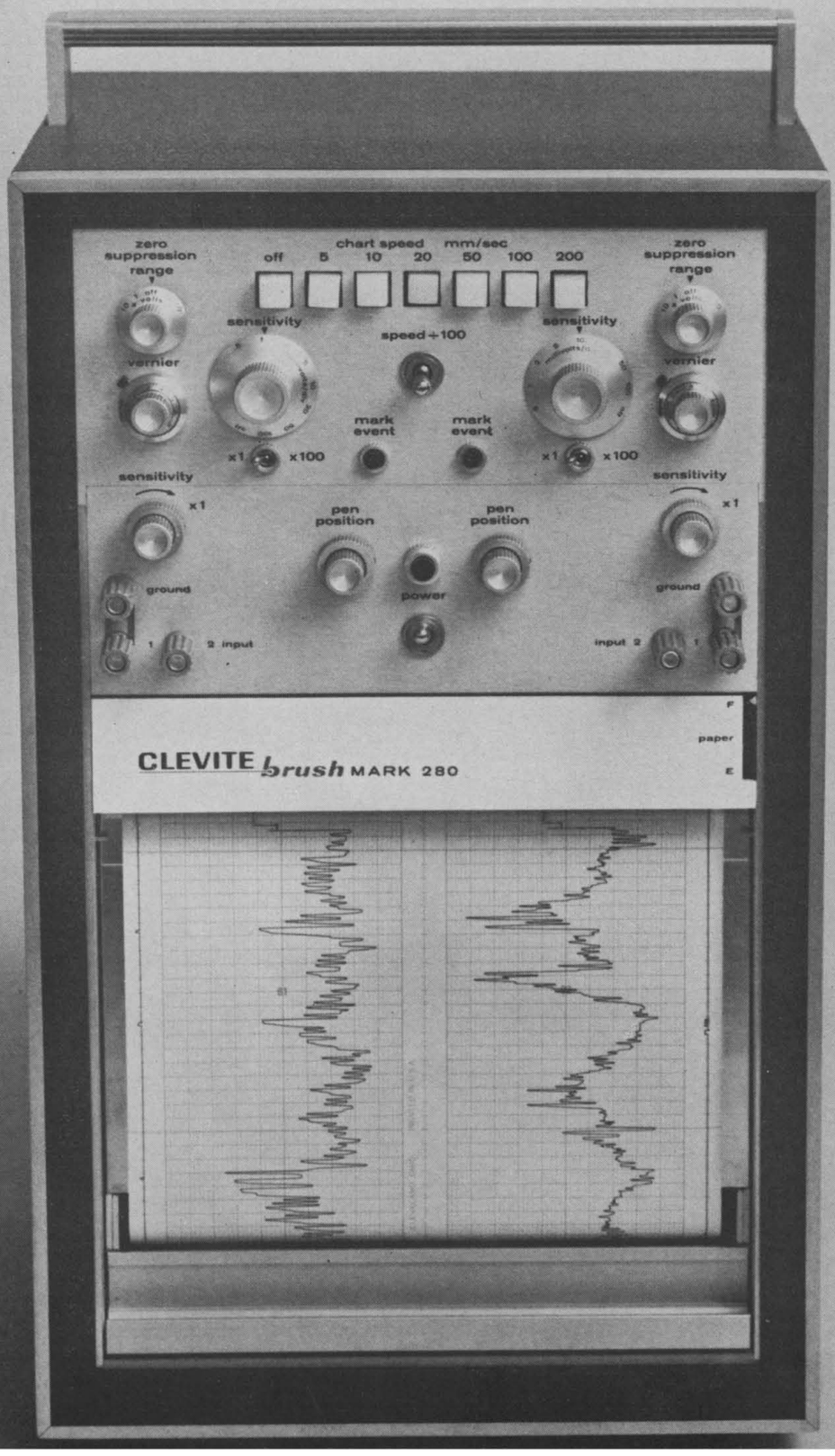
Facts come in loud and clear on the Brush Mark 280.

Twice as loud and clear.

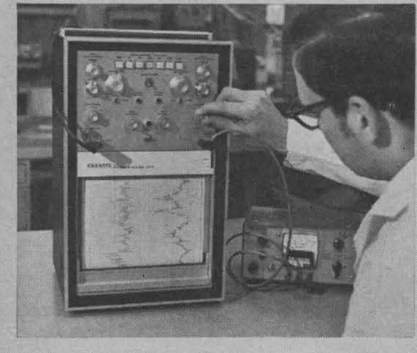


The Mark 280 is the best way yet to get high precision in a portable recorder.

The facts come in on 80mm channels, twice the width of conventional channels. Thus resolution is doubled — because measurements, no matter how complex, are displayed on twice the usual scale — are twice as easy to see and read.

The traces are just plain beautiful — clear, sharp and uniform at any writing speed — so there's no questioning the values you've recorded. They're produced by a pressurized fluid writing method that forces the trace into the paper—not just on it. Never a smudge or smear. The writing's dry on contact.

Accuracy? We guarantee 99½%, and most Mark 280's do even better—thanks to our foolproof pen-position feed-back system that *enforces* accuracy. Frequency response? To 35 Hz at full 80mm scale — out to 200 Hz at useable amplitudes. Calibrated zero suppression. It's one of many options.



Doubled resolution, near-perfect accuracy, crisp clear traces, high frequency response. That's what you can expect from the Mark 280. Ask your Brush sales engineer for a demonstration. Or write for complete details. Clevite Corporation, Brush Instruments Division, 37th and Perkins, Cleveland, Ohio 44114. We'll include our handy "Chart Running Time" calculator and slide rule.

CLEVITE BRUSH

Picker counts betas. Picker counts gammas.

(And one Picker device even counts both.)

The Liquimat 220: modest price, high performance.
Liquimat® 220: 100 sample automatic liquid scintillation counter with high analytical capability but modest price.
Liquimat 220: ambient temperature operation with better sample solubility and simpler, less expensive cocktail preparation.
Liquimat 220: four independent analysis channels, two for beta counting, two for external standardization.
Liquimat 220: most flexible and useful automatic standardization system.
Liquimat 220: logarithmic energy response to simplify instrument set-up.
Liquimat 220: offers the option of the Picker Nuclear DAC stored-program digital computer for automatic data reduction.
Liquimat 220: choice of three differently priced versions, each graded to yield an optimum performance-to-price ratio. Prices start at $8100 including lister readout.

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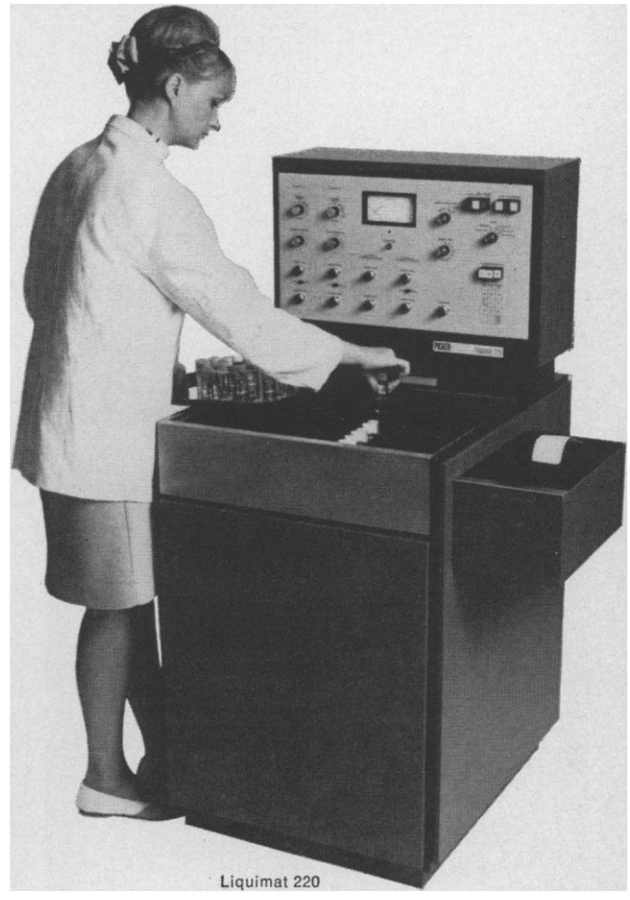

Liquimat 220

Computerized Liquimat® 330
The most sophisticated liquid scintillation counting system. Combines the Liquimat 330 (a 200 sample, 5 channel, temperature-controlled instrument) with the DAC computer (a full-fledged programmable, general-purpose computer with substantial capability). Converts raw, uncorrected data into meaningful information. The computer can also be easily coupled to other instruments to provide a "computer data reduction center."

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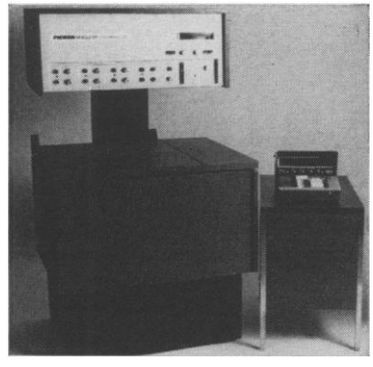

β-γ Liquimat
The only liquid scintillation counter with an integrated gamma counter: three beta channels and one gamma channel, or two beta channels and two gamma. Logarithmic energy response, external beta standardization, temperature control, 200 sample capacity. Gamma detection chamber has 3" x 3" diameter NaI crystal.

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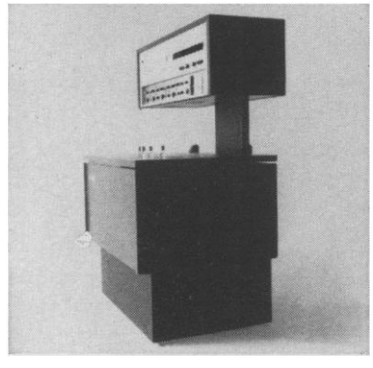

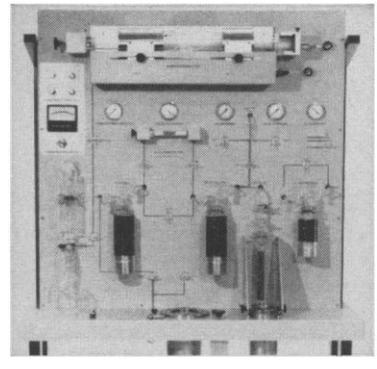

^{14}C Dating Laboratory
The combination of Picker's Benzene Synthesizer and a high-performance version of the Liquimat 220 provides a complete ^{14}C dating (and ^{3}H counting) laboratory for less than $17,000. Converts all low activity ^{14}C materials to benzene for high-efficiency liquid scintillation counting. Non-explosive catalyst produces no fractionation. High yield: typically $>90\%$. Incorporates standard glassware; all connections easily accessible.

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Autowell® II
High-efficiency system for automatic counting of one or up to 100 liquid or solid gamma-emitting samples in test tubes. All samples are rotated about a centrally-located shielded detector assembly to ensure a constant low background. Choice of 3" x 3"D or 2¼" x 2¼"D crystals. Single or dual channel pulse height analysis, choice of lister, calculator, or teletypewriter printer.

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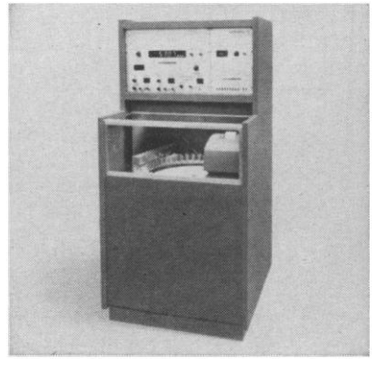

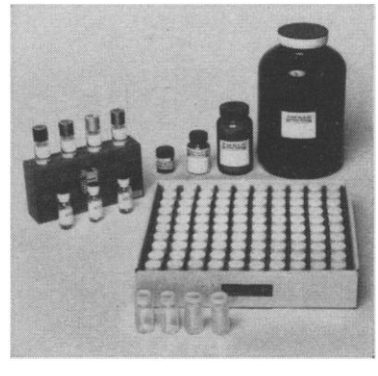

Liquid Scintillation Supplies
Picker Nuclear has the most-needed supplies for liquid scintillation counting. Immediate delivery available on glass or plastic vials, scintillators of the highest purity, precise standards, and other items. These competitively-priced products are compatible not only with Picker Nuclear counters but with those of other manufacturers.

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We'll be happy to forward detailed information on these products.
Write to Picker Nuclear, 1275 Mamaroneck Avenue, White Plains, N.Y. 10605 and request file 234S.

PICKER

Visit our booths at the FASEB meeting.

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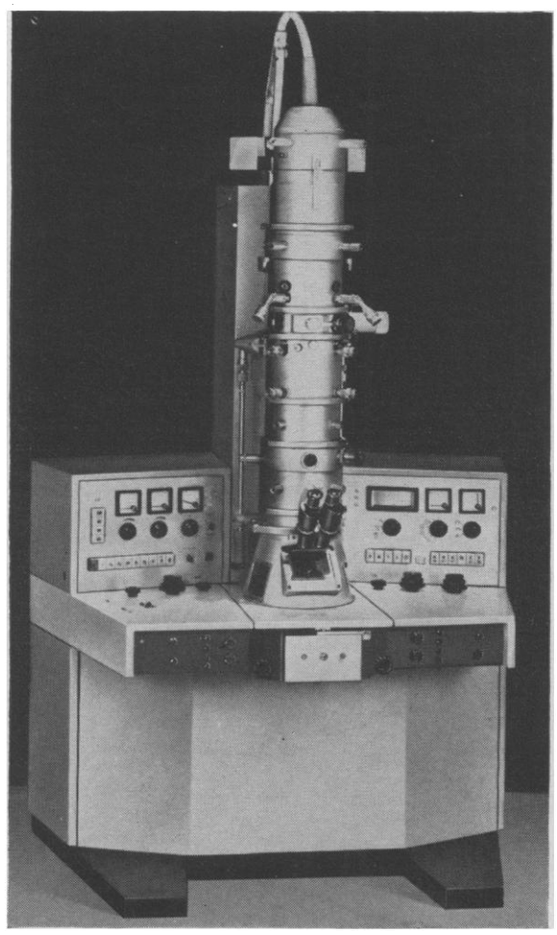
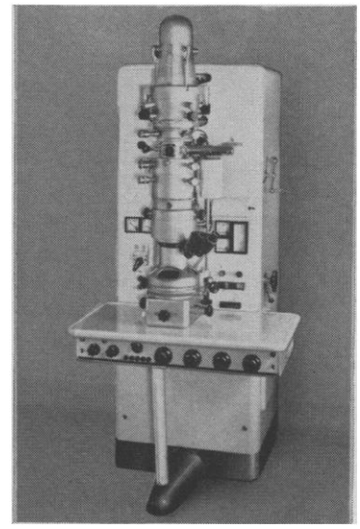
SIEMENS



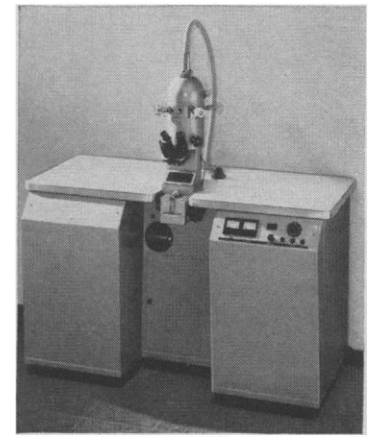
The ELMISKOP Line...for the ultimate in high-performance electron microscopy

Siemens—world leader in electron microscopy—offers a complete line of fine-quality instruments for penetrating the microworld. From the high-resolution Elmiskop 101, to the new "Low Cost" Elmiskop 51—for diagnosis, research or production control—The Elmiskop Line provides a single source for satisfying your most exacting requirements.

Elmiskop 101—With a point to point resolution of 3.5 AU and a magnification range of 285X to 280,000X, the Elmiskop 101 offers the ultimate in high-resolution microscopy, designed for an almost infinite variety of applications.



Elmiskop 1A—This high power electron microscope has proved itself as the standard of excellence, with over 1000 instruments installed all over the world today. The Elmiskop 1A is also the basic instrument for our newly developed microprobe and scanning electron microscope.



New Elmiskop 51—Featuring a resolution capability of 20-25A, this new, easy-operating, quick search instrument is designed to hold up to 15 specimens simultaneously. Elmiskop 51 is the ideal instrument for production control or diagnostic work. For teaching, or as a search instrument used in conjunction with a high resolution microscope.

For full information on The Elmiskop Line of electron microscopes and complete line of accessories, write:

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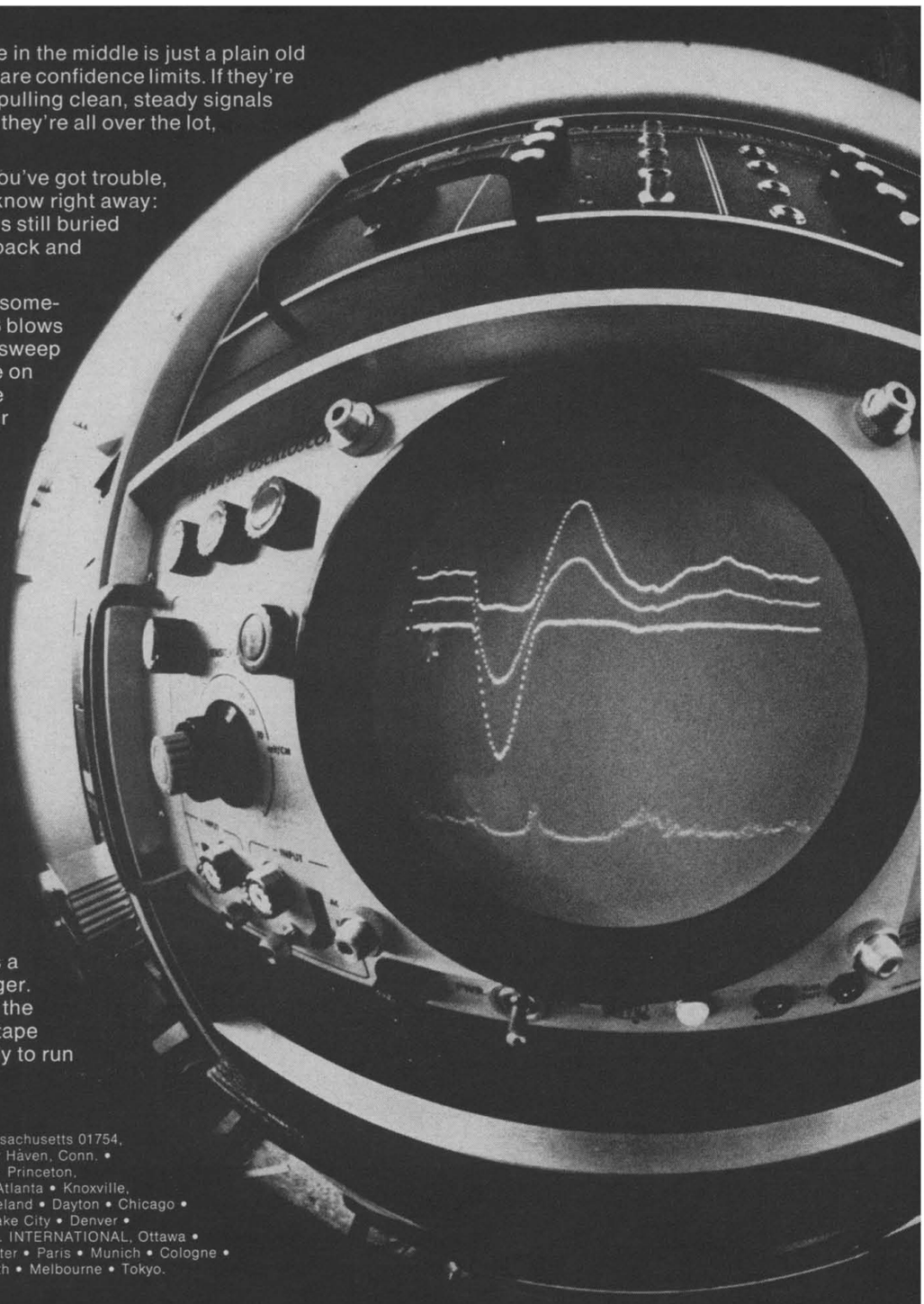

See those three curves on top? The one in the middle is just a plain old average. That's basic. The body guards are confidence limits. If they're nice and tight, you know that LAB-8 is pulling clean, steady signals out of the background. Beautiful. But if they're all over the lot, you've got trouble.

Look at the bottom line. Trend. When you've got trouble, trend tells you something you need to know right away: your signal is drifting, it's oscillating, it's still buried in the noise. Now you know how to go back and do it better.

Other good LAB-8 tales to tell. There's something you really want to look at – LAB-8 blows it up, gives you more data on a shorter sweep segment, and still keeps the big picture on the scope. It can start averaging before the sync pulse. And it talks back to your technician in English. And it records run parameters on paper tape (so they come back to fight another day).

No other Signal Averager Can make This Statement.

LAB-8 costs approximately as much as a conventional, hard-wired signal averager. The basic price includes the averager, the computer that runs it, Teletype, paper tape punch, and reader. This system is ready to run the day it comes into the laboratory.

That says something, too.

DIGITAL EQUIPMENT CORPORATION, Maynard, Massachusetts 01754, Telephone: (617) 897-5111 – Cambridge, Mass. • New Haven, Conn. • Rochester, N.Y. • New York City • Long Island, N.Y. • Princeton, Parsippany, N.J. • Washington, D.C. • Cocoa, Fla. • Atlanta • Knoxville, Tenn. • Huntsville • Philadelphia • Pittsburgh • Cleveland • Dayton • Chicago • Minneapolis • Ann Arbor • Houston • Dallas • Salt Lake City • Denver • Albuquerque • Los Angeles • San Francisco • Seattle. INTERNATIONAL, Ottawa • Toronto • Montreal • Edmonton • Reading • Manchester • Paris • Munich • Cologne • The Hague • Stockholm • Milan • Sydney • West Perth • Melbourne • Tokyo.

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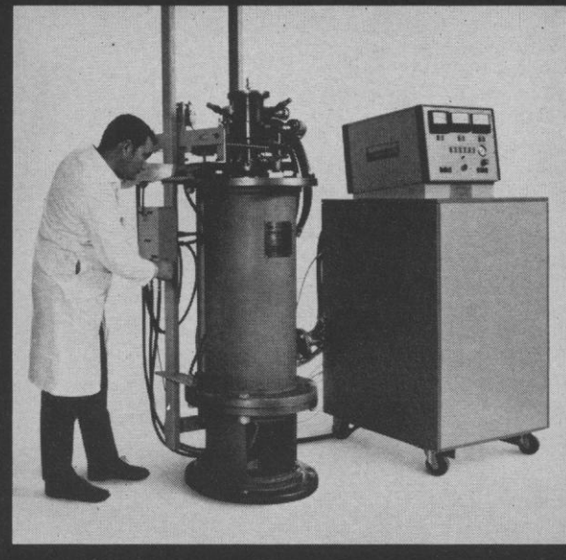
Our extraordinary gravity-increasing machine.



(The only centrifuge that can process over 40 liters/hr. at 90,000 times gravity.)

This is the highest capacity ultracentrifuge ever developed. Its ability to handle up to 400 liters per day at speeds as high as 35,000 RPM provides a new separation capability for research and production. This 35,000 RPM speed—with an aluminum rotor—provides gravitational forces up to 83,500 g, and the titanium rotors now being developed will push the maximum operating gravity field over 90,000 g.

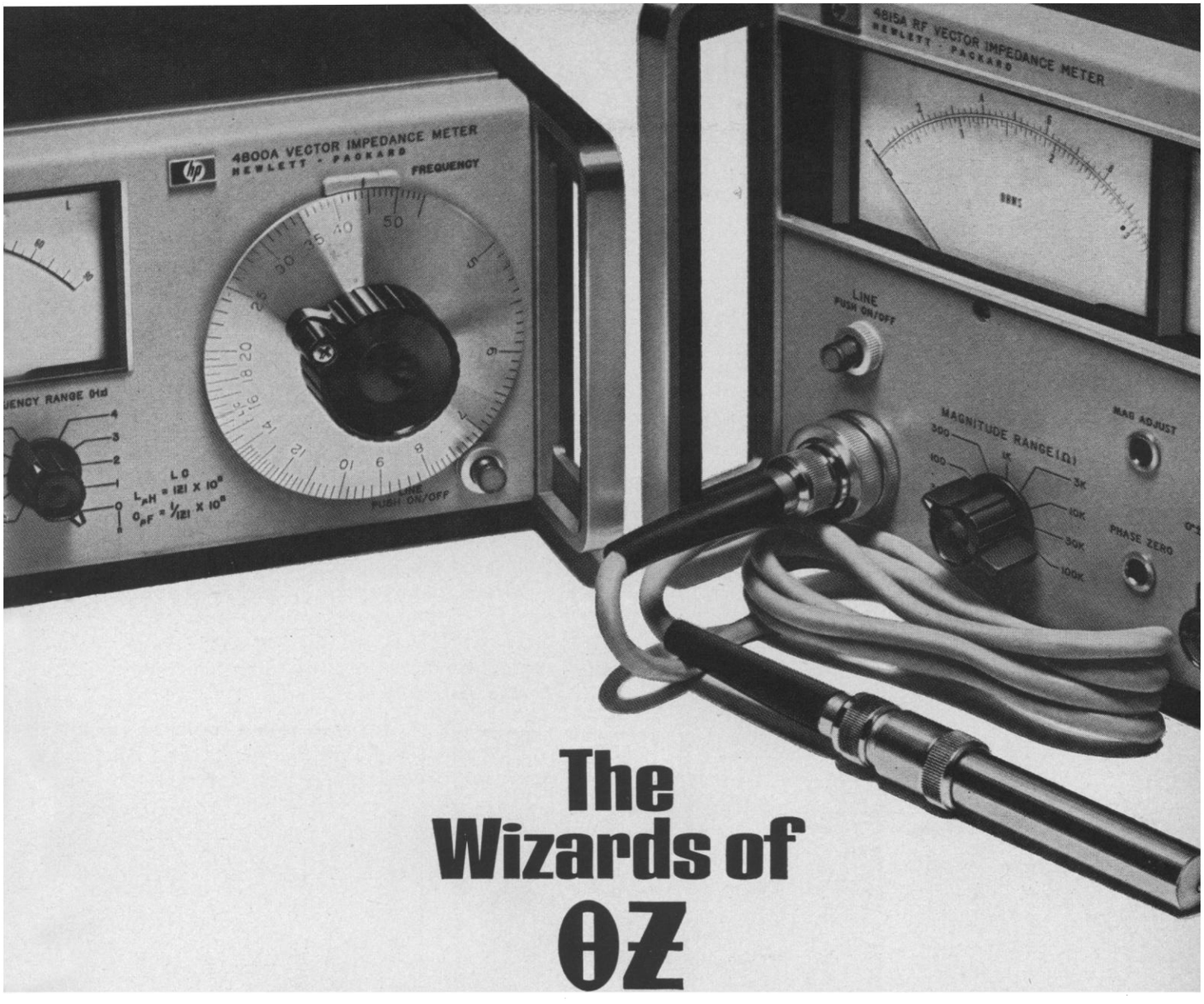
This Model K liquid zonal ultracentrifuge can be used to achieve separations with any of these techniques: continuous flow with banding, continuous flow with pelleting, rate zonal separation, or gradient resolubilization. The continuous-flow-with-banding technique is now being used by several major pharmaceutical companies for the production purification of influenza virus vaccine. This instrument is providing vaccine up to ten times purer than any previously available commercially. The benefits: fewer local and systemic reactions, full potency with half the dosage volume, marked reduction of non-viral antigens.

This high capacity zonal ultracentrifuge was developed by the AEC and the NIH as part of their joint Molecular Anatomy Program. Electro-Nucleonics, Inc. is the only company making this device available commercially.

Invitation: the availability of a production-scale machine delivering such high gravitational forces should lead to the development of new applications in a wide variety of fields. So whatever your area of interest, if you think the Model K might have applicability to your particular separation problems, talk to us. We'll be most happy to cooperate in exploring its possible usefulness to you. Or for more information, call Tom Guerin collect, at (201) 228-0515, or write to him at Electro-Nucleonics, Inc., Box 803, Fairfield, N.J. 07006. Request File KS.

Visit our FASEB Booth H 130

ELECTRO-NUCLEONICS



The Wizards of θZ

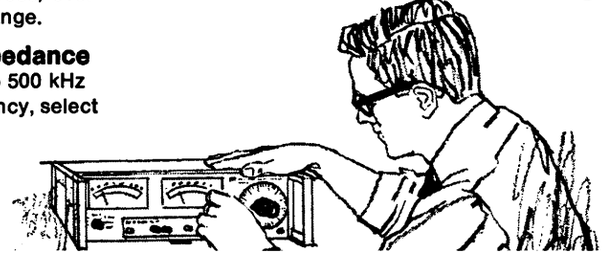
Like magic . . . vector impedance instruments read out complex impedance in an instant.

Measurements in scientific and educational laboratories involving impedance magnitude, Z, and phase angle, θ, no longer require tedious test procedures. These measurements are now as easy to make as voltage readings. No nulling . . . no balancing . . . no calculations to make. The wizardry of these HP instruments provides direct readout in terms of Z (in ohms) and θ (in degrees) over a continuous frequency range.

HP 4800A Vector Impedance Meter covers the 5 Hz to 500 kHz range. You set the frequency, select the impedance range and read: Z from 1 ohm to 10 Megohms, and θ from −90° to +90°. $1650.

HP 4815A RF Vector Impedance Meter covers 500 kHz to 108 MHz. Measures, via a probe, active or passive circuits directly in their normal operating environment. Z from 1 ohm to 100 K ohms; θ from 0° to 360°. $2650.

Application Note 86 describes many applications of the 4800A and the 4815A Vector Impedance Meters including the measurement of Z, R, L, and C. For your copy and complete specifications, contact your local Hewlett-Packard field engineer or write: Hewlett-Packard, Green Pond Road, Rockaway, New Jersey 07866. In Europe: 1217 Meyrin-Geneva, Switzerland.



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IMPEDANCE INSTRUMENTS

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The Zetopan is an advanced research microscope that can be extended to cover fluorescence, polarization, microphotometry and phase techniques, and can be used with transmitted, incident, epi or Nomarski interference.

The Automatic Camera is adaptable to any microscope in your lab, and is the only camera with direct exposure readout. Built-in factor keys allow you to compensate the measured exposed time for film reciprocity failure. Light measurement may be detailed to one small spot or over the entire frame. Interchangeable 35 mm film magazines.

For a convincing demonstration of the microscope and/or camera write: American Optical Corporation, Reichert Products, Buffalo, New York 14215.

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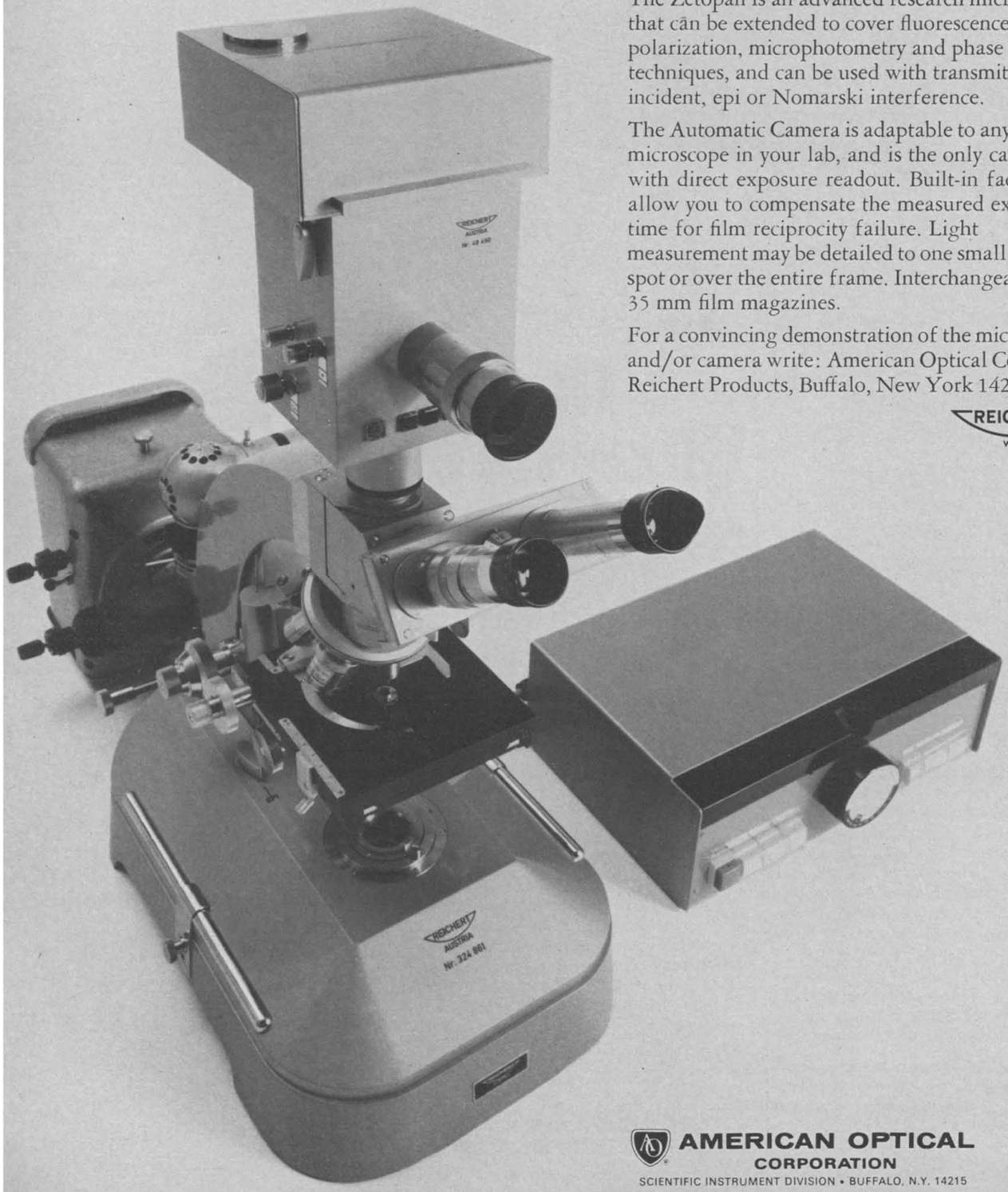

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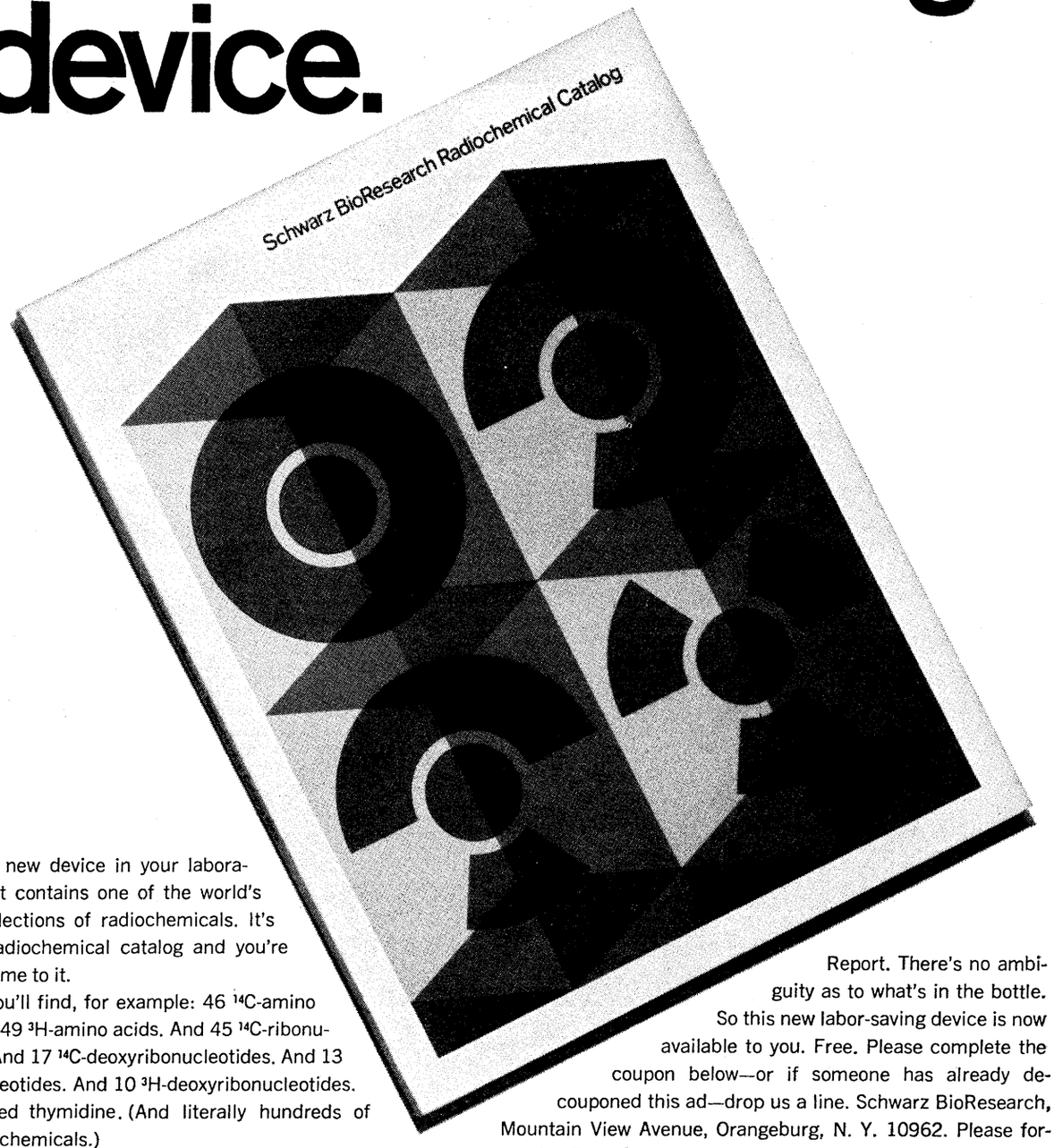
Free labor-saving device.



Install this new device in your laboratory now. It contains one of the world's largest collections of radiochemicals. It's our new radiochemical catalog and you're most welcome to it.

Inside you'll find, for example: 46 ^{14}C-amino acids. And 49 ^{3}H-amino acids. And 45 ^{14}C-ribonucleotides. And 17 ^{14}C-deoxyribonucleotides. And 13 ^{3}H-ribonucleotides. And 10 ^{3}H-deoxyribonucleotides. And tritiated thymidine. (And literally hundreds of other radiochemicals.)

These compounds are characterized by high specific activity, e.g. ^{14}C-amino acids are now at 52 mc/matom; ^{3}H-amino acids up to 25-26 c/mmole; thymidine at 20 c/mmole. Prices are equal to or lower than those of other suppliers. Compounds are *available*—in stock almost always. And as with all Schwarz radiochemicals, they are constantly reassayed while "in stock."

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So this new labor-saving device is now available to you. Free. Please complete the coupon below—or if someone has already decouponed this ad—drop us a line. Schwarz BioResearch, Mountain View Avenue, Orangeburg, N. Y. 10962. Please forward to Dept. S.

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S/P has no traveling salesmen. Our 230-man field representative organization virtually blankets the laboratory equipment and supply industry. So your S/P Representative never has to stray more than 50 miles from home. Of course, your local laboratory supply companies can say the same thing. But there's a lot they can't do. Like stocking 100,000 items. Or ordering out-of-stock items in one minute via super-speed TWX-T service. Or servicing everything they sell. If, like the farmer's daughter, you never heard of us, you'll find our nearest S/P office listed in the Yellow Pages in major cities. S/P . . . the single source for all laboratory equipment, supplies, scientific instruments. Scientific Products, a division of American Hospital Supply Corporation, 1210 Leon Pl., Evanston, Ill. 60201.

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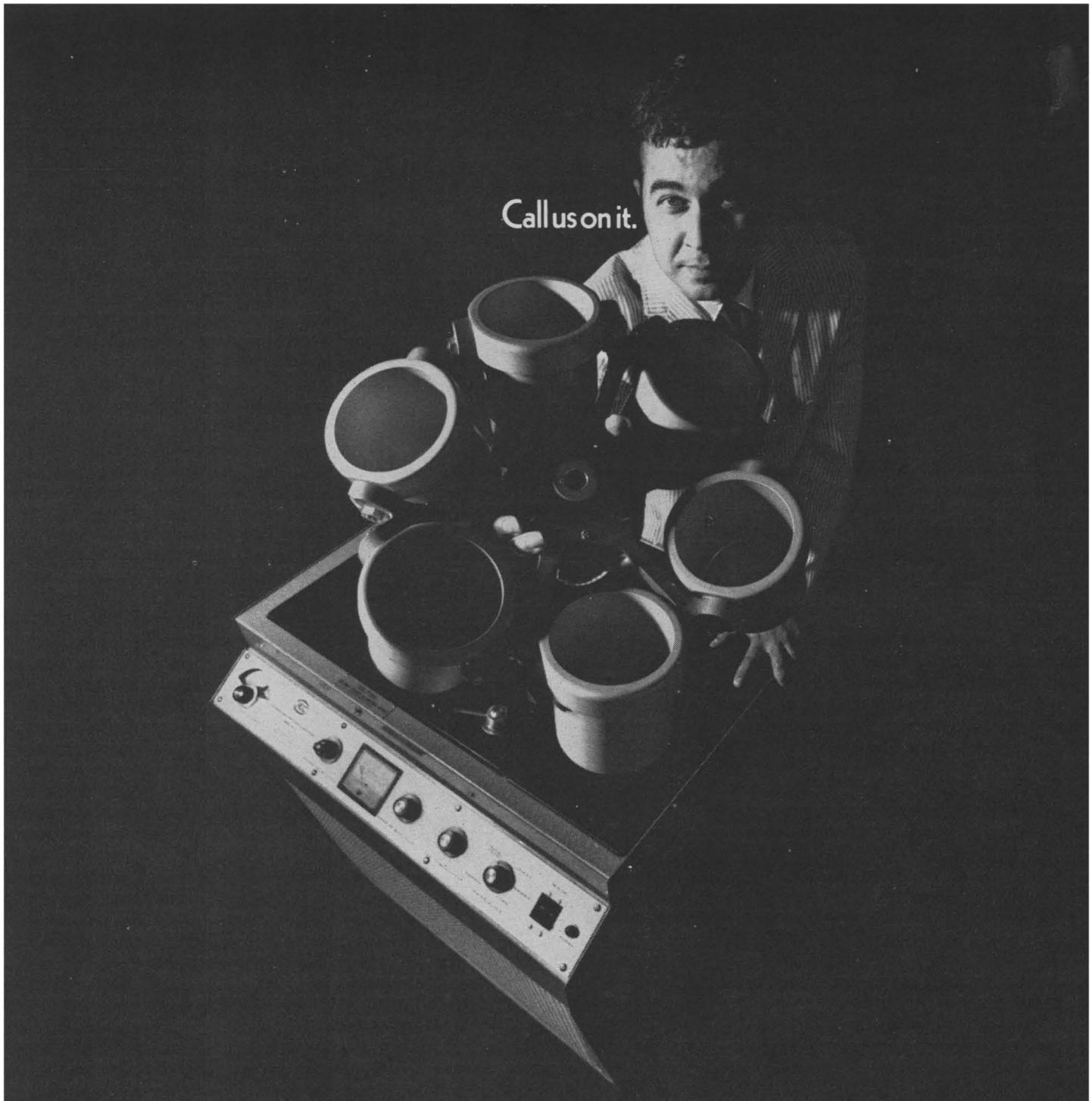

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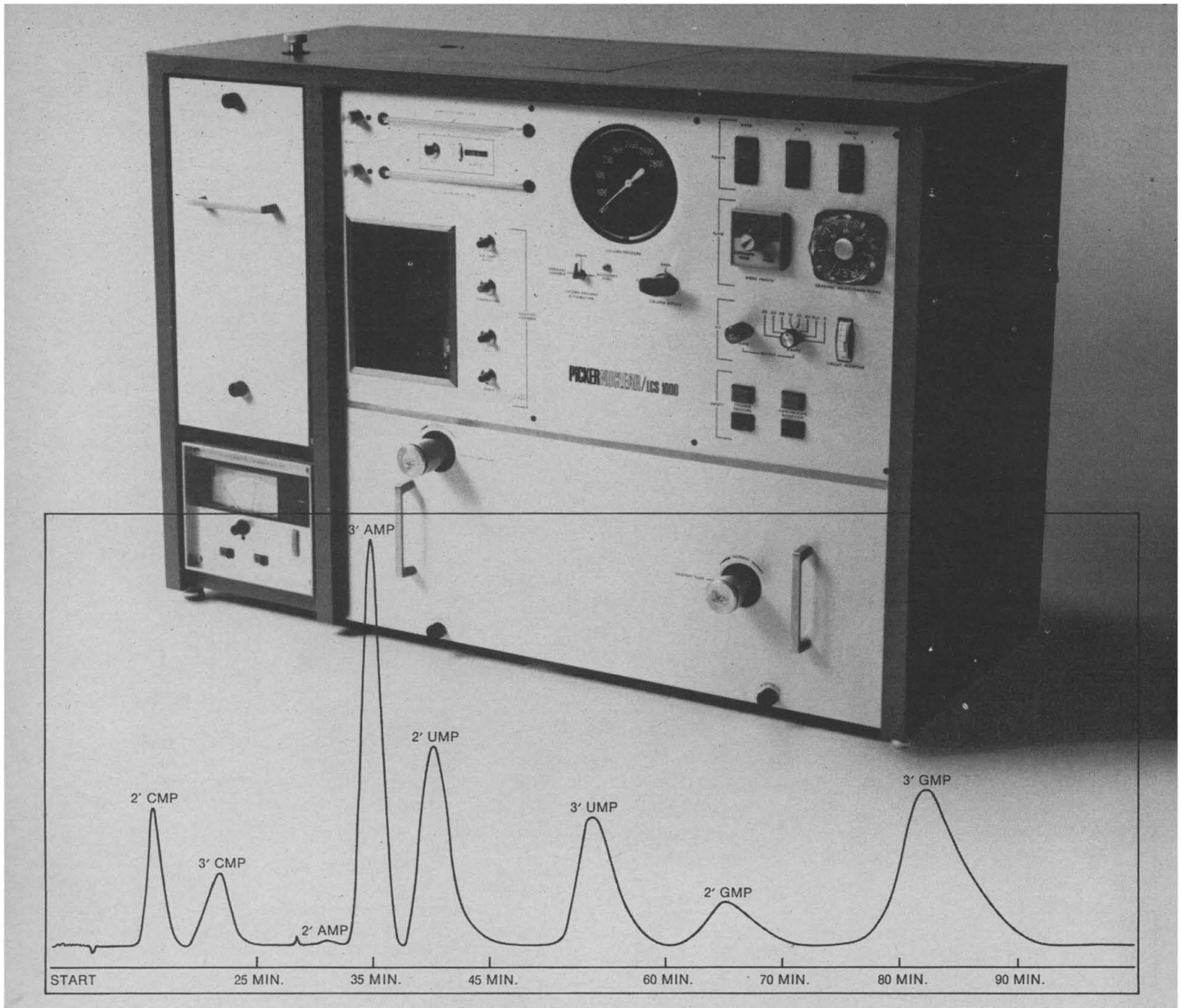

This new Nucleic Acid Analyzer separated this nucleotide mixture in only 80 minutes. (And it's the only one in the world that could have.)

That chromatogram above actually took only 80 minutes with Picker's new Nucleic Acid Analyzer. It represents the separation of 1 microgram quantities of the 2′, 3′ monophosphates of ribonucleosides of cytosine, uracil, adenine, and quanine. Accordingly, if one were anxious to prove a point and the circumstances were truly ideal, you might well squeeze more than 12 separations out of this device in 24 working hours. Four separations in a typical work day: easy.

In any case, happy results have also been achieved with our Nucleic Acid Analyzer and mixtures of the mono-, di-, and triphosphates of the ribonucleosides of adenine, guanine, cytosine, and uracil. Complete analysis time: about 100 minutes. Mixtures of nucleotides and other UV-absorbing substances from natural sources yield chromatograms with an impressive multiplicity of peaks. Quickly.

So how does Picker's Nucleic Acid Analyzer effect nucleotide separations in so much less than the usual 24 to 36 hours? By introducing some interesting innovations into semi-automatic liquid chromatography: small bore columns packed with glass microspheres (which are coated with a skin of anion exchange resins), the columns run at high pressure (1000 psi or more).

The benefits are several. High speed: an hour or more per separation instead of a day or more. High sensitivity: nanomole quantities are sufficient. Excellent resolution: see chromatogram above.

This most interesting development—the only high pressure liquid chromatography system now available—has been unpretentiously dubbed "LCS 1000."

If you now write that number on a postcard (and also tell us who you are, where you are, and what zip code locates you), we'll reveal more. Thank you.

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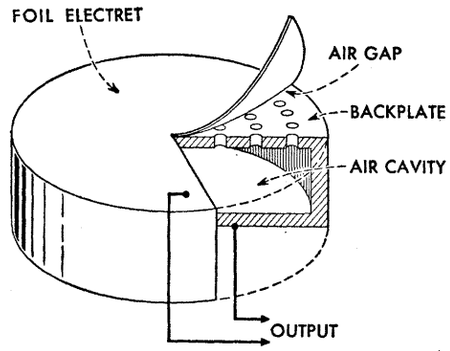
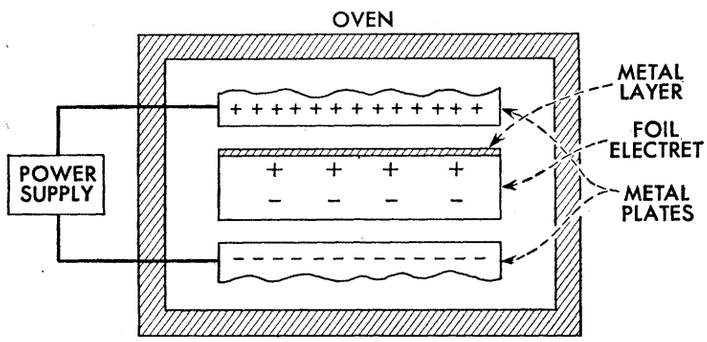
Report from

BELL LABORATORIES

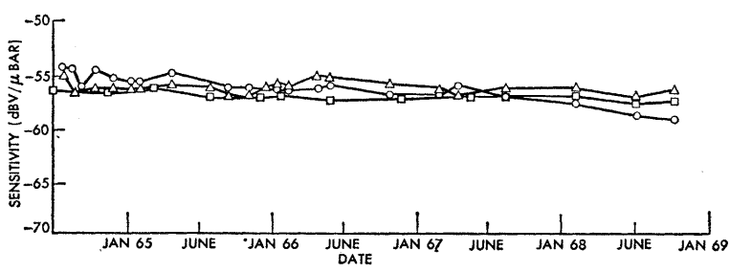
A simple, better microphone



Essentials of the new microphone: The microphone's diaphragm is a charged dielectric foil upon which a thin metal layer has been deposited; it is called a foil electret. The electret touches a metal backplate in several places and, due to surface irregularities, air pockets form between the electret and the backplate. The backplate is perforated so that the air layer can communicate with the larger cavity, increasing the vibration amplitude (and thus the sensitivity) of the system.



Simplified cross-sectional diagram showing how microphone "electrets"—permanently charged dielectric foils—are made. The metallized foil is heated to about 200°C while between a pair of charged metal plates which create an electrostatic field of between 10 and 100 kV/cm. Charges, identical in sign to the adjacent plates, migrate from the plates to the electret, where they remain after cooling. This method of foil electret preparation was announced by Bell Laboratories in 1962.



Sensitivity of electret microphones using fluorocarbon foils is nearly constant. Extrapolated lifetime is about 100 years.

A new kind of condenser microphone with several valuable features has been invented by Gerhard M. Sessler and James E. West of Bell Laboratories. It has the excellent sound fidelity of former types of condenser microphones, but does not need a d-c supply, and has much lower electrical impedance; this permits good low-frequency response without the need for special circuits.

Like previous designs, the new microphone depends on a varying capacitance—produced as sound vibrations impinge on one flexible plate of a capacitor. But there's a difference: here, the flexible plate is a "foil electret"—a thinly metallized sheet of fluorocarbon or polycarbonate. The electret contains a permanent static charge. As the electret moves, it varies the electrostatic field across the air gap (drawing). This produces a varying voltage at the output. Thus, the microphone needs no d-c supply.

In any capacitor, the thinner the dielectric, the higher the capacitance. Dielectric films can be made 0.00012 to 0.001 inch thick. So, the capacitance of the electret microphone is about triple that of conventional types of condenser microphones, and the impedance is comparably lower. This simplifies accompanying circuitry.

The microphone is inexpensive, exceptionally rugged, and immune to wide temperature fluctuations.

As the graph (left) shows, the microphone's sensitivity remains essentially constant for very long periods. This is due to an inherent compensation only possible with thin-film electrets: as the charge on the electret decays—and measurements indicate that it will take about 100 years to fall 50 percent—electrostatic attraction between electret and backplate is reduced. This diminishes the restoring force on the electret, allowing it to vibrate at greater amplitude. Electrical output remains, therefore, nearly constant.

As with all promising devices the electret microphone is being evaluated by our development and systems engineers. Because of its simple construction and low cost it may well find application in future telephones.

Bell Telephone Laboratories
Research and Development Unit of the Bell System

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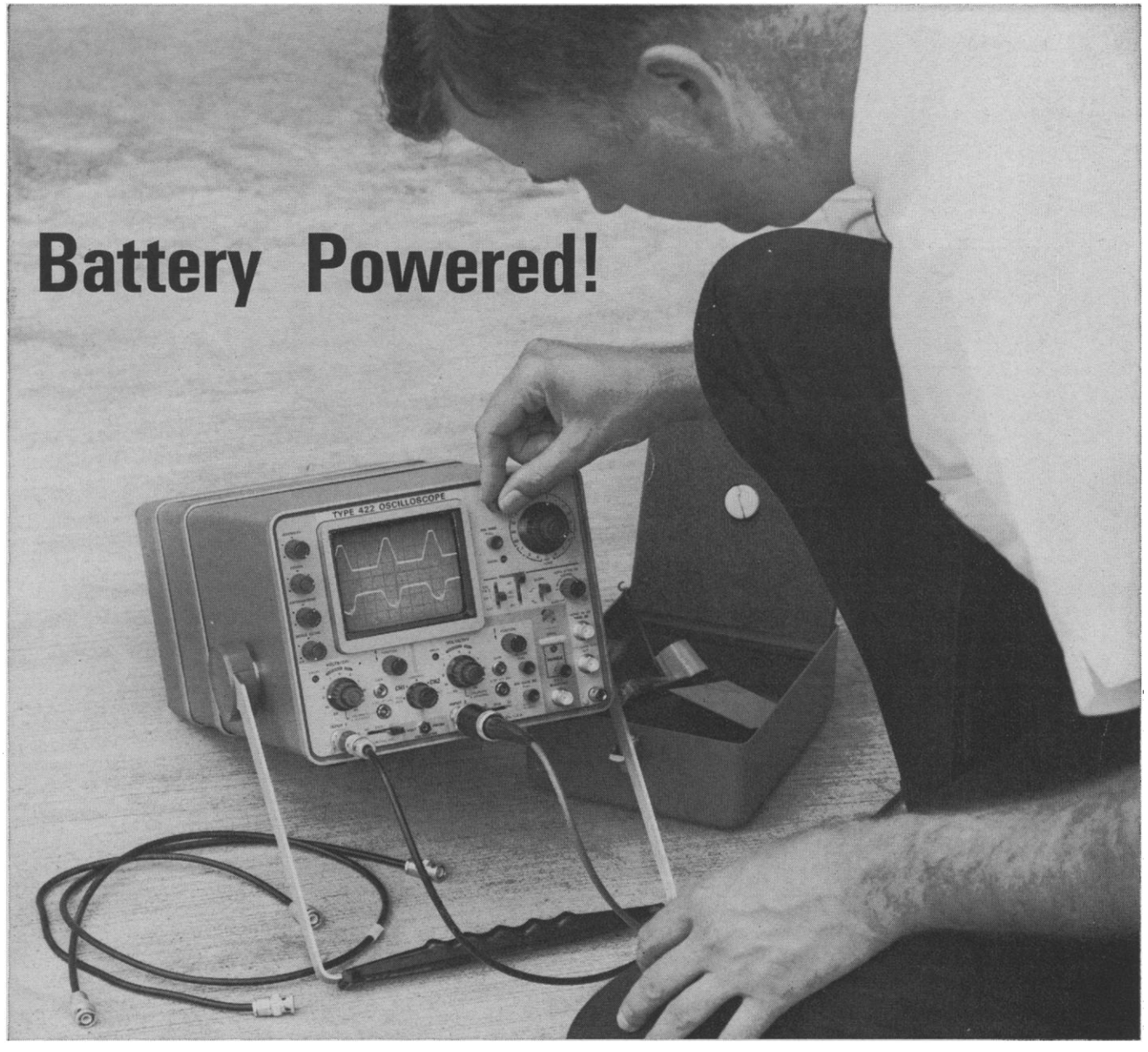

15-MHz, Dual-Trace Portable Oscilloscope

Your waveform measurements no longer need be compromised by adverse field conditions or the absence of a convenient power connection. The Tektronix Type 422 Portable Oscilloscope brings the precision of the laboratory "on site" to meet your measurement requirements.

This compact, rugged oscilloscope combines small size and light weight with 15-MHz, dual-trace performance! Two models are available. One is powered from AC; the other from AC, DC, or internal rechargeable batteries. The AC version weighs less than 22 pounds including accessories and operates from 115 or 230 VAC ±10%, 45 to 440 Hz, 40 watts. The AC/DC version (MOD 125B) with built-in battery recharger weighs 30 pounds including accessories and batteries and operates from an internal 24-volt rechargeable battery pack; from 115 or 230 VAC ±20%, 45 to 440 Hz, 27 watts; or from 11.5 to 35 VDC, 23 watts.

For a demonstration of the Type 422 in your application call your Tektronix Field Engineer or write, Tektronix, Inc., P.O. Box 500, Beaverton, Oregon 97005.

Type 422 Oscilloscope, AC powered	$1450
Type 422 MOD 125B Oscilloscope, AC/DC powered (without battery pack)	$1800
Battery Pack for Type 422 MOD 125B (order 016-0066-02)	$ 125

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(or why Jeolco's 100B doesn't have any competition.)

2Å. Most manufacturers of electron microscopes would have been satisfied.

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A specimen carousel that accepts six grids at one time.

An electronic specimen position indicator.

Lighted nixie tubes that display magnification from 125X to 500,000X.

A push-button gun lift that lets you change the filament in seconds, every 150-200 hours.

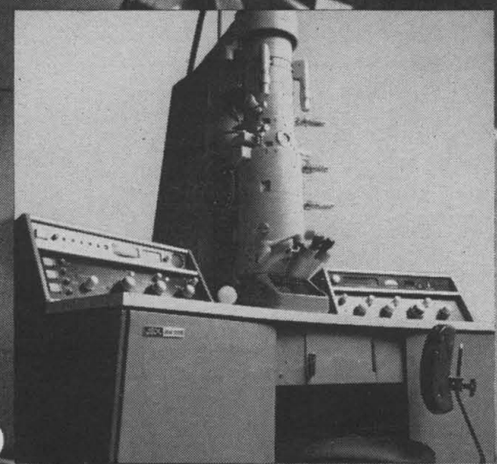
Printed identification numbers on your film or plates.

And a hydraulic chair. (Sorry. Only one to a customer.)

Cameras, air locks, vacuum systems – we automated the works.

But don't just take us at our word. Come in to our applications lab. And give our 100B a good, healthy workout.

Then go talk to the people you thought were our competition.



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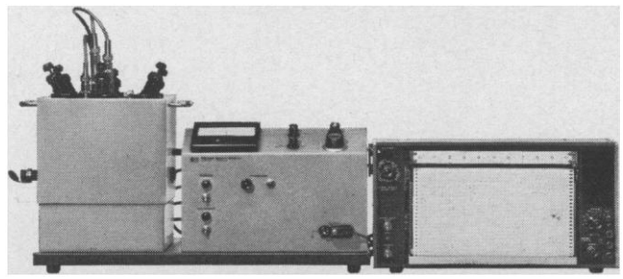


Now you can record VPO measurements automatically

...and do away with stopwatches, bridge-balancing and note-taking

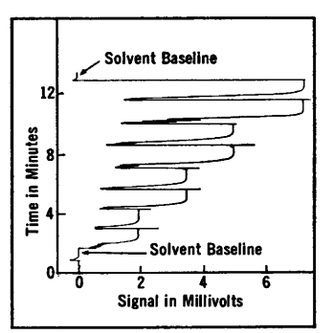
The unique recorder capability of our Model 302B Vapor Pressure Osmometer allows you to get a continuous and permanent record of your $\overline{M}_n$ determinations . . . automatically.

No longer do you have to stand over the VPO with stopwatch in hand while balancing the bridge and noting the instrument reading: the recorder does it all for you. The chart record of a four-dilution concentration series reproduced below illustrates the advantages. First, you can recognize the equilibrium point clearly from the shape of the recorder trace . . . hence there's no need for a stopwatch. Second, you can read the output signal at equilibrium directly from the chart . . . a much easier procedure than the manual bridge balancing method. Third, the chart gives you a permanent and accurate record of the sample measurement . . . thus eliminating the note-taking chore.

Perhaps the most significant advantage of the 302B recorder capability is the way that it makes the entire measurement process visible, discloses washing errors and generally acquaints you with the instrument characteristics, leading to more effective utilization.

For a full description of the second-generation 302B VPO, write for Data Sheet 3021 or call your local HP sales office. Prices start at $2990.

Hewlett-Packard, Route 41, Avondale, Pennsylvania 19311. In Europe: 1217 Meyrin-Geneva, Switzerland.



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ANALYTICAL INSTRUMENTS

43909

A microscope in the field is worth two in the lab

...for some applications

There are many situations—away from the lab—where the opportunity for on-the-spot use of a microscope can be most valuable, even essential.

The veterinarian determining the sperm virility of a prize bull would certainly find this more practical than taking either the animal or the specimen to his laboratory. The public health man working on pest control or water pollution, can pack a prodigious amount of work into his field trips by simply screening and classifying samples on-the-spot; pre-selecting those warranting final study in the lab.

The Nikon H hand or field microscope was designed for just such applications. Notwithstanding its diminutive size (it's no larger than a 35mm camera) the Nikon H is a sophisticated, precision instrument. It is equipped with a 10X screw-in, wide-field eyepiece and a rotating nosepiece which accepts any three of the following parfocal, achromatic objectives: 4X, 10X, 40X and oil immersion 100X. The Nikon H also has a built-in Abbe double-lens condenser with iris diaphragm.

Illumination is provided by either daylight, or a built-in incandescent lamp powered by two self-contained penlight batteries. All controls for fine focusing, nosepiece rotation and slide manipulation are conveniently located, yet recessed to prevent accidental disturbance.

Among the most obvious applications for the Nikon H microscope is its use as an educational tool. There are others, equally self-evident. For the benefits to be derived from the capabilities of this unique little instrument are manifold. The Nikon H is supplied complete with oil applicator, carrying case and shoulder strap.

For details and specifications, write: Nikon Inc. Instrument Division, Subsidiary of Ehrenreich Photo-Optical Industries, Inc., Garden City, N.Y. 11533.

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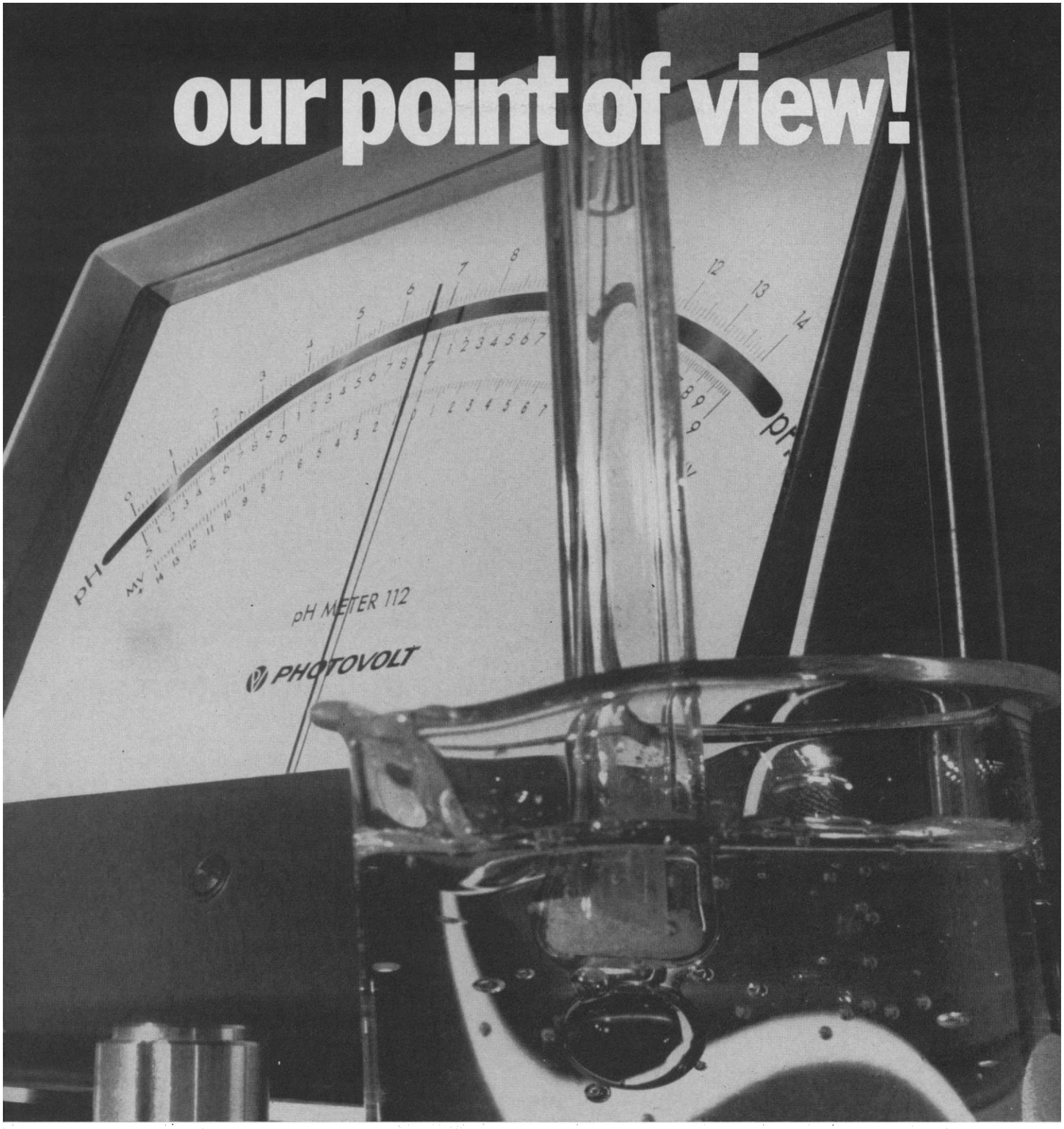
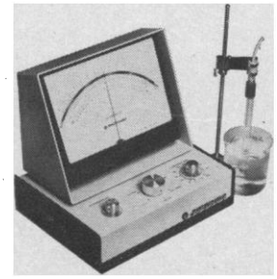


No need to be without an expanded scale pH meter—it's only $40 more.

Photovolt's *Expander IV,* pH meter 112, is $395.00—only $40 more than most laboratory models.

Any range of four pH units can be expanded over the entire scale. This solid state unit is readable and reproducible to within 0.005 pH and accurate to within 0.01 pH. An expanded millivolt range, ± 140 mv, readable to 0.5 mv extends *Expander IV's* ability to all ion selective electrodes.



Expander IV is supplied with a single, fast, high-sensitivity electrode, but it also accepts all others, including ion selective and redox electrodes.

An output is available for Karl Fischer titrations, as well as a 10 mv recorder output.

Our point of view is that there is no longer any reason to be without an expanded scale pH meter. What's your point of view?

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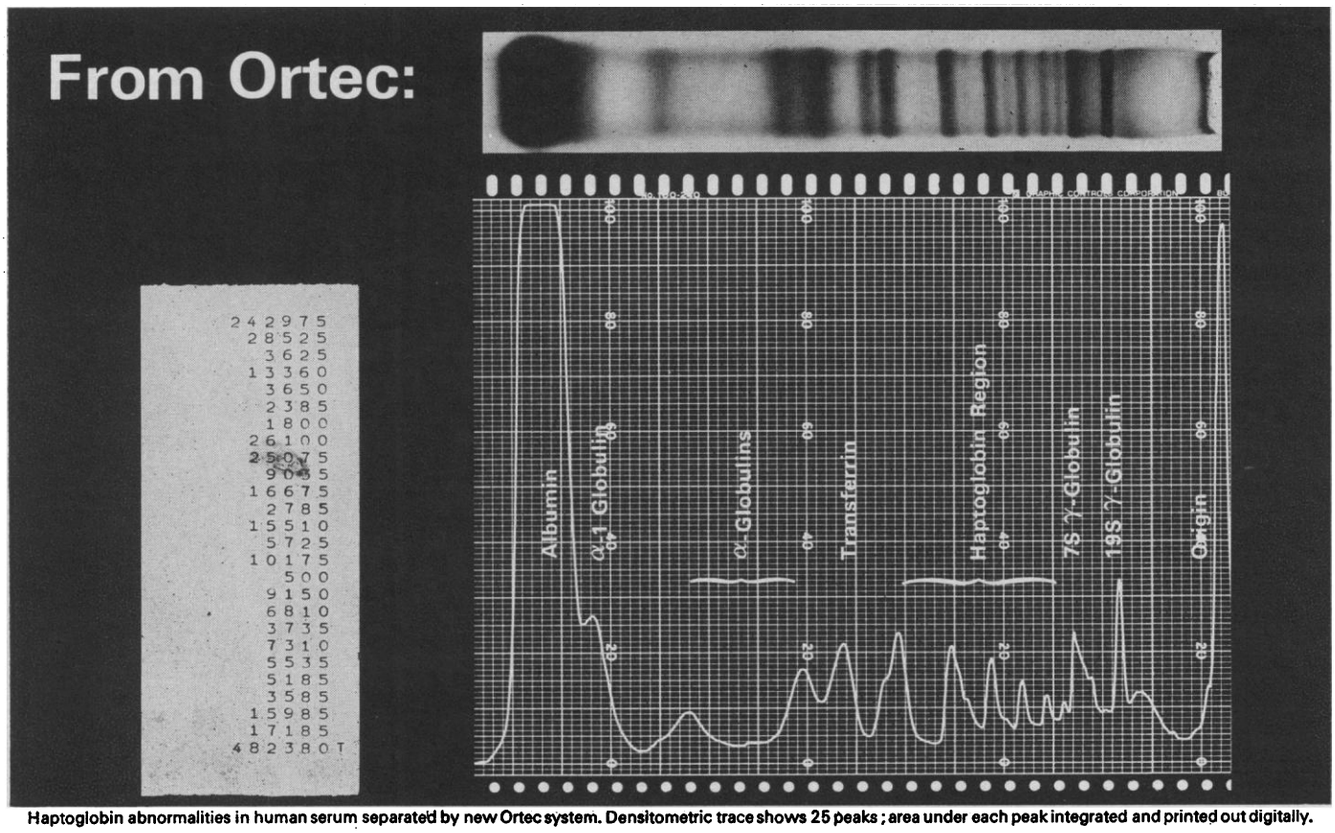

Haptoglobin abnormalities in human serum separated by new Ortec system. Densitometric trace shows 25 peaks; area under each peak integrated and printed out digitally.

News of a major development in electrophoresis

- **marked improvement in acrylamide-gel resolution**
- **pulsed regulated power, reducing joule heating and permitting higher voltage gradients for faster separations**
- **the first digital densitometric readout**
- **protein and isoenzyme separated simultaneously in the same gel slab**

To the already familiar advantages of polyacrylamide-gel electrophoresis, Ortec brings advances in equipment and electrochemistry that result in significantly sharpened resolution.

Pulsed constant power. The complete new Ortec system, shown for the first time at the 1969 FASEB Conference, owes a great deal of its effectiveness to a new principle of power supply. Rather than rely only on regulated current or voltage, Ortec went to the heart of joule heating, which has been a major drawback to improved electrophoretic resolution: Low-duty-cycle *pulsed constant power**, provided by the new Model 4100 Power Supply, permits very high voltage gradients free of the damaging heating effects that until now have prevented rapid enzyme separations.

Conductivity shift plus moving ion boundary. With the new high-resolution Ortec system, a wide differential in ionic strength (conductivity shift) between buffered sample and gel allows the rapid formation of very thin starting zones. Pulsed constant power is then increased, and a boundary or envelope of fast- and slow-moving ions moves down, further sharpening the zones sequentially. Separations of proteins and isoenzymes are completed in one-half to three-quarters the time required in previous techniques. As many as thirty clearly defined component bands now appear where only about twenty could be resolved before.

Continuous pH. The new Ortec method utilizes the same pH in both the gel and the electrode-buffer tanks. No pre-electrophoresis of the gel is necessary, nor is a spacer gel required.

Tank and Cell Assembly (Model 4200). Hard glass or quartz cells permit use of vertical flat-slab gels on which up to twelve samples per gel may be separated side-by-side. The tank accommodates two cells completely immersed in pre-cooled buffer; thus, even labile enzymes can be separated in 40 to 50 minutes without external cooling. Single samples (up to 25 mg of protein per cell) may be placed across the entire cell width for preparative separations.

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*Patent pending

†Allen, R. C., Moore, D. J., and Dilworth, R. H., "A New Rapid Electrophoresis Procedure Employing Pulsed Power in Gradient Gels at a Continuous pH: The Effect of Various Discontinuous Buffer Systems on Esterase Zymograms," *Abstract, 20th Histochem. and Cytochem. Meetg.*, Atlantic City, N.J., April 1969.

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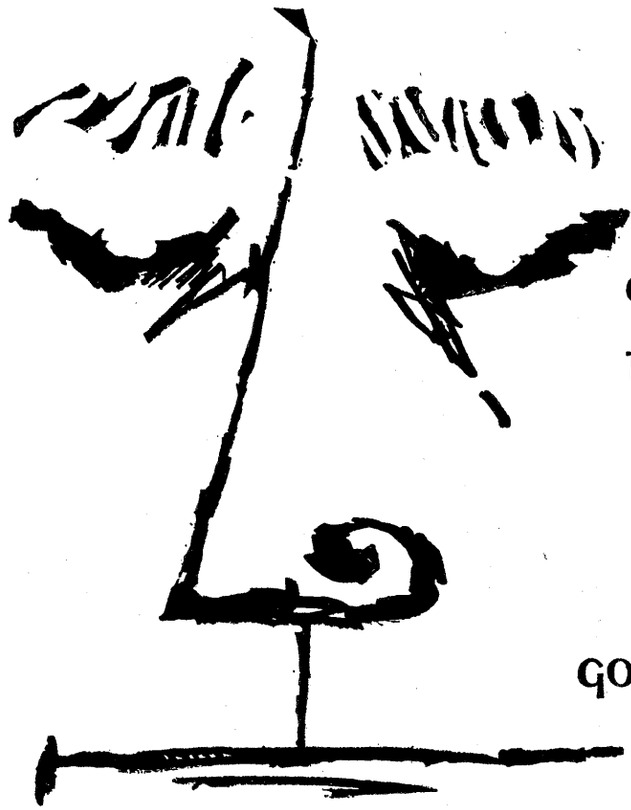

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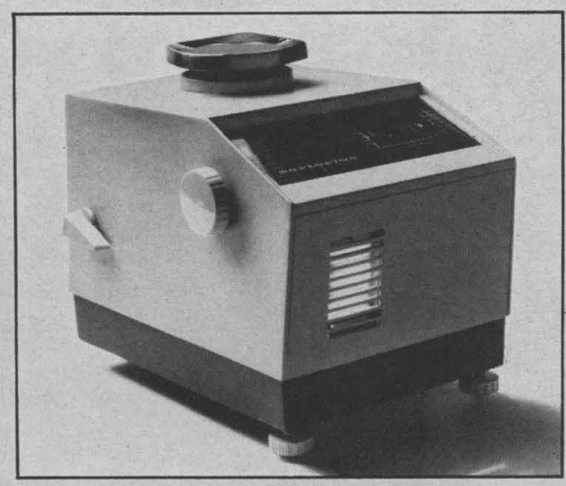

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by the university's board of trustees and administration so that the majority of students and the community will not be bypassed in order to pursue unrealistic academic goals. Such a policy should carry with it the idea that the growth and ultimate prestige of the university depend on how well it serves the community, not on how well it compares with M.I.T.

The emphasis should be placed on that research and innovation which will benefit the underdeveloped area. After all, the most prestigious universities of our time were founded originally to serve the educational and cultural needs of their Colonial and pioneer communities. If institutions which serve primarily underdeveloped constituencies would set their goals realistically, their graduates could return to teach in them with a true sense of purpose and attune themselves to those policies, regardless of where they obtained their advanced training.

RUPERT G. SEALS

Department of Dairy and Food Industry, Iowa State University, Ames 50010

Appreciation

We have been informed that 4 March 1969 was designated as a holiday by a number of M.I.T. scientists and other researchers around the country. We also note that 4 March happens to be the birthday of the City of Chicago (incorporated 1837). We sincerely thank our colleagues for their thoughtfulness in helping us celebrate this memorable event.

A. BEZKOROVAINY*

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T. HOEVEKE*

1925 West Newport, Chicago, Illinois 60657

* Ad Hoc Committee of Two for the Preservation of Chicago as a Scientific Convention City.

Common Leeches

It would be greatly appreciated if any reader of *Science* would send me information concerning suppliers of the common leech. The supplier, Carolina Biologicals, from whom I usually obtain leeches has informed me that they will not be able to supply any until early or mid-April. A slip from the

dorsal muscle of this animal is used in my laboratory for the biological assay of acetylcholine. Other systems have been tried, but none have been found to be sensitive enough for my work. A supplier of this animal is needed so that the main line of research in my laboratory can continue.

LOUIS A. BARKER
Department of Neurochemistry, New York State Institute for Basic Research in Mental Retardation, 1050 Forest Hill Road, Staten Island 10314

Guide for Biology Referees

The Council of Biology Editors' Committee on editorial policy has asked Franz Ingelfinger and me to draft a guide for referees or reviewers of journal articles.

Our first step is to collect prepared statements now used by journal editors for instructing reviewers. Readers can help by sending copies of such statements to me. We also welcome comments on the reviewing process from editors, referees, or authors.

KARL F. HEUMANN
Federation of American Societies for Experimental Biology, 9650 Rockville Pike, Bethesda, Maryland 20014

Dynastic Dutch

In reference 5 of his article (5 Apr. 1968, p. 28), J. Z. Levinson describes the confusion in the *Journal of the Optical Society of America* where a Dutch name, H. de Lange, Dzn., is indexed under "Dzn." "In Holland, one writes the abbreviation in three letters 'zn' for 'zohn,' preceded by the father's initial," says Levinson.

In Dutch registers, indexes, and telephone directories names such as de Lange, van Allen, and van der Mast are indexed under L, A, and M, respectively, never under D or V. Although Jr. and Sr. are common abbreviations in Dutch, Dzn. (contraction of D-zoon, not zohn) is not. It gives no indication of one's relation to another in terms of age, as Jr. and Sr. do. An abbreviation like Dzn. only identifies someone without indicating the exact family relation.

G. J. VAN KOLMESCHATE
Tak van Poortvlietstraat 17, Delft, Holland

21 March 1969, Volume 163, Number 3873 **SCIENCE**

Overconfidence in American Technology

Great achievements often carry with them the seeds of future failures. Repeated success breeds overconfidence and unwillingness to persist in the hard measures that led to excellence. Prolonged enjoyment of excellence brings indifference and even contempt for it. Examples of these tendencies of human nature can be seen in current attitudes toward science and technology.

When people witness accomplishments such as those of Apollo 8 and Apollo 9, they are impressed with the power of American technology. They are inclined to say, "If we can do that, we can do anything." They are also inclined to believe that we can do everything—that, given the goal and the money, technology can be bent to the accomplishment of any and all tasks. This is not true. Technology cannot rescue society from unlimited folly—a long-continued population explosion, for example.

Overconfidence in our technology leads to other faulty judgments. As Lee Dubridge has recently pointed out, we have become so accustomed to the almost magical capabilities of technology that we expect instantaneous solutions to all problems, no matter how complicated. This demand is unreasonable, even when the problems are purely technical. When complex social, political, and ethical considerations are additional important factors, rosy expectations are just plain foolish.

Confident in the power of American science and technology, the public is indifferent to them and turns its attention elsewhere. In response to the clamors of the moment, many of the brightest young students drift away from the physical sciences, seeking a future role in solving social problems. In some instances their youthful enthusiasm may produce worthwhile change, but many will discover that the problems of society are not easily solved and that the hard-won progress of today often disintegrates tomorrow.

After a period of enjoyed prosperity, affluence seems to be a guaranteed feature of life. Why struggle for it? Critics see that affluence has a seamy side—pollution and the like. And so they criticize, and rightly so. However, being human, some do not stop with constructive criticism. They go far beyond that, asserting that technology is the source of most of our present social problems. Perhaps it is, but who wants the standard of living and the pestilence of the Middle Ages?

We must learn to live more wisely with technology, but we cannot abandon it. We cannot even assume that present technology will guarantee future prosperity. During the past few decades the cream has been skimmed off many natural resources. During the next decades raw materials will become more costly, and scarcities of many items will be an unpleasant fact of life.

At the beginning of this century this country was the world's leading miner of gold; today we produce a small fraction of the total. At that time we had vast supplies of copper ore, with a copper content of about 2 percent; the average copper content of the ore that is being mined today is about a third that much. Once we were a great exporter of iron, lead, silver, and petroleum. Today we are a net importer of these items.

To maintain solvency, we must find new sources of raw materials or develop substitutes, or improve our competitive position in world trade so that imports of raw materials can be paid for. All these possibilities involve—among other things—the requirement that our science and technology be excellent. Prerequisite to the maintenance of such competence are more realistic attitudes toward science and technology on the part of all of us, including the public and their political representatives.

—PHILIP H. ABELSON

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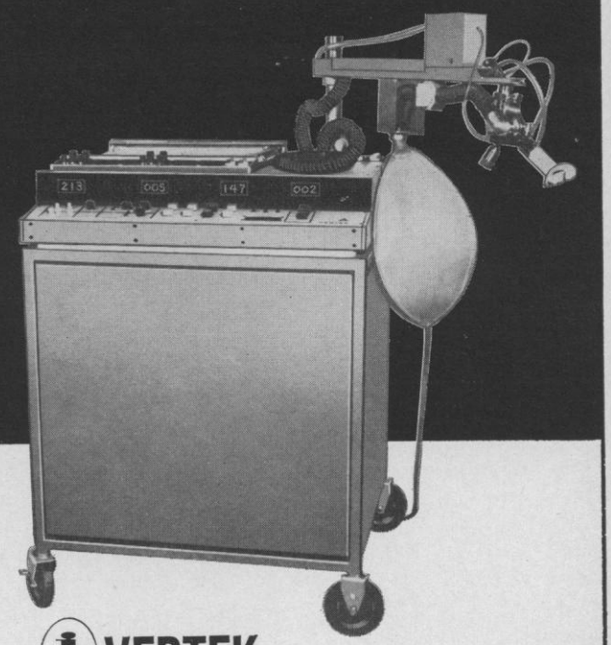

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fully the evidence for the induction of tolerance in vitro.

A long-standing problem, the mechanism of immunological paralysis following administration of large amounts of pneumococcal polysaccharides to mice, now appears solved. Mice given "paralyzing" amounts of pneumococcal polysaccharide lack specific antibodies in their serums, but Howard found that their spleens contain numerous cells that are able to form antibodies. It appears that this slowly catabolized antigen persists in tissues, neutralizing antibody as it is produced. Thus, this form of paralysis represents an immunological treadmill.

The last session of the conference was largely devoted to an attempt by Melvin Cohn to provide a molecular model of tolerance based entirely on the evidence he had heard in the preceding 3 days. He began with four assumptions: (i) the only recognition element is antibody itself; (ii) there is constant birth of antigen-sensitive cells throughout life; (iii) antigen-sensitive cells express but one antibody-response and will produce it as secretable antibody on induction; (iv) depending on the signal received, an antigen-sensitive cell may go on to either paralysis or to antibody formation. Assuming that a signal could be a conformational change in an antibody, he sketched a model in which paralysis represented a "half-open" position of an antibody molecule on a cell surface achieved by combination with a single antigenic determinant. For antibody formation the model required a "wide-open" antibody, resulting from a combination of two separate antigenic determinants held on the cell surface in an extended configuration by a factor he designated "carrier antibody."

The discussions were transcribed, are now being edited, and the proceedings will be published by March 1969.

ROBERT S. SCHWARTZ
SIDNEY LESKOWITZ
Tufts University School of Medicine
and *Harvard Medical School,*
Boston, Massachusetts

Calendar of Events

National Meetings

April

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

1. New Mexico Acad. of **Science**, Socorro. (L. A. File, New Mexico Tech., Campus Station, Socorro 87801)

1–2. **Advanced Techniques in Real-Time Simulation**, Philadelphia, Pa. (University City Science Center, Science Center Bldg. No. 1, 3401 Market St., Philadelphia 19104)

1–3. **Numerical Control** Soc., 6th, Cincinnati, Ohio. (P. Senkiw, Advanced Computer Systems, Inc., 2185 S. Dixie Ave., Dayton, Ohio 45409)

1–4. American Assoc. of **Anatomists**, Boston, Mass. (R. T. Woodburne, Dept. of Anatomy, Univ. of Michigan, East Medical Bldg., Ann Arbor 48104)

2. **Oral Cancer** Symp., 7th, Poughkeepsie, N.Y. (Sister M. A. Elizabeth, Poughkeepsie, N.Y.)

2–4. **Picture Bandwidth Compression**, Cambridge, Mass. (E. E. Witchi, Boston Section, Inst. of Electrical and Electronics Engineers, 31 Channing St., Newton, Mass. 02158)

3–4. American Soc. for **Engineering Education**, Fayetteville, Ark. (E. H. Wright, The Society, 2100 Pennsylvania Ave., NW, Washington, D.C. 20037)

3–5. Southern Soc. for **Philosophy and Psychology**, Miami, Fla. (D. Browning, Dept. of Philosophy, Univ. of Miami, Coral Gables, Fla.)

3–5. National Conf. on **Schizophrenia**, Topeka, Kan. (Dept. of Education, Menninger Foundation, Box 829, Topeka 66601)

7–9. **Operations Research** Seminar, Cleveland, Ohio. (Office of Public Relations, Case Western Reserve Univ., University Circle, Cleveland 44106)

7–11. **Offshore Exploration and Mining Engineering**, Los Angeles, Calif. (P.O. Box 24902, Engineering and Physical Sciences Extension, University Extension, Univ. of California, Los Angeles 90024)

7–11. **Public Health Aspects of Peaceful Uses of Nuclear Explosives**, Las Vegas, Nev. (Symp. Committee, Southwestern Radiological Health Lab., P.O. Box 15027, Las Vegas 89114)

8–9. **High Performance Composites**, 4th symp., St. Louis, Mo. (G. L. Esterson, Box 1048, Washington Univ., St. Louis 63130)

8–11. **Acoustical** Soc. of America, 71st, Philadelphia, Pa. (B. Goodfriend, 335 E. 45 St., New York 10017)

9–10. American Assoc. of **Planned Parenthood Physicians**, 7th, San Francisco, Calif. (G. C. Denniston, The Association, 515 Madison Ave., New York 10022)

9–11. Midwest **Benthological** Soc., 17th, Gilbertsville, Ky. (C. I. Weber, Secretary, Federal Water Pollution Control Administration, 1014 Broadway, Cincinnati, Ohio 45202)

9–11. **Textile Research** Inst., 39th, New York, N.Y. (P.O. Box 625, Princeton, N.J.)

9–12. **Geological** Soc. of America, southeastern section, Columbia, S.C. (D. J. Colquhoun, Dept. of Geology, Univ. of South Carolina, Columbia 29208)

10. Health Conf. on **Diet, Exercise, and Cardiovascular Disease**, Philadelphia, Pa. (R. L. Kunes, Heart Assoc. of Southeastern Pennsylvania, 318 S. 19 St., Philadelphia)

10–12. **Population** Assoc. of America, Atlantic City, N.J. (A. L. Ferriss, Russell Sage Foundation, 1755 Massachusetts Ave., NW, Washington, D.C. 20006)

10–16. American **Leprosy Missions**, 10th PHS seminar, Carville, La. (American Leprosy Missions, 297 Park Ave. South, New York 10010)

11–12. American Soc. for **Engineering Education** (North Central Section mtg.), Windsor, Ont., Canada. (E. H. Wright, The Society, 2100 Pennsylvania Ave., NW, Washington, D.C. 20037)

12. New Jersey Acad. of **Science**, East Orange. (F. F. Katz, Seton Hall Univ., South Orange, N.J. 07079)

12–16. American Soc. of **Abdominal Surgeons**, Las Vegas, Nev. (B. F. Alfano, 675 Main St., Melrose, Mass. 02176)

12–13. National Guild of **Catholic Psychiatrists**, Washington, D.C. (P. A. Santucci, 4962 Hampden Lane, Bethesda, Md. 20014)

12–13. **Histochemical** Soc., 20th, Atlantic City, N.J. (G. M. Lehrer, Div. of Neurochemistry, Mount Sinai Medical School, 11 E. 100 St., New York 10029)

13–16. **Plant Engineering and Maintenance**, 12th conf., Pittsburgh, Pa. (B. J. Cross, Lederle Labs., Pearl River, N.Y. 10965)

13–17. American Assoc. of **Cereal Chemists**, 54th, Chicago, Ill. (R. Tarleton, 1955 University Ave., St. Paul, Minn. 55104)

13–17. Pacific Coast **Oto-Ophthalmological** Soc., San Francisco, Calif. (F. A. Sooy, Dept. of Otolaryngology, Univ. of California Medical Center, San Francisco 94122)

13–18. American Socs. for **Experimental Biology**, Atlantic City, N.J. (J. F. A. McManus, FASEB, 9650 Rockville Pike, Bethesda, Md. 20014)

13–18. American Soc. for **Experimental Pathology**, Atlantic City, N.J. (R. E. Knotti, 9650 Rockville Pike, Bethesda, Md. 20014)

13–18. **Health Services Research** Seminar, Baltimore, Md. (J. W. Williamson, Dept. of Medical Care and Hospitals, Johns Hopkins Univ., Seminar Office, 550 N. Broadway, Baltimore 21205)

13–18. American Inst. of **Nutrition**, Atlantic City, N.J. (J. Waddell, 9650 Rockville Pike, Bethesda, Md. 20014)

13–18. American Soc. for **Pharmacology and Experimental Therapeutics**, Inc., Atlantic City, N.J. (E. B. Cook, Executive Officer, The Society, 9650 Rockville Pike, Bethesda, Md. 20014)

14–16. Soc. for **Economic Botany**, Kennett Square, Pa. (A. der Marderosian, Philadelphia College of Pharmacy and Science, 43rd and Kingsessing Ave., Philadelphia 19104)

14–16. American Inst. of **Mining, Metallurgical and Petroleum Engineers**, Inc., 52nd, Toronto, Ont., Canada. (The Society, 345 E. 47 St., New York 10017)

14–16. **Structures, Structural Dynamics, and Materials** Conf., 10th, New Orleans, La. (A. H. Hausrath, Bldg. 520, Room 144, TRW Systems, P.O. Box 1310, Norton AFB, Calif. 92402)

14–17. American **Cleft Palate** Assoc., Houston, Tex. (K. R. Bzoch, Dept. of Communicative Disorders, Univ. of Florida, Gainesville 32601)

14–17. American Assoc. of **Petroleum Geologists**, 54th, Dallas, Tex. (The Association, Box 979, Tulsa, Okla.)

14–18. American Soc. of **Biological**

Chemists, Inc., Atlantic City, N.J. (Executive Officer, The Society, 9650 Rockville Pike, Bethesda, Md. 20014)

14–18. American Assoc. of **Immunologists**, Atlantic City, N.J. (Secretary-Treasurer, The Association, 9650 Rockville Pike, Bethesda, Md. 20014)

14–18. American **Physiological** Soc., Atlantic City, N.J. (R. G. Daggs, The Society, 9650 Rockville Pike, Bethesda, Md. 20014)

14–18. Federation of American Socs. for **Experimental Biology**, 53rd, Atlantic City, N.J. (Convention Manager, 9650 Rockville Pike, Bethesda, Md. 20014)

15. **Labeling of Blood Typing Sera**, New York, N.Y. (A. S. Wiener, Office of the Chief Medical Examiner of New York City, 520 First Ave., New York 10016)

16–17. American Inst. of **Aeronautics and Astronautics** (structural dynamics and aeroelasticity conf.), New Orleans, La. (H. Runyan, Dynamics Loads Div., NASA Langley Research Center, Langley Field, Va. 23365)

16–18. American Soc. of **Neuroradiology**, Cleveland, Ohio. (A. E. Zimmer, Danbury Hospital, Danbury, Conn. 06810)

16–18. Institute of **Electrical and Electronics Engineers** (geoscience electronics symp.), Washington, D.C. (M. E. Ringenbach, Equipment Development Lab., Room 201, Gramax Bldg., 8060 13 St., Silver Spring, Md. 20901)

16–18. American Soc. for **Engineering Education**, Southeastern Section mtg., Coral Gables, Fla. (E. H. Wright, The Society, 2100 Pennsylvania Ave., NW, Washington, D.C. 20037)

16–26. **Solid State Chemistry** Advanced Study Inst., Scottsdale, Ariz. (L. Eyring and M. O'Keeffe, Dept. of Chemistry, Arizona State Univ., Tempe 85281)

17–18. **Fiber** Soc., Raleigh, N.C. (L. Rebenfeld, Box 625, Princeton, N.J.)

17–18. American Assoc. of **Railway Surgeons**, Chicago, Ill. (C. Y. Werelius, 5800 Stony Island Ave., Chicago 60637)

17–19. **Orthopaedic** Symp., 5th, Houston, Tex. (W. M. Granberry, 6624 Fannin St., Houston 77025)

17–19. Association of **Southeastern Biologists**, Memphis, Tenn. (C. D. Brown, Memphis State Univ., Memphis)

17–20. Southwestern Assoc. of **Naturalists**, Tempe, Ariz. (M. J. Fouquette, Jr., Dept. of Zoology, Arizona State Univ., Tempe 85281)

17–22. American **Dermatological** Assoc., Inc., Scottsdale, Ariz. (R. R. Kierland, % Mayo Clinic, Rochester, Minn. 55901)

18. **Human Ecology**, Symp., Fullerton, Calif. (A. J. Simonds, Life Sciences Symp., Fullerton Junior College, 321 E. Chapman Ave., Fullerton 92634)

18–19. International College of **Applied Nutrition**, San Diego, Calif. (J. D. Walters, 14629 Ventura Blvd., Sherman Oaks, Calif. 91403)

18–19. Iowa Acad. of **Sciences**, Cedar Falls, Iowa. (R. Hanson, Dept. of Science, Univ. of Northern Iowa, Cedar Falls 50613)

18–20. American Soc. of **Internal Medicine**, Chicago, Ill. (A. V. Whitehall, 3410 Geary Blvd., San Francisco, Calif. 94118)

20–23. Institute of **Environmental Sciences**, 15th, Anaheim, Calif. (Technical Program Committee, The Institute, 940

E. Northwest Highway, Mount Prospect, Ill. 60056)

20–23. West Virginia Acad. of **Ophthalmology and Otolaryngology,** Greenbrier. (J. E. Blaydes, Jr., 107 Federal St., Bluefield, W.Va.)

20–23. Assoc. for **Research in Ophthalmology,** Sarasota, Fla. (H. E. Kaufman, Office of Secretary-Treasurer, Dept. of Ophthalmology, Univ. of Florida Medical College, Gainesville 32601)

20–24. American **Oil Chemists'** Soc., San Francisco, Calif. (C. H. Hauber, The Society, 35 E. Wacker Drive, Chicago, Ill. 60601)

20–25. Society of **Motion Picture and Television Engineers,** 105th, Miami Beach, Fla. (Executive Secretary, 9 E. 41 St., New York 10017)

21–22. American Soc. for **Artificial Internal Organs,** Atlantic City, N.J. (E. F. Bernstein, Dept. of Surgery, Univ. of Minnesota Medical School, Minneapolis 55455)

21–22. Midwest Symp. on **Circuit Theory,** 12th, Austin, Tex. (Dept. of Electrical Engineering and Electronics Research Center, Univ. of Texas, Austin)

21–22. **Temperature Measurements** Soc., 6th, Hawthorne, Calif. (C. L. Vaughn, Paper Selection Committee, % The Society, P.O. Box 156, Palos Verdes Estates, Calif. 90274)

21–23. **Effective Use of Computers in the Nuclear Industry,** Knoxville, Tenn. (B. F. Maskewitz, Oak Ridge Natl. Lab., P.O. Box X, Oak Ridge, Tenn. 37830)

21–24. American **Industrial Health** Conf., Houston, Tex. (American Industrial Health Conf., 55 E. Washington St., Chicago, Ill. 60602)

21–25. **Astrodynamics and Related Planetary Sciences,** Washington, D.C. (J. W. Siry, NASA Goddard Space Flight Center, Code 550, Greenbelt, Md. 20771)

21–25. American College of **Physicians,** 50th, Chicago, Ill. (E. C. Rosenow, Jr., 4200 Pine St., Philadelphia, Pa.)

21–25. **Solid State Chemistry** Conf., 2nd, Scottsdale, Ariz. (L. Eyring and M. O'Keeffe, Dept. of Chemistry, Arizona State Univ., Tempe 85281)

21–26. American Acad. of **Neurology,** Washington, D.C. (S. A. Nelson, 4005 W. 65 St., Minneapolis, Minn. 55435)

22–23. National **Relay** Conf., 17th, Stillwater, Okla. (D. D. Lingelbach, School of Electrical Engineering, Oklahoma State Univ., Stillwater 74074)

22–24. **Space,** natl. mtg. of the Inst. of **Navigation,** Houston, Tex. (R. Freeman, Inst. of Navigation, 711 14th St., NW, Washington, D.C. 20005)

22–24. **Pollution Control** Conf., Houston, Tex. (A. LaFargue, % PACE Management Corp., 4710 Greeley St., Houston, 77006)

22–24. **Telemetering** Conf., Washington, D.C. (R. W. Rochelle, NASA Goddard Space Flight Center, Code 710, Greenbelt, Md. 20771)

22–25. American **Geophysical** Union, Washington, D.C. (R. Yorks, Univ. of Michigan, Ann Arbor)

22–25. American College **Health** Assoc., Oklahoma City, Okla. (J. W. Dilley, 2807 Central Ave., Evanston, Ill. 60201)

22–25. National **Pollution** Conf., Houston, Tex. (The Conference, 4710 Greeley St., Houston 77006)

23–24. **Electric Process Heating in Industry,** Inst. of Electrical and Electronics Engineers, Philadelphia, Pa. (G. Bobart, Westinghouse Electric Corp., Box 300, Sykesville, Md. 21784)

23–25. Institute of **Electrical and Electronics Engineers** Conv., San Antonio, Tex. (W. H. Hartwig, Dept. of Electrical Engineering, Engineering Science Bldg. 439, Univ. of Texas, Austin 78712)

23–25. **Nondestructive Evaluation of Components and Materials in Aerospace, Weapons Systems, and Nuclear Applications,** San Antonio, Tex. (C. E. Lautzenheiser, Southwest Research Inst., 8500 Culebra Rd., San Antonio 78228)

24–26. Council on **Medical Television,** Kansas City, Mo. (J. R. Sutherland, Medical College of Georgia, Augusta)

24–26. American Acad. of **Physical Medicine and Rehabilitation,** Chicago, Ill. (C. C. Herold, 30 N. Michigan Ave., Chicago 60602)

24–26. New York **Roentgen** Soc., New York, N.Y. (S. H. Madell, 1 E. 82 St., New York 10028)

24–26. Illinois State Acad. of **Science,** Decatur, Ill. (K. Harmet, Dept. of Biology, Northern Illinois Univ., DeKalb 60115)

24–26. Ohio Acad. of **Science,** Delaware. (J. H. Melvin, Ohio Acad. of Science, 505 King Ave., Columbus 43210)

24–26. Annual **Wildflower** Pilgrimage, 19th, Gatlinburg, Tenn. (Gatlinburg Chamber of Commerce, Box 527, Gatlinburg 37738 or E. E. C. Clebsch, Dept. of Botany, Univ. of Tennessee, Knoxville 37916)

24–27. Association of **Clinical Scientists,** Mobile, Ala. (R. P. MacFate, 125 N. Rutledge St., Pentwater, Mich. 49449)

25–26. American Soc. for **Engineering Education,** Rocky Mountain Section mtg., Logan, Utah. (E. H. Wright, The Society, 2100 Pennsylvania Ave., NW, Washington, D.C. 20037)

25–26. National Assoc. of **Geology Teachers,** North-Central Section, Grand Forks, N.D. (J. R. Reid, Dept. of Geology, Univ. of North Dakota, Grand Forks 58201)

25–26. American Society of **Group Psychotherapy and Psychodrama,** New York, N.Y. (A. Manzoeillo, P.O. Box 311, Beacon, N.Y. 12508)

25–26. Nebraska Acad. of **Science,** Lincoln. (C. B. Schultz, 101 Morrill Hall, University Museum, Univ. of Nebraska, Lincoln 68508)

25–26. South Dakota Acad. of **Science,** Vermillion. (T. Van Bruggen, Dept. of Botany, Univ. of South Dakota, Vermillion 57069)

26. American Soc. for **Engineering Education,** Illinois-Indiana Section mtg., Terre Haute, Ind. (E. H. Wright, The Society, 2100 Pennsylvania Ave., NW, Washington, D.C. 20037)

26–27. **Eye Bank** Assoc. of America, New Orleans, La. (W. Clark, 211 S. Saratoga St., New Orleans 70112)

27–30. **Isotopes Application,** 3rd Conf., Gatlinburg, Tenn. (J. H. Gillette, Isotopes Div., Oak Ridge Natl. Lab., P.O. Box X, Oak Ridge, Tenn. 37830)

27–30. American Soc. of **Maxillofacial**

Surgeons, San Francisco, Calif. (D. Goulian, Jr., 116 E. 68 St., New York 10021)

27–30. **Southwestern and Rocky Mountain** Div. of AAAS, Colorado Springs, Colo. (M. G. Anderson, Dept. of Biology, New Mexico State Univ., Las Cruces 88001)

28. National **Cystic Fibrosis** Research Foundation, Atlantic City, N.J. (W. H. Boyer, 202 E. 44 St., New York 10017)

28–29. **Photo-Optical Techniques in Simulators**, South Fallsburgh, N.Y. (Photo-Optical Techniques in Simulators Seminar Committee, % SPIE Natl. Office, P.O. Box 288, Redondo Beach, Calif. 90277)

28–30. American Inst. of **Aeronautics and Astronautics**, Cincinnati, Ohio. (J. Lukasiewicz, ARO, Inc., Arnold Engineering Development Center, Arnold Air Force Station, Tenn. 37389)

28–30. Association of **Iron and Steel Engineers**, Detroit, Mich. (Managing Director, The Association, 1010 Empire Bldg., Pittsburgh, Pa.)

28–30. American **Radium** Soc., Philadelphia, Pa. (J. V. Blady, 2201 Benjamin Franklin Parkway, Philadelphia 19130)

28–30. American **Vacumm** Soc., Los Alamos, N.M. (D. G. Schreiner, New Mexico Section, AVS, P.O. Box 11451, Albuquerque 87112)

28–30. **Water and Air** Conf., 6th, Assoc. of the Pulp and Paper Industry, Jacksonville, Fla. (H. O. Teeple, 360 Lexington Ave., New York 10017)

28–1. American College of **Obstetricians and Gynecologists**, Bal Harbour, Fla. (M. Newton, 79 W. Monroe St., Chicago, Ill. 60603)

28–1. American **Physical** Soc., Washington, D.C. (W. W. Havens, Jr., The Society, 335 E. 45 St., New York 10017)

28–2. **Surveyor Thermal Control** Conf., Santa Monica, Calif. (Engineering and Physical Sciences Extension, University Extension, Uiv. of California, P.O. Box 24902, Los Angeles 90024)

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

29. **Cystic Fibrosis** Club, 10th, Atlantic City, N.J. (W. W. Waring, Tulane Univ. Medical School, 1430 Tulane Ave., New Orleans, La. 70112)

29. American Soc. of **Therapeutic Radiologists**, Philadelphia, Pa. (C. R. Bogardus, Jr., Univ. of Oklahoma Medical Center, Oklahoma City 73114)

29–1. Society of **Aerospace Material and Process Engineering**, Los Angeles, Calif. (Mail Station D-133, Hughes Aircraft Co., Centinela Ave. and Teale St., Culver City, Calif. 90230)

29–1. **Scanning Electron Microscopy** Symp., 2nd, Chicago, Ill. (J. Pearre, Public Information Office, IITRI, Chicago, Ill.

29–2. American **Chemical** Soc. (Div. of Rubber Chemistry), Los Angeles, Calif. (G. G. Winspear, R. T. Vanderbilt Co., Inc., 230 Park Ave., New York 10017)

29–3. **Student American Medical** Assoc., Chicago, Ill. (C. Hewitt, 2635 Flossmoor Road, Flossmoor, Ill. 60422)

30–2. **Chemical Marketing** Research Assoc., New York. (R. H. Mattson, Glidden-Durkee, Div. of SCM Corp., 900 Union Commerce Bldg., Cleveland, Ohio 44115)

30–2. **Electronic Components** Conf., Washington, D.C. (J. A. O'Connell, Electronic Components Conf., ITT Headquarters, 320 Park Ave., New York 10022)

30–2. American **Surgical** Assoc., Cincinnati, Ohio. (C. R. Hanlon, 1325 S. Grand Blvd., St. Louis, Mo. 63104)

30–3. Midwest **Anesthesiology** Conf., Chicago, Ill. (A. P. Winnie, Illinois Soc. of Anesthesiologists, 1825 W. Harrison St., Chicago 60612)

30–3. American Assoc. of **Plastic Surgeons**, San Francisco, Calif. (R. M. McCormack, 260 Crittenden Blvd., Rochester, N.Y. 14620)

30–4. Continual Education of the American Acad. of **Oral Medicine**, 23rd, San Juan, Puerto Rico. (W. M. Greenhut, 124 E. 84 St., New York 10028)

International and Foreign Meetings

April

21–23. Canadian Inst. of **Mining and Metallurgy**, 71st, Montreal, Canada. (Executive Director, The Institute, Suite 906, 1117 St. Catherine St. W., Montreal 2)

21–25. **Switching Techniques for Telecommunication Networks**, London, England. (Conference Dept., Institution of Electrical Engineers, London, W.C.2)

21–26. Canadian **Pulp and Paper** Assoc., 10th, Vancouver, B.C. (W. K. Voss, Ontario Paper Co. Ltd., Thorold, Ont.)

22–25. **Cotton Textile Research**, 1st intern. symp., Paris, France. (Institut Textile de France, 23 rue des Abondances, 92, Boulogne, France)

22–29. **Hydrology of Deltas**, intern. symp., Bucharest, Rumania. (A. I. Johnson, Water Resources Div., U.S. Geological Survey, Denver, Colo. 80225)

25–27. Canadian **Science Film** Assoc., 2nd, Radio and Electrical Engineering Div., Ottawa, Ont. (J. deBlois, % Canadian Film Inst., 1762 Carling Ave., Ottawa 13)

28–2. Symposium on **Radiation-Induced Carcinogenesis**, Athens, Greece. (R. N. Mukherjee, Unit of Radiation Biology, Intern. Atomic Energy Agency, Karntner Ring 11–13, A-1010 Vienna, Austria)

May

5–8. **Instrumentation in Aerospace Simulation Facilities**, 3rd intern. congr., Farmingdale, N.Y. (C. R. Spitzer, MS-236, NASA Langley Research Center, Hampton, Va. 23365)

5–8. International **Microwave** Symp., Dallas, Tex. (J. B. Horton, MS 905, Texas Instrument Co., Box 5012, Dallas 75222)

5–9. Commonwealth **Mining and Metallurgical** Congr., 9th, London, England. (Congress Secretary, Commonwealth Council of Mining and Metallurgical Institutions, 44 Portland Pl., London, W.1)

6–8. **Nuclear Electronics** Symp., Ispra, Italy. (L. Stanchi, C.C.R. Euratom, 21020 Ispra)

6–8. **Power Thyristors and Their Applications**, London, England. (Conference Dept., Institution of Electrical Engineers, Savoy Pl., London, W.C.2)

6–8. **Radiosensitizing and Radioprotective Drugs**, 2nd intern. symp., Rome, Italy. (H. Moroson, Sloan-Kettering Inst. for Cancer Research, Donald S. Walker Lab., 145 Boston Post Rd., Rye, N.Y.)

6–9. **Fluid Sealing**, 4th intern. conf., Philadelphia, Pa. (J. J. Sherlock, Midwest Aero Industries, Inc., P.O. Box 536, Oak Ridge Sta., 4834 Delemere Ave., Royal Oak, Mich. 48073)

7–9. International Joint Conf. on **Artificial Intelligence**, Washington, D.C. (D. E. Walker, Mitre Corp., Bedford, Mass. 01730)

10–11. International Soc. for the Study of **Social and Behavioral Sciences**, Princeton, N.J. (J. Jaynes, Dept. of Psychology, Princeton Univ., Princeton 08540)

11–18. International Exhibition on **Diagnostics**, Munich, Germany. (Munchener Messe-und Ausstellungs-Gesellschaft MBH, Theresienhohe 13, 8 Munich 12)

15–18. International **Revolving-Shutter** Products Fair, Stuttgart, Germany. (Stuttgarter Ausstellungs GMBH, Postfach 990, 700 Stuttgart 1)

26–30. **Spectroscopy**, 15th intern. colloquium, Madrid, Spain. (Secretary, XV Colloquium Spectroscopium Internationale, Serrano 119, Madrid 6)

27–31. International Assoc. of **Thalassotherapy**, 14th, Eforie Nord, Roumania. (Prof. Binculescu, Strada Transilvaniei 47, Bucharest, Roumania)

27–1. German Congr. for **Medical Continuation Studies**, 18th, Berlin. (Kongressgesellschaft fur Artliche Fortbildung, Klingsortstr. 21, Berlin 41)

28–7. **Pro Aqua** Congr., 4th, Basel, Switzerland. (O. Jaag, % Secretariat Pro Aqua, Basel 21)

29–3. International Assoc. for **Accident and Traffic Medicine**, 3rd, New York, N.Y. (M. Helpern, % Office of Chief Medical Examiner, 520 First Ave., New York 10016)

29–19. General Assembly of Pan-American Inst. of **Geography and History**, Washington, D.C. (C. A. Forray Rojas, Ex-Arzobispado 29, Mexico, D.F. Mexico)

June

1–12. Symposium on **Non-Destructive Testing of Concrete and Timber**, London, England. (Institution of Civil Engineers, Great George St., London, S.W.1)

2–6. International Symp. on **Yeasts**, Delft and The Hague, Netherlands. (L. Rodrigues de Miranda, Organizing Committee, Julianalaan 67A, Delft)

3–13. International Conf. on **Arid Lands in a Changing World**, Tucson, Ariz. (International Arid Lands Conf., % Dept. of Geochronology, Univ. of Arizona, Tucson 85721)

4–6. **Automated Analysis**, intern. congr., Chicago, Ill. (J. E. Golin, Technicon Corp., Ardsley, N.Y. 10502)

4–7. Union of Textile **Chemists and Colorists**, 21st congr., Baden-Baden, Germany. (The Union, Rohsbacherstr. 78, Heidelberg, Germany)

5. European Federation of Intern. College of **Surgeons**, London, England. (F. P. Fitzgerald, 129 Harley St., London, W.1)

5–7. **Mineralogical** Assoc. of Canada, Montreal, P.Q. (J. Beland, Dept. of Geology, Univ. of Montreal, Montreal)

5–11. **Forensic Sciences**, 5th intern., Toronto, Ont., Canada. (L. Ball, Center of Forensic Sciences, Dept. of Attorney General, 8 Jarvis Street, Toronto 2)

6–9. Canadian **Pediatric** Soc., Montreal, P.Q. (J. H. V., Marchessault, 14 Green Ave., St. Lambert, Quebec City, P.Q.)

8–14. Canadian **Medical** Assoc., 102nd, Toronto, Ont., Canada. (The Association, 170 St. George Street, Toronto, Canada)

9–11. International **Communications** Conf., Boulder, Colo. (M. Nesenbergs, Environmental Science Services Administration, Inst. for Telecommunication Sciences, R614, Boulder 80302)

9–12. International **Food** Congr. and Exhibition, 7th, Madrid, Spain. (L. Naranon, % Federacion Nacional de Almacenistas de Alimentacion, Paseo del Prado 18–20, Planta 11, Madrid)

9–13. **Clean Air** Congr. and Exhibition, Dusseldorf, Germany. (V. Deutscher, Postfach 1139, 4 Dusseldorf 1)

9–14. Canadian Assoc. of **Pathologists**, Toronto, Ont., Canada. (D. W. Penner, Winnipeg General Hospital, Winnipeg 3, Manitoba)

10–20. International **Marine and Shipping** Conf., London, England. (Inst. of Marine Engineers, 76 Mark Lane, London, E.C.3)

11–13. Canadian Federation of **Biological Societies** (Canadian Physiological Soc., Pharmacological Soc. of Canada, Canadian Assoc. of Anatomists, Canadian Biochemical Soc.), 12th, Edmonton, Alberta. (A. H. Neufeld, Univ. of Western Ontario, London, Ont., Canada)

11–14. Canadian **Psychiatric** Assoc., 19th, Toronto, Ont. (W. A. Blair, 225 Lisgar St., Ottawa, Ont.)

14–20. Canadian Assoc. of **Gastroenterology**, 8th, Toronto, Ont. (The Association, 426 170 St. George St., Toronto 5)

15–18. **Chemical** Inst. of Canada, 19th, Montreal, P.Q. (The Institute, 151 Slater St., Ottawa 4, Ont.)

15–20. Canadian **Anaesthetists** Soc., 20th, Toronto, Ont. (E. R. Campbell, 178 St. George St., Toronto 5)

15–20. International **Data Processing** Conf., Montreal, Canada. (M. Rafferty, Data Process Managing Assoc., 505 Busse Highway, Park Ridge, Ill. 60068)

15–22. World **Medical** Assoc., 23rd, Paris, France. (M. Poumailloux, Domus Medica, 60 Blvd. de Labour-Maubourg, Paris 15)

16–18. **Thermophysics** Conf., 4th, San Francisco, Calif. (E. R. Streed, Vehicle Systems Design Branch, NASA Ames Research Center, N244-6, Moffett Field, Calif. 94035)

16–21. Triennial Congr. of Intern. Federation of **Automatic Control**, Warsaw, Poland. (Organizing Committee, Ul Czackiego 3/5, P.O. Box 903, Warsaw 1)

16–21. **Sarcoidosis**, 5th intern. conf., Prague, Czechoslovakia. (L. Levinsky, University Clinic for Tuberculosis and Respiratory Diseases, 19 Katerinska, Prague 2)

21–29. Quadrennial Congr. of Intern. Council of **Nurses**, Montreal, Canada. (H. M. Nussabaum, P.O. Box 42, 1211 Geneva 20, Switzerland)

22–29. **Application of Mathematics in Engineering**, 5th biennial intern. congr., Weimar, Germany. (H. Matzke, Weimar College of Architecture and Building, Karl-Marx-Platz 2, 53 Weimar)

22–29. **Nephrology**, 4th intern. congr., Stockholm, Sweden. (F. Berglund, Postfack 272, Stockholm 1)

BOOKS RECEIVED

(Continued from page 1319)

Introduction to Medical Cybernetics. V. V. Parin and R. M. Bayevsky. Translation of the Russian edition (Moscow, 1966). National Aeronautics and Space Administration, Washington, D.C., 1969 (available as NASA TT F-459 from Clearinghouse for Federal Scientific and Technical Information, Springfield, Va.). vi + 226 pp., illus. Paper, $3.

Introduction to Switching Theory and Logical Design. Fredrick J. Hill and Gerald R. Peterson. Wiley, New York, 1968. xiv + 450 pp., illus. $14.50.

Long Range Forecasting Methodology. A symposium, Alamogordo, N.M., 1967. Air Force Office of Scientific Research, Arlington, 1968 (available from Clearinghouse for Federal Scientific and Technical Information, Springfield, Va.). viii + 192 pp., illus. $3.

Lunar Atlas. Prepared by the Space Sciences Laboratory of the Space Division of North American Aviation, Inc. Dinsmore Alter, Ed. Dover, New York, 1968. xiv + 346 pp., illus. Paper, $5. Reprint of the 1964 edition.

Manual of the Leafy Hepaticae of Latin America. Part 3. Margaret H. Fulford. New York Botanical Garden, Bronx, 1968 (available from Stechert-Hafner, New York). Illus. Paper, $6. Memoirs of the New York Botanical Garden, vol. 11, No. 3, pp. 277–394.

Modern Calculus and Analytic Geometry. Richard A. Silverman. Macmillan, New York; Collier-Macmillan, London, 1969. xviii + 1038 pp., illus. $12.95.

Naturalistic Viewpoints in Psychological Research. Edwin P. Willems and Harold L. Raush, Eds. Holt, Rinehart and Winston, New York, 1969. x + 294 pp., illus. $7.50.

New Pathways in Inorganic Chemistry. E. A. V. Ebsworth, A. G. Maddock, and A. G. Sharpe, Eds. Cambridge University Press, New York, 1968. xxxiv + 392 pp., illus. $13.

A New Philosophy of Life. J. H. Wegerif. Philosophical Library, New York, 1968. 290 pp., illus. $7.95.

Photoemissive Materials. Preparation, Properties, and Uses. A. H. Sommer. Wiley, New York, 1968. xii + 258 pp., illus. $12.95.

Physical Science Simplified. James W. Batchelor. Barnes and Noble, New York, 1968. viii +168 pp., illus. Paper, $2.25. Barnes and Noble Keynotes, No. 717.

Physics of Planets. V. I. Moroz. Translation of the Russian edition (Moscow, 1967). National Aeronautics and Space Administration, Washington, D.C., 1969 (available as NASA TT F-515 from Clearinghouse for Federal Scientific and Technical Information, Springfield, Va.). vi + 416 pp., illus. Paper, $3.

Physics of Simple Liquids. H. N. V. Temperley, J. S. Rowlinson, and G. S. Rushbrooke, Eds. Interscience (Wiley), New York; North-Holland, Amsterdam, 1968. xii + 716 pp., illus. $33.50.

Plant Diversity. Robert M. Harris. Brown, Dubuque, Iowa, 1969. x + 102 pp., illus. Paper, $1.95. Concepts of Biology Series.

Plasma Diagnostics. W. Lochte-Holt-

greven, Ed. North-Holland, Amsterdam; Interscience (Wiley), New York, 1968. xviii + 930 pp., illus. $38.50.

Plastics Rheology. Mechanical Behaviour of Solid and Liquid Polymers. R. S. Lenk. Interscience (Wiley), New York, 1968. xxvi + 214 pp., illus. $11.

Population Biology and Evolution. Proceedings of an international symposium, Syracuse, N.Y., 1967. Richard C. Lewonton, Ed. Syracuse University Press, Syracuse, 1968. x + 206 pp., illus. $8.

Principles of Geomorphology. William D. Thornbury. Wiley, New York, ed. 2, 1969. xii + 596 pp., illus. $13.95.

Proceedings of the Conference on the Use of Small Accelerators for Teaching and Research. Oak Ridge, Tenn., 1968. Jerome L. Duggan, Ed. U.S. Atomic Energy Commission, Oak Ridge, 1968 (available from Clearinghouse for Federal Scientific and Technical Information, Springfield, Va.). x + 464 pp., illus. Paper, $3.

The Pyrrolizidine Alkaloids. Their Chemistry, Pathogenicity and Other Biological Properties. L. B. Bull, C. C. J. Culvenor, and A. T. Dick. North-Holland, Amsterdam; Interscience (Wiley), New York, 1968. xviii + 294 pp., illus. $15.50. Frontiers of Biology, vol. 9.

Regulatory Mechanisms for Protein Synthesis in Mammalian Cells. Third Kettering Symposium, Yellow Springs, Ohio, 1968. Anthony San Pietro, Marvin R. Lamborg, and Francis T. Kenney, Eds. Academic Press, New York, 1968. xvi + 480 pp., illus. $12.50.

Representation Theory and Automorphic Functions. I. M. Gel'fand, M. I. Graev, and I. I. Pyatetskii-Shapiro. Translated from the Russian edition (Moscow, 1966) by K. A. Hirsch. Saunders, Philadelphia, 1969. xviii + 430 pp. $18. Generalized Functions, vol. 6.

A Short Course in Differential Equations. Earl D. Rainville and Phillip E. Bedient. Macmillan, New York; Collier-Macmillan, London, ed. 4, 1969. xvi + 288 pp., illus. $7.50.

Singular Points of Complex Hypersurfaces. John Milnor. Princeton University Press, Princeton, N.J.; University of Tokyo Press, Tokyo, 1968. x + 122 pp., illus. Paper, $3.25. Annals of Mathematics Studies, No. 61.

Skyshooting: Photography for Amateur Astronomers. R. Newton Mayall and Margaret W. Mayall. Dover, New York, 1968. xviii + 206 pp., illus. + 42 plates. Paper, $2.50. Revised version of *Skyshooting–Hunting the Stars with Your Camera.*

Social Scientists and International Affairs. A Case for a Sociology of Social Science. Elizabeth T. Crawford and Albert D. Biderman, Eds. Wiley, New York, 1969. xviii + 334 pp. $11.95.

Soil Mechanics. Selected Topics. I. K. Lee, Ed. Elsevier, New York, 1968. xii + 628 pp., illus. $31.50.

Solid State Physics, Nuclear Physics, and Particle Physics. Ninth Latin American School of Physics, Santiago, Chile, 1967. Kenneth Johnson *et al.* Igor Saavedra, Ed. Benjamin, New York, 1968. xvi + 848 pp., illus. $16.

A Source Book in Mathematics, 1200–1800. D. J. Struik, Ed. Harvard University Press, Cambridge, Mass., 1969. xviii + 430 pp., illus. $11.95. Source Books in the History of the Sciences.

Spectroscopic and Group Theoretical Methods in Physics. Racah Memorial Volume. F. Bloch, S. G. Cohen, A. De-Shalit, S. Sambursky, and I. Talmi, Eds. Interscience (Wiley), New York; North-Holland, Amsterdam, 1968. xii + 462 pp., illus. $22.

A Spider's Web. Problems in Regulatory Biology. Peter N. Witt, Charles F. Reed, and David B. Peakall. Springer-Verlag, New York, 1968. viii + 108 pp., illus. $9.

Starch and Its Derivatives. J. A. Radley. Chapman and Hall, London, ed. 4, 1968 (U.S. distributor, Barnes and Noble, New York). x + 558 pp., illus. + 18 plates. $22.50.

Subcortical Correlates of Human Behavior. A Psychological Study of Thalamic and Basal Ganglia Surgery. Manuel Riklan and Eric Levita. Williams and Wilkins, Baltimore, 1969. xii + 340 pp., illus. $17.

Suns, Myths and Men. Patrick Moore. Norton, New York, 1968. xiv + 242 pp., illus. $6.95. Amateur Astronomer's Library. Revised version of *The Story of Man and the Stars.*

The Theory of Price Uncertainty, Production, and Profit. Clement Allan Tisdell. Princeton University Press, Princeton, N.J., 1968. x + 198 pp., illus. $6.50.

Theory of Suicide. Maurice L. Farber. Funk and Wagnalls, New York, 1968. xii + 116 pp. $5.95.

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