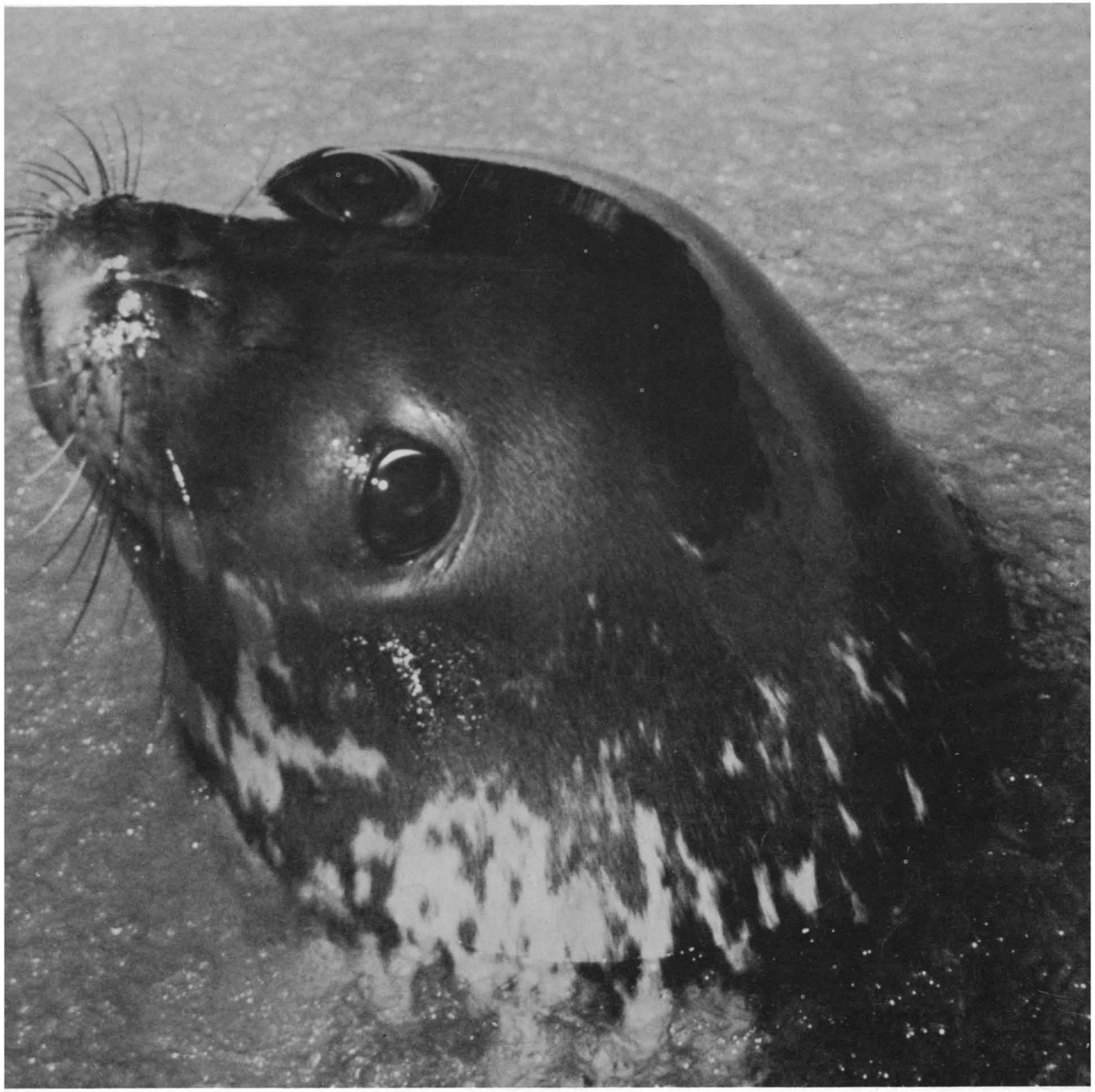
SCIENCE

25 March 1966

Vol. 151, No. 3717

AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE



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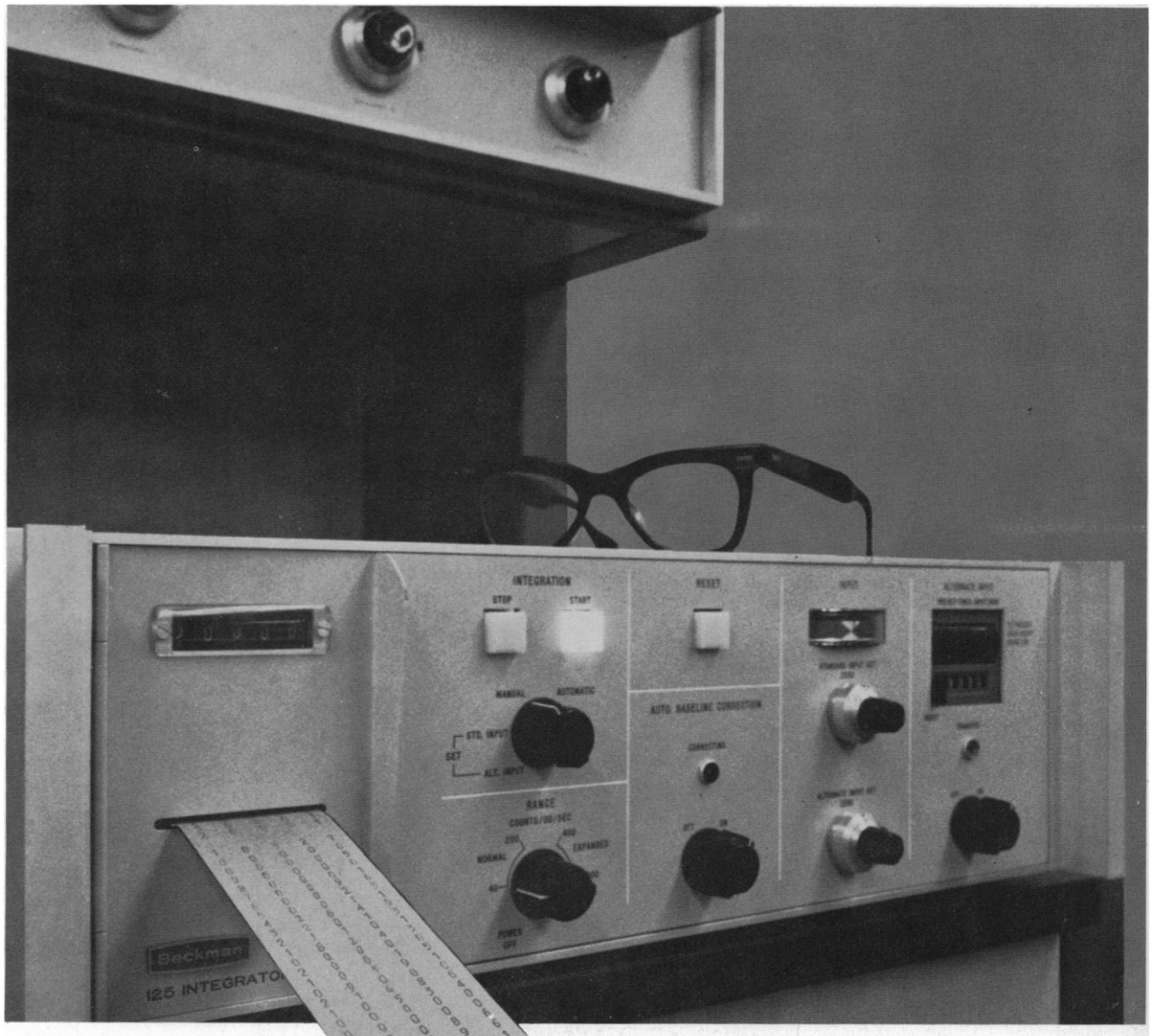

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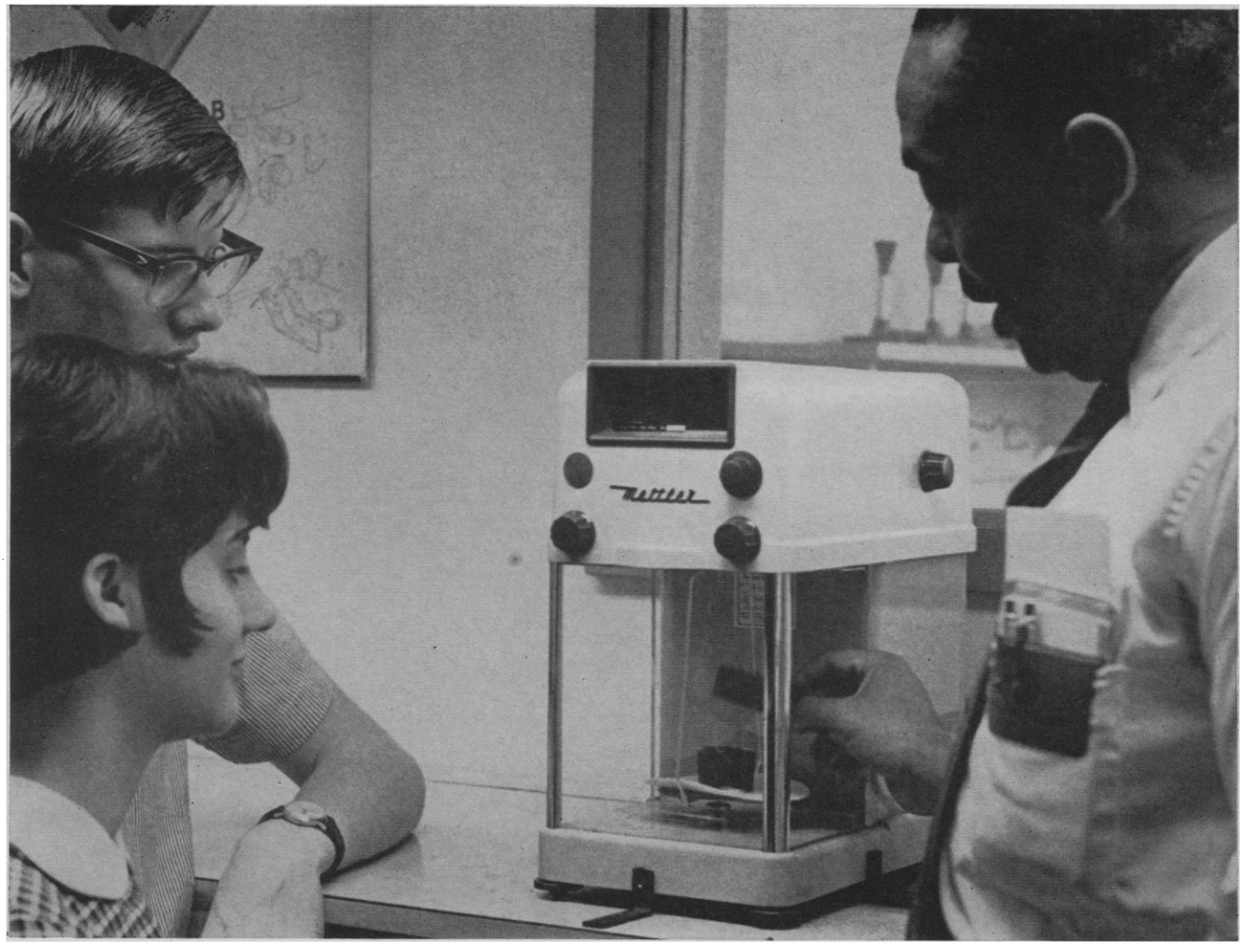

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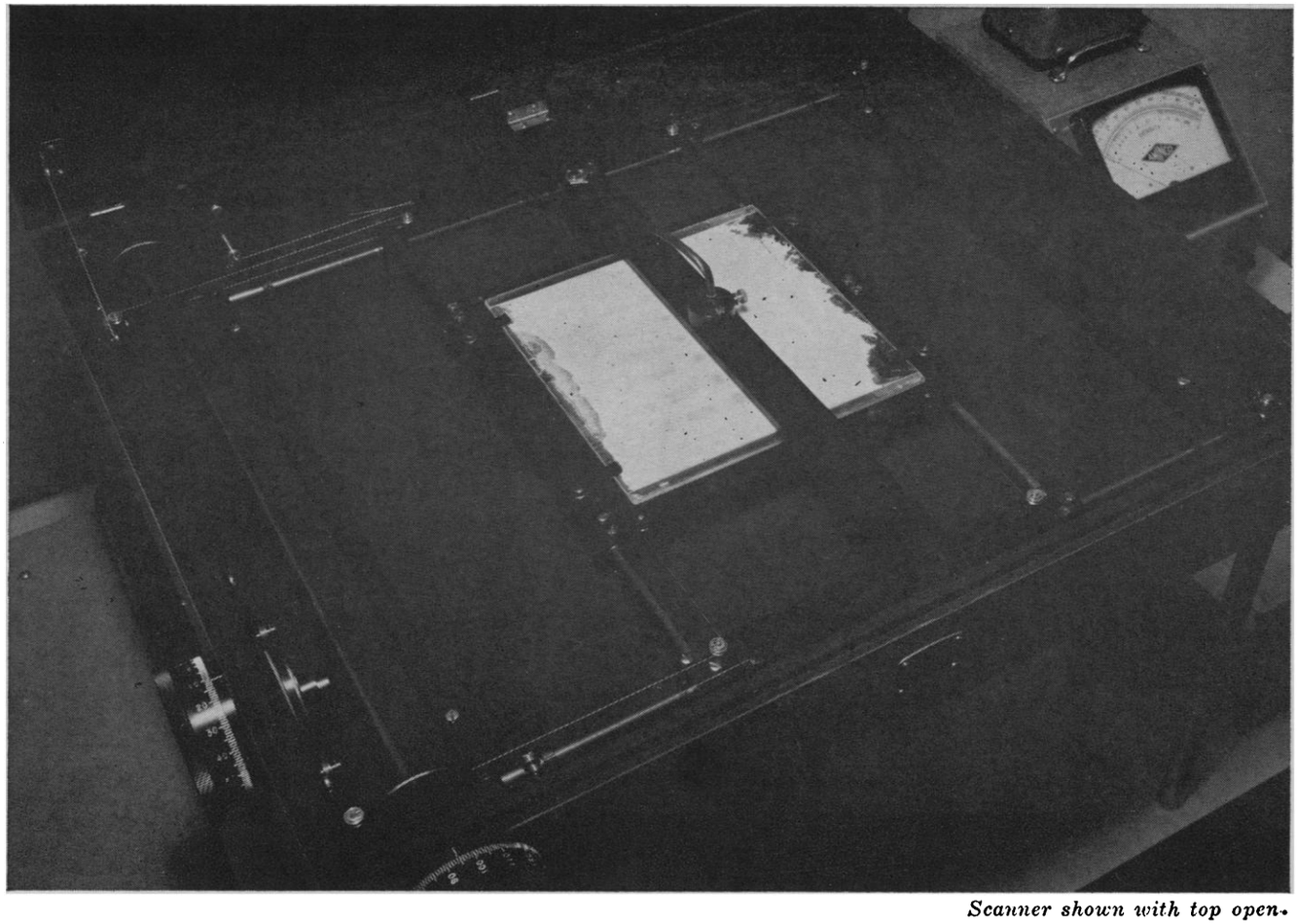

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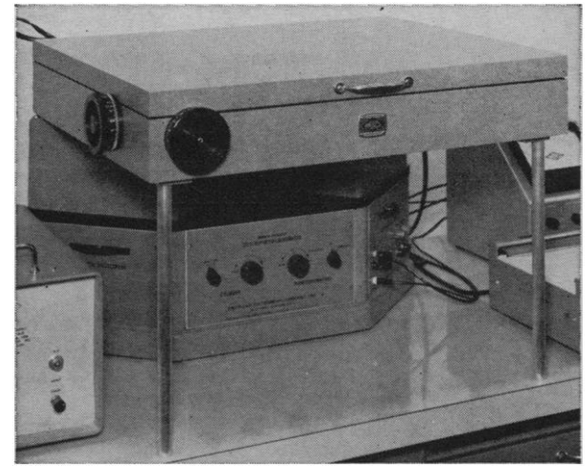

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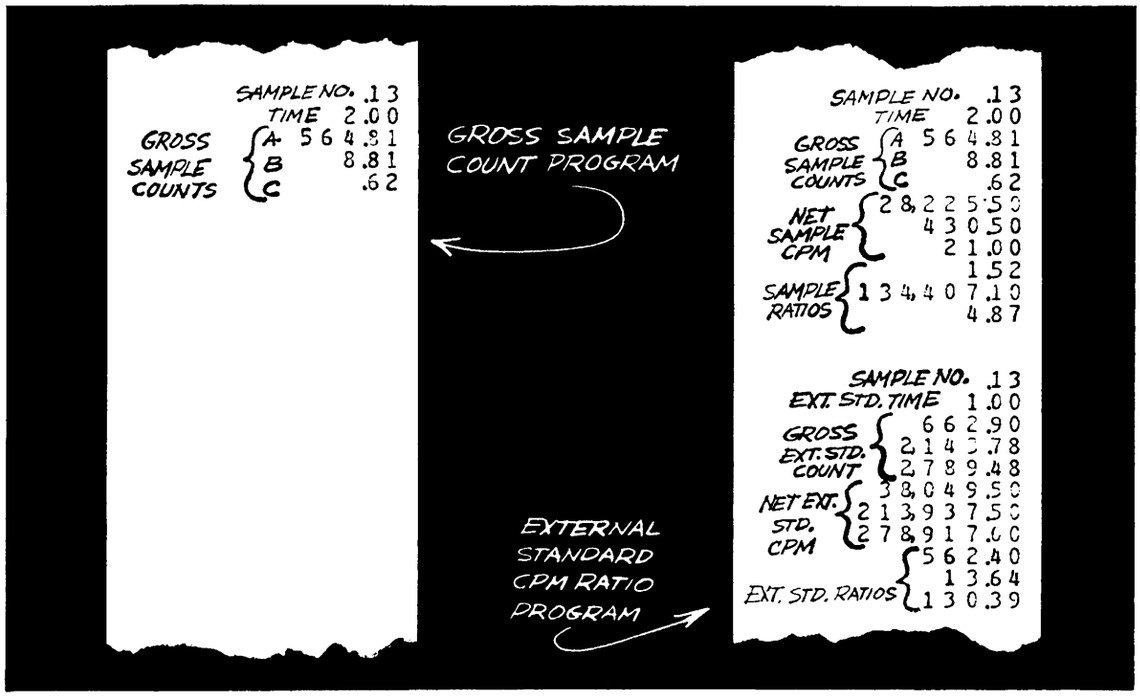

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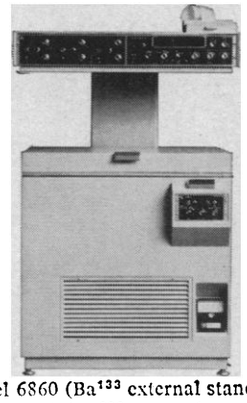

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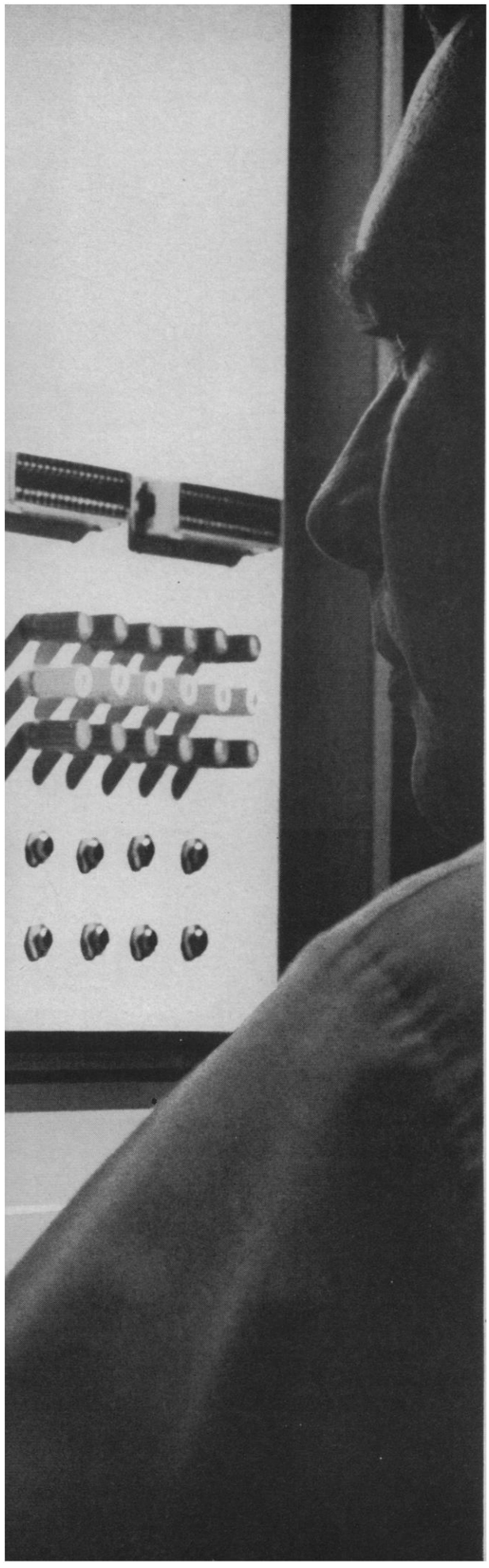

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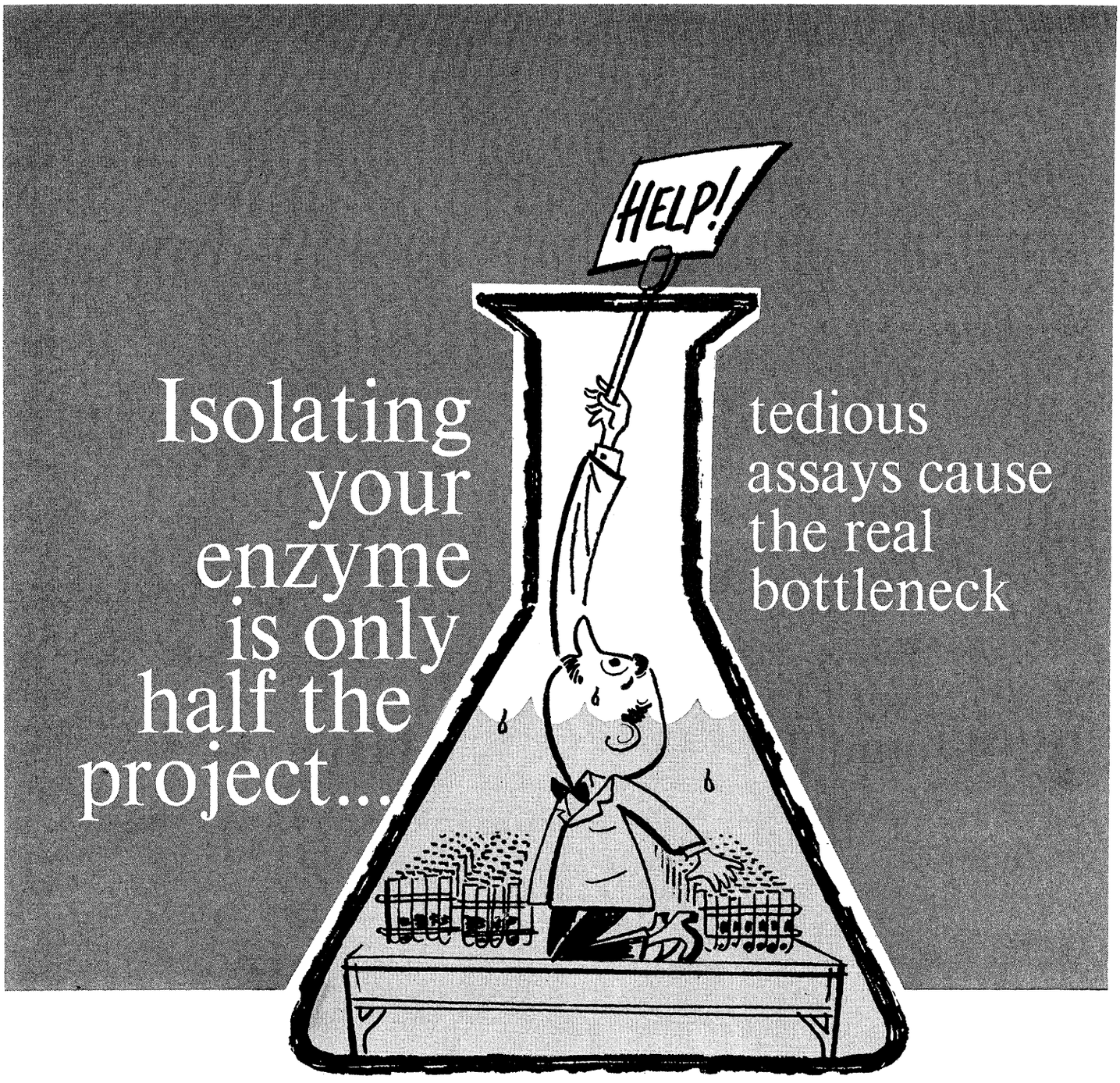

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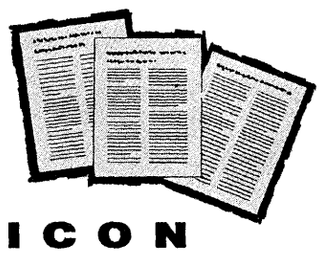

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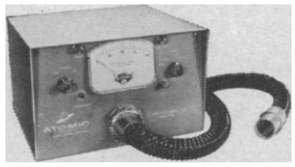

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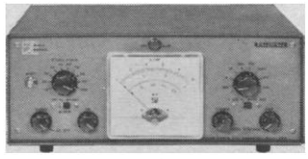

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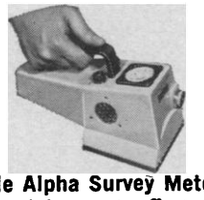

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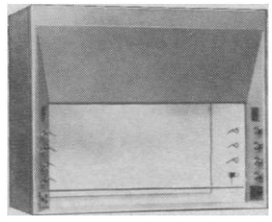

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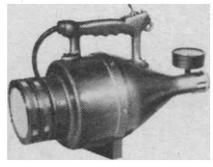

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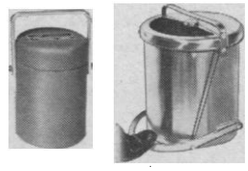

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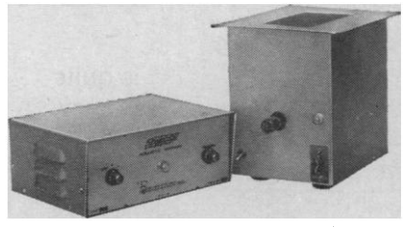

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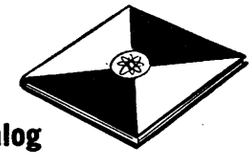

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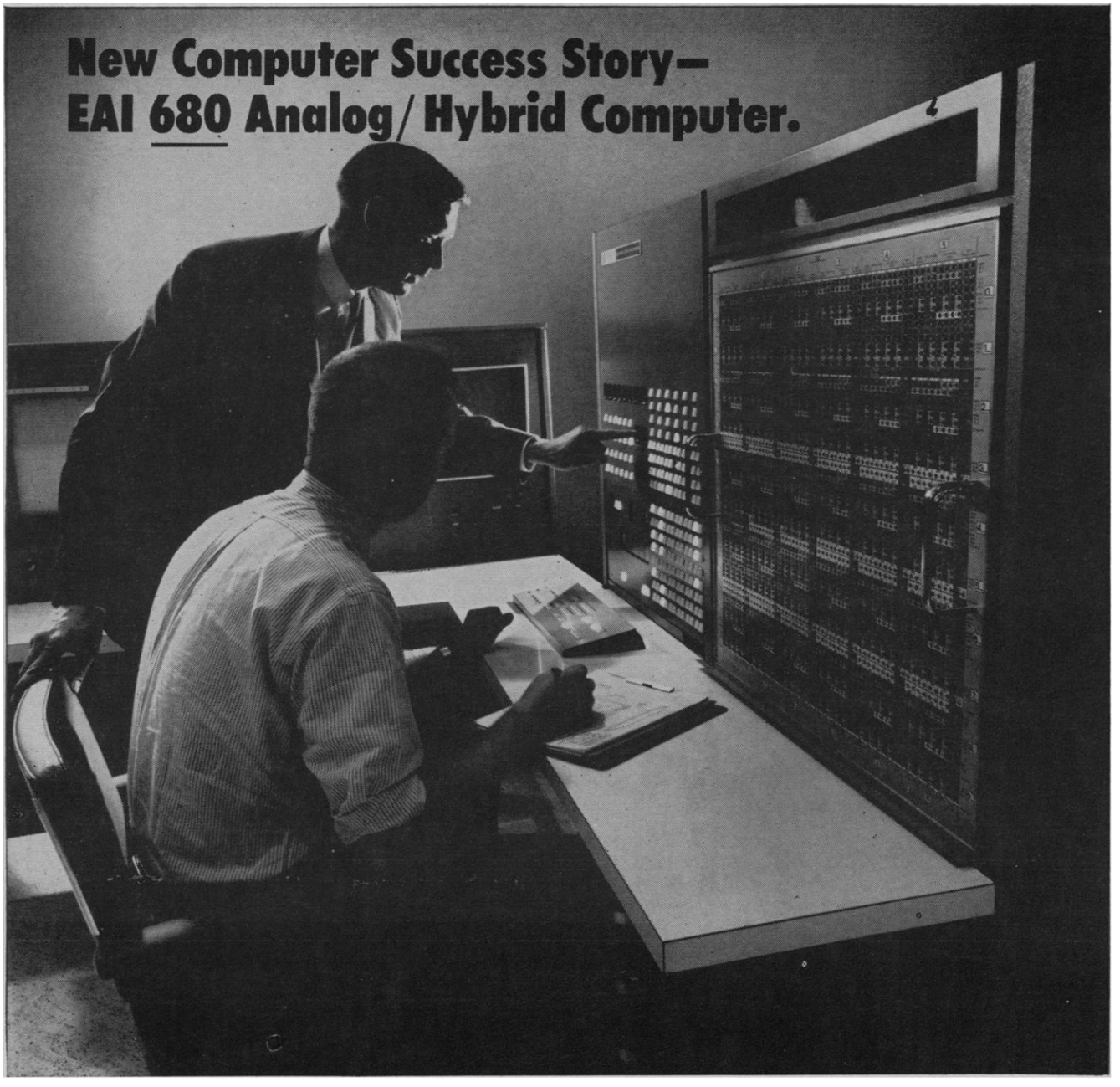

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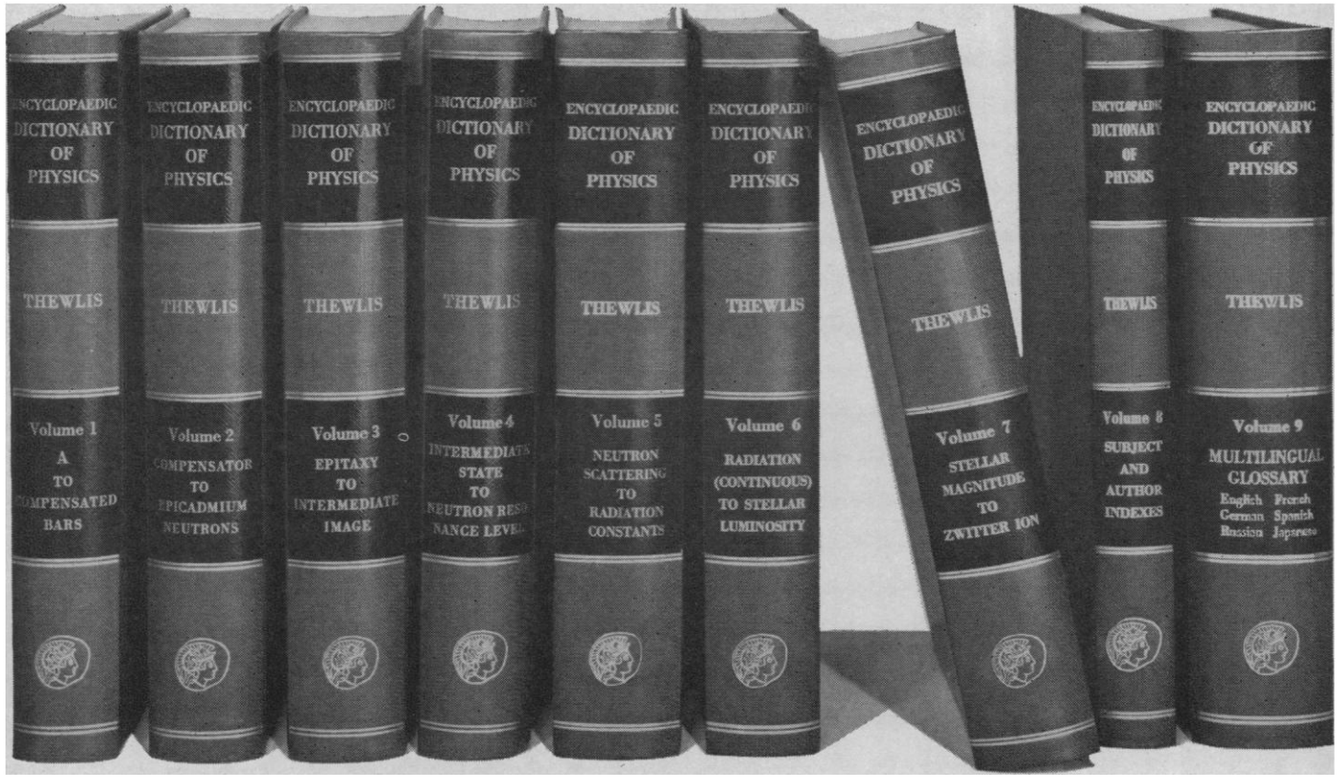

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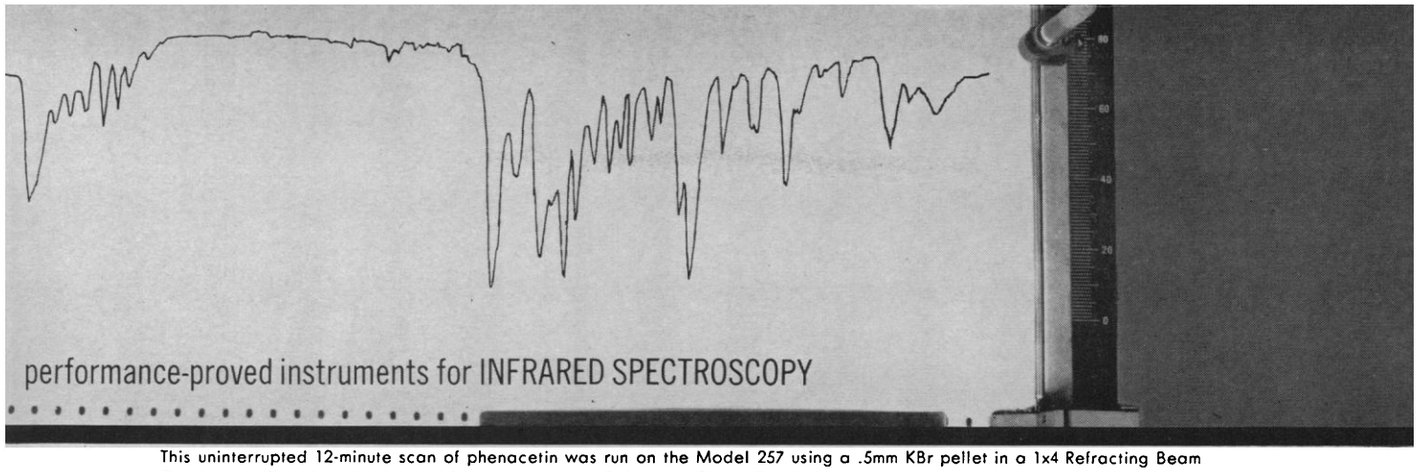

This uninterrupted 12-minute scan of phenacetin was run on the Model 257 using a .5mm KBr pellet in a 1x4 Refracting Beam Condenser. Sample volume was 1 microgram. A Refracting Beam Condenser was also placed in the Reference Beam.

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- Variable slit control, allowing very narrow slits for high resolution, as well as the wide openings required for energy-limited analyses such as by ATR and microsampling.
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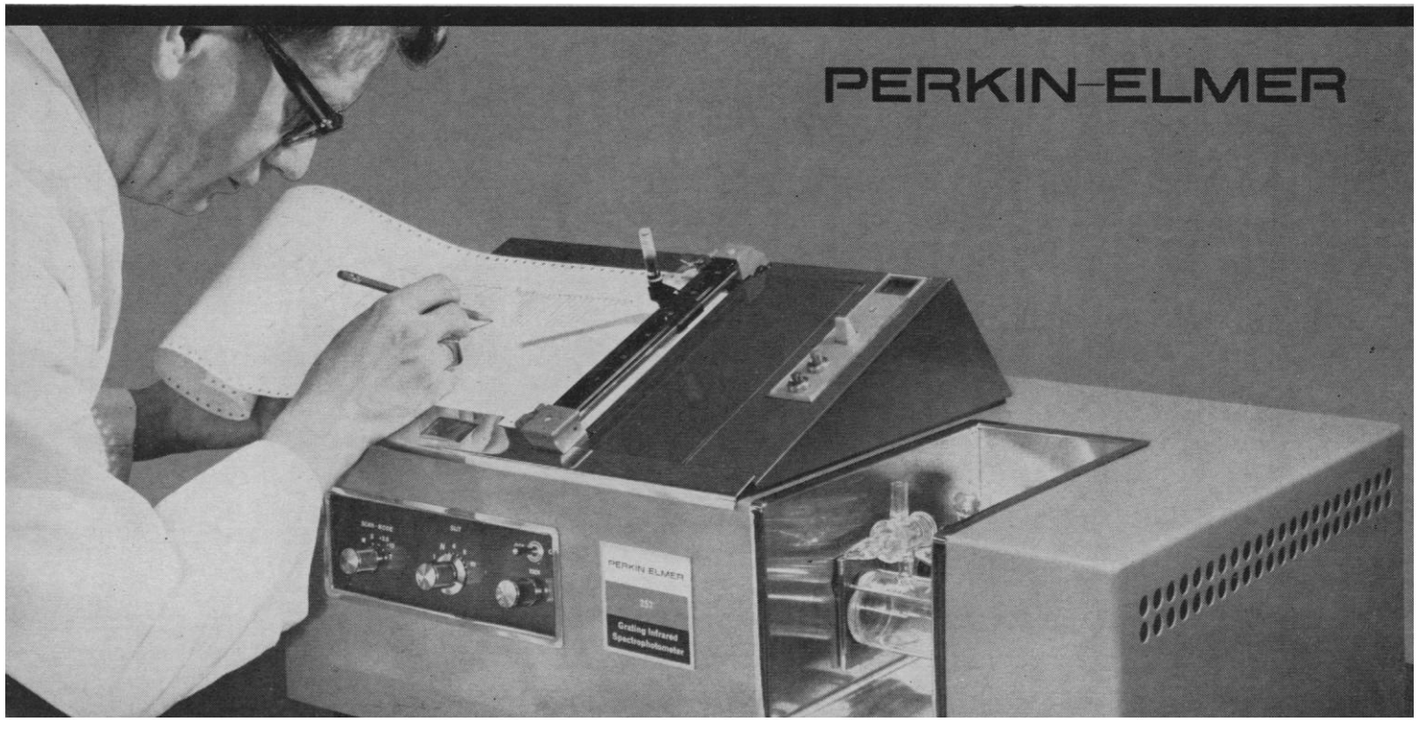

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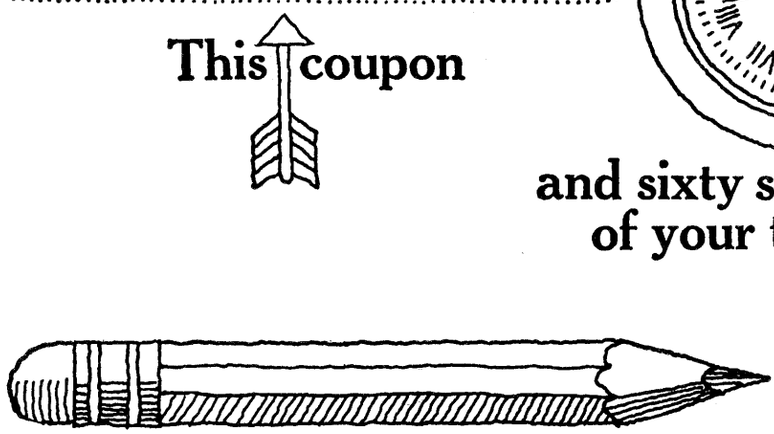

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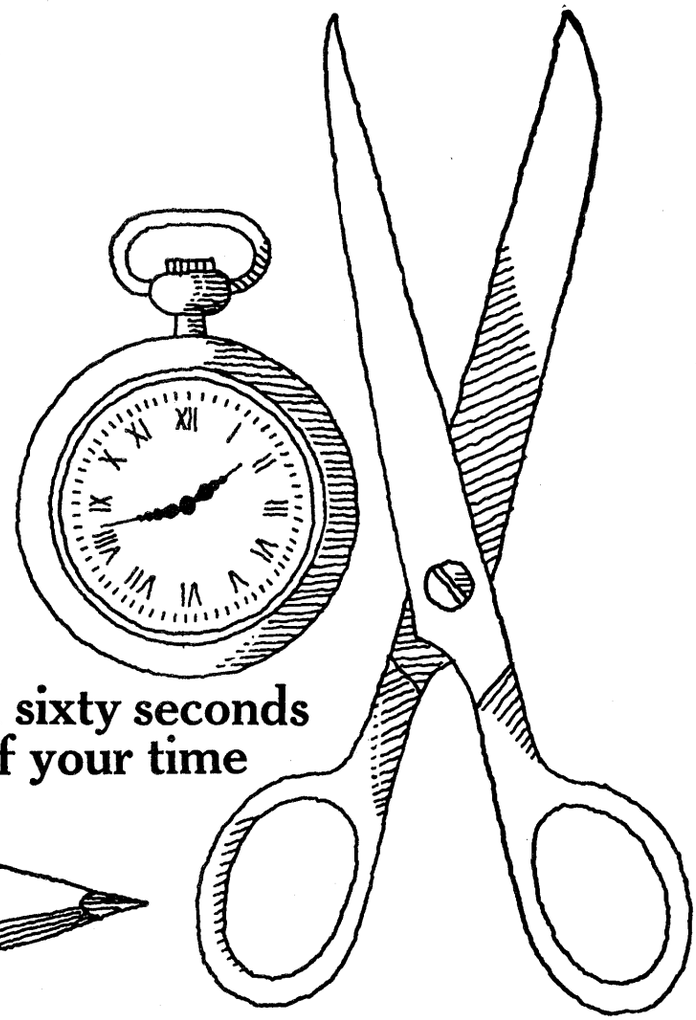

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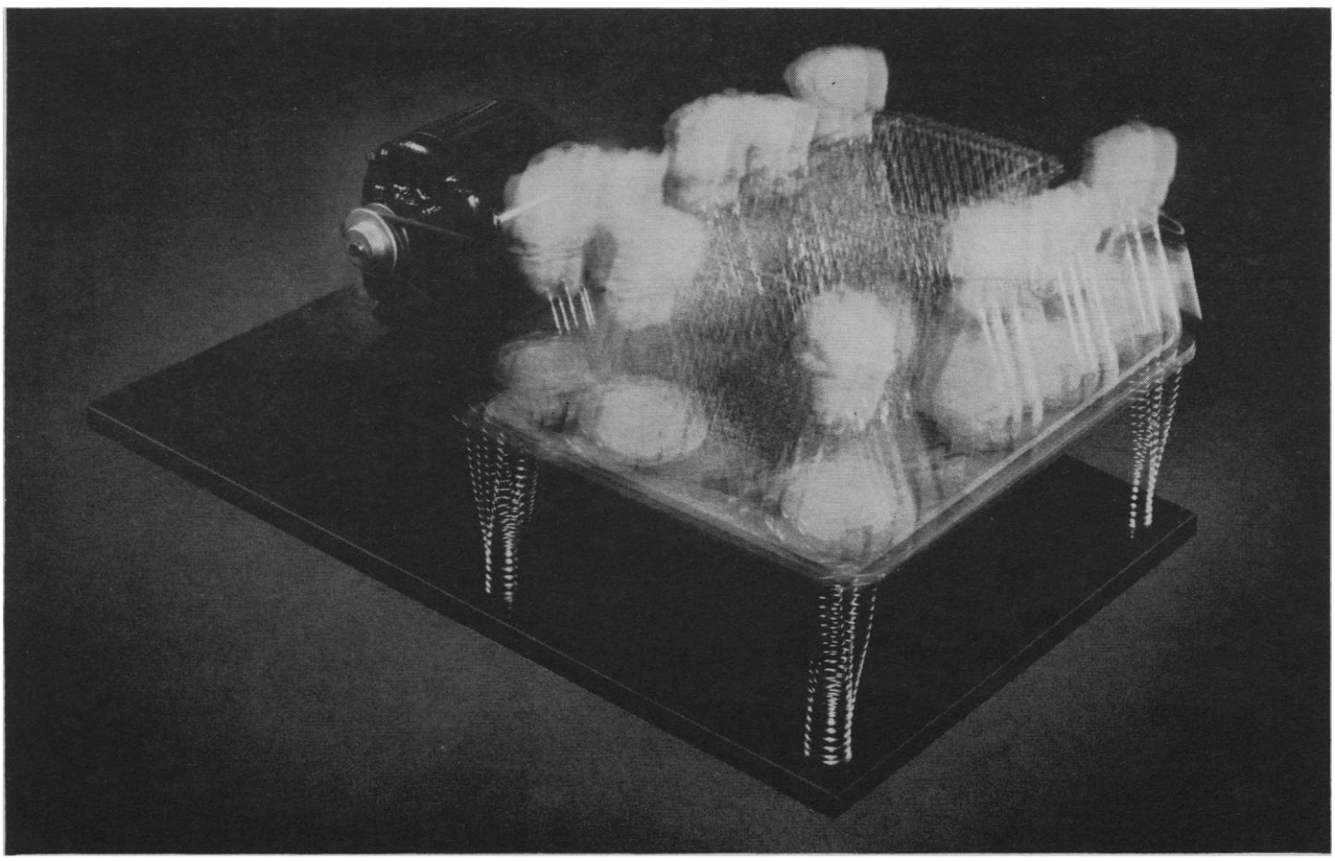

While other equipment sleeps, this New Brunswick shaker works overtime. It has been running almost 24 hours a day for 17 years . . . day-in, day-out . . . at the Rutgers University College of Agriculture. This Model "C" sustains three times more shaking action than those machines that are switched off after a normal 8-hour day. Simple multiplication shows that this workhorse has provided 51 years of service . . . and it's still going strong!

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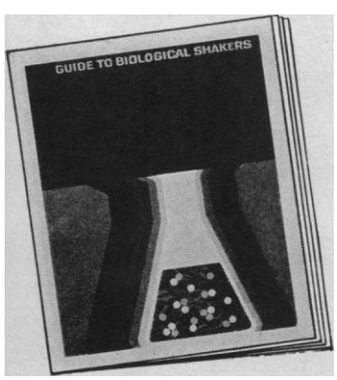

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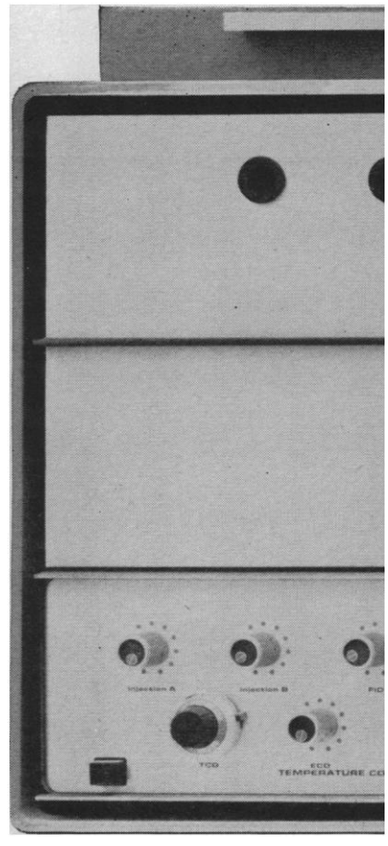

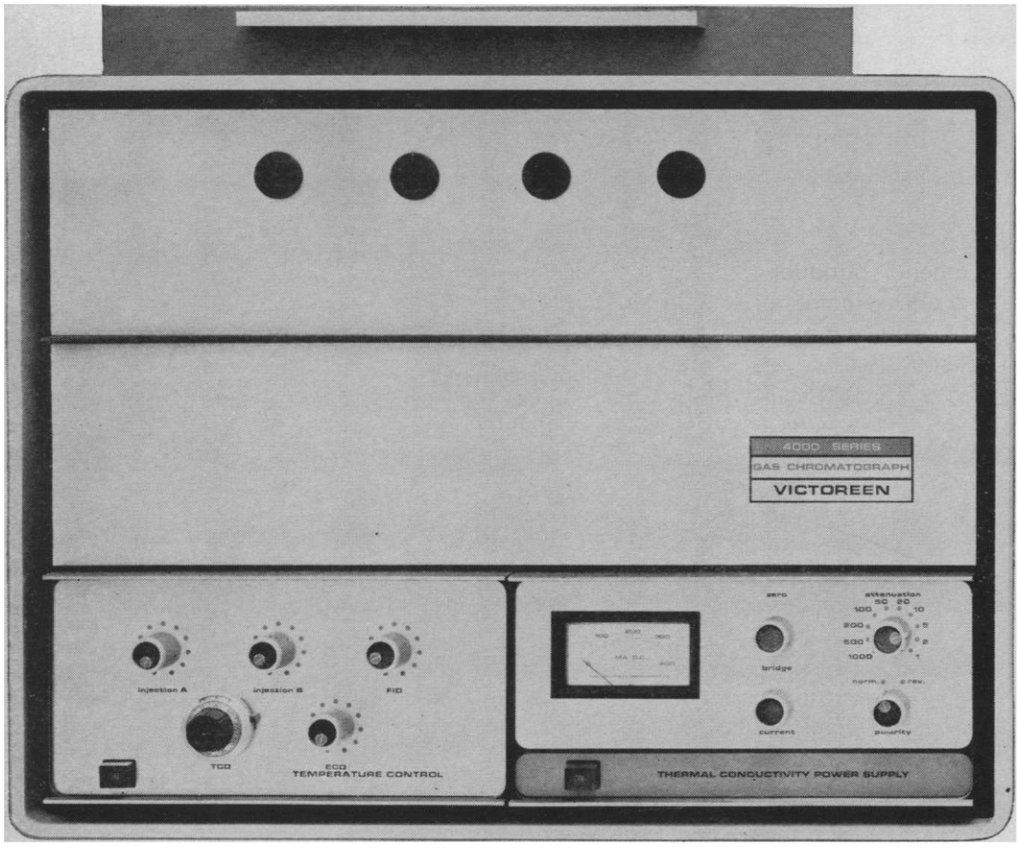

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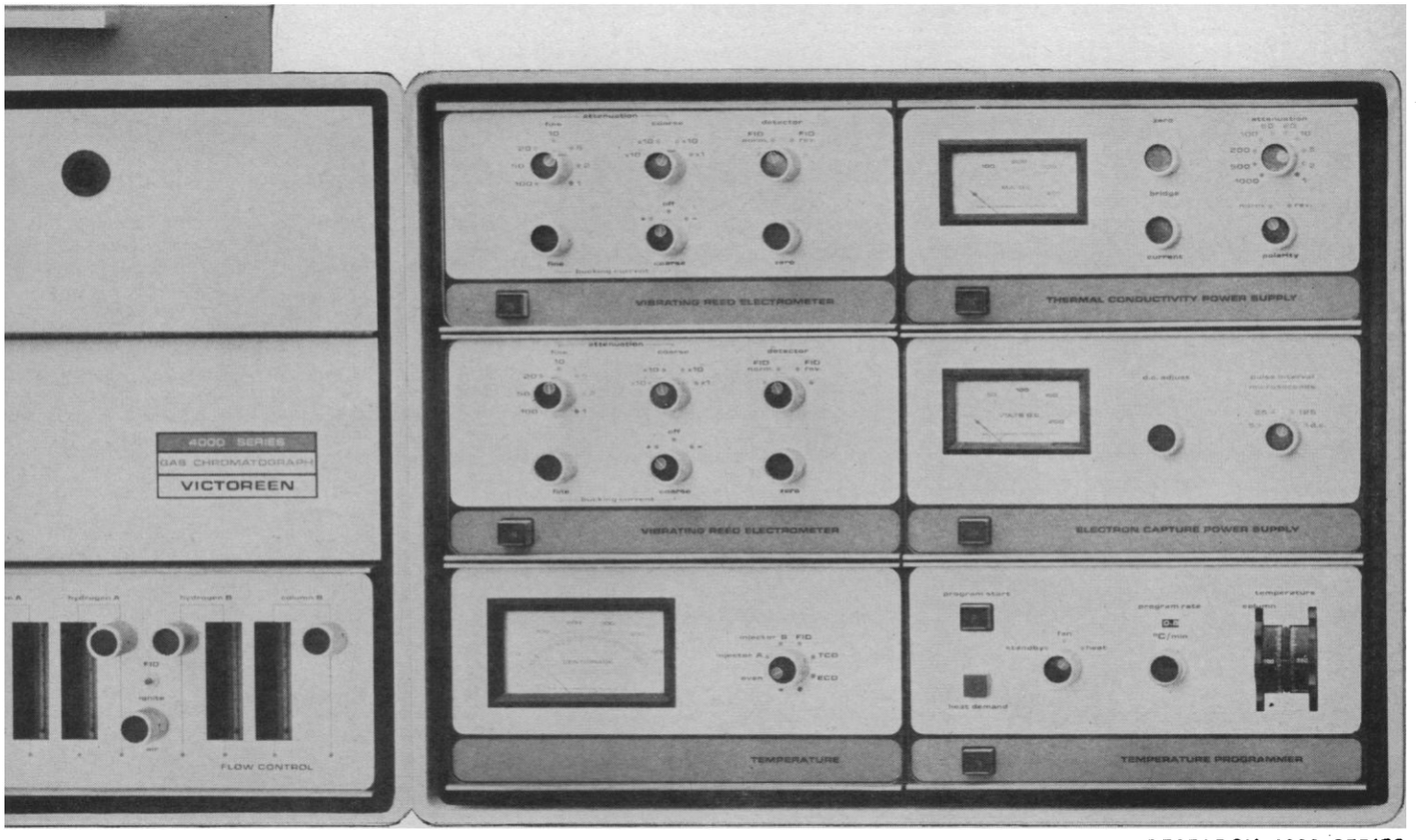

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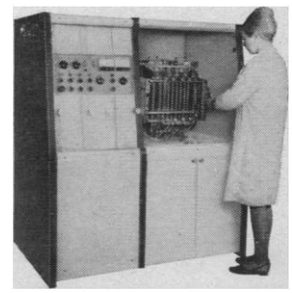
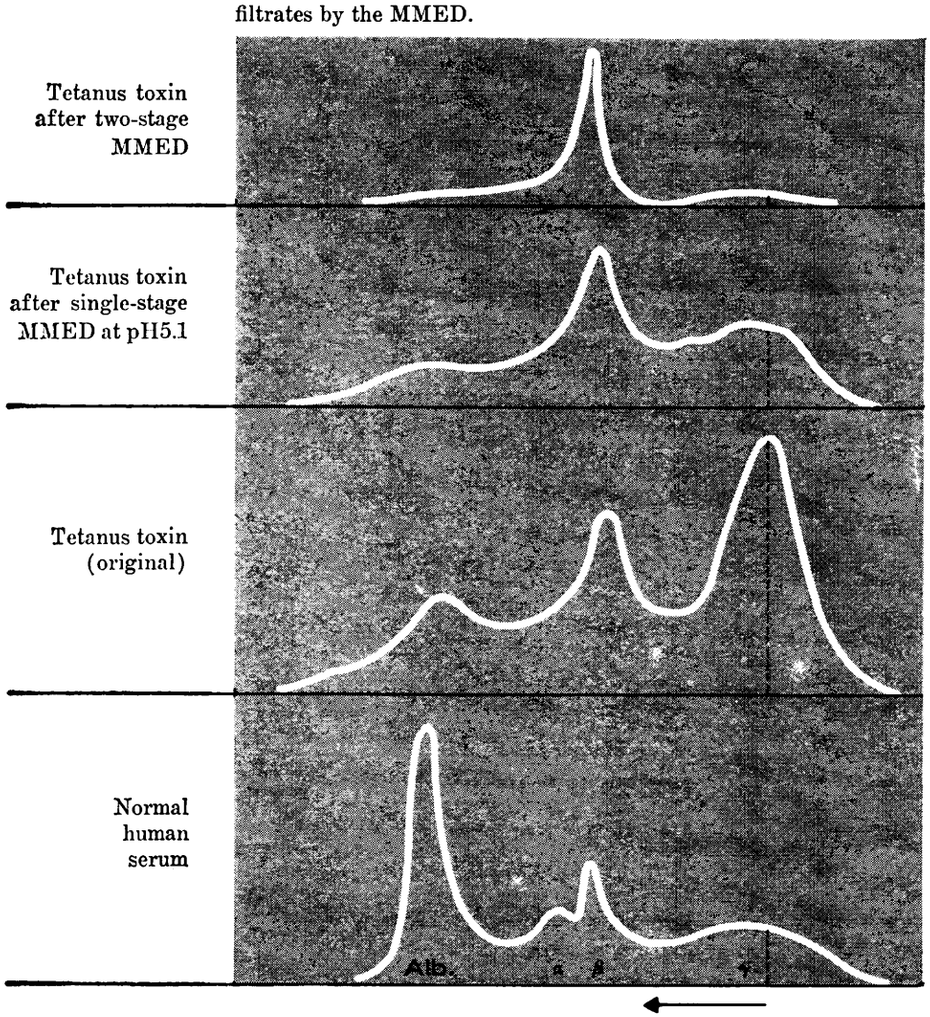


QUICKFIT REEVE ANGEL MULTI-MEMBRANE ELECTRODECANTER

The isolation of the exo-toxin of *Cl. tetani* from crude bacterial filtrates by the MMED.



Electrophoretic analyses of tetanus toxin at various stages in purification, as well as that of normal human serum for reference purposes. Dotted lines show the position of the initial interfaces.

Reprinted by Permission Pergamon Press Oxford and New York—Source Alexander, P. and Block, R. J. "The Separation and Isolation of Proteins Vol. 1 of a Laboratory Manual of Analytical Methods of Protein Chemistry" Pergamon Press, Ltd. 1960.

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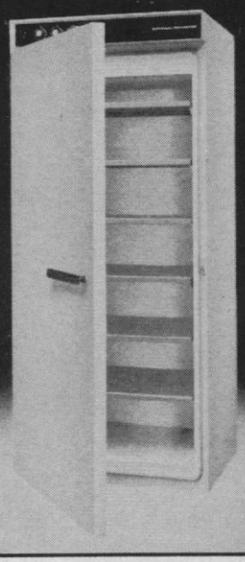

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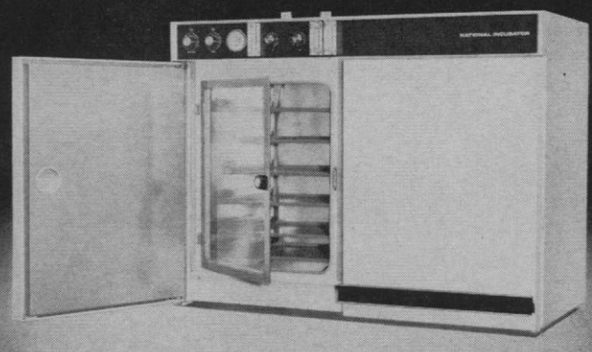
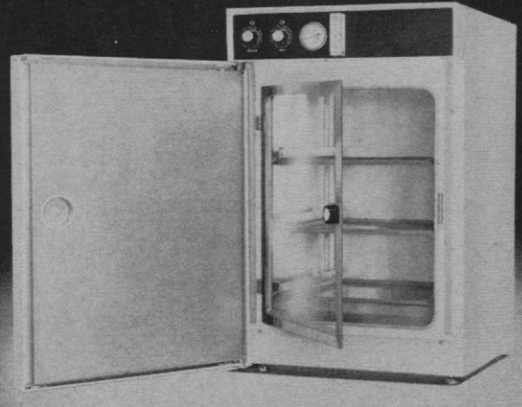
Exterior Size: 36⅛″ x 29⅛″ x 88½″
Interior Size: 31″ x 24½″ x 72½″
Temperature Range: Room to 65°C
Temperature Variation: ±0.5°C
Shelf Capacity: 30 square feet
Electrical: 1500 watts; 115, 208, 230 volts

#3321– WATER-JACKETED CO_2 INCUBATOR



Exterior Size: 46¼″ x 23″ x 36″
Interior Size, Left: 19″ x 18″ x 26¾″
Right: 19″ x 18″ x 26¾″
Temperature Range: Room to 65°C
Temperature Variation: ±0.3°C
Shelf Capacity: 20.5 square feet
Electrical: 500 watts, 115 volts

#3212 WATER-JACKETED INCUBATOR



Exterior Size: 23″ x 23″ x 36″
Interior Size: 18⅞″ x 18″ x 26¾″
Temperature Range: Room to 65°C
Temperature Variation: ±0.3°C
Shelf Capacity: 10 square feet
Electrical: 250 watts; 115 volts

#3211– ANHYDRO INCUBATOR

Exterior Size: 23″ x 23″ x 36″
Interior Size: 18″ x 17½″ x 26″
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Temperature Variation: ±0.5°C
Shelf Capacity: 5 square feet
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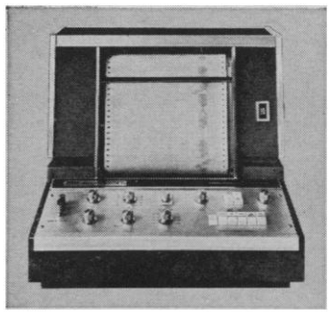
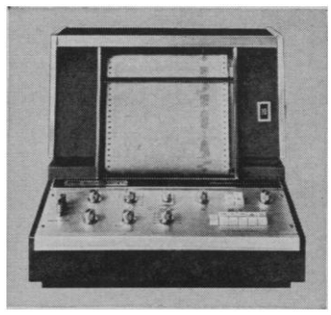
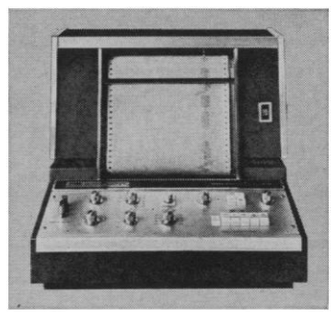
(and the specs tell you why)



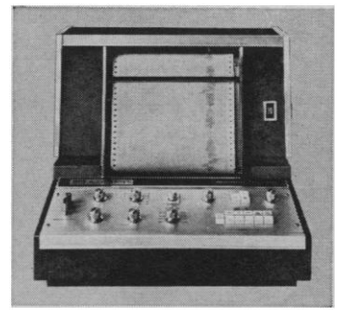
DESCRIPTION: SARGENT MODEL MR RECORDER—automatic, self-balancing, 10-inch potentiometer recorder. Includes special high gain amplifier, and high stability solid state reference power supply requiring no standardization. Line operated.



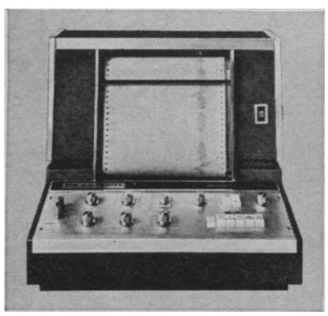
QUANTITY RECORDED: mV, V, μa and ma—selected by panel switch.



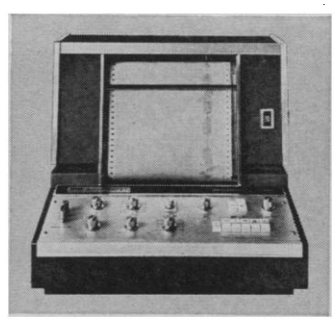
ELECTRICAL RANGE: twelve pre-calibrated ranges by switch selection — 0.5, 1, 2, 5, 10, 20, 50, 100, 200, 500, 1000, 2000. Variable range expansion from 100% (off) to 40% of selected range with continuously adjustable dial.



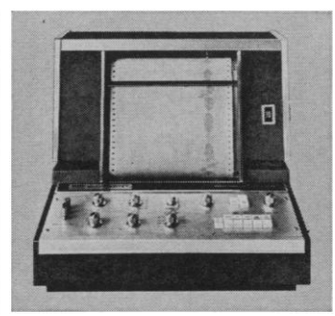
LIMIT OF ERROR: 0.1% or 5 μv, whichever is greater.



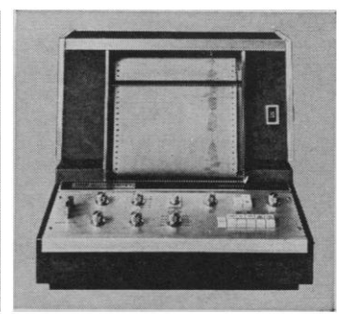
ZERO DISPLACEMENT: calibrated ranges of 10, 100, 1000 and 5000 of the selected units, upscale or downscale. Continuously adjustable reading dial for 0 to 100% of selected range.



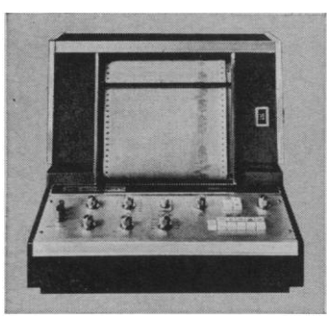
SOURCE RESISTANCE TOLERANCE: 50,000 ohms in most sensitive range, increasing with increasing range.



ELECTRICAL FILTERING: four position switch to reject transverse and common mode A.C. superimposed on the D.C. signal, without loss of sharp balancing characteristics.



PEN SPEED: 1 second for full scale transverse.



DAMPING GAIN ADJUSTMENT: automatic with range change; panel dial for fine adjustment—particularly for low resistance systems like thermocouples.

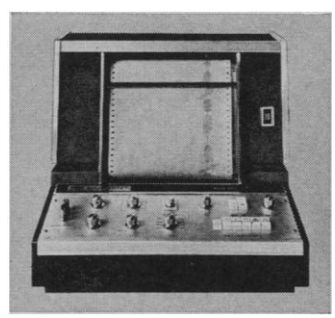


CHART DRIVE: twelve synchronous speeds—0.5, 1, 2, 4, 10, 20—by dial selection, inches per hour or per minute by panel switch. Magnetically braked in "off" position. Free clutch system scans chart with rapid drive; averages 50 feet per minute in forward or reverse directions.

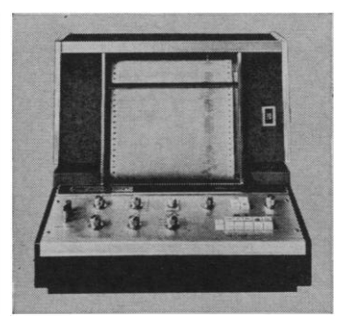
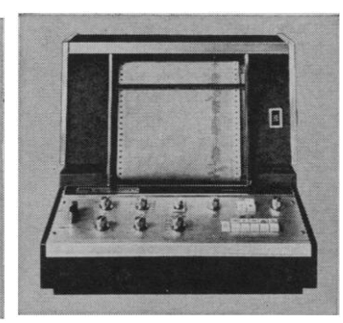


CHART TAKE-UP: automatic, if opted, by motor with preset torque—or by-pass for free end chart tear off.



SYNCHRONIZATION: chart drive may be synchronized with external systems connected to rear panel, and operated by the chart drive switch. Or chart drive may be operated from an external switch.

This gives you some idea why the SARGENT MODEL MR RECORDER can do the work of *several* less versatile recorders, manual potentiometers or precision meters. To get the complete picture, write for Bulletin MR.

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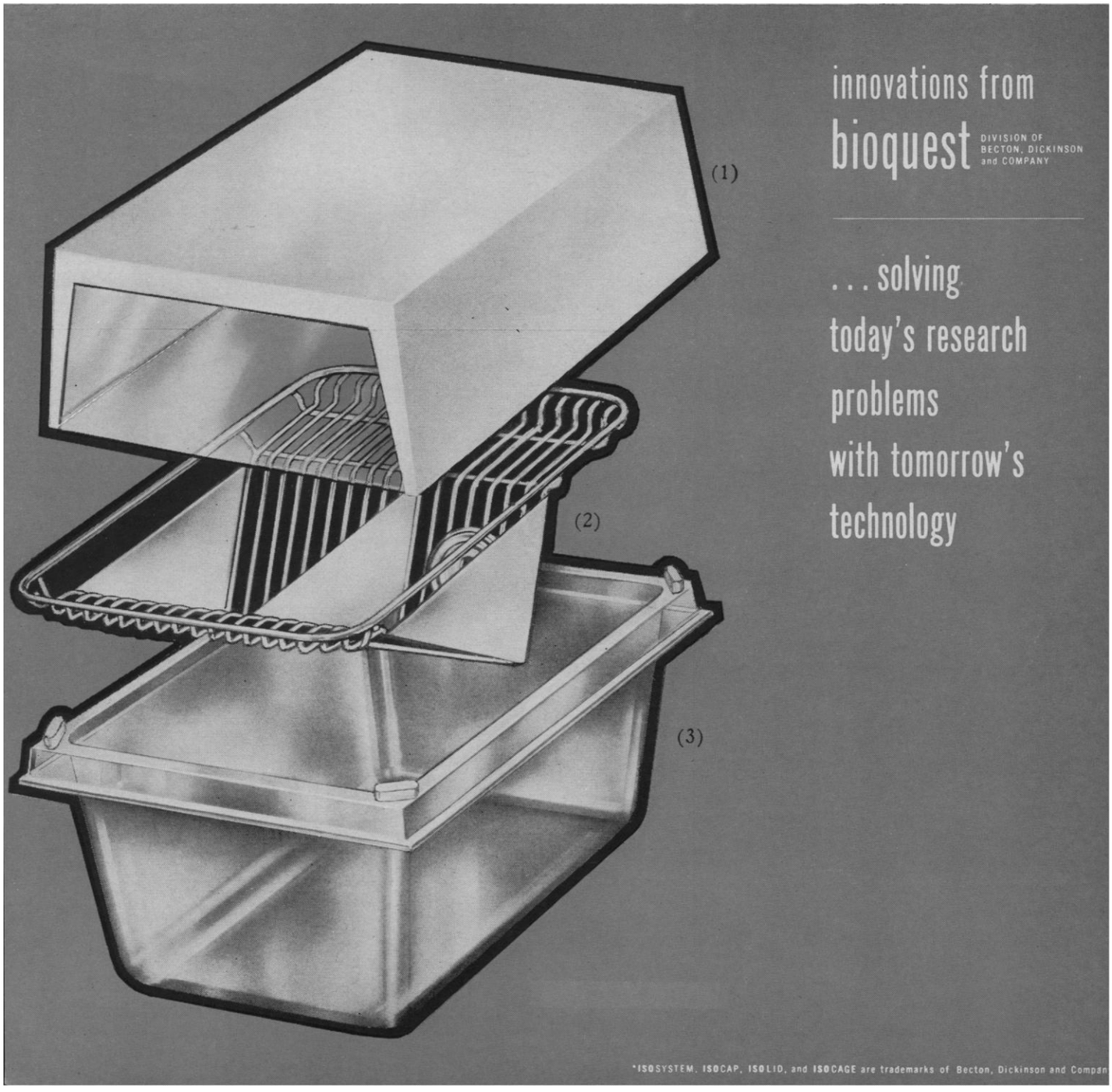

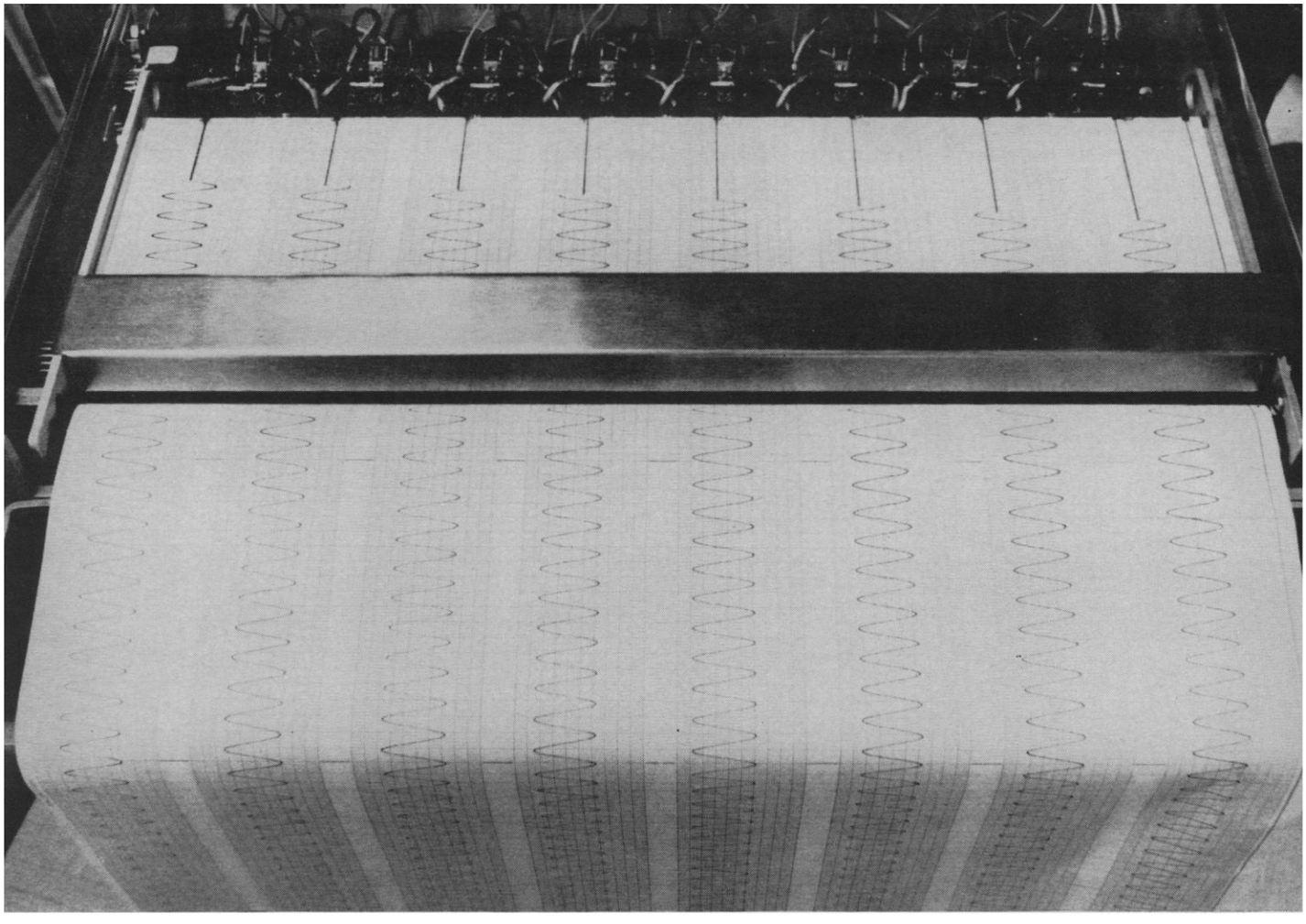

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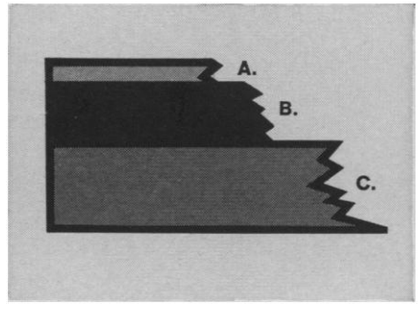

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B. Contrast undercoat
C. Substrate

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Refrigerators

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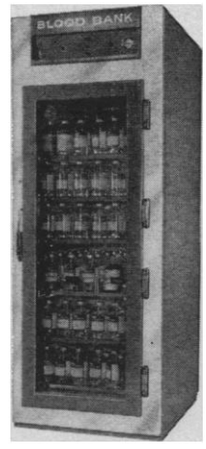
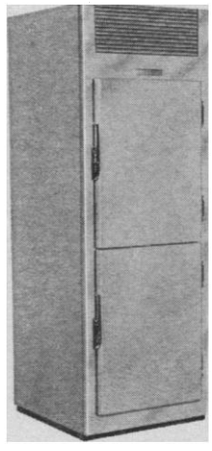
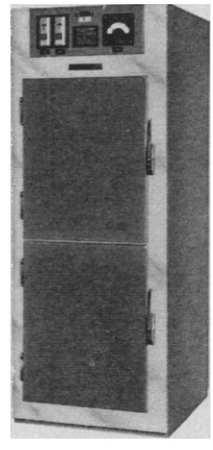


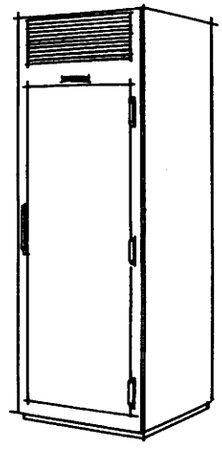
BLOOD BANK



BIOLOGICAL REFRIGERATOR

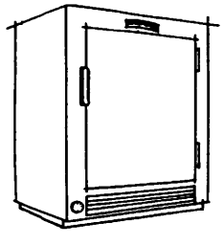


INCUBATOR



Explosion Safe

REFRIGERATED CHAMBER



UNDER COUNTER REFRIGERATOR

A series of refrigerators designed specifically to satisfy the requirements for storage of biological materials, "blood bank" storage, industrial and clinical temperature control needs. These are the products of the Puffer-Hubbard Refrigerator Co., Scientific Division, which stabilized designs of each unit after exhaustive analysis conducted to determine unfulfilled needs of hospitals, schools, laboratories, clinics, and pharmaceutical suppliers for safekeeping of temperature-sensitive materials.

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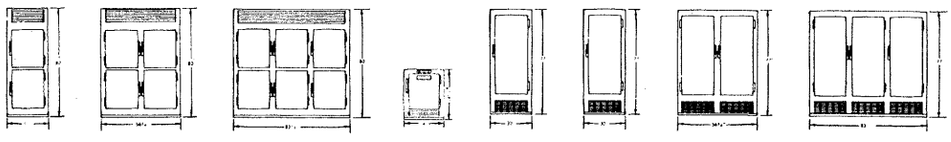

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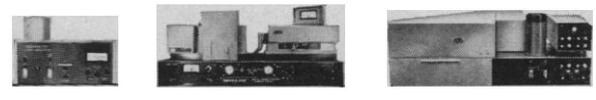
For maximum versatility, no other atomic absorption spectrometer can compare with the 82-500. Based on the famous Model 82-000 Ebert Spectrometer, it contains a unique multi-pass optical system, plus facilities for altering system components and adding new developments. The 82-500 provides the lowest known limits of detection.

For multi-element analysis, the Model 82-600 gives you the first direct-reading polychromator in the atomic absorption field. Precise and speedy, it analyzes very low concentrations of metallic elements in agricultural, biomedical or industrial samples . . . can determine up to 12 elements simultaneously, perform up to 600 analyses an hour.

We'd like to send you complete technical information on the instrument or instruments that interest you. Also available are copies of a new 16mm color sound movie "Atomic Absorption Spectrometry". Write: Jarrell-Ash, Film Library, 530 Lincoln Street, Waltham, Mass. 02154. Tel. (617) 899-4300. Jarrell-Ash (Europe) S.A., rue de la Jaluse 6, Le Locle, Switzerland.



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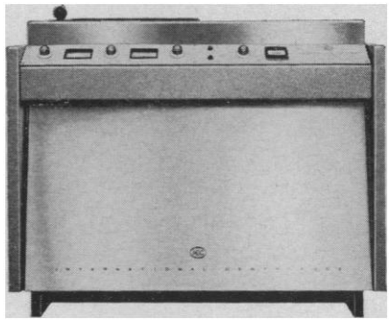

The new IEC B-35.
It provides high-resolution density gradients at 206,200 g in computer-designed long tube rotors. And spins two full liters at 28,500 g!

The new B-35 is a unique concept in ultracentrifugation. This single instrument performs a host of tasks you'd assign to a high speed refrigerated centrifuge. At the same time it provides exceptional capabilities in preparative and high-resolution density gradient research work with enzymes, nucleic acids, viruses and subcellular fractions.

Ten new rotors are available for a wide range of work. Due to new metallurgical and design advances they never need to be derated. Temperature is controlled through a precision thermistorized system electronically calibrated to the rotor. An automatic lock-in speed control and single programming switch insures precise reproducibility of speed conditions for repetitive experiments. The vacuum system provides an operational level below 50 microns in under 8 minutes. The belt-type flexible drive is inherently balanced, vibrationless and requires only eye-level rotor balancing techniques. At 35,000 rpm the B-35 is whisper-quiet.

If you have space problems in your lab, this one instrument that does the work of two will give you an extra bonus, space conservation.

Write for bulletin B-35.

INTERNATIONAL (IEC) EQUIPMENT CO.

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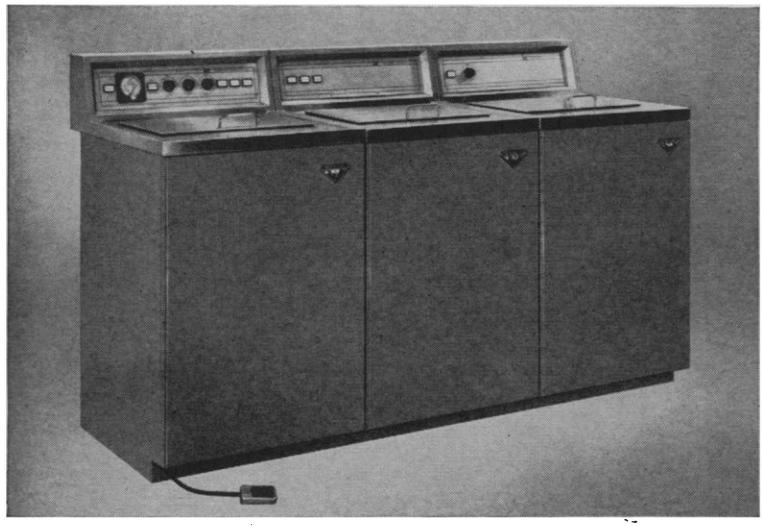
We've got three reasons why you should quit cleaning organic, inorganic and mineral contaminants the hard way.



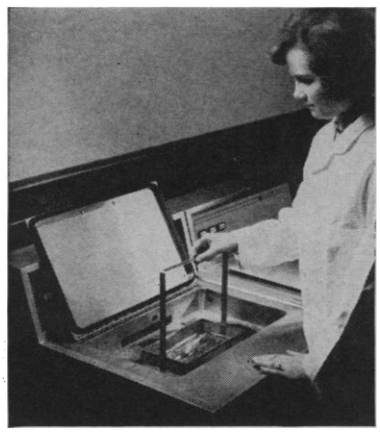
Blackstone's new 3-Console Ultrasonic Cleaning System.

This new Blackstone cleaning system processes organic, inorganic and mineral-contaminated items faster and better than any other cleaning means known. Designed for use with water base detergents, it gives you ultrasonic scrubbing, spray rinsing and air drying. For complete arrangement flexibility, each operation is housed in a matched, free-standing console.

The 3-Console System is equally at home (and versatile) in laboratory, hospital and industrial facility. It provides precise cleaning of a variety of contaminated objects, such as laboratory and hospital instruments and glassware, electronic transistors and diodes, and objects contaminated by radioactivity.

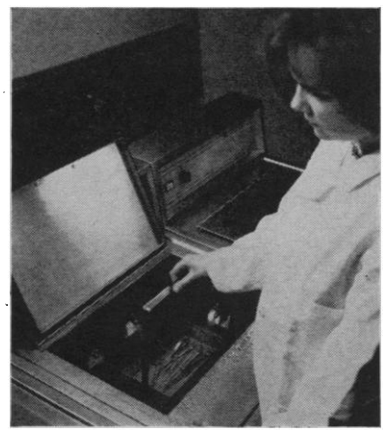
Three ultrasonic tank sizes are available: 12″ x 12″ x 9″ liquid level, 12″ x 18″ x 12″ liquid level, 18″ x 24″ x 15″ liquid level. Lead zirconate titanate transducers operate at 23 kc. nominal range and are mechanically held by a retainer silver-brazed to 316 L stainless steel tank bottom. Generator output is manually controllable from 0 to 100%—a Blackstone first.

Console cabinets are available in your choice of either baked enamel finish with stainless steel tops, or stainless steel throughout.



Ultrasonic Cleaning Unit

Pre-set repeat cleaning cycles or continuous operation made possible by timer cut-out switch.



Spray Rinse Unit

Multiple and adjustable spray heads around inside perimeter provide converging spray on objects being cleaned.

Air Dryer Unit

Drying chamber with heating elements, exhaust-type blower and air filter provides forced hot-air drying of cleaned items.

See us at Booth A-108, Federation of American Societies for Experimental Biology Show, April 12-16, or for literature on the 3-Console or any other Blackstone ultrasonic system, write:

Blackstone Ultrasonics, Inc.

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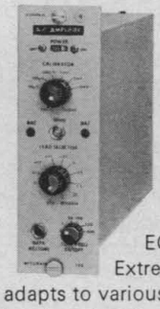
Now—complete flexibility in measuring ECG, EEG, EMG, PCG, Respiration, Blood Flow & Pressure with compatible solid-state medical amplifiers from Honeywell

For new ease in conditioning signals while making physiological measurements, Honeywell introduces four fully compatible solid-state amplifiers. Designed to be used singly or in combination, these modular size units (2" x 7" x 12") will add a great measure of flexibility to your electronic monitoring/measuring system.

ACCUDATA 108 AC AMPLIFIER

Providing amplification of low-level signals such as ECG, EEG, EMG, and PCG, this battery-powered, wideband



differential unit offers high input impedance and low noise level. It features 6 low frequency cutoff filters, square wave calibrator at six voltages, and an ECG lead selector switch. Extremely versatile, the 108 adapts to various measurements simply by changing the sensor, and when used with the companion Accudata 109, serves as a preamplifier for parameters requiring high-frequency recording.

ACCUDATA 109 DC AMPLIFIER

A direct coupled, wideband, medium-gain differential amplifier featuring 4 high-frequency cutoff filters. The 109 will drive fluid-damped galvanometers and other floating or grounded recording or display devices. Its power source can be used as a supply for a single strain gage such as the Statham P23Db pressure transducer, and when a gage control unit is added, the result is complete signal conditioning for an amplified blood pressure channel.

ACCUDATA M104 DC AMPLIFIER

The M104 is a direct coupled, medium-gain amplifier with step gain control providing recorder sensitivities of 400, 200, 100, 50, and 25mm Hg full scale for blood pressure measurement. The amplifier provides the functions of meaning and differentiation of the analog blood pressure signal. The pulsatile/mean and differentiated outputs may be used simultaneously.

IMPEDANCE PLETHYSMOGRAPH

This compact 3½" x 19" unit is designed to measure the basal impedance of biological segments as well as the pulsatile changes in impedance which accompany cardiac and breathing cycles. The Electrical Impedance Plethysmograph employs a selectivity-tuned 50 Kc oscillator, buffer amplifier, and a four-electrode, modified Kelvin double bridge. In use, electrodes are connected to the examined segment, the bridge is manually adjusted, and the bridge balance is read on a front panel mounted null meter. The amplifier's output is adaptable to a wide range of recording devices, and integral calibration capability for both shunt and substitution techniques is provided.

Honeywell . . . for one-source responsibility in medical electronics. For complete specifications and information on Honeywell data acquisition capabilities in the field of medicine, including literature on Honeywell's comprehensive line of medical sensors and transducers for Honeywell medical amplifiers, please mail the coupon below.

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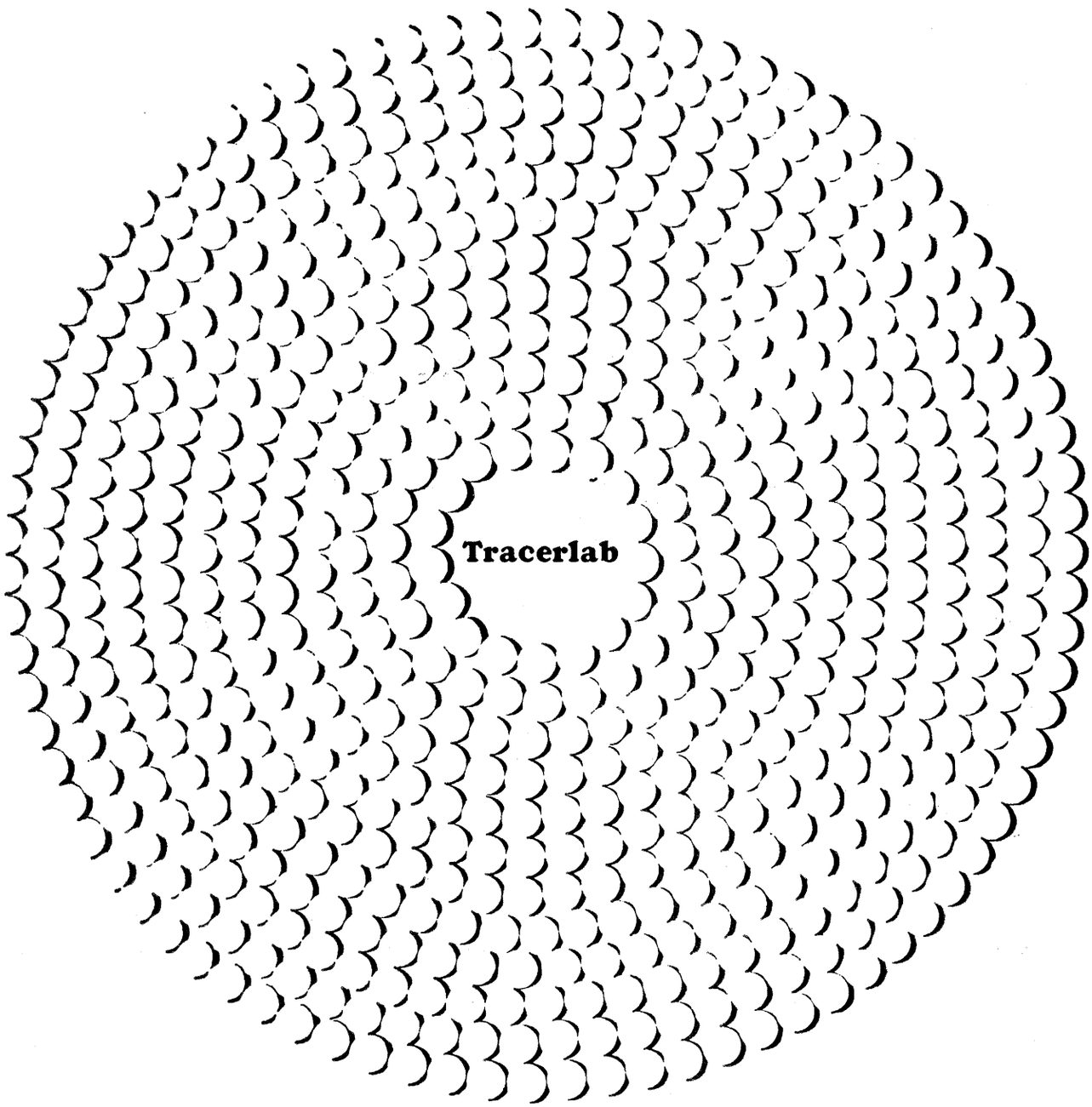

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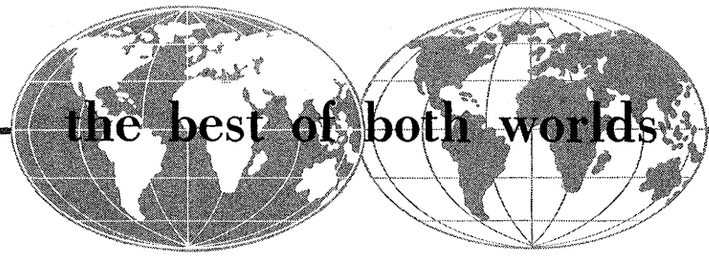
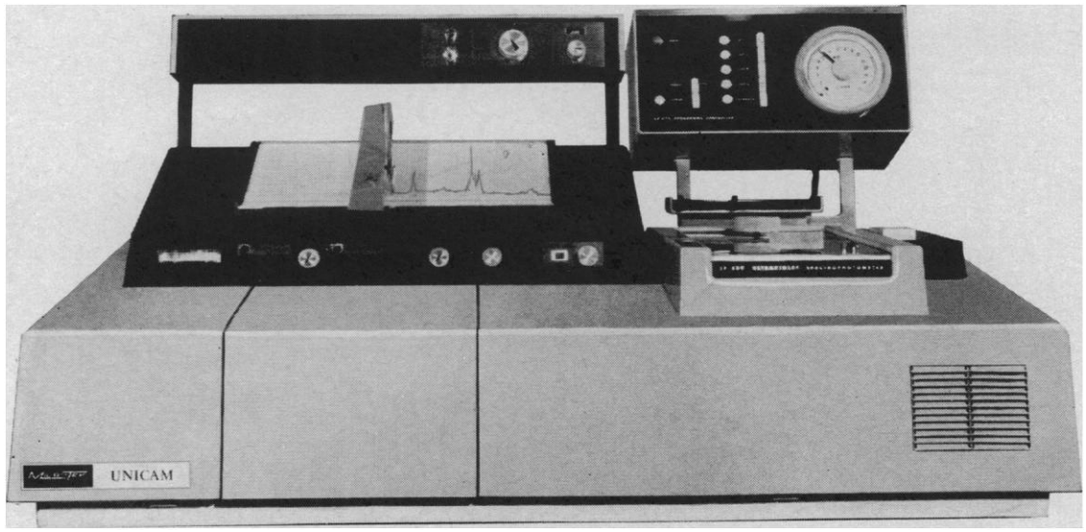
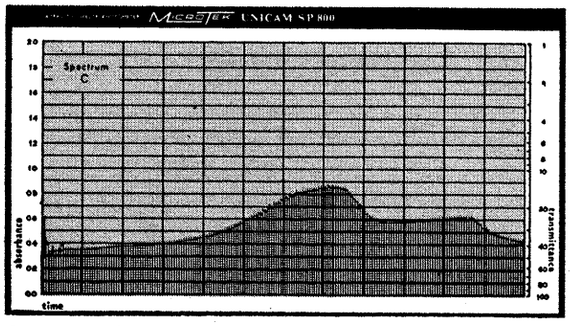


PRESENTS SP800 Double Beam Automation In Enzyme Analysis



At last you can realize the full potential of a double beam recording spectrophotometer *plus* automatic multi-sampling at fixed wavelengths or recycling over any wavelength range.

A recent marketing agreement between Micro Tek and Unicam makes it so easy.

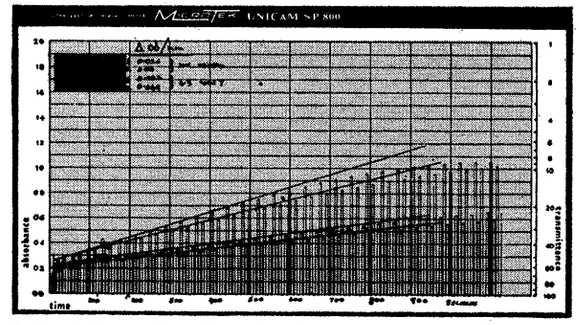


Emergence of bacteriological toxins from a single liquid column. Measurements at 270 mu every 3 minutes.

The SP800 Spectrophotometer is ideal for routine recording of all standard spectra in the ultraviolet and visible. It is robust and simple to operate but presents many advanced design features including a unique capability with turbid solutions.

Why settle for less than the fully automatic double beam compensation of the SP800?

The maximum capacity with automatic selection of 4 sample and 4 reference cells permits sophisticated experiments in enzymology without the tedious calculations often involved in single beam instrumentation.



Each of 4 sample cells and reference pairs is examined for 5 seconds in turn and repeated indefinitely.

Zero drift in this null balancing system is simply specified; there is none. The SP800 has a maximum linear wavelength scale of 190-850 mu. For more details simply call your area Micro Tek Sales Engineer or write to the Home Office.

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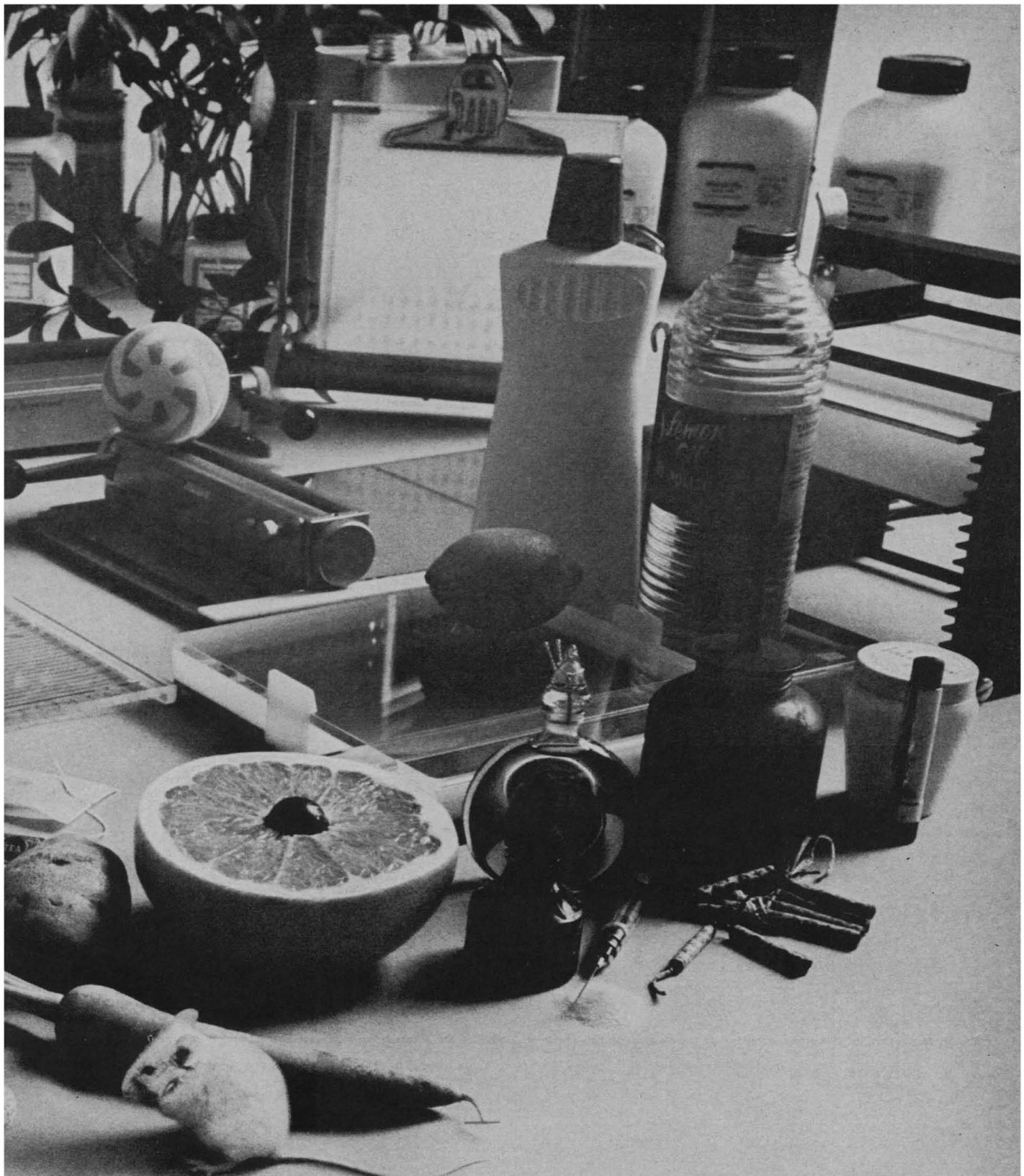
Whatever you want to separate — we have all the TLC chemicals and equipment you need. We offer the largest selection of basic apparatus and various pre-coated systems including new pre-coated foils, new pre-coated glass tubes, and new pre-coated glass plates. Over 50 different chemicals are in stock, special sorbents for analytical TLC and brand new grades for preparing layers up to 5mm thick. For those with more specialized needs we have the original B-N Chamber for horizontal and vertical development, continuous flow



and temperature controlled separations. We supply equipment for Sandwich Development, Gradient Layer Application, Thin Layer Electrophoresis, and Preparative TLC. And we have the only 2-D Radiochromatogram Scanner specifically designed for TLC. If you need reference sources, we have the most comprehensive bibliography currently available. Our Applications Laboratory will provide information on routine problems free of charge—consultation on more complicated problems at reasonable rates. For full details write to:

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The activity center of the LOWBETA® II and WIDEBETA™ II Radioactivity Counting Systems is the detector and shield assembly. It has been specially designed to provide the lowest background possible—0.5 cpm, at ranges up to 50,000 or 1,000,000 cpm.

LOWBETA II is a moderate cost, highly sensitive, low background system that counts alphas and betas at rates up to 50,000 cpm. WIDEBETA II is the ultimate in a wide range, high sensitivity, low background system that counts from 0.1 to 1,000,000 cpm with less than 1% dead time loss.

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LOWBETA II AND WIDEBETA II Counting Systems incorporate the most advanced concepts in high-speed alpha and beta counting. Their completely transistorized electronics insure reliable, precise performance.

For more information on Beckman Planchet Counting Systems, contact your local Beckman Sales Engineer or write for Data File LN-166.

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Is ersatz ever better?

(Or: is it excessively presumptuous to claim—as we do herein—that our new reconstituted C^{14} protein hydrolysate is always all ways better for protein labeling than a natural C^{14}protein hydrolysate?)

The problem with using a natural yeast or algal C^{14} protein hydrolysate for protein labeling is that you *start* your work with numerous and varied unneeded unknowns since the natural hydrolysate is relatively crude and may contain as much as 30-40% of non-amino acid material. And who needs such gratuitous complications?

The uncertainty that comes from undefined and unwanted contaminants can now be avoided by using our new reconstituted C^{14} protein hydrolysate which consists of C^{14} amino acids (and C^{14} amino acids *only*.) This product is exclusive with us. At least for the nonce.

Our work gets started (as *yours* shouldn't) with the typically unpredictable C^{14} yeast hydrolysate. But its amino acids are then separated and purified and the extraneous materials eliminated. At this point we have the individual amino acids, each with a *minimum* radiochemical purity of 99%. Thirteen of these are then recombined so as to mimic closely their proportions in the natural hydrolysate.

Two things can now be said about this reconstituted protein hydrolysate: (1) it has a 100% biosynthetically-prepared L-amino acid composition, and (2) all of the amino acids are uniformly C^{14} labeled. Or, more simply: this mixture is free of any non-amino acid material, hot or cold, and all of the amino acids are hot.

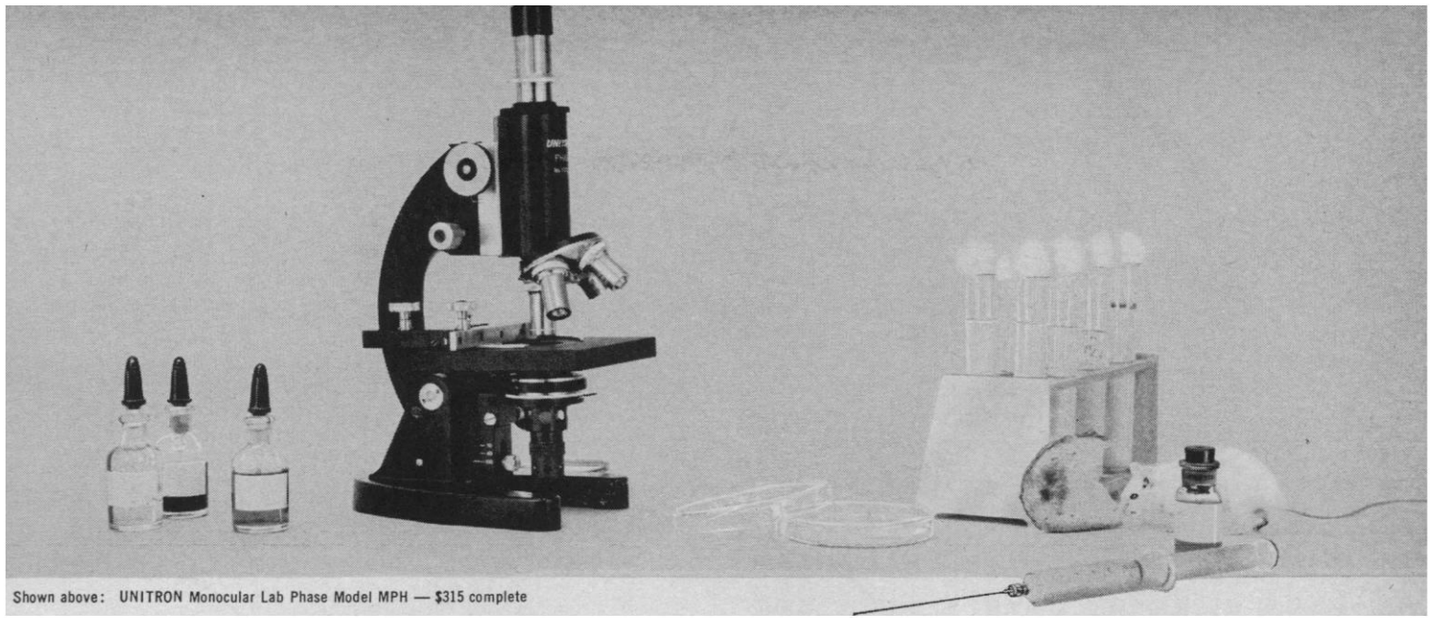
If you reached this point assuming that the extra processing, the extra purity, the extra convenience to you, is going to *cost* you extra—forget it. It won't. Rather surprisingly, 100 μc of this C^{14} reconstituted protein hydrolysate costs only $35. 500 μc is $170. 1 mc runs $320. And 2 mc a mere $600. (For a pleasant surprise, compare these prices with what you now pay for the crude natural product.) Also, please note that you get a Product Analysis Report with every shipment with the specific activity of each of the component amino acids. The other specifications for this product look like this:

	sp. act. mc/mmole	μc/mc of mix.		sp. act. mc/mmole	μc/mc of mix.
L-Ala-C^{14}	> 70	80	L-Phe-C^{14}	>168	80
L-Arg-C^{14}	>130	50	L-Pro-C^{14}	>110	50
L-Asp-C^{14}	>110	125	L-Ser-C^{14}	> 85	80
L-Glu-C^{14}	>165	125	L-Thr-C^{14}	>100	80
L-Ileu-C^{14}	>110	100	L-Tyr-C^{14}	>150	80
L-Leu-C^{14}	>130	50	L-Val-C^{14}	>100	50
L-Lys-C^{14}	>180	50			

mixture of purified L-amino acids is in 0.01 *N* HCl/ 100 μc vials contain 100 μc/ml / all other vials contain 1 mc/ml

One interesting final point: we also have a mixture that is comparable in essentially every respect to the reconstituted protein hydrolysate shown above but with only these four C^{14} essential amino acids: arginine, leucine, lysine, valine, and with total activity divided equally among these. This too is new. We call it our C^{14} L-Amino Acid Protein Labeling Mixture (catalog no. 3122-06). It, and the reconstituted protein hydrolysate (catalog no. 3122-08), are immediately available to you from stock. Write, or call us collect at 914-359-2700. Ask for Maryann.

Schwarz BioResearch, Inc.
ORANGEBURG, NEW YORK 10962



Shown above: UNITRON Monocular Lab Phase Model MPH — $315 complete

There are 3 microscopes in this picture

...at a distinctly singular UNITRON price

Most lab microscopes are used for ordinary *brightfield* studies.

So is UNITRON's MPH.

Some lab microscopes can also be used for *darkfield.*

So can UNITRON's MPH.

Still other lab microscopes offer *phase contrast* to aid in the study of *living, unstained* material.

So does UNITRON's MPH.

Until now, no lab microscope has provided all 3 for the price of 1.

UNITRON's MPH does. The 3 most important techniques of microscopy are built-in, yet the MPH costs less than many single-purpose microscopes.

That's not all. UNITRON's MPH gives you more than just the advantages of 3 specialized microscopes. It unites them in "Continuous-Transition Microscopy." With a turn of the condenser knob, you change from *brightfield* to *darkfield* to *phase contrast,* all in rapid succession. Operation is so easy, it's almost automatic. There are no accessories to attach and no time-consuming adjustments to make. Everything has been factory-centered for you. Even the light source is built-in and permanently aligned.

Have cost and complexity kept you in the dark about phase? If so, you're in for a treat UNITRON phase contrast will impress you all the more if you've tried to study *unstained, living* material with ordinary brightfield microscopes. There's no need to close the iris to pinhole size, reducing resolution and detail. Gone are those ghostly artificial images.

UNITRON Phase Contrast provides optical staining. You get the benefits of chemical staining, without the time-consuming preparation. And what's more, you see material *alive* with vivid contrast and pin-point detail. With phase, even your stained slides show unsuspected details. All this, without any special effort.

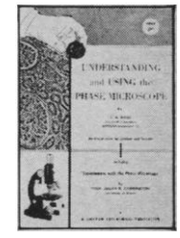
There's more. UNITRON's built-in illuminator provides five intensities . . . more than enough to meet your visual and photographic needs. Even the eyepieces are special . . . the widefield type for comfortable viewing.

And now, the moment of truth. The price. Only $315 for UNITRON's Monocular Laboratory Phase Model MPH . . . less than you pay for many ordinary brightfield lab microscopes. The Binocular Model BPH, with several additional features of its own, costs only $527.

UNITRON prices include everything but the specimens. In addition to all the special features of our phase models, you'll find everything else you expect in a good lab microscope. Four achromatic objectives (including high-power oil-immersion), mechanical stage, focusable substage condenser with iris diaphragm and filter system, fitted cabinet, etc. These, and all the other features we've described, are standard equipment with UNITRON. *There are no hidden extras to buy*

Too good to be true? You needn't take our word for it. Borrow a UNITRON Monocular MPH or Binocular BPH for 10 days. No cost or obligation. (We'll even pay shipping charges for a chance to let you put our microscope through its paces.) Give this UNITRON an opportunity to prove its value in your lab. We think it will sell itself.

Teachers will be interested to learn that UNITRON even offers *student phase models* for as little as $99. To introduce phase to the student lab, and to other areas where it has been a stranger, UNITRON has published a fully illustrated 64-page booklet, *Understanding and Using the Phase Microscope.* The text includes a special chapter of experiments written by Professor Julian D. Corrington of the University of Miami. Other subjects are covered, including the optical theory of microscopes in general. The booklet normally sells for $1 00 but we will be glad to send a free copy to any interested teacher or researcher



Ask for a free 10-day trial. Please specify whether you want to try Model MPH or BPH. A phase booklet is shipped with each microscope . . . or, you may request the booklet separately.

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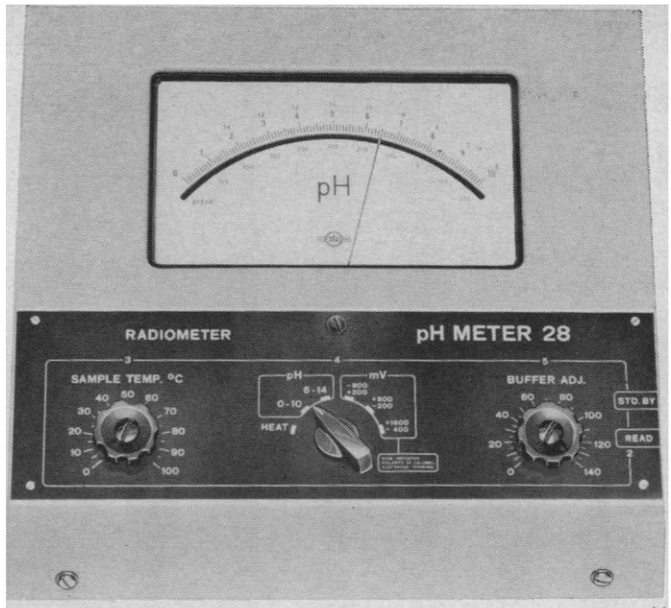
pH Measurement

pH Control



Teamwork: The basis of Radiometer systems for measuring and controlling pH.

The pH meter above is a Model 28, ready to measure pH accurately and dependably. It is typical of the several fine Radiometer models from which the one best meeting your particular requirements can be selected. The Titrators below are designed to team up with the pH meter either singly or in pairs.

One of these economically priced model 11s adds the facility to perform all types of end-point titrations automatically, or to control pH in one direction.

Two of them provide control to maintain a constant pH regardless of which way the pH is changing.

The variety of delivery systems and recording facilities available provides for even more potent combinations. Write for more detailed information on how to put a Radiometer team to work for you.

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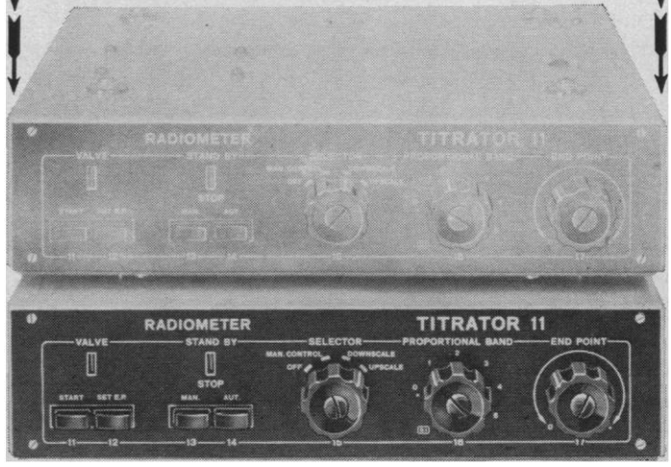

If you work with organic chemicals and don't have the J.T. Baker BATCH Directory... you're missing a valuable new tool!

The location of organic compounds by structural and atomic characteristics takes time. That's why J. T. Baker's BATCH Directory program was undertaken to help you solve this problem for the more than 5,000 organic compounds now in J. T. Baker's Laboratory chemicals line.

What is a BATCH Directory? A BATCH Directory is a listing of chemical compounds according to an easily mastered structural-atomic code, the BATCH Number. The J. T. Baker BATCH Directory lists the BATCH Number, commodity name, and commodity number for J. T. Baker's offerings. This Directory program provides valuable working aids to those interested in organic synthesis or medicinal chemistry—including technologists and chemistry-oriented purchasing agents.

What is a BATCH Number? A BATCH Number is a 5-digit code that classifies a compound of carbon according to the following number measures. It works like this:

The B-digit (B = Basis or Benzene ring number) relates to the nature (and number) of rings present.

The A-digit (A = Atomic class) is assigned according to the nature (and number) of atoms present other than carbon and hydrogen.

The T-digit (T = Total heteroatom count) relates to the total number of atoms present other than carbon and hydrogen.

The C-digit (C = Carbon-atom count) is the units value of the number of carbon atoms in the empirical formula.

The H-digit (H = Hydrogen-atom count) is derived from the number of hydrogen atoms in the empirical formula.

You'll find the scheme for assigning a BATCH Number in the Introduction to the J. T. Baker BATCH Directory and also in J. T. Baker Laboratory Chemicals Catalog 660 just released.

What can the J. T. Baker BATCH Directory program do for you? With a few minutes spent in mastering the assignment of a BATCH Number, you can have the J. T. Baker BATCH Directory work for you. For example, from the more than 5,000 compounds of carbon in J. T. Baker's Catalog 660 you can establish 1) what members of a class of structures are offered, 2) what substitution products of a structure are offered, and 3) what isomers or homologs of a structure are offered. This Directory can also assist in establishing the commodity name and number for a compound where a systematic name has not been devised or where only a partial structure is at hand.

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In the interests of *your time*, take the time to complete the coupon for your copy of 1) the J. T. Baker BATCH Directory, 2) the special BATCH Directories on halogen, hydroxy, and cyclic nitrogen compounds, and 3) J. T. Baker Laboratory Chemicals Catalog 660.

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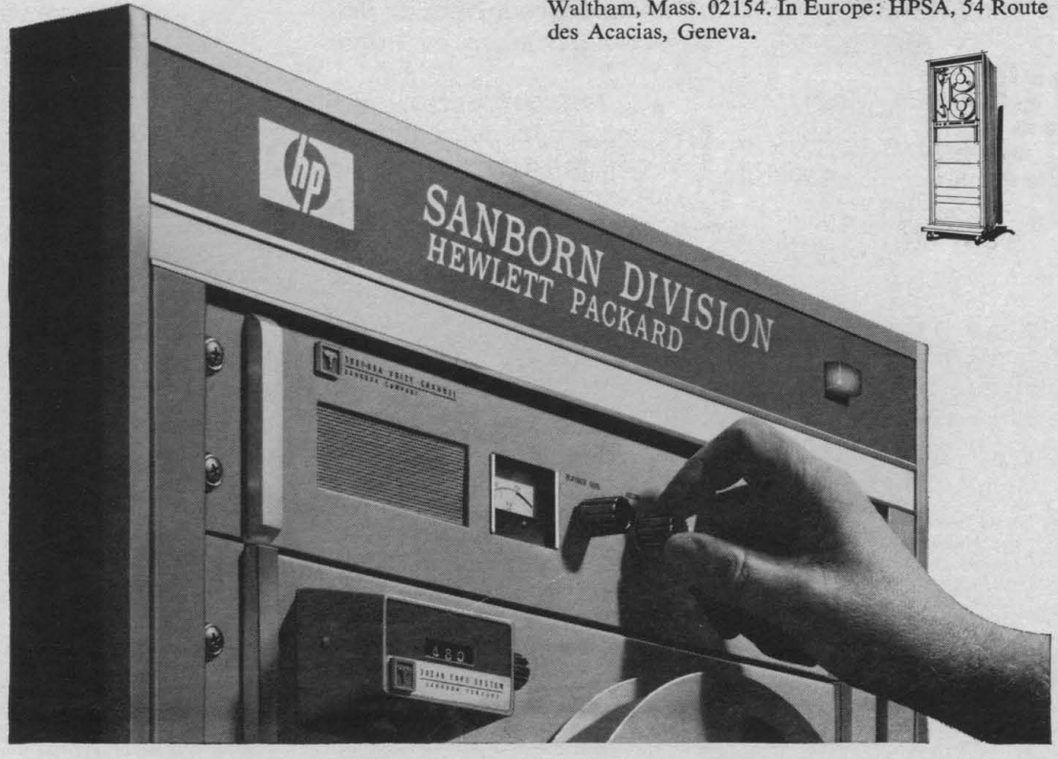

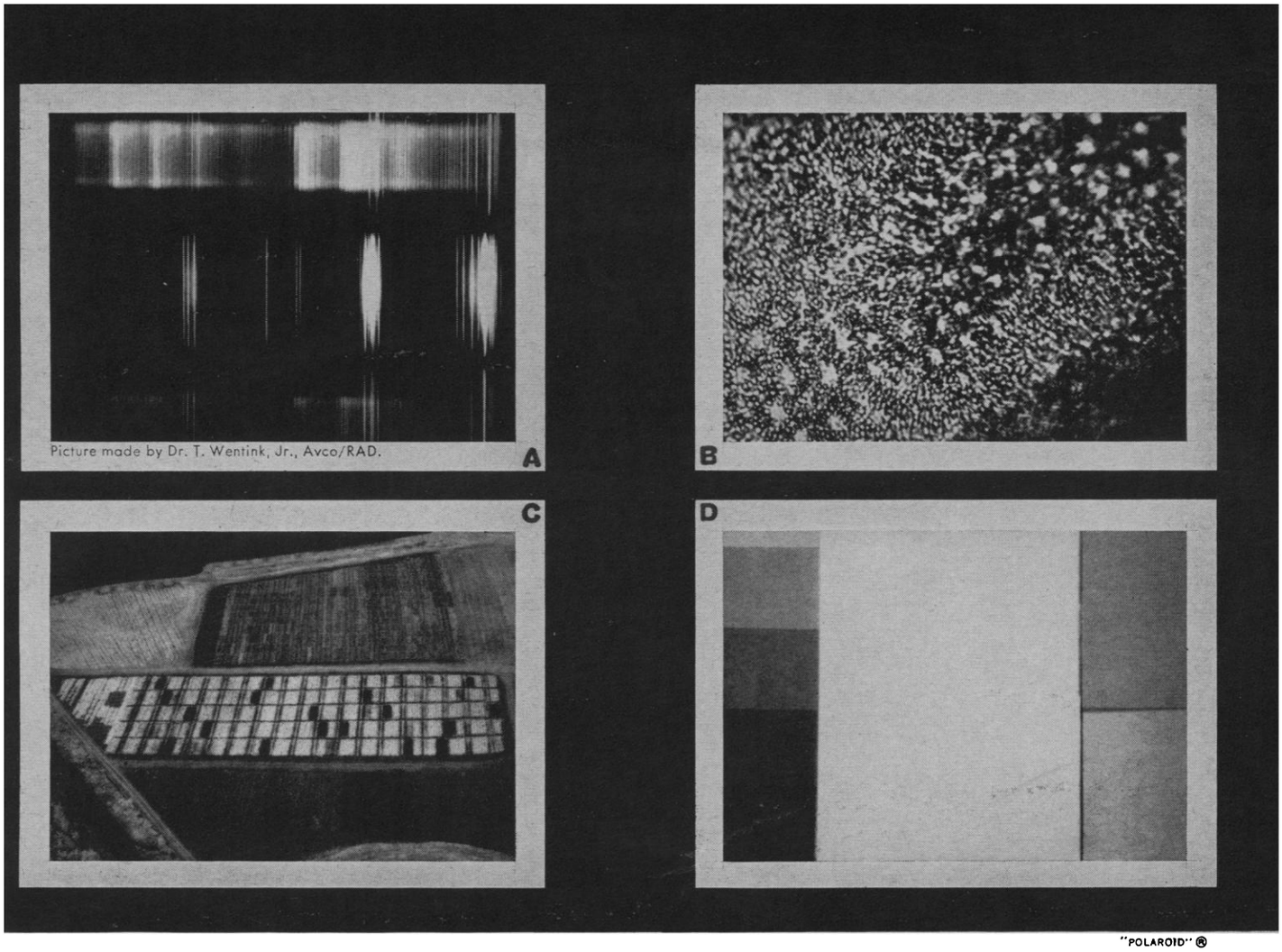

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Polaroid's latest film brings you information from the infrared in 15 seconds.

It's called Polaroid Type 413 Land Infrared Film. Its spectral sensitivity extends from the visible into the infrared beyond 9000Å, peaking at 8400Å. Its development time is 15 seconds.

Being able to see your infrared pictures on the spot has important advantages. You can go ahead with testing or experimentation uninterrupted. If you need a record of spectrographic data, for example, you've got it then and there. **Picture A**—arc emission spectra, 6000Å-8800Å—is an example of the sharp, detailed record you get after a 15-second pause in operations. (Top and bottom records are CN spectra, middle record is a copper spectrum.)

Also, if your picture requires special or elaborate equipment, Type 413 film saves you the risk of having to set it up twice. **Picture B,** for example, a microspectrograph of the cones of the retina, required the use of infrared lighting because visible light causes bleaching of the pigments. The scientist who took it saw his results immediately and knew he had a perfect picture while his set-up was still intact.

While on-the-spot recording is the most important advantage of this remarkable new film, it isn't the only one. Type 413 film is also three times as sensitive as conventional infrared films. Its A.S.A. equivalent speed is 800 without filters. Since this permits faster shutter speeds and smaller lens apertures, the film is ideal for applications like aerial photography. In **Picture C**—an aerial shot of a potato field used for plant pathology testing—you can see how clearly the film was able to record the fungus-infected areas (dark rectangles) using an extremely fast exposure setting. Shot was made at f/32 and 1/300th of a second.

And Type 413 film is as easy to use as any other Polaroid Land film. It can be used in almost all standard Polaroid Land cameras and camera backs using Series 40 film and the procedure is the same. Just snap the picture, pull the tab, and peel off the finished print in 15 seconds. Because it's as simple as that to use, the film will enable technicians and other personnel who may not be trained photographers to take perfect infrared pictures whenever they're needed. **Picture D,** for example, a record of the infrared reflectance of concrete curing compounds, is a type of photograph often called for in materials testing—and any Sunday photographer could have filled in and done the job.

Because of these advantages, Type 413 film will have wide use in almost every field of industrial and scientific photography. In laser research, spectrographic analysis, specialized industrial photography where heat is a factor, plant pathology, general medical research—wherever there is a need to investigate the infrared.

If you would like to know more about our latest film, write to: Sales Department, Polaroid Corporation, Cambridge, Mass. 02139.

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How to rent a mass spectrometer for three full months for $794.

(And then how to get $715 of that back.)

We are about to describe a procedure for putting a mass spectrometer in your laboratory for a full three-month period for a maximum cost to you of $794. Honest. (And the *minimum* cost can be even lower than that.) So if you have ever wished to try mass spectroscopy, this may be the time to begin.

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The MS-10 was initially introduced in 1960 by AEI (the world leader in mass spectrometry). Since then, hundreds have gone into service throughout the world and, quite literally, there are now more MS-10's being used than any other mass spectrometer. By far. As a result, the MS-10 has been applied to more end uses than any other piece of equipment. The implication of this: the chances are good that, whatever *your* application, someone has already applied the MS-10 to it.

And comprehensive technical information on the use of the MS-10 for these many applications is available to you. Because of this, you usually don't have to start your work from scratch with an MS-10.

There are many accessories and vacuum systems available for the MS-10. Consequently, you need choose only those elements which fit the MS-10 to your specific requirements. These accessories — and every subsequent MS-10 development — are designed for easy adaptation to all existing instruments. The MS-10 will never become obsolete.

Now, we'll happily rent you an MS-10 for three months for a total cost of $794. Then, should you decide to buy it within the three-month period, 90% of your rental fee ($715) is credited to the low purchase price of $5,290.

We might as well admit that people inevitably buy the MS-10 after they've tried it. So we love to rent them. We've obviously learned that it makes sense to put the MS-10 on the road to sell itself. (To short-circuit this sequence, why not skip the rental and consider buying the MS-10 immediately?)

For more on the instrument, write for bulletin M1S3. For more on *renting* the instrument, write for bulletin RM1S3. For more on both, write for both.

PICKER NUCLEAR: 1275 Mamaroneck Avenue, White Plains, N.Y. 10605

PICKER
AEI

ing to pay the additional cost of dual brakes. In my opinion the difference in cost would be so small that buyers wouldn't feel it. (The American Motors design consists of a simple mechanical separation in the master cylinder between the flow of rear-wheel brake fluid and the front-wheel brakes.) The industry has been busy selling a "new" brake innovation, disc brakes. The disc-brake patent is more than 40 years old and is in the public domain. . . .

The automobile industry used to be looked upon as the leader in quality control and reliability. In recent years these have been sacrificed because of higher labor costs . . . and the practice of including an obsolescence factor in design. . . .

ABRAHAM L. KORR
8712 Hickory Drive,
Philadelphia, Pennsylvania

Project Orion

In "Death of a project" [F. J. Dyson, *Science* **149**, 141 (1965)], Project Orion is described as "a project to design a vehicle which would be propelled through space by repeated nuclear explosions occurring at a distance behind it." The author says that "Designs were worked out in detail for vehicles that could carry eight men and a payload of 100 tons on fast trips to Mars and back" after the vehicle had been "lifted into space by Saturn chemical rockets."

Space travel consists essentially not of being "propelled through space" but of acceleration, followed later by equivalent deceleration. The original acceleration given to the proposed vehicle by the Saturn rockets could, as is now standard practice, be later counteracted by the decelerative effect of returning through the earth's atmosphere. But where is there any discussion of the fact that all of the acceleration added by the *exotic* means of "propulsion" would have to be subtracted later by *conventional* means, since it is quite obvious that the new, exotic means could not be used for deceleration?

Perhaps that is why the project was dropped.

JO FISHER FREEMAN
American Embassy,
Agency for International Development,
APO, New York 09674

Woodlands in the Great Plains

Commenting on a report in which P. V. Wells (*1*) points out that nonriparian woodlands occur on topographic breaks in the Great Plains and suggests fire and other factors to partly account for the grasslands on more level topography, G. Ehrenfried (*2*) cites an 1860 publication which describes fires caused by Indians as evidently accounting for an extension of the prairies in Canada.

In March 1805, in a letter to his mother, Meriwether Lewis (*3*) wrote concerning the country along the Missouri River between the Platte River and Ft. Manda, North Dakota:

> With respect to this open country, I have been agreeably disappointed. From previous information I had been led to believe that it was barren, sterile and sandy; but, on the contrary, I found it fertile in the extreme, the soil . . . consisting of a fine black loam . . . [with] a luxuriant growth of grass and other vegetable productions, particularly such as are not liable to be much injured, or wholly destroyed by the ravages of the fire. . . . there can exist no other objection to it, except that of the want of timber. . . . This want of timber is by no means attributable to a deficiency in the soil to produce it, but owes its origin to the ravages of the fires, which the natives kindle in these plains at all seasons of the year. The country on both sides of the river, except some of its bottom lands, . . . is one continued open plain, in which no timber is to be seen except a few . . . clumps of trees, which, from their moist situation, or the steep declivities of hills, are sheltered from the effects of fire.

Thus 160 years ago Lewis recognized nonriparian as well as riparian forests in the midst of the grasslands, attributed the treeless condition to man-caused fires, and recognized the fertility of the soil. It was evidently Major Long, after his 1820 expedition, who applied to the Great Plains the name "Great American Desert," which term was subsequently publicized by James Fenimore Cooper in his novel *The Prairie* (1827). From this came the long-held belief in the treelessness of the Great Plains.

DILWYN J. ROGERS
Department of Biology,
Augustana College,
Sioux Falls, South Dakota

References

1. P. V. Wells, *Science* **148**, 246 (1965).
2. G. Ehrenfried, *ibid.*, p. 1173.
3. R. G. Thwaites, *Original Journals of the Lewis and Clark Expedition* (Dodd, Mead, New York, 1905), vol. 7.

25 March 1966, Volume 151, Number 3717 **SCIENCE**

EDITORIAL CORRESPONDENCE: 1515 Massachusetts Ave., NW, Washington, D.C. 20005. Phone: 202-387-7171. Cable: Advancesci, Washington. Copies of "Instructions for Contributors" can be obtained from the editorial office. ADVERTISING CORRESPONDENCE: Rm. 1740, 11 W. 42 St., New York, N.Y. 10036. Phone: 212-PE 6-1858.

Support of Science in Underdeveloped Countries

There is a proverb to the effect that an alms-giver throws a starving man a fish, whereas a truly charitable man gives him a hook and line. The U.S. foreign aid program is in effect almsgiving. We have not recognized what has to be done to bring prosperity to the underdeveloped nations.

In a recent issue of *Science* (4 February), Homi Bhabha delineated the problem and suggested a means of solving it.

> What the developed countries have and the underdeveloped lack is modern science and an economy based on modern technology. The problem of developing the underdeveloped countries is therefore the problem of establishing modern science in them and transforming their economy to one based on modern science and technology.

Bhabha went on to advance the thesis that the problem of establishing science as a live and vital force in a society is an inseparable part of the problem. Bhabha spoke authoritatively, for he was the key man in creating a self-reliant atomic energy industry in India. In 1943 no scientific institution in India had facilities for work in subjects at the frontiers of physics, including nuclear physics. Bhabha persuaded an industrialist, J. R. D. Tata, to establish the Tata Institute of Fundamental Research, which has been a constituent institution of Bombay University from the beginning "and has had close relations with many other universities in India, so that students of many of them have done work for the Ph.D. at the institute." From a small start with a recurring annual budget of $16,000, the institute grew initially at the rate of 30 percent per year. Its current budget is $3 million.

Early in its history the institute had a key role in the development of atomic energy.

> . . . groups were established at the institute to design and build all the electronics instrumentation without which atomic energy work is impossible. Thus, the Physics Division and the Electronics Division of the Atomic Energy Establishment at Trombay were both initially housed and built up in the institute. The electronics group of the Atomic Energy Establishment has today a staff of over 1300 people and is the strongest research and development group in electronics in the whole country.

In contrast to the fine performance in atomic energy, where a strong base in fundamental physics existed, Bhabha described the dismal performance of the steel industry. In turn, German, Russian, and British consultants have been called in, but India still does not have the capacity to design and build new steel plants.

> . . . Unless powerful scientific and engineering groups are established during the construction and operation of existing steel plants as a matter of deliberate policy, the dependence on foreign technical assistance will continue, and the steel industry will not reach a stage of technical self-reliance. A similar situation exists in almost every other industry.

Had Bhabha lived and had his influence expanded, many of India's problems might have been solved. Science and technology can expand faster than populations, thus providing time to solve the population problem. Bhabha and the Tata Institute have shown the profound effect of small sums spent wisely in support of fundamental research. If the United States wishes to be a true friend to the underdeveloped countries, it will find means of helping in the establishing and supporting of indigenous fundamental research institutes. Basic research is only one of several important prerequisites to obtaining optimal benefits from science, but competence in research provides a base from which the most complex technology can evolve when governments are alert and stable.

—PHILIP H. ABELSON

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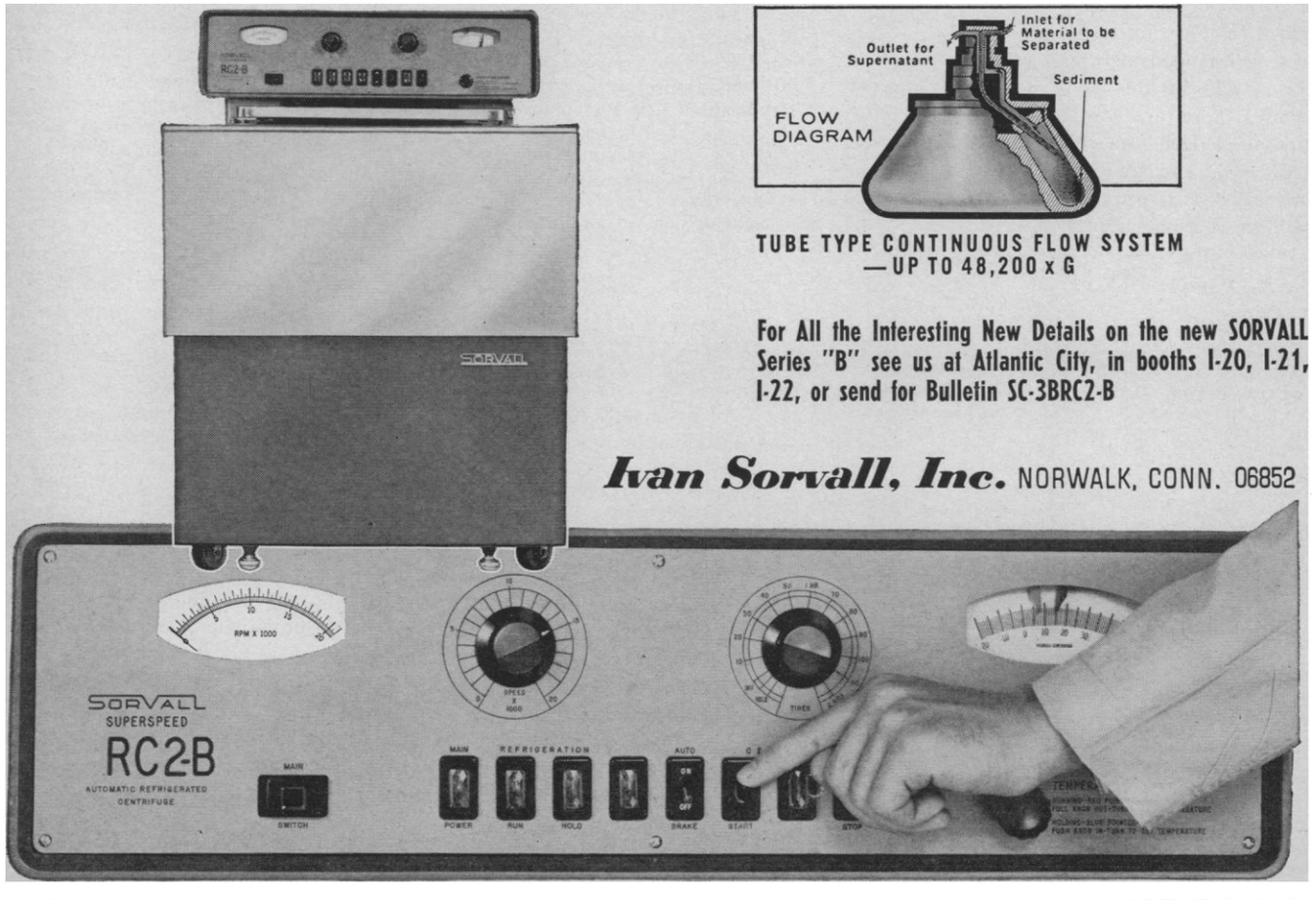

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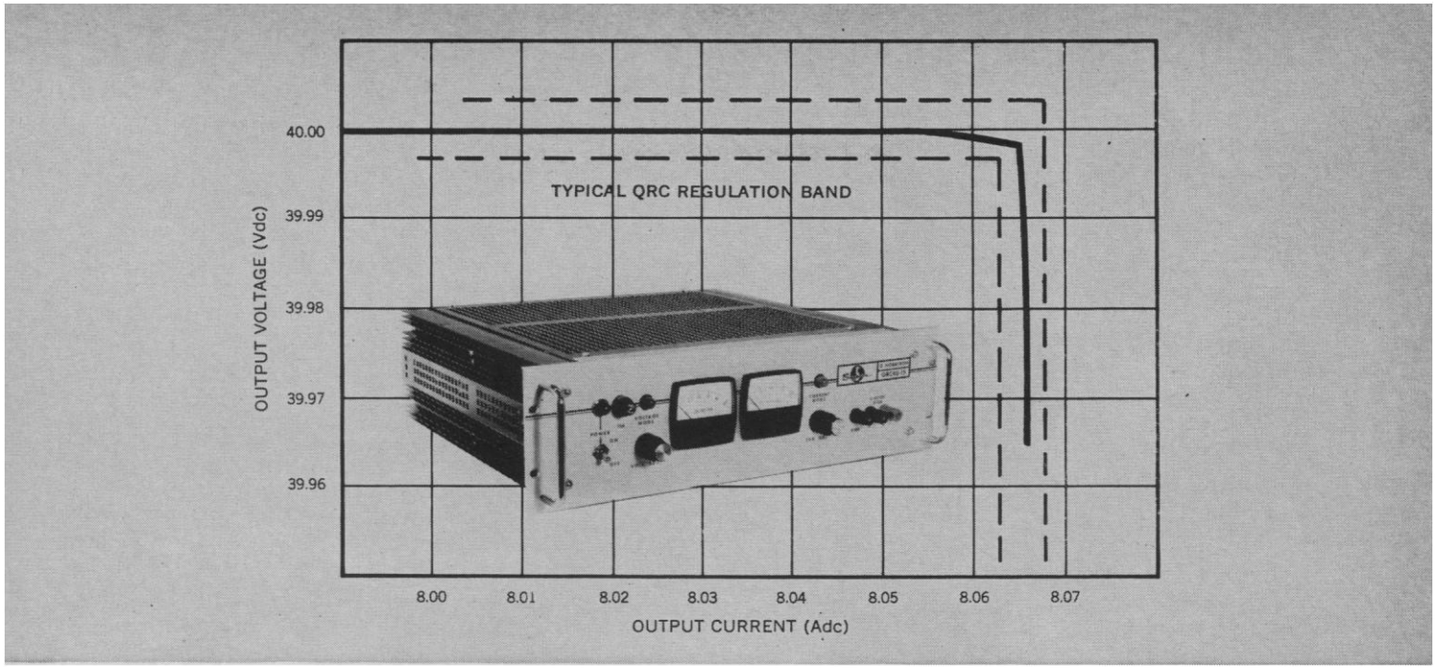

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QRC20-30	0-20	0-30	± .005% or ± 1 mv	1 mv	± .05% or ± 16 ma	8 ma	7	700.00
QRC40-4	0-40	0-4	± .005% or ± 1 mv	1 mv	± .05% or ± 2 ma	1 ma	5¼†	315.00
QRC40-8	0-40	0-8	± .005% or ± 1 mv	1 mv	± .05% or ± 4 ma	2 ma	3½	450.00
QRC40-15	0-40	0-15	± .005% or ± 1 mv	1 mv	± .05% or ± 8 ma	4 ma	5¼	575.00
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Forthcoming Events

April

1–2. Alabama **Acad. of Science**, Birmingham-Southern College, Birmingham. (W. B. DeVall, Dept. of Forestry, Auburn Univ., Auburn, Ala.)

1–2. Arkansas **Acad. of Science**, Little Rock. (G. E. Templeton, Univ. of Arkansas, Fayetteville)

1–5. National **Science Teachers** Assoc., New York, N.Y. (R. H. Carleton, 1201 16th St., NW, Washington, D.C. 20036)

1–7. American Acad. of **General Practice**, Boston, Mass. (M. F. Cahal, Volker Blvd. at Brookside, Kansas City 12, Mo.)

4–6. **Atomic Energy** Soc. of Japan, annual mtg., Tokyo. (M. Masamoto, Japan Atomic Energy Research Inst., 1-1, Shibatamura-cho, Minato-ku, Tokyo)

4–6. **Exobiology**, conf., Ames Research Center, Moffett Field, Calif. (Letters and Science Extension, Univ. of California, Berkeley 94720)

4–6. American Assoc. of **Physical Anthropologists**, Berkeley, Calif. (F. E. Johnston, Dept. of Anthropology, Univ. of Pennsylvania, Philadelphia 19104)

4–6. **Biomedical Communication**, conf., New York, N.Y. (J. Lieberman, Public Health Service Audiovisual Facility, Atlanta, Ga. 30333)

4–7. Federation of European **Biochemical** Soc., 3rd mtg., Warsaw, Poland. (T. Klopotowski, Polish Biochemical Soc., Freta 16, Warsaw)

4–7. Advances in **Water Quality Improvement**, conf., Univ. of Texas, Austin. (Special Lecture Series, Engineering Laboratories Bldg. 305, Univ. of Texas, Austin)

4–8. International **Biological Program**, 2nd general assembly, Paris, France. (F. W. G. Baker, 2 via Sebenico, Rome, Italy)

4–10. **Psychology**, 10th inter-American congr., Lima, Peru. (Intern. Soc. of Psychology, 2104 Meadowbrook Dr., Austin, Tex.)

5–7. Middle East **Neurosurgical** Soc., mtg., Jerusalem, Jordan. (F. S. Haddad, Orient Hospital, Beirut, Lebanon)

5–8. American Assoc. of **Anatomists**, San Francisco, Calif. (R. T. Woodburne, Dept. of Anatomy, Univ. of Michigan, Ann Arbor 48104)

6–7. **Phlebology**, 6th intern. mtg., Aix-en-Provence, France. (F. Beurier, 94, cours Sextius, Aix-en-Provence)

6–8. **Electron and Laser Beam Technology**, Univ. of Michigan, Ann Arbor. (G. I. Haddad, Electrical Engineering Dept., Univ. of Michigan, Ann Arbor)

6–8. Recent Advances in **Phytochemistry**, intern. symp., Univ. of Texas, Austin. (T. J. Mabry, Dept. of Botany, Univ. of Texas, Austin 78712)

6–8. **Plant Phenolic** Group of North America, 6th annual mtg., Austin, Tex. (V. C. Runeckles, Imperial Tobacco Co., Montreal, P.Q., Canada)

7–8. **Histochemical** Soc., 17th annual mtg., Atlantic City, N.J. (J. Y. Terner, College of Physicians and Surgeons, Columbia Univ., New York, N.Y. 10032)

7–8. Southern **Sociological** Soc., annual mtg., New Orleans, La. (J. J. Honigmann, Dept. of Anthropology, Univ. of North Carolina, Chapel Hill)

7–9. **Developmental Biology**, annual

New England regional conf., Univ. of Connecticut, Storrs. (H. Laufer, Dept. of Zoology, Univ. of Connecticut, Storrs)

7–9. **Developmental Biology**, Northeast regional conf., Univ. of Connecticut, Storrs. (H. Laufer, Dept. of Zoology, Univ. of Connecticut, Storrs 06268)

7–9. Southern Soc. for **Philosophy and Psychology**, New Orleans, La. (G. R. Hawkes, U.S. Army Medical R&D Command, Washington, D.C. 20315)

8–9. American Soc. for **Artificial Internal Organs**, Atlantic City, N.J. (B. K. Kusserow, Dept. of Pathology, Univ. of Vermont College of Medicine, Burlington)

8–9. **Pennsylvania Acad.** of Science, 42nd annual mtg., Lehigh Univ., Bethlehem. (J. J. McDermott, Franklin and Marshall College, Lancaster, Pa. 17604)

8–11. **Animal Toxins**, intern. symp., Atlantic City, N.J. (F. E. Russell, Box 323, Los Angeles County General Hospital, 1200 N. State St., Los Angeles, Calif.)

9. **Paleontological Research** Inst., semiannual mtg., Ithaca, N.Y. (The Institution, 109 Dearborn Pl., Ithaca, N.Y. 14850)

10–11. **Microcirculatory Soc.**, 14th conf., Atlantic City, N.J. (H. J. Berman, Dept. of Biology, Boston Univ., Boston, Mass. 02215)

11–13. Institute of **Electrical and Electronics Engineers**, Region 3, conv., Atlanta, Ga. (M. D. Price, Dept. 72-14, Zone 400, Lockheed-Georgia Co., Marietta, Ga.)

11–13. Comparative **Hemoglobin** Structure, intern. symp., Salonika, Greece. (Secretary, P.O. Box 201, Salonika)

11–15. **Aeronomic Studies of Lower Ionosphere**, conf., Ottawa, Ont., Canada. (W. Pfister, Air Force Cambridge Research Laboratories, Upper Atmosphere Physics Laboratory, L. G. Hanscom Field, Bedford, Mass.)

11–15. American Assoc. of **Cereal Chemists**, New York, N.Y. (R. J. Tarleton, The Association, 1955 University Ave., St. Paul, Minn. 55104)

11–16. Federation of American Societies for **Experimental Biology**, 50th annual mtg., Atlantic City, N.J. The following societies will meet in conjunction with the FASEB; information may be obtained from FASEB, 9650 Rockville Pike, Bethesda, Maryland 20014:

American Physiological Society
American Soc. of Biological Chemists
American Soc. for Pharmacology and Experimental Therapeutics
American Soc. for Experimental Pathology
American Inst. of Nutrition
American Assoc. of Immunologists

12–13. Frontiers in **Food Research**, symp., Cornell Univ., Ithaca, N.Y. (W. F. Shipe, Dept. of Dairy and Food Science, Cornell Univ., Ithaca)

12–14. **Generalized Networks**, intern. symp., New York, N.Y. (H. J. Carlin, Polytechnic Inst. of Brooklyn, 333 Jay St., Brooklyn, N.Y. 11201)

12–14. **Remote Sensing of Environment**, 4th symp., Univ. of Michigan, Ann Arbor. (Extension Service, Conference Dept., Univ. of Michigan, Ann Arbor 48104)

12–15. **Quantum Electronics**, intern. conf., Phoenix, Ariz. (J. P. Gordon, Bell Telephone Laboratories, Murray Hill, N.J.)

12–16. Society for Applied **Mathematics and Mechanics**, annual scientific mtg., Darmstadt, Germany. (F. Reutter, Gesellschaft für Angewandte Mathematik und Mechanik, Templergraben 55, 51, Aachen, Germany)

12–29. **Soil Conservation**, 1st Pan American congr., São Paulo, Brazil. (J. Abramides Neto. avda. Francisco Matarazzo 455, Caixa Postal 8366, São Paulo)

13–15. Institute of **Environmental Sciences**, 12th annual tech. mtg. and equipment exp., San Diego, Calif. (The Institute, 34 S. Main St., Mount Prospect, Ill.)

13–15. Use of **X-Rays in Medicine and Industry**, public health conf., Univ. of Miami, Coral Gables, Fla. (M. Dauer, Div. of Radiological Physics, Jackson Memorial Hospital, Univ. of Miami, Miami, Fla.)

13–16. **Geological Soc**. of America, southeast section, Univ. of Georgia, Athens. (L. D. Ramspott, Dept. of Geology, Univ. of Georgia, Athens 30601)

13–16. American **Orthopsychiatric** Assoc., 43rd annual mtg., San Francisco, Calif. (M. F. Langer, The Association, 1790 Broadway, New York 10019)

13–16. National Soc. for **Programmed Instruction**, natl. conv., St. Louis, Mo. (M. Arky, 714 Kingsland, University City, Mo. 63130)

13–16. American **Radium** Soc., annual mtg., Phoenix, Ariz. (J. L. Pool, Memorial Soc., 444 E. 68 St., New York 10021)

13–16. National Council of **Teachers of Mathematics**, 44th annual mtg., New York, N.Y. (J. D. Gates, 1201 16th St., NW, Washington, D.C. 20036)

14–15. British **Biophysical** Soc., spring mtg., Oxford, England. (D. Noble, Balliol College, Oxford)

14–15. **Molecular Interactions and the Crystallography of Ceramics**, Univ. of Nottingham, Nottingham, England. (S. C. Wallwork, Dept. of Chemistry, Univ. of Nottingham, University Park, Nottingham)

14–16. Association of Southeastern **Biologists**, Raleigh, N.C. (M. Y. Menzel, Dept. of Biological Sciences, Florida State Univ., Tallahassee)

14–16. American **Cleft Palate** Assoc., Mexico City, Mexico. (C. G. Wells, Parker Hall, Univ. of Missouri, Columbia)

14–16. Eastern **Psychological** Assoc., New York, N.Y. (M. A. Iverson, Queens College, Flushing, N.Y. 11367)

14–17. American Assoc. of **Endodontists**, 23rd annual mtg., San Francisco, Calif. (J. F. Bucher, 6828 Winterberry Lane, Bethesda, Md. 20034)

14–19. American **Dermatological** Assoc., Hot Springs, Va. (R. R. Kierland, Mayo Clinic, Rochester, Minn.)

14–20. **Geodetical Measuring Technique and Instruments**, conf., Budapest, Hungary. (F. Raum, Preparatory Committee of the Conference, Technika Haza, Szabadsag ter 17, Budapest 5)

15–16. Iowa **Acad. of Science**, Pella. (G. W. Peglar, Dept. of Mathematics, Iowa State Univ., Ames)

15–16. Montana **Acad. of Sciences**, Missoula. (L. H. Harvey, Univ. of Montana, Missoula 59801)

15–17. American Soc. of **Internal Medicine**, New York, N.Y. (A. O. Whitehall, 3410 Geary Blvd., San Francisco, Calif.)

16–18. **Lateral Line Detectors**, intern. conf., New York, N.Y. (P. H. Cahn, Stern College, Yeshiva Univ., 253 Lexington Ave., New York 10016)

17–20. **Electron and Ion Beam Science and Technology**, 2nd intern. conf., American Inst. of Mining, Metallurgical, and Petroleum Engineers, New York, N.Y. (H. N. Appleton, 345 E. 47 St., New York 10017)

18–19. American **Otological** Soc., San Juan, P.R. (W. H. Bradley, 1100 E. Genessee St., Syracuse, N.Y.)

18–20. Thermodynamics of **Ceramic Systems**, mtg., London, England. (J. P. Roberts, British Ceramics Soc., Houldsworth School of Applied Science, Univ. of Leeds, Leeds 2, England)

18–20. Technical **Microbiology**, symp., Berlin, Germany. (S. Windisch, Inst. für Gärungsgewerbe, Seestrasse, 13, 1 Berlin 65)

18–20. **Structures and Materials**, 7th conf., Cocoa Beach, Fla. (R. W. Leonard, NASA–Langley Research Center, Mail Stop 188C, Langley Station, Hampton, Va.

18–21. **Aerospace Medical** Assoc., 37th annual scientific mtg., Las Vegas, Nev. (C. A. Berry, Chief of Center Medical Programs, NASA–Manned Spacecraft Center, Houston, Tex. 77058)

18–21. International **Scientific Radio** Union, U.S. natl. committee, mtg., Washington, D.C. (USNC–URSI, 2101 Constitution Ave, NW, Washington, D.C.)

18–21. **Tectonic Levels** in the Earth's Crust, intern. symp., Neuchatel, Switzerland. (J.-P. Schaer, Dept. of Geology, University, 11 rue Emile Argand, 200 Neuchatel)

18–22. American Assoc. of **Corrosion Engineers**, 22nd annual mtg., Miami Beach, Fla. (N. E. Hamner, The Association, 980 M&M Bldg., Houston, Tex.)

18–22. Applications of **Liquid Fuels**, conf., Torquay, England. (Inst. of Fuel, 18 Devonshire St., Portland Pl., London, W.1, England)

18–22. American College of **Physicians**, New York, N.Y. (E. C. Rosenow, Jr., 4200 Pine St., Philadelphia 4, Pa.)

19–22. American **Geophysical** Union, 47th annual mtg., Washington, D.C. (W. E. Smith, AGU, 1145 19th St., NW, Washington, 20036)

18–23. International Soc. for **Photogrammetry**, technical commissions, Munich, Germany. (G. Krauss, Deutsche Gesellschaft für Photogrammetrie, Waasemstr. 19-21, Bad Godesberg, Germany)

19–21. **Frequency Control**, 20th annual symp., U.S. Army Electronics Command, Atlantic City, N.J. [Director, Electronics Components Laboratory, U.S. Army Electronics Command, Attn: AMSEL-KT-ST (M. F. Timm), Fort Monmouth, N.J. 07703]

19–22. **Microwave Communications**, 3rd colloquium, Budapest, Hungary. (Valko Peterne, Szabadsag ter 17, Budapest)

19–23. **Scientific and Technical Books and Journals**, 2nd intern. exhibition, Paris, France. (F. Retailliau, Intern. Exhibition of Scientific and Technical Books and Journals, 117 Blvd. St. Germain, Paris 6)

20–22. Institute of **Electrical and Electronics Engineers**, southwestern conf., Dallas, Tex. (R. Carrel, Collins Radio Co., Dallas 75207)

20–22. American **Laryngological, Rhinological, and Otological** Assoc., San Juan, P.R. (V. R. Alfaro, 917 20th St., NW, Washington, D.C. 20006)

20–22. **Magnetics**, 4th intern. conf. (INTERMAG), Stuttgart, Germany. (E. W. Pugh, I.B.M. Corp., 1000 Westchester Ave., White Plains, N.Y.)

20–23. Application of **Physicochemical Methods in Chemical Analysis**, conf., Budapest, Hungary. (M. K. Egyesülete, Szabadsag ter 17, Budapest 5)

20–23. **Solar Energy** Soc., 2nd annual mtg., Boston, Mass. (F. Edlin, Solar Energy Soc., Arizona State Univ., Tempe 85281)

21–22. **Space Navigation**, natl. mtg., Boston, Mass. (E. S. Keats, Westinghouse Electric Corp., Box 1897, Baltimore, Md. 21203)

21–23. Ohio **Acad. of Science**, 75th annual mtg., Columbus. (J. H. Melvin, 505 King Ave., Columbus 43201)

21–23. Southwestern **Psychological** Assoc., 13th annual conv., Arlington, Tex. (C. Cleland, 2104 Meadowbrook Dr., Austin, Tex.)

21–23. West Virginia **Acad. of Science**, Institute, W. Va. (J. B. Hickman, West Virginia Univ., Morgantown 26506)

22. **Computer Aided Basic Research**, symp., Hoboken, N.J. (I. Flores, Electrical Engineering Dept., Stevens Inst., Hoboken 07030)

22. Illinois **Acad. of Science**, Illinois State Univ., Normal. (N. D. Levine, Univ. of Illinois, Urbana)

22–23. National Council of **Teachers of Mathematics**, Greeley, Colo. (J. D. Gates, 1201 16th St., NW, Washington, D.C. 20036)

23–24. American **Laryngological** Assoc., San Juan, P.R. (L. Richards, 12 Clovelly Rd., Wellesley Hills, Mass.)

24. Society for **Clinical Ecology**, 1st annual mtg., Chicago, Ill. (T. G. Randolph, Human Ecology Research Foundation, 720 N. Michigan Ave., Chicago 11, Ill.)

24–26. American Assoc. of **Colleges of Pharmacy**, Dallas, Tex. (C. W. Bliven, 1507 M St., NW, Washington, D.C. 20005)

24–27. American Soc. of **Abdominal Surgeons**, Chicago, Ill. (B. F. Alfano, 663 Main St., Melrose 76, Mass.)

24–27. American **Oil Chemists'** Soc., Los Angeles, Calif. (C. H. Hauber, The Society, 35 E. Wacker Dr., Chicago, Ill. 60601)

24–28. **Infectious Pathology**, 4th intern. congr., Stuttgart, Germany. (G. Hoffman, Hugstetterstr. 55, 78 Frieburg im Briesgau, Germany)

24–29. American College of **Allergists**, 22nd annual congr., Chicago, Ill. (J. D. Gillespie, 2141 14th St., Boulder, Colo.)

24–29. American Soc. of **Hospital Pharmacists**, annual mtg., Dallas, Tex. (J. A. Oddis, 2215 Constitution Ave., NW, Washington, D.C. 20037)

24–29. American **Pharmaceutical** Assoc., Dallas, Tex. (W. S. Apple, 2215 Constitution Ave., NW, Washington, D.C. 20037)

25–27. **Antidepressant Drugs**, symp., Milan, Italy. (S. Garattini, Inst. di Ricerche Farmacologiche "Mario Negri," Via Eritrea, 62, Milan)

25–27. **National Acad. of Sciences**, 103rd annual mtg., Washington, D.C. (Home Secretary, NAS, 2101 Constitution Ave., NW, Washington, D.C. 20418)

25–27. American Acad. of **Pediatrics**, Montreal, P.Q., Canada. (E. H. Christopherson, 1801 Hinman Ave., Evanston, Ill. 60204)

25–27. Academy of **Religion and Mental Health**, annual mtg., Chicago, Ill. (G. C. Anderson, 16 E. 34 St., New York, N.Y.)

25–28. Society of **Economic Paleontologists and Mineralogists**, St. Louis, Mo. (R. Tener, The Society, Box 979, Tulsa, Okla. 74101)

25–28. American Assoc. of **Petroleum Geologists**, St. Louis, Mo. (N. C. Smith, Box 979, Tulsa, Okla.)

25–28. Improving Effectiveness in **Research and Development Administration**, 11th annual inst., American Univ., Washington, D.C. (P. W. Howerton, Center for Technology and Administration, American Univ., 2000 G St., NW, Washington, D.C. 20006)

25–29. **Radioecological Concentration Processes**, intern. symp., Stockholm, Sweden. (Inst. of Radiophysics, Stockholm 60)

25–30. American Acad. of **Neurology**, Philadelphia, Pa. (T. D. Swedien, 7100 France Ave., Minneapolis, Minn.)

25–7. **Psychotherapy**, 16th Lindauer week, Lindauer, Germany. (H. Stolze, Adalbert-Stifterstr. 31, 8 München 27, Germany)

26. National **Cystic Fibrosis** Research Foundation, Atlantic City, N.J. (The Foundation, Medical Dept., 521 Fifth Ave., New York, N.Y. 10017)

26–27. **Electromagnetic Relays**, 14th annual natl. conf., Oklahoma State Univ., Stillwater. (D. D. Lingelbach, Dept. of Electrical Engineering, Oklahoma State Univ., Stillwater 74075)

26–28. Joint **Computer** Conf., Boston, Mass. (J. L. Mitchell, P.O. Box 460, Lexington, Mass. 02173)

26–28. Institute of **Electrical and Electronics Engineers**, region 6, annual conf., Tucson, Ariz. (L. P. Huelsman, Dept. of Electrical Engineering, Univ. of Arizona, Tucson 85721)

26–28. **National Acad. of Engineering**, 2nd annual mtg., Washington, D.C. (Secretary, NAE, 2101 Constitution Ave., NW, Washington, D.C. 20418)

27–29. Institute of **Mathematical Statistics**, Upton, L.I., N.Y. (G. E. Nicholson, Jr., Univ. of North Carolina, Chapel Hill)

27–29. American **Pediatric** Soc., Atlantic City, N.J. (C. D. Cook, 333 Cedar St., New Haven, Conn. 06510)

27–1. Technical Union of **Italian Pharmacists**, 9th natl. congr., Naples, Italy. (UTI. Far. Secretariat, Via Balbi 29/4, Genoa)

28–29. Electrical Conduction Properties of **Polymers**, symp., Pasadena, Calif. (A. Rembaum, Jet Propulsion Laboratory, California Inst. of Technology, 4800 Oak Grove Dr., Pasadena)

28–30. Central States **Anthropological** Soc., annual mtg., St. Louis, Mo. (G. H. Fathauer, Dept. of Sociology and Anthropology, Miami Univ., Oxford, Ohio 45056)

28–30. **Wildflower Pilgrimage**, 16th annual, Gatlinburg, Tenn., and Great Smoky Mountain Natl. Park. (A. J. Sharp, Dept. of Botany, Univ. of Tennessee, Knoxville)

29–30. Georgia **Acad. of Science**, Geor-

gia Southern College, Statesboro. (J. T. May, School of Forestry, Univ. of Georgia, Athens)

29–30. Mississippi **Acad. of Sciences**, Mississippi State Univ., State College. (C. Q. Sheeley, Box 574, State College 39762)

29–30. **Population** Assoc. of America, New York, N.Y. (A. S. Lunde, Natl. Center for Health Statistics, U.S. Public Health Service, Washington, D.C. 20201)

29–30. American Assoc. of **University Professors**, Atlanta, Ga. (W. P. Fidler, The Association, 1785 Massachusetts Ave., NW, Washington, D.C.)

29–1. Association of **Clinical Scientists**, Chicago, Ill. (R. P. MacFate, 300 N. State St., Chicago, Ill. 60610)

29–1. American Soc. for the Study of **Sterility**, Chicago, Ill. (H. H. Thomas, 944 S. 18 St., Birmingham, Ala.)

May

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

1–4. **AAAS**, Southwestern and Rocky Mountain Div., Las Cruces, N.M. (M. G. Anderson, P.O. Box AF, University Park, N.M. 88070)

1–4. American Soc. for **Clinical Investigation**, Atlantic City, N.J. (G. W. Liddle, School of Medicine, Vanderbilt Univ., Nashville, Tenn.)

1–4. American College of **Obstetricians and Gynecologists**, Chicago, Ill. (R. A. Kimbrough, 79 W. Monroe, Chicago 60603)

1–5. American Soc. for **Microbiology**, annual mtg., Los Angeles, Calif. (R. W. Sarber, The Society, 115 Huron View Blvd., Ann Arbor, Mich. 48103)

1–6. **Electrochemical Soc.**, annual spring mtg., Cleveland, Ohio. (The Society, 30 E. 42 St., New York 10017)

1–6. International College of **Surgeons**, North American Federation, congr., Houston, Tex. (S. E. Henwood, 1516 Lake Shore Dr., Chicago, Ill. 60610)

2–3. Canadian **Aeronautics and Space** Inst., annual mtg., Ottawa, Ontario. (The Institute, 77 Metcalfe St., Ottawa 4)

2–3. **Bioengineering**, 3rd annual Rocky Mountain symp., University of Colorado, Boulder. (J. C. Daniel, Dept. of Biology, Univ. of Colorado, Boulder 80304)

2–3. American Inst. of **Mining, Metallurgical**, and **Petroleum Engineers**, Inst. of Petroleum Engineers, Wichita Falls, Tex. (Executive Secretary, 345 E. 47 St., New York 10017)

2–4. Council ot **Biology Editors**. Univ. of Notre Dame, Notre Dame, Ind. (R. E. Gordon, Dept. of Biology, Univ. of Notre Dame, Notre Dame)

2–4. **Communications Satellite Systems**, conf., American Inst. of Aeronautics and Astronautics, Washington, D.C. (W. J. Brunke, AIAA, 1290 Sixth Ave., New York 10019)

2–5. **Isochronous Cyclotrons**, intern. conf., Gatlinburg, Tenn. (R. S. Livingston, Oak Ridge Natl. Laboratory, P.O. Box X, Oak Ridge, Tenn. 27831)

2–7. International Inst. of **Optics**, conf., Paris, France. (Conference Secretariat, Inst. for Optics, 3, blvd. Pasteur, Paris 15)

3–5. British Joint **Computer** Conf., Eastbourne, England. (Secretariat, Inst. of

Electrical Engineers, Savoy Place, London W.C.2, England)

3–5. **Industrial Waste**, 21st conf., Purdue Univ., Lafayette, Ind. (D. E. Bloodgood, School of Civil Engineering, Purdue Univ., Lafayette 47907)

3–6. American Chemical Soc., Div. of **Rubber Chemistry**, San Francisco, Calif. (G. N. Vacca, Bell Telephone Laboratories, Murray Hill, N.J.)

3–8. Mechanism of Action of **Fungicides and Antibiotics**, intern. symp., Biological Soc. of the GDR, Reinhardsbrunn, East Germany. (H. Lyr, Inst. für Forstwissenschaften, Alfred-Möllerstr., 13 Eberswalde die Berlin)

4. Society for **Analytical Chemistry**, mtg., Bristol, England. (The Society, 14 Belgrave Sq., London, England)

4–6. **Genetics** Soc. of Canada, 11th annual mtg., Banff, Alberta. (C. O. Person, Dept. of Genetics, Univ. of Alberta, Edmonton, Canada)

4–6. Society for Experimental **Stress Analysis**, spring mtg., Detroit, Mich. (B. E. Rossi, 21 Bridge Sq., Westport, Conn. 06882)

4–7. **Virginia Acad.** of Science, Madison College, Harrisonburg. (R. C. Berry, Virginia Acad. of Science, P.O. Box 8203, Richmond 23226)

4–8. **Laboratory Medicine**, 12th congr., Bad Kissengen, West Germany. (W. Albath, Katharinengasse 3, 87 Würzburg, Germany)

4–11. **Instability Phenomena in Galaxies**, symp., Armenian SSR. (A. N. Hakopian, Acad. of Sciences of the Armenian SSR, Erevan)

5–6. **Human Factors in Electronics**, 7th symp., Minneapolis, Minn. (C. A. Baker, Honeywell, Inc., 2700 Ridgeway Rd., Minneapolis)

5–6. **Rabies**, natl. symp., Atlanta, Ga. (J. R. Ray, American Veterinary Medical Assoc., Chicago, Ill.)

5–6. **Strontium Metabolism**, intern. symp., Annan, Scotland. (J. H. Martin, United Kingdom Atomic Energy Agency, Chapelcross Works, Annan, Dumfriesshire, Scotland)

5–7. Society for American **Archaeology**, 31st annual mtg., Univ. of Nevada, Reno. (D. D. Fowler, Dept. of Anthropology, Univ. of Nevada, Reno 89507)

5–7. New Jersey Soc. of **Professional Engineers**, 42nd annual conf. and exhibition, Atlantic City. (K. G. Stanley, The Society, 495 West State St., Trenton 08618)

5–7. Midwestern **Psychological** Assoc., Chicago, Ill. (F. A. Mote, Psychology Dept., Univ. of Wisconsin, Madison)

5–8. **Protides of the Biological Fluids**, 14th annual colloquium, Bruges, Belgium. (P.O. Box 71, Bruges)

6–7. **North Dakota Acad.** of Science, North Dakota State Univ., Fargo. (B. G. Gustafson, Univ. of North Dakota, Grand Forks)

6–8. Society for Applied **Anthropology**, 25th annual mtg., Milwaukee, Wis. (The Society, Rand Hall, Cornell Univ., Ithaca, N.Y.)

6–8. **Wisconsin Acad.** of Sciences, Arts, and Letters, Lawrence Univ., Appleton, Wis. (D. J. Behling, 720 Wisconsin Ave., Milwaukee 53202)

6–9. American **Psychoanalytic** Assoc.,

Atlantic City, N.J. (H. Fischer, 1 E. 57th St., New York, N.Y.)

7–8. Academy of **Psychoanalysis**, Atlantic City, N.J. (A. H. Rifkin, 125 E. 65 St., New York 10021)

7–12. American **Ceramic** Soc., 68th annual mtg., Washington, D.C. (The Society, 4055 N. High St., Columbus, Ohio 43214)

8–10. Society of the **Plastics Industry**, Canadian section, 24th annual mtg., Montreal, P.Q. (The Society, 250 Park Ave., New York 10017)

8–11. **Administrative Management** Soc., 47th intern. conf., Boston, Mass. (W. H. Latham, Willow Grove, Pa. 19090)

8–12. Association of American State **Geologists**, annual mtg., Univ. of Indiana, Bloomington. (W. C. Hayes, Missouri Geological Survey, P.O. Box 250, Rolla 65401)

8–12. **Organic Sulphur Compounds**, symp., Univ. of Groningen, Groningen, Netherlands. (M. J. Janssen, Dept. of Organic Chemistry, Univ. of Groningen, Groningen)

8–15. **Stereochemistry**, conf., Bürgenstock, Switzerland. (D. Arigoni, Dept. of Organic Chemistry, Univ. of Zurich, Zurich, Switzerland)

9–10. **Circuit Theory**, 9th midwestern symp., Oklahoma State Univ., Stillwater. (D. R. Wilson, School of Electrical Engineering, Oklahoma State Univ., Stillwater 74045)

9–11. Nuclear Applications of **Non-Fissile Ceramics**, conf., Washington, D.C. (A. Boltax, Westinghouse Astronuclear Laboratory, P.O. Box 10864, Pittsburgh, Pa. 15236)

9–11. Numerical Solution of **Nonlinear Differential Equations**, symp., Madison, Wis. (D. Greenspan, Mathematics Research Center, U.S. Army, Univ. of Wisconsin, Madison 53706)

9–12. **Cell Nucleus Functions and Radio-Sensitivity**, symp., Rijswijk, Netherlands. (H. M. Klouwen, Radiobiological Inst., Organization for Health Research, T.N.O,. 151 Lang Kleigweg, Rijswijk)

9–12. **Standards Laboratory** conf., Natl. Bureau of Standards, Gaithersburg, Md. (W. R. Tilley, NBS, Washington, D.C. 20234)

9–13. Society of **Photographic Scientists** and **Engineers**, annual conf., San Francisco, Calif. (J. B. Bell, 1525 Tennessee St., San Francisco, Calif.)

9–13. American **Psychiatric** Assoc., annual mtg., Atlantic City, N.J. (P. Woodward, 1700 18th St., NW, Washington, D.C. 20009)

9–14. **Condensation Nuclei**, 6th intern. symp., Albany, N.Y. (D. G. Barry, Atmospheric Sciences Research Center, State Univ. of New York, P.O. Box 7185, Albany 12224)

10–12. **Telemetering**, natl. conf., Boston, Mass. (F. Nieman, NASA Electronics Research Center, 575 Technology Sq., Cambridge, Mass. 02139)

10–14. American Assoc. of **Mental Deficiency**, Chicago, Ill. (G. E. Milligan, 1601 Broad St., Columbus, Ohio)

10–19. Committee on **Space Research**, 9th plenary mtg., Vienna, Austria. (COSPAR, 55, blvd. Malesherbes, Paris 8, France)

11. **Electroluminescence and Semiconductor Lasers**, seminar, Stevens Inst. of

Technology, Hoboken, N.J. (G. J. Herskowitz, Dept. of Electrical Engineering, Stevens Inst. of Technology, Hoboken, N.J. 07030)

11–13. **Analysis Instrumentation**, 12th natl. symp., Houston, Tex. (G. I. Doering, Industrial Nucleonics Corp., 650 Ackerman Rd., Columbus, Ohio 43202)

11–13. American Inst. of **Chemists**, 43rd annual mtg., New Orleans, La. (C. L. Hoffpauir, Southern Regional Research Laboratory, New Orleans 70119)

11–13. **Industrial Research** Inst., spring mtg., Buck Hill Falls, Pa. (The Institute, 100 Park Ave., New York 10017)

11–13. **Military Oceanography**, 3rd U.S. Navy symp., San Diego, Calif. (Office of the Oceanographer of the Navy, Washington, D.C.)

11–14. American Assoc. for the **History of Medicine**, Rochester, Minn. (J. B. Blake, Natl. Library of Medicine, Bethesda, Md.)

11–14. Society for **Industrial and Applied Mathematics**, natl. mtg., Univ. of Iowa, Iowa City. (J. B. Rosser, Mathematics Research Center, Univ. of Wisconsin, Madison)

11–14. Society of Technical **Writers and Publishers**, 13th annual mtg., Fort Worth, Tex. (N. J. Kennedy, Box 3706, Columbus, Ohio 43214)

11–21. **Photographic Systems** for Engineers, seminar, San Francisco, Calif. (J. B. Bell, 1525 Tennessee St., San Francisco)

12–13. **Information Retrieval**, 3rd natl. colloquium, Univ. of Pennsylvania, Philadelphia. (A. W. Speakman, E. I. DuPont de Nemours & Co., Wilmington, Del. 19898)

12–14. **Diabetology**, 7th annual mtg., Paris, France. (M. Rathery, Hotel-Dieu, 1, pl. du Parvis-Notre Dame, Paris 4)

12–14. Czechoslovak Soc. of **Urology**, congr., Brno. (M. Jerabek, Clinique Urologique, 53, Pekarska, Brno)

13. **Desert Environment**, mtg., Fullerton Junior College, Fullerton, Calif. (M. D. Brown, Div. of Life Sciences, Fullerton Junior College, Fullerton)

14. **Reliability**, 7th annual West Coast symp., Univ. of Southern California, Los Angeles. (R. J. Guarino, TRW Systems, One Space Park, Redondo Beach, Calif.)

15–18. American Inst. of **Chemical Engineers**, 59th annual mtg., Columbus, Ohio. (The Institute, 345 E. 47 St., New York 10017)

15–18. **Kinetics and Catalysis**, intern. symp., Columbus, Ohio. (P. B. Weisz, Socony Mobil Research and Development Labs., Paulsboro, N.J. 08066)

15–19. **Radiation Chemistry**, 2nd symp., Tihany, Hungary. (A. Somogyi, Research Inst. for the Plastics Industry, Hungaria krt. 114, Budapest 14, Hungary)

15–21. Dynamic Role of **Molecular Constituents in Plant-Parasite Interaction**, U.S.—Japan seminar, Gamagori, Japan. (C. J. Mirocha, Dept. of Plant Pathology and Physiology, Univ. of Minnesota, St. Paul)

16–17. **Plant Growth**, conf., New York, N.Y. (J. F. Frederick, Dodge Chemical Co., Research Labs., 3425 Boston Rd., Bronx, N.Y. 10469)

16–18. **Aerospace Electronics**, 18th natl. conf., Dayton, Ohio. (J. M. Mayer, 4525 Fernbrook St., Kettering, Ohio 45440)

16–18. Society of German **Engineers**, conf., Berlin. (The Society, Postfach 10 250, 4 Düsseldorf 10, Germany)

16–18. Institute of Electrical and Electronics Engineers, Group on **Microwave Theory and Technique**, symp., Palo Alto, Calif. (L. Young, Stanford Research Inst., Menlo Park, Calif. 94025)

16–18. **Power Instrumentation**, 9th natl. symp., Detroit, Mich. (R. C. Austin, Detroit Edison Co., 2000 Second Ave., Detroit 48226)

16–18. American Assoc. for **Thoracic Surgery**, Vancouver, B.C., Canada. (A. Henvey, 311 Carondelet Bldg., 7730 Carondelet Ave., St. Louis, Mo.)

16–19. **Biomedical Sciences Instrumentation**, 4th natl. symp., Anaheim, Calif. (T. B. Weber, Beckman Instruments, Inc., 2500 Harbor Blvd., Fullerton, Calif.)

16–20. American Soc. of **Civil Engineers**, Denver, Colo. (W. H. Wisley, 345 E. 47 St., New York, N.Y. 10017)

16–20. **Disposal of Radioactive Wastes** into the Seas, Oceans, and Surface Waters, symp., Intern. Atomic Energy Agency, Vienna, Austria. (IAEA, 11 Kärntnerring, Vienna 1)

16–20. American **Industrial Hygiene** Assoc., Pittsburgh, Pa. (A. D. Hosey, 1014 Broadway, Cincinnati, Ohio 45202)

16–20. **Water Resources Engineering**, conf., American Soc. of Civil Engineers, Denver, Colo. (W. H. Wisley, The Society, 345 E. 47 St., New York 10017)

17–19. **Fast Breeder Reactors**, intern. conf., London, England. (H. C. Dunn, British Nuclear Energy Soc., Risley, Warrington, Lancashire, England)

18–20. **Operations Research** Soc. of America, 29th natl. mtg., Santa Monica, Calif. (J. E. Walsh, System Development Corp., 2500 Colorado Ave., Santa Monica 90406)

18–25. **Warm-Water Pond Fish Culture**, world symp., U.N. Food and Agriculture Organization, Rome, Italy. (T. V. R. Pillay, FAO, Via delle Terme di Caracalla, Rome)

19–20. **Membrane Processes** for Industry, symp., Southern Research Inst., Birmingham, Ala. (J. H. Strickland, SRI, 2000 Ninth Ave. S., Birmingham 35205)

19–21. **Organellogenesis**, regional conf., Soc. for Developmental Biology, Ames, Iowa. (J. M. Arnold, Dept. of Biochemistry and Biophysics, Iowa State Univ., Ames 50010)

19–22. **Exfoliative Cytology**, intern. congr., Rio de Janeiro, Brazil. (E. von Haam, Ohio State Univ., Columbus)

19–22. German Bunsen Soc. for **Physical Chemistry**, 65th general assembly, Freudenstadt. (The Society, Varrentrappstr. 40-42, 6 Frankfurt am Main, West Germany)

20–21. **Surface Physics**, 4th symp., Washington State Univ., Pullman. (E. E. Donaldson, Dept. of Physics, Washington State Univ., Pullman 99163)

20–22. Royal **Astronomical** Soc. of Canada, general assembly, Univ. of Manitoba, Winnipeg. (R. J. Lockhart, Dept. of Mathematics, Univ. of Manitoba, Winnipeg)

20–22. Society for **Experimental Medicine** of the German Democratic Republic, 3rd general conf., Leipzig, East Germany. (Secretariat, The Society, Friedrichstr. 129,

Block F, 104 Berlin, East Germany)

21. **Southern Calif. Acad.** of Sciences, annual mtg., California State College, San Diego. (C. Rozaire, The Academy, Los Angeles Museum, Exposition Park, Los Angeles, Calif.)

22–26. Institute of **Food Technologists**, 26th annual mtg., Portland, Ore. (C. L. Willey, 176 W. Adams St., Chicago, Ill. 60603)

22–26. American **Orthopedic** Assoc., Colorado Springs, Colo. (S. W. Banks, 29 E. Madison St., Chicago, Ill.)

23–24. **High Temperature Reactors** and the Dragon Project, symp., London, England. (Secretary, British Nuclear Energy Soc., Inst. of Civil Engineers, 1-7 Great George St., London S.W.1)

23–25. American **Astronautical** Soc., 12th annual mtg., Los Angeles and Anaheim, Calif. (L. Larmore, Douglas Aircraft, 3000 Ocean Park Blvd., Santa Monica, Calif.)

23–25. **Chemical and Petroleum Instrumentation**, 7th natl. symp., San Francisco, Calif. (J. T. Ward, E. I. duPont de Nemours & Co., Wilmington, Del. 19898)

23–25. Dynamics of **Chemical Reactions**, intern. symp., Padua, Italy. (Direzione Istituto di Impianti Chimici, Univ. degli Studi, Padua)

23–26. Association for Research into **Periodontal Disease**, 18th mtg., West Berlin, Germany. (M. J. Matthey, 2 rue Bartholini, Geneva, Switzerland)

23–26. **Spaceflight**, 6th European symp., Brighton, England. (British Interplanetary Soc., 12 Bessborough Gardens, S.W., London, S.W.1, England)

23–28. International Assoc. for the Study of the **Bronchi**, 16th congr., Athens, Greece. (The Association, 189 Blvd. St.-Germain, Paris 7, France)

23–28. **Hormonal Steroids**, intern. congr., Milan, Italy. (L. Martini, Inst. di Farmacologia, Via Andrea del Sarto 21, Milan)

24–26. **Solid Propulsion**, conf., Chicago, Ill. (Chemical Propulsion Information Agency, 8621 Georgia Ave., Silver Spring, Md.)

24–26. **Ultrasonic Testing** of Materials, 2nd intern. symp., Berlin, Germany. (Kammer der Technik FV "Maschinenbau", Clara-Zetkinstr. 115-117, 108 Berlin)

25. American Soc. for **Gastrointestinal Endoscopy**, Chicago, Ill. (B. H. Sullivan, Jr., 2020 E. 93 St., Cleveland, Ohio 44106)

25–27. Society of **Radiographers**, 20th annual conf., Brighton, England. (The Society, 32 Welbeck St., London, W.1, England)

25–27. **Sulfamic Acid** and Its Electrometallurgical Applications, symp., Milan, Italy. (R. Piontelli, Laboratorio de Electrochimica, Clinica-Fisica e Metallurgia del Politecnico de Milano, 32 Piazza Leonardo da Vinci, Milan)

26–27. **Fiber** Soc., spring mtg., Williamsburg, Va. (L. Rebenfeld, The Society, Textile Research Inst., P.O. Box 625, Princeton, N.J.)

26–28. American Assoc. for **Cancer Research**, annual mtg., Denver, Colo. (H. J. Creech, 7701 Burholme Ave., Philadelphia, Pa. 19111)

26–28. American **Gastroenterological** Assoc., Chicago, Ill. (D. Cayer, 2240 Cloverdale Ave., Winston-Salem, N.C.)

(Continued from page 1523)

John W. Gofman, Eds. Academic Press, New York, 1965. 432 pp. Illus. $15.50. Six papers: "The effects of ionizing radiation on the nervous system" by H. Gangloff and O. Hug; "Use of short-lived nuclides in medical research" by Rune Söremark; "Biological effects of laser radiation" by Samuel Fine and Edmund Klein; "Tracer techniques for the study of bone metabolism in man" by Göran C. H. Bauer; "Elastic reservoir theories of the human circulation with applications to clinical medicine and to computer analysis of the circulation" by Freeman W. Cope; and "Implantable cardiac pacemakers" by George J. Haupt and Newton C. Birkhead.

Advances in Cancer Research. vol. 9. Alexander Haddow and Sidney Weinhouse, Eds. Academic Press, New York, 1965. 440 pp. Illus. $16. Five papers: "Urinary enzymes and their diagnostic value in human cancer" by Richard Stambaugh and Sidney Weinhouse; "The relation of the immune reaction to cancer" by Louis V. Caso; "Amino acid transport in tumor cells" by R. M. Johnstone and P. G. Scholefield; "Studies on the development, biochemistry, and biology of experimental hepatomas" by Harold P. Morris; and "Biochemistry of normal and leukemic leucocytes, thrombocytes, and bone marrow cells" by I. F. Seitz.

Advances in Food Research. vol. 14. C. O. Chichester, E. M. Mrak, and G. F. Stewart, Eds. Academic Press, New York, 1965. 472 pp. Illus. $16. Five papers: "Techniques for sensory evaluation of food odors" by Herbert Stone, Rose Marie Pangborn, and C. S. Ough; "Methods of meat texture measurement viewed from the background of factors affecting tenderness" by Alina Surmacka Szczesniak and Kathryn Weiss Torgeson; "Chemistry of nonenzymic Browning II" by T. M. Reynolds; "Unimolecular thermal transformations of organic compounds under food processing conditions" by Jack W. Ralls; and "Theory and practice of hard-surface cleaning" by Walter G. Jennings.

Advances in Genetics. vol. 13. E. W. Caspari and J. M. Thoday, Eds. Academic Press, New York, 1965. 388 pp. Illus. $15. Seven papers: "Cytoplasmic pollen sterility in corn" by Donald N. Duvick; "Genetic variation in chromosome pairing" by Ralph Riley and C. N. Law; "Evolutionary significance of phenotypic plasticity in plants" by A. D. Bradshaw; "The premeiotic stages of spermatogenesis" by Aloha Hannah-Alava; "The function of the y-chromosome in man, animals, and plants" by K. R. Dronamraju; "Mammalian pigment genetics" by Morris Foster; and "The complex locus R in *Mormoniella vitripennis* (Walker)" by Anna R. Whiting.

An Atlas of Fine Structure: The Cell, Its Organelles and Inclusions. Don W. Fawcett. Saunders, Philadelphia, 1966. 456 pp. Illus. $11.

Changing Human Behavior. John Mann. Scribner, New York, 1965. 249 pp. $5.95.

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search Council, Washington, D.C., 1966. 231 pp. Illus. Paper, $4. Fourteen papers: Some Recent Advances in the Study of Physiological Reflex Mechanisms in Vision (4 papers); Some Recent Advances in Instrumentation and Procedures in Vision Research (4 papers); The Effects of Drugs on Vision (6 papers).

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Economics and the Social Sciences

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Nonalignment in Foreign Affairs (*Ann. Amer. Acad. Polit. Soc. Sci.* **362**). Cecil V. Crabb, Jr., Ed. American Acad. of Political and Social Science, Philadelphia, 1965. 231 pp. Paper, $2.50; cloth, $3.50. Thirteen papers: "Nonalignment as a diplomatic and ideological credo" by Khalid I. Babaa and Cecil V. Crabb, Jr.; "Is containment moral?" by D. F. Fleming; "The European version of neutralism" by Jacques Freymond; "Nonalignment in the Arab world" by Don Peretz; "Asian nonalignment" by Sisir K. Gupta; "Nonalignment in Africa" by Thomas Patrick Melady; "Latin America and neutralism" by Nelson de Sousa Sampaio; "The neutralist world and disarmament negotiations" by Joseph L. Nogee; "The 'third force' and the United Nations" by Khalid I. Babaa; "The United States and the neutralists: a decade in perspective" by Cecil V. Crabb, Jr.; "The Soviet Union and the neutralist world" by John S. Reshetar, Jr.; "Communist China and the uncommited zone" by Harold A. Vinacke; and "The future of nonalignment" by M. S. Rajan.

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Michigan Press, Ann Arbor, 1965. 558 pp. Illus. $9. Forty-two papers on the following topics: Definitions and prevalence of poverty (4 papers); Who are the poor? (6 papers); Poverty and the political economy (4 papers); Sustaining conditions of poverty (6 papers); The values of the poor (4 papers); The life of the poor (9 papers); and Policies and programs (9 papers).

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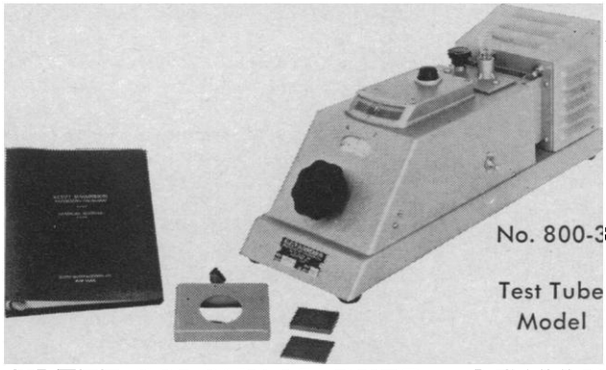

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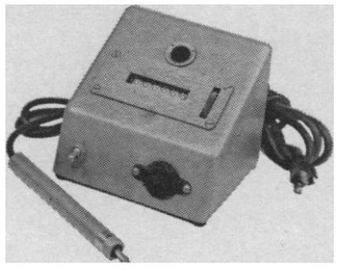

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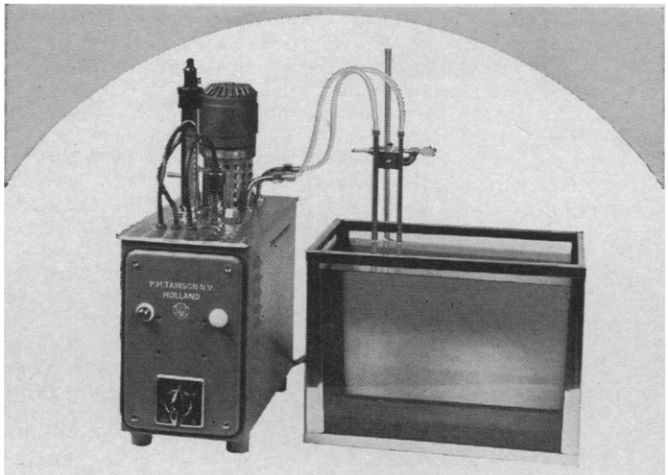

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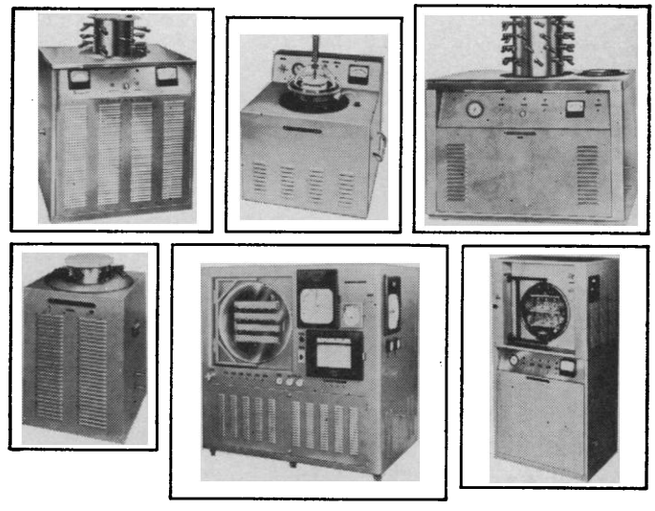

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Mental Retardation in Canada. Proceedings, Federal-Provincial Conference (Ottawa), October 1964. Harvey W. Adams, Ed. Department of Natl. Health and Welfare, Ottawa, 1965. 313 pp. Paper, $3. Includes papers from the five plenary sessions and the four group discussions. Available in French or English.

Non-Equilibrium Thermodynamics, Variational Techniques, and Stability. A symposium (Chicago), May 1965. Russell J. Donnelly, Robert Herman, and Ilya Prigogine, Eds. Univ. of Chicago Press, Chicago, 1966. 323 pp. Illus. $10. Seventeen papers and ten discussions.

Precipitation from Iron-Base Alloys. Proceedings of a symposium (Cleveland, Ohio), October 1963. Gilbert R. Speich and John B. Clark, Eds. Gordon and Breach, New York, 1966. 420 pp. Illus. Paper, $8.50; cloth, $21. Metallurgical Society Conferences, vol. 28; nine papers: "Precipitation from binary substitutional solid solutions of alpha iron" by E. Hornbogen (with discussion by G. R. Speich); "Precipitation from substitutional iron-base austenitic and martensitic solid solutions" by R. F. Decker and S. Floreen (with discussion by R. F. Pitler and L. Habraken); "Quench aging in Fe-Mn-C-N alloys" by J. E. Enrietto, M. G. H. Wells, and E. R. Morgan; "A study of the tempering of steel using transmission electron microscopy" by E. Tekin and P. M. Kelly (with discussion by C. Altstetter, M. G. H. Wells, and E. Smith); "Theory of strengthening due to precipitate phases" by G. S. Ansell; "Interaction of dislocations and precipitates in some iron-base alloys" by A. S. Keh, W. C. Leslie, and D. L. Sponseller; "Dispersion strengthening of iron" by K. M. Zwilsky, R. C. Nelson, and N. J. Grant; "Effect of precipitation on magnetic

properties of iron-base alloys" by E. A. Nesbitt and A. J. Williams; and "Precipitation in iron-base alloys—state of the art" by Morris Cohen.

Proceedings, London Mathematical Society: Papers Presented to J. E. Littlewood on His 80th Birthday. vol. 14A, 1965. J. D. Weston, Ed. Oxford Univ. Press, New York, 1966. 320 pp. Illus. $12.80. Twenty-six papers.

Proceedings of the Natural Rubber Producers' Research Association Jubilee Conference (Cambridge, England), 1964. L. Mullins, Ed. Published for the Natural Rubber Producers' Research Assoc. by Maclaren, London, 1965. 258 pp. Illus. 42s. Sixteen papers: Plenary lectures (3 papers); Symposium on rubber biosynthesis (7 papers); and Symposium on relation between chemical structure and mechanical properties (6 papers).

Proceedings of the Symposium on Bacterial Transformation and Bacteriocinogeny (Budapest), August 1963. vol. 6. B. Györffy, Ed. Akadémiai Kiadó, Budapest, 1966. 167 pp. Illus. $6. Twenty-two papers: Bacterial Transformation (9 papers); Bacteriocinogeny (6 papers); and DNA specificity and regulation (7 papers).

Radiological Monitoring of the Environment. A symposium (Berkeley, England), October 1963. B. C. Godbold and J. K. Jones, Eds. Pergamon, New York, 1965. 443 pp. Illus. $15. Thirty-three papers.

VII International Mineral Processing Congress. vol. 1. A symposium (New York), September 1964. Nathaniel Arbiter, Ed. Gordon and Breach, New York, 1965. 623 pp. Illus. $45. Fifty-five papers on the following topics: Comminution (6 papers); Gravity and Dense Media Separation (6 papers); Chemical Processing (3 papers); Flotation Kinetics (5 papers); Flotation Practice (4 papers); Chemistry of Flotation (7 papers); Surface Chemistry in Mineral Processing (6 papers); Magnetic and Electrical Separation (6 papers); Automation and Control (5 papers); and Symposium on Autogenous Grinding (7 papers).

Surface Interactions Between Metals and Glass. V. I. Arkharov and K. M. Gorbunova, Eds. Translated from the Russian edition (Moscow, 1964). Consultants Bureau, New York, 1966. 171 pp. Illus. Paper, $25. Twenty-seven papers on topics considered at a conference (May 1963) honoring P. D. Dankov on his 60th birthday.

Symposium on Diffusions in Oceans and Fresh Waters (Palisades, N.Y.), August–September, 1964. Takashi Ichiye, Ed. Lamont Geological Observatory, Columbia University, Palisades, N.Y., 1965. 174 pp. Illus. Paper, $2. Fourteen papers and five summaries of papers prepared from notes.

The United States and Japan. Twenty-eighth American Assembly (New York), October 1965. Herbert Passin, Ed. Prentice-Hall, Englewood Cliffs, N.J., 1966. 186 pp. Paper. $1.95. Six papers: "The image" by Edward Seidensticker; "The legacy of the occupation" by Robert E. Ward; "Political relations" by Lawrence Olson; "Political economy" by William W. Lockwood; "The view from Japan" by Kinhide Mushakoji; and "The future" by Herbert Passin.

(Continued from page 1518)

climatological aspects; and recommendations for further research. Sponsors: International Commission on Polar Meteorology, IUGG; Scientific Committee on Antarctic Research; and World Meteorological Organization. Send title and indication of scope of proposed papers to K. Langlo, WMO, 41 Avenue Giuseppe-Motta, 1200, Geneva.

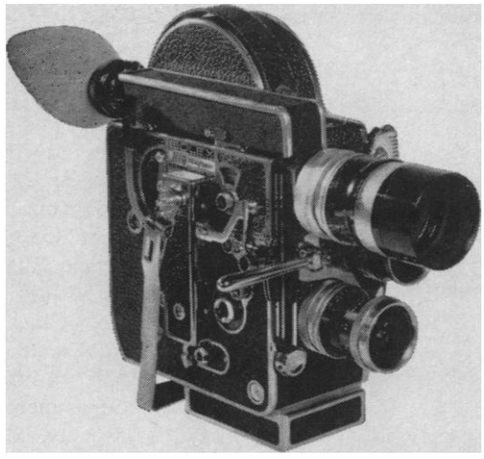
Abstracts: six copies in English; if possible, necessary diagrams; deadline: *1 June*. (Svenn Orvig, Department of Meteorology, McGill University, Montreal, Quebec, Canada)

A symposium on fundamentals of **gas-surface interaction** is scheduled for 14–16 December in San Diego, California. The topics to be covered include the surface and its characteristics; adsorption and reaction of gases on or with surfaces; and scattering processes, including energy and momentum transfer at the gas-surface interface. Emphasis will be on studies involving incident particles which are gaseous neutral species with energies below 10 electron volts, on their interaction with well-defined crystalline, but not necessarily clean, surfaces. Deadlines: declaration of intent to submit a paper, and title: *1 June*; abstracts: *1 September*. (H. Saltsburg, General Dynamics/General Atomic, P.O. Box 608, San Diego, California 92112)

Courses

Applications are being accepted for a course on **marine geology** of the Pacific basin, scheduled for 24–26 June at the University of California, Berkeley. The program is designed to provide postgraduate work in marine geology for earth scientists and people in related fields. Topics to be covered include structure and bathymetry of the Pacific basin, deep-sea sediments, marine sediments off California, marine geochemistry, instrumentation in marine geology, and the federal role in marine geology. The registration fee is $125; graduate students may apply for a reduced fee of $60. (R. E. Patterson, Letters and Science Extension, University of California, Berkeley)

The American Association of Immunologists will present a course in **basic immunology**, 25 July to 6 August



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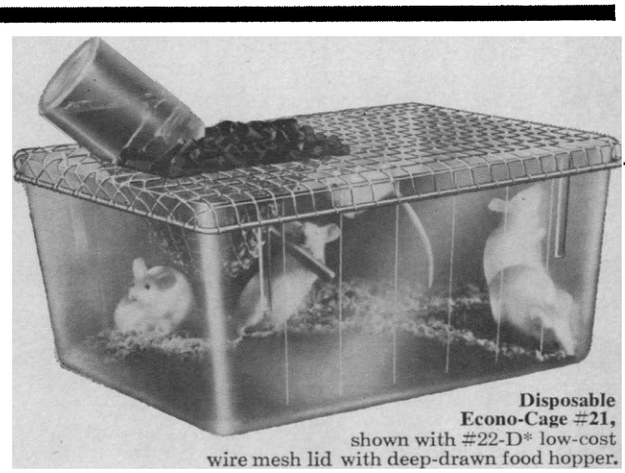

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at Lake Forest College, Lake Forest, Illinois. The course is intended for university instructors and investigators. Enrollment will be limited to 40. Deadline: *1 May*. (Sheldon Dray, University of Illinois Medical Center, P.O. Box 6998, Chicago 60680)

Rochester Institute of Technology will offer a course on **statistical techniques in quality control**, 13–22 June. The program is designed to present basic elements of statistics for research and industry. Tuition is $275.

The course will be followed, 22–30 June, by a program on **design of experiments** for persons who require advanced programs for the more complex problems revolving around industrial experimentation. Tuition will be $250. (James Swanton, Extended Services Division, Rochester Institute of Technology, 65 Plymouth Avenue South, Rochester, New York 14608)

A course on **elastomers** will be offered by the institute of polymer science at the University of Akron. Attendance will be limited to 25 scientists and engineers employed in industry and business. A $175 registration fee is being charged. Registration deadline: *15 May*. (Institute of Polymer Science, University of Akron, 302 East Buchtel Avenue, Akron, Ohio 44304)

Publications

The Office of Science and Technology recently published a report listing the **marine science** curricula being offered this year at U.S. universities. For each institution included, the report names the departments that provide instruction in the marine sciences, lists and describes the courses, and indicates the academic degrees that may be earned. It also lists the name, rank, and degree of each faculty member who teaches or supervises student research. Special information on undergraduate curricula and on financial aid are included. (*University Curricula in Oceanography, Academic Year 1965–66*. Interagency Committee on Oceanography, 4th Floor, Bldg. 159E, Washington Navy Yard, Washington, D.C. 20390. ICO Pamphlet No. 23; 116 pages. Free of charge)

A brochure naming the **foreign scholars available under the Fulbright-Hays Act** for employment at U.S. colleges and universities has been prepared by the Committee on the International Exchange of Persons, Conference Board of Associated Research Councils. The persons listed are eligible for U.S. government grants to cover round-trip transportation costs between their home countries and the host institutions, if they obtain teaching or research jobs on American campuses. The booklet provides biographical data on the scholars and describes the procedures for inviting them and the conditions of the appointments. (Grace E. L. Haskins, Committee on International Exchange of Persons, 2101 Constitution Avenue, NW, Washington, D.C.)

A recent NIH publication discusses the increasing importance of voluntary health agencies in **research into national health problems**. More than 50 such organizations, supported by contributions from the public, operate on a nationwide scale. The report analyzes the relationship of their research support to their other major programs and notes how much of the total expenditure is given for research and training in various fields. In 1963, the report says, the total spent for research was $44 million; for training of research personnel an additional $4 million was spent. Three agencies supported the largest share (two-thirds): The American Cancer Society, the American Heart Association, and the National Foundation; and each of six other organizations had programs amounting to over $1 million. (*Voluntary Health Agency Expenditures for Research and Research Training*. For single copies: Research Analysis Branch, NIH, Bethesda, Md. 20014; free of charge. For multiple copies: Superintendent of Documents, Government Printing Office, Washington, D.C. 20402; 20 cents)

The National Science Foundation has issued its annual inventory of the research projects American colleges and universities are conducting on the **impact of science and technology**. The report includes projects on the impact of agricultural technology, decision-making in science and technology, international and foreign studies, and scientific and engineering manpower. Other topics range from patents and trademarks to changing patterns of research administration. (*Current Projects on Economic and Social Implications of Science and Technology, 1964*. Superintendent of Documents, U.S. Government Printing Office, Washington, D.C.; 50 cents)

New Journals

Bibliography of Medical Translations; National Library of Medicine–sponsored journal; originally issued quarterly, semi-monthly as of July 1965. (Superintendent of Documents, Government Printing Office, Washington, 20402. $4.50 a year)

Current Papers in Physics. Vol. 1, No. 1, January 1966. A. Tybulewicz, Editor. Titles of physics research papers published in about 100 journals. (Institution of Electrical Engineers, Savoy Place, London, W.C.2, England. Semimonthly; surface mail $5, airmail $11, for members of AIP member societies; $8.50, surface, $14.50 air, for nonmembers)

Gastroenterology Abstracts and Citations. Vol. 1. No. 1, March 1966. Frank P. Brooks and Edward C. Raffensperger, Editors. Titles of original papers on digestive diseases, published in medical journals throughout the world; abstracts or summaries of some entries. (Communications Office, *Gastroenterology Abstracts and Citations,* National Institute of Arthritis and Metabolic Diseases, NIH, Bethesda, Maryland 20014. Monthly; free of charge)

Metrologia. Intern. journal of scientific metrology; vol. 1, No. 2, April 1965. L. E. Howlett, Editor. Articles in English, French, German, or Spanish; results of research on fundamental measurements in any field of physics. (L. E. Howlett, Division of Applied Physics, National Research Council, Ottawa 2, Ontario, Canada. Quarterly, $8.50 a year)

Scientists in the News

Richard P. Schmidt, chairman of the department of medicine at the University of Florida's college of medicine, has been appointed associate dean of the college and chief of staff of its teaching hospital.

John C. Weaver, vice president for academic affairs and dean of faculties at Ohio State University, will become president of the University of Missouri on 1 August. He will succeed **Elmer Ellis**, who plans to retire.

The following appointments have been announced by the University of Louisville, Louisville, Kentucky:

John A. Dillon, professor and executive officer of the physics department

at Brown University, dean of the graduate school, effective 1 July.

Randolph B. Renda, associate professor of mechanical engineering at the University of Kentucky, head of the Speed scientific school.

Arman F. Frederickson, formerly chairman of the department of earth and planetary sciences at the University of Pittsburgh, has become director of the university's Center for Oceanography.

Merton R. Clarkson has been appointed director of the recently established Bureau of Veterinary Medicine at the Food and Drug Administration. Clarkson retired in 1964 as associate administrator of the USDA's Agricultural Research Service; he is a former president of the American Veterinary Medical Association.

Southern Methodist University's newly established Institute for the Study of Earth and Man will be directed by **William B. Heroy**, who joined the SMU faculty last fall when he retired as board chairman of Geotechnical Corporation, Dallas.

Donald L. Kimmel, chairman of anatomy at Chicago Medical School, has been appointed professor and chairman of the department of anatomy at West Virginia University medical school, effective 1 June.

Leighton E. Cluff, head of the division of allergy and infectious diseases at Johns Hopkins University, has been appointed professor and head of the department of medicine in the University of Florida's college of medicine, effective 1 June.

NASA has named **George J. Howick** director of the Technology Utilization Division, succeeding **Richard L. Lesher**, acting director. He had been manager of industrial technology services at Midwest Research Institute, Kansas City, Mo.

Drexel Institute of Technology has appointed **Bertrand E. Bennison** head of the department of biological sciences. He had been assistant director of research at Ortho Pharmaceutical Corporation.

Harry P. Day, dean of students of Florida State University, has been named director of the recently established New England Regional Center for Continuing Education, effective 1 May. The center is being built on the campus of the University of New Hampshire.

Recent Deaths

George E. Adams, 91; first dean of the college of agriculture at the University of Rhode Island; 12 March.

Everitt P. Blizard, 49; director of the neutron physics division at Oak Ridge National Laboratory and editor of *Nuclear Science and Engineering*; 22 February.

Marvin S. Burstone, 43; head of the histochemistry section, National Cancer Institute, NIH; 19 February.

Harold J. Grant, Jr., 45; chairman of the entomology department, Academy of Natural Sciences of Philadelphia, and president of the American Entomological Society; 27 February in a swimming accident in Trinidad, where he was taking part in an expedition to collect and observe the ecology of tropical katydids.

Ned Guthrie, 66; professor emeritus of chemistry at Hanover College, Hanover, Indiana; 5 February.

Eino Nelson, 46; chairman of pharmaceutics, school of pharmacy, State Univeristy of New York at Buffalo; 5 January.

Frank H. H. Roberts, Jr., 69; retired director of the Smithsonian Institution's bureau of American ethnology; 23 February.

Leslie Silverman, 51; head of the department of industrial hygiene at Harvard and president-elect of the American Industrial Hygiene Association; 4 March.

Norair M. Sisakyan, 58; chief academic secretary of the Presidium of the Soviet Academy of Sciences and head of the group that directs the life sciences program of the Soviet space effort; 12 March.

Leroy Stockmann, 65; physicist in charge of radon testing in the radiation physics division, radioactivity section, National Bureau of Standards; 4 February.

Ronald Allen Veeder, 59; manager of the development program at Woods Hole Oceanographic Institution; 2 March.

Fritz Zernike, 77; professor and former lecturer on theoretical physics at Groningen State University, Netherlands, and winner of the 1953 Nobel prize in physics, for inventing the phase-contrast microscope; 10 March.