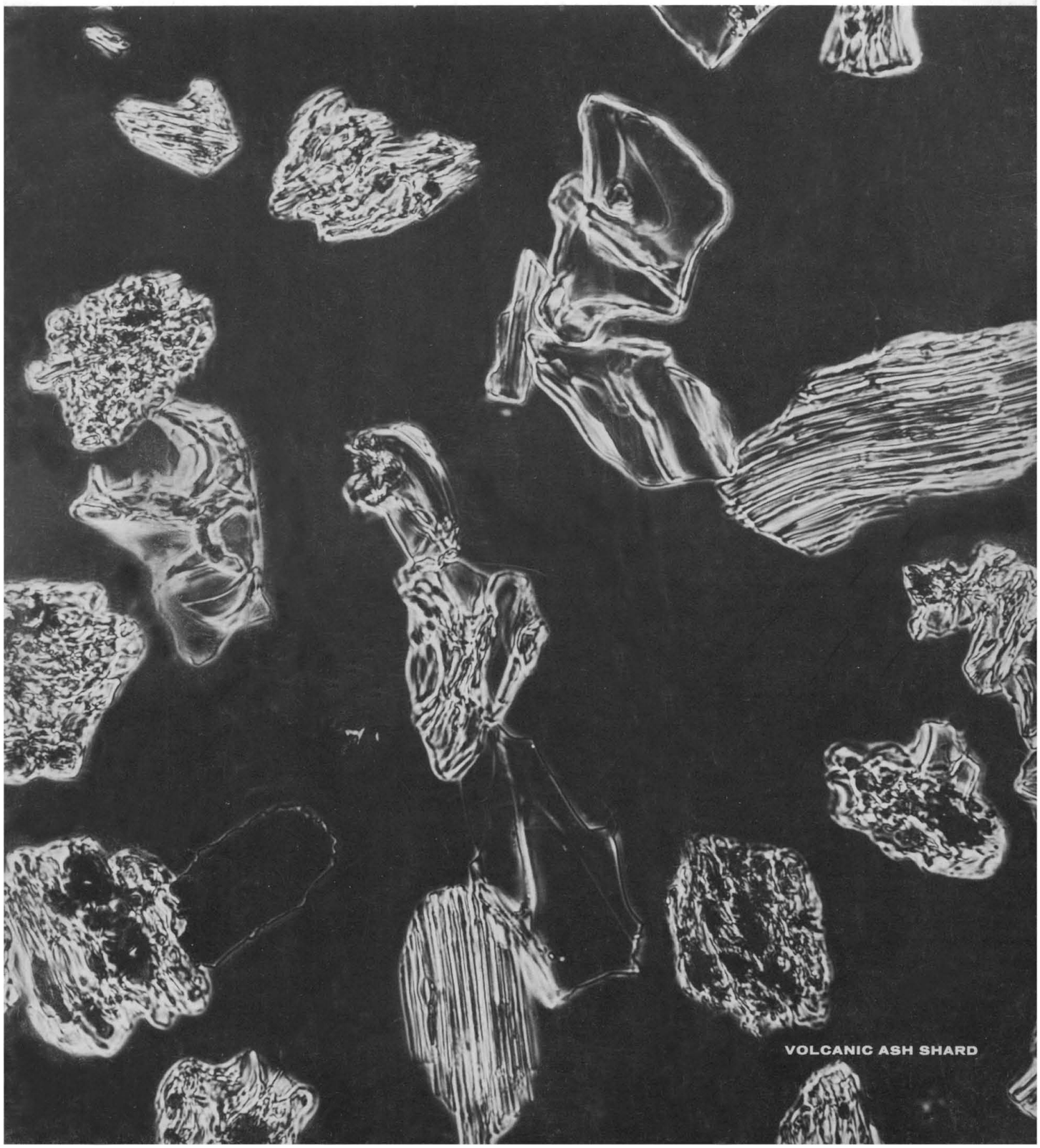
SCIENCE

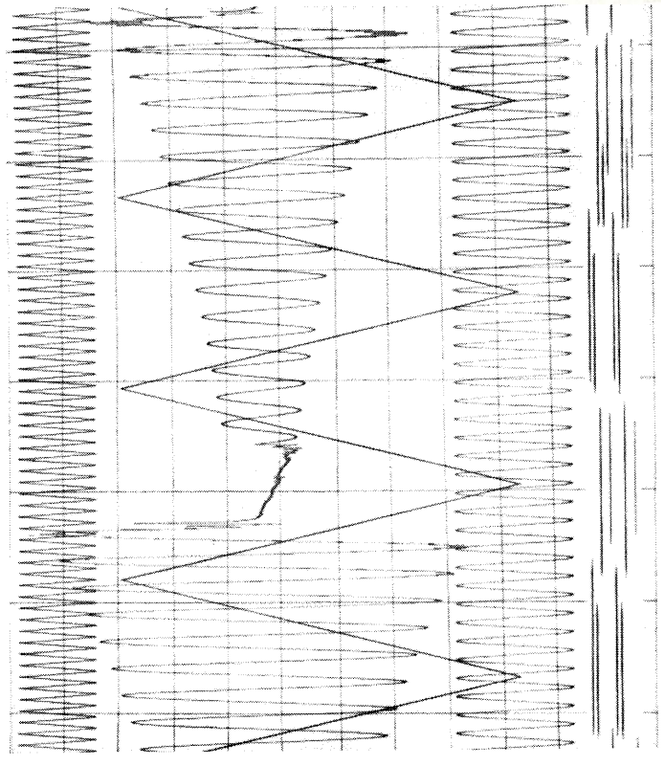
12 June 1964
Vol. 144, No. 3624

AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE



VOLCANIC ASH SHARD

In graphic recording nothing is as versatile as the Brush 2300



There's hardly a recording requirement that cannot be met by this new addition to the complete Brush line. Your application possibilities are almost unlimited . . . whether they're industrial or aero-space. Check out these facts.

1 to 16 Analog channels . . . or 120 event channels . . . or any combination of both
Meets MIL RFI Specs and Safety Codes
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Add to this a low cost-per-channel and you'll understand why we believe the Brush 2300 satisfies the widest range of requirements in graphic recording today.

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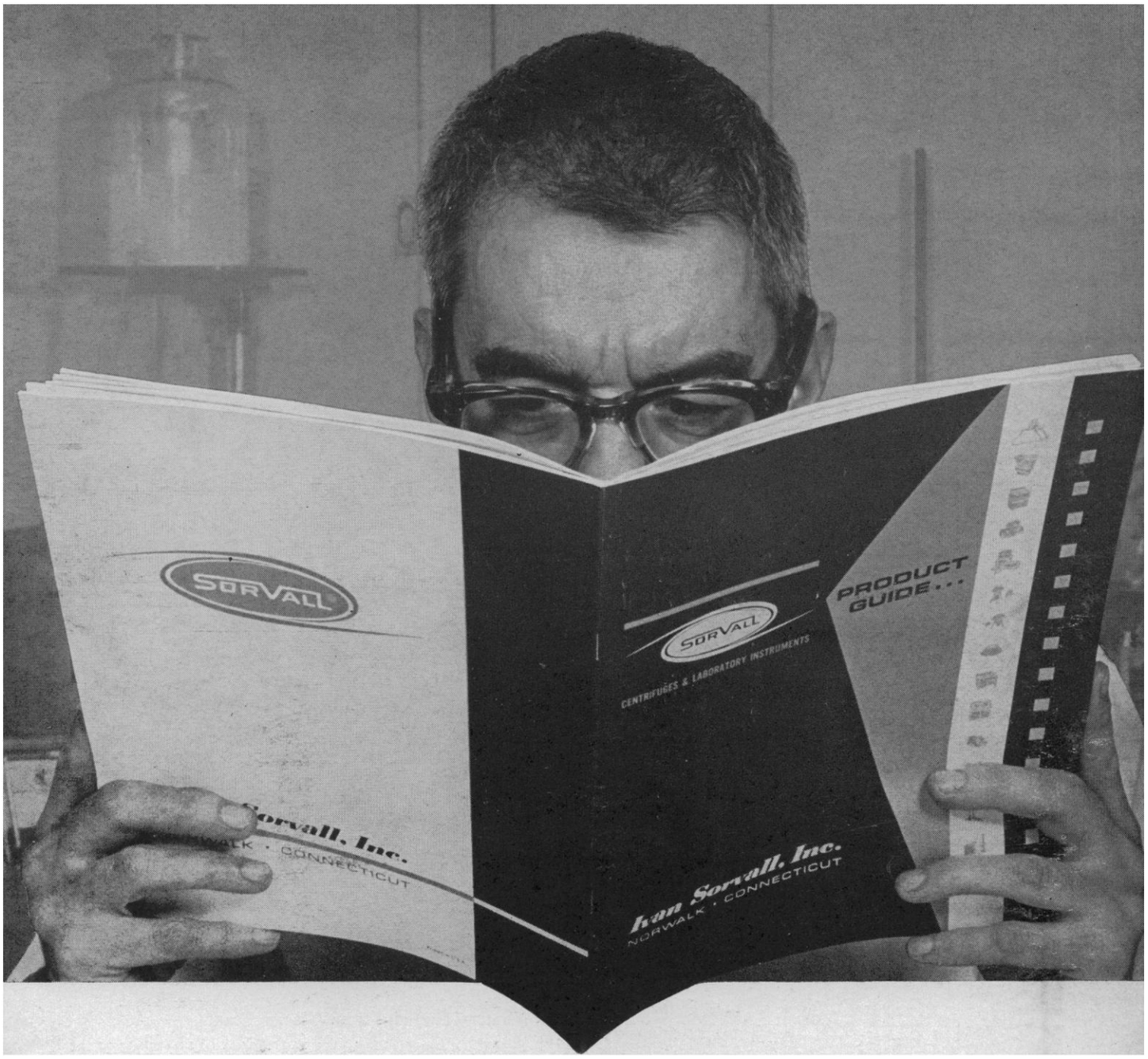

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12 June 1964
Vol. 144, No. 3624

SCIENCE

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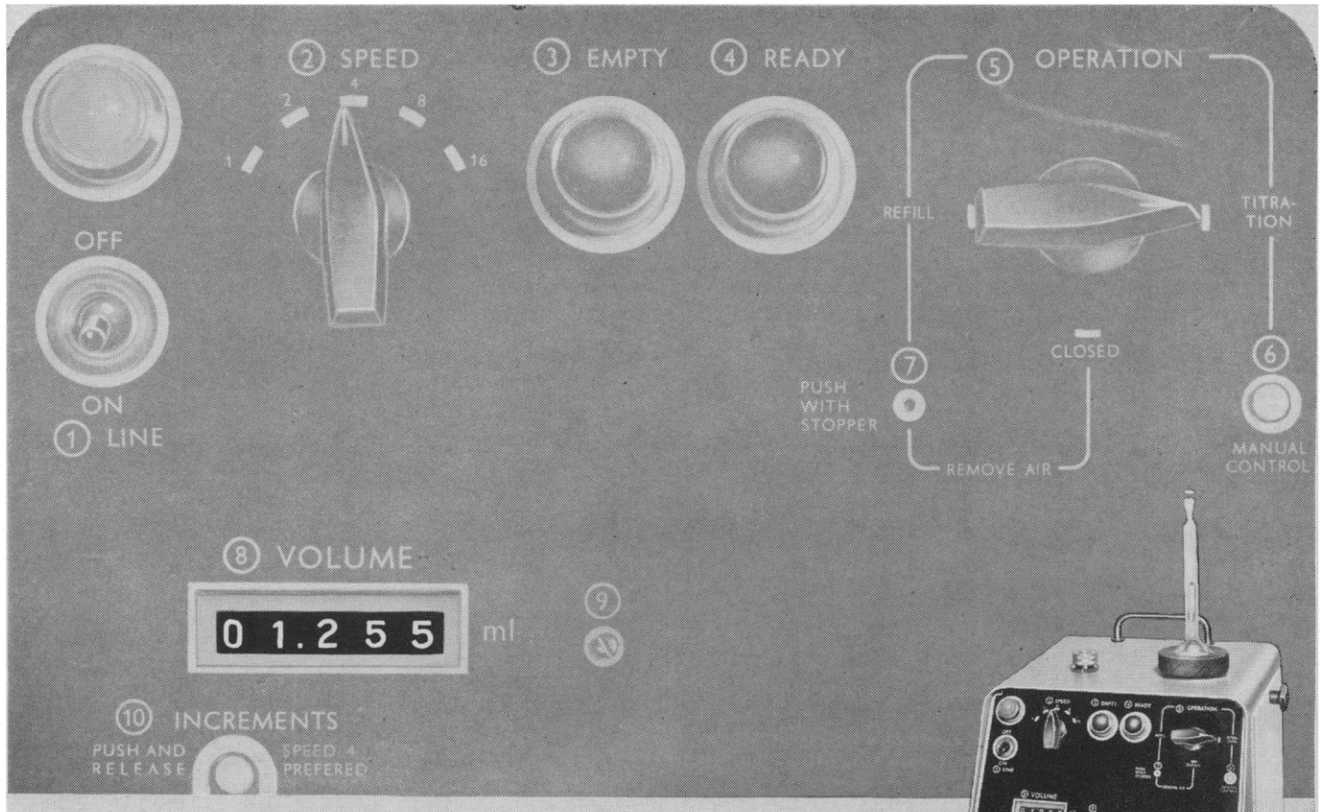
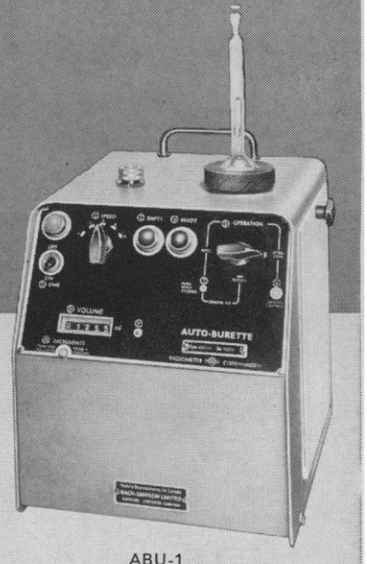
AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE

COVER

Glass shards of the Mazama volcanic ash layer in Creston Bog, Washington. The dark field "focal masking" illumination used for this photograph aids in the determination of refractive index ranges of glass and phenocrysts. These ranges distinguish the Mazama volcanic ash from the older Glacier Peak ash (about × 300). See page 1334. [Richard B. Taylor, U.S. Geological Survey]





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A new auto burette unit for repetitive routine end point titrations

End point titrations when required on a repetitive basis can be time consuming, tiresome, and open to human error. The Radiometer Auto Burette ABU-1 replaces conventional burette units for all forms of end point titrations—acid-base, redox, precipitation, or dead-stop end point—and features a power driven displacement type syringe, interchangeable in 3 sizes of 25 ml, 2.5 ml, or 0.25 ml.

The read-out of titrant consumed is *digital*, on a counter-type volume indicator, and refilling is automatic—including resetting of the 5 digit counter to zero. Rate of titrant delivery is completely adjustable, and the automatic operation can be overridden by manual control, or by *an incremental control* capable of adding precisely equal increments of titrant in tracing titration curves and establishing equivalence points for the subsequent routine work.

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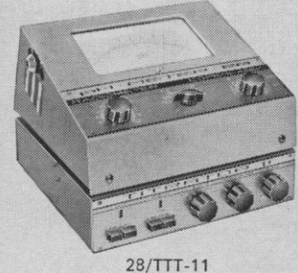

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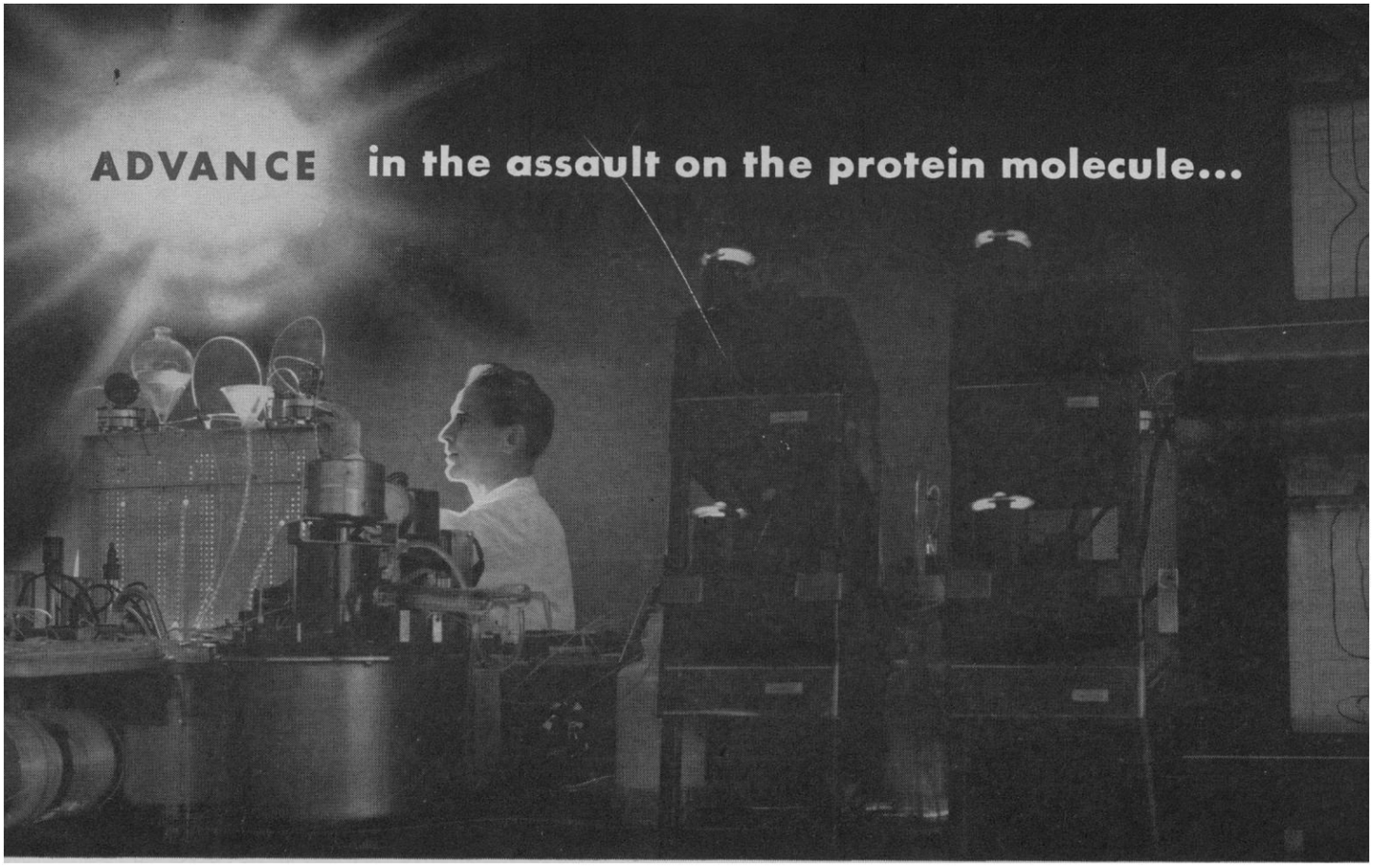


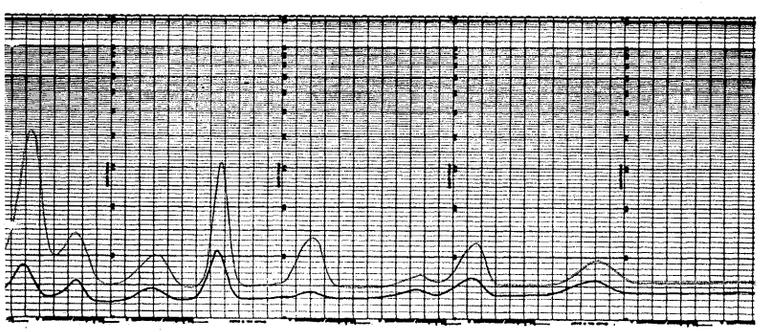
new automated technic provides rapid preparative and quantitative information on peptides ... their size, occurrence and distribution ... and assures detection.

The Technicon AutoAnalyzer system you see above may well make history in protein research. By an ingenious extension of multiple-analysis chromatography, it not only separates peptides for preparative purposes, but at the same time gives quantitative information.

The column effluent is split into many streams. One stream is subjected to a system of continuous hydrolysis. Another stream, unhydrolyzed, is used as control. Both are reacted with Ninhydrin. Comparison of these gives information about the size of the peptide. Other parallel streams can be used simultaneously for specific amino acid reactions. Thus, the basic AutoAnalyzer® train can be augmented and shaped at will to provide more and more analytic information.

In doing this, the system takes up where paper chromatography, electrophoresis and UV monitoring leave off. These methods are generally adequate enough for limited qualitative findings only.

The Technicon® peptide system is automated from beginning to end with thoroughgoing AutoAnalyzer efficiency, rapidity, and reliability. This versatile AutoAnalyzer reduces to *hours* the *days* now conscripted to the tedious task of peptide analysis.



Section of a chromatogram showing tryptic hydrolyzate of performic acid oxidized bovine pancreatic Ribonuclease before and after alkaline hydrolysis.

AUTOMATION IN ANALYTICAL CHEMISTRY
SEPTEMBER
16, 17 and 18
1964
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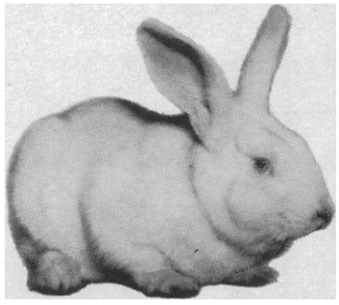
Solution by simulation

FROM BIO-MEDICAL THEORY TO FACT BY SIMULATION

Biomedical scientists have made the analog computer an invaluable aid in advanced research and for educating others in the field. Because it offers complete flexibility in simulating, or "model building," of organic functions it has been accepted in virtually all areas of life sciences.

As described by one medical practitioner:*

(1) Little knowledge of electronics is required to solve the problem. Certain combinations of components perform certain operations. The operator need not know why. (2) Virtually no knowledge of operational mathematics is required. The equations are simple descriptions of relationships and are not subjected to any manipulation. For example, the operator need not know how to integrate an expression, only that the expression requires integration. (3) The intellectual labor lies where it belongs, in writing the equations and in interpreting the solutions. The steps between are purely mechanical and governed by a strict but easily applicable set of rules.



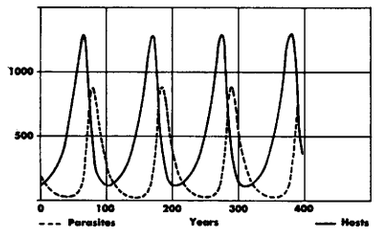
*From "Computers and Experimental Medicine," Richard H. Shepard, M.D.; The American Journal of Medicine, Vol. XXVII, Number 3, pp. 357-359.

Centuries of Ecological Balance

A problem of general interest in the life sciences is the relationship between host and parasite within a given environment. This relationship was mathematically described by A. J. Lotka in the *Proceedings of the National Academy of Science* in 1920. It suggested that when the parasite population P is living on a host population H, the changes of P and H with time depend on the current populations of both P and H. The equations describing the host-parasite relationship can be written as

$$dP/dt = -aP + bPH$$
$$dH/dt = cH - dPH$$

where a, b, c and d are constants expressing the rate of appearance,



disappearance and encounters of H and P. The number of hosts and parasites in this problem are limited only by the number of amplifiers in the computer.

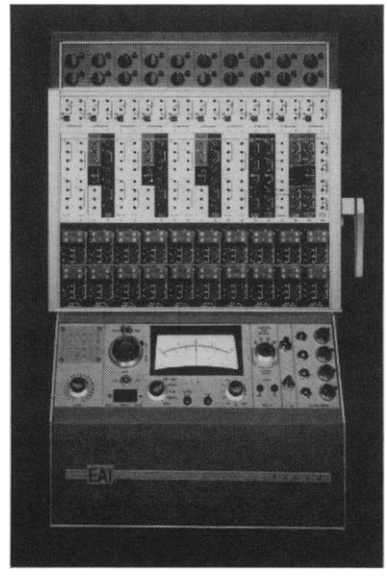
In this analog study, the investigator has the facility to instantaneously change the environment by the simple turning of a knob—enabling many hundreds of years of host-parasite relationship to be compressed into a few seconds of actual time. Conversely, extremely rapid events can be slowed down for detailed observation. The curves superimposed above show the results of a host-parasite population study for a period of approximately 400 years.

EAI's desk-top computers have found wide acceptance in all categories of the life sciences. EAI's TR-20 and TR-48 analog computers, with 20 and 48 operational amplifiers respectively, are within the means of virtually all medical universities and research laboratories.

A free computer operations course is provided with every TR-20 and TR-48 purchase at one of the company's computation centers. In addition, EAI offers tuition courses on Bio-Medical Applications (send for details and date of next course).

Every new owner of an EAI computer automatically becomes a participant in the growing EAI Applications Library, and is eligible to receive simulation studies pertaining to all categories of research.

Send for detailed literature on EAI TR-20 and TR-48 analog computers, or arrange for a biomedical problem-solving demonstration in your laboratory or classroom—at no charge.



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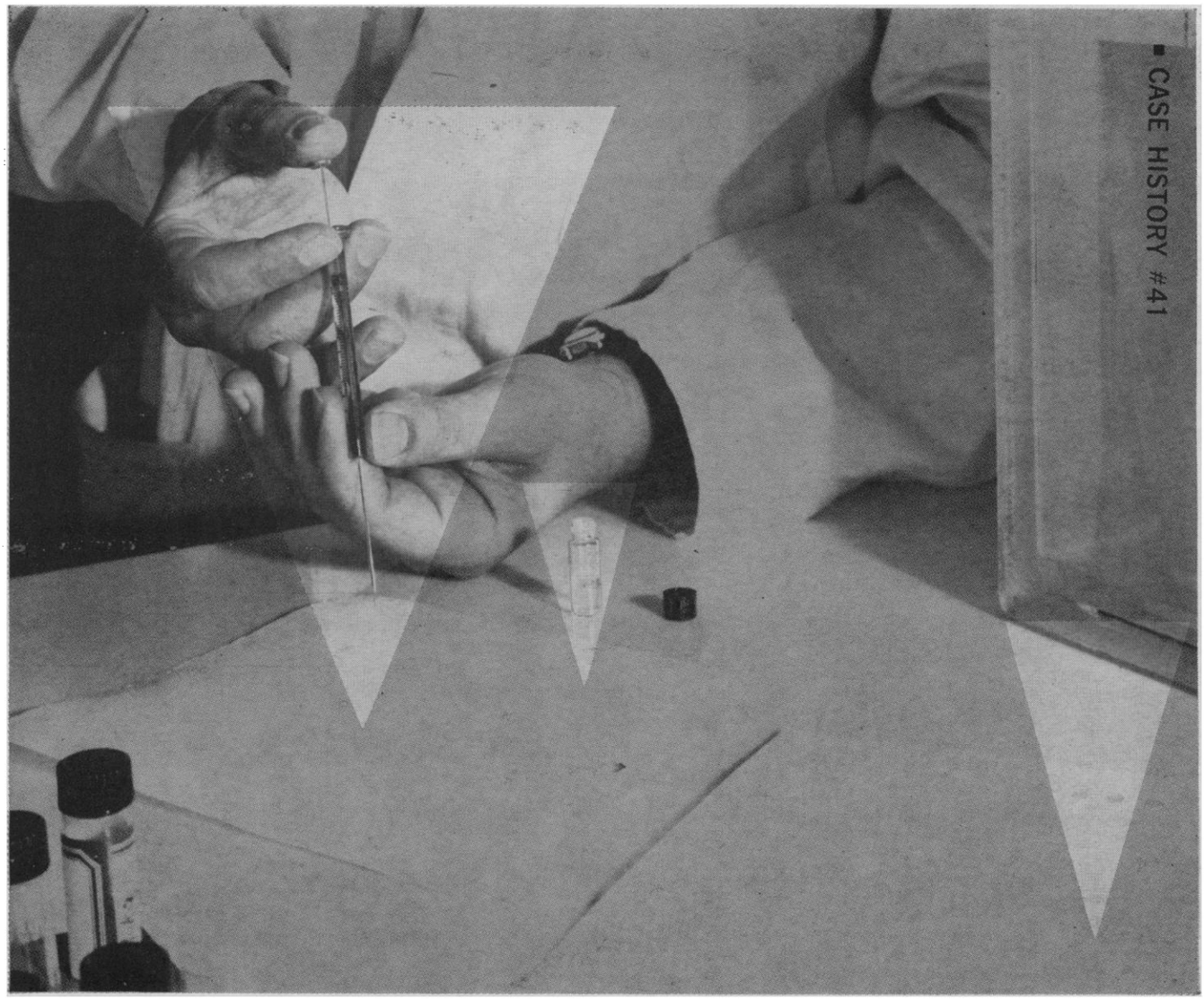

"IT IS ESSENTIAL TO KNOW THE SIZE OF THE SAMPLE"

Applied Science Laboratories, Inc., State College, Pennsylvania, finds the Hamilton 701N especially valuable for chromatographic analysis with silica gel impregnated glass fiber paper (GFP), which it produces and sells. "Our papers are impregnated with 2% and 5% silica gel respectively," reports **Nicholas Pelick.** "Because of this relatively light impregnation, it becomes very critical to be able to deliver reproducible, microgram amounts of sample. Too much sample will overload the paper causing tailing of the compounds and too little will cause spots to be barely visible. We found the Hamilton 701N Syringe suitable for measuring and dispensing the correct sample size. Various compounds such as cholesteryl esters, phospholipids, triglycerides and methyl esters of fatty acids can be separted by this technique." **Hamilton manufactures a complete line of precision syringes, solid samplers, and related chromatograph equipment.**

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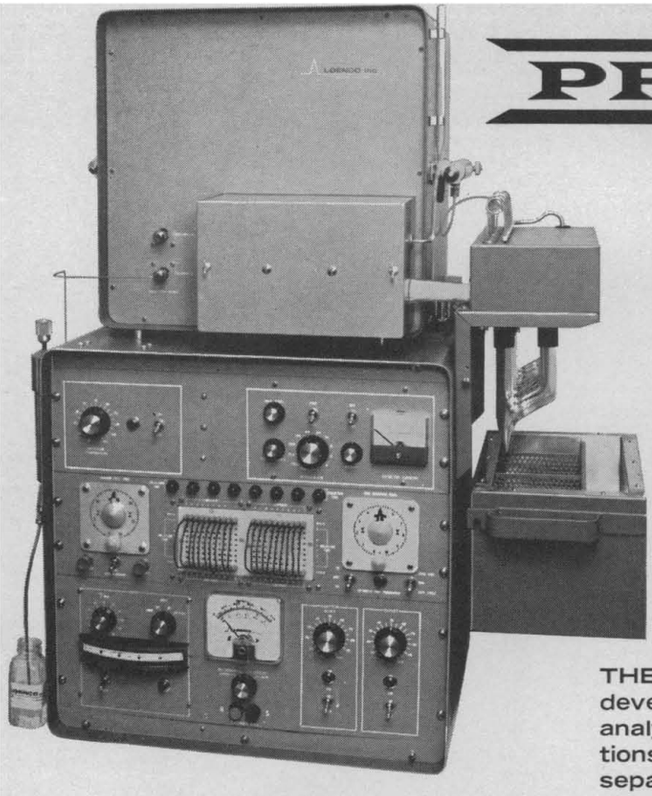

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The 160-PM fills the gap between very basic units with limited performance capabilities and the oversized units which are inconveniently large. The PREP-MATIC occupies only 33 inches of bench space including a standard wide chart recorder.

Available with either dual thermal conductivity or dual hydrogen flame ionization detection.

You should certainly consider the superior extra performance features of the LOENCO PREP-MATIC if you are in the market for a modern preparation scale unit. The price will please you too – only $5,289.00 including a high-quality, wide chart recorder.

Your inquiry will be answered promptly.

OUTSTANDING FEATURES

1. Completely automatic separation of samples up to 3cc.
2. Collects any 8 of first 20 peaks eluted—threshold recorder actuation.
3. Permits compositing of more than one component into any trap for "type" separations.
4. All "wasted" peaks are collected.
5. Completely closed collection system prevents opportunity for room atmosphere contamination.
6. "Anti-dribble" injection system prevents sample bleeding after sample introduction.
7. Prep columns up to ½″ OD with coil diameter up to 11″.
8. Dual column and detection system for use of either prep columns or high efficiency analytical columns. Use as a high performance analytical instrument in "automatic-single" cycle mode.
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11. Precise cycle timing control.
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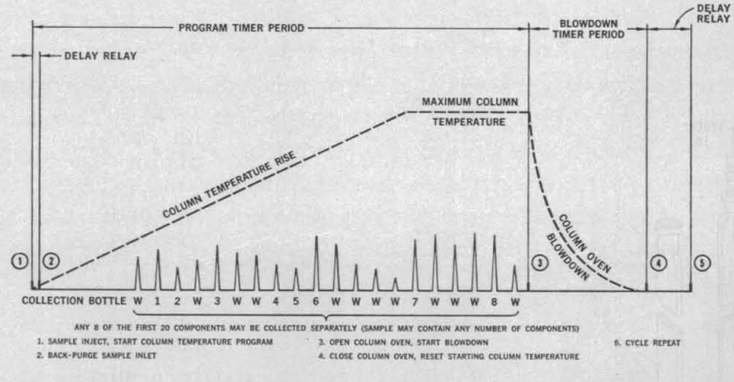

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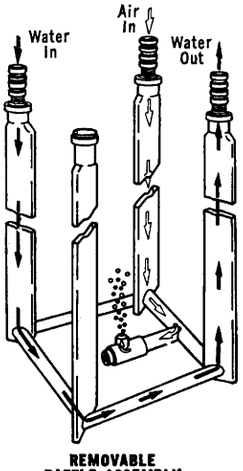

REMOVABLE BAFFLE ASSEMBLY

A wide range of microbial investigations can now be made with bench-top convenience in the MicroFerm, a compact research fermentor. In the quiet of your own laboratory, you can conduct realistic pilot studies while temperature, agitation, and aeration are carefully controlled.

±0.25°C TEMPERATURE CONTROL

To conserve space and achieve more efficient temperature regulation, the conventional water bath has been eliminated. A new design permits tempered water to flow through hollow baffles* in the fermentor from an integral recirculating system. Temperature is adjustable from 5°C above water-supply temperature to 60°C, by means of a Thermistor controller.

Cultures can be irradiated with fluorescent or neon illumination from a Photosynthetic Light Manifold.

Accommodates 4 interchangeable fermentors: 2, 5, 7½ or 14 liters. Easy to remove. Designed for repeated sterilization in a 20″ autoclave.

*Patent Pending

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Liquid Column Chromatography
Sucrose Density Gradients
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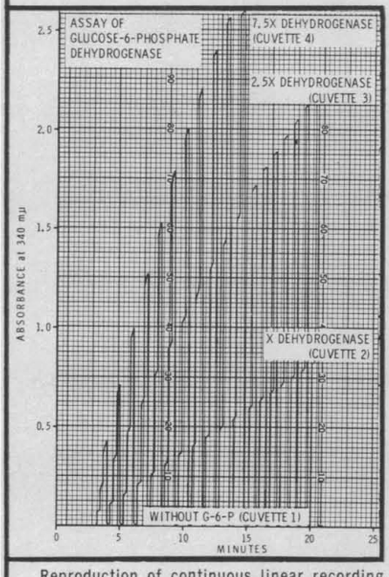


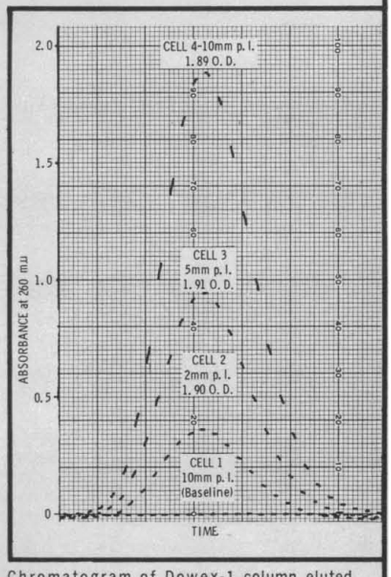
Reproduction of continuous linear recording of assay of G-6-P Dehydrogenese illustrates one of the many types of enzyme kinetic recordings obtainable virtually automatically with the Model 2000 or Series 200 Modular Gilford System.

Scanning for protein using the sucrose density gradient method. A 10 mm pathlength Gilford Flow-Through Cuvette was employed with the Gilford Spectrophotometric Recording System to produce the record shown.

The Gilford Model 2000

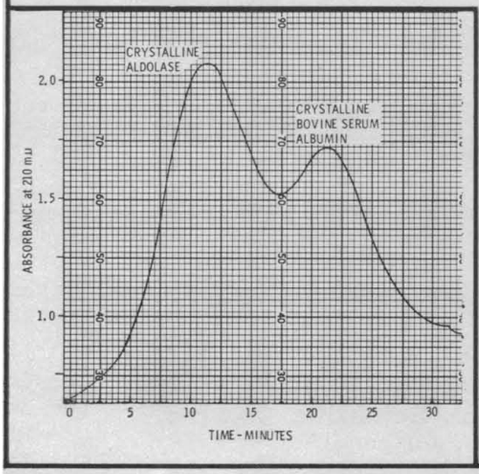
This highly productive spectrophotometric system has the essential flexibility to keep pace with changing directions in research. Based upon a unique photometric system with an output linear with absorbance over a wide range, the Model 2000 system offers exceptional sensitivity and stability together with low noise level and high accuracy. The inherent capability of the photometric element is greatly extended by automation of the sample handling device to provide precise positioning of up to four sample cells with programmed timing. Additions of flow cells, a temperature recording channel, automatic baseline compensation and wavelength programming facilities further enhance the usefulness of the Model 2000. Request brochure and quotation.

Conventional Absorbance Measurements also easier, more accurate. Digital readout: 0.00 to 3.000 O. D. Sensitivity, dark current controls and shutter eliminated. Line operated.



Chromatogram of Dowex-1 column eluted with Formic Acid shows section with AMP peaks only. Record made with Gilford Model 2000 equipped with Gilford Flow-Through Cuvettes and Automatic Blank Compensator.

Salmon Sperm DNA profile illustrates linear registration of both temperature and absorbance changes on the same scale. Gilford Model 2000 equipped with Gilford Linear Thermosensor which measures temperature changes in cuvette chamber.



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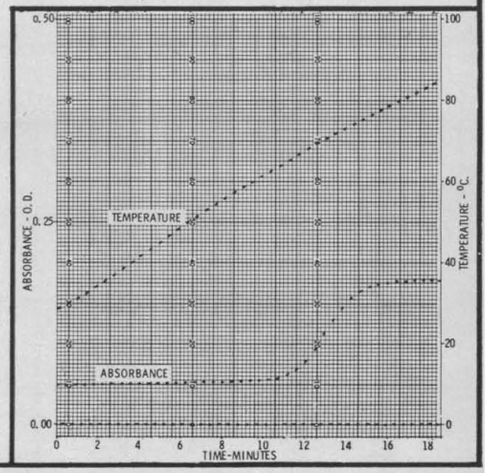

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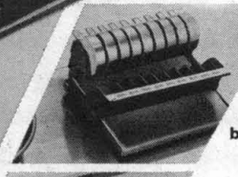

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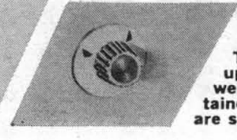

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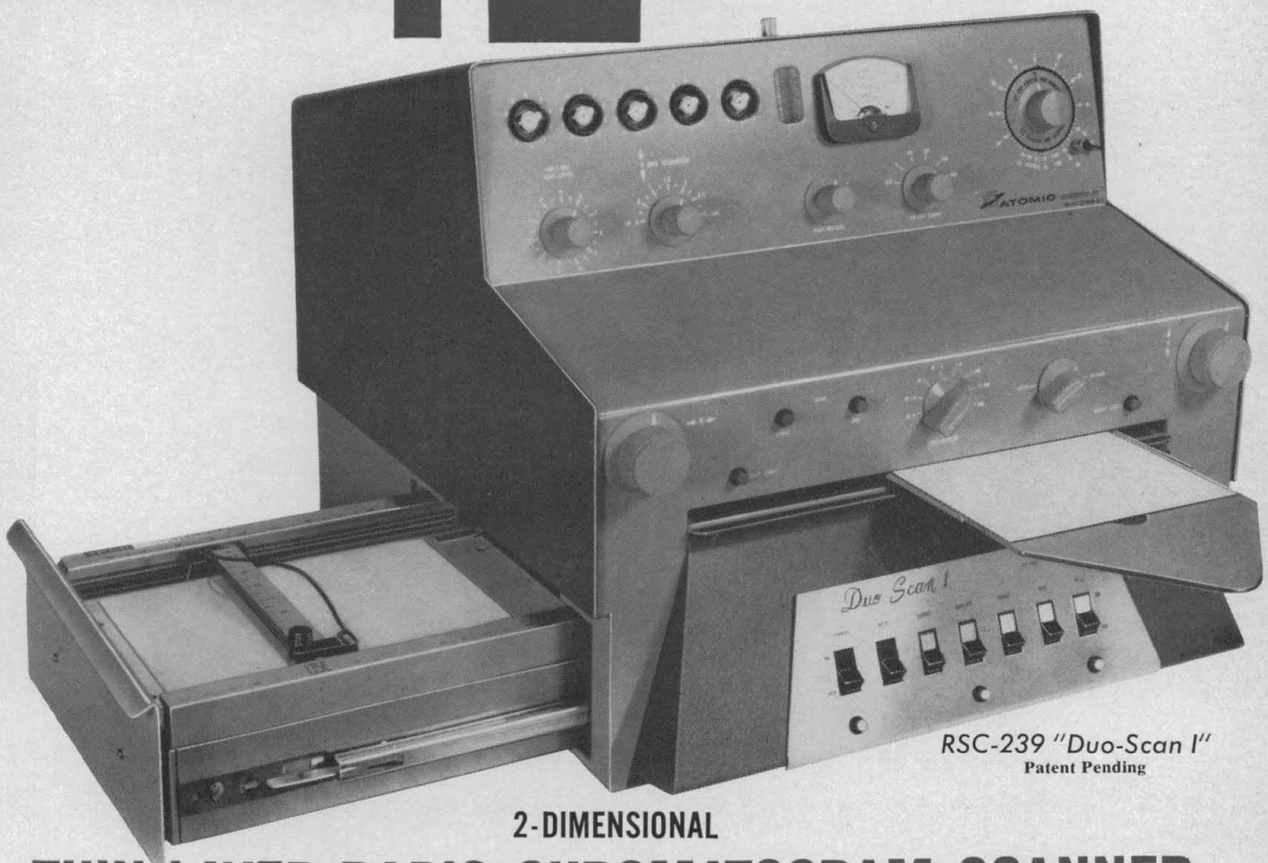

RSC-239 "Duo-Scan I"
Patent Pending

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THIN LAYER RADIO-CHROMATOGRAM SCANNER

Localizes and Quantitates Radioactive Areas on Glass Plates from 1″ x 8″ to 8″ x 8″ in size

Now you can increase your radio-analytical Thin Layer Chromatography capabilities to a remarkable degree with this newly-developed instrument.

The "Duo-Scan I" (1) greatly increases the speed of locating radioactive spots . . . plotting them precisely on an x-y recorder, and (2) accurately counts each hot spot shown on the recorder paper.

Previous time-consuming techniques are now eliminated. For example, in a matter of hours, "Duo-Scan I" locates and counts a sample that formerly required up to two weeks by the photographic method.

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The "Duo-Scan I" is a completely self-contained unit (ratemeter, scaler and recorder) . . . offering a non-destructive method of analysis . . . and can scan, at one time, one or more glass plates totalling up to 8″ x 8″ in area.

*** YOU CANNOT PURCHASE THIS INSTRUMENT...** unless we have proved its capabilities to your complete satisfaction.
Upon your request, we will send you a special mailing carton in which you may ship us a TLC glass plate for evaluation. We will scan it and send you a full report. Only then will we accept your order.

For complete details, send for Bulletin TL-2.

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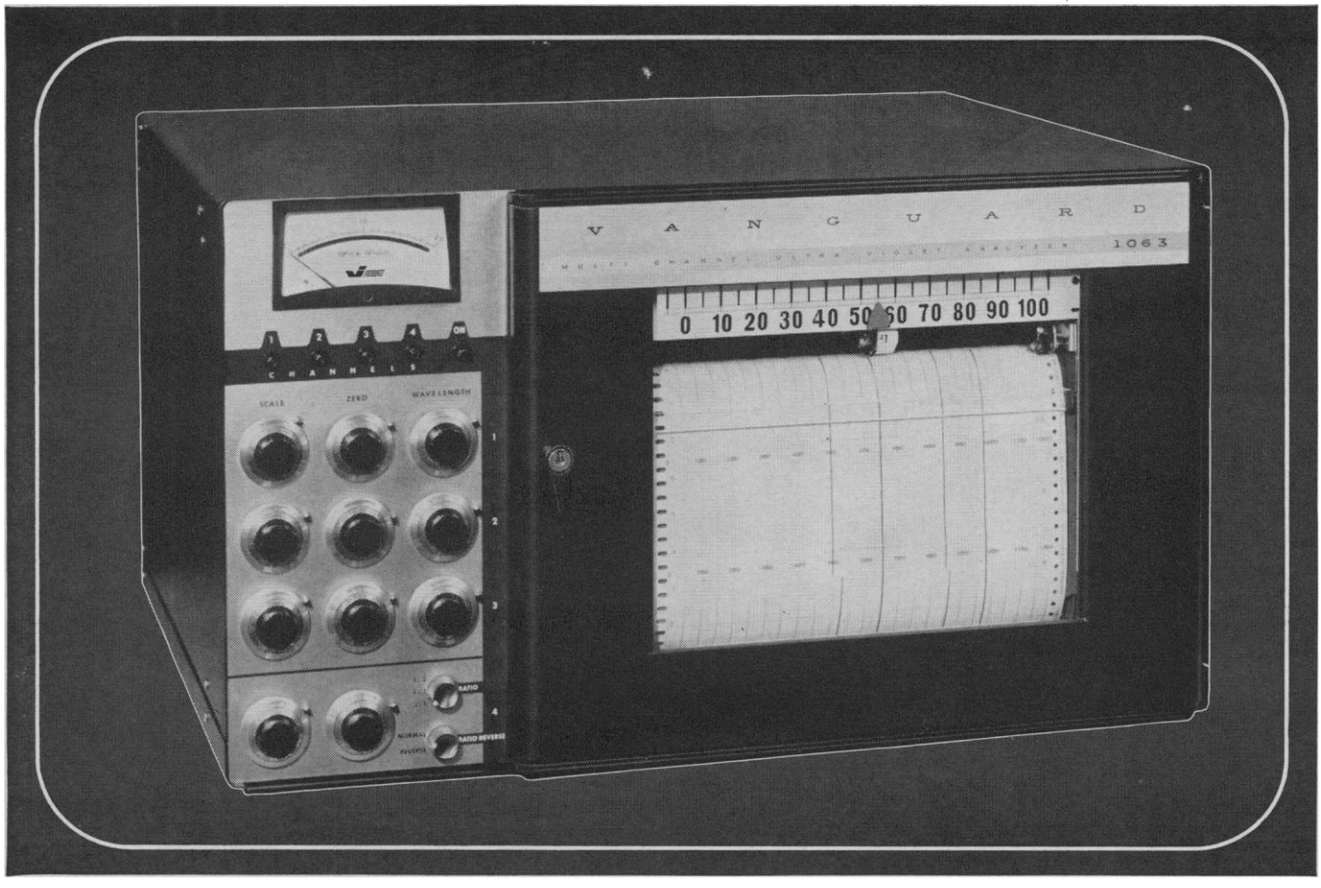
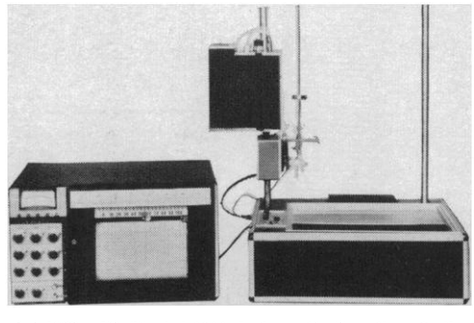


new automatic multi-channel ultra-violet analyzer (od)

Vanguard's Model 1063 Automatic Multi-Channel Ultra-Violet Analyzer provides the investigator with heretofore unavailable versatility. This instrument presents a recording of the optical density of the effluent from a chromatographic column at three different wavelengths. In addition, it provides a recording of the ratio of the optical density of the effluent at two of these wavelengths. Two of Vanguard's logarithmic converters are used in each channel to provide a recording linear with optical density. The ratio is recorded as the logarithm to provide a compact scale. ■ Space-saving design—Model 1063 measures only 27¾″ wide, 15½″ high and 21¼″ deep ■ Precision plane diffraction grating monochromator of highest quality ■ Matched quartz cuvettes designed for minimum hold-up and mixing ■ Completely transistorized for dependable, maintenance-free operation ■ Detection system completely self-contained and light-shielded.



Model 1063 with Model 1011 Automatic Fraction Collector. Model 1063 is compatible with all Fraction Collectors.

All these features plus many others provide the investigator with complete information on every elution. For specifications on the Model 1063 Multi-Channel Ultra-Violet Analyzer (and the Model 1011 Fraction Collector shown at left), send for new informative brochure. For immediate information and/or a quotation, call your nearest Vanguard office.

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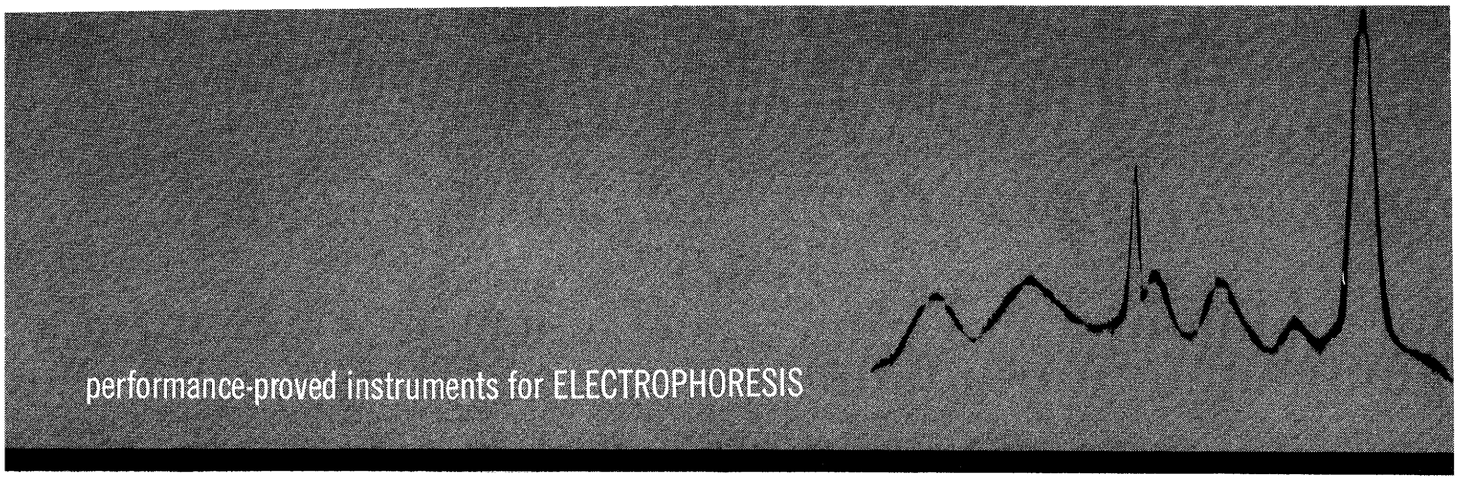

Electrophoresis diagram (above) from a descending limb obtained by using the half-wave phaseplate as the schlieren diaphragm. Electrophoresis diagram (lower left) of same serum as that represented above, but made by combining interference and phaseplate schlieren optics. Another electrophoresis diagram (lower right) of the same serum, made by using an 0.35 mm diagonal slit as the schlieren diaphragm.

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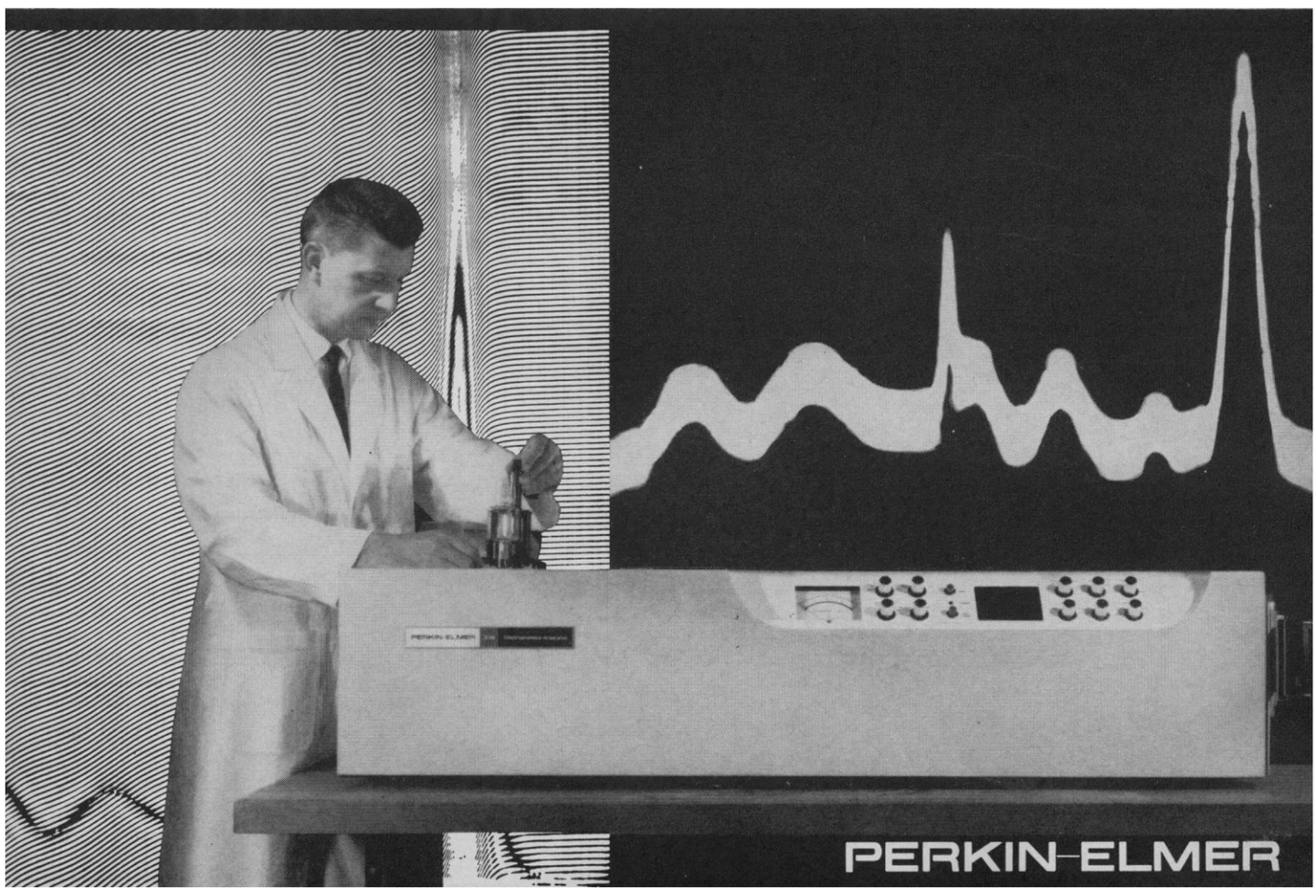
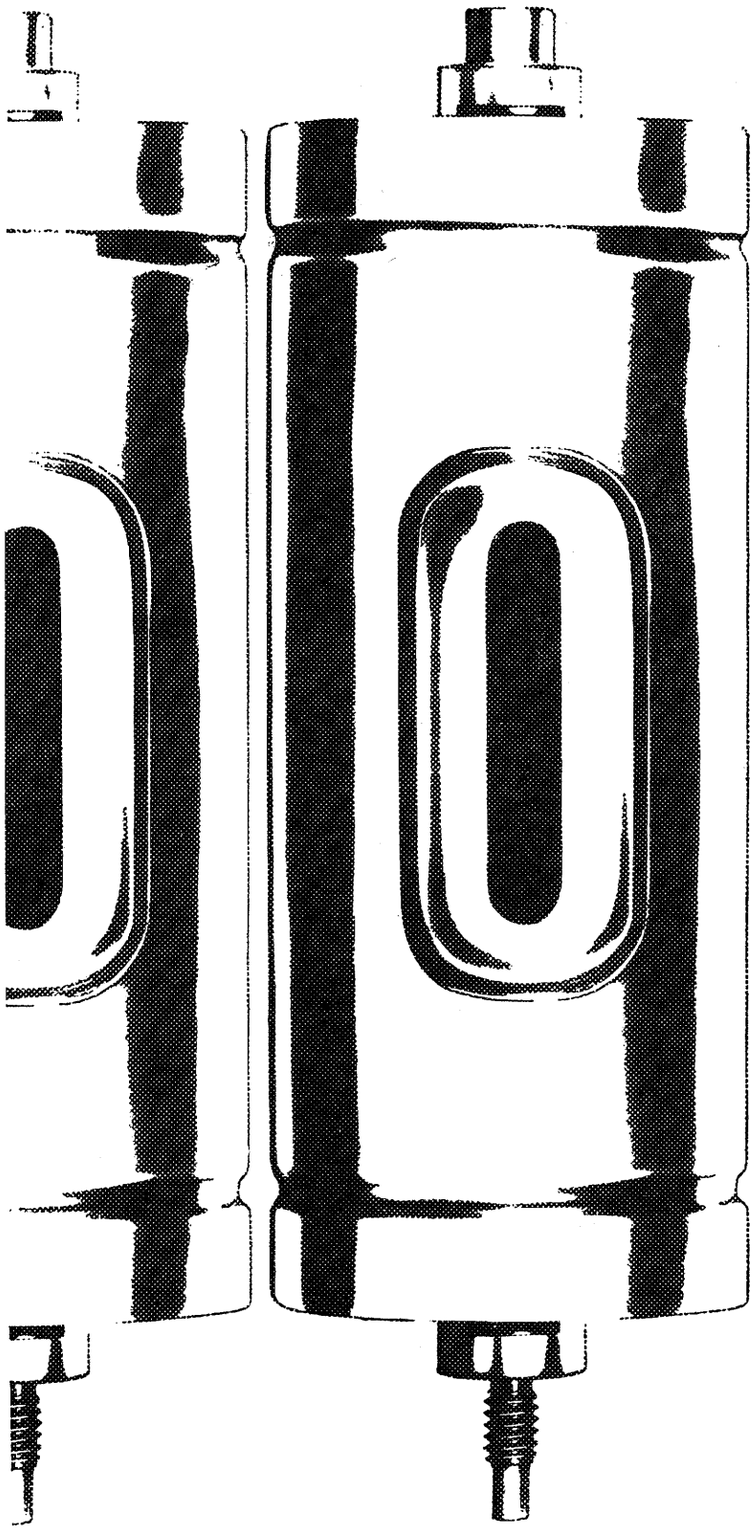
Wouldn't now be a good time to consider up-dating your electrophoresis facilities? For further Model 238 information, write to Instrument Division, Perkin-Elmer Corporation, 910 Main Avenue, Norwalk, Connecticut.





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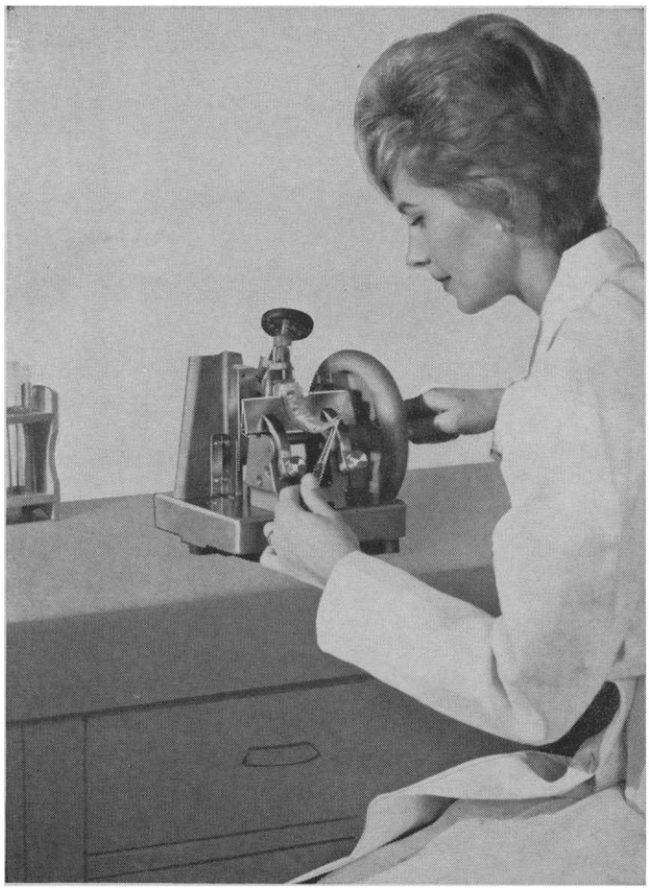

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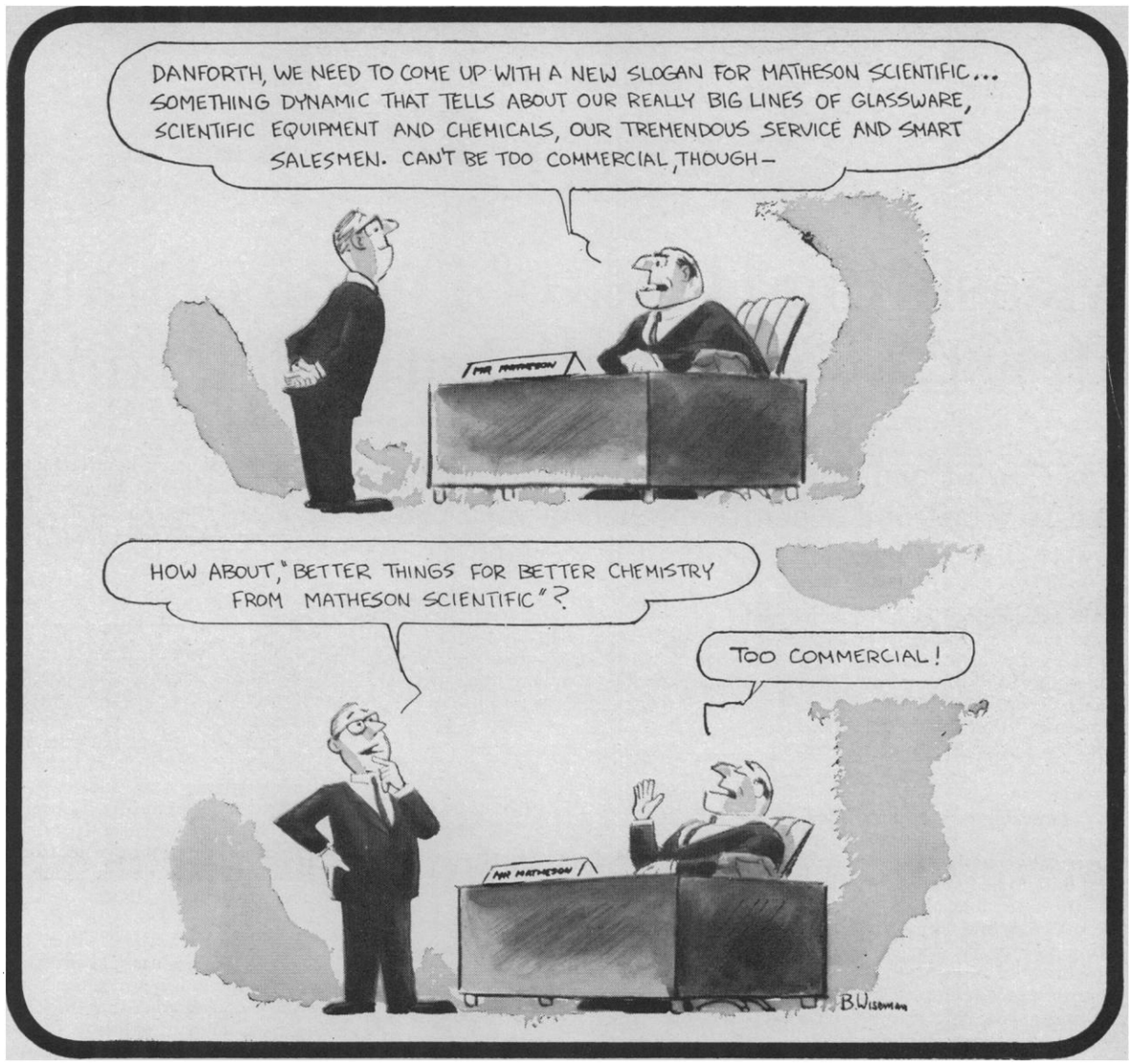

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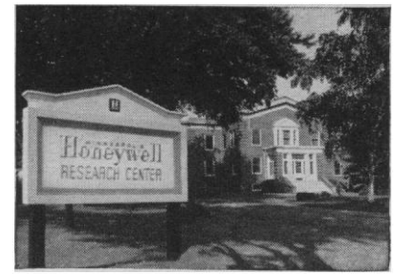


Measuring Heats of Fusion of Salts with a Dynamic Adiabatic Calorimeter

Modification of and additions to known techniques have led to a fast and accurate method of measuring heats of fusion and specific heats of materials.

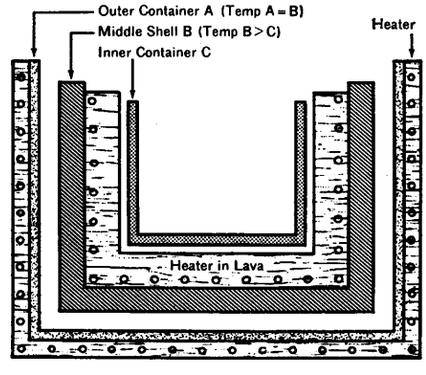
Fused salts are stable at high temperatures, have low vapor pressure, low viscosity and good electrical conductivity. They are also able to dissolve many different materials. Extremely useful in metallurgical processes, they have been used as heat transfer materials, power sources, control devices, and coolants and fuels in atomic reactors.

One area of interest to Honeywell scientists concerns heats of fusion of specific salts. Much older heat of fusion and specific heat data to be found in the calorimetric literature are inaccurate, particularly those on inorganic compounds with high melting points. At the same time present methods of obtaining accurate data are cumbersome, complex and time consuming.

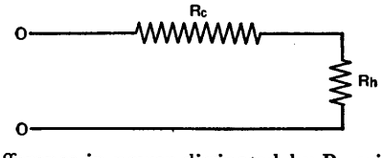
Modifying and adding to known techniques, Honeywell scientists have developed a calorimeter that gives direct reading, highly accurate data in as little as two hours.

A conventional calorimetry equation is $q_h = q_s + q_c + q_l$ or the heat supplied to the system equals the heat absorbed by the sample (q_s) plus the heat absorbed by the calorimeter (q_c) plus any heat loss (q_l).

Honeywell's approach (see illustration) is to eliminate q_l by maintaining adiabatic conditions between the outer shell (A) and the next or middle shell (B) and to maintain a constant temperature gradient between a higher temperature in the middle shell (B) and a lower temperature in the inner shell (C) containing the sample. The equality of temperatures at (A) and (B) forbids heat from passing from the middle (B) to the outer shell (A) so that after the middle shell temperature reaches its control point all heat must pass to the sample. The outer-middle shell adiabatic condition and the middle-inner constant temperature gradient condition are maintained with two feed-back control systems. If these conditions are met q_l can be ignored and $q_h = q_s + q_c$. If the sample is removed $q_h = q_c$ and q_c becomes known so that q_s can be determined by a simple subtraction. The problem then becomes how to accurately measure q_h.



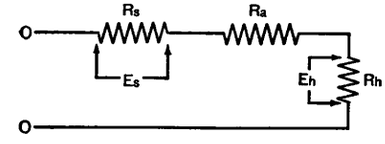
The problem $q_h = \int$ watts x time or $\int$ amps x volts x time is simple to pose, but the integration is difficult without a constant current, voltage or wattage. To obtain a constant power (amps x volts), Honeywell borrowed an approach of Rosengren whose circuit is such that the



difference in power dissipated by R_h will be negligible between any two temperatures if $R_c = \sqrt{R_{h1} \times R_{h2}}$ where R_{h1} is resistance at temperature 1 and R_{h2} is resistance at temperature 2, whereas without R_c the power dissipation decreases inversely as R_h increases.

Desiring, however, to use an adjustable system to cover different temperature ranges, Honeywell separated R_c into R_a, an adjustable resistor, and R_s, a known standard resistance.

Then, adding a potentiometer to measure E_s across R_s and E_h across R_h,



$E_s = R_s i_s$, where i_s is the same as i_h and R_s is known. Thus watts across R_h can be determined: $E_h E_s/R_s$ = watts of constant power.

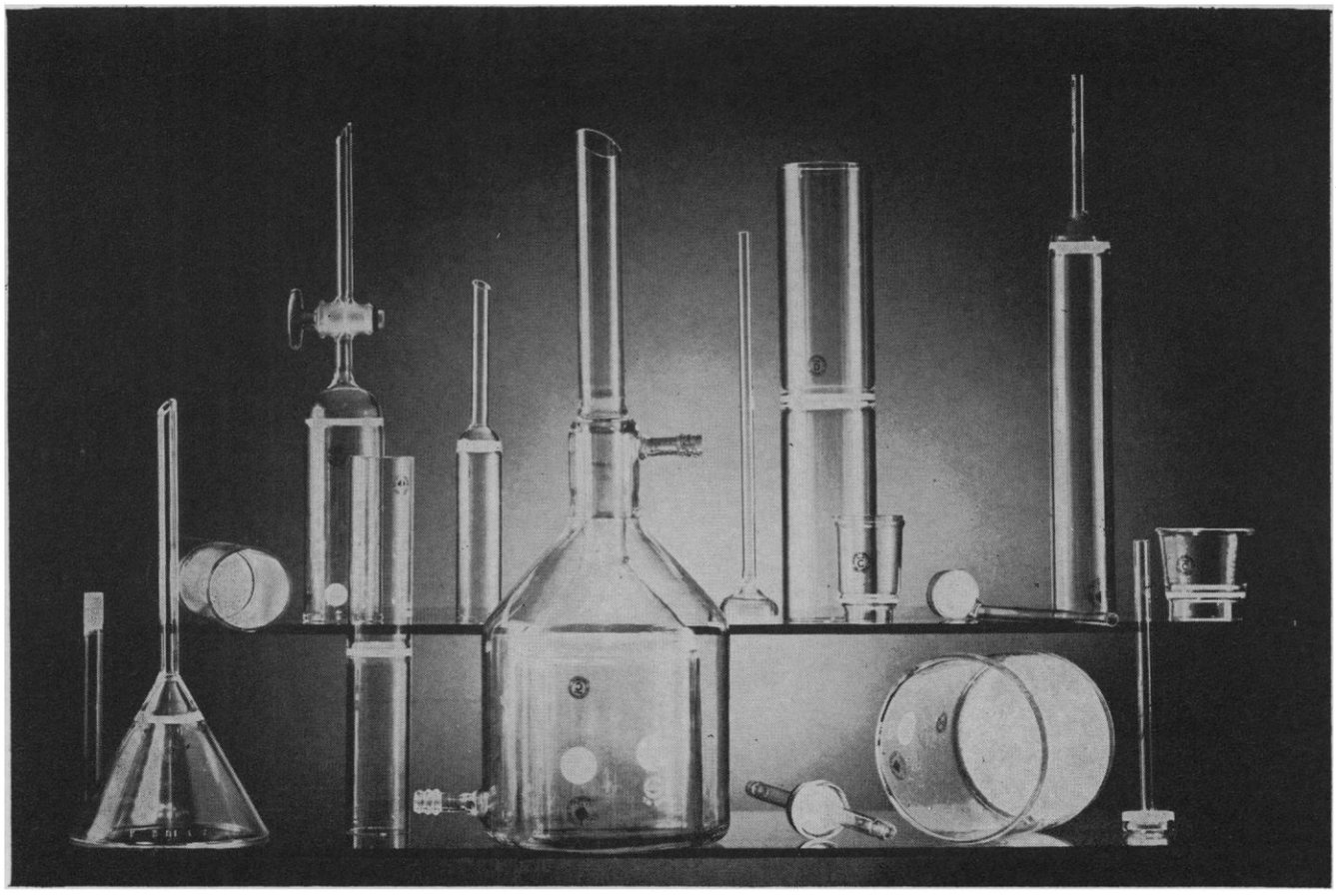
With a strip chart recorder measuring the temperature of the sample only when power is demanded, a direct readout of the heat of fusion (q_h) is possible. The chart reads time directly between any two points. Therefore, when temperature ceases to climb, fusion is taking place and when temperature rises again fusion is completed.

Since q_h = watts x time, and watts ($E_h E_s/R_s$) is maintained constant, q_h becomes a known factor x time, so that by an easy conversion, time for fusion is in effect, q_h, the heat of fusion. By comparing plots with and without the sample, specific heat data are also easily obtained.

This chart, plotted automatically in two to three hours, replaces computations that took several weeks. Results have been impressive. In measuring the heat of fusion of benzoic acid in five runs, one was +1.7% above the Bureau of Standards figure, one +2% and three exactly on standard.

Work is continuing at Honeywell's Research Center. As heats of fusion of various salts are more readily measured and predicted, further uses are expected. If you are engaged in high temperature calorimetry and wish to know more about Honeywell's work in this area you are invited to write Dr. Cyril Solomons, Honeywell Research Center, Hopkins, Minn.

If you are interested in a career at Honeywell's Research Center and hold an advanced degree in any branch of science you are invited to write Dr. John Dempsey, Director of Research, at this same address.



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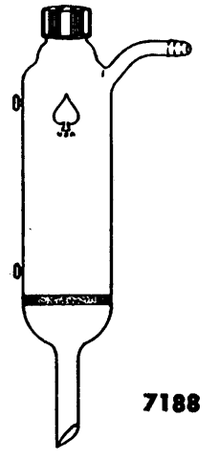

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Catalog Number	Compound	Specific† Activity	PRICE 50μc*	0.1mc	0.5mc	1 mc
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NEC-267	L-Arginine-C^{14} (u.l.)	240	45	75	355	675
NEC-268	L-Aspartic-C^{14} Acid (u.l.)	164	35	65	310	585
NEC-290	L-Glutamic-C^{14} Acid (u.l.)	205	35	65	310	585
NEC-276	Glycine-C^{14} (u.l.)	80	20	23	110	220
NEC-277	L-Histidine-C^{14} (u.l.)	240	55	100	475	900
NEC-278	L-Isoleucine-C^{14} (u.l.)	240	45	75	355	675
NEC-279	L-Leucine-C^{14} (u.l.)	240	45	85	390	740
NEC-280	L-Lysine-C^{14} (u.l.)	240	45	85	390	740
NEC-284	L-Phenylalanine-C^{14} (u.l.)	360	45	85	390	740
NEC-285	L-Proline-C^{14} (u.l.)	200	55	100	475	900
NEC-286	L-Serine-C^{14} (u.l.)	120	45	75	355	675
NEC-287	L-Threonine-C^{14} (u.l.)	160	45	75	355	675
NEC-289	L-Tyrosine-C^{14} (u.l.)	360	55	100	475	900
NEC-291	L-Valine-C^{14} (u.l.)	200	45	75	355	675
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†Present lot. *AEC License Exempt Package.

NOTE: All uniformly labeled amino acids are dissolved in 0.01N HCl solution, at a concentration of 0.1mc/ml and are packaged in screw cap vials.

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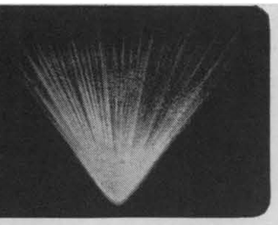
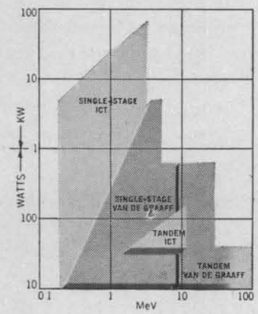


THE ICT CONCEPT:
new high-current machines emerging from HVEC research

Development of higher energy Van de Graaff particle accelerators which retain high beam precision, stability, and homogeneity, remains a continuing contribution by HVEC to "energy-oriented" research.

To provide even greater freedom of experimentation, HVEC is also anticipating the need for the higher beam intensities required in *power*-oriented research projects. Invented by Dr. R. J. Van de Graaff, the new Insulating Core Transformer (ICT) accelerator now provides high beam currents with all the desirable beam characteristics of Van de Graaff machines. As the graph shows, the high power levels available from the ICT accelerator now make possible a new realm of precision experimentation.



The Insulating Core Transformer

The ICT is essentially a three-phase power transformer with multiple secondaries, each of which is insulated from the other. Rectified current from the secondaries is series-connected to achieve total voltage. In the ICT, electrostatic and electromagnetic fields exist in the same space, as contrasted to the conditions in a coventional transformer. The result is a highly efficient dc power source capable of stable operation at elevated potentials *and* power levels.

A number of ICT accelerators and power generation systems are now available.

Single-Stage ICT Accelerators

Two types of single stage ICT accelerators have been developed for research use. The first incorporates an ICT power source coupled to the acceleration assembly through a coaxial cable.

	PROTON ENERGY (KeV)	CURRENT (MAX.) (Analyzed)	TANK HEIGHT Feet	TANK HEIGHT Meters	TANK DIAMETER Feet	TANK DIAMETER Meters
ICT 300	300	15 mA	4'4"	1.32	4	1.2
ICT 500	500	10 mA	5'3"	1.60	4	1.2

The second system utilizes a rigid transmission line to transmit electrical power to the accelerator terminal.

4 MeV ICT	ENERGY (MeV)	CURRENT	DIMENSIONS Length Feet	DIMENSIONS Length Meters
Positive Ions	1.5-4	3 mA	26'6"	8.08
Electron Conversion	1.5-3	10 mA	26'6"	8.08
3 MeV ICT Electrons	1.5-3	20 mA	29'	8.84

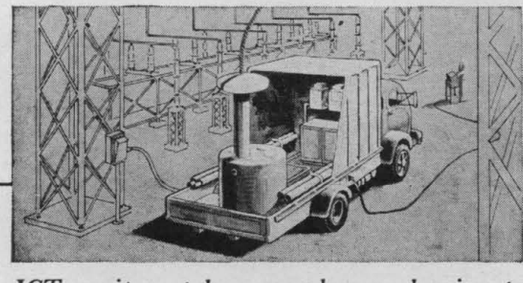
8 MeV ICT Tandem Accelerator

The 8 MeV ICT Tandem provides proton energies continuously variable from 3 to 8 MeV at a maximum guaranteed beam current of 2μA. The ICT power source is capable of providing 12 mA at 4 mv which, in combination with newly developed components emerging from HVEC, will enable the accelerator to keep pace with future research requirements. The 8 MeV Tandem is convertible to single-stage ion or electron operation.

ICT Electron Processing Systems

Developed primarily as high-current sources of electrons for industrial processing applications, these systems allow extreme flexibility of operation. Two models are available: 300 kv at 30 mA maximum beam current and 500 kv at 20 mA maximum beam current.

Series 7 ICT Power Supplies



ICT equipment has crossed many barriers to dc operation at high particle energies and currents. There is no indication that a ceiling exists to further advances of similar importance.

Available with output ratings ranging from 240 kv at 80 mA to 600 kv at 20 mA, these highly stable power sources are suitable for use in high energy beam separator systems, r.f. transmission systems, plasma research and high voltage testing programs.

For detailed information, please write to Technical Sales, High Voltage Engineering Corporation, Burlington, Massachusetts.

HIGH VOLTAGE ENGINEERING

12 June 1964, Volume 144, Number 3624 **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.

Time To Pause and Regroup?

Science course improvement is making remarkable progress, thanks to the generosity of able scientists, skilled teachers, and granting agencies. But an essential step remains if the American public is to be brought to a proper level of scientific literacy. To this end specialists in the fields of science must broaden the perspective of their teaching. Otherwise, not only the support of science but effective citizenship in the neotechnical age—to say nothing of the vast possibilities of increasing enjoyment for the individual—will suffer.

Present emphasis is on course improvement from kindergarten through high school, and this is good. It is now clear that the capacity of pre-college pupils has long been underestimated. But the best of syllabi and other accessories cannot operate well without good teachers and informed parents. What happens in undergraduate college years is critical to the supply of both. Except for the small minority who specialize in science or who must have it for professional reasons, too few students elect more science than they are obliged to.

In one liberal arts college, the figure for those who do go beyond the minimum is a remarkable high of about 50 percent of the student body. In another, probably much nearer the national average, the figure is only 15 percent. To lapse for a moment into the approved idiom, the explanation is probably complex and calls for a thorough statistical sampling. Even so, the results of five decades of discussion with students and alumni are too consistent to be ignored.

Right or wrong, the impression prevails that the typical introductory college course is taught with a jealous eye on the possible majors who "must be prepared to take the next course." Meanwhile, knowledge important to the layman is reserved for the advanced courses—carbon chemistry and the energetics of living communities, for example.

Most universal is dissatisfaction over the lack of convincing experience with actual phenomena in the laboratory, which should be the heart of the whole enterprise. Often the student's work in the laboratory is in the charge of cheap and preoccupied labor. This is part of a larger problem that exists in the humanities as well, notably freshman English. There should be some contact with masters, more leisure for reading, for rumination, for trial and error, for simple probing around. What scientist has ever savored his subject, or what scholar the field of literature, by bell and time clock?

The final evil of the one-course-and-it's-over lies in the lack of communication and concession at the beginning level among the science departments themselves. One narrow window, even though clean and polished, is not enough to open the vista which science can give of the world of nature and its component man. There ought to be, in the modern college, a 2-year sequence knitting together the "sciences" into *science*, taught by men who work as a team, who wish to do this, who believe profoundly that it can be done, and who have strong administrative support.

As a practical means to this end, I suggest that a few groups of such individuals be set up and supported for a suitable period of discourse among themselves, and then be given the chance to try out the results. Compared to the millions that have been spent for intensifying the teaching of the separated conventional fields of science, this would be a relatively inexpensive enterprise, but the benefits might well be incalculable.—PAUL B. SEARS, *Department of Biology, Yale University*

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Specifications, optional equipment and system capabilities are fully described in a series of technical bulletins. Contact any of the TMC offices listed below or write Technical Measurement Corporation, 441 Washington Avenue, North Haven, Connecticut.

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IN CANADA: Allan Crawford Associates, Ltd., 4 Finch Avenue, W., Willowdale, Ontario, Canada.

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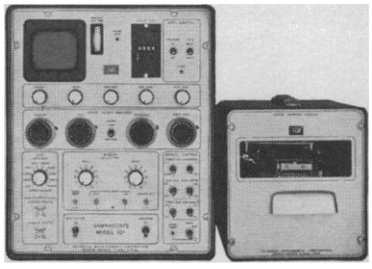

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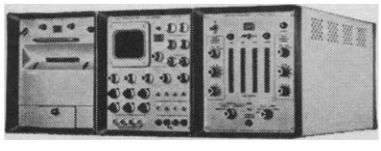
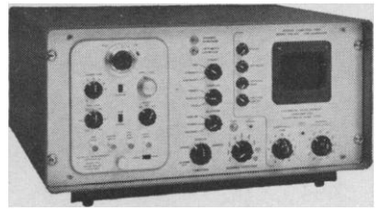


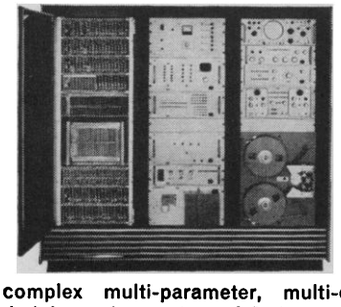
For field or laboratory applications in health physics, geological surveys, medical, chemical and physics laboratories where broad operating capabilities and compactness are important . . . 400-SERIES, 400-channel pulse height analyzers with optional equipment for resolving and integrating data, with digital or analog readout. Models also available with inputs for Mössbauer effect studies.

For General Nuclear Use



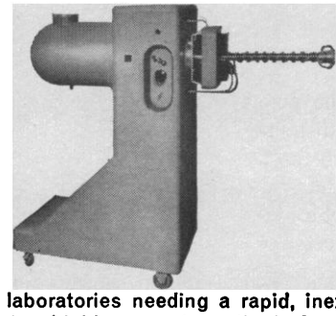
In 1959 TMC produced the first transistorized multichannel analyzer with plug-in logic . . . the CN-110 256-channel pulse analyzer still used throughout the world. Plug-in logic for the CN-110 and the CN-1024 (1024-channel model) includes units for pulse height analysis, pulsed neutron studies, time-of-flight and for sampling a wide range of analog signals for digital conversion. A choice of readouts is available.

For Multi-Parameter Pulse Analyses



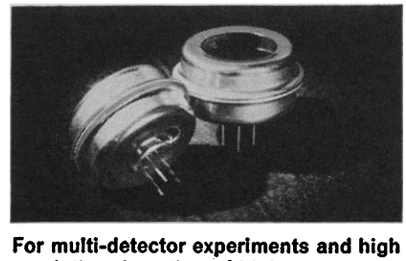
For complex multi-parameter, multi-detector pulse height analyses, time-of-flight studies and combinations of both . . . LARGE MEMORY SYSTEMS with 1024-, 4096- or 16,384-channel memories. Wide choice of plug-in modules for input, display, multi-input routing, pulse sorting, permit "custom" system design and "add-on" flexibility. If general purpose digital computers for multi-parameter analysis interest you, ask about our soon-to-be-announced **SPIDAR** system.

Complete Activation Analysis Systems



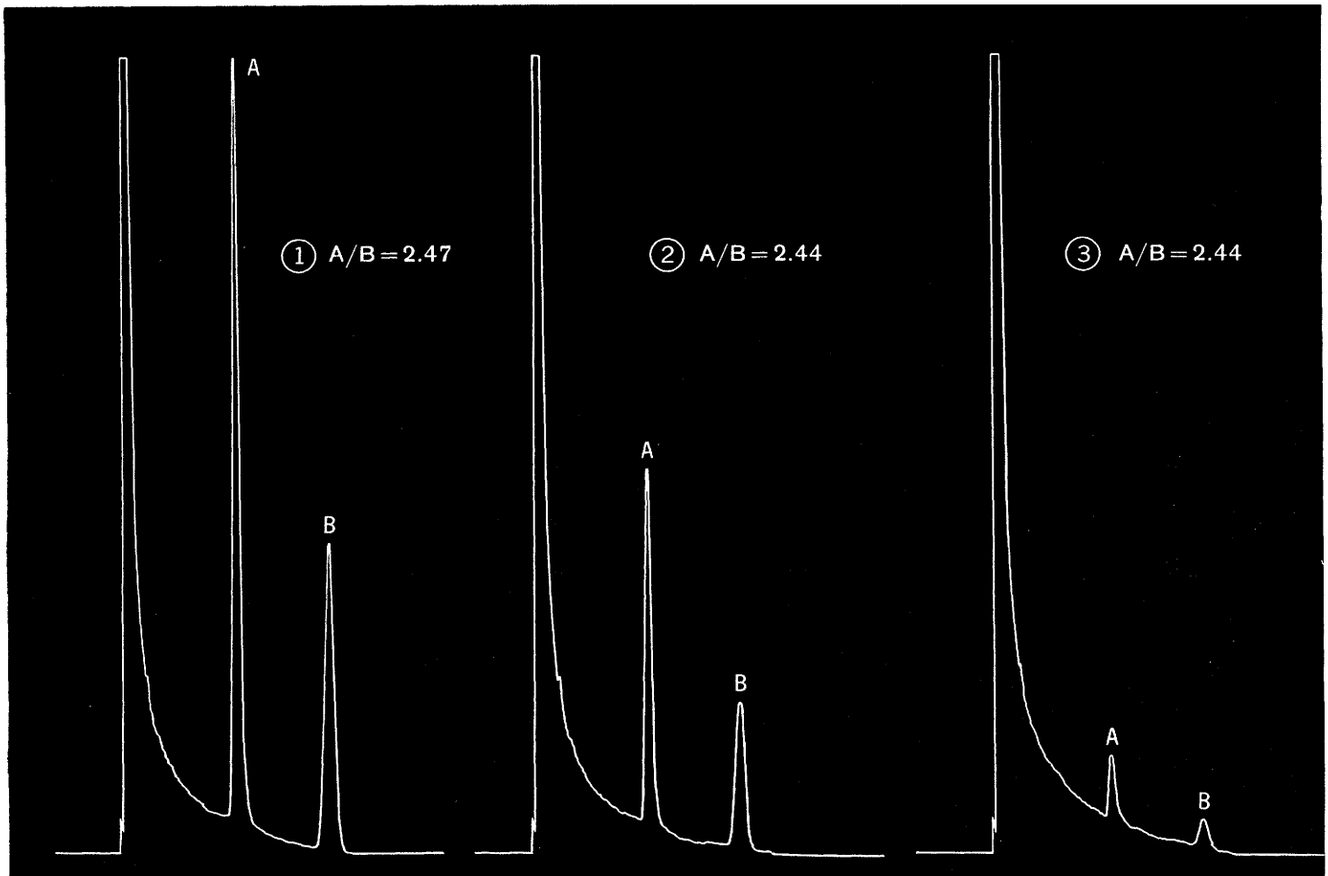
For laboratories needing a rapid, inexpensive, highly accurate method of performing analytical analysis . . . ACTIVATRON Model 210 (2×10^{10} n/sec.) or 111 (1×10^{11} n /sec.) low cost, sturdy Cockroft-Walton Linear Accelerator designed to produce 14 MEV neutrons from the D-T reaction. Activation analysis systems with sample transfer equipment available with choice of TMC pulse height analyzers and readout units.

For Nuclear Particle Detection



For multi-detector experiments and high resolution detection of high energy protons, beta particles and other charged particles . . . SOLID STATE LITHIUM DRIFT DETECTORS available in 5 sensitive areas — 20 to 500 mm² and 5 thicknesses — ½ to 5 mm. Dead layer less than 1 micron. For complete particle detection systems, TMC offers a new amplifier-coincidence system and 3 new solid state detector preamplifiers.

TMC **TECHNICAL MEASUREMENT CORPORATION**



ELIMINATE COMPONENT "LOSS" IN STEROID ANALYSIS

Whatever its true cause and its correct name, component "loss" is a very real problem in the quantitative analysis by gas chromatography of free sterols and other biological substances with polar functional groups. This phenomenon has limited the usefulness of gas chromatography in certain biomedical investigations . . . until now. ■ Specifically designed for this use, the F & M Model 400 Biomedical Gas Chromatograph eliminates component loss, even when sample size is reduced to the nanogram level. Dramatic proof of the accuracy with which steroids may be quantitatively analyzed is illustrated in the series of chromatograms reproduced above, covering a range of sample quantities from 0.1 microgram down to 5 nanograms. ■ Successive dilutions of a mixture of testosterone (a highly polar, easily lost steroid) and cholestane (a saturated, non-polar hydrocarbon that is readily chromatographed without loss) were injected into the Model 400 and onto a 2% SE-30 Silicone Gum Rubber column. If testosterone loss were occuring, the peak height ratio of testosterone to cholestane would decrease as the amount of sample injected decreased, because the amount lost would be a larger percentage of the smaller sample. But this ratio (A/B) remains constant through all three injections, even the most dilute run #3 where only 10 nanograms of testosterone were injected. Note also the almost perfect symmetry of all the peaks, including the cholestane peak in run #3, which represents only 5 nanograms of sample. ■ For complete information about the Model 400 and its capability to analyze biological compounds such as steroids, vitamins, alkaloids, bile acids, fatty acids, amino acids, pesticides, and many others, write for the new Bulletin 4000. F & M Scientific Corporation, Route 41 and Starr Road, Avondale, Pennsylvania, phone (215) 268-2281. European subsidiary: F & M Scientific Europa N.V., Leidsestraat 67, Amsterdam, The Netherlands.

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F&M SCIENTIFIC CORPORATION
AVONDALE, PENNSYLVANIA

15–19. **Technical Writers,** 12th annual inst., Troy, N.Y. (J. R. Gould, Rensselaer Polytechnic Inst., Troy)

15–21. **Women Engineers and Scientists,** 1st intern. conf., New York, N.Y. (E. Eaves, 18 Third Ave., Port Washington, N.Y. 11050)

15–3. **Relativity,** teaching at undergraduate level, Arlington, Tex. (J. Ellis, Dept. of Physics, Arlington State College, Arlington)

15–4 Sept. **Gordon Research Conf.,** New Hampshire. (W. G. Parks, Dept. of Chemistry, Univ. of Rhode Island, Kingston)

16–17. **Computer Augmentation of Human Reasoning,** symp., Washington, D.C. (W. D. Orr, TRW Computer Div., 8433 Fallbrook Ave., Canoga Park, Calif.)

16–18. **Entomological** Soc. of America, Pacific Branch, annual, Long Beach, Calif. (W. W. Allen, 112 Agric. Hall, Dept. of Entomology, Univ. of California, Berkeley)

17–19. **Microscopy,** 11th intern. symp., Chicago, Ill. (MICRO-64, McCrone Research Inst., 451 E. 31 St., Chicago 60616)

17–20. American College of **Angiology,** Las Vegas, Nev. (A. Halpern, 11 Hampton Court, Great Neck, N.Y.)

17–20. International Assoc. for the Study of the **Bronchi,** 14th congr., Vienna, Austria. (Secretariat, The Congress, c/o Wiener Medizinische Akademie für Ärztliche Fortbidung, Aslerstr. 4, Vienna 9)

18–19. **Patent, Trademark, and Copyright Research** Inst., 8th annual conf., George Washington Univ., Washington, D.C. (PTCR Inst., George Washington Univ., Washington, D.C. 20006)

18–19. American **Rheumatism** Assoc., San Francisco, Calif. (J. A. Coss, Jr., 20 E. 76 St., New York, N.Y. 10021)

18–20. **Community Psychiatry,** conf., Univ. of Wisconsin, Madison. (L. M. Roberts, 1300 University Ave., Madison)

18–20. **Endocrine** Soc., San Francisco, Calif. (H. H. Turner, 200 N. Walker, Oklahoma City, Okla.)

18–20. American Assoc. of **Physics Teachers,** summer meeting, Madison, Wis. (H. R. Crane, Dept. of Physics, Univ. of Michigan, Ann Arbor)

18–20. **Space Technology,** 4th European symp., Rome, Italy. (A. Eula, Associazzione Italiana Razzi, Piazzo Santo Bernardo 101, Rome)

18–20. **Sulfite Pulping,** conf., Chicago, Ill. (Technical Assoc. of the Pulp and Paper Industry, 360 Lexington Ave., New York, N.Y. 10017)

18–22. American College of **Chest Physicians,** San Francisco, Calif. (M. Kornfeld, 112 E. Chestnut, Chicago, Ill.)

19. **Parenteral Drug** Assoc., Philadelphia, Pa. (The Association, Broad and Chestnut Sts., Philadelphia 7)

19–20. American **Geriatrics** Soc., 21st annual, San Francisco, Calif. (AGS, 10 Columbus Circle, New York, N.Y. 10019)

19–27. **Chemical Engineering,** European conv., Frankfurt am Main, Germany (Chicago Section, American Chemical Soc., 86 E. Randolph St., Chicago 1, Ill.)

21. **Surface Physics,** Providence, R.I. (W. H. Brattain, Bell Telephone Laboratories, Murray Hill, N.J. 17971)

21–23. Society for **Investigative Dermatology,** 25th annual, San Francisco,

Calif. (H. Beerman, SID, 255 S. 17 St., Philadelphia, Pa. 19103)

21–24. American Soc. of **Agricultural Engineers**, Fort Collins, Colo. (J. L. Butt, ASAE, 420 Main St., St. Joseph, Mich.)

21–25. **Air Pollution Control** Assoc., 57th annual, Houston, Tex. (The Association, 4400 Fifth Ave., Pittsburgh, Pa.)

21–25. **American Medical Assoc.**, San Francisco, Calif. (F. J. L. Blasingame, N. Dearborn, Chicago, Ill. 60610)

21–26. American Soc. for **Testing and Materials**, 67th annual, Chicago, Ill. (ASTM, 1916 Race St., Philadelphia 3, Pa.)

22–24. American **Dairy Science** Assoc., Tucson, Ariz. (H. F. Judkins, 32 Ridgeway Circle, White Plains, N.Y.)

22–24. **Medicinal Chemistry**, 9th natl. symp., Minneapolis, Minn. (A. T. Winstead, American Chemical Soc., 1155 16th St., NW, Washington, D.C. 20006)

22–24. Association for Research in **Ophthalmology**, San Francisco, Calif. (H. Kaufman, c/o Hillis Miller Health Center, Gainesville, Fla.)

22–24. **Photosensitization in Solids**, intern. conf., Chicago, Ill. (L. Grossweiner, Dept. of Physics, Illinois Inst. of Technology, Chicago)

22–24. American Assoc. of **Physical Anthropologists**, 33rd annual, Mexico City, Mexico. (T. D. Stewart, The Association, U.S. Natl. Museum, Washington, D.C.)

22–24. **Polymers**, 2nd biennial symp., American Chemical Soc., Durham, N.C. (H. N. Friedlander, Chemstrand Research Center, Inc., Box 731, Durham)

22–25. **Agricultural Pesticides** Technical Soc., Fredericton, N.B., Canada. (W. H. Minshall, University Substation P.O., London, Ont., Canada)

22–25. American Soc. of **Pharmacognosy**, annual, Pittsburgh, Pa. (R. Blomster, Univ. of Pittsburgh School of Pharmacy, Pittsburgh 15213)

22–26. American Soc. for **Engineering Education**, Orono, Maine. (W. L. Collins, Univ. of Illinois, Urbana)

22–26. **Nobel Prize Winners**, 14th meeting, Lindau im Bodensee, Germany. (H. F. Kinderlen, Standing Working Committee for the Nobel Prize Winners, Postfach 11, 899 Lindau im Bodensee)

22–26. Association of Official **Seed Analysts**, Rochester, N.Y. (E. W. Sundermeyer, 329 U.S. Court House, Kansas City 6, Mo.)

22–27. **AAAS Pacific Division**, 45th meeting, Vancouver, B.C., Canada. (R. C. Miller, California Acad. of Sciences, San Francisco)

22–27. International Organization for **Pure and Applied Physics**, 2nd general assembly, Paris, France. (J. Tonnelot, Laboratoire de Biologie Physico-Chimique, Orsay, Seine-et-Oise, France)

23. National Assoc. of **Science Writers**, San Francisco, Calif. (M. D. Spencer, Buffalo *Evening News*, Buffalo, N.Y.)

23–25. Precision **Electromagnetic Measurements**, conf., Boulder, Colo. (National Bureau of Standards, Boulder Labs., Boulder)

23–26. American **Home Economics** Assoc., 55th annual, Detroit, Mich. (AHEA, 1600 20th St., NW, Washington, D.C.)

24–25. **Computers and Data Processing**, 11th annual, symp., Estes Park, Colo. (W. H. Eichelberger, Denver Research Inst., Univ. of Denver, Denver, Colo. 80210)

24–26. Joint **Automatic Control** Conf., Stanford, Calif. (L. Zadeh, Univ. of California, Berkeley)

24–28. American Assoc. of **Bioanalysts**, annual, Las Vegas, Nev. (W. N. Reich, AAB, P.O. Box 607, Walnut Creek, Calif.)

24–1. **Air Pollution**, European conf., Strasbourg, Austria. (A. Stern, Div. of Air Pollution, U.S. Public Health Service, Washington, D.C. 20201)

25–26. Fundamental Phenomena in **Hypersonic Flow**, intern. symp., Buffalo, N.Y. (H. S. Tolley, Cornell Aeronautical Laboratory, P.O. Box 235, Buffalo 14221)

25–27. **American Physical Soc.**, Denver, Colo. (R. G. Sachs, Sterling Hall, Univ. of Wisconsin, Madison 53706)

25–28. **Rockets and Space Flight**, 13th symp., Darmstadt, Germany. (A. F. Staats, Hermann-Oberth-Gesellschaft, Fritz-Beindorff-Allee 9, Hanover, Germany)

28–4. American **Library** Assoc., St. Louis, Mo. (D. H. Clift, 50. E. Huron St., Chicago, Ill.)

29–30. **Vacuum Metallurgy**, conf., New York, N.Y. (M. A. Cocca, General Electric Laboratory, P.O. Box 1088, Schenectady, N.Y.)

29–1. American Soc. of **Heating, Refrigerating, and Air-Conditioning Engineers**, 71st annual, Cleveland, Ohio. (ASHRAE, 345 E. 47 St., New York, N.Y.)

29–1. Effects of **Radiation on the Hereditary Fitness** of Mammalian Populations, symp., Bar Harbor, Maine. (T. H. Roderick, Jackson Laboratory, Bar Harbor)

29–2. American Inst. of **Aeronautics and Astronautics**, 1st annual, Washington, D.C. (AIAA, 500 Fifth Ave., New York, N.Y. 10036)

29–2. American **Dermatological** Assoc., Honolulu, Hawaii. (W. M. Sams, 303 Ingraham Bldg., Miami 32, Fla.)

30–5. Society for **Social Responsibility in Science**, Fellowship Farm, Pa. (W. C. Davidson, Dept. of Physics, Haverford College, Haverford, Pa.)

July

1–4. National Soc. of Professional **Engineers**, annual, Asheville, N.C. (K. E. Trombley, NSPE, 2029 K St., NW, Washington, D.C.)

1–4. British **Tuberculosis** Assoc., St. Andrews, Scotland. (BTA, 59 Portland Place, London, W.1, England)

2–3. **Spectrochemical Analysis**, limits of detection, conf., Exeter, England, Institute of Physics and the Physical Society, 47 Belgrave Sq., London, S.W.1, England)

2–4. Scandinavian, **Dental** Congr., Helsinki, Finland. (N. Anderson, Bergmansg. 11 D, Helsinki)

2–5. Northwest **Proctologic** Soc., Banff, Canada. (F. C. Swartzlander, Greyhound Bldg., Calgary, Canada)

2–8. **Nuclear Physics**, intern. congr., Paris, France. (The Congress, B.P. No. 14, Orsay, Seine-et-Oise, France)

5–10. American **Physical Therapy** Assoc., annual conf., Denver, Colo. (H. J. Hislop, 1790 Broadway, New York, N.Y.)

6–8. **Electron-Beam Processes** for Microelectronics, symp., Malvern, Worcester, England. (Information Officer, Royal Radar Establishment, St. Andrews Rd., Malvern)

6–9. **Learning and Associated Phenomena in Invertebrates**, Cambridge, England. (D. Davenport, Dept. of Biological Sciences, Univ. of California, Santa Barbara)

6–9. **Signal Processing** in Radar and Sonar Directional Systems, Birmingham, England. (British Institution of Radio Engineers, 9 Bedford Sq., London, W.C.1)

6–10. **Magnetic Recording**, intern conf., London, England. (Secretariat, the Conference, c/o Inst. of Electrical Engineers, Savoy Pl., London, W.C.2)

6–10. Theoretical and Applied **Mathematical Programming**, intern. symp., London, England. (M. Kinnaird, Operational Research Soc., 64 Cannon St., London, E.C.4)

6–10. Physics of **Non-crystalline Solids**, intern congr. Delft, Netherlands, (J. A. Prins, Lab. Technische Natuurkunde T.H. Delft)

6–11. **Magnetohydrodynamic Electrical Power** Production, Paris France. (European Nuclear Energy Agency, 38 Blvd. Suchet, Paris 16e)

6–12. **Sanitary Engineering**, 9th inter-American congr., Bogotá, Colombia. (J. A. Jove, Inter-American Assoc. of Sanitary Engineering, Centro Simón Bolívar, Edificio Sur, 6° piso, Caracas, Venezuela)

7–10. **American Dental Soc. of Europe**, annual, Brighton, England. (A. E. F. Sturridge, 35 Harley St., London, W.1, England)

7–11. European **Orthodontic** Soc., 40th congr., Athens, Greece. (H. N. Haralabakis, Akadimias St. 31, Athens 135)

8–10. **Sulfur Allotropes**, Univ. of California, Berkeley. (B. Meyer, Latimer Hall, Univ. of California, Berkeley)

8–11. International Soc. of **Gastroenterology**, 6th intern. congr., Medellin, Colombia. (J. L. A. Roth, 419 S. 19 St., Philadelphia, Pa.)

8–16. **Entomology**, 12th intern. congr., London, England. (P. Freeman, British Museum of Natural History, Cromwell Rd., London, S.W.7)

10–11. Rocky Mountain **Cancer** Conf., Denver, Colo. (N. P. Isbell, 1809 E. 18 Ave., Denver 80218)

10–15. **Pleistocene Geomorphology**, symp., Exeter, England. (T. H. Elkins, Royal Geographical Soc., Kensington Gore, London, S.W.7)

12–15. **Solid Propulsion**, NASA meeting, Philadelphia, Pa. (W. H. Hunter, Office of Program Development, Washington, D.C. 10025)

12–16. **Gastroenterology**, 9th Pan American congr., Bogotá, Colombia. (C. A. Estape, Soriano 877, Montevideo, Uruguay)

13–15. Problems of **Capillary Permeability** in Health and Disease, Univ. of Michigan 1964 summer symp., Ann Arbor, Mich. (M. M. Dewey, Dept. of Anatomy, Univ. of Michigan, Ann Arbor)

13–15. **Data Processing and Acquisition in Biology and Medicine**, conf., Rochester, N.Y. (K. Enslein, 42 East Ave., Rochester 14604)

13–17. **Canadian Teachers'** Federation,

Lac Beauport, P.Q., Canada. (G. Nason, 444 MacLaren St., Ottawa, Ont., Canada)

13–17. Chemistry of **Carbohydrates**, intern. symp., Münster, Germany. (F. Micheel, Organisch-Chemisches Institut, Universität, Hindenburgplatz 55, Münster)

13–17. International Assoc. for **Child Psychiatry** and Allied Professions, London, England. (F. H. Stone, Royal Hospital for Sick Children, 70 University Ave., Glasgow, W.2 Scotland)

13–18. **Instrumental Analytical Chemistry**, 3rd annual symp., Bethlehem, Pa. (A. J. Diefenderfer, Dept. of Chemistry, Lehigh Univ., Bethlehem)

13–18. Latin Federation of **Medical Electro-Radiological Socs.**, 6th congr., Brussels, Belgium. (Secretariat, 256 Chaussee de Wavre, Heverle-Louvain, Belgium)

14–17. **Rarefied Gas Dynamics**, 4th intern. symp., Toronto, Ont., Canada. (G. N. Patterson, Inst. of Aerophysics, Univ. of Toronto, Toronto 5)

14–17. **Regional Science** Assoc., 4th congr., Ghent, Belgium. (W. Isard, Univ. of Pennsylvania, Philadelphia 19104)

14–17. **Western Resources** Conf., Boulder, Colo. (Bureau of Continuation Education, 352 Chemistry Bldg., Univ. of Colorado, Boulder)

14–19. **Sociology**, 7th Latin American congr., Bogotá, Colombia. (C. E. Angulo, Facultad de Sociologia, Universidad Nacional de Colombia, Bogotá)

15–19. **Pleistocene Geomorphology**, symp., Cambridge, England. (T. H. Elkins, Royal Geographical Soc., Kensington Gore, London, S.W.7, England)

16–24. **British Medical Assoc.**, annual, Manchester, England. (D. Gullick, BMA, Tavistock Sq., London, W.C.1, England)

16–24. **Organic Photochemistry**, intern. symp., Strasbourg, France. (G. S. Hammond, Gates and Crellin Laboratories of Chemistry, California Inst. of Technology, Pasadena)

18–22. International Union of **Biological Sciences**, 15th general, Prague, Czechoslovakia. (G. L. Stebbins, Dept. of Genetics, Univ. of California, Davis)

19–24. American **Veterinary Medical** Assoc., 101st annual, Chicago, Ill. (AVMA, 600 South Michigan Ave., Chicago 5)

19–25. **Polarography**, 3rd intern. congr., Southampton, England. (D. A. Pantony, Dept. of Metallurgy, Royal School of Mines, Prince Consort Rd., London, S.W.1, England)

19–26. Comparative **Endocrinology**, 4th intern. symp., Paris, France. (L. Gallien, Laboratoire d'Embryologie, Faculte des Sciences de Paris, 9 quai St.-Bernard, Paris 5e)

20–22. **Magnetic Resonance** in Biological Systems, Boston, Mass. (R. G. Shulman, Bell Telephone Laboratories, Murray Hill, N.J.)

20–23. New Mexico Acad. of **General Practice**, Ruidoso. (H. L. Douglas, Box 767, Tatum, N.M.)

20–24. International **Diabetes** Federation, 5th congr., Toronto, Ont., Canada. (H. Best, Organizing Council, 477 Mt. Pleasant Rd., Toronto 7)

20–24. **Nuclear Radiation** Effects, technical conf., Seattle, Wash. (Inst. of Electrical and Electronics Engineers, Box A, Lenox Hill Station, New York, N.Y. 10021)

20–24. **Organic Reaction Mechanism,** intern. symp. Cork, Ireland. (General Secretary, Chemical Soc., Burlington House, London, W.1, England)

20–24. **Semiconductor Physics,** intern. conf., Paris, France. (M. Balkanski, Laboratoire de Physique, Ecole Normale Supérieure, 24, rue Lhomond, Paris 5e)

20–25. **Catalysis,** 3rd intern. conf., Amsterdam, Netherlands. (D. M. Brouwer, c/o Badhuisweg 3, P.O. Box 3003, Amsterdam-N, Netherlands)

21–23. Physiology and Experimental Psychology of **Color Vision,** Ciba Foundation symp., London, England. (Ciba Foundation, 41 Portland Pl., London, W.1)

21–24. American **Malacological** Union, New Orleans, La. (M. C. Teskey, Rt. 2, Box 318, Marinette, Wis.)

21–28. International **Geographical** Union, 20th intern. congr., London, England. (T. H. Elkins, Royal Geographical Soc., Kensington Gore, London, S.W.7)

25–1. **Religion and Science,** 11th conf., Star Island. Portsmouth, N.H. (Religion and Science, 280 Newton St., Brookline, Mass. 02146)

26–29. **Photobiology,** 4th intern. congr., Oxford, England. (Blandford Site, Whiteknights Park, Reading, England)

26–31. American **Crystallographic** Assoc., Bozeman, Mont. (B. Post, Brooklyn Polytechnic Inst., 333 Jay St., Brooklyn, N.Y.)

26–31. **Mineralogical** Soc. of America, Bozeman, Mont. (G. Switzer, MSA, U.S. Natl. Museum, Washington, D.C. 20560)

26–31. **Pharmacology,** Teachers' Seminar, Univ. of Connecticut, Storrs. (M. H. Malone, School of Pharmacy, Univ. of Connecticut, Storrs)

26–1. **Biochemistry,** 6th intern. congr., New York, N.Y. (R. A. Harte, 6th Intern. Biochemistry Congr., 9650 Wisconsin Ave., NW, Washington, D.C. 20014)

27–21. **Engineering Foundation** Research Confs. Andover, N.H. (United Engineering Center, 345 E. 47 St., New York 17)

27–28. International **Cartographic** Assoc., 2nd general assembly, London, England. (D. E. Imhof, Kartographisches Institut, Eidgenössische Technische Hochschule, Zurich, Switzerland)

27–30. Technical Assoc. of the **Pulp and Paper Industry,** engineering conf., Seattle, Wash. (TAPPI, 360 Lexington Ave., New York, N.Y. 10017)

27–31. American **Dietetic** Assoc., 47th annual, Portland, Ore. (ADA, 620 N. Michigan Ave., Chicago, Ill. 60611)

30–1. International Soc. for **Human and Animal Mycology,** 3rd, Edinburgh, Scotland. (R. Vanbreuseghem, Inst. of Tropical Medicine, 155 rue National, Antwerp, Belgium)

August

2–4. American Assoc. of **Colleges of Pharmacy,** New York, N.Y. (C. W. Bliven, 1507 M St., NW, Washington, D.C. 20005)

2–7. American **Pharmaceutical** Assoc., 111th annual, New York, N.Y. (G. B. Griffenhagen Div. of Communications, 2215 Constitution Ave., NW, Washington, D.C.)

2–8. **Applied Psychology,** 15th intern.

conf., Ljubljana, Yugoslava. (B. Petz, Inst. of Psychology of Zagreb, Djure Salaja b.b., Zagreb, Yugoslavia)

2–8. **Reactivity of Solids**, 5th intern. symp., Munich, Germany. (B. Stuke, Physikalische-Chemisches Institut, Sophienstr. 11, Munich)

3–5. Compounds of Interest in **Nuclear Reactor Technology**, intern. symp., Boulder, Colo. (J. T. Waber, Los Alamos Scientific Laboratories, P.O. Box 1663, Los Alamos, N.M. 87544)

3–7. Instrument Soc. of America, **instrumentation** conf., Geneva, N.Y. (H. S. Kindler, 530 William Penn Place, Pittsburgh, Pa.)

3–7. World Federation for **Mental Health**, 17th annual, Bern, Switzerland. (F. Cloutier, 1, rue Gevray, Geneva, Switzerland)

3–8. International **Years of the Quiet Sun**, regional symp., Buenos Aires, Argentina. (J. G. Roederer, Facultad de Ciencias, Perú 272, Buenos Aires)

3–10. **Anthropologists and Ethnologists**, 7th world conf., Moscow, U.S.S.R. (American Anthropological Assoc., 1530 P St., NW, Washington, D.C. 20005)

3–12. **Botanical** Congr., 10th intern., Edinburgh, Scotland. (Miss S. C. Penny, 5 Hope Park Sq., Edinburgh 8)

4–7. **Poultry Science** Assoc., annual, Minneapolis, Minn. (E. L. Johnson, Dept. of Poultry Science, Univ. of Minnesota, St. Paul 55101)

4–17. Methods of **Hydrological Forecasting**, 3rd inter-regional seminar, World Meteorological Organization/UN Economic Commission for Asia and the Far East, Bangkok, Thailand. (WMO, Secretariat, Geneva, Switzerland)

5–7. Sonic Investigations on **Internal Damping in Solids**, symp., London, England (Administration Assistant, Institute of Physics and the Physical Society, 47 Belgrave Square, London, S.W.1)

5–12. **Atmospheric Radiation**, symp., World Meteorological Organization/Intern. Union of Geodesy and Geophysics, Leningrad, U.S.S.R. (Secretariat, WMO, Geneva, Switzerland)

5–15. **High Energy Physics**, 12th intern. conf., Dubna, U.S.S.R. (M. L. Goldberger, Commission on High Energy Nuclear Physics, IUPAC, Princeton Univ, Princeton, N.J. 08540)

6–11. American **Podiatry** Assoc., New York, N.Y. (F. A. Kalbacher, American Podiatry Assoc., 3301 16th St., NW, Washington, D.C. 20010)

7–14. Scientific Study on **Mental Retardation**, intern. congr., Copenhagen, Denmark. (A. Dupont, Statens Andsvageforsorg, Nyropsgade 28.2, Copenhagen 5)

9–12. **Heat Transfer**, 7th natl. conf., Cleveland, Ohio. (W. Chenoweth, American Inst. of Chemical Engineers, 345 E. 47 St., New York 17)

9–13. American Soc. of **Animal Science**, Knoxville, Tenn. (J. E. Oldfield, Dept. of Animal Science, Oregon State Univ., Corvallis)

9–14. South American Union of **Engineers'** Federations, 10th conv., Rio de Janeiro, Brazil. (Federacão Brasileira de Associacões de Engenheiros, Caixa Postal 1229, Rio de Janeiro)

10–14. **Structural Developments in In-**

organic Chemistry, New Hampton, N.H. (W. G. Parks, Dept. of Chemistry, Univ. of Rhode Island, Kingston)

10–15. Pan American Federation of **Engineering** Socs. 8th biennial conv., Caracas, Venezuela. (L. K. Wheelock, Engineers Joint Council, 345 E. 47 St., New York 10017)

11–14. American Soc. for **Pharmacology and Experimental Therapeutics**, San Francisco, Calif. (H. G. Mandel, George Washington Univ. Medical School, Washington, D.C. 20005)

12–14. **Ballistic Missile and Space Technology**, 9th symp., U.S. Naval Training Center, San Diego, Calif. (C. Morrow, Aerospace Corp., P.O. Box 95085, Los Angeles, Calif. 90045)

12–14. **Galaxies**, preliminary conf., Uppsala, Sweden. (T. Page, Van Vleck Observatory, Wesleyan Univ., Middletown, Conn. 06457)

12–14. **X-Ray Analysis** Applications, 13th annual conf., Denver, Colo. (W. G. Mueller, Metallurgy Div., Denver Research Inst., Denver 80210)

13–15. International Soc. for **Horticultural Science**, Edinburgh, Scotland. (G. de Bakker, Le v.d. Boschstraat 4, The Hague, Netherlands)

16–21. **Histochemistry and Cytochemistry**, intern. congr., Frankfurt am Main, Germany. (T. H. Schiebler, Anatomisches Institut der Universität, Koellikerstr. 6, 87 Würzburg, Germany)

16–23. Latin American **Schools of Medicine**, 4th conf., Pocos de Caldas, Brazil. (O. Versiani Caldeira, Univ. of Minas Gerais Medical School, Belo Horizonte, Minas Gerais, Brazil)

16–24. **Human Economy**, conf., Inst. of Paper Chemistry, Appleton, Wis. (A. N. McLeod, IPC, Appleton)

17–20. American Assoc. of **Clinical Chemists**, 16th natl., Boston, Mass. (F. F. Ronan, AACC, 19 Bay State Rd., Boston 15)

17–20. **Natural Ultra Low Frequency Electromagnetic Fields**, symp., Boulder, Colo. (W. H. Campbell, National Bureau of Standards, Boulder)

17–21. **Combustion**, 10th intern. symp., Cambridge, England. (Combustion Inst., 986 Union Trust Bldg., Pittsburgh 19, Pa.)

17–21. **Cryogenic Engineering**, conf., Philadelphia, Pa. (K. D. Timmerhaus, Engineering Research Center, Ketchum 129, Univ. of Colorado, Boulder)

17–21. **Simulation in Space Technology**, Blacksburg, Va. (F. J. Maher, Virginia Polytechnic Inst., Blacksburg)

17–22. International **Astronomical** Union, symp., Thessaloniki, Greece. (Maj. B. R. Agins, Air Force Office of Scientific Research, SRMA, Washington, D.C. 20333)

17–22. **Cardiology**, 4th European congr., Prague, Czechoslovakia. (H. Kafka, Karlovo nám. 32, Prague 2)

17–22. **Endocrinology**, 2nd intern. congr., London, England. (A. S. Mason, London Hospital, Whitechapel, London, E.1)

17–22. **Social Psychiatry**, 1st intern. congr., London, England. (J. Bierer, 7 Hollycroft Ave., London, N.W.3)

17–28. **Molecular Biophysics**, intern. inst., Squaw Valley, Calif. (Prof. Weiss-

bluth, Biophysics Laboratory, Stanford Univ., Stanford, Calif.)

18–20. International Assoc. of **Milk and Food Sanitarians**, Portland, Ore. (H. L. Thomasson, P.O. Box 437, Shelbyville, Ind.)

19–21. Physiology of **Digestion in the Ruminant**, 2nd intern. symp., Ames, Iowa. (R. W. Dougherty, Box 70, Ames)

20–21. National **Council of Teachers of Mathematics**, Minneapolis, Minn. (J. D. Gates, NCTM, 1201 16th St. NW, Washington, D.C. 20036)

22. American Inst. of **Ultrasonics in Medicine**, 9th annual, Boston, Mass. (W. J. Fry, Biophysical Research Laboratory, Univ. of Illinois, Urbana)

22–24. **History of Astronomy**, symp., Hamburg, Germany. (B. Sticker, Institut für Geschichte der Naturwissenschaften, Universität Hamburg, Hartnungstr. 5, 2 Hamburg 13, Germany)

22–28. American Soc. of **Human Genetics**, Boulder, Colo. (S. H. Boyer, Johns Hopkins Hospital, Baltimore, Md.)

23. American Assoc. of **Electromyography**, annual, Boston, Mass. (M. K. Newman, 16861 Wyoming Ave., Detroit, Mich. 48221)

23–26. American **Phytopathological** Soc., Lafayette, Ind. (J. R. Shay, Purdue Univ., Lafayette)

23–26. **Soil Conservation** Soc. of America, 19th annual, Jackson, Miss. (SCS, 7515 Northeast Ankeny Rd., Ankeny, Iowa)

23–28. American Inst. of **Biological Sciences**, annual, Boulder, Colo. (AIBS, 2000 P St. NW, Washington, D.C. 20036)

23–28. American Congr. of **Physical Medicine and Rehabilitation**, Boston, Mass. (G. Gullickson, Jr., 30 N. Michigan, Chicago, Ill.)

24–26. American Inst. of **Aeronautics and Astronautics**, Los Angeles, Calif. (AIAA, 1290 Sixth Ave., New York, N.Y.)

24–26. Society for **Cryobiology**, annual, Washington, D.C. (V. P. Perry, Tissue Bank Dept., U.S. Naval Medical School, National Naval Medical Center, Bethesda, Md. 20014)

24–26. **Education in the Nuclear Power Era**, conf., Gatlinburg, Tenn. (M. L. Nelson, Education Div., Oak Ridge Natl. Laboratory, P.O. Box 117, Oak Ridge, Tenn.)

24–26. **Mathematical** Assoc. of America, summer meeting, Univ. of Massachusetts, Amherst. (H. M. Gehman, Univ. of Buffalo, Buffalo 14, N.Y.)

24–27. American **Hospital** Assoc., Chicago, Ill. (E. L. Crosby, 840 N. Lake Shore Dr., Chicago 11)

24–27. **Toxicology and Occupational Medicine**, 4th inter-American conf., Miami Beach, Fla. (W. Machle, Univ. of Miami School of Medicine, Coral Gables, Fla.)

24–28. International Council of the **Aeronautical Sciences**, 4th congr., Paris, France. (American Inst. of Aeronautics and Astronautics, 2 E. 64 St., New York, N.Y. 10021)

24–28. **Astrodynamics Guidance and Control**, conf., Los Angeles, Calif. (K. Watanabe, 4731 B Engineering Bldg. III, Univ. of California, Los Angeles 24)

24–28. American **Astronautical** Soc.,

military space applications symp., Stanford, Calif. (AAS, 516 Fifth Ave., New York, N.Y.)

24–28. Society for **Industrial and Applied Mathematics**, Amherst, Mass. (W. S. Dorn, I.B.M. T. J. Watson Research Center, P.O. Box 218, Yorktown Heights, N.Y.)

24–28. Scandinavian **Mathematical** Congr., Copenhagen, Denmark. (Secretariat, The Congress, c/o Mathematical Inst., H. C. Ørsted Inst., Universitetsparken 5, Copenhagen Ø)

24–28. American **Mathematical** Soc., New York, N.Y. (G. L. Walker, AMS, 190 Hope St., Providence, R.I.)

24–28. **Preventive Cardiology,** first intern. conf., Burlington, Vt., (W. Raab, Preventive Heart Reconditioning Foundation, 206 Summit St., Burlington, Vt.)

24–28. **Water Pollution Research**, 2nd intern. conf., Tokyo, Japan. (Water Pollution Control Federation, 4435 Wisconsin Ave., Washington, D.C. 20016)

24–29. **Psychotherapy**, 6th intern. congr., London, England. (F. Pannell, The Congress, 11 Whitehall Ct., London, S.W.1)

24–3. International Assoc. of **Agricultural Economists**, 12th triennial conf., Lyons, France. (French Organization Committee of the Conference, 4, rue de Lasteyrie, Paris 16e, France)

25–27. Association for **Computing Machinery**, 19th annual, Philadelphia, Pa. (H. S. Bright, Philco Computers, Willow Grove, Pa.)

25–28. Western Electronics Show and Conv. (WESCON), Inst. of **Electrical and Electronics Engineers**, summer meeting, Los Angeles, Calif. (R. R. Bennett, Suite 1920, 3600 Wilshire Blvd., Los Angeles)

25–29. **Audiology**, 7th intern. congr., Copenhagen, Denmark. (H. W. Ewertsen, c/o State Hearing Centre, 7 D. Tvaergade, Copenhagen K)

25–3. International **Astronomical** Union, 12th general assembly, Hamburg, Germany. (D. A. Bell, c/o Royal Greenwich Observatory, Hertsmonceaux Castle, Hailsham, Sussex, England)

26–2. **British Association for the Advancement of Science**, 126th annual, Southampton, England. (BAAS, 3 Sanctuary Bldgs., London, S.W.1, England)

26–2. **Logic, Methodology, and Philosophy of Science**, intern. conf., Jerusalem, Israel. (Y. Bar-Hillel, Hebrew Univ., Jerusalem)

26–3. **Electron Microscopy**, 3rd European regional conf., Prague, Czechoslovakia. (Organizing Committee, Albertov 4, Prague 2)

27. American Soc. for **Horticultural Science**, Amherst, Mass. (R. E. Marshall, AMHS, Dept. of Horticulture, Michigan State Univ., East Lansing)

27–28. **Activation Analysis**, Glasgow, Scotland. (J. M. A. Lenihan, Western Regional Hospital Board, 9 W. Greham St., Glasgow, C.4)

27–29. **Reactive Intermediates in Organic Chemistry**, symp., Quebec City, P.Q., Canada. (C. R. Engel, Faculté des Sciences, Université Laval, Quebec City)

28–3. **Neurology**, 8th intern. congr., Vienna, Austria. (H. Hoff, Medizinische Fakultät, Neurologische und Psychiatrische Abteilung, Vienna 9)

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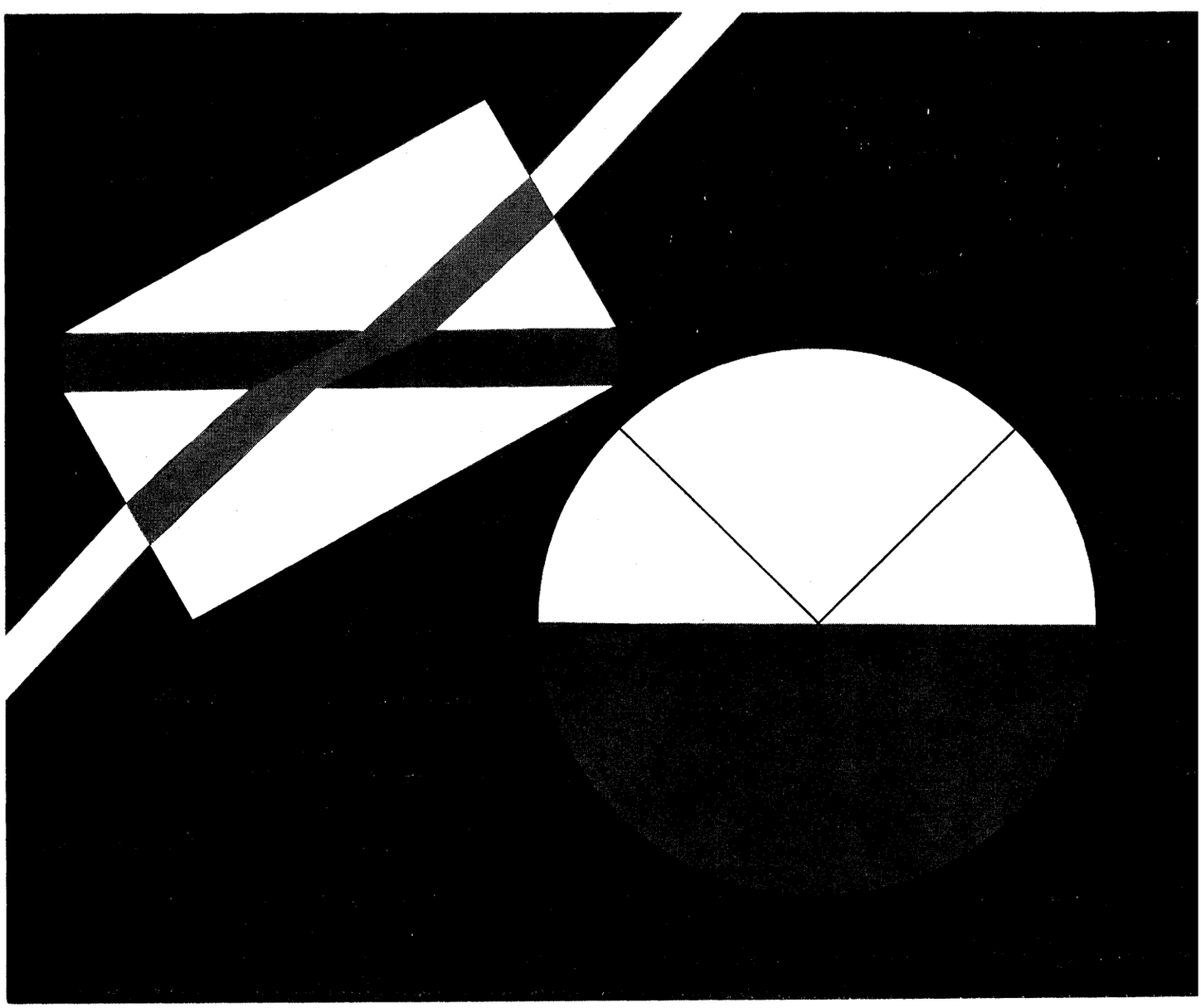

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Multi-channel oscilloscope has a 17-inch (43.2-cm) screen on which wave forms of physiological data are clearly visible at distances of 20 ft (6 m) and more in brightly lit rooms. Monitoring of patient heart action, blood pressure, respiration rate, and other physiological data during surgery is facilitated by the brightness and large size of the traces. As many as eight channels of analog data can be monitored simultaneously on the Honeywell Model MS 731 multi-trace oscilloscope at speeds of 2.5, 5, 25, 50, 100, or 200 mm/sec. It is available as a complete system or as subassemblies. A complete system, in either four- or eight-channel configurations, consists of the oscilloscope display unit and associated electronics, a control unit with either low- or high-gain amplifiers, and a sloping front 55-inch (140-cm) console. Display units may be slaved from the master control unit. Frequency response is d-c to 1000 cy/sec ±3 db. Sensitivity of low-gain amplifiers is 40 mv/cm ±15 percent. That of high-gain amplifiers is 100 μv/cm minimum.—D.J.P. (Honeywell, Denver Div., Industrial Products Group, Denver, Colo.)

Circle 1 on Readers' Service card

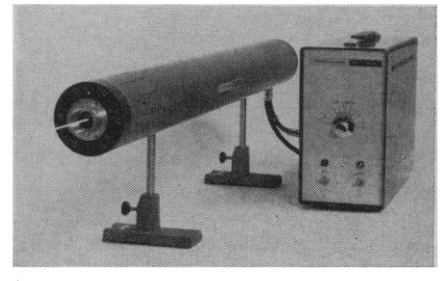
Portable videotape television recorders permit the operator to stop the tape during the reproduce mode at any instant for close inspection of any video field. This feature is useful in analysis of x-rays, detailed study of material for educational presentation, study of athletic form, and minute inspection of materials in quality-control applications. A push button disengages the capstan motor from the capstan shaft on the recorder and the tape stops. By manual rotation of the pinch roller, the tape may be moved to any desired position or video frame for inspection on a monitor. When the button is released, normal reproduce mode is reestablished. A kit is available to enable older recorders to be updated to stop motion capability. The Ampex VR-1500 is widely used in education, industry, and medical applications. It records either off-the-air television pictures or live action for immediate playback through conventional television receivers. Another model, the VR-660, is designed for mobile and studio use by network, commercial, and industrial broadcasters—R.L.B. (Ampex Corp., 401 Broadway, Redwood City, Calif.)

Circle 2 on Readers' Service card

Thermoelectric freeze-dryer employs a two-stage thermoelectric cooling unit to replace the freeze-bath in a new instrument designed for freeze-drying tissue specimens under vacuum for microscope work. The temperature of the element is accurately and simply controlled between +42° and −60°C by a variable transformer. Inside the vacuum chamber, which is pumped by a two-stage mechanical rotary pump, two thermoelectric modules of differing capacity are mounted in series on a water-cooled baseplate. The specimen carrier, ¼ inch (0.6 cm) deep by 1 inch (2.5 cm) in diameter, rests on the upper module. Specimens prefrozen by immersion in isopentane, cooled with liquid oxygen or nitrogen, are transferred in a boat containing embedding wax to the tissue dryer platen which has been cooled to −60°C by the thermoelectric cooler. The drying chamber is then evacuated and freeze-drying takes place. Water vapor subliming from the frozen specimen is absorbed by a small vessel containing phosporus pentoxide positioned on the chamber baseplate. Any water vapor not trapped is removed by the rotary pump. Drying times vary according to specimen thickness and temperature: a 2-mm thickness dries in 60 to 90 minutes at −10°C and a 5-mm thickness in 7 to 8 hours at −20°C. Dried specimens are heated to wax-embedding temperature by reversing the direction of the current through the thermoelectric element, the wax melting and impregnating the specimens. The modules, supplied with low voltage d-c current from a power unit, are protected from excessive temperature during embedding by a stop on the variable transformer which is interlocked mechanically with the main control switch. Under normal conditions vacuum chamber pump-down from atmospheric pressure to 0.01 torr takes 4 to 5 minutes. The tissue dryer platen cools from 14°C to −60°C in 5 minutes. Melting the wax and embedding the specimen takes less than 30 minutes.—D.J.P. (Edwards High Vacuum, Inc., 3279 Grand Island Blvd., Grand Island, N.Y.)

Circle 3 on Readers' Service card

Helium-neon laser features hot-cathode d-c discharge excitation and produces continuous wave output at approximately 8 mw in the diffraction-limited mode and about 15 mw multimode. Normally supplied with reflectors for visible red light output at a wavelength of 6328 Å, the model 5300 is available with readily interchangeable reflectors for infrared output at 1.15 or 3.39 μ. The resonator consists of an 88-cm optical cavity. Brewster angle windows of highest optical homogeneity terminate the gas plasma tube, and minimum-loss, multilayer, dielectric reflectors are used for maximum power output. The fine beam of coherent monochromatic light can be



The material in this section is prepared by the following contributing writers:

Robert L. Bowman (R.L.B.), with the assistance of Denis J. Prager (D.J.P.), Laboratory of Technical Development, National Heart Institute, Bethesda 14, Md. (medical electronics and biomedical laboratory equipment).

Joshua Stern (J.S.), Basic Instrumentation Section, National Bureau of Standards, Washington 25, D.C. (physics, computing, electronics, and nuclear equipment).

The information reported here is obtained from manufacturers and from other sources considered to be reliable. Neither *Science* nor the writers assume responsibility for the accuracy of the information. A Readers' Service card for use in mailing inquiries concerning the items listed is included on pages 1283 and 1381. Circle the department number of the items in which you are interested on this card.

used to produce sharp light scattering, diffraction, and interference patterns and can be focused to fine spots of high-power density for study of effects of local irradiation on biological specimens. The laser is housed in a rugged 35-inch (89-cm) long, 4-inch (10.2-cm) outside diameter cylinder with threaded, photographic-type, series-V accessory mounts on each end. It is suitable for mounting in any position. A companion power supply unit provides hot-cathode power and high-voltage d-c discharge current. Primary power required is 117 volts a-c (nominal), 1.7 amp, 50/60 cy/sec.—R.L.B. (Optical Maser Marketing, Perkin-Elmer Corp., Main Ave., Norwalk, Conn.)

Circle 4 on Readers' Service card

Temperature controller for constant-temperature baths is an electronically controlled power relay designed for operation with a mercury-type thermoregulator. Because such thermoregulators have limited current-carrying capacities, they cannot be used directly to control current to bath heaters. However, the opening and closing of the thermoregulator's contacts can be utilized to trigger a relay capable of switching large power loads. In the Fisher bath control, the thermoregulator triggers the heavy-duty relay circuit which controls the bath's intermittent heaters. This circuit incorporates silicon transistors and is capable of handling resistive loads of 1700 watts and currents of 15 amps. A second circuit with its own switch and pilot light is used for the bath's continuous heaters which plug into a receptacle on the back of the unit. Other receptacles are provided for auxiliary heaters and stirrers. The model 33 measures 7 by 4 by 4½ inches (18 by 10 by 11 cm) and operates from standard 110-volt a-c.—D.J.P. (Fisher Scientific Co., 415 Fisher Bldg., Pittsburgh 19, Pa.)

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Lamp housing (model LH 150) comprises a multipurpose design to accommodate high-pressure compact arc lamps (up to 250 watts) as well as numerous spectral discharge lamps. Light sources are easily interchangeable by means of socket mounts fitting particular lamps. The housing is furnished complete with ultraviolet-transmitting optics ($f/1.5$) in lever-operated focusing sleeve, compartment for light or heat filter insertion, a spherical first surface reflector, and a blower cooler to operate xenon and xenon-mercury

compact arc lamps at highest efficiency. Size is approximately 5 by 5 by 10 inches (12.7 by 12.7 by 25.4 cm). Also available are larger housings for lamps of greater wattage. Accessories for adapting the housing for use with the QPM-30 Monochromator are available including: focusing sleeve with fused silica lens to focus light into the monochromator; adaptor ring and fused silica lens permitting insertion of a secondary collimator lens sleeve for substage illumination between 700 and 200 mμ; light tube with 90° front surface deflection for substage or right-angle illumination; and 50-mm Fl-UV-IR transmitting fused silica lens mounted in a focusing sleeve to fit standard threads in entrance and exit side of QPM-30 Monochromator.—D.J.P. (Schoeffel Instrument Co., 355 Hillsdale Ave., Hillsdale, N.J.)

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Ultra-high purity compressed gases intended for special atmospheres in semiconductor or other electronic work or analytical instrument standards may have utility in biological research. Hydrogen, argon, and helium are 99.999 percent pure and oxygen and methane are 99.99 percent pure. A UHP gas catalog supplement is available.—R.L.B. (Matheson Co., Inc., P.O. Box 85, East Rutherford, N.J.)

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Wide-mouth flash evaporator glassware utilizes a patented "O" ring snap together, snap apart seal. The flash evaporator glassware features a minimum of a 2-inch (5-cm) opening through which the sample may be reached. The glassware is available in four sizes. The 250-ml and 500-ml capacity have a mouth opening of 2 inches and a top joint of 24/40. The 1000-ml and 2000-ml capacity have a mouth opening of 3 inches (7.6 cm) and a 24/25 top joint. The wide-mouth flash evaporator glassware may be obtained with any standard joint and is completely compatible with all standard flash evaporators. The wide mouth permits complete access to the contained sample, thereby eliminating sample loss. The glassware is constructed of heavy-wall borosilicate glass. The versatility is such that it may be utilized as a reaction kettle or for lyophilization procedures.—R.L.B. (Bio-Chem Instruments, Inc., Div. of Thermovac Industries Corp., 39 Decker St., Copiague, L.I., N.Y.)

Circle 8 on Readers' Service card

NEW BOOKS

(*Continued from page 1329*)

G. E. Fogg, Ed. Published for the Company of Biologists by Academic Press, New York, 1963. 412 pp. Illus. $14. The papers were presented at a symposium held in September 1962 at Edinburgh, Scotland.

The Cerebellum of the Cat. Structure and fibre connexions. J. Voogd. Davis, Philadelphia, 1964. 223 pp. Illus. $20.

The Chemistry and Therapy of Disorders of Voluntary Muscles. E. G. Murphy; with an introductory chapter by G. R. Williams. Thomas, Springfield, Ill., 1964. 137 pp. Illus. $6.50.

Clinical Chemistry. Principles and technics. Richard J. Henry. Harper and Row, New York, 1964. 1152 pp. Illus. $24.50.

Comprehensive Biochemistry. vol. 15, *Group-Transfer Reactions*. Marcel Florkin and Elmer H. Stotz, Eds. Elsevier, New York, 1964. 258 pp. Illus. $12.50.

Cytologie de l'Adénohypophyse. An international colloquium (Paris), September 1963. Jacques Benoit and Christian Da Lage, Eds. Éditions du Centre National de la Recherche Scientifique, Paris, 1963. 448 pp. Illus. Plates. F.98.

Development: Selected Topics. Lucena Jaeger Barth. Addison-Wesley, Reading, Mass., 1964. 123 pp. Illus. Paper, $1.75; cloth, $2.95.

Diagnostic Procedures and Reagents. Technics for the laboratory diagnosis and control of the communicable diseases. Albert H. Harris and Marion B. Coleman, Eds. American Public Health Assoc., New York, ed. 4, 1963. 900 pp. Illus. $15.

Elements of Cytology. Norman S. Cohn. Harcourt, Brace, and World, New York, 1964. 384 pp. Illus. $8.95.

Experimental Chemotherapy. vol. 2, pt. 1, *Chemotherapy of Bacterial Infections*. R. J. Schnitzer and Frank Hawkins, Eds. Academic Press, New York, 1964. 632 pp. Illus. $23.

Fermentdiagnostik Interner Erkrankungen. Diethard Amelung. Thieme, Stuttgart, 1964. 187 pp. Illus. Paper, DM. 29.70.

Fetal and Infant Liver Function and Structure. Annals of the New York Academy of Sciences, vol. 111, art. 1. Harold E. Whipple, Ed. The Academy, New York, 1963. 558 pp. Illus. Paper, $7. Papers on morphology, physiology, chemistry, bilirubin and related compounds, pathology, and clinical problems. The series of papers resulted from a conference held in November 1962.

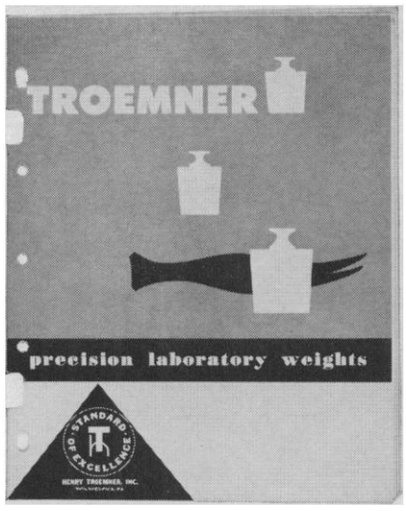
Genetical Principles and Plant Breeding. Watkin Williams. Davis, Philadelphia, 1964. 514 pp. Illus. $12.75.

The Genetics of the Silkworm. Yataro Tazima. Logos Press, London; Prentice-Hall, Englewood Cliffs, N.J., 1964. 265 pp. Illus. $9.95.

Handbook of Basic Microtechnique. Peter Gray. McGraw-Hill, New York, ed. 3, 1964. 316 pp. Illus. $7.95.

International Review of Cytology. vol. 16. G. H. Bourne and J. F. Danielli, Eds. Academic Press, New York, 1964. 355 pp. Illus. $14.

Jahresberichte des Naturwissenschaftlichen Vereins in Wuppertal. vol. 19,



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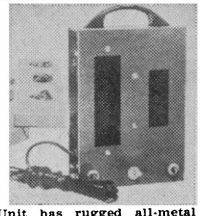

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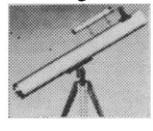

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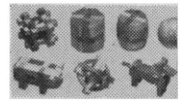

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Principles of Biology. W. Gordon Whaley, Osmond P. Breland, Charles Heimsch, Austin Phelps, A. R. Schrank, and Orville Wyss. Harper and Row, New York, ed. 3, 1964. 796 pp. Illus. $8.95.

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Quantum Aspects of Polypeptides and Polynucleotides. A symposium (Stanford University), March 1963. M. Weissbluth, Ed. Interscience (Wiley), New York, 1964. 571 pp. Illus. $22.50.

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Thirst. Proceedings of a symposium

(Tallahassee, Fla.), May 1963. Matthew J. Wayner, Ed. Pergamon, London; Macmillan, New York, 1964. 578 pp. Illus. $20.

The Thyroid Gland. vols. 1 and 2. Rosalind Pitt-Rivers and W. R. Trotter, Eds. Butterworth, Washington, D.C., 1964. vol. 1, 454 pp. $18.50; vol. 2, 337 pp. Illus. $13.50.

Veterinary Toxicology. Annals of the New York Academy of Sciences, vol. 111, art. 2. Harold E. Whipple, Ed. The Academy, New York, 1964. 253 pp. Illus. Paper, $5. Twenty-five papers that resulted from a conference on problems related to the general increase in the use of chemicals in livestock husbandry and agriculture. The conference, which was sponsored by the Academy and the American College of Veterinary Toxicologists, was held in July 1963.

Vitamin B_{12} Coenzymes. Annals of the New York Academy of Sciences, vol. 112, art. 2. Harold E. Whipple, Ed. The Academy, New York, 1964. 375 pp. Illus. Paper, $7. A series of 36 papers presented at a conference held in April 1963. The sections are entitled Chemistry, Chemical Synthesis, and Biosynthesis of Corrin Coenzymes; Enzymic Roles of Cobamide Coenzymes; and B_{12}-Coenzymes in Microorganisms and Animals.

The Yorkshire Jurassic Flora. vol. 2, *Caytoniales, Cycadales and Pteridosperms.* Thomas Maxwell Harris. British Museum (Natural History), London, 1964. 199 pp. Illus. Plates. £6 10s.

General

The Natural Philosopher. Papers devoted to the history of physics and to the influence of physics on human thought and affairs through the ages. vol. 2. Daniel E. Gershenson and Daniel A. Greenberg, Eds. Blaisdell, New York, 1963. 135 pp. Illus. Paper, $1.95; cloth, $2.95. Contents: The first chapter of Aristotle's "Foundations of scientific thought" (a new translation by the editors); "Einstein's first paper on quanta," by M. J. Klein; "The great van Marum electrical machine," by B. Dibner; and "The quantification of the concepts of electric charge and electric current," pt. 1, by W. J. King.

Polish Research Guide, 1964. Jerzy Koztowski, Ed. Translated by Lidia Damm. Published for the National Science Foundation (Washington, D.C.) by Centralny Instytut Informacji, Warsaw, Poland, 1963 (order from Office of Technical Services, Washington 25, D.C.). 431 pp. Paper, $4.25. Contents: The institutions covered include the Polish Academy of Sciences (names of members are provided as well as a list of the attached research institutes, committees, and commissions); governmental research institutes for the application of nuclear energy; universities and colleges; other research institutions; archives, museums, and research libraries; learned societies and scientific-technical organizations. The guide is based on information supplied by the institutions and is correct as of March 1963 (in some cases corrected to June 1963).

Religion Ponders Science. Edwin P. Booth, Ed. Appleton-Century, New York, 1964. 314 pp. $5.95.

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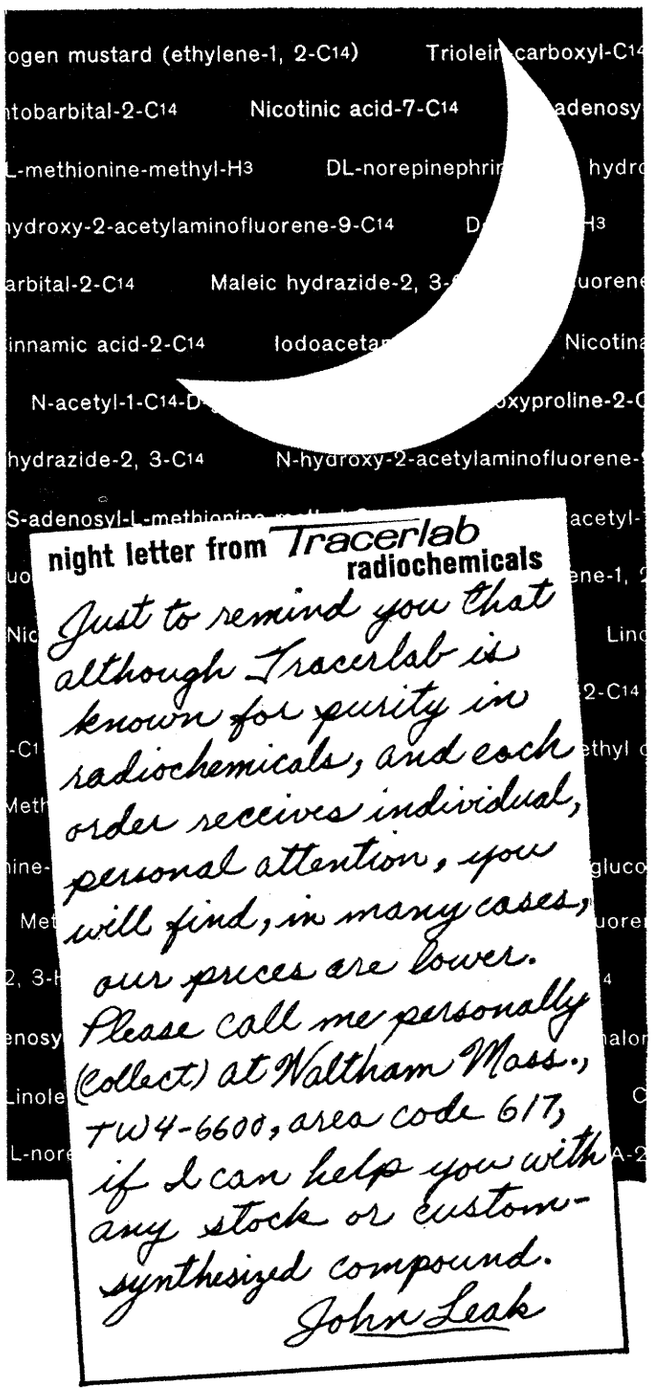

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(*Continued from page 1322*)

of renal involvement is essential, but the blood urea nitrogen must not exceed 30 mg/100 ml. Patients not suitable as subjects for the study include those with bleeding disorders, severe thrombocytopenia, psychotic episodes, advanced osteoporosis, and peptic ulcer, and patients receiving high doses of steroids. Physicians who wish to have their patients considered for admission to the study should contact J. J. Bunim, clinical director, NIAMD, Bethesda, Md. 20014.

Meeting Notes

Papers are invited for presentation at the mid-American **electronics** conference (MAECON), scheduled 23 and 24 November in Kansas City, Mo. Papers are invited on the broad applications of measurements and instrumentation. Deadline for receipt of abstracts: *15 July*; for papers: *1 September*. (E. J. Martin, Jr., Midwest Research Institute, 425 Volker Blvd., Kansas City, Mo. 64110)

The call for papers has been issued for a conference on **flight testing**, to be held 15–17 February 1965, in Huntsville, Alabama. The meeting will be sponsored by the American Institute of Aeronautics and Astronautics. Papers are invited on pre-flight or pre-launch preparations, flight measurements, data analysis and evaluation, test requirements for manned versus unmanned systems, development of flight test equipment, and future requirements of flight testing. Classified sessions may be held, and authors are requested to indicate preference and security level. Abstracts of 500 to 1000 words are required. Deadline: *13 July*. (K. K. Dannenberg, Systems Office, NASA Marshall Space Flight Center, Huntsville, Ala.)

Courses

Current developments in **analog modulation and continuous estimation** will be the topic of a course at Massachusetts Institute of Technology, 13–24 July. The course is designed for scientists and engineers concerned with using analog transmission techniques for transmitting continuous information, and for teachers of demodulation the-

ory at the graduate level. Participants must have a degree in science or engineering and a semester course in random processes, or the equivalent experience. The course will include a week's review of random process theory, and a week developing a logical approach to optimum demodulation theory. Tuition is $350. (Director, Office of the Summer Session, Room 7-103, M.I.T., Cambridge, Mass. 02139)

A course on the **genetics and physiology of bacterial viruses** will be held 11 September to 9 October at the International Laboratory of Genetics and Biophysics, Naples, Italy. Applicants for the UNESCO-sponsored course must be postgraduate students in mathematics, physics, chemistry, or biology; proficiency in English is required. Participation is limited to 16 persons. Fellowships covering travel and living expenses are available—four for Italians, ten for other Europeans, and two for non-Europeans. Deadline for applications: *1 July*. (Laboratorio Internazionale di Genetica e Biofisica, Casella Postale 104, Naples, Italy)

A **linguistics** institute will be held from 17 June to 14 August at Indiana University, sponsored by the university and by the Linguistic Society of America. The program will include course work, invited lectures, and seminars in the traditional areas of linguistics and linguistics analysis and in related fields. (T. A. Sebeok, P. V. McNutt Quadrangle, Central Bldg., Room 304, Indiana University, Bloomington)

Grants, Fellowships, and Awards

A research training fellowship in **allergy and immunology** is available at the Kaiser Foundation Hospital, San Francisco, California. Applicants must hold an M.D. or Ph.D. degree and have a background in biochemistry, immunology, immunochemistry, or allied fields. The fellowship is for 2 years and carries a $7000 annual stipend. (B. F. Feingold, Allergy Department, Kaiser Foundation Hospital, 2425 Geary Blvd., San Francisco, Calif.)

Fellowships in **cancer research** are available through the International Union Against Cancer, with funds provided by the Eleanor Roosevelt Cancer Foundation. The awards are for a year's work at an institution in a country other than the recipient's. Appli-

cants must be experienced investigators in clinical or experimental cancer research and must be on the staff of a university, teaching hospital, research laboratory, or similar institution. Stipends will be based on the recipient's current salary and on salaries of persons with comparable qualifications in the host institution. Round-trip travel allowances will be provided for recipients and their families. Deadline for receipt of applications: *1 September.* (International Union Aganist Cancer, P.O. Box 400, Geneva 2, Switzerland)

Senior scientists who wish to make **short-term visits to Australia** may apply for fellowship support from the Australian Academy of Science. Applicants should be professors or the equivalent, and must have had prior correspondence with the Australian laboratories they wish to visit regarding the desirability of the trip. The trips should be for at least 6 weeks and recipients of the fellowships will receive economy class air fare, plus £A5 (about $11 U.S. funds) a day. Fellows will be expected to participate in colloquiums and to deliver a limited number of lectures. The awards are made quarterly; next deadline for applications: *31 July.* (Executive Secretary, Australian Academy of Science, Gordon St., Canberra City, A.C.T., Australia)

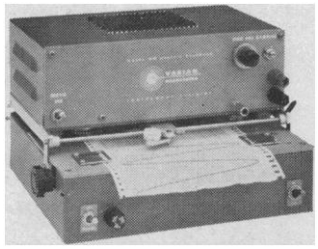
Scientists in the News

Carlton C. Hunt, chairman of the physiology department at the University of Utah college of medicine, has been appointed chairman of the department of physiology at Yale University's medical school, as of July 1.

Paul A. Weiss, professor of developmental biology at the Rockefeller Institute, New York, has been named university professor and dean of the graduate school of biomedical sciences at the University of Texas, Houston, effective 1 October.

John B. Lucke, former head of the geology and geography department at the University of Connecticut, has been appointed professor of geology at Grand Valley State College, Allendale, Michigan.

Morton L. Curtis, professor of mathematics at Florida State University, has been named professor and chairman of the department of mathematics



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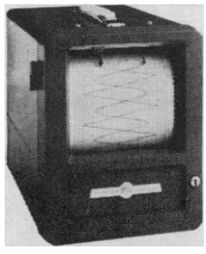

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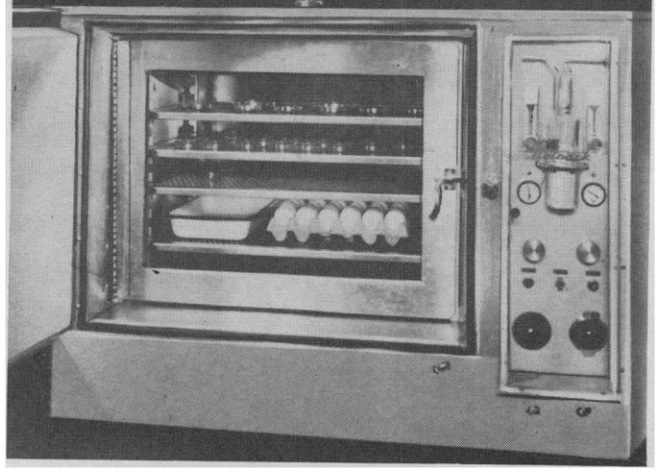

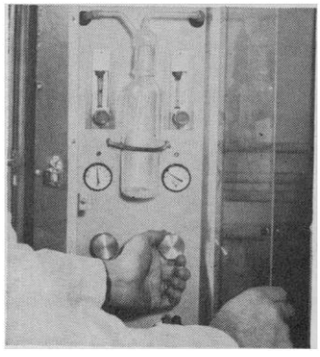

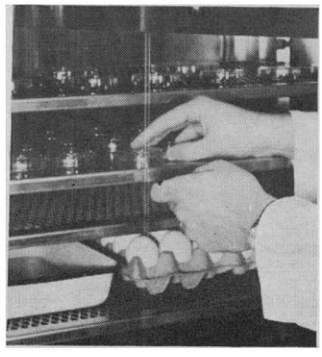

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at Rice University, effective 1 September. He will replace **Gerald R. MacLane**, who has been appointed head of the division of mathematical sciences at Purdue University.

Keith R. Porter, biology professor at Harvard, and **George E. Palade**, professor of cytology at the Rockefeller Institute, will share the $5000 Passano award for 1964. The award cites their work in developing the use of the electron microscope for cytological research, and the subsequent importance of their work in genetics.

David B. Beard, physics professor at the University of California, Davis, has been appointed professor and chairman of the department of physics and astronomy at the University of Kansas, Lawrence, as of 1 July.

The Industrial Research Institute has elected **Philip M. Arnold** president. He is vice president for research and development at Phillips Petroleum Co.

James A. Peters, professor of biology at San Fernando Valley State College, Northridge, California, has been appointed associate curator of herpetology at the Smithsonian Institution, effective 1 July.

St. Lawrence University, Canton, New York, has appointed **James H. L. Roach** professor and head of the psychology department, effective with the fall term. He is currently associate professor of psychology at Albion College, Albion, Michigan.

John M. Stalnaker, president of the National Merit Scholarship Corporation, has been named executive director of the Commission on Presidential Scholars, established in April by President Johnson.

George V. Coelho, formerly visiting scientist in the adult psychiatry branch of the National Institute of Mental Health, NIH, has joined the department of adult education and youth activities in UNESCO, as programme specialist.

Walter A. Sedelow, Jr., human factors scientist at the System Development Corporation, Santa Monica, California, has been appointed director of the department of sociology and anthropology, St. Louis University, St. Louis, Missouri, as of 1 September.