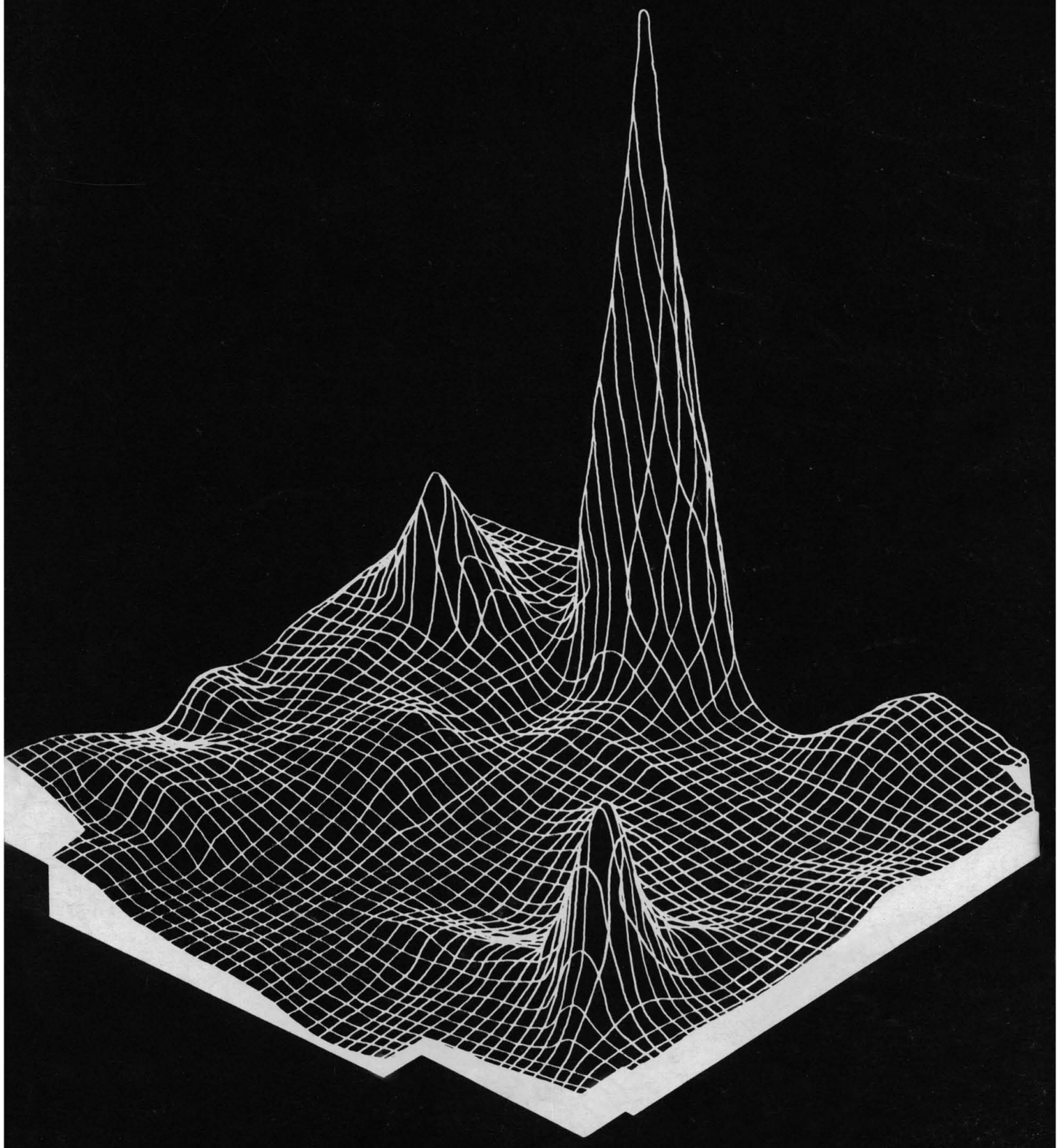
SCIENCE

18 November 1966

Vol. 154, No. 3750

AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE



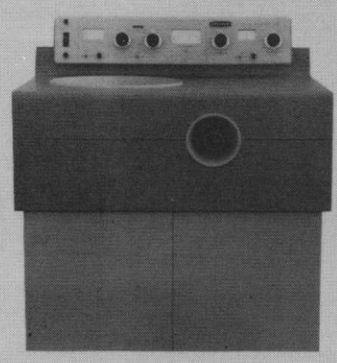
STATISTICAL MAP

Questions about centrifugation?

Try these answers.

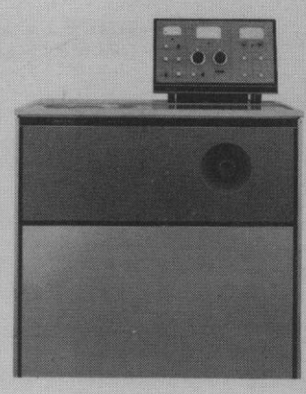
Model L

The lowest cost preparative ultracentrifuge available—and the most widely used. More than 3000 units in use throughout the world. The Model L gives you 50,000 rpm and 274,000 *g*, yet it costs less than many instruments offering lesser speeds. An unbeatable combination of high force and low cost for basic sedimentation work.



Model L2-65

65,000 rpm and forces to 420,000 g —the highest force in the field reduces sedimentation times, separates smaller particles, and improves resolution in density gradient studies. With its big chamber and large capacity rotors, the Model L2-65 is the outstanding general-purpose preparative ultracentrifuge.



Model L4

Continuous Flow, Zonal, and 65,000 rpm capabilities—the largest volume, most versatile preparative ultracentrifuge ever built. As a Zonal Ultracentrifuge, the L4 spins 1725 ml and permits recovery of fractions during rotation. As a Continuous Flow Ultracentrifuge, the L4 accepts sample at rates to 10 liters per hour. For additional utility, it also uses most rotors in the broad Beckman line.

Some things you should also know if you've never used a Beckman ultracentrifuge: Beckman has a nationwide network of field service engineers, factory-trained to keep your instrument in choice condition . . . central locations throughout the U.S. for fast delivery of accessories and parts . . . the largest line of fixed angle and swinging bucket rotors, with the widest range of capacities, speeds, forces . . . the widest range of accessories and centrifuge tubes, all made by Beckman or for Beckman to stringent specifications . . . and Beckman has experience; Spinco Division of Beckman has been making preparative ultracentrifuges for more than 15 years. For more information on our preparative ultracentrifuges, a review of density gradient techniques, and a comprehensive applications bibliography, write for Data File L-5.

Beckman INSTRUMENTS, INC.
SPINCO DIVISION
PALO ALTO, CALIFORNIA • 94304

INTERNATIONAL SUBSIDIARIES: GENEVA; MUNICH; GLENROTHES, SCOTLAND; TOKYO; PARIS; CAPETOWN; LONDON; MEXICO CITY

18 November 1966
Vol. 154, No. 3751

SCIENCE

LETTERS Information Exchange Groups To Be Discontinued: *E. A. Confrey*; Qualifying Orals for the Ph.D.: A Test of the Examiners: *M. Hildebrand*; Shrouds Around LSD: *J. C. Pollard*; Fur, Lice, and History: *F. L. Dunn*; Gerontocracy: *M. P. de Garilhe* 843

EDITORIAL The Worlds of Reflection and Action 849

ARTICLES Isotopic Paleotemperatures: *C. Emiliani* 851

Three-Dimensional Map Construction: *G. F. Jenks* and *D. A. Brown* 857

Development of Quantum Electrodynamics: *S. Tomonaga* 864

NEWS AND COMMENT University of Montreal—Center of Ferment; Defense Research—Project Hindsight 868

BOOK REVIEWS Traditions in Anthropology: *R. F. Murphy* 874

The History of Psychiatry, reviewed by *E. H. Ackerknecht*; other reviews by *P. Kotin, H. Linschitz, J. D. Caston, W. L. Stern, P. S. Freier*; New Books; Reprints; Miscellaneous Publications 875

REPORTS Sediment Movement on the Continental Shelf near Washington and Oregon: *M. G. Gross* and *J. L. Nelson* 879

Thyrocalcitonin: Ultracentrifugation in Gradients of Sucrose: *J. L. H. O'Riordan* et al. 885

Pacific Pleistocene Cores: Faunal Analyses and Geochronology: *A. Blackman* and *B. L. K. Somayajulu* 886

Absence of Neutral Alkali Atoms in Rhodizite: *G. Donnay* et al. 889

Beach Cusps: Response to Plateau's Rule?: *P. E. Cloud, Jr.* 890

Ultrasonic Sensitivity: A Tympanal Receptor in the Green Lace Wing *Chrysopa carnea*: *L. E. Miller* and *E. G. MacLeod* 891

Chlorinated Hydrocarbon Pesticides: Degradation by Microbes: *C. I. Chacko, J. L. Lockwood, M. Zabik* 893

Molybdenum Diselenide: Rhombohedral High Pressure–High Temperature Polymorph: *L. C. Towle* et al. 895

SCIENCE is published weekly on Friday and on the fourth Tuesday in November by the American Association for the Advancement of Science, 1515 Massachusetts Ave., N Washington, D.C. 20005. Now combined with **The Scientific Monthly®**. Second-class postage paid at Washington, D.C. Annual subscriptions $8.50; foreign postage, $1.50; Canadian postage, 75¢; single copies, 35¢, except **Guide to Scientific Instruments**, which is School year subscriptions: 9 months, $7, 10 months, $7.50. Provide 4 weeks' notice for change of address, giving new and old address and zip numbers. Send a recei address label. SCIENCE is indexed in the **Reader's Guide to Periodical Literature**.

AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE

Nucleohistone Dissociation by Ganglioside Micelles: *M. H. Meisler* and *R. H. McCluer* 896

Light-Induced Changes in Pineal Hydroxyindole-*O*-Methyltransferase: Abolition by Lateral Hypothalamic Lesions: *J. Axelrod* et al. 898

Subacute Sclerosing Leukoencephalitis: Ultrastructure of Intranuclear and Intracytoplasmic Inclusions: *I. Tellez-Nagel* and *D. H. Harter* 899

Paraproteinemia and Reticulum Cell Sarcoma in an Inbred Mouse Strain: *H. J. Wanebo* et al. 901

Substructure of Certain Cytoplasmic Microtubules: An Electron Microscopic Study: *P. R. Burton* 903

Sweet-Sensitive Protein from Bovine Taste Buds: Isolation and Assay: *F. R. Dastoli* and *S. Price* 905

Parathyroid Hormone in Plasma in Adenomatous Hyperparathyroidism, Uremia, and Bronchogenic Carcinoma: *S. A. Berson* and *R. S. Yalow* 907

Lipolysis in Homogenates of Adipose Tissue: An Inhibitor Found in Fat from Obese Rats: *H. A. Haessler* and *J. D. Crawford* 909

Desert Tortoise *Gopherus agassizii*: Cutaneous Water Loss: *K. Schmidt-Nielsen* and *P. J. Bentley* 911

Nucleotide Formation as a Determinant of 5-Fluorouracil Response in Mouse Leukemias: *D. Kessel, T. C. Hall, I. Wodinsky* 911

Cilia Regeneration in the Sea Urchin Embryo: Evidence for a Pool of Ciliary Proteins: *W. Auclair* and *B. W. Siegel* 913

Comparative Mutagenicity of Two Chemosterilants, Tepa Hempa, in Sperm of *Bracon hebetor: J. Palmquist* and *L. E. LaChance* 915

Release of Coordinated Behavior in Crayfish by Single Central Neurons: *D. Kennedy, W. H. Evoy, J. T. Hanawalt* 917

Technical Comments: Tris(1-aziridinyl)Phosphine Oxide: Caution on Use: *W. Klassen* and *T. H. Chang*; Computer-Plotted Receptive Fields: *H. B. Barlow, W. R. Levick, G. Westheimer; D. N. Spinelli* 920

ASSOCIATION AFFAIRS

Alcoholism: *J. O. Cole* 922

MEETINGS

Czechoslovak Science: *M. Rechcigl, Jr.*; Forthcoming Events 924

COVER

Three-dimensional map showing population density in central Kansas. Such maps can vividly portray physical and statistical surfaces that are difficult to visualize in conventional two-dimensional format. See page 857. [George F. Jenks and Dwight A. Brown, University of Kansas, Lawrence]

introducing
the balanced computer

EAI 640

Some computers emphasize computational speed. Others, flexibility. Still others, low cost. The new EAI 640 offers all three.

The balanced design of the EAI 640 assures high computer performance – in systems or for general purpose computation – at a price you'll find hard to believe.

Where else can you get all these features for under $30,000?

1. 16-bit data word & memory protect
2. 1.65 microsecond complete memory cycle
3. Hardware multiply, divide and square root
4. 4K core memory—expandable to 32K
5. Teletype keyboard/printer
6. Paper tape reader and punch
7. 4 input/output channels
8. 4 interval timer interfaces

The balanced design of the EAI 640 means more computations per dollar.

The EAI 640 is not only a good, general-purpose digital computer, it can also be easily integrated into hybrid or special-purpose systems because of its extremely flexible I/O structure. Or it can be mated with scientific simulation systems, data acquisition/reduction systems, process control, and biomedical systems. It's a truly versatile computer!

And we've balanced the powerful hardware with all the basic software: assembler, FORTRAN, loader, update and debug packages. We're also offering something unique for a machine in this class—the 640 Operations Interpreter, an on-line interactive language system specifically designed for scientists and engineers.

Full supporting services further balance the total system. They include special systems engineering, customer training, maintenance, and applications assistance with your specific problems.

Write for detailed information on its characteristics. Or better yet, contact your EAI representative. We think you'll find the balance is in your favor.

EAI® ELECTRONIC ASSOCIATES, INC.
West Long Branch, New Jersey 07764

New Science Titles

MATHEMATICS FOR SCIENTISTS. *Thor A. Bak, University of Copenhagen, and Jonas Lichtenberg, Royal Danish College of Education.* A text-supplement for undergraduates majoring in the natural sciences. Strengthens understanding and ability so that mathematics can be used effectively as a scientific tool. 512 Pages (1966). Code #430.
Regular Price: $12.50 Cloth.
Prepaid Price: $10.00 Cloth.*

INTRODUCTION TO STRONG INTERACTIONS, *David Park, Williams College.* An elementary and modern account of strong interactions of elementary particles, which provides background for understanding the highly technical literature now being published. 260 Pages (1966). Code #7750 Cloth; #7751 Paper.
Regular Price: $4.95 Paper; $9.00 Cloth.
Prepaid Price: $3.96 Paper; $7.20 Cloth.*

INTERPRETATION OF MASS SPECTRA: AN INTRODUCTION, *Fred W. McLafferty, Purdue University.* A comprehensive introduction to the interpretation of mass spectra, this text assumes no prior knowledge of the subject. Organic Chemistry Spectroscopy Series. 244 Pages (1966). Code #7050 Cloth; #7051 Paper.
Regular Price: $4.95 Paper; $9.00 Cloth.
Prepaid Price: $3.96 Paper; $7.20 Cloth.*

MOLECULAR ASPECTS OF SYMMETRY, *Robin M. Hochstrasser, University of Pennsylvania.* This senior-graduate level text provides, in a single volume, the background, formalism, and application of group theoretical notions as they relate to molecular problems. 369 Pages (1966). Code #4304.
Regular Price: $14.75 Cloth.
Prepaid Price: $11.80 Cloth.

BIOORGANIC MECHANISMS, VOLUMES I AND II, *Thomas C. Bruice, University of California, Santa Barbara, and Stephen J. Benkovic, The Pennsylvania State University.* An extensive, detailed reference work in bioorganic mechanisms for advanced graduate students and researchers. Vol. I, 376 Pages; Vol. II, 427 Pages (1966). Vol. I, Code #1540; Vol. II, Code #1542.
Regular Price: $22.50 Each Volume Cloth.
Prepaid Price: $18.00 Each Volume Cloth.*

ALGEBRES DE LIE SEMI-SIMPLES COMPLEXES, *Jean-Pierre Serre, Collège de France.* A compact presentation in French of the structure of semi-simple complex Lie algebras and their representation theory. 150 Pages (1966). Code #8750 Cloth; #8751 Paper.
Regular Price: $3.95 Paper; $8.00 Cloth.
Prepaid Price: $3.16 Paper; $6.40 Cloth.*

SEMINAIRE BOURBAKI, VOLUMES 1-12. A special reprinting of the Séminaire Bourbaki, for the years 1948-1965. Approx. 300 Pages Each Vol. (1966). Code #1100 (complete set).
Regular Price: $129.00 Cloth (Complete Twelve Volume Set); $12.25 Each Volume
Prepaid Price: $103.20 Cloth (Complete Twelve Volume Set); $9.80 Each Volume.*

RAPPORT SUR LA COHOMOLOGY DES GROUPS, *Serge Lang, Columbia University.* Previously unpublished basic results, in French. For graduate students and mathematicians in homological algebra and number theory. 250 Pages (1966). Code #5808 Cloth; #5809 Paper.
Regular Price: $3.95 Paper; $8.00 Cloth.
Prepaid Price: $3.16 Paper; $6.40 Cloth.*

THE ANALYTIC S MATRIX: A BASIS FOR NUCLEAR DEMOCRACY, *Geoffrey F. Chew, University of California, Berkeley.* A systematic presentation of strong interaction dynamics on the basis of the S Matrix. 115 Pages (1966). Code #1900.
Regular Price: $7.50 Cloth.
Prepaid Price: $6.00 Cloth.*

HOMOLOGY AND FEYNMAN INTEGRALS, *Rudolph C. Hwa, State University of New York at Stony Brook, and Vigdor L. Teplitz, Massachusetts Institute of Technology.* The application of homology theory to the analytic structures of Feynman and unitary integrals in the scattering matrix theory. Mathematical Physics Monograph Series. 250 Pages (1966). Code #4750.
Regular Price: $12.50 Cloth.
Prepaid Price: $10.00 Cloth.*

NON-COMPACT GROUPS IN PARTICLE PHYSICS, *Yutze Chow (editor), University of Wisconsin.* Proceedings of the 1966 Conference, including eleven talks on the applications and possible mathematical extensions of non-compact groups in particle physics. 228 Pages (1966). Code #2200.
Regular Price: $8.50 Cloth.
Prepaid Price: $6.80 Cloth.*

PROBABILITY: A SURVEY OF THE MATHEMATICAL THEORY, *John Lamperti, Darthmouth College.* A brief, general exposition of probability theory, particularly the theory of sums of independent random variables. Mathematics Monograph Series. 152 Pages (December 1966). Code #5670 Cloth; #5671 Paper.
Regular Price: $3.95 Paper; $8.00 Cloth.
Prepaid Price: $3.16 Paper; $6.40 Cloth.*

UNDERSTANDING CHEMISTRY, VOLUMES I-V, *Gordon M. Barrow, Malcolm E. Kenney, Jean D. Lassila, Robert L. Litle, and Warren E. Thompson, Case Institute of Technology.* These new programmed supplements give freshman chemistry students a background in basic chemistry and develop facility in problem-solving. 128 Pages Each Volume (1966). Code #480-484.
Regular Price: Each Volume $1.95 Paper.
Prepaid Price: Each Volume $1.56 Paper.*

MODERN ORGANIC CHEMISTRY, *John D. Roberts, California Institute of Technology, and Marjorie C. Caserio, University of California, Irvine.* This introductory organic chemistry text is a shortened version of the highly successful BASIC PRINCIPLES OF ORGANIC CHEMISTRY. 840 Pages (1966). Code #8336.

INTRODUCTORY DESCRIPTIVE CHEMISTRY: SELECTED NONMETALS, THEIR PROPERTIES AND BEHAVIOR, *Ronald C. Johnson, Emory University.* Detailed study of a few elements (hydrogen, nitrogen, and the halogens) introduces descriptive chemistry to the beginning student. General Chemistry Monograph Series. 156 Pages (December 1966). Code #5050 Cloth; #5051 Paper.
Regular Price: $2.45 Paper; $4.95 Cloth.
Prepaid Price: $1.96 Paper; $3.96 Cloth.*

FOUNDATIONS OF MECHANICS, *Ralph Abraham and J. E. Marsden, Princeton University.* A complete treatment of classical mechanics in the language of modern differential geometry. Mathematical Physics Monograph Series. 400 Pages (March 1967). Code #100.
Regular Price: $15.00 Cloth.
Prepaid Price: $12.00 Cloth.*

LINEAR AND MULTILINEAR ALGEBRA, *Ralph Abraham, Princeton University.* This undergraduate text is intended for a one-semester course in linear algebra for good students. 128 Pages (October 1966). Code #90.
Regular Price: $6.50 Cloth.
Prepaid Price: $5.20 Cloth.*

SET THEORY AND THE CONTINUUM HYPOTHESIS, *Paul J. Cohen, Stanford University.* A detailed exposition of the author's research on the independence of the continuum hypothesis from the axioms of set theory. 160 Pages (October 1966). Code #2326 Cloth; #2327 Paper.
Regular Price: $3.95 Paper; $8.00 Cloth.
Prepaid Price: $3.16 Paper; $6.40 Cloth.*

When ordering these titles, please specify code numbers.

*A DISCOUNT OF 20% OFF THE REGULAR PRICE IS GRANTED ON ALL PREPAID ORDERS.

w. a. benjamin, inc.
ONE PARK AVENUE • NEW YORK

"The System" takes the great ones.

The Hasselblad System has taken more than one thousand pictures in space. A stripped-down, off-the-shelf 500C (80 mm f/2.8 Planar lens) has been part of every manned space flight since 1962. In four years "The System" has never failed the astronauts. (Hasselblad has a way of making amateurs look good... very, very good.)

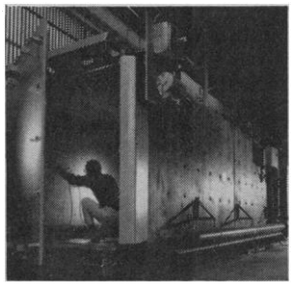
The essential beauty of the Hasselblad is you get what you see. Its through-the-lens 2¼ x 2¼ ground-glass viewing and focusing guarantee precision results. But the Hasselblad System is extraordinarily flexible, too. Hasselblad offers over 100 combinations of interchangeable lenses, camera backs, and accessories that enable you to build as sophisticated a system as you'll ever need. (It was recently named allover best and most versatile in a survey of 500 pros.) Write for catalog: Paillard Incorporated, 1900 Lower Road, Linden, New Jersey 07036.

That's why the great ones take "The System."

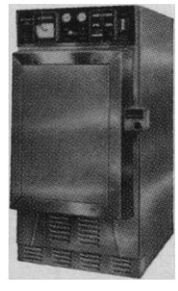
HASSELBLAD

we build sterilizers

Huge ones for industrial applications . . . small ones for lab or clinic use . . and all the sizes in between. Sterilization reliability is a constant factor in every one That's what our reputation is based on. And it's been a good one for over 75 years. If you'd like to write us outlining your sterilization requirements, we'll be glad to give you full details on the Castle Sterilizer to best meet your needs.



Castle Industrial PowerClave Systems. Whatever the application, Castle can engineer an industrial PowerClave sterilization system to your needs in a wide choice of standard or custom sizes and controls. Utilizing the unique power-operated door design proven in medium rectangular hospital sterilizers, Castle can provide any chamber size or configuration desired. And equally varied is the selection of controls available; from manual operation to sophisticated automatic programming for steam, ethylene oxide, or the new air displacement ethylene oxide system.

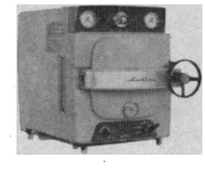


Castle PowerClave Sterilizers. Famous Electrilock Door allows pushbutton operation of the entire sterilization cycle. Consistent locking pressure, assured by power closure mechanism and long-lasting silicone rubber O-ring gasket provides simplicity of operation and safe, efficient processing. The PowerClave sterilizer, a standard in hospital central supply rooms, is available in four high-capacity chamber sizes with a wide choice of controls ranging from manual steam operation to high vacuum steam, ethylene oxide gas, or combination steam/gas cycles. Choice of free-standing cabinet or recessed models.

Castle Straightline and Cylindrical Sterilizers. Designed for a wide variety of laboratory uses, these low-priced units offer four standard control choices. Standard steam controls are available for manual or automatic operation. Laboratory by-pass piping is available for flowing steam processing; inspissation, or fractional sterilization. Multitherm offers finer control of low temperature sterilization. Straightline models are also available with ethylene oxide controls for gas sterilization. Both straightline and cylindrical models are available in a variety of sizes and mountings.

CASTLE AUTOCLAVES

Model 999-C Autoclave. Finest in portable autoclaves. Fits most countertops. Easy-to-operate controls make sterilization routine simple for almost any employee. Big 9" x 16" chamber lets you handle more items per cycle.



Model 7 SpeedClave. Operation is automatic and positive. Just load, close and dial—in 3-4 minutes from a warm start you've reached sterilizing temperatures of 270°F. 14½" x 7½" chamber holds two trays, has room for a third.

WILMOT CASTLE COMPANY

a division of Ritter Pfaudler Corporation

POST OFFICE BOX 629, ROCHESTER, NEW YORK 14602

November, 1966

FISHER PRODUCT REPORT

News about instruments, apparatus and reagent chemicals that make your work quicker, surer, safer and easier.

Smart, simple way to liberate bench-top space: Newest Fisher Isotemp® Oven.

It hangs. On useless wall space to free useful counter space. Out of the way, yet handy. Eliminates stooping and bending. It's a gravity-convection oven with a roomy double-door chamber having a capacity of more than 3 cu ft. Temperature, from 50° C to 200° C, is registered on a dial thermometer. Only 30 minutes to heat to 100° C, 75 minutes to reach 200° C. Heat is maintained within ±2° C. The control thermostat responds to as little as ±0.5° C change in temperature. If something goes amiss, the famous Isotemp "Safety Sentinel" thermostat takes over before any damage can happen. All controls, dials and pilot lights are located on an easy-to-reach, easy-to-see front panel. The new oven operates on 115-volt AC, 50/60-cycle current and costs $365. Our product bulletin gives full details on what we believe you'll find is a smart idea in lab ovens. (a) □

It looks smart, too. It's finished in shell white and contrasting slate gray to harmonize with our new CONTEMPRA™ laboratory furniture . . .

New Fisher CONTEMPRA counter units are 1 inch higher; that's only the beginning of CONTEMPRA comfort and convenience.

Seems that people who work in labs these days are taller. So Fisher makes its counter units 1 inch higher to bring work tops to a more comfortable level. And these taller people spend more time in their labs. So new CONTEMPRA furniture comes in colors. After all, for the long haul, colors are more agreeable than drab gray. Color is practical, too. Designates work areas, codes drawers according to contents. And all-white interiors eliminate the "built-in darkness" of old-style drawers and cabinets. CONTEMPRA modular units readily adapt to any layout or lab requirement, and the unique Tilt-In™ work-top design saves hours of installation time and dollars of installation costs. But you'll want to study all the many CONTEMPRA comfort and convenience features for yourself. Our new CONTEMPRA catalog will soon be off the press; say so, and we'll reserve a copy for you. (b) □

You could almost spell the name on the cap "P-U-R-I-T-Y."

In the world of reagent chemicals, the words "Fisher" and "purity" are practically synonymous. That's because our manufacturing chemists at Fair Lawn, N. J., are a bit obsessed with meeting and exceeding accepted purity standards. For example, take-off points for Fisher *Certified* reagents are the ACS standards. Thus, when it comes to solvents . . . well, there's nothing in Fisher Pesticide Grade Solvents to upset a pesticide residue analysis, and Fisher's 99+ Mol % Solvents for chromatography have less than 1% total impurities. With Fisher *Certified* buffer solutions, you can rely on guaranteed pH. The low metallic content of Fisher's Rexyn™ ion exchangers is assured by atomic absorption testing procedures; and if you're also using atomic absorption, there are Fisher's *Certified*, dilute-and-use, metal-reference solutions. Since we're obsessed with purity, you needn't be. Just order Fisher reagents from your nearest Fisher branch with impunity. F-562

Photo Courtesy Pittsburgh Plate Glass, Fiber Glass Research Laboratory

What would you like?

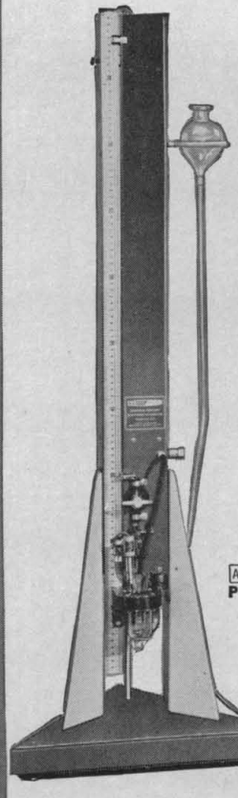
Just check your special interest and send this page, along with your name and address, to Fisher Scientific Company, 139 Fisher Building, Pittsburgh, Pa. 15219.

FISHER SCIENTIFIC CO.

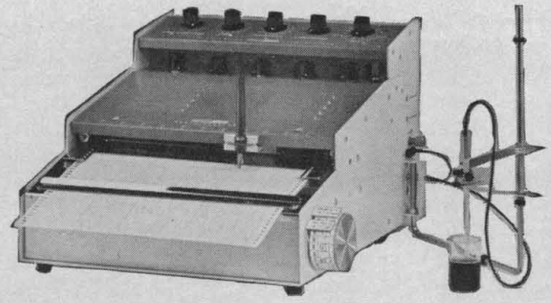
Instruments, Apparatus, Furniture and Chemicals for Laboratories

Complete stocks in all these locations: Atlanta • Boston • Chicago • Cleveland • Houston • New York Philadelphia • Pittsburgh • St. Louis • Union, N. J. • Washington • Edmonton • Montreal • Toronto • Vancouver

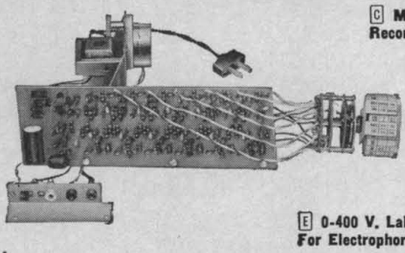
Heath Sets New Value Standards For Laboratory Instrumentation



[B] Professional DC Scope With Triggered Sweep

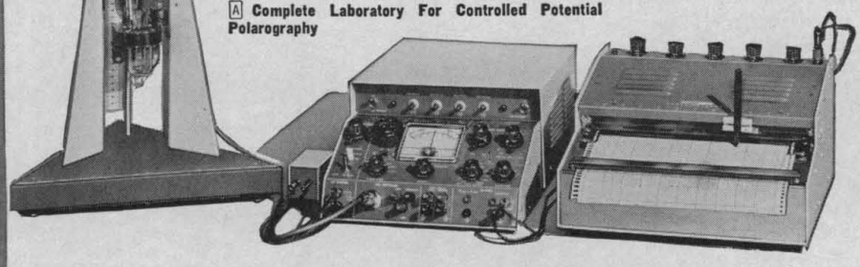


[C] Multi-Speed pH Meter/pH Recorder—Accurate To 0.005 pH



[D] 21-Speed, Multi-Speed Chart Drive Unit For Heath Servo-Chart Recorders. 12″/min. to ½″/hour.

[A] Complete Laboratory For Controlled Potential Polarography



[E] 0-400 V. Laboratory Power Supply—Excellent For Electrophorisis!

[A] **Complete Laboratory For Controlled Potential Polarography . . .** consisting of a highly versatile Dropping Mercury Electrode Apparatus, the Heath/Polarography Module and Operational Amplifier for producing a precision controlled sweep potential, and the Heath EUW-20A Servo Chart/Recorder for strip-chart display of the readout current. The Heath Polarography Laboratory is capable of analysis of ion concentrations as low as 10^{-7} moles . . . It is highly capable of oxygen analysis with most quality oxygen electrodes.

[B] **Professional DC Oscilloscope . . .** features triggered sweep and DC to 8 mc bandwidth. Sensitivity: 0.05 v/cm AC or DC. Rise time: 0.04 microseconds. 3% calibrated vertical attenuator and calibrated time base: 0.5 sec/cm to 1 microsecond/cm. 5x sweep magnifier. Forced air ventilation. Delay line on vertical signal for highly linear presentation of fast-rise signals. Electronically regulated power supply. This instrument truly sets new value standards for laboratory oscilloscopes!

[C] **pH Meter/pH Recorder With Multi-Speed Chart Drive.** A 10″ linear meter scale accurate to 0.005 pH on a span of 1 pH, adjustable pH spans of 14, 10, 5, 2, and 1, plus 21-speed chart drive of 12 inches per minute to 0.5 inches per hour make this the most versatile pH Meter/Recorder on the market today!

[D] **21-Speed, Multi-Speed Chart Drive Unit . . .** for the Heath EUW-20A Servo-Chart Recorder and pH adaptation of the Heath recorder. This unit provides chart speeds from 12 inches per minute to 0.5 inches per hour which are as accurate as the 60 cps frequency of the AC line. Auxiliary input allows chart speed to be synchronized to external events. To fully realize its capabilities, send for the free brochure describing this unit.

[E] **Laboratory Power Supply . . .** 0 to 400 volts, 100 milliamperes max. Excellent for electrophorisis! . . . Or for general laboratory requirements. The 0 to -100 volts at 1 ma. bias & 6.3 VAC at 4 amps filament supply add to the versatility of this kit or factory-assembled instrument.

ALL MODELS FACTORY ASSEMBLED

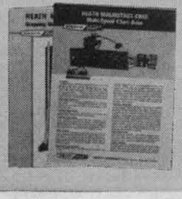
[A] **EUW-402 Polarography Laboratory**.....**$599.00**
EUW-401 Polarography System (does not include Dropping Mercury Electrode Apparatus).....**$480.00**
EUA-19-2 Polarography Module only.....**$185.00**
EUW-19A Operational Amplifier only.....**$135.00**
EUW-20A Servo-Chart Recorder only.....**$199.00**

[B] **Kit IO-14 DC Oscilloscope**.....**$299.00**
Wired IOW-14 DC Oscilloscope.....**$399.00**

[C] **EUW-301M pH Recording Electrometer** with Multi-Speed Chart Drive.....**$369.00**
EUW-301 pH Recording Electrometer with single-speed (2″/min) chart drive.....**$280.00**

[D] **EUA-20-26 Multi-Speed Chart Drive**.....**$ 89.00**
EUW-20M Heath Servo-Chart Recorder (10, 25, 50, 100, 250 mv full scale) with Multi-Speed Chart Drive installed.....**$289.00**

[E] **Kit IP-32 Laboratory Power Supply**.....**$ 56.95**
Wired IPW-32 Laboratory Power Supply.....**$ 84.95**



FREE DESCRIPTIVE BROCHURES!
Fully describe these and other Heath instruments for the laboratory and classroom.

HEATH

HEATH COMPANY, Dept. 520-21
Benton Harbor, Michigan 49022

☐ Please send more information on _____ (product)

Name _____

Address _____

City _____ State _____ Zip _____

Prices & Specifications subject to change without notice. EK-206

Disinfect, Deodorize and Clean animal cages with Mikro-Spray as easily as you now hose them down!

A unique device for the in-place cleaning of animal cages and animal rooms, the MIKRO-SPRAY system injects detergent germicides into your waterline at a rate exactly proportional to the flow of water.

Any surface or object that can be washed with water can be cleaned, disinfected and deodorized with the MIKRO-SPRAY just as easily and far more effectively. In fact, MIKRO-SPRAY hooks right into your existing waterline system. It is available in both wall-hung and portable models, which dispense one of two powerful detergent germicides (whichever one is best suited for your needs) in a rate exactly proportional to your flow of water. And gives you your safest, most sanitary, in-place cage cleaning ever, with no mopping or rinsing needed!

The first of these two detergent germicides, MIKRO-QUAT, is a quaternary ammonium detergent germicide. Completely harmless to animals, it disinfects and deodorizes for a full twenty-four hours. It is recommended for normal in-place cage cleaning requirements.

The second, MIKRO KLENE, is an iodophor detergent germicide that gives you the ultimate in disinfection results. It is recommended for use in cages where animals are being used for experimentation with dangerous infectious diseases and a fast, positive bacterial kill is required. Like MIKRO-QUAT, it is completely harmless to animals.

Use of the MIKRO-SPRAY system, of course, is not limited to just in-place cage cleaning. It is equally effective in disinfecting and deodorizing cage racks, walls and floors of the cage room and for general clean-up duties in the incinerator and waste disposal room. Send coupon today for new manual on environmental sanitation, including complete details on application of MIKRO-SPRAY system.

ECONOMICS LABORATORY, INC.

Economics Laboratory, Inc., Dept. 204-L
250 Park Avenue, N.Y., N.Y. 10017

Please send me full details on the disinfecting, deodorizing, and cost-cutting effects of the MIKRO-SPRAY in-place cage cleaning system.

NAME_____ TITLE_____

ORGANIZATION_____

ADDRESS_____

CITY_____ STATE_____ ZIP_____

RECENT findings

RESEARCH LABORATORIES

Ford

Ionic conduction study leads to new concept in energy conversion device at Ford Motor Company.

Heart of the new sodium-sulfur battery recently announced by Ford Motor Company is a highly ionically conducting poly-crystalline ceramic, based on the compound beta alumina $Na_2O \cdot 11Al_2O_3$. This compound exhibits unusual two-dimensional diffusion and ion exchange properties.

A summary of the ion exchange properties of beta alumina when in equilibrium with mixtures of molten nitrates of monovalent cations is shown in Figure 1. The symbol X designates the cation shown with each curve.

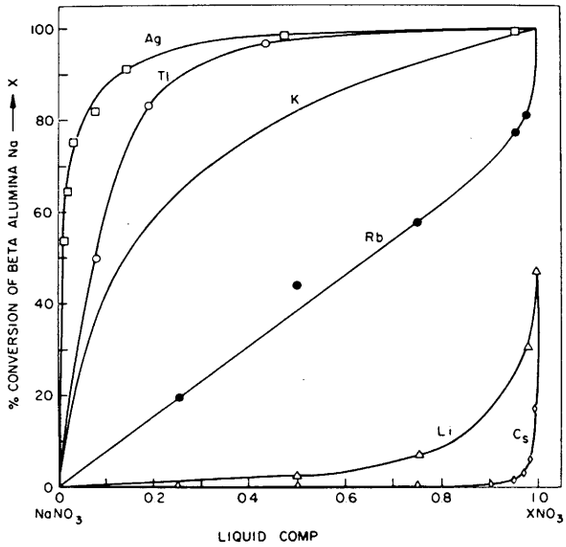


Fig. 1 Equilibria between beta alumina and various bimary nitrate melts containing $NaNO_3$ and another meltal nitrate at 300-350°C.

No anions of the molten salt enter the solid beta alumina phase. The equilibrium is unfavorable with cesium because the cesium ion is larger than the volume available at the cation location in the beta alumina, and is unfavorable for the lithium ion because this small ion can coordinate closer to the anions of melt than of the beta alumina.

In spite of the fact that beta alumina is a robust material with a melting point approaching 2000°C and a demonstrated resistance to molten salts, the diffusion rate of sodium ions in this material is as fast as the best solid inorganic ionic conductors known. For example, when a 2mm diameter single crystal of this material is placed in molten sodium nitrate at 300°C, it will exchange one half of its sodium ions with the sodium ions of the melt in 60 seconds. In more scientific terms, the diffusion coefficient for the sodium ion in the crystal is $\sim 1 \times 10^{-5} cm^2/sec$ at 300°C and $4.0 \times 10^{-7} cm^2/sec$ at 25°C.

The two-dimensional character of the diffusion is strikingly shown in Figure 2. The sodium ions of this thin single crystal of beta alumina were originally completely exchanged with the lithium isotope Li^6.

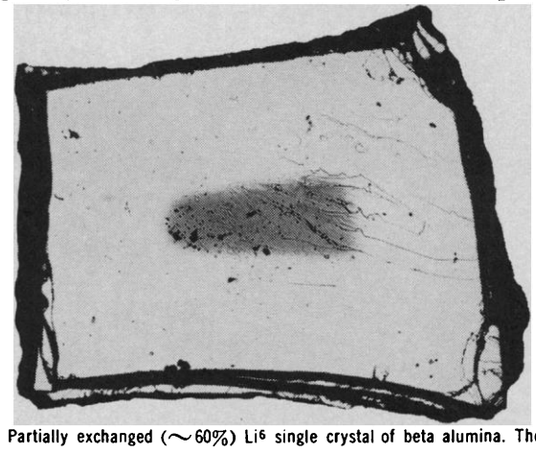


Fig. 2 Partially exchanged ($\sim$60%) Li^6 single crystal of beta alumina. The area of high Li^6 concentration has become dark under neutron irradiation ($\sim 10^{13}$ neutrons per cm^2 for 1 hour).

The crystal was then exchanged for a short period of time with molten Li^7NO_3 which resulted in a replacement of part of the Li^6 atoms with Li^7 atoms. The crystal was then irradiated with neutrons in the Phoenix reactor of the University of Michigan which caused the area containing a large amount of Li^6 atoms to turn dark in color. As can be seen in the photograph, the center portion contains the unexchanged Li^6. This is a direct visual indication that the exchange is two dimensional in the plane of this thin crystal.

Science is always interested in findings that indicate a potentially new form of energy conversion. The development of this high-energy secondary battery system is a significant step in that direction.

PROBING DEEPER FOR BETTER IDEAS

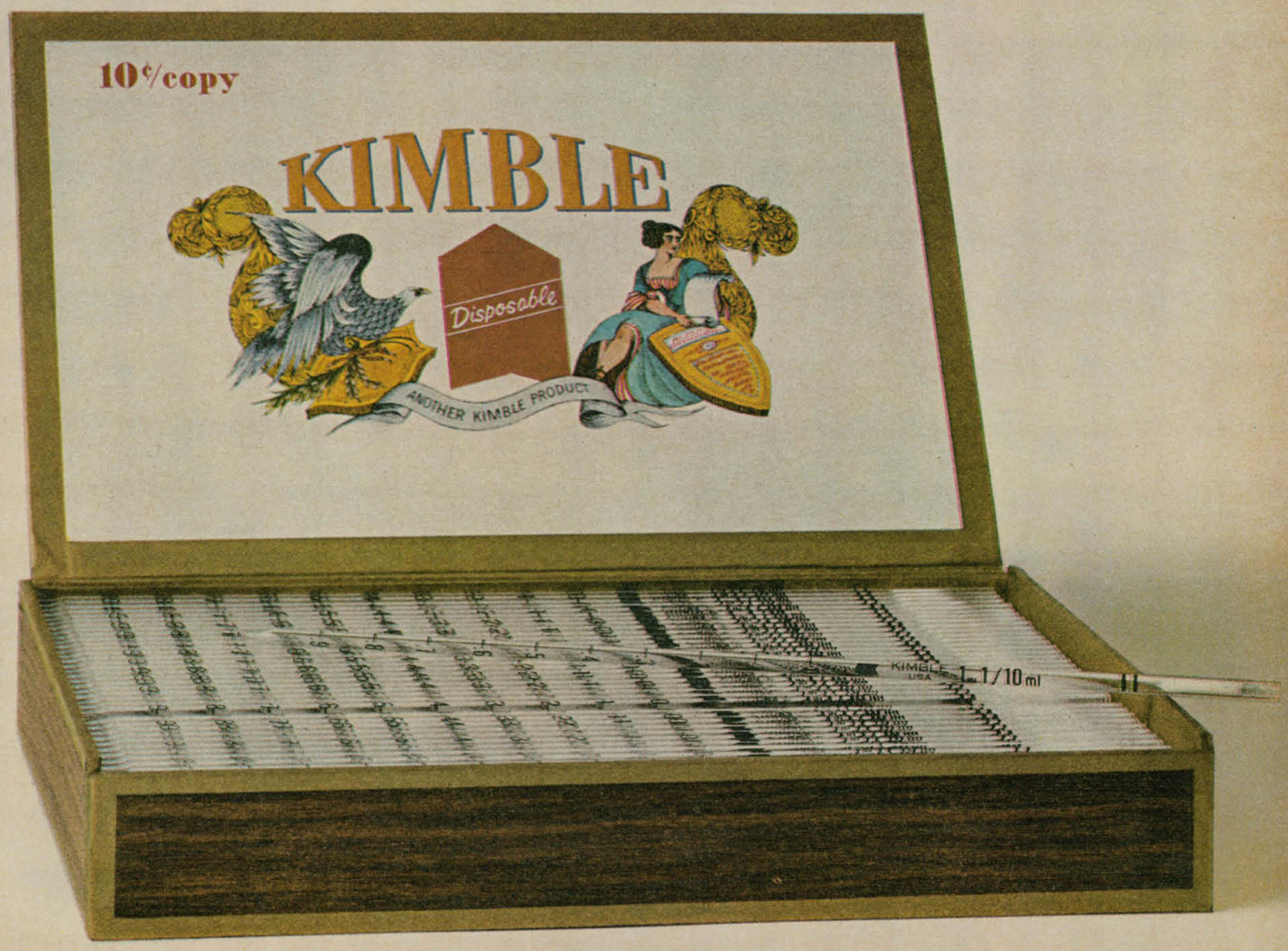
Ford

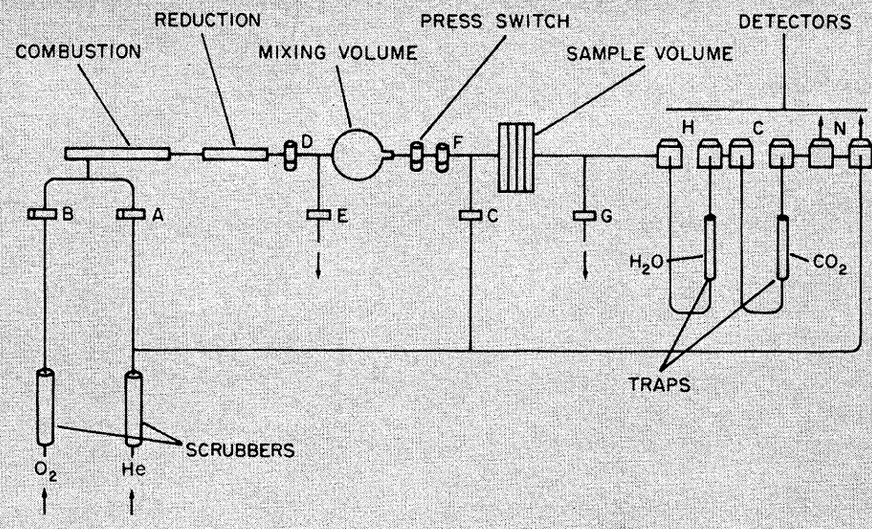
What this country needs is a good 10-cent pipet!

Could a 10-cent pipet do the same job as a conventional pipet? This new Kimble *disposable* pipet can...for even less than a dime! Made of fine borosilicate glass, it's clean, cotton-plugged, sterile, ready to use. Features a rugged, uniform tip for consistent delivery. Same accuracy as a regular pipet: ±2%. The right length for handling ease; the right price for disposable convenience, and new packaging for added utility. Compare! Write for your complimentary sample and complete information. Address below, c/o Marketing Services Department.

OWENS-ILLINOIS

maker of Kimble Products
Toledo, Ohio 43601





performance-proved instruments for ELEMENTAL ANALYSIS

FLOW SCHEMATIC

Helium is the driving gas and pure O_2 is used for combustion. The combustion and reduction furnaces, contained in one housing, are independently heated to 900°C and 650°C respectively. Halogens and sulfur are removed by silver; other "scrubbing" materials may be added as required. Excess oxygen is removed and oxides of nitrogen are converted to nitrogen in the reduction furnace. The combustion gases attain equilibrium in a glass mixing volume. The sample volume is a coil of tubing 12 feet long, allowing ample time for the detectors to measure the steady-state gas concentration. Chemical traps are used to remove CO_2 and H_2O between thermal conductivity cells. The nitrogen is measured by reference to pure helium in the third pair of thermal conductivity cells. Each detector's output is electrically independent and is recorded separately.

MICROCHEMISTS– NOW DO C-H-N DETERMINATIONS AUTOMATICALLY

With the Perkin-Elmer Model 240 CHN Analyzer you can simultaneously determine carbon, hydrogen and nitrogen to within ±0.3% of theoretical value. The Model 240 is the only instrument which retains the proven Pregl-Dumas technique, but enhances it by making it practically automatic.

The instrument combusts samples in the convenient 1 to 3 milligram range in pure oxygen. Total analysis time is 13 minutes. A unique flow system is used, which permits *steady-state* measurements of component concentrations. Output signals are constant voltages, with a 30-second reading taken for each element; there is no need to integrate the area under a voltage peak. The analyzer automatically scans each detector and records the signals on the chart. All electronics are solid-state, and the analytical section is contained in a thermostated environment.

With reasonable care in weighing the microsample, you can get a recorded C-H-N analysis from the Model 240 which is equal—or better—in accuracy than one obtained by conventional involved procedures.

For a reprint of papers describing the instrument and its applications in microanalysis, write to: Instrument Division, Perkin-Elmer Corporation, 723 Main Avenue, Norwalk, Connecticut.

The plane leaves at 5:04 PM (CST).

Just in time for radiochemical orders phoned in to us by 3:30 PM (CST).

Distance: Between Nuclear-Chicago's Radiochemical Division and O'Hare International Airport—one mile.

Elapsed time: Between you and our radiochemical consultation and ordering service—nothing flat (direct/collect phone no. 312 296-1055).

Result: The radiochemical order you give us by 3:30 PM is on its way, by air, the same day.

But don't get the idea that dealing with us is all that coldly, mechanically impersonal. When speed in getting a radiochemical to you is important, speed is what you get.

Sometimes, though, you want to talk things over with someone who speaks your language. Someone who can answer your questions about the stability and purity of our radiochemicals, as well as their selection.

Again the number to call is our number: 312 296-1055.

Talk to one of our radiochemical specialists directly. Ask him anything about anything in our radiochemical line. Labelled compounds. Standards. Radionuclides. Reference sources. High-intensity sources. Primary radioisotopes. Liquid scintillation chemicals, standards, supplies, and accessories. Custom-prepared compounds.

If our radiochemical specialist thinks it'll help you and your work, he'll mail to you the latest Nuclear-Chicago radiochemical bulletins and schedules. Or he'll forward a data sheet on a specific compound. Also available is bibliographical and reference literature of interest to almost everyone who uses radiochemicals.

Now you know what to do the next time you need a radiochemical fast. And who to talk to when you need some straight answers. Us—Nuclear-Chicago's Radiochemical Division. 296-1055, area code 312. Call collect.

NUC:G-6-853

NUCLEAR-CHICAGO CORPORATION

349 East Howard Avenue, Des Plaines, Illinois 60018, U.S.A. / Donker Curtiusstraat 7, Amsterdam W, The Netherlands.

Workhorse

Meet the toughest of high-speed refrigerated centrifuges. Our B-20. Durable. Dependable. The strong, silent type. With its flexible belt-drive it will deliver 46,300 g with hardly a murmur. Or swing 4x250 ml in a bucket head. You won't find a comparable centrifuge that'll do all that for you. What's more the B-20 has a unique Turbo-Cover (patent pending) that stabilizes the load and provides remarkable temperature control. And it offers programmed, one-knob automation. In short, the B-20 is in a class by itself. So if you're in the market for a workhorse that can shoulder more than its share of the workload, drop us a line. We'd like to tell you more about ours. Your IEC dealer has the B-20 in stock. Send for Bulletin B-20.

IEC **INTERNATIONAL EQUIPMENT CO.**

300 SECOND AVENUE • NEEDHAM HEIGHTS, MASSACHUSETTS 02194.

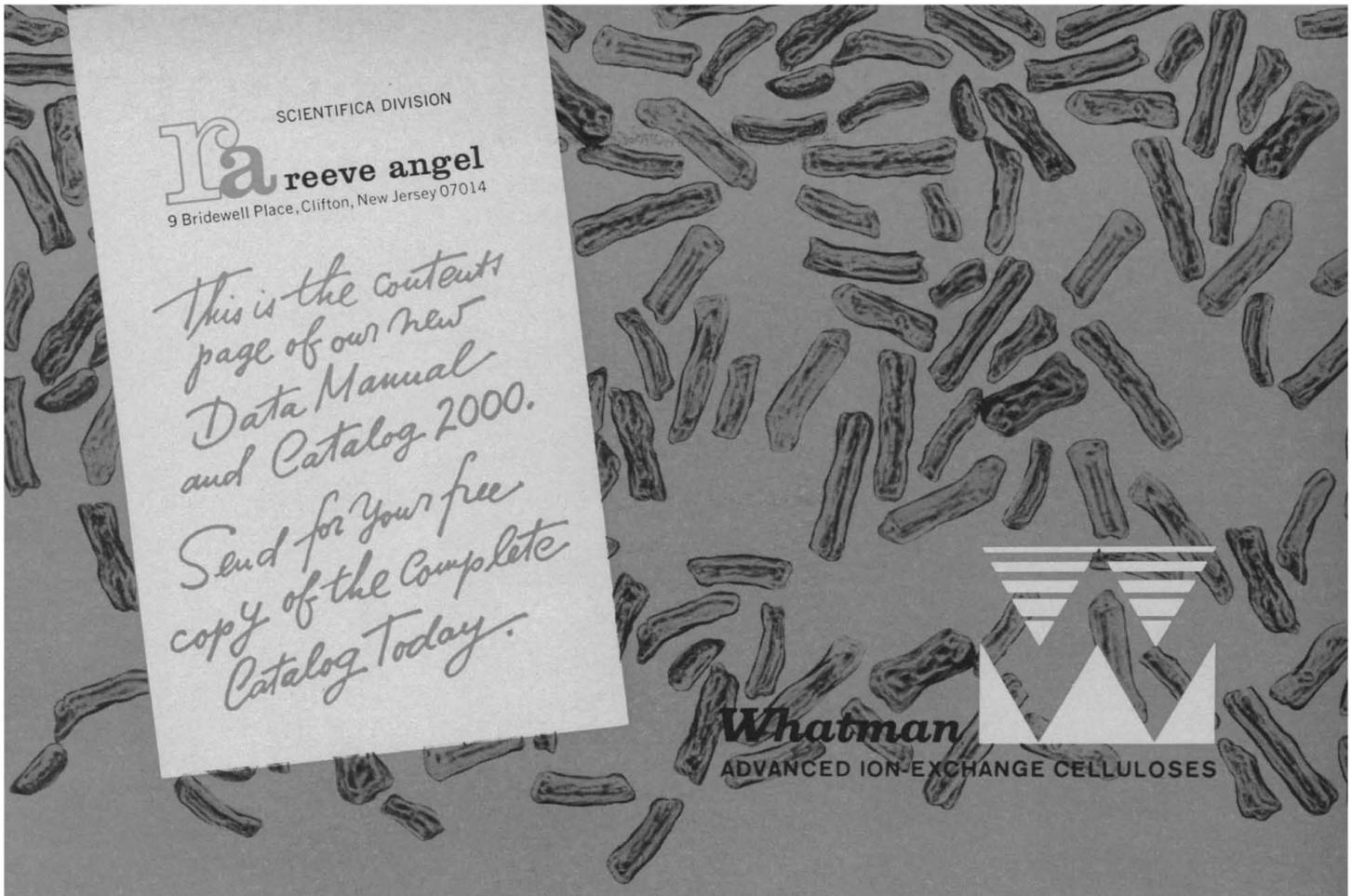


Table of Contents

General Information 2
- Advanced Ion Exchange Celluloses 3
- Microgranular 3
  - Table of Properties 4
- Fibrous 3
  - Table of Properties 5

Composition 6
- Advanced Ion Exchange Celluloses 6
- Microgranular 6
  - Microstructure 6
- Fibrous 7
  - Microstructure 7

Properties 8
- Particle Size and Form 8
- Capacity and Kinetics of Exchange 10
- Water Regain 12
- Column Bed Volumes 12
- Column Flow Rates 13
- Precycling 13

Choice of Physical Form 14
- Column Separations 14
  - Microgranular 14
  - Fibrous 14
- Batchwise Operations 14
  - Microgranular 14

Choice of Exchanger Type 16

Choice of Buffer 16

Laboratory Methods 18
- General Handling 18
  - Storage 18
  - Usage 18
- Exchanger Preparation 18
  - Precycling 18
  - Equilibration 18
  - Removal of Fines 19
  - Slurry Preparation and Degassing 19
- Column Separations 19
  - Pouring 19
    - Microgranular Series 19
    - Fibrous Series 19
  - Column Preparation 20
  - Sample Introduction 20
- Batchwise Techniques 20
- Re-Use 20

Applications 21

Ordering Information 24

Technical Bulletins and Catalogs 26

Objective aperture shown several times actual size.

Objective-Aperture Contamination Gone... Image Contrast Increased

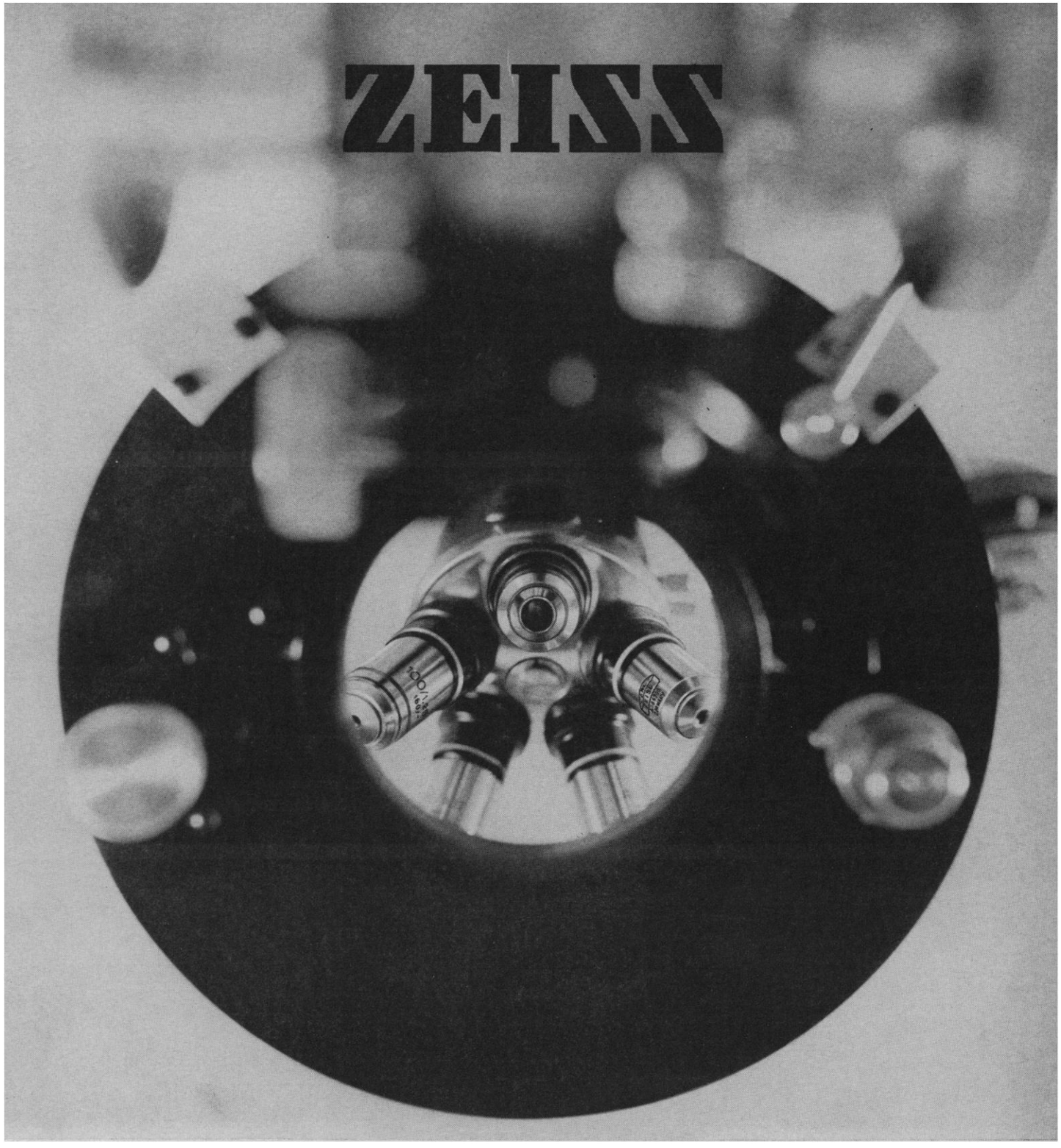
The reason?... controlled heat, applied to the objective aperture so that contaminants refuse to gather on the aperture—at all beam intensities. With such contamination eliminated, the diameter of the hole can be reduced to realize an *increase in image contrast*. In addition, the aperture can be moved in or out of a fully-saturated beam, repeatedly, without contamination.

The *permanent* objective aperture is standard equipment on the RCA Type EMU-4 Microscope and is but one of the many innovations that are "standard" for the *new look in electron microscopes:* transistorized, modularized electronics; an exclusive selected-area diffraction facility; provision for instrument revision and expansion; high-capacity, minimum-backstreaming diffusion pump and many others.

For more information, write RCA Scientific Instruments, Building 15-5, Camden, N. J. 08102. In Canada: RCA-Victor Co. Ltd., Montreal.

Nationwide service available through RCA Service Company. Offices in major cities.

The Most Trusted Name in Electronics



What's in a Name?

Objectives of unsurpassed quality, if the name is ZEISS.

ZEISS offers the widest range of precision objectives. 132 of them. From 1/.04 to 100/1.32. Many available exclusively from ZEISS.

For instance, only ZEISS offers 4x, 10x and 25x dry Planapochromats which provide unequalled sharpness across the entire field. Only ZEISS offers a 100x Planapochromat for phase-contrast work. Only ZEISS offers Ultrafluars which are corrected across the entire visible spectrum—and beyond, for exploring the invisible worlds of the ultraviolet microcosm.

All ZEISS objectives are parfocalized (except the 1x Planachromat). And there is no such thing as a "selected" ZEISS objective, since each must meet the precision standards which have made the name ZEISS a synonym for quality for more than a hundred years.

For complete information about objectives for your needs, write Carl Zeiss, Inc., Dept. sc, 444 Fifth Avenue, New York, N.Y. 10018. In Canada: 14 Overlea Blvd., Toronto. Other offices in Atlanta, Chicago, Denver, Los Angeles, San Francisco, Seattle, Washington D. C., Boston, Montreal, Winnipeg and Vancouver.

FROM PAR Detection, Measurement or Comparison of Noisy Signals

New Signal Correlator

PERFORMS AUTO- OR CROSSCORRELATIONS IN REAL TIME

CORRELATION FUNCTION COMPUTED FOR 100 DELAY POINTS SIMULTANEOUSLY

The PAR Model 100 Signal Correlator, a general purpose, high accuracy instrument of wide dynamic and delay range, computes the auto- or cross-correlation function of input signals and makes them available for continuous display. This system computes 100 points of the correlation function over total spans from 100 microseconds to 1 second. It operates by simultaneously multiplying one input signal by 100 separate delayed replicas of the second input signal. The resulting 100 products are individually averaged and stored in analog memory elements. Readout, which may be performed continuously as the correlation function is being computed, is accomplished by scanning the memory bank at a rate consistent with the speed of the external readout device, e.g., an oscilloscope or x-y recorder.

Correlation analysis — an extremely powerful signal processing technique in many areas of science and engineering — has heretofore been neglected, largely due to a lack of availability of suitable equipment. The PAR Model 100 Signal Correlator will be useful in such diverse fields as aero- and hydrodynamics, plasma physics, vibration analysis, radio astronomy, radar, lasers, medical physics and geophysics.

PAR Model 100—
Hundred Point Time Delay Correlator
SPECIFICATIONS IN BRIEF:

Total Delay Range: 100 μSec to 1 Sec in 1, 2, 5 sequence.

Input Signal Levels: Peak-to-peak signals of 0.4 volts to 200 volts are accommodated without overload in each channel.

Correlator Gain Factor: At gain of 1 in each channel, 1 volt into each input will give 1 volt of correlated output. Gain for each channel is .01 to 5, in 1, 2, 5 sequence.

Noise and Dynamic Range: Base line noise with no signals, 10^{-3} volts peak-to-peak. Maximum correlated output, 3.5 volts.

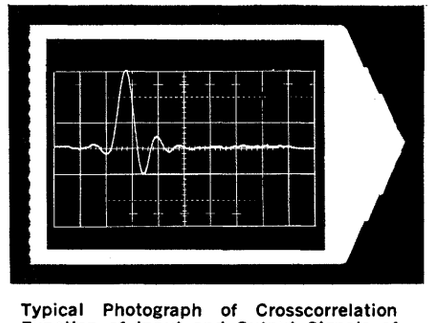
Frequency Response and Resolution: Channel amplifiers flat to 1 megacycle. Resolution: 100 sampling points on output function.

Averaging Time - Constant: Nominally 20 seconds: May be changed to any value from 0.1 to 100 seconds.

Accuracy: Better than 1%.

Readout: 0-3.5 volts at sweep rates of 20 per Sec, 1 per 10 Sec, 1 per 50 Sec.

Price: Approx. **$8500.00**



Typical Photograph of Crosscorrelation Function of Input and Output Signals of Complex Passive Network Driven by White Noise.

For more information call (609) 924-6835 or write Princeton Applied Research Corp., Dept. G, P.O. Box 565, Princeton, N. J. 08540.

PRINCETON APPLIED RESEARCH CORP.

If the examiner asks only questions jotted down in advance and allows the candidate to talk himself out in reply, then the exam might better have been written. Should the candidate either flounder or quickly demonstrate mastery, it may be best to probe elsewhere by politely interrupting with a different question. If one long struggle uses up most of the time allotted to a field, then, to compensate, short answers can be requested to a series of short questions. It is important, particularly with a marginal performance, that enough questions be asked to provide adequate sampling. If one examiner explores methods, or history, or relevant literature, another can turn to a different approach. Let us take advantage of the adaptability of the oral examination for making the most of time, achieving balance, finding strength and weakness, and assuring validity of the final judgment.

Some examiners allow candidates to pad answers against the chill of fresh questions. Some permit near answers to count as hits. Some feed answers or ask questions that can hardly be missed. ("What have you read lately? Tell us about it.") Some can be counted on to ask certain questions well known to the underground. Others require only an acquaintance with notes of their own courses. A difficult candidate for all examiners is the one who thinks and speaks slowly; he may require a second sitting to cover the material adequately. Let us maintain reasonable control of the pace, precision, and uniqueness of each examination, refusing to let gamesmanship substitute for scholarship.

Most examiners pass the test, many with distinction, yet low marks are too frequent to ignore. Let us make the effort to do our best.

MILTON HILDEBRAND

Department of Zoology, University of California, Davis, 95616

Shrouds Around LSD

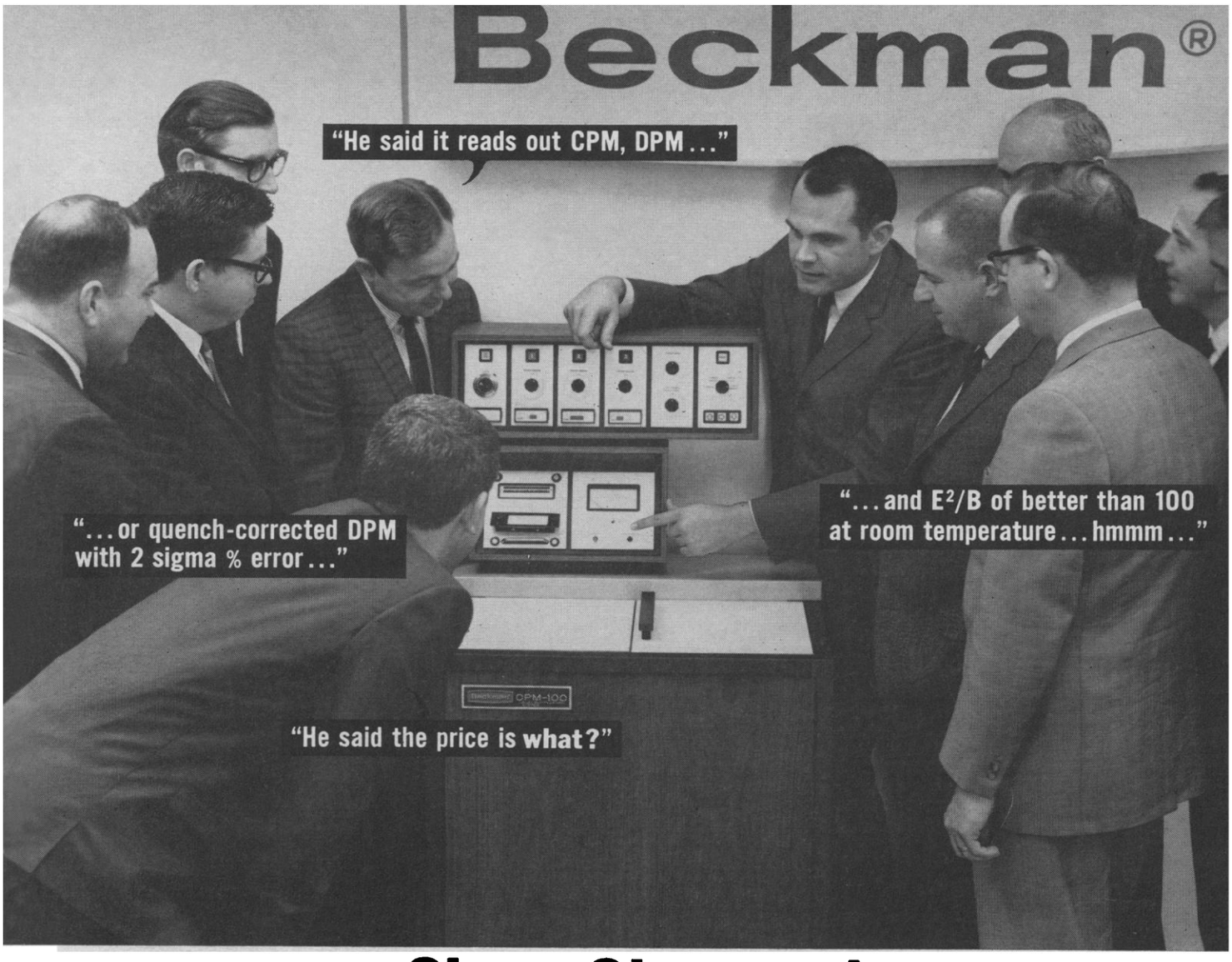
After my summer of one-way correspondence and long-distance calls, Dahlberg's letter (30 Sept.) regarding continued research with LSD was encouraging. Unfortunately, I have not been so lucky (for luck it must be, the logic eludes me), in obtaining LSD for research purposes. Last spring I designed an experiment to measure objective behavioral and performance changes under the influence of LSD-25. With LSD fantasies running rampant, it seemed that a few facts would be useful. I hired a research assistant (on nonfederal funds) and we were about to start the project. Then came the send-it(LSD)-all-back-to-Sandoz letter. I objected, they commiserated, I sent it back. With the LSD went my approval to use the drug since this had been filed previously by Sandoz. They indicated that I should write to NIMH. Delayed but not discouraged, since I had formerly received an NIMH grant for LSD research from which resulted a book and several papers, I sent the proposal to them. I asked for approval and a small supply of the drug but *not* for funds. (Was this my error?) No reply for 1 month so I phoned—of course a committee had to meet, a stupid oversight on my part. It met and approved the proposal if I would change one step. Gladly, for it was a wise recommendation. Another month went by, no letter, no drug, so I phoned again. The committee had to meet again. (Will I never learn?) Eventually, upon phoning again, I learned that I did have the NIMH Committee's approval but I had to have someone in the Food and Drug Administration approve the distribution of the drug. I had spoken to only four different individuals at NIMH, but after speaking to five at the Food and Drug Administration, I despaired and hoped that my correspondence would eventually filter through to the appropriate person. The summer passed, the research assistant worked on his thesis, and I ran up a phone bill.

Contrary to Dahlberg's experience, the small amount of LSD research that we have undertaken in this research center has not gained me the reputation of being a "kook" but I have never been too sensitive to the criticisms of others whose pursuit of a quiet life is an excuse for being ineffectual. I have had the encouragement of the director of this institute and the chairman of the department of psychiatry, notwithstanding the obvious jeopardy of research with such a controversial agent as this.

I wish I could end this letter with the same phrase that Dahlberg used—that the work on LSD is proceeding as planned. Here it is not.

JOHN C. POLLARD

Department of Psychiatry, University of Michigan, Ann Arbor 48104



Show-Stoppers!

The new Beckman CPM-100™ and DPM-100™ Liquid Scintillation Systems literally stopped the show at a recent scientific meeting. And for good reason. These new systems electronically compute data and provide readout in CPM, DPM, or quench-corrected DPM with 2 sigma % error. And of equal significance, they now make it possible to achieve uncompromised performance and data quality from a room-temperature system with 100-sample capacity.

These three-channel systems attain an E^2/B of better than 100 with no refrigeration. The degree of quenching is accurately determined by external-ratio standardization, and the entire system is easily calibrated with the adjustment of only one control. They also feature a Command Tower Programmer™ which allows the personal selection of samples and channels of interest. The CPM-100 and DPM-100 Spectrometers represent a major advancement in the field of liquid scintillation analysis. Yet, the CPM-100 is priced at $7,995.00† and the DPM-100 is only $8,995.00†.

For more information on these advanced liquid scintillation counters, contact your Beckman Sales Representative today about a demonstration, or write for Data File LLS-266-Sp.

†Prices are stated in U.S. funds and are subject to change without notice.

Beckman INSTRUMENTS, INC.
SCIENTIFIC AND PROCESS INSTRUMENTS DIVISION
FULLERTON, CALIFORNIA • 92634

INTERNATIONAL SUBSIDIARIES: GENEVA; MUNICH; GLENROTHES, SCOTLAND; TOKYO; PARIS; CAPETOWN; LONDON; MEXICO CITY

Fur, Lice, and History

In his contribution to the discussion on the evolution of hairlessness in man, Olson (Letters, 22 July, p. 364) suggests that disease-causing agents transmitted by ectoparasitic vectors may have selectively "wiped out the entire fur-bearing segment of the human population" because "the nonhairy members of the population probably took great pains to rid themselves" of body lice and ticks (the latter, by the way, are not insects) while their "furry cousins probably never could delouse or detick themselves." There are several lines of evidence derived from studies of modern hunter-gatherers and nonhuman primates which, in my opinion, make Olson's imaginative proposal untenable or at least improbable.

There is, first, the matter of grooming. Modern fur-bearing primates, with few exceptions (for example, the spider monkeys), are efficient delousers and detickers. Records for fleas, lice, and ticks on apes and monkeys, regardless of their state of arboreal or terrestrial adaptation, are rare for most species and extremely rare for species that indulge in mutual grooming activities. Fur-bearing primates are no less adept than hairless men in removing ectoparasitic visitors. Presumably this was also true for early, hairy hominids.

Second, man may actually have increased his ectoparasite burden, and the potential for transmission of disease-causing agents, by providing—particularly for lice—a rich array of clothing microhabitats as a substitute for body hair, and by providing—for other arthropod parasites which do not remain on the mammalian host continuously—an elaborate nest (the shelter, cave, or house). Early, presumably hairy, hominids probably harbored one variety of the louse, *Pediculus humanus*, which roamed through the hair forests of all body surfaces. Today man harbors two varieties, one adapted particularly to life on the scalp, the other to the body and to clothing where the eggs are deposited.

Third, all available data suggest that vector-borne epidemic diseases capable of "wiping out" segments of human populations must have been exceedingly rare prior to the development of agriculture and urban ways of life, with consequent increases in human population density and disruption of the natural environment. Hunt-

er-gatherer population units are necessarily small and geographically dispersed; furthermore, these populations function (or have until recently) in relatively stable ecosystems. Vectors and infectious and parasitic agents of disease are also components of such systems. In the stable situation, transmission of autochthonous agents, especially by ectoparasites, is sporadic and focal—the diseases are endemic. New human susceptibles, appearing on the scene infrequently as newborns or migrants, will die sporadically, or survive as relative or absolute immunes. Epidemics undoubtedly occurred among the early hominids, as they do (rarely) among the modern hunter-gatherers and primates in undisturbed settings, but the majority of these epidemics must have been caused by agents transmitted by unspecialized, direct, respiratory and contaminative routes. Only agents of this kind can readily be introduced from outside into a stable ecosystem and a wholly susceptible population. Epidemics caused by vector-borne agents must have been rare, as is true among the modern primates and hunter-gatherers; and within the vector-borne group, epidemics due to transmission by ectoparasites must have been extremely rare.

FREDERICK L. DUNN
Institute for Medical Research, University of California ICMRT Program, Kuala Lumpur, Malaysia

Gerontocracy

In *Science* (12 Aug. p. 723) it is reported, as it was too in the daily press, that the Fermi award for 1966 will be shared by three venerable nuclear scientists. It is not to belittle the immense merit of these scientists, but one cannot help being struck by the age of the happy laureates: respectively 87, 87, and 64, average: 79. I feel it is a pity to distribute such important awards to people already covered with honor, respect, and consideration when so many valuable young scientists await in vain any recognition of their efforts. I thought up to now that "gerontocracy" was the privilege of our old European civilizations. This event makes me change somewhat my opinion.

MICHEL PRIVAT DE GARILHE
11, rue Roger-Bacon Paris 17e, France

18 November 1966, Volume 154, Number 3751

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.

The Worlds of Reflection and Action*

Every great modern university must balance its responsibilities to the worlds of reflection and action. There is a whole range of social roles between the ivory tower and the executive desk. At one end of the spectrum sits Thoreau by his pond, the poet in his garret, the scholar in his study. At the other sits the active citizen in his committee meeting, the leader surrounded by his followers. Every individual must decide where to place himself along that range. Each has to decide how much he wants to become personally involved in the action and effort of his society.

A society that aspires to creativity has urgent need of its detached scholars and critics, as well as of those who will become deeply involved in the world of action. Our society must have the wisdom to reflect *and* the fortitude to act. It must provide the creative soil for new ideas *and* the skill and patience and hardihood to put those ideas into action. The creative society will be one in which there is continuous and fruitful interaction between the two worlds of action and reflection. And no institution in our society can do more to keep that interaction vital and productive than the university. It must preserve within its walls an environment in which the relatively disengaged scholar, artist, critic, scientist, or writer can live and flourish. But it must also relate itself to the organized world of action.

There are those in the population, even in the alumni population, even on the boards of trustees of some universities, who resent the fact that the university is a haven for dissent, for criticism, and for the free examination of assumptions and practices. They often strive to diminish this fundamental role of a university. They seem to imagine that the chief role of the university is to endorse the status quo.

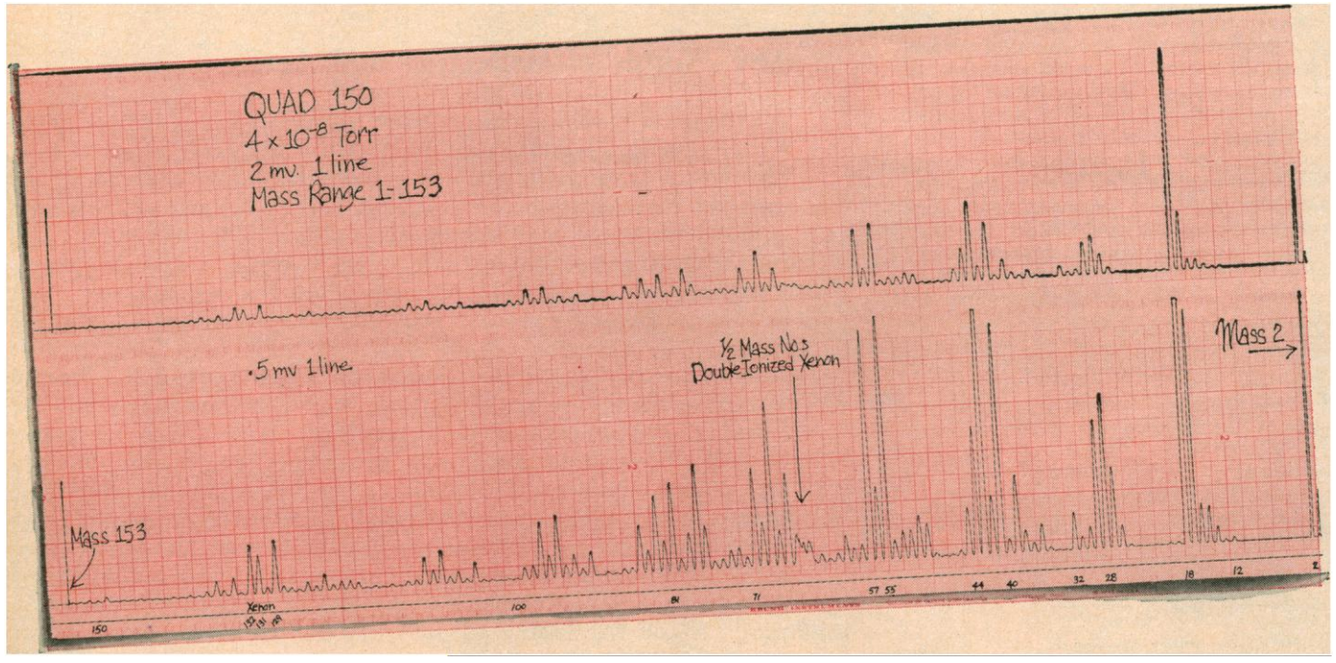
On the other side, there are some within the university community who seem to want to cut all ties with the rest of the society and to persuade every last student to choose the life of detachment and dissent. They do not like the way the society is run, but they are not inclined to prepare young people to run it better. And they communicate to their students a moral snobbism toward those who live with the ethical dilemmas of responsible action.

The life of reflection is not superior to the life of action, or vice versa. Both are essential to a vital society. Surely our universities should strive to be as effective in preparing young people for one role as for the other.

I hope that in preparing young men and women for lives as scholars and critics our universities will make them aware of the dangers of irresponsibility and moral snobbism. I hope that in preparing them for the world of business and government the universities will make them appreciative of the social function of the scholar, the dissenter, and the critic. Finally, I hope that the universities will persuade a reasonable proportion of their graduates to move back and forth between the two worlds.—JOHN W. GARDNER, *Secretary of Health, Education, and Welfare.*

* This editorial is adapted from remarks delivered at the 75th Anniversary Convocation of the California Institute of Technology, Pasadena, 24 October 1966.

Get this kind of RGA sensitivity and resolution...

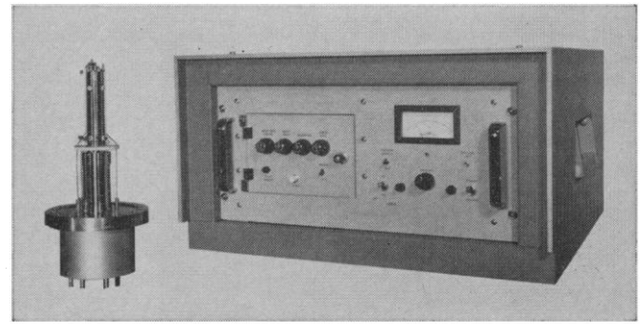


from a Quadrupole system priced at $7950.

Ultek/EAI QUAD™ 150

- **1-150 amu in one mass range**
- **Greater than unit resolution* at 150 amu**
- **5x10⁻¹⁴ torr partial pressure sensitivity**
- **130 millisecond scan with linear mass separation**

The new QUAD 150 Residual Gas Analyzer can sweep the entire mass range from mass 1 to mass 150 in 130 milliseconds. This high speed scan permits the user to analyze the kinds and quantities of the various molecules contributing to the system pressure, and follow their dynamic pressure changes. A continuously variable scan speed allows the setting of a sweep compatible with any recording system used, up to a 10-minute sweep. The single mass monitoring feature permits the dc level of any one mass peak to be recorded or observed on an oscilloscope for long periods of time. The system consists of a Quadrupole axial-beam ionizer assembly (bakeable to 400°C, and operable to 250°C) and a controller unit which can be removed from cabinet and mounted in a standard 19" rack. The QUAD 150 is manufactured by Electronic Associates Incorporated and marketed exclusively by Ultek. Send for complete specifications. Write Ultek Corp., Box 10920, Palo Alto, California 94303.



ULTEK

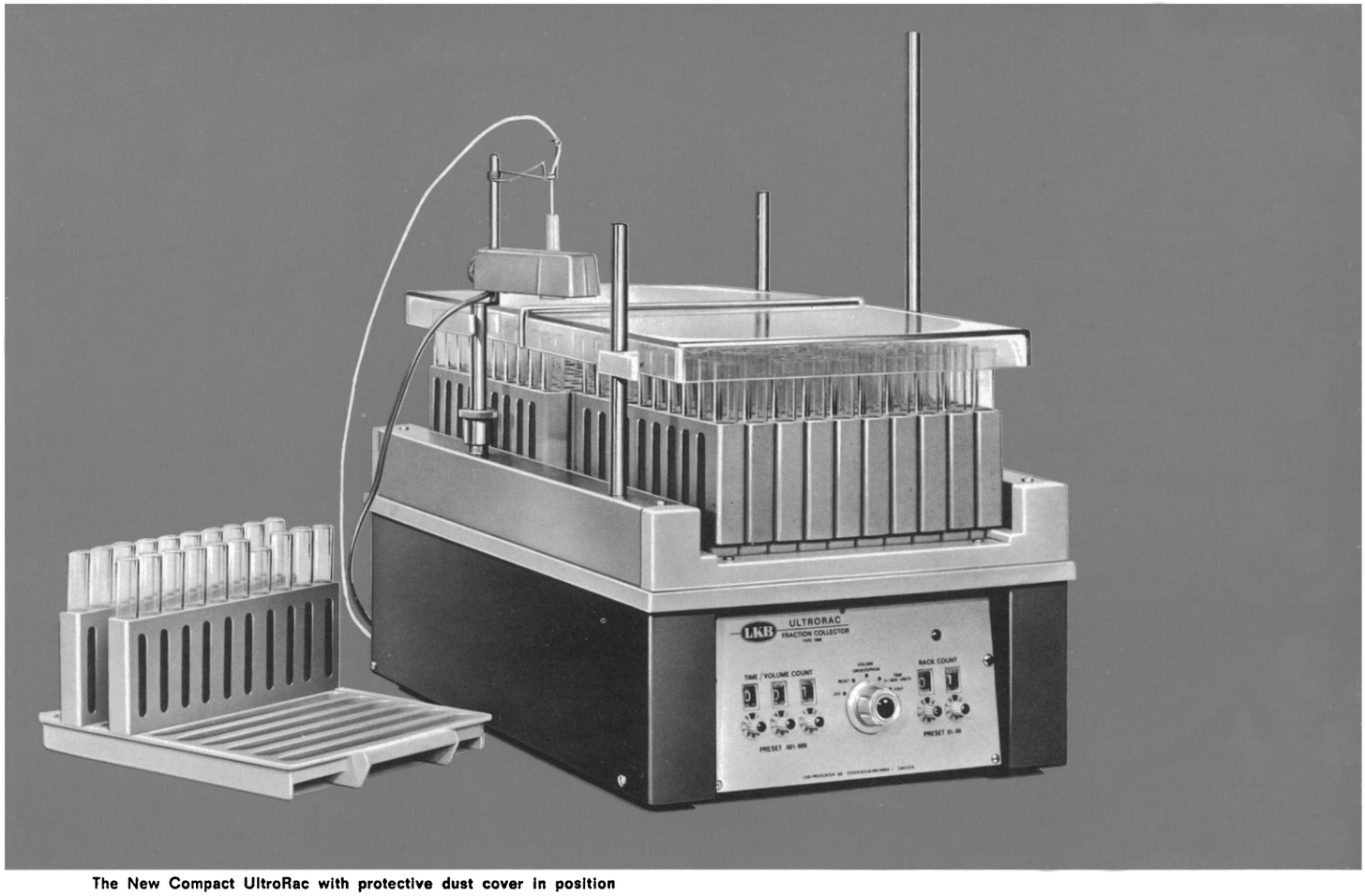
* Resolution is defined as two peaks, one mass unit apart, and of equal height, and with a valley between them with a depth of 90% of the height of the peaks.

QUAD is trademark of Electronics Associates, Inc.

LKB

IN THE SERVICE OF SCIENCE

Presenting the new UltroRac



The New Compact UltroRac with protective dust cover in position and a plastic rack tray with two test tube racks

The New Minimum Space UltroRac® Fractio

- **Designed for space saving**
- **Designed for coldroom use**
- **Designed for standard test tubes**
- **Compact, removable electronic unit**
- **200 test-tube capacity**
- **For time, drop and volumetric capabilities**
- **Stainless steel support rods — polypropylene racks**
- **Provision for event marking**
- **Power outlet for flow pump**

Introduction

The LKB UltroRac is an innovation in the field of fraction collection. It is presently the smallest fraction collector, 13.5 in (33 cm) × 20 in. (50 cm), which combines the capacity (200 test tubes) of much larger units with such compact design. It will even fit in a domestic refrigerator.

The instrument gives users reliable collection, ease of operation, easily varied test tube capacity and freedom of choice in the method of collection. The standard UltroRac will control fraction size by timed flow collecting and drop counting while facilities for volumetric siphoning are optionally available.

Independent rack movement gives increased versatility

The simple rack moving mechanism makes the UltroRac versatile. Any number of racks, each of ten test tubes, can be removed from the collecting platform without interrupting the collection process. It would be possible to continuously remove racks and add others thereby postponing indefinitely the end of a run.

Separate plastic rack trays holding ten racks facilitate the removal of filled test tubes, in order of collection, for storage, further processing or washing.

Given constant time operation, the fractions from two experiments can be collected simultaneously, each column filling half the available number of racks.

Advanced design of tube racks

Fraction collection is made easier due to the advanced design features incorporated in the plastic racks.

Firstly, they have a seam down the centre which enables them to be opened out, with a hinge-type action, to stand on three points without any other support. Tests so far carried out show that after more than 2,000,000 flexings the plastic seam neither breaks nor cracks.

Secondly, each tube compartment has a stainless

steel spring which snugly positions tubes having diameters from 15 mm to 18 mm (max), without rattling. All racks are blue in colour except one, the starter rack, which is grey. By positioning the grey rack so that it is always filled first in any collecting operation, its subsequent position will serve to indicate the progress of the run.

ADDITIONAL FEATURES

Remote Control

For ease of operation all controls have been grouped on a panel at the front of the collector. This control unit can be easily withdrawn from the collector and placed in a separate cabinet whenever remote control working is desirable. The separate cabinet, a 5 meter extension cable, and a coverplate for the front of the collector unit are optionally available.

Stainless Steel Apparatus Masts

Sturdy half inch (12 mm) diameter stainless steel rods which can be easily and quickly positioned and adjusted in height are provided to form apparatus masts which will enable chromatographic columns and other auxiliary devices to be mounted at correct heights above the collecting tubes.

Safety and protection

To secure fully reliable working LKB have enclosed all counters and relays on the UltroRac in a hermetically sealed control unit. Break-downs, due to corro-

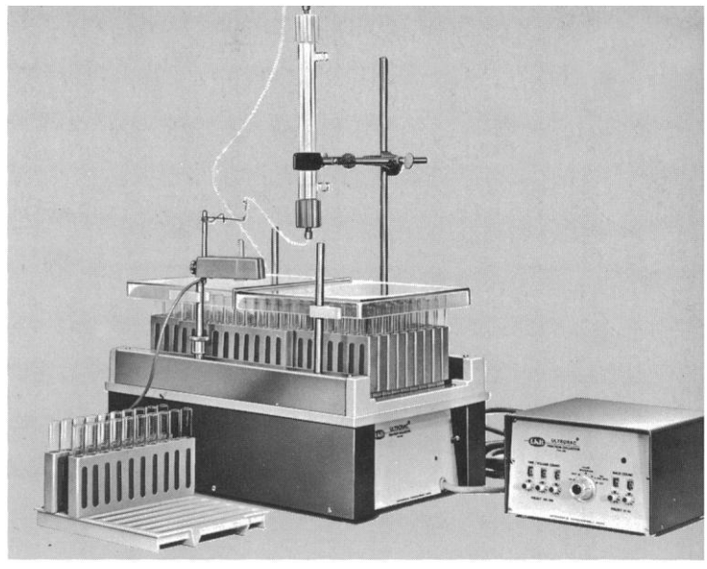
n Collector LKB 7000

sion of switches by laboratory atmosphere, are avoided and also any fire risk is considerably diminished. The remaining switches are of a magnetically operated, hermetically sealed dry-reed type.
To protect empty tubes and collected fractions from dust particles or other air-borne impurities a two-piece plastic dust protection cover is provided to shield all tubes on the collecting platform.
All metallic parts liable to come in contact with liquids are of stainless steel and all racks and slide tracks are of polypropylene.

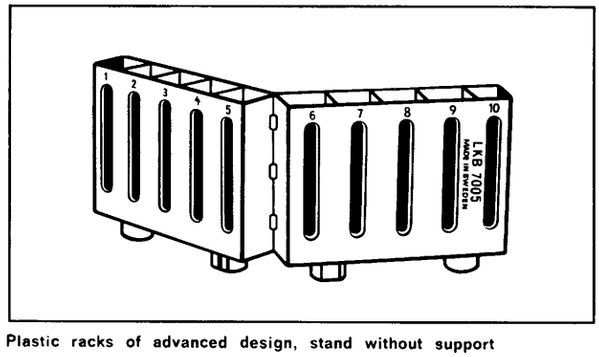
Operation

Rack filling can be preset, as soon as the set number have been filled a counter operates an automatic shut-down.
Fraction changes are initiated by electrical pulses from the triple decade counter which can be set to initiate a fraction change after any number of pulses from 1—999.
Two power outlets enable auxiliary equipment to be connected.

ALSO WITH THE UltroRac
A THREE YEAR WARRANTY

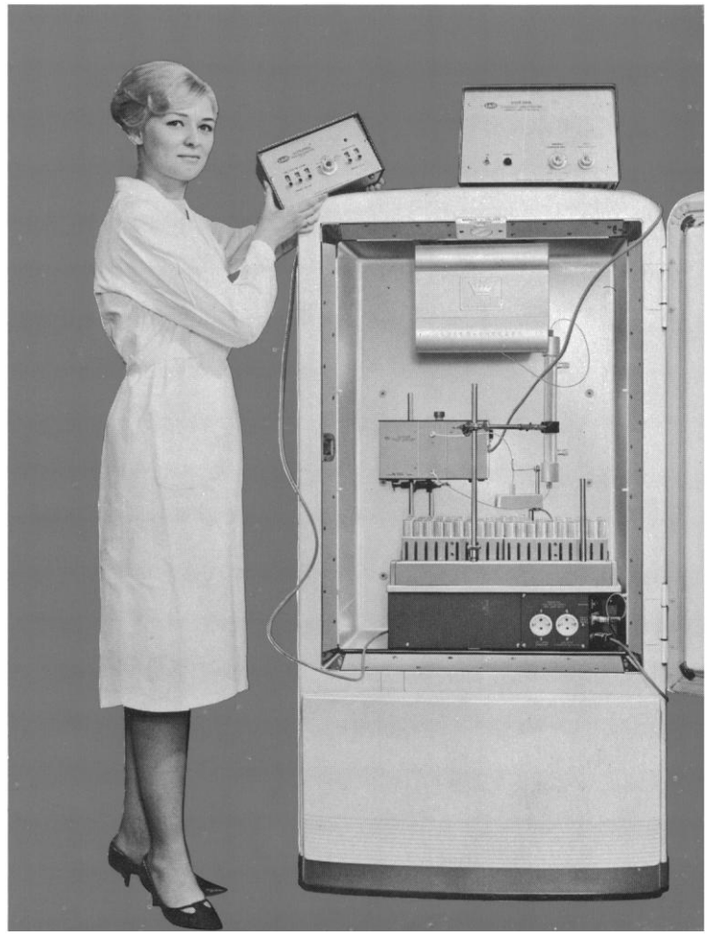


The UltroRac with control unit in separate cabinet ready for remote operation



Plastic racks of advanced design, stand without support

The UltroRac, complete with separation column, ready for operation in a normal domestic refrigerator



ORDERING INFORMATION

LKB 7000-1 UltroRac
Automatic Fraction Collector
*** For 115 V, 60 cps**

Basic assembly for timed-flow collecting and drop counting consisting of main unit and control unit, and including:
1 pc 7004 Drop Counter Head, 20 pcs 7005 Tube Rack, 20 pcs 7006 Rack Carrier, 2 pcs 7007 Dust Cover, 1 pc 7008 Rod for Drop Counter Head and Siphon Stand, 2 pcs 7009 Rod for Dust Cover, 1 pc 7010 Adapter Cable for Recorders 6520A, and H, 2 pcs 7011 Rack Tray, 2 pcs 7016 Apparatus Mast; Tools, Fuses and Instruction Manual.

LKB 7000-2
Similar to 7000-1 but wired for 220 V*, 50 cps.

* NOTE: Standard units are wired for 115 V and 220 V. Customers requiring other voltages in the range 100, 127, 200 and 250 V must alter the transformer tappings to the appropriate value.

OPTIONAL ACCESSORIES

7013, Separate metal case to contain the Control Unit when it is being used remote from the collector.
7014, 5 meter cable to connect Main Unit to Control Unit for remote working.
Assembly for volumetric siphoning including 3404B Siphon Stand with cable, plug and 7015 Adaptor.
3430A, Event Marker, produces an electrical impulse of amplitude adjustable up to 100 mV to indicate on chart of any potentiometric recorder used together with a flow analyzer, each time distributor or racks make a step.
Not required for LKB Recorders 6520A and 6550A.

TECHNICAL SPECIFICATIONS

Methods of collection:	Timing, Drop Counting or Siphoning
Time range:	0.1 min. to 99.9 min.
Timer step interval:	0.1 min.
Drop counter range:	1 to 999 drops
Siphoning:	Siphon stand, with 5 to 25 ml siphons optional accessory
Automatic shut-down:	Operates after preset number of racks from 1 to 99
Duration of fraction tube change:	Approx. 2 sec.
Number of tubes:	200
Number of racks:	20 (10 tubes each)
Temperature range (ambient)	0° to 45°C
Power requirements:	100, 115, 127, 200, 220 and 250 V.
	Voltage variations of ± 10 % of the set value do not impair the functioning of the collector
Frequency:	50 or 60 cps (different timers)
Power consumption:	50 W without auxilliary equipment, 400 W maximum permissible including outlets
Tube sizes:	15 mm to 18 mm max diameter 75 mm to 200 mm length
Fraction marking:	Internal contact closes for 1.2 seconds. The contact is connected to an external socket on the rear panel
Materials:	The racks and slide track are of polypropylene and all metallic parts liable to come in contact with liquids are made of stainless steel
Dimensions:	Length 50 cm (20 in) Width 33 cm (13.5 in) Height without tubes 20 cm (8 in) Height with 160 mm tubes 34 cm (13.5 in)
Weight of Main Unit and Control Unit:	20 kg (44 lbs)

SALES AND SERVICE: NEW YORK, BOSTON, ROCKVILLE, MD., ATLANTA, CHICAGO, HOUSTON, INDEPENDENCE, MO., SAN FRANCISCO, LOS ANGELES

LKB INSTRUMENTS, INC., 12221 Parklawn Drive, Rockville, Maryland 20852 · Tel: 949-6510

International Headquarters: LKB-Produkter AB, P.O.Box 76, Stockholm-Bromma 1, Sweden

out priorities for scientific research and development.

The Soviet Communist Party Program and directives were, quite naturally, adopted in due course by Czechoslovakia and other Bloc countries. By now, they all have prepared their so-called "perspective" planning of scientific development to the year 1970. This is an interesting experiment which accords with the policies formulated at the Congress and with Party decisions. Teams of scientists, technicians, and economists are asked to evaluate the feasibility of directing research and development toward specific scientific and technological objectives in terms of available human, material, and financial resources.

As our own government concern with, and expenditures for, scientific activity grow, the responsible agencies may find it worthwhile to follow attentively the course of Czechoslovak science in the coming years.

M. RECHCIGL, JR.

Forthcoming Events

December

19–20. British **Biophysical** Soc., winter mtg., London, England. (W. Gratzer, Biophysics Dept., King's College, 26 Drury Lane, London W.C.2)

19–21. **Acceleration Biology,** Sunnyvale, Calif. (Univ. of California Extension, Berkeley 94720)

26–31. **American Assoc. for the Advancement of Science,** annual, Washington, D.C. (R. L. Taylor, AAAS, 1515 Massachusetts Ave., N.W., Washington, D.C. 20005)

In addition to the 20 sections of the Association and five AAAS committees, the following organizations have arranged sessions at the AAAS annual meeting 26–31 December in Washington, D.C.

Mathematics

American Mathematical Soc. (E. Pitcher, Lehigh Univ., Bethlehem, Pa.)

Association for Computing Machinery (D. Leiti, Heliodyne Corp., Rosslyn, Va.)

National Council of Teachers of Mathematics (J. Gates, 1201 16 St., NW, Washington, D.C.)

Society for Industrial and Applied Mathematics (J. H. Griesmer, I.B.M., T. J. Watson Research Center, Yorktown Heights, N.Y.)

Physics

American Astronautical Soc. (S. F. Singer, Univ. of Miami, Coral Gables, Fla.)

American Meteorological Soc. (J. E. Masterson, Natl. Center for Atmospheric Research, Greenbelt, Md.)

Harvard Project Physics (F. J. Rutherford, Harvard Univ., Cambridge, Mass.)

Chemistry

American Assoc. of Clinical Chemists (R. S. Melville, Natl. Inst. of General Medical Sciences, NIH, Bethesda, Md. 20014)

Geology and Geography

Association of American Geographers, Middle Atlantic Div. (D. J. Patton, Carnegie Inst. of Washington, Washington, D.C.)

National Geographic Soc. (R. Gray, The Society, Washington, D.C.)

National Speleological Soc. (W. B. White, Pennsylvania State Univ., University Park)

Zoological Sciences

American Fisheries Soc. (R. F. Hutton, The Society, Washington, D.C.)

American Soc. of Zoologists (L. E. DeLanney, Ithaca College, Ithaca, N.Y.)

Animal Behavior Soc. (E. M. Banks, Univ. of Illinois, Urbana)

Herpetologists' League (J. E. Huheey, Dept. of Chemistry, Univ. of Maryland, College Park)

Society of Systematic Zoology (R. P. Higgins, Wake Forest College, Winston Salem, N.C.)

Zoological and Botanical Sciences

American Soc. of Naturalists (R. D. Hotchkiss, Rockefeller Univ., New York, N.Y.)

Association of Southeastern Biologists (E. Quarterman, Vanderbilt Univ., Nashville, Tenn.)

Beta Beta Beta Biological Soc. (Mrs. F. G. Brooks, Box 515 Ansonia Sta., New York, N.Y.)

Ecological Soc. of America (C. D. Monk, Laboratory of Radiation Biology, Bldg. 772-G, Aiken, S.C.)

Society for the Study of Evolution (E. C. Olson, Univ. of Chicago, Chicago, Ill.)

Psychology

American Speech and Hearing Assoc. (E. D. Schubert, Stanford Univ., Palo Alto, Calif.)

Social and Economic Sciences

American Economic Assoc. (H. F. Williamson, Northwestern Univ., Evanston, Ill.)

American Political Science Assoc. (G. M. Lyons, Natl. Acad. of Sciences, Washington, D.C.)

American Soc. of Criminology (D. E. J. MacNamara, City Univ. of New York, New York)

American Sociological Assoc. (J. A. Beegle, Michigan State Univ., East Lansing)

Metric Assoc. (R. P. Fischelis, College of Pharmacy, Ohio Northern Univ., Ada)

National Inst. of Social and Behavioral Science (D. P. Ray, The Institute, Washington, D.C.)

Society for the Scientific Study of Religion (H. L. Silverman, Seton Hall Univ., South Orange, N.J.)

History and Philosophy of Science

History of Science Soc. (B. S. Finn, Museum of History and Technology, Smithsonian Inst., Washington, D.C.)

Science Courses for Baccalaureate Education Project (V. L. Parsegian, Rensselaer Polytechnic Inst., Troy, N.Y.)

Society for General Systems Research (R. F. Ericson, George Washington Univ., Washington, D.C.)

Society for the History of Technology (R. Sanders, Industrial College of the Armed Forces, Washington, D. C.)

Medical Sciences

Alpha Epsilon Delta (M. L. Moore, The Society, Bronxville, N.Y.)

American Acad. of Psychoanalysis (E. A. Weinstein, Washington School of Psychiatry, Washington, D.C.)

American Assoc. of Bioanalysts (M. M. Cohen, 165-25 Hillside Ave., Jamaica, N.Y.)

American Physiological Soc. (F. Halberg, Univ. of Minnesota, Minneapolis)

American Psychiatric Assoc. (J. O. Cole, Natl. Inst. of Mental Health, NIH, Bethesda, Md.)

Education

AAAS Commission on Science Education (J. R. Mayor, AAAS, Washington, D.C.)

American Nature Study Soc. (D. E. Wade, 106 Depot St., Oregon, Ill.)

Cooperative Committee (E. Will, State College of New York, Oneonta)

Educational Policies Commission (J. E. Russell, The Commission, Natl. Education Assoc., Washington, D.C.)

National Assoc. of Biology Teachers (W. Stephenson, Earlham College, Richmond, Ind.)

National Science Teachers Assoc. (A. F. Eiss, NSTA, Washington, D.C.)

Pennsylvania Science Teachers Assoc. (D. Ulmer, Lock Haven State College, Lock Haven, Pa.)

Science Teaching Soc. Coordinated Program (A. F. Eiss, Natl. Science Teachers Assoc., Washington, D.C.)

Information and Communication

National Assoc. of Science Writers (L. Zahn, Hill and Knowlton, Inc., 150 E. 42 St., New York, N.Y.)

Society of Technical Writers and Publishers (I. D. Welt, School of Government, American Univ., Washington, D.C.)

Biometric Soc. ENAR (D. S. Robson, Dept. of Plant Breeding, Cornell Univ., Ithaca, N.Y.)

Science in General

Academy Conference (K. Reiss, Tulane Univ., New Orleans, La.)

Scientific Research Soc. of America (D. B. Prentice, The Society, 51 Prospect St., New Haven, Conn.)

Society of the Signa Xi (T. T. Holme, 51 Prospect St., New Haven, Conn.)

Washington Acad. of Sciences (J. K. Taylor, The Academy, Washington, D.C.)

Wildlife Soc. (J. L. Buckley, U.S. Dept. of the Interior, Washington, D.C.)

27–30. American **Astronomical** Soc., 123rd mtg., University of California, Los Angeles, (G. C. McVittie, The Society, Univ. of Illinois Observatory, Urbana)

28–30. **Econometric** Soc., winter mtg., San Francisco, Calif. (Box 1264, Yale Station, New Haven, Conn.)

NEW BOOKS

(Continued from page 878)

Mathematics, Physical Sciences, and Engineering

Benzenoid-Metal Complexes: Structural Determinations and Chemistry. H. Zeiss, P. J. Wheatley, and H. J. S. Winkler. Ronald, New York, 1966. 107 pp. Illus. $7.

The Bridge of Life: From Matter to Spirit. Edmund W. Sinnott. Simon and Schuster, New York, 1966. 255 pp. $4.95. Credo Perspectives Series.

Classical and Contagious Discrete Distributions. Proceedings of the International Symposium (Montreal, Canada), August 1963. Supported by Canadian Mathematical Congress, McGill University, and National Research Council of Canada. Ganapati P. Patil, Ed. Pergamon, New York, 1966. 566 pp. Illus. $21. There are 37 papers.

Communication Systems and Techniques. Mischa Schwartz, William R. Bennett, and Seymour Stein. McGraw-Hill, New York, 1966. 634 pp. Illus. $16.50. Inter-University Electronics Series.

The Concept of Energy. D. W. Theobald. Spon, London; Barnes and Noble, New York, 1966. 208 pp. Illus. $7.50.

Dielectric Behavior of Physically Absorbed Gases. Robert L. McIntosh. Dekker, New York, 1966. 174 pp. Illus. $9.75.

Direct Energy Conversion. George W. Sutton, Ed. McGraw-Hill, New York, 1966. 358 pp. Illus. $14.50. Inter-University Electronics Series.

Electroanalytical Chemistry: A Series of Advances. vol. 1. Allen J. Bard, Ed. Dekker, New York, 1966. 438 pp. Illus. $15.75. Four papers.

Elementary Partial Differential Equations. Paul W. Berg and James L. McGregor. Holden-Day, San Francisco, 1966. 437 pp. Illus. $11.75.

Elementary Particles. William R. Frazer. Prentice-Hall, Englewood Cliffs, N.J., 1966. 202 pp. Illus. $6.95.

Engineering Radiation Heat Transfer. John A. Wiebelt. Holt, Rinehart, and Winston, New York, 1966. 288 pp. Illus. $9.50.

Extractive Metallurgy of Tin. Peter A. Wright. Elsevier, New York, 1966. 238 pp. Illus. $17.

Frege's Logical Theory. Robert Sternfeld. Southern Illinois Univ. Press, Carbondale, 1966. 214 pp. $8.50.

Fundamental Phenomena in the Materials Sciences. vol. 3, *Surface Phenomena.* Proceedings of the Third Symposium (Boston), January 1965. L. J. Bonis, P. L. de Bruyn, and J. J. Duga, Eds. Plenum Press, New York, 1966. 240 pp. Illus. $12.50. Ten papers.

Handbook of Mechanical Specifications for Buildings and Plants. A checklist for engineers and architects. Robert Henderson Emerick. McGraw-Hill, New York, 1966. 496 pp. Illus. $12.50.

High Explosives and Propellants. S. Fordham. Pergamon, New York, 1966. 236 pp. Illus. Paper, $3.50. Commonwealth and International Library.

Homology Theory: A First Course in Algebraic Topology. Sze-Tsen Hu. Holden-Day, San Francisco, Calif., 1966. 259 pp.

Illus. $11. Holden-Day Series in Mathematics.

Hydrogen Compounds of the Metallic Elements. K. M. Mackay. Spon, London; Barnes and Noble, New York, 1966. 192 pp. Illus. $10.

IAEA Laboratory Activities. Third Report. International Atomic Energy Agency, Vienna, 1966 (order from Natl. Agency for Intern. Publications, New York). 167 pp. Illus. Paper, $1.

Interactions in Electrolyte Solutions (Metal Complex and Ion-Pair Formation in Solution). George H. Nancollas, Elsevier, New York, 1966. 224 pp. Illus. $14.50. Topics in Inorganic and General Chemistry Series.

An Introduction to American Archaeology. vol. 1, *North and Middle America*. Gordon R. Willey. Prentice-Hall, Englewood Cliffs, N.J., 1966. 540 pp. Illus. $16.95.

Introduction to Mass Spectrometry. H. C. Hill. Sadtler Research Laboratories, Philadelphia, 1966. 147 pp. Illus. Paper. Spectroscopy in Education Series, vol. 3.

Introduction to Molecular Spectroscopy. Anthony J. Sonnessa. Reinhold, New York, 1966. 128 pp. Illus. Paper, $1.95. Selected Topics in Modern Chemistry Series.

Introduction to Solid State Physics. Charles Kittel. Wiley, New York, ed. 3, 1966. 660 pp. Illus. $12.50.

Introduction to the Theory of Flow Machines. Albert Betz. Translated from the German edition by D. G. Randall. Pergamon, New York, 1966. 297 pp. Illus. $11.50.

Kinetic Theory. vol. 2, *Irreversible Processes*. S. G. Brush. Pergamon, New York, 1966. 261 pp. Illus. Paper, $4.95. Commonwealth and International Library.

Lectures in Theoretical Physics. vols. 8A to 8C. vol. 8A, *Statistical Physics and Solid State Physics* (363 pp., $7); vol. 8B, *Fundamental Particles and High Energy Physics* (436 pp., $7); vol. 8C, *Nuclear Structure Physics* (685 pp., $9). Lectures delivered at the Summer Institute for Theoretical Physics (Boulder, Colo.), 1965. P. D. Kunz, D. A. Lind, and W. E. Brittin, Eds. Univ. of Colorado Press, Boulder, 1966. Illus. Paper. There are 40 lectures.

Lectures on Riemann Surfaces. R. C. Gunning. Princeton Univ. Press, Princeton, N.J., 1966. 258 pp. Illus. Paper, $3.75.

The Magnetic Properties of Matter. D. E. G. Williams. Elsevier, New York, 1966. 238 pp. Illus. $11.75.

Matrices and Transformations. Anthony J. Pettofrezzo. Prentice-Hall, Englewood Cliffs, N.J., 1966. 143 pp. Illus. $3.95. Teachers' Mathematics Reference Series.

Mechanics of Materials. Seibert Fairman and Chester S. Cutshall. Wiley, New York, 1966. 430 pp. Illus. $14.95.

Methods in Chemical and Mineral Microscopy. Essam E. El-Hinnawi. Elsevier, New York, 1966. 232 pp. Illus. $16.50.

Modern Aspects of Polarography. A tribute to Isamu Tachi. Tomihito Kambara, Ed. Plenum Press, New York, 1966. 253 pp. Illus. $10. There are 32 papers reprinted from *Review of Polarography*, vol. 11, Nos. 1 to 6.

Milestones of Modern Chemistry: Orig-

inal Reports of the Discoveries. Selected by Eduard Farber. Basic Books, New York, 1966. 247 pp. Illus. $5.95.

Noise and Its Effect on Communication. Nelson M. Blachman. McGraw-Hill, New York, 1966. 222 pp. Illus. $13.50.

Physico-Chimie du Protactinium. A symposium (Orsay, France), July 1965. Éditions du Centre National de la Recherche Scientifique, Paris, 1966. 351 pp. Illus. There are 38 papers in French or English and an abstract of each paper in both French and English.

Plastics in Building. Irving Skeist, Ed. Reinhold, New York, 1966. 478 pp. Illus. $18. There are 21 papers.

Scattering Theory of Waves and Particles. Roger G. Newton. McGraw-Hill, New York, 1966. 699 pp. Illus. $19.50. International Series in Pure and Applied Physics.

Science on the Move. A basic text in chemistry, biology, physics, and space. Francis H. Sheehan, Antonio J. Ceddia, Rudolph A. Feudo, and Charles A. Woodman. Educators Publishing Service, Cambridge, Mass., 1966. 469 pp. Illus. Secondary level.

Sequential Methods in Statistics. G. Barrie Wetherill. Methuen, London; Wiley, New York, 1966. 228 pp. Illus. $5.50. Methuen's Monographs on Applied Probability and Statistics.

Single Crystal Diffractometry. U. W. Arndt and B. T. M. Willis. Cambridge, Univ. Press, New York, 1966. 347 pp. Illus. $15. Cambridge Monographs on Physics.

Le Soleil et la Terre. André Boischot. Presses Universitaires de France, Paris, 1966. 128 pp. Illus. Paper. Que Sais-Je, le Point des Connaissances Actuelles, No. 1233.

A Summary of A-Level Physics. H. J. P. Keighley. Pergamon, New York, 1966. 144 pp. Illus. Paper, $1.50. Commonwealth and International Library of Science.

Technical Writing and Presentation. W. S. Robertson and W. D. Siddle. Pergamon, New York, 1966. 128 pp. Illus. Paper, $3.95. Commonwealth and International Library.

Techniques and Methods of Polymer Evaluation. vol. 1, *Thermal Analysis*. Philip E. Slade, Jr., and Lloyd T. Jenkins, Eds. Dekker, New York, 1966. 263 pp. Illus. $10.75. Five papers.

Theory and Research in Lubrication: Foundations for Future Developments. Mayo Dyer Hersey. Wiley, New York, 1966. 504 pp. Illus. $17.50.

The Theory of Hydrodynamic Stability. C. C. Lin. Cambridge Univ. Press, New York, 1966. 167 pp. Illus. $7.50.

Where the Sea Breaks Its Back. The epic story of a pioneer naturalist and the discovery of Alaska. Corey Ford. Little, Brown, Boston, 1966. 218 pp. Illus. $5.95.

World List of Abbreviations. F. A. Buttress. Leonard Hill, ed. 3, London, 1966. 192 pp. 35s. A compilation of more than 9000 items.

A World of Nuclear Powers? Alastair Buchan, Ed. Prentice-Hall, Englewood Cliffs, N.J., 1966. 188 pp. Paper, $1.95; cloth, $3.95. American Assembly Series. Eight papers.

The Acridines: Their Preparation, Physical, Chemical, and Biological Properties and Uses. Adrien Albert. St. Martin's Press, New York, ed. 2, 1966. 616 pp. Illus. $32.50.

Advances in Enzymology: And Related Subjects of Biochemistry. vol. 28. F. F. Nord, Ed. Interscience (Wiley), New York, 1966. 553 pp. Illus. $15. Seven papers; in English or German.

Agricultural Physics. C. W. Rose. Pergamon, New York, 1966. 242 pp. Illus. Paper, $3.50. Commonwealth and International Library of Science.

The Alcoholic Personality: A Clinical Study. Veikko Tähkä. Finnish Foundation for Alcohol Studies, Helsinki; Rutgers Center of Alcohol Studies, New Brunswick, N.J., 1966. 279 pp. $6.

Allergy and Anaphylaxis as Metabolic Error. vols. 1 and 2. vol. 1, *Dual Response to Antigenic Stimulation* (468 pp.); vol. 2, *Anabolic Hormones in Immuno-metabolic Therapy* (746 pp.). Z. Z. Godlowski. Immuno-metabolic Press, Chicago, 1966. Illus. $17 per volume; $30 set.

American Handbook of Psychiatry. vol. 3. Silvano Arieti, Ed. Basic Books, New York, 1966. 794 pp. Illus. $20.

Anatomy of the Cell. Björn Afzelius. Translated from the Swedish edition (Stockholm, 1964) by Birgit Satir. Univ. of Chicago Press, Chicago, 1966. 133 pp. Illus. $5.50.

Anatomy of the Human Body. Henry Gray. Charles Mayo Goss, Ed. Lea and Febiger, Philadelphia, ed. 28, 1966. 1464 pp. Illus. $22.50.

Animal Ecology in Tropical Africa. D. F. Owen. Freeman, San Francisco, 1966. 130 pp. Illus. $5. Tropical Biology Texts.

Animal Gametes (Male): A Morphological and Cytochemical Account of Spermatogenesis. Vishwa Nath. Asia Publishing House, New York, 1966. 352 pp. Illus. $13.50.

Antibiotics and Chemotherapeutic Agents in Clinical and Laboratory Practice. Victor Lorian. Thomas, Springfield, Ill., 1966. 349 pp. Illus. $15.50.

Aspects of Learning and Memory. Derek Richter, Ed. Basic Books, New York, 1966. 192 pp. Illus. $5.95. Eight papers.

Biological Treatment of Mental Illness. Proceedings of the Second International Conference of the Manfred Sakel Foundation (New York), October–November 1962. Max Rinkel, Ed. Page (Farrar, Straus and Giroux), New York, 1966. 1051 pp. Illus. $25. There are 65 papers.

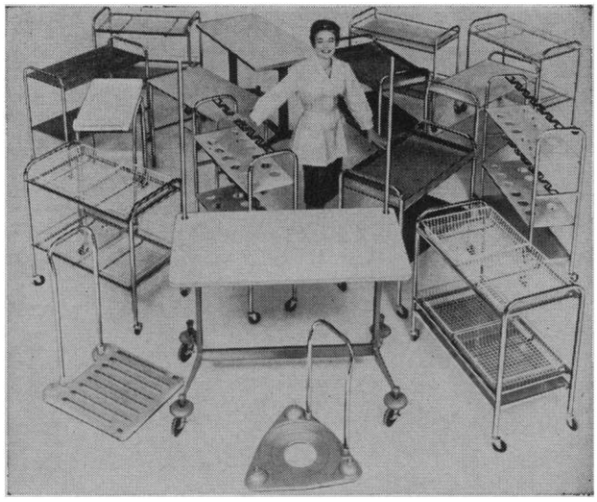
Biology of the Laboratory Mouse. Earl L. Green, Ed. McGraw-Hill, New York, ed. 2, 1966. 718 pp. Illus. $16.50.

Brain Tissue Electrolytes. A. Van Harreveld. Butterworth, Washington, D.C., 1966. 183 pp. Illus. $7.95.

Centennial of Entomology in Canada 1863–1963. A tribute to Edmund M. Walker. Glenn B. Wiggins, Ed. Univ. of Toronto Press, Toronto, Canada, 1966. 104 pp. Illus. $5. Eight papers.

Clinical Capillary Microscopy. Eli Davis and Jacob Landau. Thomas, Springfield, Ill., 1966. 243 pp. Illus. $25.75.

The Common Bile Duct: Operative Cholangiography, Biliary Endoscopy and Choledocholithotomy. Clarence J. Schein,



only Labconco makes 17 different laboratory carts

This is the only line of carts designed specifically for use in the laboratory. They're made of heavy steel, welded for extra strength. There are no rivets or bolts to work loose. All steel parts are chrome plated.

Typical materials used in making Labconco carts are fiberglass, compressed asbestos, and polyvinyl. These materials are chemically inert, easy to maintain.

Labconco carts start as low as $35. For a fully-illustrated brochure, write Laboratory Construction Company or see your laboratory supply dealer.

LAB CON CO

8805 Prospect
Kansas City Missouri

PRESCRIPTION RESEARCH MATERIALS

Highest purity materials, now available in a variety of forms from MRC.

- **SINGLE CRYSTALS**
  Random and specific orientations, as-grown or with cut surfaces. Grown by electron beam, Bridgman, strain anneal and Czochralski techniques.
- **POLYCRYSTALLINE METALS**
  Crystallite, rod, wire and foil prepared from super-pure zone refined materials.
- **CUSTOM ALLOYS**
  Hard-to-make and specified composition alloys (including intermetallic compounds). Wide range of sizes, shapes, purities and quantities (grams to lbs.)
- **SPUTTERING ELECTRODES**
  Rectangular and circular . . . to 6" x 6" and larger, from ultra-high purity metals.
- **VAPOR DEPOSITION PELLETS**
  High purity and low gas assure high reliability films and devices.

Write or call for data and prices

mrc

Advanced Materials Division
MATERIALS RESEARCH CORPORATION
Orangeburg, New York 10962
(914) ELmwood 9-4200

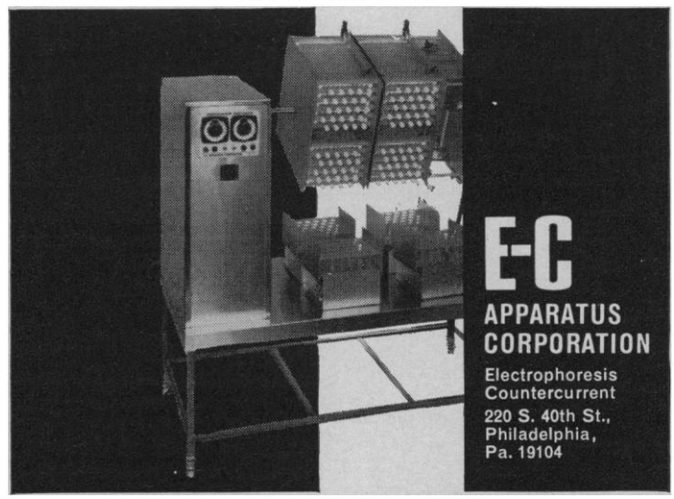
YOU CAN WHEEL IT THROUGH ANY LABORATORY DOOR

ENJOY THE CONVENIENCE OF MOVING THIS **COUNTERCURRENT** TO YOUR EXPERIMENT AND NOT VICE VERSA

■ EXPANDABLE FROM 100 TO 500 TUBES, IT CAN BE CUSTOMED TO FIT THE NEEDS OF YOUR LABORATORY ■ AUTOMATIC FILLING DEVICE FOR OVERNIGHT RUNS

The Countercurrent technique has proven invaluable in many fields. Write for bibliography which best covers your field of interest—Apparatus and Reviews, Theory, nucleic acids, polymers, polypeptides, lipids and lipid steroids, aliphatics, amino compounds, antibiotics, aromatics, natural products, and inorganics.

Circle Reader Service Card for Data Sheets



20-22 N. Moore Street, Dept. 524, New York, N.Y. 10013

MANOSTAT Corporation

Wilhelm Z. Stern, and Harold G. Jacobson. Thomas, Springfield, Ill., 1966. 304 pp. Illus. $22.50. American Lecture Series.

The Development of Zonal Centrifuges and Ancillary Systems for Tissue Fractionation and Analysis. Norman G. Anderson, Ed. U.S. Department of Health, Education, and Welfare, Washington, D.C., 1966 (order from Superintendent of Documents, Washington, D.C.). 536 pp. Illus. $4.75.

Diseases of the Cat. G. T. Wilkinson. Pergamon, New York, 1966. 378 pp. Illus. $9.50. Contributions by P. P. Scott and E. Cotchin.

Ecological Methods: With Particular Reference to the Study of Insect Populations. T. R. E. Southwood. Methuen, London; Barnes and Noble, New York, 1966. 409 pp. Illus. $13.50.

Environmental Influences on Reproductive Processes. Seventh Biennial Symposium on Animal Reproduction (East Lansing, Mich.), July 1965. William Hansel and R. H. Dutt. American Society of Animal Science, Albany, N.Y., 1966. 147 pp. Illus. Paper, $5. Suppl. to *Journal of Animal Science*, vol. 25. Nine papers.

Flavins and Flavoproteins. E. C. Slater, Ed. Elsevier, New York, 1966. 561 pp. Illus. $27. B.B.A. Library, vol. 8. There are 27 papers given at a symposium (Trippenhuis, Netherlands), June 1965.

Flavor Chemistry. A symposium (Detroit, Mich.), April 1965. Sponsored by the Division of Agricultural and Food Chemistry, American Chemical Society. Irwin Hornstein, symposium chairman. American Chemical Soc., Washington, D.C., 1966. 288 pp. Illus. $8. Advances in Chemistry Series, vol. 56. There are 15 papers.

Food Values of Portions Commonly Used. Anna Bowes and Charles F. Church. Revised by Charles Frederick Church and Helen Nichols Church. Lippincott, Philadelphia, ed. 10, 1966. 160 pp. Paper, $4.50.

The Galápagos. Proceedings of the symposia of the Galápagos International Scientific Project, 1964. Robert I. Bowman, Ed. Univ. of California Press, Berkeley, 1966. 336 pp. Illus. $10. There are 40 papers.

General Biology. Andrew Stauffer, Ed. Van Nostrand, Princeton, N.J., ed. 2, 1966. 556 pp. Illus. $9.75.

Guaianolides and Germacranolides. František Šorm and Ladislav Dolejš. Hermann, Paris; Holden-Day, San Francisco, Calif., 1966. 153 pp. Illus. $9.75. Chemistry of Natural Products Series.

Human Microanatomy. Hans Elias and John E. Pauly. Davis, Philadelphia, ed. 3, 1966. 396 pp. Illus. $10.

Manpower for the World's Health. Conference of the Institute on International Medical Education (Washington, D.C.), March 1966. Sponsored by the Association of American Medical Colleges. Henry van Zile Hyde, Ed. Association of American Medical Colleges, Evanston, Ill., 1966. 360 pp. Illus. Paper, $2; cloth, $4. There are 11 papers.

Marshall's Physiology of Reproduction. vol. 3. A. S. Parkes, Ed. Little, Brown, Boston, ed. 3, 1966. 1184 pp. Illus. $70.

Medical Care: Social and Organizational Aspects. Compiled by Leslie J. DeGroot.

Thomas, Springfield, Ill., 1966. 552 pp. $16.50.

Mental Health with Limited Resources: Yankee Ingenuity in Low-Cost Programs. Hans R. Huessy, Ed. Grune and Stratton, New York, 1966. 136 pp. There are 16 papers.

Neurology. Simeon Locke. Little, Brown, Boston, 1966. 289 pp. Illus. Paper, $5.75; cloth, $8.50.

Oils, Fats and Fatty Foods: Their Practical Examination. K. A. Williams. Elsevier, New York, ed. 4, 1966. 496 pp. Illus. $18.50.

Pain. A symposium (Detroit, Mich.), October 1964. Sponsored by Henry Ford Hospital. Robert S. Knighton and Paul R. Dumke, Eds. Little, Brown, Boston, 1966. 607 pp. Illus. $17.50.

Pharmaceutical Chemistry. vol. 1, *Theory and Application*. Leslie G. Chatten, Ed. Dekker, New York, 1966. 519 pp. Illus. $14.50. There are 13 papers.

Physiology. Ewald E. Selkurt, Ed. Little, Brown, Boston, ed. 2, 1966. 810 pp. Illus. Paper, $8.50; cloth, $12.50.

The Physiology of Trematodes. J. D. Smyth. Freeman, San Francisco, 1966. 272 pp. Illus. Paper, $4. University Reviews in Biology Series.

Phage and the Origins of Molecular Biology. John Cairns, Gunther S. Stent, and James D. Watson, Eds. Cold Spring Harbor Laboratory of Quantitative Biology, Cold Spring Harbor, N.Y., 1966. 351 pp. Illus. $12.50. A collection of 33 papers dedicated to Max Delbrück on his 60th birthday.

Pharmakogenetik und Präventivmedizin. G. W. Löhr and H. D. Waller. Thieme, Stuttgart, Germany, 1966 (order from Intercontinental Medical Book Corp., New York). 69 pp. Illus. Paper, DM. 13,80.

The Physiology and Biochemistry of Muscle as a Food. Proceedings of an international symposium (Madison, Wis.), July 1965. Sponsored by the University of Wisconsin. E. J. Briskey, R. G. Cassens, and J. C. Trautman, Eds. Univ. of Wisconsin Press, Madison, 1966. 453 pp. Illus. $8.50. There are 22 papers.

Prevention and Treatment of Mental Retardation. Irving Philips, Ed. Basic Books, New York, 1966. 477 pp. Illus. $12.50. There are 25 papers.

Primary Productivity in Aquatic Environments. Proceedings of an I.B.P.PF. Symposium (Pallanza, Italy), April–May 1965. C. R. Goldman, Ed. Univ. of California Press, Berkeley, 1966. 464 pp. Illus. $7. There are 24 papers and 3 abstracts.

Principles of Microbial Ecology. Thomas D. Brock. Prentice-Hall, Englewood Cliffs, N.J., 1966. 320 pp. Illus. $7.75.

Proceedings of the Fourth Congress of the Hungarian Association of Microbiologists (Budapest, 1964). R. Backhausz, Ed. Akadémiai Kiadó, Budapest, 1966. 423 pp. Illus. $12. There are 69 papers and 137 abstracts of papers.

A Prospective Study of the Incidence of Mental Disorder. Olle Hagnell. Svenska Bokförlaget, Stockholm, Sweden, 1966. 175 pp. Paper.

Psychiatry in the American Community. H. G. Whittington. International Universities Press, New York, 1966. 486 pp. Illus. $10.

Psychoanalysis in the Americas. Papers

given at the first Pan American Congress for Psychoanalysis (Mexico City), March 1964. Robert E. Litman, Ed. International Universities Press, New York, 1966. 327 pp. $7.50. There are 13 papers.

Readings in Clinical Psychology. R. D. Savage, Ed. Pergamon, New York, 1966. 821 pp. Illus. $23. There are 44 papers.

Scientific Aspects of Pest Control. A symposium arranged and conducted by the National Academy of Sciences–National Research Council (Washington, D.C.), February 1966. C. E. Palm, chairman, Steering Committee. Natl. Acad. of Sciences–Natl. Research Council, Washington, D.C., 1966. 482 pp. Illus. Paper, $5. There are 28 papers.

The Structure and Function of Animal Cell Components. An introductory text. P. N. Campbell and M. A. Epstein. Pergamon, New York, 1966. 165 pp. Illus. Paper, $3.45. Commonwealth and International Library.

Structure, Form, Movement. Heinrich Hertel. Translated from the German edition (Mainz, 1963) by Scripta Technica. Milton S. Katz, Translation Ed. Reinhold, New York, 1966. 263 pp. Illus. $17.50.

Supplement to Smith's Marine Algae of the Monterey Peninsula. George J. Hollenberg and Isabelle A. Abbott. Stanford Univ. Press, Stanford, Calif., 1966. 142 pp. Illus. $3.50.

Swine in Biomedical Research. Proceedings of a symposium (Richland, Wash.), July 1965. Sponsored by the Division of Biology and Division of Technical Information, United States Atomic Energy Commission and Pacific Northwest Laboratories Division, Battelle Memorial Institute. Leo K. Bustad and Roger O. McClellan, Eds. Battelle Memorial Institute, Richland, Wash., 1966 (available from Frayn Printing Co., 2518 Western Ave., Seattle, Wash. 98121). 846 pp. Illus. Paper, $12.50; cloth, $16.50. There are 79 papers. See Meetings, *Science* **152**, 1526 (10 June 1966).

Synopsis of Gross Anatomy. John B. Christensen and Ira Rockwood Telford. Harper and Row, New York, 1966. 256 pp. Illus. $5.95.

The Thymus: Its Role in Immune Responses, Leukaemia Development and Carcinogenesis. Donald Metcalf. Springer-Verlag, New York, 1966. 154 pp. Illus. $6. Recent Results in Cancer Research, vol. 5.

Tools of Biology. Edward S. Lenhoff. Macmillan, New York, 1966. 128 pp. Illus. Paper, $1.95. Current Concepts in Biology Series.

Treating the Troubled Family. Nathan W. Ackerman. Basic Books, New York, 1966. 320 pp. $7.50.

Variation in Chemical Composition of the Nervous System as Determined by Developmental and Genetic Factors. G. B. Ansell, Ed. Pergamon, New York, 1966. 119 pp. Paper, $4. Abstracts of papers presented at the International Neurochemical Conference (Oxford, England), July 1965.

Vasoactive Amines—Treatment of Shock. Assemblée annuelle de la Société suisse d'Angéïologie en commun avec la Société suisse de Cardiologie (Lausanne), November 1965. J. L. Schelling and L. K. Widmer, Eds. Karger, Basel, Switzer-

land, 1966 (order from Phiebig, White Plains, N.Y.). 142 pp. Illus. Paper, $10.85. Four papers.

Vertebrate Biology. Robert T. Orr. Saunders, Philadelphia, ed. 2, 1966. 495 pp. Illus. $8.

Zinc Metabolism. Ananda S. Prasad, Ed. Thomas, Springfield, Ill., 1966. 481 pp. Illus. $16.75. There are 23 papers.

General

The American Heritage Pictorial Atlas of United States History. Editors of *American Heritage*. American Heritage; McGraw-Hill, New York, 1966. 424 pp. Illus. $12.95 until 25 December; thereafter $16.50; Deluxe edition, $15.45 until 25 December; thereafter $19.

Australian Academy of Science Yearbook. Australian Acad. of Science, Canberra City, 1966. 97 pp.

The Birds of Tikal. Frank B. Smithe. Published for the American Museum of Natural History. Natural History Press, Garden City, N.Y., 1966. 380 pp. Illus. $7.50.

British Palaeozoic Fossils. British Museum (Natural History), London, ed. 2, 1966. 216 pp. Illus. Paper, 12s. 6d.

The Contributions of Faraday and Maxwell to Electrical Science. R. A. R. Tricker. Pergamon, New York, 1966. 299 pp. Illus. Paper, $4.50. Commonwealth and International Library.

Elections and the Political Order. Angus Campbell, Philip E. Converse, Warren E. Miller, and Donald E. Stokes. Wiley, New York, 1966. 395 pp. Illus.

Entretiens avec Pierre Aigrain: sur l'homme de science dans la société contemporaine. Georges Charbonnier. Presses Universitaires de France, Paris, 1966. 129 pp. Paper, F. 7.

Sigmund Freud und die Wiener Universität. K. R. Eissler. Verlag Hans Huber, Bern, Switzerland, 1966. 191 pp. Paper, DM. 25.

From Earth to Heaven. Isaac Asimov. Doubleday, Garden City, N.Y., 1966. 216 pp. $4.50.

Future Environments of North America. A conference (Warrenton, Va.), April 1965. Sponsored by The Conservation Foundation. F. Fraser Darling and John P. Milton, Eds. Natural History Press, Garden City, N.Y., 1966. 785 pp. Illus. $12.50. There are 34 papers.

A Geologist's View of Cape Cod. Arthur N. Strahler. Published for the American Museum of Natural History. Natural History Press, Garden City, N.Y., 1966. 125 pp. Illus. $4.95.

Great Undersea Adventures. Helen Wright and Samuel Rapport. Harper and Row, New York, 1966. 391 pp. $4.95. There are 18 stories.

The Human Machine: Adjustments. Rémy Chauvin and others, Eds. Doubleday, Garden City, N.Y., 1966. 159 pp. Illus. $9.95. Encyclopedia of the Life Sciences, vol. 7.

The Hyksos: A New Investigation. John Van Seters. Yale Univ. Press, New Haven, Conn., 1966. 240 pp. Illus. $6.50.

The Inner Ring. The early history of the National Research Council of Canada.

Mel Thistle. Univ. of Toronto Press, Toronto, Canada, 1966. 469 pp. $7.

The Integration of Technologies. Leslie Holliday, Ed. Hutchinson, London, 1966. 167 pp. Illus. 30s. There are 15 papers.

Interactions of Man and His Environment. Proceedings of the Northwestern University Conference (Evanston, Ill.), January 1965. Burgess H. Jennings and John E. Murphy, Eds. Plenum Press, New York, 1966. 180 pp. Illus. $9.50. There are 17 papers.

An Inventory of Geographic Research of the Humid Tropic Environment. vol. 1, *KWIC Index Humid Tropic Environmental Literature*. Harvey Vogel, Texas Instruments, Dallas, 1965. Unpaged. Contains five sections: Frequency of Stop Words; Frequency of OK Words; Author Listing and Index; Key Word Listing and Index; and Bibliographic Listing and Index.

Knowledge and Power: Essays on Science and Government. Sanford A. Lakoff, Ed. Free Press (Macmillan), New York, 1966. 512 pp. $10.95. There are 15 papers.

Land, Sea, and Sky. An introduction to the wonders of natural science. George Groh. Macmillan, New York, 1966. 94 pp. Illus. $2.95. Juvenille book.

The Literature of Agricultural Planning. J. Price Gittinger. Natl. Planning Assoc., Washington, D.C., 1966. 136 pp. Paper, $2. Planning Methods Series No. 4.

LSD on Campus. Warren R. Young and Joseph R. Hixson. Dell, New York, 1966. 192 pp. Illus. Paper, 60¢.

Man and Space. Lester M. Hirsch. Pitman, New York, 1966. 218 pp. Paper, $2.95.

Man of Tomorrow. Jean Rostand and others. Doubleday, Garden City, N.Y., 1966. 159 pp. Illus. $9.95. Encyclopedia of the Life Sciences, vol. 8.

Marsh's Dinosaurs: The Collections from Como Bluff. John H. Ostrom and John S. McIntosh. Yale Univ. Press, New Haven, Conn., 1966. 402 pp. Illus. $15.

Mathematics on Vacation. Joseph S. Madachy. Scribner, New York, 1966. 251 pp. Illus. $6.95.

The Natural History of Palms. E. J. Corner. Univ. of California Press, Berkeley, 1966. 403 pp. Illus. $12.95.

The Ocean Adventure: Science Explores the Depths of the Sea. Gardner Soule. Appleton-Century, New York, 1966. 288 pp. Illus. $5.95.

L'organisation de l'espace: Eléments de géographie volontaire. Jean Labasse. Hermann, Paris, 1966. 605 pp. Illus. 75 F.

Protecting our Food. Jack Hayes, Ed. U.S. Department of Agriculture, Washington, D.C., 1966. 416 pp. Illus. $2.50. There are 41 papers in this yearbook.

The Rise and Fall of Maya Civilization. J. Eric S. Thompson. Univ. of Oklahoma Press, Norman, ed. 2, 1966. 344 pp. Illus. $5.95.

Science Year, 1966. The World Book Science Annual. Field Enterprises Educational Corp., Chicago, 1966. 443 pp. Illus.

Seabirds of the Tropical Atlantic Ocean. George E. Watson. Smithsonian Press, Washington, D.C., 1966. 120 pp. Plates. $3.75.

Le Soleil. Raymond Michard. Presses Universitaires de France, Paris, 1966. 128 pp. Illus. Paper, F. 2. 50. Que Sais-Je Series.

Strategic Terminology. Urs Schwarz and Laszlo Hadik. Pall Mall Press, London; Praeger, New York, 1966. 159 pp. $6.75. A compilation of more than 100 terms with definitions and a short explanation of the term in English, French, and German.

Submarine Canyons and Other Sea Valleys. Francis P. Shepard and Robert F. Dill. Rand McNally, Chicago, 1966. 397 pp. Illus. Maps. $9.75.

The Universe: From Flat Earth to Quasar. Isaac Asimov. Walker, New York, 1966. 320 pp. Illus. $6.50.

Reprints

Cooperation in Change. An anthropological approach to community development. Ward Hunt Goodenough. Wiley, New York, 1966. 549 pp. Paper, $2.95. Reprint, 1963 edition.

Dielectrics and Waves. Arthur R. von Hippel. M.I.T. Press, Cambridge, Mass., 1966. 298 pp. Illus. Paper, $5.95. Reprint, 1954 edition.

The Elements of Probability Theory and Some of Its Applications. Harald Cramér. Wiley, New York, 1966. 281 pp. Illus. Paper, $1.95. Reprint, 1955 edition.

Experimental and Quasi-Experimental Designs for Research. Donald T. Campbell and Julian C. Stanley. Rand McNally, Chicago, 1966. 94 pp. Illus. Paper, $1.95. Reprinted from *Handbook of Research on Teaching* (1963).

Extra-Sensory Perception After Sixty Years. A critical appraisal of the research in extrasensory perception. J. G. Pratt, J. B. Rhine, Burke M. Smith, Charles E. Stuart, and Joseph A. Greenwood. Humphries, Boston, 1966. 475 pp. Illus. $5.95. Reprint, 1940 edition.

Flying Saucers: The Startling Evidence of the Invasion from Outer Space. Coral E. Lorenzen. New American Library, New York, 1966. 278 pp. Illus. Paper, 75¢. Reprint, *The Great Flying Saucer Hoax* (1962).

Fundamentals of Ornithology. Josselyn Van Tyne and Andrew J. Berger. Wiley, New York, 1966. 636 pp. Illus. Paper, $2.95. Reprint, 1959 edition.

The Method and Theory of Ethnology: An Essay in Criticism. Paul Radin. Basic Books, New York, 1966. 398 pp. $7.50. Reprint, 1933 edition. Classics in Anthropology Series.

Mushrooms, Molds, and Miracles: The Strange Realm of Fungi. Lucy Kavaler. New American Library. New York, 1966. 256 pp. Illus. Paper, 75¢. Reprint, 1965 edition.

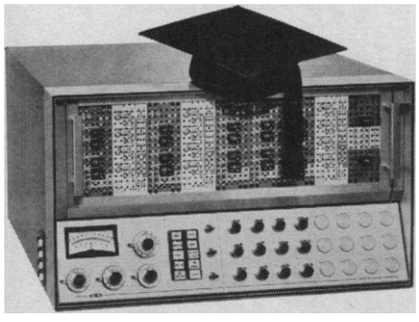
New Patterns in Genetics and Development. C. H. Waddington. Columbia Univ. Press, New York, 1966. 285 pp. Illus. Paper, $2.95. Reprint, 1962 edition.

Patterns in Criminal Homicide. Marvin E. Wolfgang. Wiley, New York, 1966. 427 pp. Paper, $2.45. Reprint, 1958 edition.

Prehistoric Europe: The Economic Basis. J. G. D. Clark. Stanford Univ. Press, Stanford, Calif., 1966. 385 pp. Illus. $15. Reprint, 1952 edition.

Prelude to Chemistry. An outline of alchemy: Its literature and relationships. John Read. M.I.T. Press, Cambridge,

World's most sophisticated little computer:

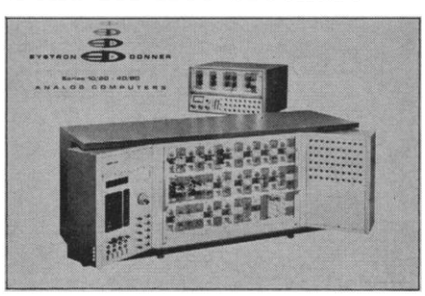


Systron-Donner's desk-top analog computers are available with built-in digital logic that enables you to solve problems the way the big computers do. You can program sub-routines. Run iterative solutions at rates up to 100 computations per second. Change nearly any parameter automatically during a computation. For example, initial conditions, coefficients, fixed voltages and patchboard connections can be programmed to change at a preset time or when a variable reaches a preset value.

Though capable of these sophisticated operations, Systron-Donner computers are unusually simple to set up. The removable patchboards are coded to match textbook diagrams. A "static check" button verifies integrator amplitude scaling instantly. A "dynamic check" button tests integrator time scaling without disturbing patching.

The 20-amplifier computer shown here is our smallest. We have 40 and 100-amplifier models. All use identical plug-in components. To get a good, close look at what you can do with these extraordinary computers, send for our abundantly illustrated 16-page brochure.

Send for free brochure



SYSTRON DONNER

Systron-Donner Corporation,
888 Galindo Street, Concord, California

Ready January!

ENGINEERING IN THE PRACTICE OF MEDICINE

This new book explains the engineering concepts and methods which have been so fruitful in modern medical research, diagnosis and treatment. Such topics as ultrasonics, cinefluorography, thermography, microsurgery, hyberbaric oxygenation, cryosurgery, hypothermia, cardiac "pacemakers," the artificial heart, lung and kidney machines, are among the subjects covered, and in many cases by the world-renowned authority on the subject.

Edited by Bernard L. Segal, M.D., Department of Medicine, Hahnemann Medical College, Philadelphia; and David G. Kilpatrick, Head, Biomedical Engineering Division, American Electronic Laboratories, Inc. 1967, 486 pp., 249 figs., $20.00.

THE WILLIAMS & WILKINS CO.
428 EAST PRESTON STREET
BALTIMORE, MD. 21202

Publishers of Books and Periodicals in Medicine and the Allied Sciences.

SPEED UP YOUR RESEARCH

Just drop L/I Automatic REPIPETS* and Automatic Dilutors into your reagent bottles. They'll dispense, transfer, mix, aspirate and dilute with a guaranteed accuracy of 1% and 0.1% reproducibility. Because these two automatic L/I instruments complete any operation in only a few seconds, you cut your analysis time 50-95%, speeding up your research considerably.

L/I's versatile instruments handle any liquid—acids, alkalies, solvents and volatiles included—with viscosities as high as 45 centipoises. Because there's no drainage error, you'll get 1% accuracy and 0.1% reproducibility even with viscous liquids.

L/I instruments give you complete freedom from contamination, require no change in your methods, and never need cleaning. Integral air filters keep reagents pure. Volume? From microliters to deciliters.

Dilutors $89.50, including complete set of tips for highest precision in all ranges. REPIPETES $47.50. Immediate delivery in 1, 10, 20, and 50 ml sizes. Please write for details.

* Trademark—(REpetitive PIPETS)

LABINDUSTRIES

1802-X Second Street
Berkeley, California 94710
TH 3-0220, Cable LABIND