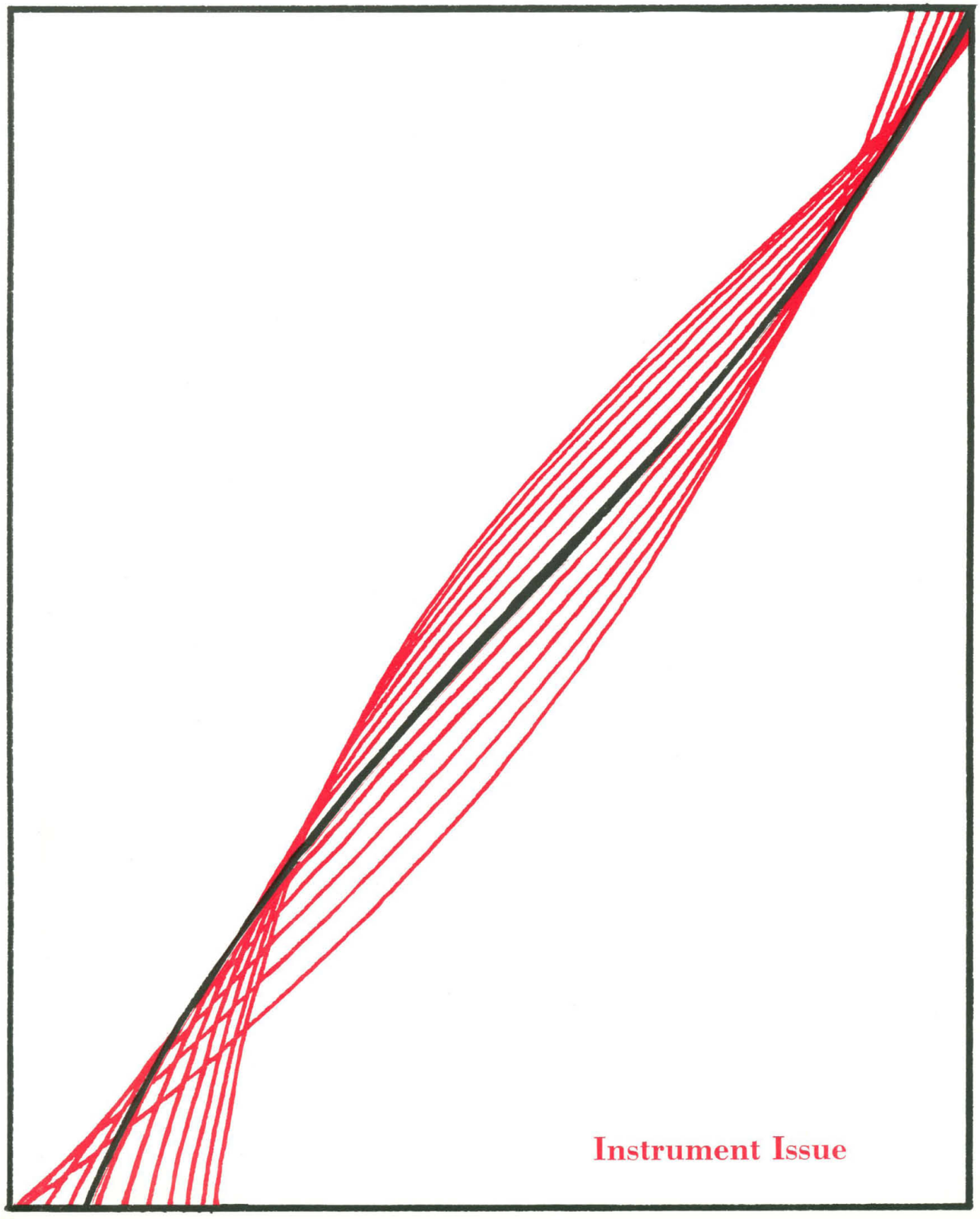
SCIENCE

15 October 1976

Volume 194, No. 4262

AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE



Instrument Issue

LKB RediRac

A new economy-priced fraction collector with the quality you have come to expect

Fill in the coupon and we will tell you why. If the coupon has already been used, write or phone for immediate information to the address below.

YES! Send to: LKB Instruments Inc., 12221 Parklawn Drive, Rockville MD. 20852

I'm interested in information about

- ☐ RediRac Fraction Collector
- ☐ VarioPerpex II Pump
- ☐ LKB Instrument Catalogue and poster on Preparative Separation Principles in Biochemistry.

Title Name

Address

Telephone Ext

Every lab should have one, and can afford to have several

LKB

LKB Instruments Inc.
12221 Parklawn Drive, Rockville MD. 20852

Collect in:
160 tubes, diam 12mm
100 tubes, diam 16mm
45 scintillation vials

Circle No. 306 on Readers' Service Card

"I have used Revco freezers for the past 10 years. Nothing can compare to their dependability."
Rockville, Maryland

"Reliability, high performance. . ."
Republic of Singapore

"We've used Revco's in our department for years. We have had excellent service."
Iowa City, Iowa

"Completely satisfied with performance of the first unit. It has been in service over 10 years!"
Windsor, Ontario

At Revco, we know we're doing our job when we receive comments like these. For over 36 years Revco has built its reputation around the world by designing and manufacturing freezers that are not only dependable, but economical to operate.

Our concern for you, the customer, **does not end** with selling you what we feel to be the finest freezer obtainable. Revco goes far beyond normal industry standards with features such as listing by Underwriters Laboratories, Inc. because we care about your safety; a nation-wide network of factory-trained people to assist and serve you; and a warranty that's second to none.

When you need dependable ULTra-Low® temperature, you need Revco.

For additional information and a copy of our new, full-color catalog, contact: Curtin-Matheson, Fisher Scientific, Scientific Products, VWR Scientific. In Canada: Canlab, Fisher Scientific, Ingram & Bell.

The world's leader in ULTra-Low® temperature equipment.

REVCO, INC.

1100 Memorial Drive, West Columbia, S. C. 29169
Telephone: 803/796-1700 TWX: 810-666-2130 Cable: Revco

Circle No. 308 on Readers' Service Card

(The comments appearing above were unsolicited and are on file at Revco for inspection.)

15 October 1976

Volume 194, No. 4262

SCIENCE

BOARD OF DIRECTORS

MARGARET MEAD, Retiring President, Chairman
WILLIAM D. MC ELROY, President
EMILIO Q. DADDARIO, President-Elect
RICHARD H. BOLT
KENNETH B. CLARK
JOEL COHEN
RUTH M. DAVIS

CHAIRMEN AND SECRETARIES OF AAAS SECTIONS

MATHEMATICS (A): Stanislaw M. Ulam, Truman A. Botts
PHYSICS (B): Freeman J. Dyson, Rolf M. Sinclair
CHEMISTRY (C): Henry A. Hill, Leo Schubert
ASTRONOMY (D): Robert B. Leighton, Arlo U. Landolt
PSYCHOLOGY (J): Wilber J. McKeachie, Edwin P. Hollander
SOCIAL AND ECONOMIC SCIENCES (K): William H. Sewell, Daniel Rich
HISTORY AND PHILOSOPHY OF SCIENCE (L): Kenneth F. Schaffner, George Basalla
ENGINEERING (M): Walter R. Hibbard, Jr., Paul H. Robbins
EDUCATION (Q): Mary Budd Rowe, James T. Robinson
DENTISTRY (R): James K. Avery, Sholom Pearlman
PHARMACEUTICAL SCIENCES (S): Joseph P. Buckley, Raymond Jang
INFORMATION, COMPUTING, AND COMMUNICATION (T): Burton W. Adkinson, Joseph Becker

DIVISIONS

ALASKA DIVISION: George C. West, Chairman, Executive Committee; Keith B. Mather, Executive Secretary
PACIFIC DIVISION: Richard Walker, President; Alan E. Leviton, Secretary-Treasurer
SOUTHWESTERN AND ROCKY MOUNTAIN DIVISION: Erik K. Bonde, President; Max P. Dunford, Executive Officer

SCIENCE is published weekly, except the last week in December, but with an extra issue on the fourth Tuesday in November, by the American Association for the Advancement of Science, 1515 Massachusetts Ave., NW, Washington, D.C. 20005. Now combined with **The Scientific Monthly®**. Second-class postage paid at Washington, D.C., and additional entry. Copyright © 1976 by the American Association for the Advancement of Science. Member rates on request. Annual subscription $50; foreign postage: Canada $10, other $13, air lift to Europe $30. Single copies $2 (back issues $3) except Materials Issue (20 Feb. 1976) is $3 and **Guide to Scientific Instruments** is $6. School year subscription: 9 months $37.50; 10 months $41.75. Provide 6 weeks' notice for change of address, giving new and old address and zip codes. Send a recent address label. **Science is indexed in the Reader's Guide to Periodical Literature.**

AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE

MIKE MC CORMACK
FREDERICK MOSTELLER

CHAUNCEY STARR
CHENNING YANG

WILLIAM T. GOLDEN
Treasurer

WILLIAM D. CAREY
Executive Officer

GEOLOGY AND GEOGRAPHY (E)
Helen L. Cannon
Ramon E. Bisque

BIOLOGICAL SCIENCES (G)
Edwin L. Cooper
Jane C. Kaltenbach

ANTHROPOLOGY (H)
David G. Mandelbaum
Philleo Nash

MEDICAL SCIENCES (N)
Harold Wayland
Richard J. Johns

AGRICULTURE (O)
Orville G. Bentley
J. Lawrence Apple

INDUSTRIAL SCIENCE (P)
Burton V. Dean
Robert L. Stern

STATISTICS (U)
Emanuel Parzen
Ezra Glaser

ATMOSPHERIC AND HYDROSPHERIC SCIENCES (W)
Fred D. White
Stanley A. Changnon, Jr.

GENERAL (X)
Gordon J. F. MacDonald
Joseph F. Coates

The American Association for the Advancement of Science was founded in and incorporated in 1874. Its objects are to further the work of scientists, to facilitate cooperation among them, to improve the effectiveness of science in the promotion of human welfare, and to increase public understanding and appreciation of the importance and promise of the methods of science and human progress. Postmaster: Send Form 3579 to SCIENCE, 1515 Massachusetts Avenue, NW, Washington, D.C. 200005.

COVER

Family of computer-generated radioimmunoassay curves. The black line most closely fits the data, while the red lines show the successive approximations used to achieve this fit. This iterative method of curve fitting is useful for the on-line calculation of automated radioimmunoassays. See page 270. [G. Brooker *et al.*, University of Virginia School of Medicine, Charlottesville]

Coming Attractions from Saunders

DE WITT: Biology of the Cell: An Evolutionary Approach

Avoiding a "catalog" approach to the study of cell features, this introductory text emphasizes evolutionary development. The author's narrative style skillfully incorporates reviews of basic chemistry, pH, basic biochemical information, and introductory aspects of cytology and molecular genetics wherever appropriate. His eclectic account of the evolution of living systems draws on theories of workers such as Oparin and Margulis. This book will fit well into an introductory "core" sequence, either before or after courses in organismic biology.

By **William De Witt,** Williams College. About 510 pp., 275 ill. About $13.75. Just Ready. **Order #3045-6.**

DE WITT & BROWN: Biology of the Cell: Laboratory Explorations

Well-conceived, class-tested experiments in cell biology—many never before adapted for undergraduates—are the cornerstone of this laboratory manual which reflects the evolutionary approach of the senior author's text. Of special interest are a number of unique experiments relating to theories on the chemical origin of life, particularly the formation of proteinoids and coacervates. No sophisticated equipment is needed to perform the experiments, and the manual can be used to complement virtually any introductory text in cell biology.

By **William De Witt** and **Eleanor R. Brown,** both of Williams College. About 205 pp. Illustd. Soft cover. About $6.95. Just Ready. **Order #3047-2.**

MAY: Theoretical Ecology: Principles and Applications

Both modern and cohensive, this book explores mathematical models depicting the essential dynamic features of plant and animal populations. The resulting theoretical insights are then related to empirical observations and applied to practical ecological problems. Intended for graduate students and advanced undergraduates, the book's approach is descriptive rather than mathematical. The authors assume only a rudimentary knowledge of calculus, and the biological meanings of the models are always prominent in the discussions. Coverage includes *population dynamics, ecosystem studies and their relevance to land use strategies, sociobiology, paleobiology, the design of natural reserves, ecology and economics,* and *strategies for integrated pest control.*

Edited by **Robert M. May,** Princeton Univ.; with 10 contributors. 317 pp. Illustd. $13.50. Sept. 1976. **Order #6205-6.**

CARPENTER: Microbiology *Fourth Edition*

Completely revised and up-dated, the new 4th edition of Carpenter's **Microbiology** maintains the same student-orientation and thoroughness of coverage that have long made it popular with students and teachers alike. The chapter on systematic study of bacteria has been completely rewritten to bring it in line with the 8th edition of Bergey's Manual; the nomenclature of genera and species has been up-dated throughout the text. The chapter on bacterial metabolism has been totally restructured; and there have been further additions to an already excellent group of illustrations. With the inclusions of sections on applied microbiology and infectious diseases—featuring the best immunologic coverage of any similar text—Carpenter's new edition is the perfect microbiology text for students in any life science discipline. An accompanying **Instructor's Manual** is also available.

By **Phillip L. Carpenter,** Univ. of Rhode Island. About 500 pp. Illustd. (with 4 color plates). Ready March 1977. **Order #2438-3.**

HORN: Biology of Insects

Here's an interesting, balanced approach to the study of insects, and how they function and interact within their environment. An introductory-level text suitable for courses in a wide range of life and agricultural sciences, it presents insects as organisms which have evolved adaptive solutions to the problems of survival. The author covers the broad spectrum of the insect kingdom in terms of anatomy, physiology and ecology with frequent references to insects that are familiar to students. Emphasis on the interaction of insects with humans reveals insects as both benefactors and pests.

By **David J. Horn,** The Ohio State Univ. 439 pp. 315 ill. About $13.50. Just Ready. **Order #4780-4.**

BAER: The Genetic Perspective

The Genetic Perspective explains the relevance and value of genetic knowledge in everyday life. Designed for the non-science major, it teaches students the essentials of genetics and evolution without overburdening them with the details found in more technically-oriented books. Topics include *genetic counseling, cancer, aging, plant breeding,* and *recombinant DNA.* And, by drawing on examples from a broad cross-cultural range (from South Sea Islanders, to Navajo Indians, to rock star Johnny Winter), the author maintains a level of relevance your students will readily appreciate.

By **Adela D. Baer,** San Diego State Univ. About 350 pp. Illustd. Ready Jan. 1977. **Order #1471-X.**

VILLEE: Biology *Seventh Edition*

Emphasizing biology with a human orientation, this new 7th edition maintains Villee's reputation for stimulating high student interest. Perfect for serious introductory courses, its extensive survey of the kinds of living things follows the Whittaker five kingdom phylogenetic scheme. Botanical coverage has been revised, rewritten and better illustrated to include modern terminology and current ideas on plant evolution and phylogeny. Physiological coverage, particularly involving humans, is accentuated with brief discussions of and allusions to topics of medical concern. New to this edition, you'll find: *a complete reorganization (and some simplification) of material on cellular biology and biochemistry; a new chapter on human ecology; careful up-dating of data from active research areas including eukaryotic molecular biology, membrane structure, and the immune system;* and *a refurbishing, replacement or addition of literally hundreds of figures.* A valuable **laboratory manual** by Clinton F. Schonberger is also available.

By **Claude A. Villee,** Harvard Univ. Medical School. About 900 pp. Illustd. Ready Feb. 1977. **Order #9023-8.**

CUSHING & WALSH: The Ecology of the Seas

Designed to meet the needs of graduate and advanced undergraduate students, this unique volume features well-balanced yet compact coverage of marine ecology. The authors have synthesized a number of distinctive viewpoints from international scientific experts to provide a quantitative approach to the analysis of marine ecosystems. Topics range from *primary production* to *fisheries;* from *descriptions of flora and fauna* to *integrative models.*

Edited by **D. H. Cushing,** Fisheries Laboratory, Lowestoft, Suffolk, U.K.; and **J. J. Walsh,** Univ. of Washington, Seattle; with 14 contributors. 467 pp. 132 ill. About $19.50. Just Ready. **Order #2812-5.**

ROMER & PARSONS: The Vertebrate Body *Fifth Edition*

A standard for any course in comparative anatomy, the fifth edition of this classic text has undergone a vigorous revision under the authorship of Dr. Parsons. Maintaining Dr. Romer's overall emphasis on phylogeny and paleontology, the text also incorporates significant insights from functional studies. You'll see evidence of up-dated information on virtually every page, in addition to many new illustrations. There's also been a substantial expansion of Chapter 3 *(Who's Who Among the Vertebrates)* and the shortening and modernization of Chapter 4 *(Cells and Tissues).*

By the late **Alfred Sherwood Romer,** formerly of Harvard Univ.; and **Thomas S. Parsons,** Univ. of Toronto. About 600 pp. Illustd. Ready April 1977. **Order #7668-5.**

TURNER & BAGNARA: General Endocrinology *Sixth Edition*

To keep pace with the wealth of new information that has emerged in endocrinology over the past five years, this leading introductory text has undergone a major facelift for its sixth edition. Virtually every chapter has been rewritten to incorporate new material on: *mechanisms of hormone action, secretion and assay; neuroendocrinology (now covered in a separate chapter); the ultrastructure of endocrine glands; the biochemical nature of hormones; the evolution of hormones and the recognition of new ones such as cholecalciferol; the endocrine role of the pineal gland;* and *new data on prostaglandins, the role of Vitamin D as a hormone, chalones, nerve growth factor and pheromones.* Many new electron micrographs, line drawings and summary tables complement the text. As in previous editions, emphasis is on the basics, with examples drawn from both clinical and comparative endocrinology.

By **C. Donnell Turner,** Duquesne Univ.; and **Joseph T. Bagnara,** Univ. of Arizona. 596 pp. 203 ill. $15.95. Sept. 1976.
Order #8933-7.

GRAHAM & WAREING: The Developmental Biology of Plants and Animals

Written for advanced courses on the senior/graduate level, this informative text is quite distinctive in its balanced treatment of both plant and animal development. Unifying and synthesizing information from many disciplines, the authors' in-depth coverage of topics relevent to general developmental problems includes *the origin of cell heterogeneity, determination and pleuripotentiality, cell interaction, hormonal control, molecular biology,* and *environmental control.* To ensure greater continuity of discussion, each section has been introduced, summarized and extensively cross-referenced.

Edited by **C. F. Graham,** Oxford Univ.; and **P. F. Wareing,** Univ. College of Wales; with 18 contributors. About 400 pp., 200 ill. About $17.95. Ready Late 1976. **Order #4205-5.**

WALKER: A Study of the Cat with Reference to Human Beings *Third Edition*

Long-recognized as a valuable tool in the study of mammalian anatomy, the new third edition of this instructive manual features 34 new figures along with an appendix of Greek and Latin roots of anatomical terms. Extensively revised, it includes: *more information on mechanical forces involved in the evolution of the skull; new discussion of the biomechanics of the jaw that clarifies the differences between carnivores, gnawing herbivores, and omnivores; comparison of fetal, neonatal and adult circulation; new information on the functional significance of the carotid rete mirabile;* and *expanded comparisons with human structure.*

By **Warren F. Walker, Jr.,** Oberlin College. About 200 pp., 110 ill. (some in color). Soft cover. About $6.50. Ready March 1977.
Order #9093-9.

W.B. Saunders CO.

West Washington Square, Philadelphia, PA 19105
833 Oxford Street, Toronto, Ontario M8Z 5T9 Prices subject to change.

To examine titles on 30-day approval, please enter order number and (first) author:

☐ check enclosed (Saunders pays postage) ☐ send C.O.D. ☐ bill me Science 10/15/76

FULL NAME (Please Print) POSITION

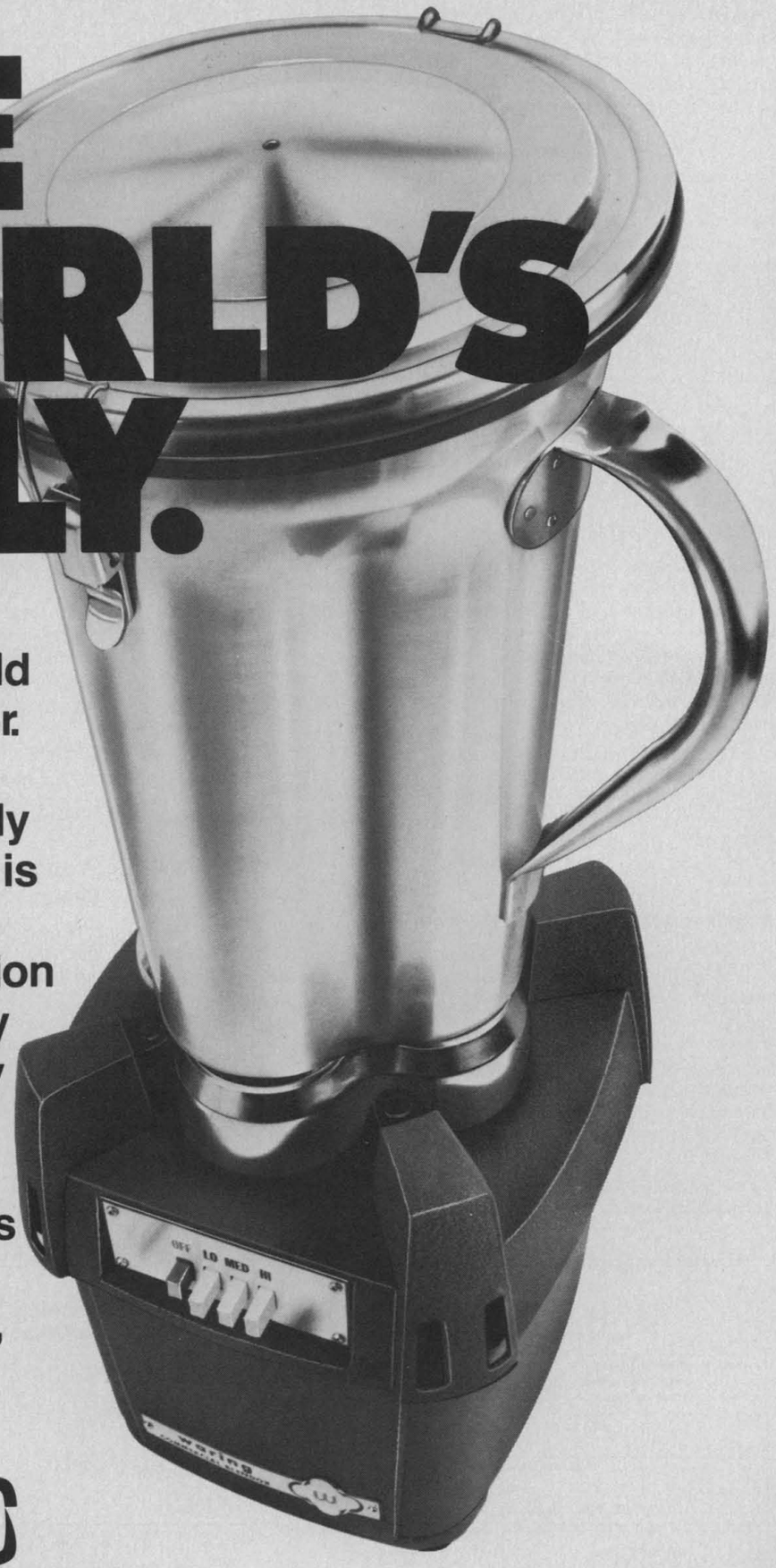
AFFILIATION ADDRESS

CITY STATE ZIP PURCHASE ORDER NUMBER

Educators: to examine titles for adoption consideration, please specify:

COURSE ENROLLMENT PRESENT TEXT

THE WORLD'S ONLY.



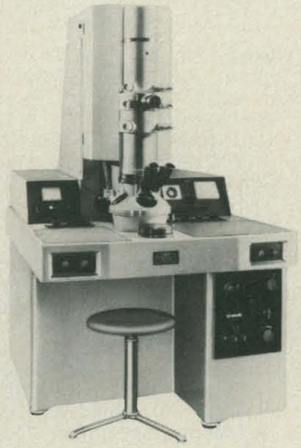
The only 1 gallon Blendor in the world is a Waring Blendor. The only Blendor designed especially for laboratory use is a Waring Blendor. For more information on the world's only Waring Laboratory Blendor write: Waring Products Division, Dynamics Corporation Of America, Route 44, New Hartford, Conn. 06057.

waring

Circle No. 38 on Readers' Service Card

Electron Microscopes – ZEISS

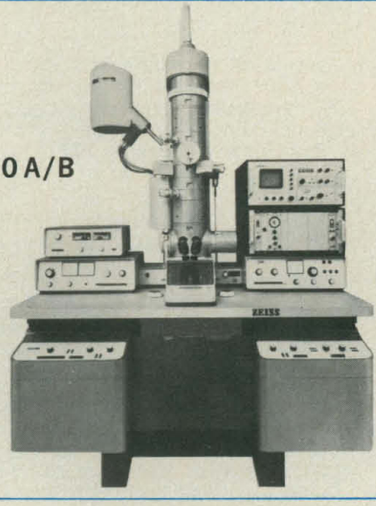
ZEISS EM 9 S-2



Transmission electron microscope
7 Å p.t.p.

Fully automatic camera system includes identification of negatives. Extremely simple to operate. Small size. Big performance. Low price. Zoom or fixed-step magnifications from 30x to 60,000x—distortion-free with direct read-out. Focusing aid. Multiple (21 openings) thin-metal film aperture. Specimen exchange through foolproof airlock in 8 secs; stereo tilt.
Reader service number 206.

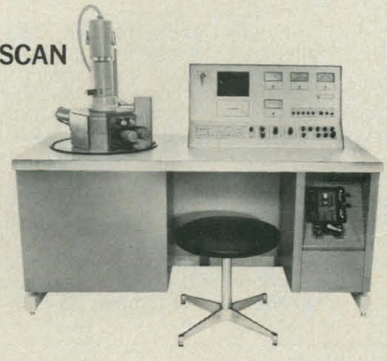
ZEISS EM 10 A/B



High-resolution transmission electron microscope
3.5 Å p.t.p.

Now two models: EM10A, 100x—200,000x; EM10B, 100x—500,000x. Easy, foolproof operation. Full X-ray protection. High-resolution goniometer, multiple specimen holder, cartridges for cooling, heating, tensile testing. Fully automatic 3¼ x 4", 70mm and 35mm camera systems, with unique 5-character automatic data imprint. Accepts X-ray element analyzer of your choice.
Reader service number 207.

ZEISS NOVASCAN



Scanning electron microscope
100 Å (edge)

5x—150,000x magnification at all scan speeds. TV is standard. 15 and 30 kV, and 1—5 kV continuously variable. Large specimen chamber with 7 ports and unique top-plate lift for easy access to chamber and 5-axis goniometer stage. Foolproof push-button operation. Polaroid camera is standard, other cameras optional. Full range of accessories.
Reader service number 208.

ZEISS TGZ 3A

Particle size analyzer for automatic data analysis

Measures and counts particles directly from any micrograph. Where sophisticated and expensive image analysis systems reach their limitations in particle size analysis, the TGZ goes on counting (1,000 particles in 15 minutes). Provision for on-line or off-line computer analysis.
Reader service number 209.

Nationwide service.

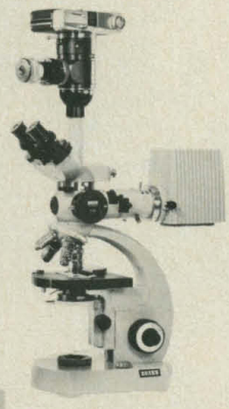
more→

ZEISS – Optical Microscopes

ZEISS Laboratory and Clinical Standard

Routine and research microscope

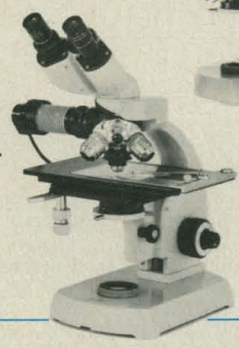
Great versatility and Zeiss quality at low price. Shown here are just three of many versions; others are for Pol, phase contrast, interference contrast, many other applications. Uses the same objectives as our large instruments: 131 to choose from. In-base Halogen illuminator.
Reader service number 210.



ZEISS Fluorescence Standard

Incident-light and/or transmitted-light fluorescence microscope

(Incident-light version shown with optional camera.) Wide range of optics, all free of autofluorescence. Complete filter package. Incident-light version eliminates oil problems, simplifies alignment, lets you combine fluorescence with conventional transmitted-light techniques. Transmitted-light version with Halogen illuminator is ideal for immunofluorescence.
Reader service number 211.

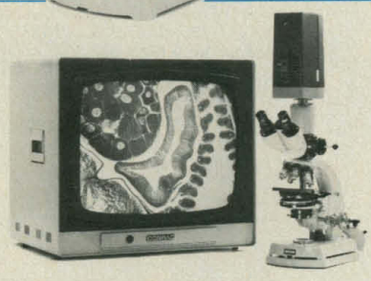


ZEISS Industrial Standard 20T

Electronics and semiconductor microscope

With 4x4" traveling stage—for large specimens in both incident and transmitted light—ideal for semiconductor and integrated circuit applications. Compact and rugged.
Reader service number 212.

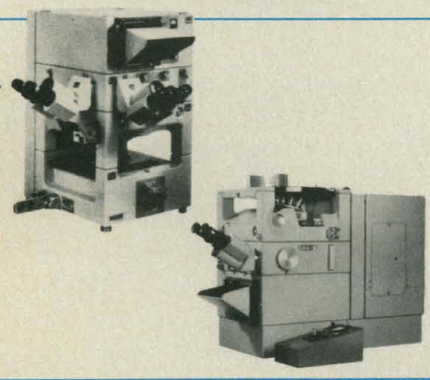
All Standards expandable with many Zeiss accessories, including still, movie and TV cameras.



ZEISS WL

Research microscope

(Shown with TV accessories.) Features include all those of the Standard Microscope plus an independent fine focus for critical work. The ideal TV microscope. Photochanger, TV tube, and special optics. Accepts any standard B&W or color TV camera. Available with zoom condenser and automatic grey-level control for instantaneous adjustment of image intensity when changing objectives. Also accepts all camera formats and all light sources.
Reader service number 213.

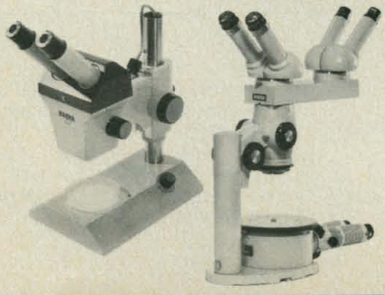


ZEISS AXIOMAT

For upright transmitted-(and reflected-) light microscopy

For inverted reflected-light microscopy

Ultimate stability for the most critical requirements in photomicrography and quantitative techniques, such as scanning microspectrophotometry and microinterferometry. Newly computed optics of unparalleled resolution and brilliance cover extremely wide fields. All features for optimum image display and documentation: 1:4 zoom projection between two real intermediate images of superb image quality, completely parfocal to all image planes; dual observation; two built-in fully automatic camera systems, 35mm and 4x5", in one module. Shown here are just two of many configurations.
Reader service number 214.



ZEISS DV4

ZEISS IVB

Stereomicroscopes

Stereo DV4 is a true high-resolution instrument with 1:4 zoom magnification system. Perfectly flat image from edge to edge. Wide-field eyepieces. Unique transmitted and reflected light illumination, all built into the compact unit.

Stereo IVB (shown with dual stereo observation system) is a zoom instrument with a 1:6 ratio and almost unlimited options: POL, transmitted or reflected light, many specimen stages, attachments for photography and drawing. Many stands.
Reader service number 215.

Nationwide service.

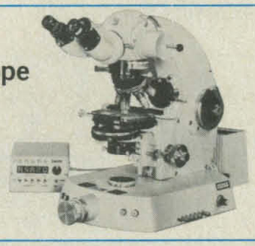
The Great Name in Optics – ZEISS

ZEISS Universal Microscope

The most universal microscope

(Shown with III RS vertical fluorescence illuminator and 35mm camera.) Accepts all accessories and all camera formats, including TV. Fully interchangeable optics and components for transmitted and reflected light, bright-field and dark-field, Nomarski interference contrast, phase contrast, polarization, fluorescence, Epi-fluorescence, and U. V.
Reader service number 216.

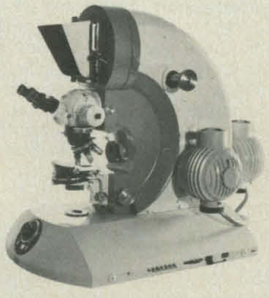
ZEISS Photomicroscope III



Completely integrated, fully automatic 35mm camera microscope

(Shown with new data recording system for safe identification of each photograph.) Electronics and all controls built into the base. A unique automatic flash with duration from 1/500 to 1/50,000 sec, and a highly sensitive automatic exposure system that works with 98% of the light directed to the film. Accepts auxiliary documentation and observation equipment.
Reader service number 217.

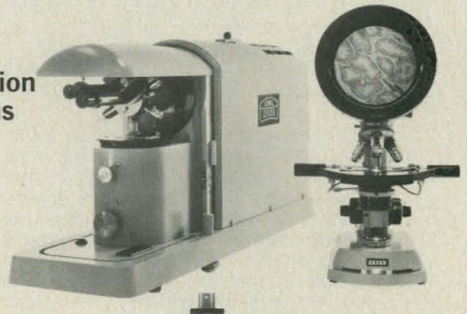
ZEISS Ultraphot IIIB



Fully automatic 4x5" camera microscope for photomacrography and photomicrography

The only fully automatic and enclosed scientific camera system for macro work with the famous Zeiss LUMINARS, and for photomicrography in all microscope techniques in transmitted and reflected light. Continuous magnification from 2.5x to the limits of light microscopy on the unique and convenient automatic 4x5" camera system, with correct exposure reading from the center of the image field. (Accepts other film formats as well.) 3 lamp housings can be simultaneously mounted; the flip of a lever selects the illumination source and mode.
Reader service number 218.

ZEISS Micro-projection Systems

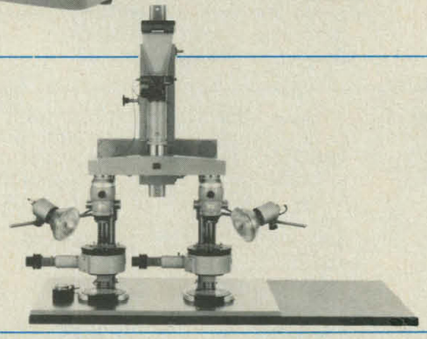


Revolver Micro-projector and Glarex Projection Screen

On the left, the Revolver Microprojector, a compact and self-contained system for macro and microprojection in the auditorium. Permanently mounted Luminar objectives for low-power projection; Planapochromats; oil-immersion objectives. Choice of four projectives for various projection distances.
Reader service number 219.

On the right, the Glarex high-resolution projection screen for conference viewing, eye-saving screening, and routine inspection. The unique screen eliminates the glare and grain you're used to seeing on other screens.
Reader service number 220.

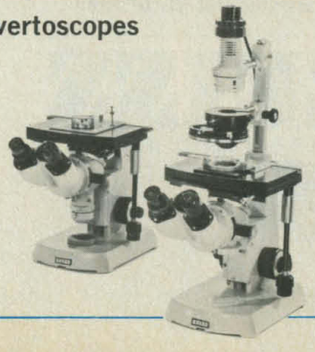
ZEISS Tessovar



Two Tessovar photomacrography systems combined for comparison

For forensic microscopy, or wherever comparisons need to be made over a wide continuous magnification range. Two zoom systems permit you to obtain identical magnifications. Can be coupled or worked independently. Images can be seen side-by-side or superimposed. Illumination in both transmitted and reflected light. Camera backs for all formats. The sturdy AC-stand is also available for all other microscopes —whenever extra stability is needed.
Reader service number 221.

ZEISS Invertoscopes D and M



Inverted microscopes

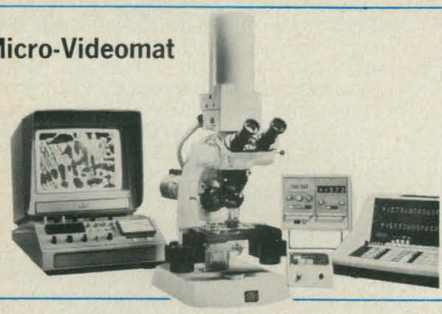
Model D for tissue culture studies provides extremely long working distances (70mm), by special LD condensers, and many special objectives for use with flasks and petri-dishes. Attachments for all microscope techniques. Ideal for neurophysiology, since the stage stays fixed for micromanipulation.
Reader service number 222.

Model M for incident light in bright-field, interference contrast, phase contrast. For study of opaque materials. Complete camera facilities, including Polaroid, for both models.
Reader service number 223.

more→

ZEISS – Quantitative...Analytical

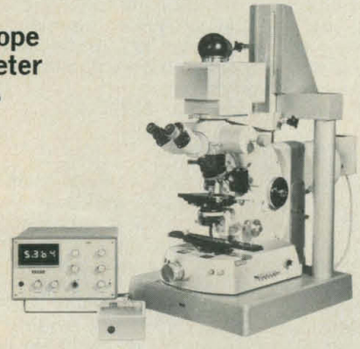
ZEISS Micro-Videomat



System for image analysis

A system for image analysis, designed for all Zeiss Research Microscopes. Rapid determination of geometric magnitudes, linear analysis and intensities or densities. Area, length, shape, particle count, size distribution, volume and weights can be determined in seconds. Manual or computer-controlled operation. Automatic shading corrector, scanning stages for systematic analysis. Extensive software for life and material sciences. Macro and TEM adapters.
Reader service number 224.

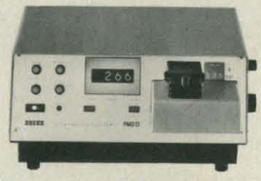
ZEISS Microscope Photometer Systems



MPM 01K
MPM 03 (shown)
Axiomat Photometer

Three different modular systems are now available to suit the widest range of application and to fit your budget. Such features as observation even during measurement make both routine and the most demanding research measurements now easier and more effective than ever before. Digital display of absorbance, transmittance, reflectance and fluorescence values. Zero-suppression, scale expansion analog and BCD output. Automatic triggering of shutters and apertures. All three Photometers can be expanded to computer-controlled scanning systems with variable step sizes. Extensive new software for automatic scanning, acquisition, reduction and processing of data for the PDP 11 computer system, PDP 8, 12 or Wang calculator.
Reader service number 225.

ZEISS PM2



Spectrophotometer

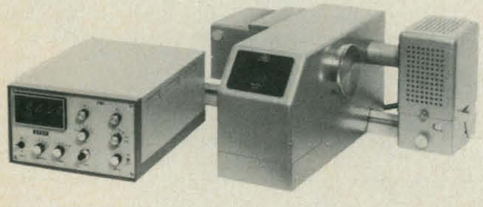
Low-priced precision-grating instrument particularly suitable for clinical use. Spectral range 200-850 nm, automatic blank reference. Excellent stability, unique sampling arrangement. Outputs for recorder and printer. Available as U. V. and visible monitor for Liquid Chromatography.
Reader service number 226.

ZEISS PM6

Spectrophotometers

A line of compact high-performance instruments consisting of several models, each tailored to specific applications. Features high-efficiency Double-Grating Monochromator, spectral range 200-800 nm. A minimum of controls for ease of operation. Unique sampling arrangements, automatic blank reference, excellent stability. Available in manual, semi-automatic and fully automatic versions, with documentation to suit every need, such as kinetics.
Reader service number 227.

ZEISS PMQ 3



Spectrophotometer

Modular Spectrophotometer with highest-efficiency prism monochromator. Spectral range 185-2500 nm. Numerous accessories, including reflectance attachments, automatic sample changer, automatic blank reference, gel scanner, TLC scanner. 4-digit display, 0-3 O.D., analog and BCD output, zero-suppression and scale expansion. The indicator unit is also available separately to up-date all existing PMQ Spectrophotometers.
For PMQ3, circle number 228.
For indicator unit, circle 229.

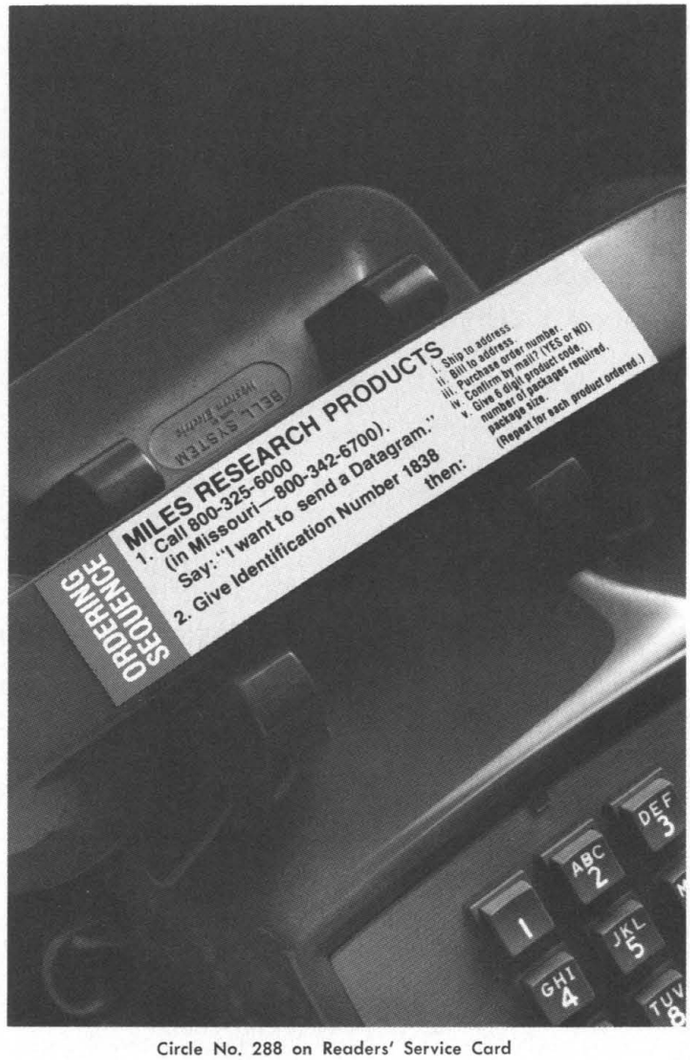
Nationwide service.

ZEISS
THE GREAT NAME IN OPTICS
CARL ZEISS WEST GERMANY

Carl Zeiss, Inc., 444 5th Ave., N.Y., N.Y. 10018 (212) 730-4400. Branches in: Atlanta, Boston, Chicago, Columbus, Houston, Los Angeles, San Francisco, Washington, D.C. In Canada: 45 Valleybrook Drive, Don Mills, Ont., M3B 2S6. Or call (416) 449-4660.

HAVE YOU MISSED YOUR CALLING?

So you're relaxing at home on Saturday, and you suddenly remember you forgot to order the antisera you'll be needing in the lab next week. Don't worry. Miles Research Products has 24-hour-a-day, 7-day-a-week ordering service. Just call 800-325-6000 toll free and send a Datagram from anywhere in the United States. Your order will be shipped bright and early the next working day. The next time you miss your calling, dial Miles. We'll give you another chance.



RESEARCH PRODUCTS

MILES

Research Products
Miles Laboratories, Inc.
Elkhart, Indiana 46514
Phone: 219-264-8804

SERVICE
THAT PUTS YOU
MILES AHEAD.

Circle No. 288 on Readers' Service Card

PRACTICAL SCANNING ELECTRON MICROSCOPY
Electron and Ion Microprobe Analysis

edited by **Joseph I. Goldstein,** Lehigh University, and **Harvey Yakowitz,** National Bureau of Standards
Foreword by **T. E. Everhart**

"This is an outstanding book . . . and should become the standard text for scanning electron microscopy (SEM) and electron probe microanalysis (EPMA) . . ."—**L. S. Birks,** *Analytical Chemistry*

582 pages, illus., $35.00

DIGITAL ELECTRONICS AND LABORATORY COMPUTER EXPERIMENTS

by **Charles L. Wilkins,** University of Nebraska, **Sam P. Perone,** Purdue University, **Charles E. Klopfenstein,** University of Oregon, **Robert C. Williams,** 3M Central Research Laboratories, and **Donald E. Jones,** Western Maryland College

". . . provide[s] an important component in a course on digital electronic and laboratory computer interfacing and should be considered by anyone developing such a course."—**Peter C. Jurs,** *Analytical Chemistry*

284 pages, illus., $15.00

PHOTOELECTRON AND AUGER SPECTROSCOPY

by **Thomas A. Carlson,** Oak Ridge National Laboratory

". . . very lively and authoritative . . . well referenced and contains a great deal of useful tabulated data. It should be valuable both to the general reader and the specialist in the field."—**W. C. Price,** *Nature*

417 pages, illus., $32.50

PRINCIPLES OF LASERS

by **Orazio Svelto,** Polytechnic Institute of Milan and National Research Council of Italy
Translated from Italian by **David C. Hanna,** Southampton University

"Anyone mastering the contents of this book will be well prepared to understand advanced treatises and research papers in laser science and technology."
—**Arthur Schawlow,** Stanford University

376 pages, illus., $25.00

LASER APPLICATIONS IN MEDICINE AND BIOLOGY
Volume 3

edited by **Myron L. Wolbarsht,** Duke University Medical Center

review of a previous volume in this dynamic series:

". . . authoritative, up-to-date reference . . . Invaluable for all concerned with present and future uses of lasers in biology and medicine."—*Aerospace Medicine*

approx. 330 pages, illus., $27.50

INTRODUCTION TO BIOELECTRODES

by **Clifford D. Ferris,** University of Wyoming, Laramie

"For the analytical microchemist, this text should be an excellent source book for techniques. . . . The clinical chemist should also add this text to his library. The text is written in a direct fashion and the theory is readily understandable. . . . —**Samuel Natelson,** *Microchemical Journal*

243 pages, illus., $19.50

STRUCTURE DETERMINATION BY X-RAY CRYSTALLOGRAPHY

by **M. F. C. Ladd,** University of Surrey, England, and **R. A. Palmer,** University of London

Offers a detailed tutorial introduction to x-ray structure determination, including not only fundamental methods in structure analysis, but also the heavy atom, isomorphous replacement, and direct methods techniques.

350 pages, $35.00

MODERN FLUORESCENCE SPECTROSCOPY
Volumes 1 and 2

edited by **E. L. Wehry,** University of Tennessee, Knoxville

In this two-volume set, recognized experts describe in careful detail the most powerful and productive recent advances in the methodology and applications of fluorescence—subjects not yet discussed in the standard texts.

Volume 1: *238 pages, illus., 24.50**
Volume 2: *459 pages, illus., $29.50**

THE LABORATORY RECORDER

by **Galen W. Ewing** and **Harry A. Ashworth,** Seton Hall University.

129 pages, $18.50

INTRODUCTION TO NUCLEAR RADIATION DETECTORS

by **P. J. Ouseph,** University of Louisville.

194 pages, $18.50

ANALYTICAL ATOMIC SPECTROSCOPY

edited by **William G. Schrenk,** Kansas State University.

375 pages, illus., $32.50

NONEMISSIVE ELECTROOPTIC DISPLAYS

edited by **A. R. Kmetz** and **F. K. von Willisen,** BBC Brown, Boveri & Company, Ltd., Baden, Switzerland

360 pages, illus., $35.00

DIGITAL PROCESSING OF BIOMEDICAL IMAGES

edited by **K. Preston, Jr.,** Carnegie-Mellon University, and **M. Onoe,** University of Tokyo

approx. 440 pages, $35.00

LOW-TEMPERATURE X-RAY DIFFRACTION: Apparatus and Techniques

by **Reuben Rudman,** Adelphi University. A volume in the Monographs in Low-Temperature Physics series.

approx. 260 pages, illus., $35.00

MÖSSBAUER EFFECT METHODOLOGY: Volume 10

edited by **Irwin J. Gruverman** and **Carl W. Seidel,** New England Nuclear Corporation

approx. 342 pages, $32.50

ATLAS OF CARBON—13 NMR DATA: Volume 1

by **E. Breitmaier, G. Haas,** and **W. Voelter,** University of Tübingen, Germany.

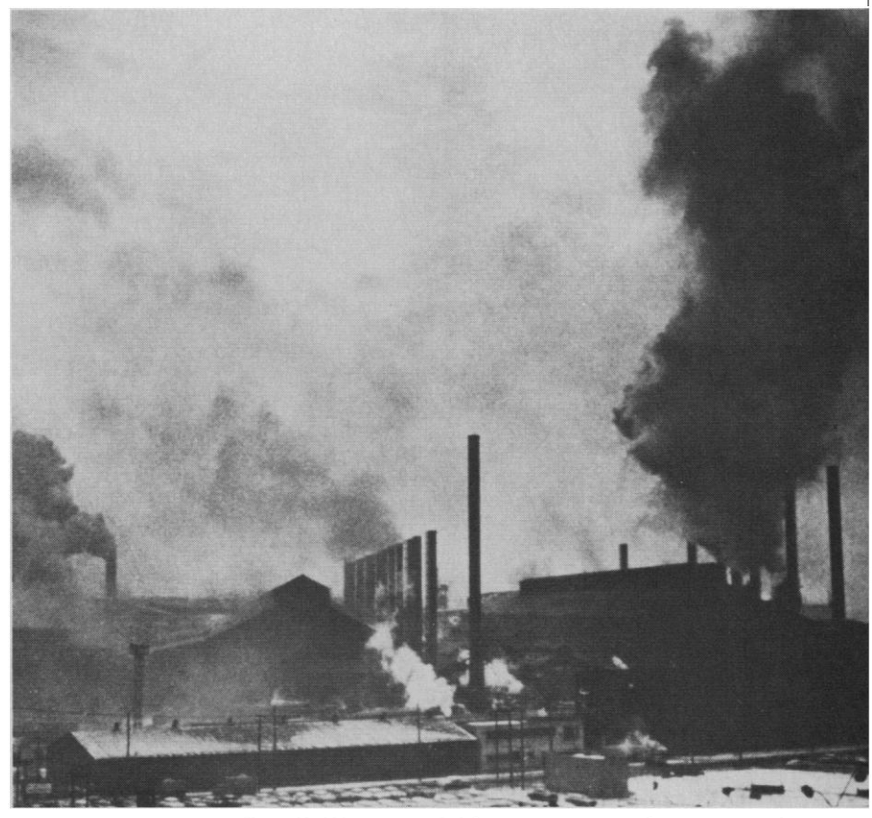
approx. 200 pages, $59.50

*Not available from Plenum in the U.K., Europe, and the Middle East (except Israel).

plenum
the language of science

PLENUM PUBLISHING CORP., 227 West 17 Street, New York, N.Y. 10011
In U.K.: Black Arrow House, 2 Chandos Road, NW10 6NR, London, England
Prices slightly higher outside the U.S. Prices subject to change without notice.

THE ONLY DISK DRIVES THAT DON'T NEED CLEAN AIR TO BREATHE.



Each Trident disk drive has its own enclosed air filtration system. No other removable-pack disk drives do.

This means you can use a Trident just about anywhere. In a warehouse. Or a factory. Even in a smoke-filled room.

This kind of flexibility is just one reason Trident is the choice of growing businesses everywhere.

You find Tridents on the job in department stores—taking care of inventory control right at the point of sale.

Tridents are at the heart of the reservations systems for major hotel chains.

And Tridents are the continuing choice of the nation's leading OEMs.

NEW! LARGE CAPACITY TRIDENTS.

Now there are two new large capacity Trident disk drives—the T-200 and T-300.

They join the T-25, T-50 and T-80 to give you a wide range of capacities—all the way from 27 to 312 megabytes.

So now, as your needs grow, you have the capacity to meet those needs.

Each Trident model is functionally compatible with every other Trident model.

Each gives you track-following servo-technology. And each gives you one of the lowest cost-per-byte ratios in the industry.

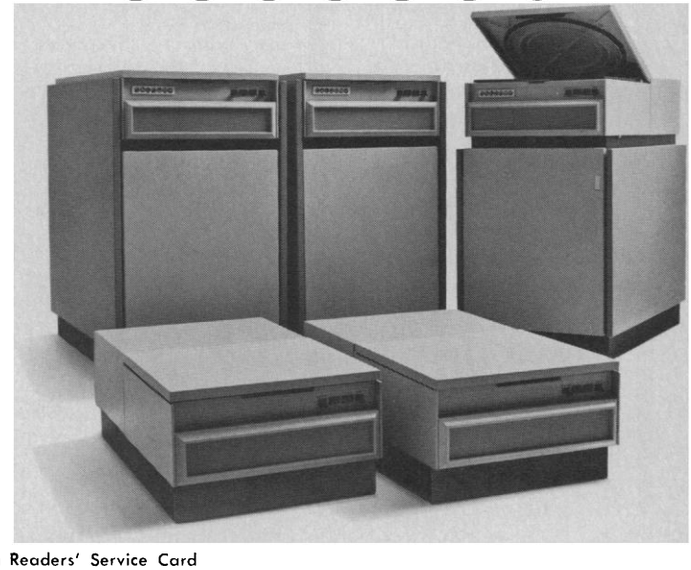
A SOLUTION FOR YOUR PROBLEMS.

At CalComp we've been solving the data problems of growing businesses for years.

If your growing systems business needs more flexibility, and if you want the experience and expertise that only CalComp can give you, call or write:

California Computer Products, Inc.,
SM-10-76, 2411 West La Palma Avenue,
Anaheim, California 92801. (714) 821-2011.

CALCOMP



Circle No. 283 on Readers' Service Card

Gaertner offers a complete selection of precision scientific optical and measuring instruments to meet your needs—

- Measurement
- Positioning
- Holography
- Microscopes
- Ellipsometers
- Components

The instrumentation shown includes representative examples from Gaertner's diverse line. Since 1896, Gaertner instruments have been recognized as the industry standard for precision and quality among scientists in every field.

Check the reader service number for literature on the Gaertner instruments shown. Or call or write if you have questions on Gaertner instrumentation to solve a specific application problem.

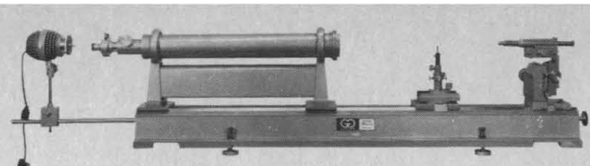
Manufacturers of ***metric*** *instrumentation since 1896*

GAERTNER

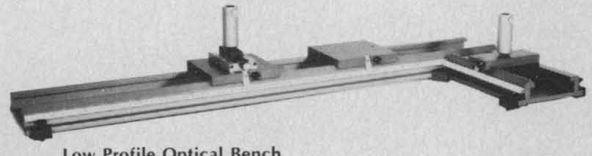
GAERTNER SCIENTIFIC COMPANY

1218 Wrightwood Avenue,
Chicago, Ill. 60614
Phone: (312) 281-5335

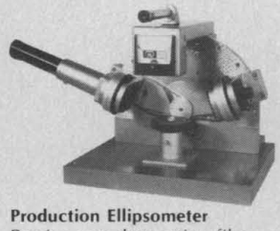
6-216



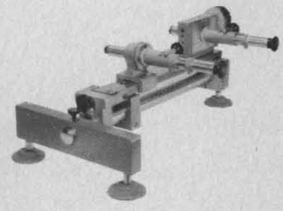
Precision Optical Bench Assembly
Exceptionally versatile, for the most critical applications.



Low Profile Optical Bench
Lightweight, rigid, inexpensive, for scores of professional uses.

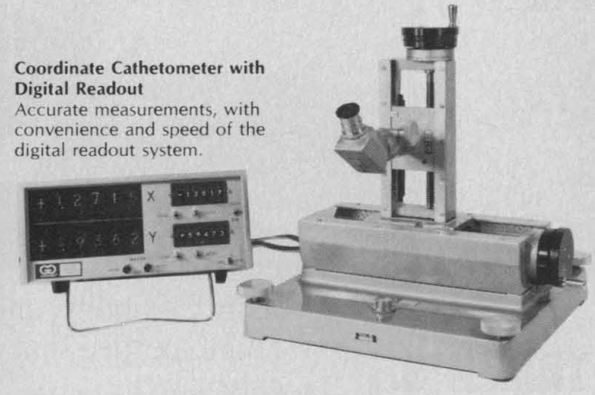


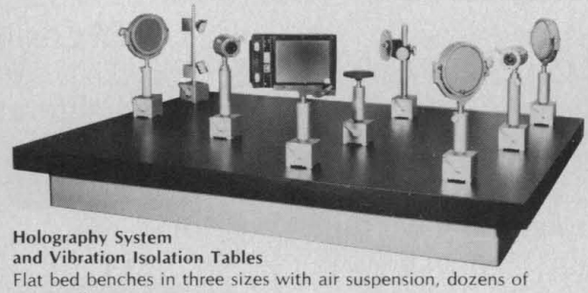
Production Ellipsometer
Precise, non-destructive film measurements, yet inexpensive to buy.



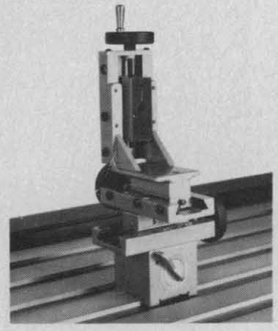
Extensometer
For measuring dimensional changes of specimens under environmental conditions.

Coordinate Cathetometer with Digital Readout
Accurate measurements, with convenience and speed of the digital readout system.

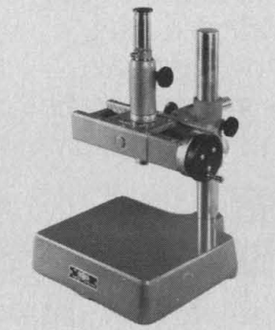




Holography System and Vibration Isolation Tables
Flat bed benches in three sizes with air suspension, dozens of accessories.



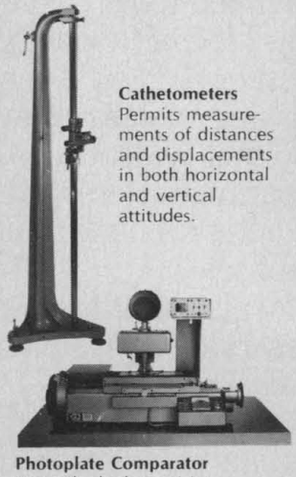
X-Y-Z Positioners
Adaptable for use on all Gaertner optical and optical/instrument benches.



Micrometer Slide Comparator
Base accommodates large fixtures and work pieces. Direct readings to 0.0001".

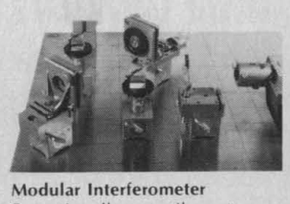
Divided Circle Spectrometers
Economical, yet accurate models with a variety of accessories to meet many needs.

Coordinate Positioning Stages
Light to heavy duty. Provides fine motion X-Y positioning for piece parts or other objects.

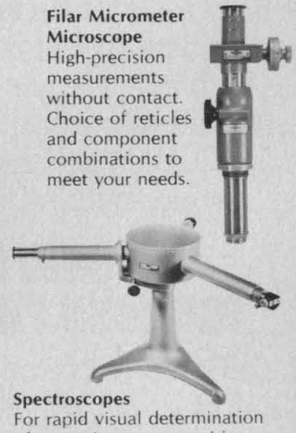


Cathetometers
Permits measurements of distances and displacements in both horizontal and vertical attitudes.

Photoplate Comparator
Versatile, high precision measuring and photosensing for astronomy, chemistry, metallurgy and crystallography and more.

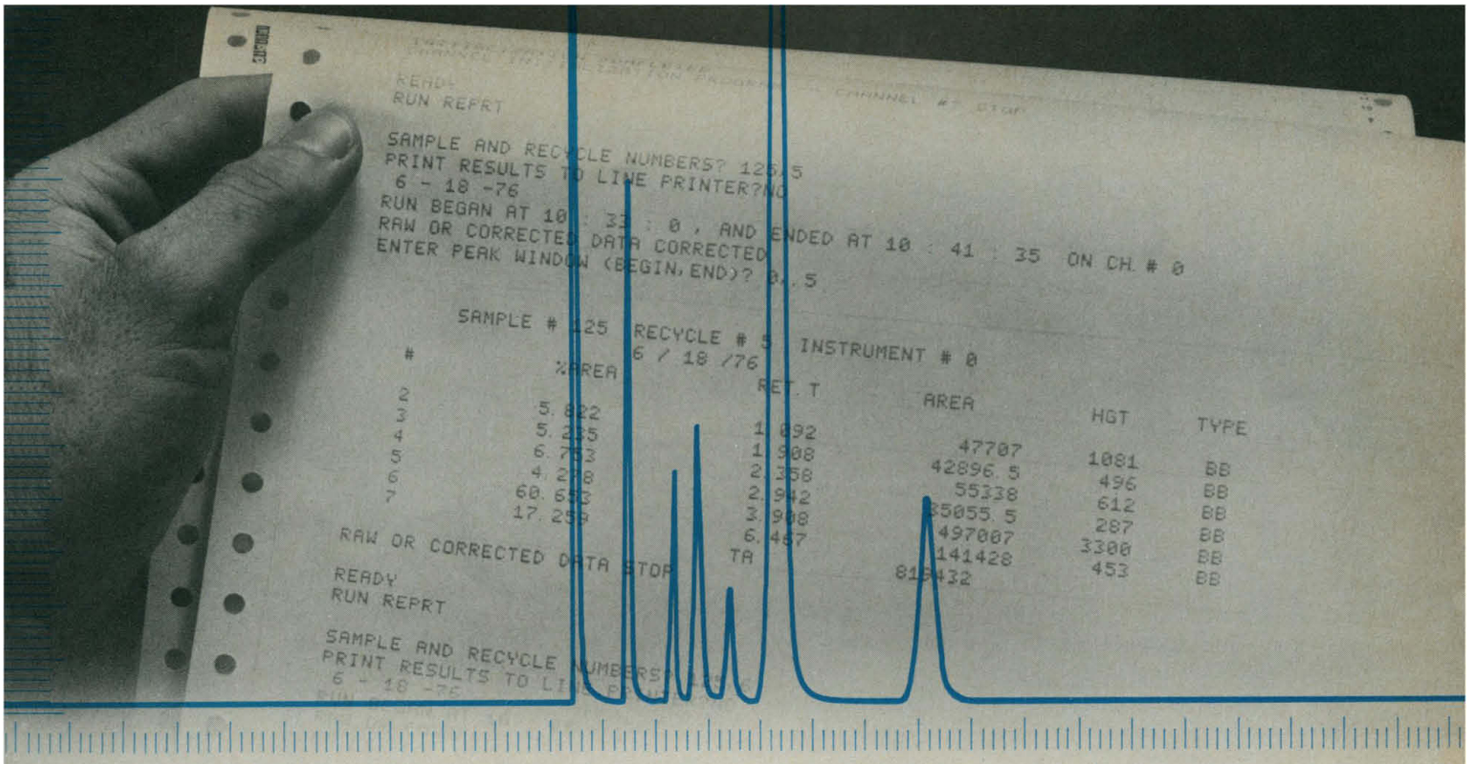


Modular Interferometer
Exceptionally versatile, yet economical. Use on any of our rectangular benches.



Filar Micrometer Microscope
High-precision measurements without contact. Choice of reticles and component combinations to meet your needs.

Spectroscopes
For rapid visual determination of approximate composition of materials.



PEAK-11...designed to help you automate your laboratory without telling you how to run it.

Some laboratory systems only work one way. But if you need a system that handles a variety of tasks, the Digital PEAK-11 system is designed for you.

FLEXIBLE—PEAK-11 lets you process raw data, reprocess peak data, store it, update it, analyze and file it, all while the system is busy collecting data. In fact, PEAK-11, with its own foreground/background operating software, lets you automatically collect, process and simultaneously analyze data from up to 16 different peak-producing devices, such as GC, LC, AA, IR and UV-VIS instruments.

INTERACTIVE—PEAK-11 also lets you control what you collect. You set up your parameters and Digital's lab system will do the rest. It handles tasks like perpendicular drop and tangential skim, automatically. With Digital's multi-terminal BASIC, you decide on the best way to analyze and present the data. This system provides *simultaneous timesharing* for your other general computational needs.

ECONOMICAL—You can get peak performance without paying high prices. A complete PEAK-11 system with a proven PDP-11/34 processor, twin disk packs, and a terminal costs *less than $2,800 a channel* (or you can leasepurchase the system for under $70 a month per channel).

EXPANDABLE—PEAK-11 is designed to grow as your laboratory grows. You can start with a basic system and expand later up to 124K words of memory, 8 removable disks, more terminals, and even a floating-point processor.

Interested? If you really want your lab to run at peak efficiency, contact your nearest Digital sales office to find out more about PEAK-11. Or send the coupon to Digital Equipment Corporation, MR2-4/M38, Marlborough, Mass. 01752; telephone 617-481-9511, extension 6949 or 6942. European headquarters: 81 route de l'Aire, 1211 Geneva 26. Tel: 42 79 50. In Canada: Digital Equipment of Canada, Ltd.

digital

50,000 Computers Saving Managers Millions.

Digital Equipment Corporation, MR2-4/M28, Marlborough, MA. 01752.

☐ I am interested. But my need is long-range. Please send me literature.

☐ I am interested. Please have a sales engineer contact me as soon as possible.

Name_____ Title_____

Company_____ Phone_____

Address_____

City_____ State_____ Zip_____

S-106

THE CONSIDERATE NIKON

Inverted MS Microscope

The Nikon Inverted MS takes into consideration just about every problem you might encounter in traditionally tedious and painstaking culture cell and histocompatability studies; then goes about resolving each and all of them.

It gives you a lot of room to work. A full 2.0mm for a 40X objective; 30-60mm for a turret condenser. Thick-walled flasks cease to be a problem.

The MS considers photomicrography, too. A special built-in phototube insures precise documentation of specimens. A changeover lever quickly switches the image from observation to photography.

Illumination? Diascopic and episcopic both. This capacity to accommodate different light sources simultaneously or independently gives you unmatched adaptability for a variety of needs. Adaptable also to polarized light microscopy.

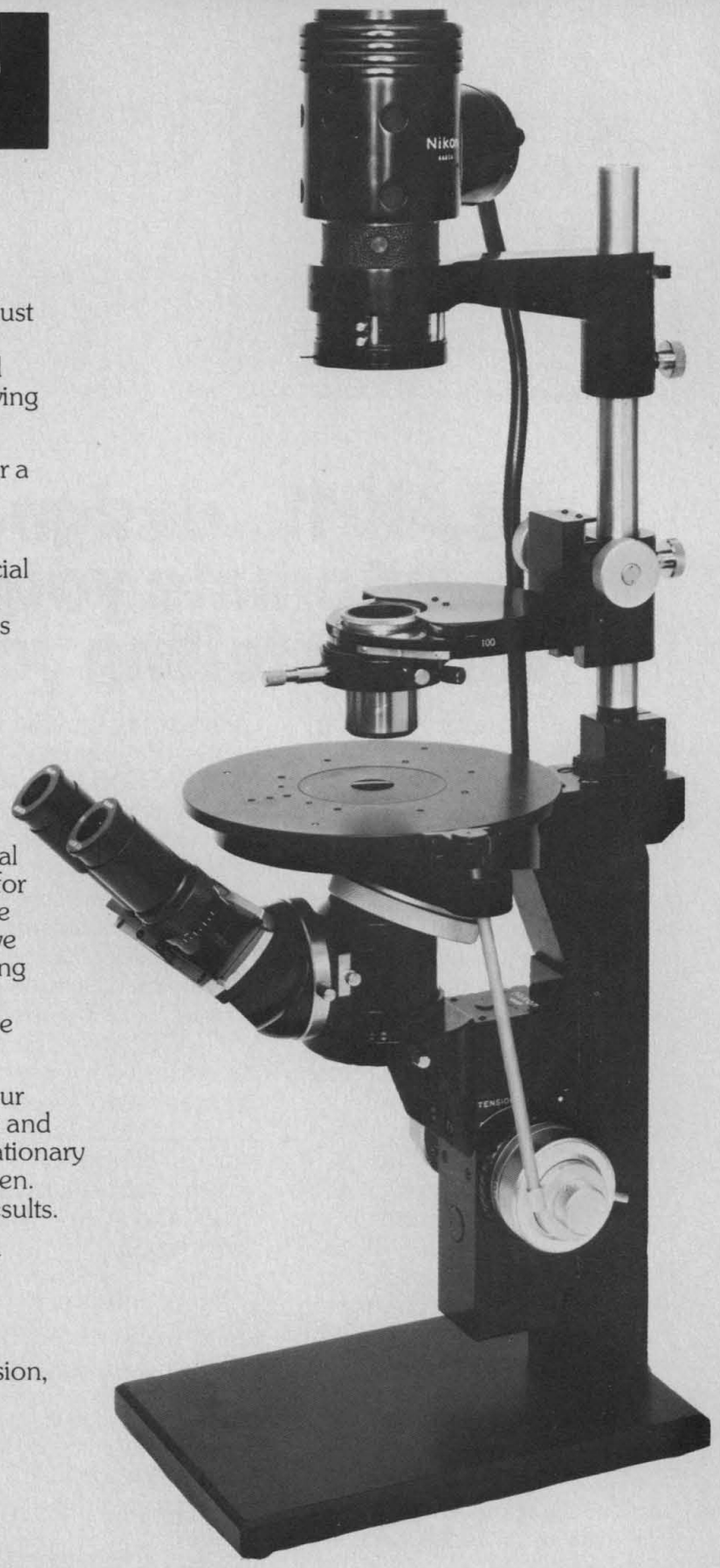
Focusing? Exact, sure, and fatigue-free with coaxial coarse- and fine-focus knobs. The *stage* moves, for example, not the eyepiece and objectives. And the eyepiece is positioned above the stage so you have only to shift your eyes—not your head—for viewing of the specimen and the magnified image. If you want, we can make the stage stationary and move the optics for micromanipulation.

The MS, in short, considers you. Your comfort. Your convenience. Making effortless your adjustments and focusing. Keeping the equipment—and you—stationary by restricting mobility to the stage and the specimen. The result is less-fatiguing work; more accurate results.

Now, if the MS has taken all these things into consideration, shouldn't you consider owning one?

Sure you should.

Write or phone for details. Nikon Instrument Division, Ehrenreich Photo-Optical Industries, Inc., 623 Stewart Avenue, Garden City, N.Y. 11530. Phone: (516) 248-5200.



Nikon

The first name—and the last word—in optics.

WE MAKE THESE ELECTROSTATIC PRINTER/PLOTTERS EASIER TO READ.

Test it yourself with a free sample roll.

Graphic Controls electrostatic paper reads easier than conventional types. Because it's obviously whiter...giving a sharper, blacker look to letters, numbers, dots and lines.

We **should** be able to produce a better paper. Making specialty papers is our ONLY business. We produce both report and translucent grades that fit all **Gould, Varian and Versatec** electrostatic printer/plotters in both roll and fanfold form.

In the wider roll sizes we offer the unique feature of rolls cross-perforated every 11 inches for easy fanfold stacking.

As a standard feature, we sequentially page number all of our fanfold packs for increased operating efficiency and ease of information retrieval. For your specialized applications, roll and fanfold paper is available with preprinted formats in your choice of color.

All this and...priced significantly below your present supplier.

For more information—or a free sample to make your own reading test—use the coupon. Or call Ray Newstead, Manager of Marketing. Phone: (716) 853-7500, Ext. 352.

Gould Versatec Varian

☐ Send me more information on your electrostatic paper, including prices. Estimated annual usage: _____rolls.

☐ I'd like a free sample to make my own reading test on my _____ machine. Chart No. _____.

☐ Have your representative call.

S-10-76

Name _____

Company _____

Address _____

City _____ State _____ Zip _____

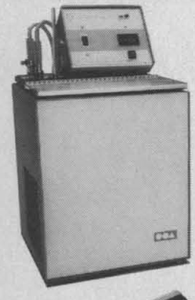
COATED PRODUCTS DIVISION
GRAPHIC CONTROLS CORPORATION
189 VAN RENSSELAER STREET, BUFFALO, NEW YORK 14210

GCA/PRECISION SCIENTIFIC

New Thelco® Water Baths

Ten new models, capacities from 2.8 to 57 liters. For biomedical, clinical, industrial and environmental applications. Without cover, they achieve a uniformity ±0.25°C at 37°C, ±0.35°C at 56°C, with cover, ±0.20°C at 37°C, 0.30°C at 56°C. Deep-drawn stainless steel chambers.

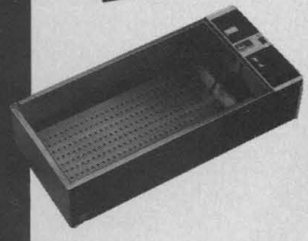
Circle No. 257 on Reader Service Card



New Temptrol Model 254

Dual-purpose bath and circulating system saves time with new direct dial temperature control that you can set and forget. Operating range is −15°C to +150°C. Bath volume is 2¾ gals., pumping capacity 260 GPH, circulates up to 15-foot head.

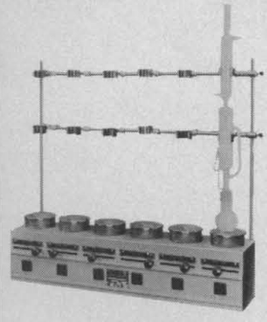
Circle No. 258 on Reader Service Card



Shaker Baths

Temperature control to ±.03°C and variable oscillation for all types of chemical/biochemical reactions. Latest solid-state technology — automatic 37°C set button. Accommodates any combination of glassware. Gassing hoods, cooling coils available. Guaranteed 5 years or 50 million oscillations.

Circle No. 259 on Reader Service Card



Extraction Racks

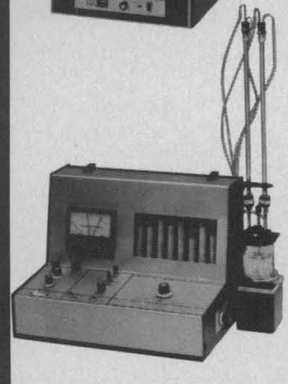
Six-unit and two-unit models, 300-watt individually controlled heaters, temperature range—390° to 775°F. Complete with support rods and clamps. In applications requiring the dichromate oxygen demand (COD) test, their 300-watt heaters are ideal.

Circle No. 260 on Reader Service Card

Thelco® Ovens and Incubators

Reliability and uniformity have kept Thelco the leading name in constant temperature equipment for 50 years. Mechanical or gravity convection and vacuum models for every need. Our published thermocouple performance tests of uniformity are guaranteed.

Circle No. 261 on Reader Service Card



Auto-Aquatrator®

Performs KF titrations automatically. Auto-Aquatrator handles any organic or inorganic giving quick, accurate and consistent results reproducible to ±0.025 ml. of titrant. Non-automatic Aquatrator® offers same accuracy—plus economy.

Circle No. 262 on Reader Service Card

VacTorr® Direct Drive Vacuum Pumps

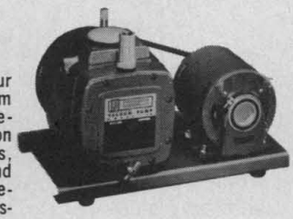
Three models that give you VacTorr's powerful pumping mechanism in a compact package. Free air displacement: Model DD-20 is 0.7 cfm, for DD-50, it's 1.77 cfm, and DD-100 is 3.53 cfm. Quiet operation, easy-to-handle, lightweight, DD-20 only 17 lbs., DD-50 and DD-100 only 40 and 45 lbs.

Circle No. 263 on Reader Service Card

VacTorr® Vacuum Pumps and Equipment

The VacTorr line is your source for all your vacuum equipment—quiet mechanical pumps, diffusion pumps, fittings, gauges, traps, pumping station and associated system elements, supplies and accessories.

Circle No. 264 on Reader Service Card



Problem Solvers

Freas® Low Temp Incubators/BOD Cabinets

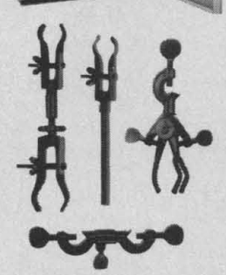
Great capacity—full 17 cu. ft. Solid-state controls — utmost dependability. Wide temperature range—from −10°C to 50°C. Uniformity—a precise ±0.3° at 20°C. Models available for photosynthesis and diurnal simulation.

Circle No. 265 on Reader Service Card

Laboratory Clamps

You name it . . . Precision's got it! A complete line with the right clamp for every laboratory need. Also unique Lab-Frames® for sturdy, versatile set-ups. All constructed of PS Alloy® for strength, durability and corrosion resistance.

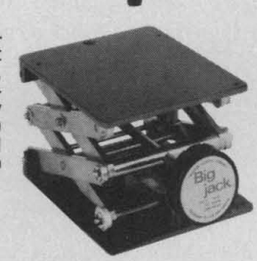
Circle No. 266 on Reader Service Card



Big Jack®/ Little Jack®

Sturdy, adjustable platform for heavy flasks, hot plates, heating mantles, baths or complicated glassware set-ups . . . precisely controlled lifting up to 100 lbs. Little Jack is designed for micro and semi-micro work.

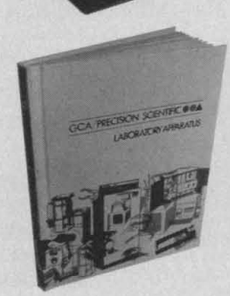
Circle No. 267 on Reader Service Card



Lab Apparatus Catalog

Get your copy of the complete GCA/Precision Scientific Laboratory Apparatus Catalog. It's a hard cover book with 260 pages of detailed information, illustrations and prices of over 1200 items. To get a free copy, use Reader Service Card or write.

Circle No. 268 on Reader Service Card



GCA/Precision Scientific
3737 W. Cortland St., Chicago, IL 60647.

Statistics: Just one reason for buying an HP computing calculator.

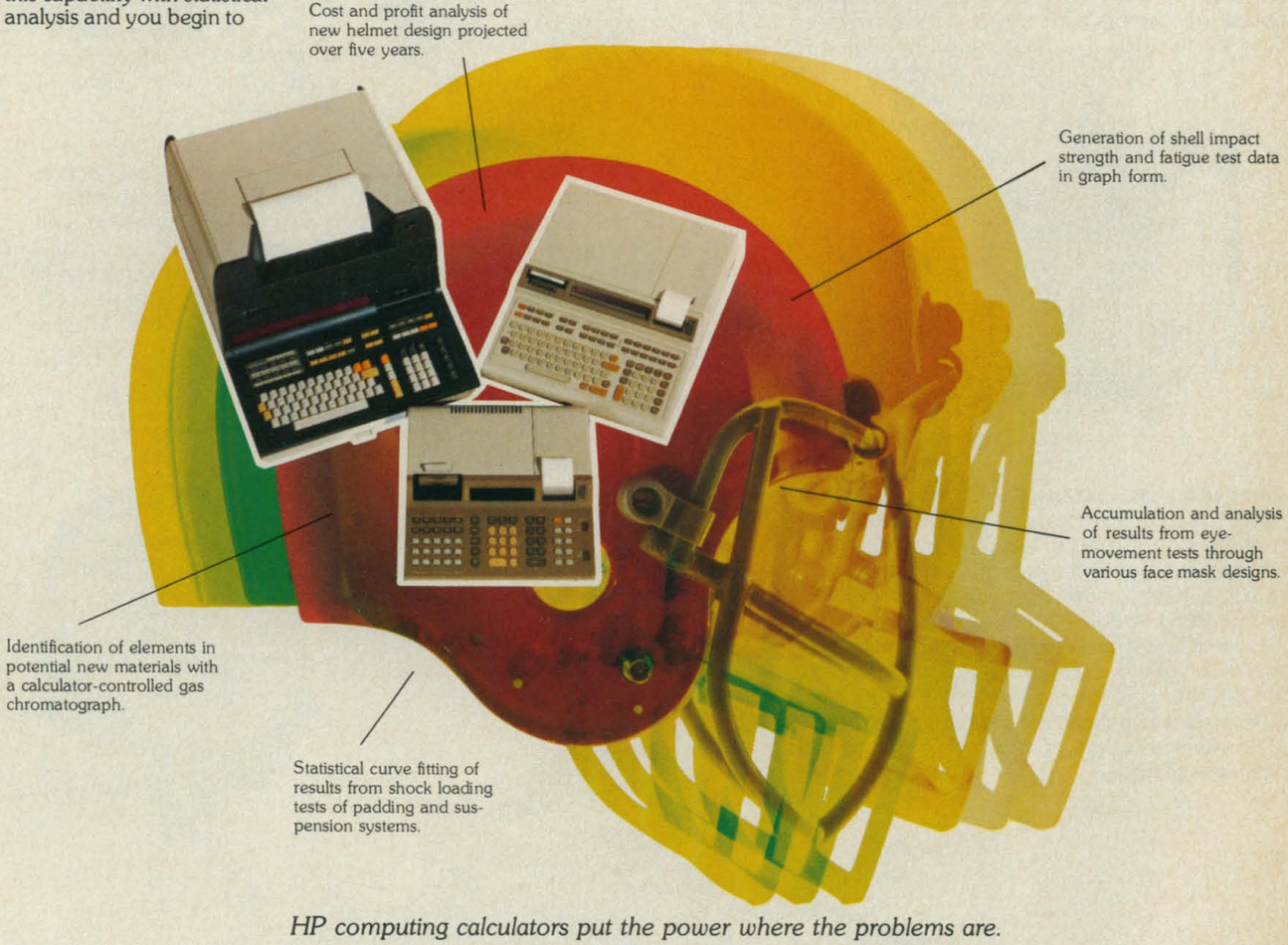
Most people with statistical problems have other kinds of problems, too—including you and the designer of our helmet. That's why we make HP computing calculators so versatile.

Sure, our machines can do stepwise regressions of 35 variables. But they can also interface to instrument systems (like chromatographs) for data acquisition and control. They can be used for profit and cost analysis. They can help people design new components, systems and products (even helmets). One can even handle accounting functions. Combine this capability with statistical analysis and you begin to appreciate the power of HP computing calculators.

Our statistical software: no job too small, few jobs too big.
Because statistics is such a powerful and versatile tool, we've developed powerful and versatile statistical software for our computing calculators. Our software can handle almost any statistical application—from curve fitting to a four-way analysis of variance—without help from a statistician, computer programmer or a data processing service.

Eliminating the steps between data acquisition and statistical analysis.
If you analyze data generated by instruments, our calculators can really save you time. By interfacing one of our computing calculators to your instruments, data acquisition becomes automatic—as does statistical manipulation of that data. All you have to do is interpret the results. And if you want to employ additional stat techniques later, you can. Just recall the data from one of HP's storage devices and load the appropriate program routine.

Get the facts about our calculators and stat programs.
We have a new brochure entitled, "Is It Statistically Meaningful?", which spells out the stat capabilities of our calculators and software. Get your copy by calling your local HP representative, or by circling our number on this publication's reader service card. The brochure is the first step to putting powerful stat techniques—and many other problem-solving capabilities—at your fingertips.

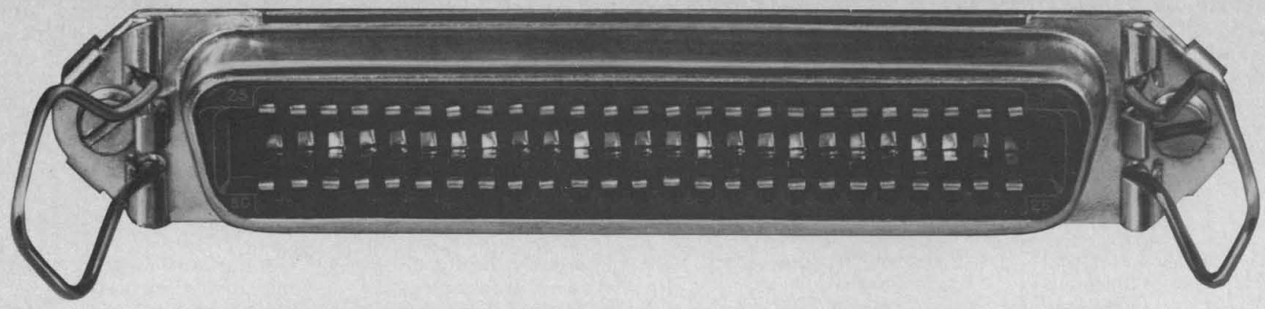


HP computing calculators put the power where the problems are.

HEWLETT hp PACKARD

406/7

Sales and service from 172 offices in 65 countries.
P.O. Box 301, Loveland, Colorado 80537

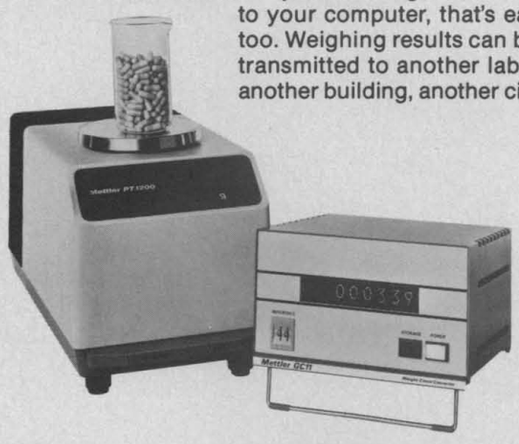


The Mettler Connection.

IT PUTS YOU IN TOUCH WITH THE DIGITAL WORLD.

The Mettler Connection is the BCD output that's built into most Mettler electronic balances. Suddenly you can do more than just weigh with your balance. BCD adds another dimension, giving you some very interesting connection possibilities.

Built-in parallel BCD. Mettler's PL, PS and PT series balances can be connected directly to printers, desk-top calculators, counting systems, digital comparators, weight converters, remote readouts. If you want to go all the way to your computer, that's easy too. Weighing results can be transmitted to another lab, another building, another city.



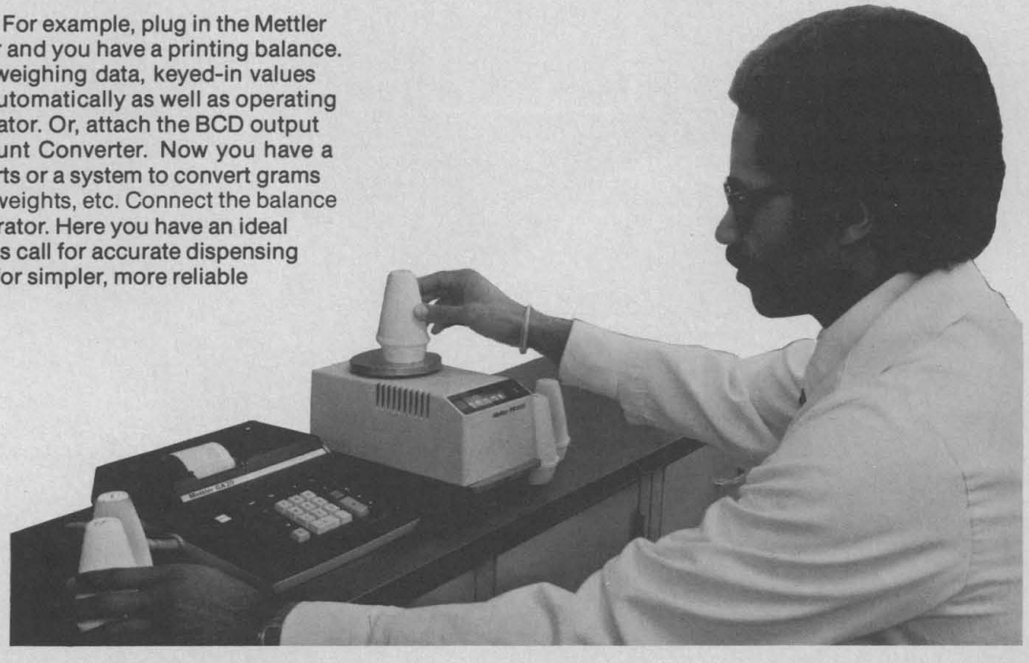
Some of the possibilities. For example, plug in the Mettler GA20 Calculating Printer and you have a printing balance. It prints out transferred weighing data, keyed-in values and calculation results automatically as well as operating as a four-function calculator. Or, attach the BCD output to our GC11 Weight-Count Converter. Now you have a system to count small parts or a system to convert grams to ounces, grains, pennyweights, etc. Connect the balance to a GC10 Digital Comparator. Here you have an ideal module when applications call for accurate dispensing of powders or liquids, or for simpler, more reliable checkweighing.

Reliable and easy to use...our hallmarks. Simple to use, these dependable Mettler top-loading balances are available with capacities from 320 g to 15 kg, with corresponding readabilities of 0.001 g and 0.1 g. They give reliable, reproducible results in 1.5 seconds. One touch bar control turns the unit on or off, sets zero or tares. And all our electronic balances are backed up by standard warranties plus a field force of 40 service technicians nationwide.

Get in touch... If you need a balance with multi-connection possibilities, call Mettler. If you don't need this capability and just want a balance that does superb weighing, call us anyway. Our balances range from the very basic to the very sophisticated—both mechanical and electronic. You just match one up to your requirements. Our phone is (609) 448-3000. If you prefer to write, we are: Mettler Instrument Corporation, Box 100, Princeton, NJ 08540.

Mettler

Circle No. 252 on Readers' Service Card



SARGENT-WELCH

INSTRUMENTATION

...when quality really matters.

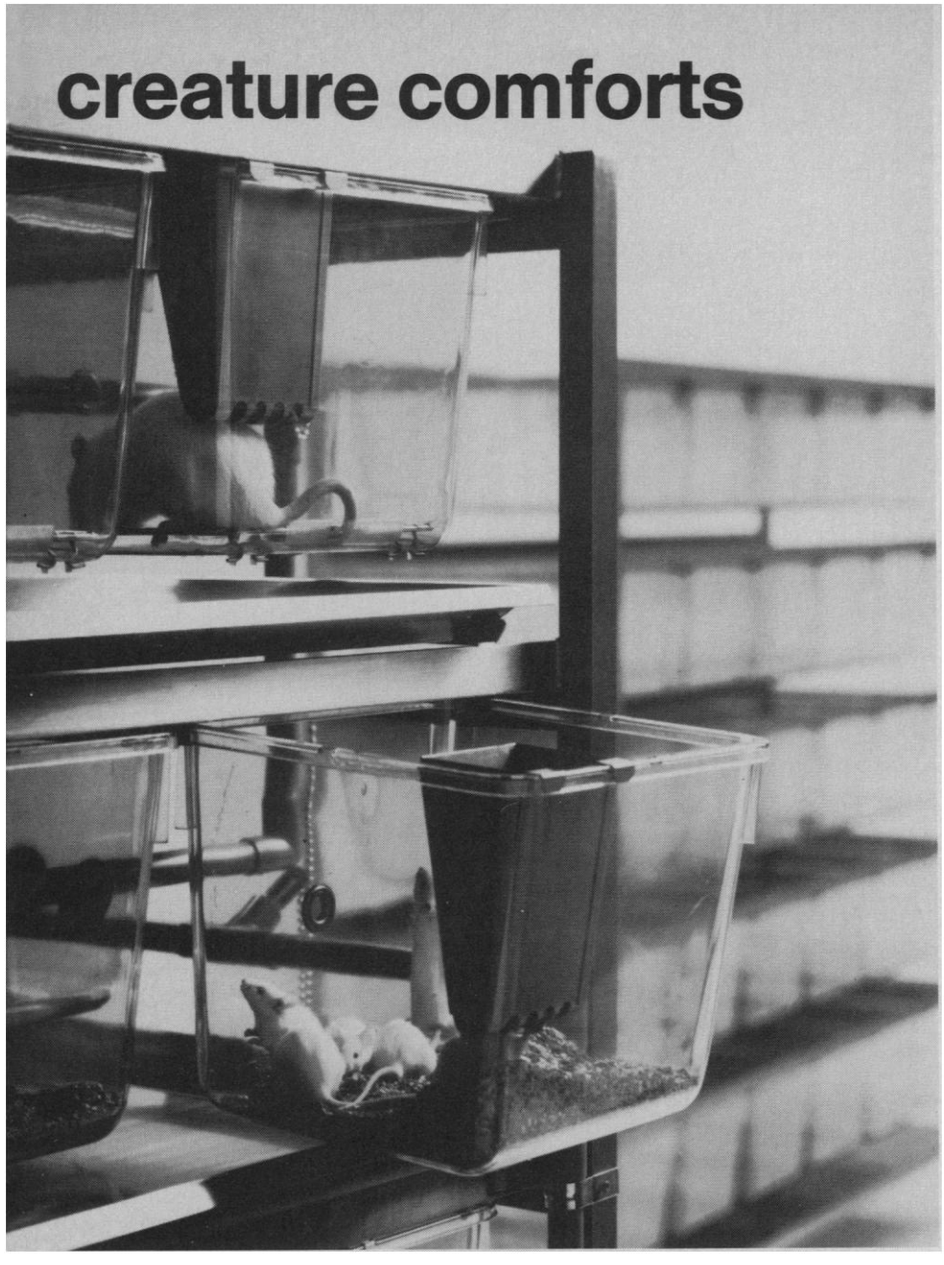
Electrolytic Analyzers and Electrodes • Recording Titrators
Laboratory Scales • Recorders • Oscillometer • Spectrophotometers
pH Meters and Electrodes • Thermostatic Baths • Vacuum Pumps

SARGENT-WELCH SCIENTIFIC COMPANY • 7300 North Linder Avenue • Skokie, Illinois 60076 (312) 677-0600

Anaheim/Birmingham/Chicago/Cincinnati/Cleveland/Dallas/Denver/Detroit/Springfield, N.J./Toronto/Montreal

For more information about these instruments, circle No. 44 for Electrolytic Analyzers and Electrodes, No. 336 for Recording Titrators, No. 337 for Laboratory Scales, No. 338 for Recorders, No. 339 for Oscillometer, No. 340 for Spectrophotometers, No. 341 for pH Meters and Electrodes, No. 342 for Thermostatic Baths, No. 343 for Vacuum Pumps.

creature comforts



Here's a small animal cage system called **see-through**®, incorporating all the features needed for convenient care: transparent cages, choice of flooring (solid, raised or drop-through), removable excreta trays and automatic watering. All are efficiently integrated into a flexible stainless steel roll-around rack.

Cages are the heart of the system. You can have **see-through** polycarbonate with wire walkfloor, or solid floor, available in two sizes: 9½" x 10½" or 19" x 10½", both 8" deep. All are interchangeable and can be modified at little added cost when your programs or research criteria change. The smaller ones give you 60 cages per rack, the larger ones 30 per rack.

Versatility, that's what the system offers. You can house a variety of colonies in a single roll-around stainless steel rack: mice, hamsters, rats or guinea pigs. And, you can do all this without readjusting the rack or changing support equipment.

Modern housing for you, the mice, and most important, for your budget. For complete details, prices and delivery, please write or call, Lab Products, 635 Midland Avenue, Garfield, New Jersey 07026, Phone (201) 478-2535.

lab products inc a BioMedic company

Circle No. 291 on Readers' Service Card

© 1974 BioMedic corporation

LETTERS

Recombinant DNA Research: A Faustian Bargain?

In all the controversy over recombinant DNA research, no one seems to have come to grips with what I think is the major issue: Should the acquisition of new knowledge, for whatever purpose, be the ultimate and sole criterion in the pursuits of biological research? If the answer is "Yes," then it should be incumbent upon those who advocate this position to expound to society the grounds—philosophical, ethical, social, or legal—upon which they base their conclusions. If the answer is "No," it should be incumbent upon those advocates to clearly delineate what they think are the limits to the freedom to conduct research, and also to define these limits in philosophical, ethical, social, or legal terms. In the case of the present controversy, those who would answer, "Yes" have really limited their discussion to what may be called cost-benefit analysis and have not spelled out the reasons for their beliefs; this absence has led to a degeneration of the arguments so that personalities and motives have replaced rational discussion.

Therefore, I would like briefly to state the case against untrammeled freedom to do research, and I hope that further arguments, for or against, can be based on this discussion. I base my arguments on two grounds, one ethical-social and the other scientific. No one should have the absolute right to do anything he or she wants; I think this is self-evident no matter what the political organization of the society. But here too there are limits to this statement; one can shout "Fire" in one context and yet should not shout "Fire" in another context. In biological research, one can conduct drug trials on humans, a form of research, under certain conditions, and yet may not use human beings as research subjects in another context. The fact that biological researchers now have to sign statements regarding research on humans should be a clear indication that the freedom to do research is not absolute, and the observation that no disavowals to this obstacle have been registered is to me clear indication that biological researchers explicitly recognize this action as a restraint on their research freedom. In other words, what goes on in our laboratories is, and I believe should be, modified by ethical and social consideration of the society in which we live, as pursuant to the laws of our society. This being the case, then it should come as no surprise that biological scientists cannot set them-

selves up as being the sole judges of the kinds of research they do. This is implied in our country, for most of us attain our research funding through the cooperative endeavor of our scientific peers and of publicly responsible legislators. To state otherwise, and I get the strong impression that this is what the advocates of recombinant DNA research state, is to go against the historical precedents already legalized in our country.

My scientific argument can be stated within the context of a few questions. Do we really know that much more about the world that we can definitely state, or even state with reasonable doubt, what scientific research will lead to? Are we really that much further along on the path to comprehensive knowledge that we can forget the overwhelming pride with which Dr. Frankenstein made his monster and the Rabbi of Prague made his Golem? Those who would answer "Yes," I would accuse of harboring that sin which the Greeks held to be one of the greatest, that of hubris, of overweening pride, even of arrogance. Like the physicists before us, we have entered the realm of the Faustian bargain, and it behooves all of us biologists to think very carefully about the conditions of these agreements before we plunge ahead into the darkness.

PHILIP SIEKEVITZ
Rockefeller University, New York 10021

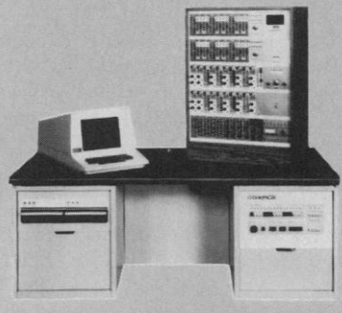
Computers: Minis and Maxis

Arthur L. Robinson's article discussing the increasing use and apparent cost advantage of minicomputers for chemistry computation (Research News, 6 Aug., p. 470) is an incomplete report on trends in computing support for American science. Some time ago the issue passed beyond a simple competition between minis and maxis. The problem now is how universities and research laboratories can best enable scientists to conveniently and economically exploit a rapidly developing technology. The complete story includes considerations raised by Robinson but also the following.

1) Minicomputers can be brought into production by their manufacturers with a development cycle of less than 2 years, compared with the 5 to 6 years required for large, full-range systems. This means that, on the average, manufacturers of minis can make use of components and fabrication techniques 3 years newer than those for large-scale computers.

2) There is no dichotomy between minis and large-scale machines. Some

The first MiniHYBRID computer.



Real world simulation at an affordable price.

From the people whose large-scale hybrids helped put man on the moon, comes the first fully integrated MiniHYBRID computer.

It's a computer that just about anyone in education, science and industry can afford – with virtually all the features its big brothers offer. Like high speed. Continuous parallel solutions. Mass memory. Stored programs. Full automation. Complete graphics.

Now there's an economical way to model real world phenomena in fast, real or slow time. Or do simulation with man and/or hardware in the loop. Or data acquisition and analysis.

At $35,000 for the standard system, it's the least expensive, most efficient, fully documented hybrid available anywhere. Can you afford not to have one?

EAI®
Electronic Associates, Inc.
185 Monmouth Parkway,
West Long Branch, N.J. 07764
(201) 229-1100

Circle No. 169 on Readers' Service Card

C&EN May 3, 1976

Heart disease, cancer linked to trace metals

The possibility that variations in dietary and environmental levels of selenium, copper, zinc, and perhaps other metals influence the rate of heart disease in various

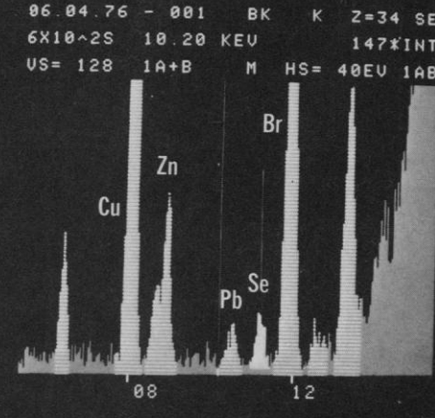
The rapid nondestructive ability to analyze many trace elements simultaneously is what X-ray energy spectrometry is all about. Now, new developments by KEVEX provide medical researchers, the pharmaceutical industry and process control people with analytical capabilities that offer far more potential than traditional techniques such as AA.

In this instance, the Kevex X-ray energy spectrometer measured the zinc-to-copper ratio and selenium concentration in two microliters of human breast fluid. A recent study shows a positive correlation between coronary mortality in 47 U.S. cities and the ratio of zinc-to-copper in cow milk of those areas. The connection between low cancer rate and high selenium diet was also reported for both cancer of the colon and breast cancer. (C & E News May 3, 1976.)

The new Kevex ULTRA-TRACE™ X-ray energy spectrometer can analyze a fraction of a billionth of a gram of selenium in human breast fluid – total analysis time per determination – 5 minutes! Are you interested in multi-element trace analysis? For more information contact Kevex at:

kevex

KEVEX Corporation
Analytical Instrument Division
898 Mahler Road, Burlingame, CA 94010
Phone (415) 697-6901



Spectrum for copper, zinc and selenium obtained from two microliters of human breast fluid.

Circle No. 235 on Readers' Service Card

Cut density gradient spin time with a Sorvall® RC-5 centrifuge and new SS-90 vertical rotor.

The Sorvall® RC-5 refrigerated superspeed centrifuge with a Rate Controller is ideal for density gradient work. The soft start and soft stop characteristics of the Rate Controller prevent mixing of the gradient at speeds between 0 and 1,000 rpm.

With this feature and the new Sorvall® SS-90 vertical rotor, the RC-5 provides high resolution with reduced spin times. The rotor holds the tube at a fixed angle of 0° while the gradient reorients from horizontal to vertical. This means the particle must travel only the width of the tube, not the length. It also improves resolution by increasing the surface area and reducing the depth of the starting zone. In fact, the K factor calculated for the ultracentrifuge swinging bucket rotor of comparable volume is 265, while the K factor for the SS-90 vertical rotor is 210. And since the SS-90 holds 8 tubes instead of 6, you can spin more total volume.

The Sorvall® RC-5 also features solid state speed and temperature control systems, direct reading tachometer and temperature gauge, and an instrument panel with convenient push-button controls. And it accepts RC-2B as well as RC-5 rotors. It is built with the high quality and attention to detail that have been characteristic of Sorvall® centrifuges for years.

For more information on the Sorvall® RC-5 centrifuge, just write Du Pont Instruments, Biomedical Division, Room 23708A, Wilmington, DE 19898

Du Pont Instruments

DUPONT

Circle No. 32 on Readers' Service Card

so-called minis are really quite large and powerful (what Robinson calls "high-performance minis"), differing from the machines usually considered large only in that they come from a less established manufacturer who has selected a more specialized market and provides fewer customer support services. In particular, there are limits (at least very long delays) in the software provided—manifested, for example, in operating system capabilities. The greatest costs these days in computer system manufacturing are for software design and development. Any vendor who wants to avoid these areas can sell at lower prices, whether he is selling small or large machines. But that means that the machines must be functionally equivalent to machines for which software already exists; otherwise, the customer must be in a position to develop his own software, or his application must be one that doesn't need a lot of sophisticated and complex software. This is the case for scientists needing to do large but straightforward numerical calculations, such as some of the work of the chemists discussed by Robinson.

3) Most university campuses have inadequate computing power and services, especially in areas which depend on recently developed hardware or software technology, for example, graphical input and output, archival data storage, data base management systems appropriate for research uses, and operating systems which economically support large-volume time-sharing. Increased dependence on minis (probably managed in a decentralized way) will meet some of their needs, but far from all of them.

4) Given their traditions of minimal cost accounting, unpaid and underpaid student labor, and the expectation that faculty members will do many things for themselves, autonomous university departments tend to be self-sufficient: they have trouble acquiring services (of any kind) from a service center that must fully and explicitly charge back all its costs.

In their glee at finding apparent large cost differences between their own minis and centrally managed service-center computers, scientists are overlooking significant differences in the type of service obtained. Should research scientist (or apprentice scientist) manpower be devoted to procuring, operating, and repairing computers? It was sad but revealing, the day after the Wisconsin chemistry department's machine was approved, for us to receive a call from a member of that department asking for our help with the acquisition process.

Those of us who have evolved item-

ized billing schemes over the years rankle at charges that they subsidize special groups and force some customers to pay for a lot of equipment they don't use. Research scientists often end up using more than they think they need, for example, development software, differential scheduling by job size and job urgency, high-quality mathematical software, and a reliable file system.

A scientific computer center in the future will have to offer a variety of services from several kinds of machines, achieving economies by combining newer technology with specialization of function. It is likely that there will continue to be demands from scientists for the service of a large, general-purpose system as well.

Finally, there is an apparently unintended irony in the accompanying article by Robinson (Research News, 6 Aug., p. 471) reporting that the chemists expect to have their cake and eat it too. They are acquiring their own minis, yet they are arranging to have access when needed to what may be the biggest center of them all, the National Resource for Computation in Chemistry.

TAD PINKERTON
LARRY TRAVIS
Academic Computing Center, University of Wisconsin, Madison 53706

Earthquake Light in Focus

In his letter on earthquake lights, J. J. Lloyd (17 Sept., p. 1070) cites obsolete speculation with facetious effect. This is a field of mystifying and elusive observations (only some of which appear to be erroneous or misinterpreted), discussed briefly in my textbook (*1*). Not cited there are observations (*2*) of numerous luminous phenomena ("total or partial illumination of the sky, the ground, the mountains, and lines of electrical connection and transmission; luminous tongues, sparks, falling balls . . . of prevailingly reddish color") for the Rumanian earthquake of 10 November 1940, which originated at a depth of about 100 kilometers. The Chinese, with their current large earthquake program involving many observers, are in a good position for investigation.

C. F. RICHTER
594 Villa Zanita, Altadena, California 91001

References

1. C. F. Richter, *Elementary Seismology* (Freeman, San Francisco, 1958), pp. 132–134; 581–582.
2. S. L. Solev'ev, in *Zemletryaseniya v SSSR*, E. F. Saverensky, I. E. Gubin, D. A. Kharin, Eds. (Academy of Sciences, U.S.S.R., Moscow, 1961), p. 178.

Slash density gradient spin time with a Sorvall® OTD ultracentrifuge and new vertical rotor.

Sorvall® OTD ultracentrifuges with oil turbine drive and Automatic Rate Controller are ideal for density gradient work. The soft start and soft stop characteristics of the ARC and Reograd mode of deceleration prevent mixing of the gradient at speeds between 0 and 1,000 rpm.

With these features and the new Sorvall® vertical rotor, Sorvall® ultracentrifuges give high resolution with reduced spin times. The rotor holds the tube at a fixed angle of 0° while the gradient reorients from horizontal to vertical. This means the particle must travel only the width of the tube, not the length. It also improves resolution by increasing the surface area and reducing the depth of the starting zone. In fact, the K factor calculated for the highest performance ultraspeed swinging bucket rotor is 45, while the K factor for the Sorvall® TV865 vertical rotor is only 10.

The oil turbine drive eliminates failure-prone gears, belts and brushes. And Sorvall® OTD-50 and OTD-65 ultracentrifuges have self-contained cooling systems — eliminating problems with hard water as well as installation of plumbing, filters, valves and gauges. Both are built with the high quality and attention to detail that have been characteristic of Sorvall® centrifuges for years.

For more information on Sorvall® OTD ultracentrifuges, just write Du Pont Instruments, Biomedical Division, Room 23707A, Wilmington, DE 19898

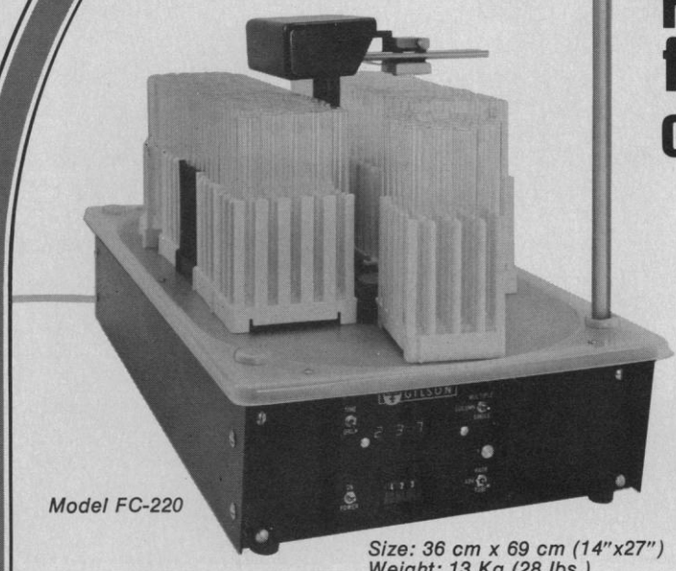
Du Pont Instruments

DUPONT

Circle No. 31 on Readers' Service Card

A NEW WINNER!

GILSON RACE TRACK FRACTIONATOR for liquid chromatography



Model FC-220

Size: 36 cm x 69 cm (14"x27")
Weight: 13 Kg (28 lbs.)

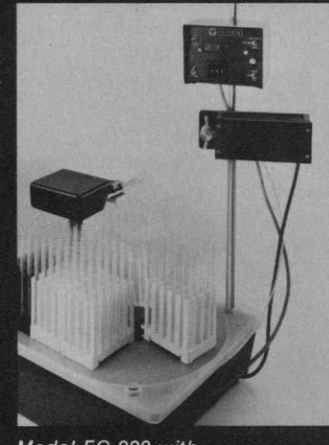
- **220 test tubes (18 x 150 mm) (13 x 100 mm)**
- **Drop counting-time**
- **Control box can be removed for remote operation**
- **Shut-off for column effluent and pump**
- **Electronic digital counter**
- **Rugged construction prevents jamming of racks**

The Gilson FC-220 RACE TRACK FRACTIONATOR is the newest addition to the Gilson Fraction Collector family. It contains eleven Polypropylene racks which move in a recirculating oval race track pattern. Each rack holds 20 glass test tubes (18 x 150 mm). Thus, 220 tubes can be collected during unattended operation or collection can be continued indefinitely, without interruption, by periodically removing filled test tube racks and adding empty racks.

A single-piece molded Polypropylene pan prevents spillage and foreign material from falling into the lower mechanism.

Multiple-column collection can be performed from 2 to 5 columns.

An accessory solenoid shut-off valve is available for stopping the column flow after the last tube is filled, to prevent drying of the column packing. It also stops column flow while changing from one test tube to the next.



Model FC-220 with control box and shut-off valve mounted on mast

Call or write TODAY

GILSON MEDICAL ELECTRONICS, INC.

P.O. BOX 27, MIDDLETON, WISCONSIN 53562 • TELEPHONE 608/836-1551

EUROPEAN MANUFACTURING PLANT

Gilson Medical Electronics
69, rue Gambetta, 95-Villiers-le-Bel, FRANCE
Telephone 990-54-41

Circle No. 254 on Readers' Service Card

15 October 1976, Volume 194, Number 4262 **SCIENCE**

AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE

Science serves its readers as a forum for the presentation and discussion of important issues related to the advancement of science, including the presentation of minority or conflicting points of view, rather than by publishing only material on which a consensus has been reached. Accordingly, all articles published in *Science*—including editorials, news and comment, and book reviews—are signed and reflect the individual views of the authors and not official points of view adopted by the AAAS or the institutions with which the authors are affiliated.

Editorial Board

1976

ALFRED E. BROWN
JAMES F. CROW
HANS LANDSBERG
EDWARD NEY
FRANK PRESS
FRANK W. PUTNAM
MAXINE SINGER
ARTHUR M. SQUIRES

1977

WARD GOODENOUGH
CLIFFORD GROBSTEIN
H. S. GUTOWSKY
N. BRUCE HANNAY
DONALD KENNEDY
NEAL E. MILLER
RAYMOND H. THOMPSON

Editorial Staff

Editor
PHILIP H. ABELSON

Publisher
WILLIAM D. CAREY

Business Manager
HANS NUSSBAUM

Managing Editor: ROBERT V. ORMES

Assistant Editors: ELLEN E. MURPHY, JOHN E. RINGLE

Assistant to the Editors: RICHARD SEMIKLOSE

News and Comment: JOHN WALSH, *Editor;* PHILIP M. BOFFEY, LUTHER J. CARTER, BARBARA J. CULLITON, CONSTANCE HOLDEN, DEBORAH SHAPLEY, NICHOLAS WADE. *Editorial Assistant,* SCHERRAINE MACK

Research News: ALLEN L. HAMMOND, *Editor;* GINA BARI KOLATA, JEAN L. MARX, THOMAS H. MAUGH II, WILLIAM D. METZ, ARTHUR L. ROBINSON. *Editorial Assistant,* FANNIE GROOM

Book Reviews: KATHERINE LIVINGSTON, LYNN MANFIELD, JANET KEGG

Cover Editor: GRAYCE FINGER

Editorial Assistants: JOHN BAKER, ISABELLA BOULDIN, MARGARET BURESCH, ELEANORE BUTZ, MARY DORFMAN, SYLVIA EBERHART, JUDITH GIVELBER, CAITILIN GORDON, CORRINE HARRIS, NANCY HARTNAGEL, OLIVER HEATWOLE, CHRISTINE KARLIK, RUTH KULSTAD, MARGARET LLOYD, JEAN ROCKWOOD, LEAH RYAN, LOIS SCHMITT, YA LI SWIGART, ELEANOR WARNER

Guide to Scientific Instruments: RICHARD SOMMER

Membership Recruitment: GWENDOLYN HUDDLE; *Subscription Records and Member Records:* ANN RAGLAND

Advertising Staff

Director
EARL J. SCHERAGO

Production Manager
MARGARET STERLING

Advertising Sales Manager: RICHARD L. CHARLES

Sales: NEW YORK, N.Y. 10036: Herbert L. Burklund, 11 W. 42 St. (212-PE-6-1858); SCOTCH PLAINS, N.J. 07076: C. Richard Callis, 12 Unami Lane (201-889-4873); CHICAGO, ILL. 60611: Jack Ryan, Room 2107, 919 N. Michigan Ave. (312-DE-7-4973); BEVERLY HILLS, CALIF. 90211: Winn Nance, 11 N. La Cienega Blvd. (213-657-2772); DORSET VT. 05251: Fred W. Dieffenbach, Kent Hill Rd. (802-867-5581)

EDITORIAL CORRESPONDENCE: 1515 Massachusetts Ave., NW, Washington, D.C. 20005. Phones: (Area Code 202) Central Office: 467-4350; Book Reviews: 467-4367; Business Office: 467-4411; Circulation: 467-4417; Guide to Scientific Instruments: 467-4480; News and Comment: 467-4430; Reprints and Permissions: 467-4483; Research News: 467-4321; Reviewing: 467-4443. Cable: Advancesci, Washington. Copies of "Instructions for Contributors" can be obtained from the editorial office. See also page xi, *Science*, 26 March 1976. ADVERTISING CORRESPONDENCE: Room 1740, 11 W. 42 St., New York, N.Y. 10036. Phone: 212-PE-6-1858.

National Paralysis on Energy

Three years after a third and highly successful oil embargo the United States continues to behave as if future supplies of oil were assured for decades. Almost every relevant segment of society has reached high levels of effectiveness in stalling or stopping development of new energy sources. Public interest groups, environmentalists, the courts, Congress, some of the Administration, and even the oil companies are diligent in finding and expounding reasons for inaction.

The public shuns the small automobiles, and its consumption of both gasoline and electricity is at record levels. Domestic production of oil is down 12 percent from 1973 and now meets less than 60 percent of consumption. Production and reserves of natural gas have decreased steadily. During the past 3 years the United States has become much more dependent on the abundant reserves of the Arabian peninsula. This dependence will increase greatly during the next decade; reserves elsewhere are limited and production from them will be leveling or declining.

Part of the difficulty in gearing up to meet future energy needs is that few people seem to grasp the magnitude of the problem. The domestic oil and gas that we are now enjoying were discovered and developed relatively inexpensively and they have been produced with only localized environmental impact. Unless our people are prepared to pay a much higher price for energy in monetary terms and to some extent in environmental factors, they must be prepared to face a drastic change in their standards of living.

Those who campaign for strong negative positions toward various energy sources rarely seem to consider the total problem. They seldom devote comparable positive effort to conservation or to the development of alternative energy sources. The net result of their activity is almost totally negative.

The situation is exemplified by a recent incident related to me by a friend. He was approached at his home by a young man seeking signatures to a petition aimed at nuclear power plants. My friend queried the petitioner about the use of other fuels. Both agreed as to the necessity of reducing imports of oil. The young man, when questioned about coal, denounced pollution arising from burning it. My friend then asked, "If we stop nuclear power, where will we get our electricity?" The reply was, "Oh, they'll take care of that." Thereupon the young man took his petition elsewhere.

Presumably the "they" that the young man was referring to was the federal government. But the power of the government, while great in some directions, is limited in others. It can smother the country in red tape. It can levy taxes. It can have at its disposal as much money as it wants merely by running the printing presses. But Congress itself cannot produce one gallon of gasoline. While Congress could in principle provide the funds or guarantees necessary to get a program on synthetic fuel rolling, it has refused to do so. Instead, we face an absurd situation in which 35 committees and subcommittees maneuver for a piece of the energy action, often making conflicting decisions. The Administration is not much better. Half a dozen agencies impinge, usually negatively, on the Energy Research and Development Administration.

The oil companies are beset with threats of divestiture. This, added to environmental problems and the near certainty of financial loss, has virtually killed the shale oil program. Liquids from coal are far distant, will be very costly, and are not readily compatible with existing refineries and distribution systems. On the other hand, the oil companies can make a profit without enormous capital investments merely by using existing facilities to process domestic and imported oil. Under the present circumstances they have little incentive to take initiative.

During the past 3 years we have experienced the paralyzing power of negative thinking. Sooner or later, the dominant national mood must shift to a more positive attitude if the nation is once again to function effectively.

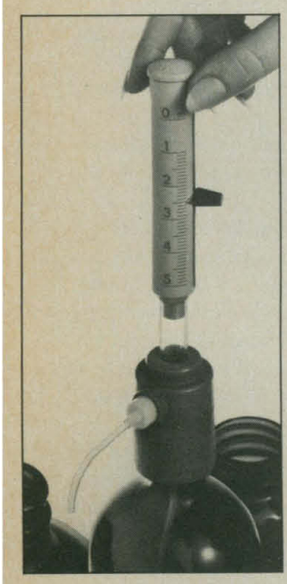
—PHILIP H. ABELSON

NOW AVAILABLE IN ADJUSTABLE 50, 25 & 0.5 ml MODELS!

The difference between a Dispensette® and other bottle-top dispensers:

Nothing to break off on the outside.

Nothing to wear out on the inside.



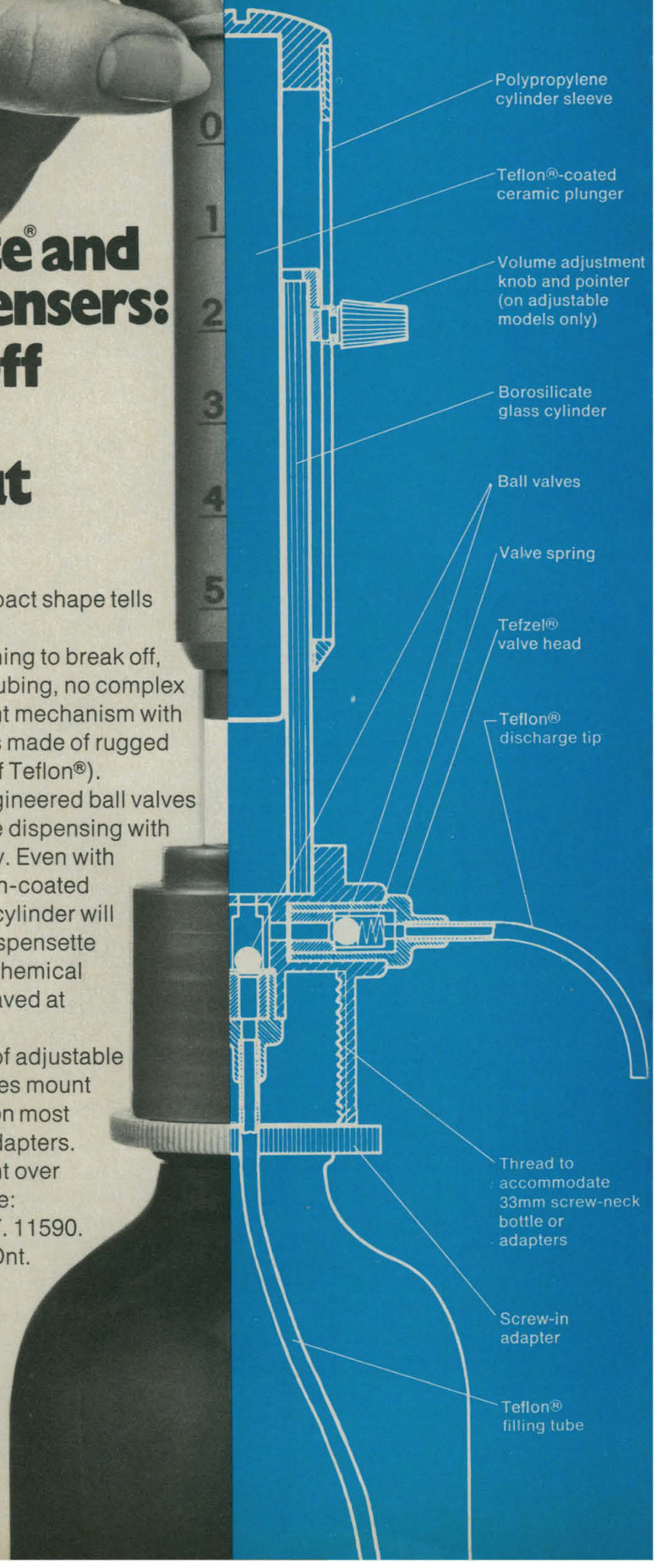
One glance at its slim, compact shape tells you a lot about a Dispensette.

On the outside, there is nothing to break off, chip or crack. No fragile glass tubing, no complex springs, no awkward adjustment mechanism with magnifier. (The outer housing is made of rugged polypropylene, the flexible tip of Teflon®).

On the inside, precision engineered ball valves and spring permit fast, accurate dispensing with better than 0.1% reproducibility. Even with strong alkalis, the smooth Teflon-coated plunger and borosilicate glass cylinder will not freeze together. In fact, a Dispensette may be used with any reactive chemical (except HF) and may be autoclaved at 120°C without disassembling.

Available in a wide variety of adjustable and fixed-volume models from 0.5 to 50ml, Dispensettes mount directly on any 33mm screw-neck reagent bottle and on most other size bottles, cans or containers using optional adapters.

Inside and out, Dispensette is a major improvement over conventional bottle-top dispensers. For literature, write: Brinkmann Instruments, Cantiague Rd., Westbury, N.Y. 11590. In Canada: 50 Galaxy Boulevard, Rexdale (Toronto), Ont.



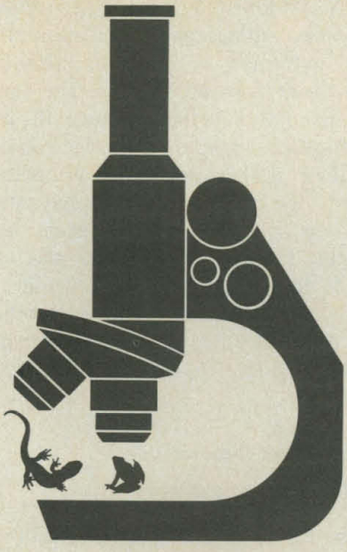
Brinkmann Dispensette

Available from: Ace Scientific / Bio-Rad Laboratories / Cole-Parmer Instrument Co. / Curtin Matheson Scientific / Fisher Scientific Preiser Scientific / Sargent Welch / Scientific Products / SGA Scientific Arthur H. Thomas Co. / VWR Scientific.

Teflon® and Tefzel® are DuPont trademarks.
Dispensette® is a registered trademark of R. Brand Co., Wertheim, W. Germany.

Circle No. 156 on Readers' Service Card

Amphibians for teaching and research? Its Mogul-ED . . . from ambystoma to xenopus



Because they are seasonally plentiful and have a wealth of data available on them, amphibians have been the traditional choice for studies in neurophysiology, physiology, regenerative and developmental biology, and related disciplines.

Educators and researchers have come to depend on Mogul-ED for quality amphibians and other living or preserved specimens. Amphibians such as the grassfrog (rana pipiens), bullfrog (rana catesbeiana), African clawed frog (xenopus laevis), tropical toad (bufo marinus), salamander (ambystoma tigrinum) or necturus maculosus are a few of more than 1,000 varieties of specimens regularly stocked.

Mogul-ED amphibians are used by several leading research institutions for programs in eye research, pigment cell research, the study if ion transport across membranes, cancer research and toxin and enzyme research.

If we do not have the specimen you need, we'll collect it, buy it, or breed it. And when we say *live*, that's the way they arrive . . . a fact we back with a guarantee.

Write us for a copy of our new catalogue. For ordering by fastest means, bug us on our toll-free number (800) 558-0216.

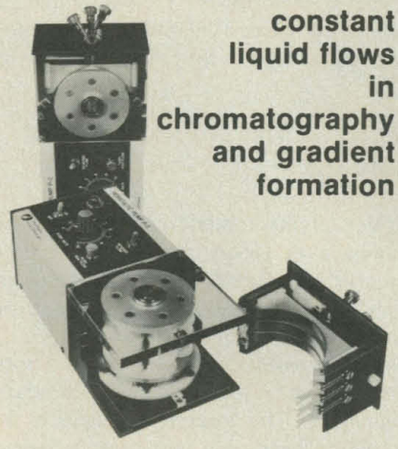
Mogul-ED
QUALITY PRODUCTS FOR EDUCATION
P. O. Box 2482
Oshkosh, Wisconsin 54901

Circle No. 112 on Readers' Service Card

NEW

Pharmacia Peristaltic Pump P-3

A compact pump electronically controlled for constant liquid flows in chromatography and gradient formation



You can

- obtain three different flow rates at the same time through the three individually tensioned pumping channels
- change tubes in seconds with the snap-in cassette
- forget about pulsation thanks to the large driven rollers
- rely on a constant motor speed, electronically compensated for load and temperature
- use any flow rate between 0.6 and 400 ml/h per channel with the same gear box
- reverse the flow instantly
- push for maximum flow and clear pump lines rapidly

For free descriptive literature, write or call:

Pharmacia Fine Chemicals
Division of Pharmacia, Inc.
Piscataway, New Jersey 08854
Phone (201) 469-1222

Pharmacia Fine Chemicals

Circle No. 167 on Readers' Service Card

NEW required reading

for Clinical Chemists from Waters Associates

Monitor Theophylline in Adults, Children, and Neonates

8 page brochure describes theophylline as a bronchodilator, its effective and toxic concentration ranges, various assay methods, and the advantages of LC as a monitor of concentration.

Circle No. 125 on Readers' Service Card

Drugs and Their Metabolites in Biological Fluids

2 page discussion of three types of drugs, their separation and quantitation in serum, plasma, or urine.

Circle No. 322 on Readers' Service Card

High-Performance Liquid Chromatographs

8 pg. illustrated brochure gives complete description of Waters' High-Performance Liquid Chromatographs for all modes of liquid chromatography.

Circle No. 323 on Readers' Service Card

WATERS ASSOCIATES
201 Maple Street, Milford, Ma 01757
Telephone (617) 478-2000
The Liquid Chromatography People

PRODUCTS and MATERIALS

Blood Gas Analyzer

The ABL2 (Fig. 1) Acid-Base Laboratory features automation of calibration, computation, chamber rinsing, and printout of results. From a small sample of the patient's blood, the ABL2 determines hemoglobin, *p*H, and partial pressure of carbon dioxide and oxygen. These data are used to calculate total carbon dioxide, base excess, standard base excess, and oxygen saturation. Special temperature conditions of the patient can be accommodated in the calculations. London. Circle 718.

Gas Chromatography Detector

Model 101 HP features a mercury-cadmium-telluride detector which scans from 4000 to 667 cm^{-1} in 6 seconds in the fast scan mode and in 30 seconds in the slow scan mode. The oven temperature range is from 70° to 250°C controlled to within ± 3°C. The instrument affords rapid identification of peaks as small as 0.01 percent. Resolution is 10 cm^{-1} at 1000 cm^{-1}. The cells are 30 cm long with a volume of 5 cc each. Applications include any use of gas chromatography as the detector is adaptable to all commercially available chromatographs. Norcon Instruments. Circle 717.

Automated Dispensing Pump

The Mark II pump achieves the maximum pumping rate for each operation in a cycle. The operator controls the dispensing times from 2 to 10 seconds and delay times from 1 to 5 seconds. This will allow for volumes of 0.05 to 380 milliliters per shot, repeatable to within 1 percent. There are six optional interchangeable Masterflex pumping heads to achieve continuous manual pumping rates from 1.8 to 2280 milliliters per minute. Spectroderm International. Circle 722.

Sialic Acid

N-Acetylneuraminic acid (NANA) is available in higher purity than it previously was. Pure NANA, also known as sialic acid, is used as an analytic standard to assay for free or bound NANA in tissues or biological fluids. It is also suitable as a substrate in the assay of neuraminidase. The reagent is available in sterile packages that require no refrigeration. Research Products International. Circle 720.

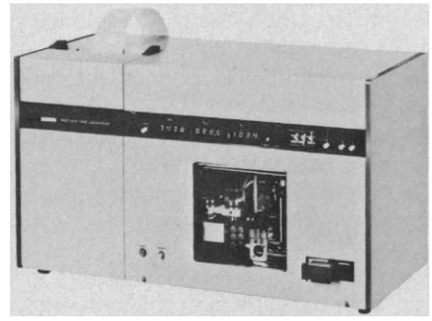


Fig. 1. The ABL 2 blood gas analyzer from the London Company yields a permanent record of all values obtained during analysis and calibration.

Fig. 2. The continuously variable wavelength fluorescence detector from Schoeffel Instrument Corporation complements the newer high performance liquid chromatographs.

Auger Spectrometer

The Automated Auger Microprobe combines submicron spatial resolution with extensive automation, including high-speed data processing. The operator manually sets the ion gauge, the ion-bombardment gun, and the electron/gun and the rest of the analysis is automated. The device can resolve and analyze the top one or two layers of atoms in a sample. The unique feature of this system is the use of digital electronics to eliminate the problems created by thermal drift affecting analog components. Varian Vacuum Division. Circle 719.

Fluorescence Detector for Liquid Chromatography

The FS970 (Fig. 2) uses a broad-band deuterium or tungsten lamp and a monochromator that enables the operator to work at the wavelength of maximum absorption for a given sample. The detector uses a 2π steradian cuvette with a capacity of 5 microliters. The design and capacity combine to permit analysis of weak signals from samples in the picogram range without fraction mixing or influence by dead volume in the cuvette. Schoeffel Instrument Corporation. Circle 721.

Literature

Controlled Temperature Baths are described and illustrated in a brochure that details specifications and suggests applications. Bench Scale Equipment. Circle 723.

Instruments for Environmental and Scientific Measurements lists *p*H and specific ion meters, controllers, electrodes, and oxidation-reduction controllers. Chemtrix. Circle 724.

Buffers is a short bibliography devoted to zwitterionic or Good buffers in biological applications. Amersham/Searle. Circle 725.

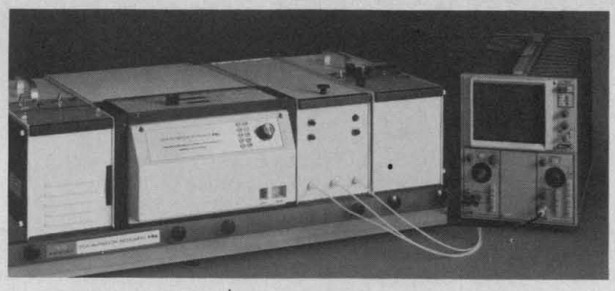
Clean Room Equipment and Accessories is an extensive catalog that features laminar-flow work stations, furniture, clothing, and other apparatus. Laminaire. Circle 726.

Microwave Instruments and Components includes thermoelectric power meters, attenuators and modulators, and many other items. General Microwave. Circle 727.

Laboratory Supplies is profusely illustrated and cross-indexed. Interex. Circle 728.

Newly offered instrumentation, apparatus, and laboratory materials of interest to researchers in all disciplines in academic, industrial, and government organizations are featured in this space. Emphasis is given to purpose, chief characteristics, and availability of products and materials. Endorsement by *Science* or AAAS is not implied. Additional information may be obtained from the manufacturers or suppliers named by circling the appropriate number on the Readers' Service Card (on pages 250A and 346A) and placing it in the mailbox. Postage is free.

—RICHARD G. SOMMER



The GCA/McPherson stopped flow module with automatic loading.

The EU-730-11 Stopped Flow Module is now available for delivery within sixty days.

This versatile and highly flexible instrument features exclusive automatic loading, and is priced surprisingly low.

Because of its unique modular design, our stopped flow system can easily be converted to a conventional UV-visible system.

For more information, call this toll free number: 800-225-1248.

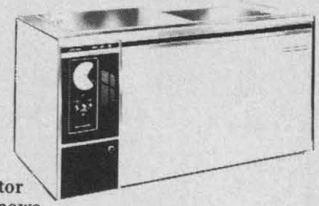
For literature, write to us at the address below.

GCA/McPHERSON INSTRUMENT

530 Main Street, Acton, Mass. 01720, (617) 263-7733,
TELEX: 928435, ANS: GCAMcPHER ACTO

Circle No. 307 on Readers' Service Card

-76°C Ultra-Cold. -96°C Ultra-Colder.



Both from Kelvinator Commercial. Upright drops to −76°C. Ultra-cold. Chest model dips to −96°C. Ultra-colder. Upright's six French doors open individually. And you can label each door to know what's inside. Easy labeling for what's under the chest's stainless steel sliding lids, too. Want more? Automatic alarm systems? 2" portholes for recorders? The Kelvinator Commercial name? You got them. Don't be caught in the cold without ultra-cold. Contact J. E. Hirssig at Kelvinator Commercial, the company that knows how to give you 12 cubic feet of the best cold you ever had.

Upright UC-105 (−76°C/−105°F) Chest UC-520 (−85°C/−120°F)
Chest UC-541 (−96°C/−140°F)

Kelvinator

621 Quay Street • Manitowoc, Wisc. 54220 • (414) 682-0156

One of the White Consolidated Industries

WCI

Circle No. 35 on Readers' Service Card

Now available

Leu⁵-[³H] enkephalin
Met⁵-[³H]enkephalin

[*tyrosyl*-3,5-³H] Enkephalin 30-60Ci/mmol TRK.516
[*tyrosyl*-3,5-³H] Enkephalin 25-50Ci/mmol TRK.522

These enkephalins are the two endogenous substances recently discovered in brain which are natural ligands for opiate receptors[1,2,3] and which have now been identified as pentapeptides[4].

1. TERENIUS, L. and WAHLSTROM, A., *Acta Pharmacol. tox. 35*, Suppl. 1, 55, (Abstract only) 1974.
2. TERENIUS, L. and WAHLSTROM, A., *Acta Physiol. scand., 94*, 74-81, 1975.
3. HUGHES, J., *Brain Res., 88*, 295-308, 1975.
4. HUGHES, J., SMITH, T. W., KOSTERLITZ, H. W., FOTHERGILL, L. A., MORGEN, B. A. and MORRIS, H. R., *Nature, 258*, 577-9, 1975.

Amersham/Searle

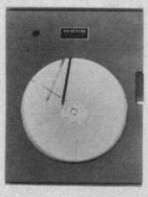
AMERSHAM/SEARLE CORPORATION
AN ACTIVITY OF G. D. SEARLE & CO. AND THE RADIOCHEMICAL CENTRE

2636 S. Clearbrook Drive
Arlington Heights, IL 60005
(312) 593-6300
Toll-free (800-323-9750)

In Canada:
400 Iroquois Shore Road
Oakville, ONT
(416) 844-8122
Toll-free (1-800-261-5061)

VISCOSITY CONVERSION TABLES

NORCROSS® Viscometers



RECEIVERS

Indicating or Recording
Electric or Pneumatic Control
High and Low Alarms
Electric Output
for Data Processing

MEASURING ELEMENTS for

VISCOSITY NORCROSS® CONTROLS

TEL. (617) 969-7020

255 NEWTONVILLE AVENUE
NEWTON, MASS., 02158

25 Years Experience with Viscosity Control

Circle No. 138 on Readers' Service Card

For Studies on the Causes of Cancer

[6-^{3}H] Benzo [a] pyrene 20-30 Ci/mmol	TRK. 501
[7,10-^{14}C] Benzo [a] pyrene 5-15m Ci/mmol	CFA. 471
[G-^{3}H] Benzo [a] pyrene 5-20 Ci/mmol	TRK. 66
Polonium-210	PDS. 1

Amersham/Searle

AMERSHAM/SEARLE CORPORATION
AN ACTIVITY OF G. D. SEARLE & CO. AND THE RADIOCHEMICAL CENTRE

2636 S. Clearbrook Drive
Arlington Heights, IL 60005
(312) 593-6300
Toll-free (800-323-9750)

In Canada:
400 Iroquois Shore Road
Oakville, ONT
(416) 844-8122
Toll-free (1-800-261-5061)

Circle No. 185 on Readers' Service Card

Scientific Freedom and Responsibility

How can we define it?

How can we defend it?

This AAAS report deals with both of these complex issues. *Scientific Freedom and Responsibility* illuminates some of the gray areas that have emerged as science and technology increasingly intersect areas of social and ethical concern. It studies and reports on the conditions required to give scientists and engineers the freedom and responsibility to speak out; it prescribes criteria and procedures for the objective and impartial study of conflicts concerning scientific freedom and responsible scientific conduct; it encourages individuals, professional societies, industrial organizations, and government agencies toward the development of mechanisms for resolving such disputes.

Are *you* concerned with the present and future uses—and misuses—of science and technology? Then be sure to add this report to your professional or personal library. You will find its thoughtful, well-written text worth reading time and again.

A report of the AAAS Committee on Scientific Freedom and Responsibility, prepared for the Committee by John T. Edsall.

• •

Please send me _____ copy(ies) of *Scientific Freedom and Responsibility* (ISBN 0-87168-224-9; 1975, xiv + 50 pp., paperbound). Retail price $3.45; AAAS member price, prepaid $2.95.

☐ check enclosed ☐ please bill me

(Please allow 6 to 8 weeks for delivery)

Name

Address

City State Zip

Send orders to Dept. SFR2
American Association for the Advancement of Science
1515 Massachusetts Avenue, N.W.
Washington, D.C. 20005

(Continued from page 306)

eventually approved Kennedy's vision of the program while the House approved the more modest plan, setting the stage for conflict when representatives from each body met in conference committee to try to iron out differences between the two versions of the legislation.

After months of haggling, the conferees agreed on a compromise program which was considerably scaled down and hedged in from what Kennedy had envisaged. The conferees recommended that $1.2 million be authorized to support the program. In deference to the concerns of the House, they set certain restrictions on how the money can be disbursed. All grants and contracts must be approved by the National Science Board, which is often skittish about getting involved in touchy political issues. No funds can be given to registered lobbying groups. And funds that are given directly to other public groups can only be used to support forums, conferences, and workshops. Nevertheless, depending on how NSF interprets its mandate, the legislation could still provide significant aid to public interest groups.

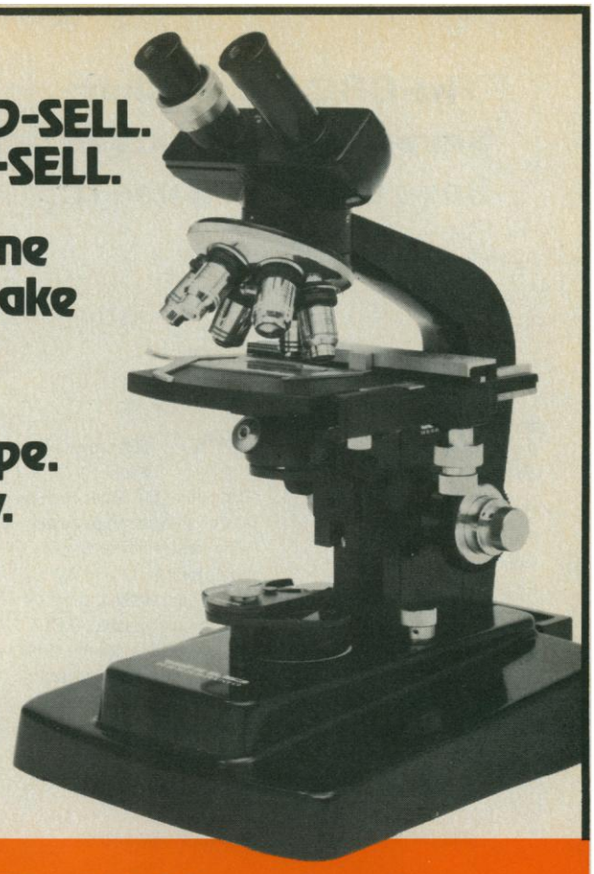
The lobbying restriction will not affect most citizen groups, since those that lobby generally set up separate units to do so. But funding of workshops could greatly assist poverty-stricken groups that have difficulty assembling scientific advisers to work jointly on a problem. And another provision of the law—authorizing NSF to support the participation of experienced scientists and students in helping the public understand issues involving science and public policy—could give some groups a new cadre of talent. The Kennedy forces view that last provision as authorizing a fellowship and internship program that would support scientists and students while they work on public policy issues. That work could be carried out in conjunction with public interest groups, state and local governments, or other appropriate bodies, thus providing an indirect form of assistance to the groups involved.

One leading public interest scientist—James B. Sullivan, codirector of the Center for Science in the Public Interest—called the legislation "a step in the right direction" toward enabling citizen groups to redress the imbalance between their technical resources and those of industry and government.

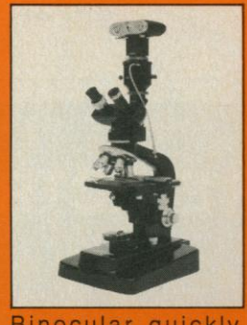
But Representative McCormack expressed fears that the new program might prove a windfall for some groups that oppose programs he favors. McCor-

NO HARD-SELL.
NO SOFT-SELL.

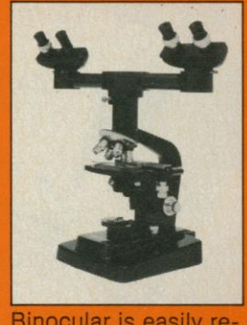
Facts alone should make you look into this microscope. Seriously.



WILD M20-EB with integrated 6v/20w Halogen lamp.



Binocular quickly converts into trinocular head, supporting a camera.



Binocular is easily replaced with Discussion Tube for dual station viewing.

Facts? Here are just a few: Integrated lightsource and transformer take up minimum desk space, thanks to compact functional design. Co-axial controls for bilateral focus, bilateral condenser, and travel for mechanical stage.

MODULAR SYSTEM: permits you to buy the configuration you need now, and add the numerous extensions and accessories available whenever you have the requirement.

SWISS QUALITY: means optical excellence with Fluotar and Plane Fluotar objectives on slide mounted nosepiece, plus the mechanical perfection for easy interchange of all modular parts.

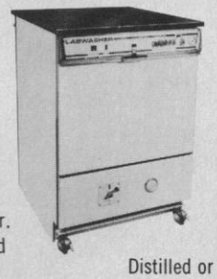
Brochure M20-EB will tell you a lot more.

WILD® HEERBRUGG

WILD HEERBRUGG INSTRUMENTS, INC.
465 SMITH ST., FARMINGDALE, NEW YORK 11735 • 516-293-7400
WILD OF CANADA, LTD. 881 LADY ELLEN PLACE, OTTAWA 3, ONT.
WILD OF MEXICO, S. A. LONDRES 256, MEXICO 6, D. F.

Circle No. 200 on Readers' Service Card

The CRC Labwasher: Save when you buy it, Save when you use it.



Save Money
Priced 15-30% lower. And save on reduced glassware breakage.

Save Time
Pays for itself in less than 6 months in an average three-man laboratory.

Save Labor
Accommodates glassware requirements of as many as 10 personnel.

Efficiency Plus
Distilled or tap water rinse on any or all three rinse cycles with booster heater to raise water temperature to 70°C (160°F) during final rinse. Drying time variable, 0-60 minutes. Under counter, free standing or mobile models available with 15 stainless steel racks.

The CRC Labwasher
Division/The Lab Apparatus Co.
18901 Cranwood Parkway, Cleveland, Ohio 44128

Get all the information. Request Bulletin A-610.

Circle No. 36 on Readers' Service Card

GLUCAGON [^{125}I]
monoiodinated

NEN is pleased to announce that our laboratories now prepare Glucagon [^{125}I] which is tested and guaranteed to be > 95% monoiodinated. The monoiodinated hormone is significantly more stable and retains a greater degree of immunoreactivity than similar preparations.

Glucagon [^{125}I], monoiodinated
100-200 μCi/μg
Shipped frozen in n-propanol: tris buffer, 1:1, containing a stabilizer and a proteolytic enzyme inhibitor.
NEX-102 $76/10$\mu$Ci $113/2x10$\mu$Ci $184/50$\mu$Ci $254/2x50$\mu$Ci

Send for our complete catalog of [^{125}I] labeled products.

NEN New England Nuclear
549 Albany Street, Boston, Massachusetts 02118
Customer Service 617-482-9595

NEN Canada Ltd., Lachine, Quebec; NEN Chemicals GmbH, Dreieichenhain, W. Germany.

Circle No. 277 on Readers' Service Card

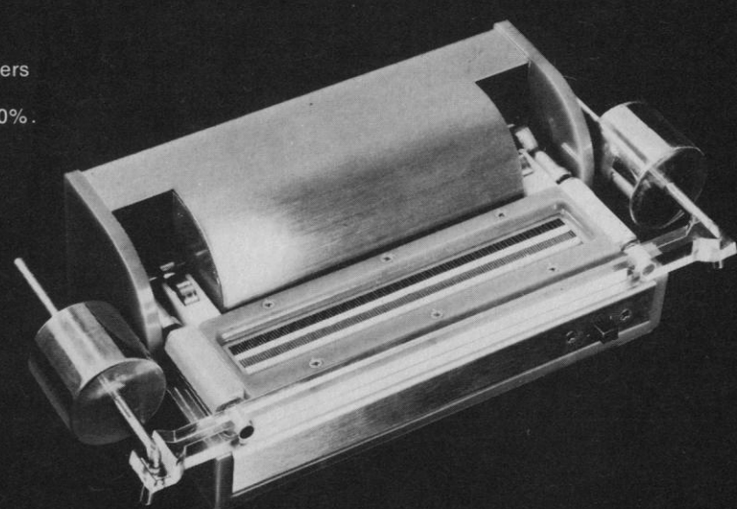
THE NEW HOEFER ELECTRIC GEL SLICER

SLICES
Fresh gels at room temperature, in diameters from 5-15 mm, in lengths up to 16 cm, in concentrations as low as 5%, as high as 30%.

ACCURATELY
The stainless steel grid slices as many as 160 1 mm segments at one pass, accurate to less than .03 mm.

AND

EASILY
Place gel in the trough; adjust the weights; turn on the motor; lower the grid.
The entire operation only takes minutes.



HOEFER SCIENTIFIC INSTRUMENTS
650 Fifth Street, P.O. Box 77387, San Francisco, CA 94107 • (415) 495-4410

Circle No. 344 on Readers' Service Card

mack, who is an ardent advocate of nuclear power, suggested that the Union of Concerned Scientists or the Natural Resources Defense Council, two groups critical of nuclear power, might stage a conference on "why nuclear power is so dangerous to the country" or "why crime rates are increasing around nuclear reactors." He also suggested that some groups might try to subvert the program by using funds intended to support forums as a device for paying off scientists who assist them in other activities. As an example, he suggested that a group might pay $1000 to a scientist for a half-hour speech at a forum, then gratefully accept the "free" service offered by that scientist in preparing a case against nuclear power. McCormack said he would use his position as a member of the House committee with legislative jurisdiction over NSF to "encourage" the Foundation to "screen the applicants so the money goes where Congress intended." By that, he means to "a public education program" rather than to support of groups that intervene in regulatory actions against the government.

Officials at NSF are somewhat baffled as to what mandate they have been given. Alexander J. Morin, director of NSF's Office of Science and Society, says he would "personally like to find a way to enable scientists to contribute to the resolution of public policy issues." But he adds: "I'm not certain at this point how to do that. I don't know what the legislative mandate allows me to do." Morin is not certain, for example, if the program would award fellowship support to a scientist who, in turn, would intervene in a regulatory case. Thus he will shortly be making the rounds of both House and Senate to get a reading from all parties as to how they interpret the legislation. The Senate will argue for a broad, aggressive program. The House will urge caution.

At the same time, budget specialists from NSF will try to divine how much money Congress really wants spent on the program. Although the authorization legislation earmarked $1.2 million for the program, the appropriations bill did not specify an amount; it simply put the program in with other science education activities under a lump sum. On a pro rata basis, it appears that Science for Citizens would receive maximum funding for fiscal year 1977 of $1 million. How well it does in future years will depend in part on the results of a "comprehensive analysis and assessment" of the program which NSF will conduct at the direction of Congress.

—PHILIP M. BOFFEY

BOOKS RECEIVED

(Continued from page 314)

Handbook of Industrial Toxicology. E. R. Plunkett. Chemical Publishing Co., New York, ed. 2, 1976. iv, 552 pp. $27.50.

Handbook of Solid-State Troubleshooting. Hershal Gardner. Reston (Prentice-Hall), Reston, Va., 1976. xii, 318 pp., illus. $15.95.

Herbal. Joseph Wood Krutch. Godine, Boston, 1976. 256 pp., illus. Cloth, $27.50; paper, $10. Reprint of the 1965 edition.

History of the Coniferous Forests, California and Nevada. Daniel I. Axelrod. University of California Press, Berkeley, 1976. vi, 62 pp., illus. Paper, $5. University of California Publications in Botany, vol. 70.

Infrared. The New Astronomy. David A. Allen. Halsted (Wiley), New York, 1976. 228 pp., illus. $12.

Intermediate Mathematics of Electromagnetics. Donald G. Stinson. Prentice-Hall, Englewood Cliffs, N.J., 1976. xii, 290 pp. $18.95. Prentice-Hall Electrical Engineering Series.

Intermediate Politometrics. Gordon Hilton. Columbia University Press, New York, 1976. x, 282 pp., illus. $15.

International Environmental Law. Bo Johnson. LiberFörlag, Stockholm, 1976. 226 pp. Paper, Sw. Cr. 40.80.

Introduction to Computers. Alton R. Kindred. Prentice-Hall, Englewood Cliffs, N.J., 1976. vi, 538 pp., illus. $14.95.

An Introduction to Hydrodynamics and Water Waves. Bernard Le Méhauté. Springer-

Originally introduced 25 years ago, the G76 is still being made to the same precision standards which have assured its continued acceptance as a dependable research tool. A triple-eccentric drive transmission imparts smooth, uniform agitation in a wide range of speeds for applications which require continuous operation, 24 hours a day, day-in and day-out. Precise controls assure reproducible conditions of temperature and agitation. The G76 is the workhorse of laboratory water bath shakers—thousands in use today and every day. If you need dependable performance rely on NBS.

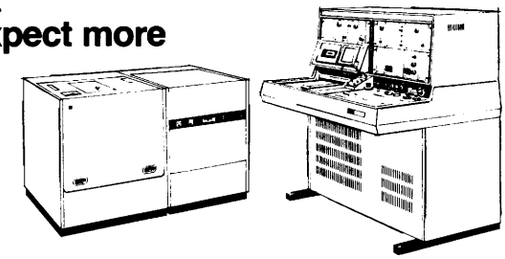
You'll still be using this water bath shaker after others have come and gone

Send for New 40 Page G76S/1076 Catalog

NEW BRUNSWICK SCIENTIFIC CO., INC.
Box 606, New Brunswick, New Jersey 08903 • 201/846-4600
With NBS, Advanced Technology is a Way of Life.
Circle No. 231 on Readers' Service Card

The Record Proves . . .

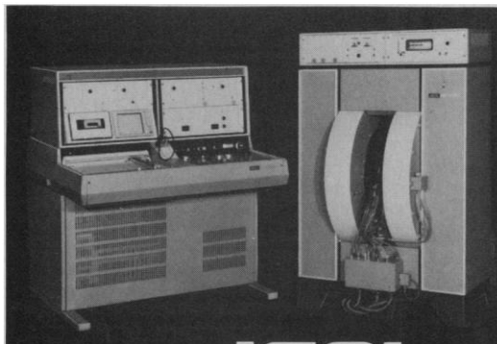
For those who expect more in FT NMR Spectrometers . . . it's JEOL



Low Cost — Routine ^{13}C System

The FX60 features:

- $^{13}C/^{1}H$ Dual Frequency 10, 5, 2mm V.T. Probes
- (LPCS) Light Pen Control System
- Built-in Proton-HOMO/HETERO decoupler
- RF crystal filter detection system
- 12 bit AD/DA for increased dynamic range
- INTERNAL and EXTERNAL locking modes
- 8, 16 and 32K word data collection
- Built-in Read/Write Cassette System
- ^{19}F, ^{31}P, ^{15}N extensions are available



Comprehensive 60 and 100 MHz Systems

The FX60Q & FX100 features:

- (DQD) DIGITAL Quadrature Detection System
- Dual Frequency variable temperature probes
- 4-channel DIGITAL phase shifters (DPS)
- Comprehensive auto-stacking system
- Computer based pulse programmer
- CPU Expandable to 65K words (MOS)
- 2-channel 12 Bit AD/DA
- $T_{1\rho}$/spin locking system
- Disc storage systems
- Multi-Frequency HOMO/HETERO decoupling capabilities
- Multi-Frequency observation

For information phone or write . . .

JEOL

Analytical Instruments, Inc.

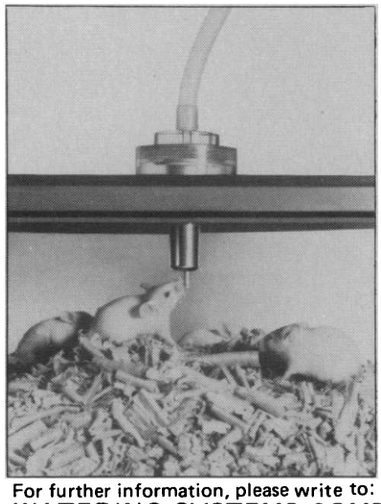
235 Birchwood Ave., Cranford, NJ 07016

201—272-8820

Circle No. 238 on Readers' Service Card

STRIKING SUCCESS!

12,000 units have been in service through the past three years in Japan. Not a case of water stoppage and subsequent accident to animals reported! Of the 12,000 units only two leaked and this was caused by human, not mechanical, error.



Check the impressive list of positive advantages:

1. Proved safety. Accident-proof.
2. Animals grow smoothly and rapidly with very little variance in body weight within the same group.
3. No need for frequent checking or inspection.
4. Cuts labor by 30%.
5. Animals get accustomed to the system instantly, so that they do not lose weight.
6. Capable of providing water to mice as young as three weeks old. Thick nozzle tip prevents animals from stopping it up with litter.
7. Water-measuring tank can be used.
8. Does not soil floor-litter.
9. Easily installed by just dropping the dispenser into the cage.
10. Applicable to cages and stands currently in use.
11. Sterilizable by autoclaving. (2 atm., 121°C, 20 min.)
12. Permanent use possible by simply replacing the valve every three years.

For further information, please write to:

WATERING SYSTEMS COMPANY

22-11 Yushima, 2-chome, Bunkyo-ku, Tokyo

A product of Takashima Shoten Co., Ltd.

Circle No. 152 on Readers' Service Card

Verlag, New York, 1976. viii, 316 pp., illus., + index. $24.80. Springer Study Edition.

Introduction to Mathematical Physics. Charlie Harper. Prentice-Hall, Englewood Cliffs, N.J., 1976. xviii, 302 pp. $16.50. Prentice-Hall Physics Series.

Introduction to Partial Differential Equations. Gerald B. Folland. Princeton University Press, Princeton, N.J., and University of Tokyo Press, Tokyo, 1976. vi, 352 pp. Paper, $8.50. Mathematical Notes, 17.

An Introduction to Program Evaluation. Jack L. Franklin and Jean H. Thrasher. Wiley-Interscience, New York, 1976. xii, 234 pp. $12.50.

Introductory Plant Physiology. G. Ray Noggle and George J. Fritz. Prentice-Hall, Englewood Cliffs, N.J., 1976. xvi, 688 pp., illus. $17.95. Prentice-Hall Biological Sciences Series.

Ionic Polymerization. Unsolved Problems. Papers from a seminar, Fuji Hakone, Japan, Oct. 1974. J. Furukawa and O. Vogl, Eds. Dekker, New York, 1976. xii, 450 pp., illus. $45.

Island of Isis. Philae, Temple of the Nile. William MacQuitty. Photographs by William and Betty MacQuitty. Scribner, New York, 1976. 192 pp. $14.95.

Journey to the Green and Golden Lands. The Epic of Survival on the Wagon Trail. Raymond N. Doetsch. Kennikat Press, Port Washington, N.Y., 1976. viii, 112p., illus. $9.95.

The Joy of Chemistry. Stanley M. Cherim and Leo E. Kallan. Saunders, Philadelphia, 1976. x, 408 pp., illus. $12.95. Saunders Golden Sunburst Series.

Kremer and Urdang's History of Pharmacy. Revised by Glenn Sonnedecker. Lippincott, Philadelphia, ed. 4, 1976. xvi, 572 pp., illus. $24.

Learning COBOL Fast. A Structured Approach. Claude J. DeRossi. Reston (Prentice-Hall), Reston, Va., 1976. xii, 212 pp., illus. Paper, $8.95.

Life Sentences. Aspects of the Social Role of Language. R. Harré, Ed. Wiley, New York, 1976. xvi, 178 pp. Cloth, $12.50; paper, $4.95.

Lifeboat. Man and a Habitable Earth. Ken Hewitt with Edward J. Hallewick, Michael R. Bevan, and L. Brian Hill. Wiley, Toronto, 1976 (U.S. distributor, Wiley, New York). viii, 336 pp., illus. $11.75.

Lipid Chromatographic Analysis. Vol. 3. Guido V. Marinetti, Ed. Dekker, New York, ed. 2, 1976. xii pp. + pp. 713–1000, illus. $35.

Livingstone's Pocket Medical Dictionary. Nancy Roper. Churchill Livingstone, Edinburgh, ed. 12, 1976 (U.S. distributor, Scribner, New York). xvi, 592 pp., illus. Paper, $3.95. Reprint of the 1974 edition.

Lymphocytes and Their Cell Membranes. Michael Schlesinger, Ed. Academic Press, New York, 1976. iv, 148 pp., illus. $14.50.

Magnificent Microbes. Bernard Dixon. Atheneum, New York, 1976. 252 pp. $8.95.

Man's Perception of Man-Made Environment. An Architectural Theory. Sven Hesselgren. Studentlitteratur, Lund, Sweden, and Dowden, Hutchinson and Ross, Stroudsburg, Pa., 1976. 214 pp., illus. $20.

Manual for Operational Amplifier Users. John D. Lenk. Reston (Prentice-Hall), Reston, Va., 1976. xii, 292 pp., illus. $16.95.

Marine Plankton Ecology. Paul Bougis. North-Holland, Amsterdam, and Elsevier, New York, 1976. x, 356 pp., illus. $49.95.

Mathematics for Electronics. Charles M.

Thomson. Prentice-Hall, Englewood Cliffs, N.J., 1976. xxii, 634 pp., illus. $12.95.

Mathematics for Technical Education. Dale Ewen and Michael A. Topper. Prentice-Hall, Englewood Cliffs, N.J., 1976. xiv, 414 pp., illus. $13.95. Prentice-Hall Series in Technical Mathematics.

Meaning in Anthropology. Papers from a conference, Santa Fe, N.M., Mar. 1974. Keith H. Basso and Henry A. Selby, Eds. University of New Mexico Press, Albuquerque, 1976. xii, 256 pp. $17.50. A School of American Research Book. School of American Research Advanced Seminar Series.

Mechanics of Materials. E. P. Popov. Text in collaboration with S. Nagarajan and problems with assistance of Z. A. Lu. Prentice-Hall, Englewood Cliffs, N.J. ed. 2, 1976. xvi, 560 pp., illus. $18.95.

Memoirs of a Minor Prophet. 70 Years of Organic Chemistry. Vol. 1. Robert Robinson. Elsevier, New York, 1976. viii, 252 pp., illus. $18.95.

Metal Ions in Biological Systems. Vol. 6, Biological Action of Metal Ions. Helmut Sigel, Ed. Dekker, New York, 1976. xvi, 454 pp., illus. $39.50.

Mixed Land Use. From Revival to Innovation. Dimitri Procos. Dowden, Hutchinson and Ross, Stroudsburg, Pa., 1976. xiv, 194 pp., illus. $18.

Molecular Gas Dynamics. G. A. Bird. Clarendon (Oxford University Press), New York, 1976. xvi, 238 pp., illus. $26.50. Oxford Engineering Science Series.

Moon Morphology. Interpretations Based on Lunar Orbiter Photography. Peter H. Schultz. University of Texas Press, Austin, 1976. xviii, 626 pp., illus. $35.

The Myth of Marginality. Urban Poverty and Politics in Rio de Janeiro. Janice E. Perlman. University of California Press, Berkeley, 1976. xxiv, 342 pp., illus. $14.95.

A National Policy for the Environment. NEPA and Its Aftermath. Richard A. Liroff. Indiana University Press, Bloomington, 1976. xii, 274 pp. $10.

Natural Hazards and Their Distributive Effects. A Research Assessment. Harold C. Cochrane. University of Colorado Institute of Behavioral Science, Boulder, 1975. xii, 136 pp., illus. Paper, $5. Program on Technology, Environment and Man Monograph Series.

Negative Ions. Harrie Massey. Cambridge University Press, New York, ed. 3, 1976. xviii, 742 pp., illus. $69.50. Cambridge Monographs in Physics.

Neuroendocrine Regulation of Fertility. A Potential New Approach to Human Fertility Regulation by Interfering with Neuroendocrine Pathways. Proceedings of a symposium, Simla, India, Oct. 1974. T. C. Anand Kumar, Ed. Karger, Basel, 1976. xii, 322 pp., illus. $62.

Neurophysiologic Studies in Tissue Culture. Stanley M. Crain. Raven, New York, 1976. xii, 280 pp., illus. $21.25.

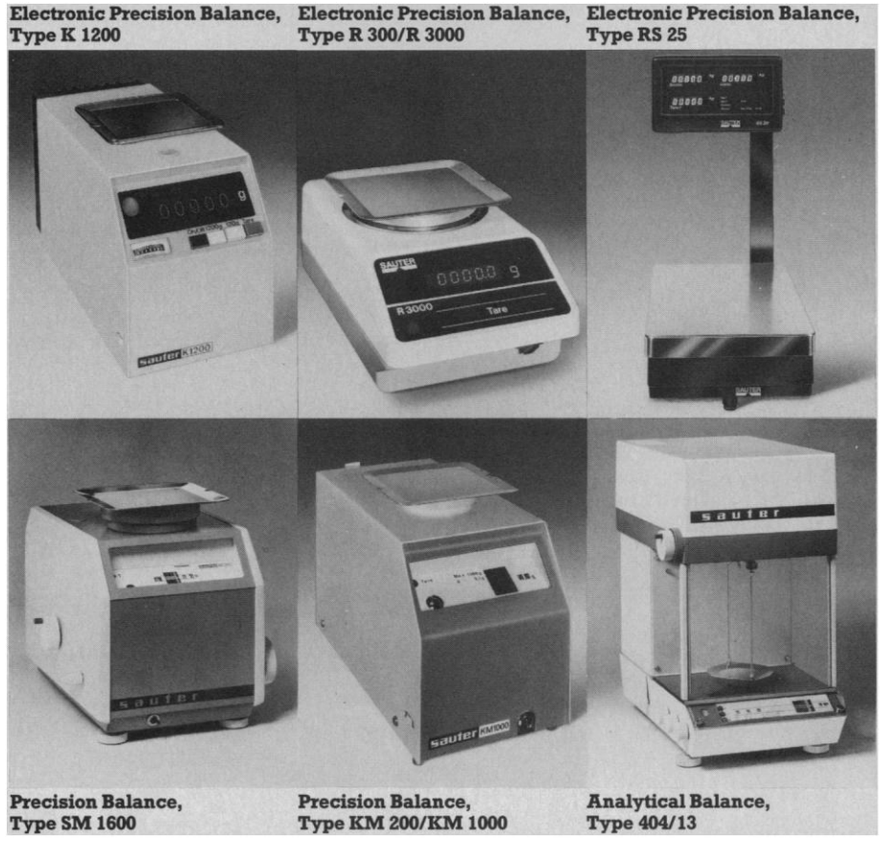
New Concepts of Cattle Growth. Roy T. Berg and Rex M. Butterfield. Halsted (Wiley), New York, 1976. xiv, 240 pp., illus. $12.50.

The New Madrid Earthquakes of 1811–1812. James Penick, Jr. University of Missouri Press, Columbia, 1976. xiv, 182 pp., illus. $10.

The New Management. Line Executive and Staff Professional in the Future Firm. William H. Gruber and John S. Niles. McGraw-Hill, New York, 1976. xiv, 242 pp. $12.95.

New Research on Women and Sex Roles at the University of Michigan. Papers from a conference, 1975. Dorothy G. McGuigan, Ed.

Precision balances and weighing systems by SAUTER.



SAUTER balances have earned a reputation for ease of operation, economy and practical technology. No wonder SAUTER balances are the choice in research and development laboratories, in industry and scientific institutions just about everywhere.
SAUTER precision toploading balances have weighing ranges from 160 g to 10 kg and more. Resolution from 1 mg to 1 g. SAUTER analytical balances are avialable with weighing ranges of 100 and 200 g.
Resolution of 0.01 mg or 0.1 mg.
Electronic precision balances are available with weighing ranges of 120 g, 300 g, 1200 g, 3000 g, 12 kg, 25 kg and 120 kg.

The K 1200, for example, combines two weighing ranges in one balance, touch a button and you can switch to a capacity ten times greater – from 120 g and a readability of 0.01 g to 1200 g and a readability of 0.1 g.
Shown here is but a small sample of the complete SAUTER line affording high accuracy in weighing ranges from a few grams up a ton.
Please write and let us help solve your particular balance problems.

SAUTER

August Sauter GmbH
Waagen und Systeme
Postfach 250, D-7470 Albstadt 1
Tel. (0 74 31) 5 10 56, Telex 07 63 851

August Sauter of America, Inc.
80 Fifth Avenue, New York N.Y. 10011
Tel. (212) 685 6659, Telex 421790

August Sauter s.r.l.
70 Via Carlo Farini, 20159 Milano
Tel. 60 60 80, 60 38 53

Circle No. 203 on Readers' Service Card

University of Michigan Center for Continuing Education of Women, Ann Arbor, 1976. vi, 404 pp. Paper, $5.

1975 Compendium of Current Environmental Studies in Puget Sound and Northwest Estuarine Waters. Saskia Schott and Joseph Pizzo, Eds. Oceanographic Institute of Washington, Seattle, 1976. Unpaged. Paper, $16.

No Other Gods. On Science and American Social Thought. Charles E. Rosenberg. Johns Hopkins University Press, Baltimore, 1976. xiv, 274 pp. $13.50.

Non-Technical FORTRAN. Thomas Worth. Prentice-Hall, Englewood Cliffs, N.J., 1976. xii, 356 pp., illus. Paper, $9.25.

Numerical Methods in Finite Element Analysis. Klaus-Jürgen Bathe and Edward L. Wilson. Prentice-Hall, Englewood Cliffs, N.J., 1976. xvi, 528 pp., illus. $28.95.

Oceans. Karl K. Turekian. Prentice-Hall, Englewood Cliffs, N.J., ed. 2, 1976. viii, 152 pp., illus. Cloth, $9.95; paper, $5.95. The Prentice-Hall Foundations of Earth Science Series.

100 Geometric Games. Pierre Berloquin. Translated from the French edition (Paris, 1973). Scribner, New York, 1976. Unpaged. $6.95.

Optimization Techniques. Modeling and Optimization in the Service of Man. Proceedings of a conference, Nice, Sept. 1975. Jean Cea, Ed. Springer-Verlag, New York, 1976. Two volumes, illus. Part 1. xiv, 854 pp. Paper, $22.50. Part 2. xiv, 852 pp. Paper, $25.50. Lecture Notes in Computer Science, vols. 40 and 41.

An Optimized Translation Process and Its Application to ALGOL 68. P. Branquart, J.-P. Cardinael, J. Lewi, J.-P. Delescaille, and M. Vanbegin. Springer-Verlag, New York, 1976. x, 334 pp., illus. Paper, $12.30. Lecture Notes in Computer Science, vol. 38.

The Over-Educated American. Richard B. Freeman. Academic Press, New York, 1976. xii, 218 pp., illus. $12.

An Overgoverned Society. W. Allen Wallis. Free Press (Macmillan), New York, and Collier Macmillan, London, 1976. x, 292 pp. $10.

Oxides and Oxide Films. Vol. 3. John W. Diggle and Ashok K. Vijh, Eds. Dekker, New York, 1976. xvi, 334 pp., illus. $33.50. The Anodic Behavior of Metals and Semiconductors Series.

Peace and World Order Systems. Teaching and Research. Paul Wehr and Michael Washburn. Sage Publications, Beverly Hills, Calif., 1976. vi, 258 pp. Cloth, $12; paper, $7. Sage Library of Social Research, vol. 25.

Petroleum Engineering. Alfred Mayer-Gürr. Halsted (Wiley), New York, 1976. xvi, 208 pp., illus. Paper, $6.95. Geology of Petroleum, vol. 3.

Pharmacology of Marihuana. Proceedings of a conference, Savannah, Ga., Dec. 1974. Monique C. Braude and Stephen Szara, Eds. Raven, New York, 1976. Two volumes, illus. xviii + pp. 1–458, and xviii + pp. 459–866. $50.

Phase Diagrams for Ceramists. 1975 Supplement. Ernest M. Levin and Howard F. McMurdie. Margie K. Reser, Ed. American Ceramic Society, Columbus, Ohio, 1975. iv, 514 pp., illus. $35.

Physical Geology. Sheldon Judson, Kenneth S. Deffeyes, and Robert B. Hargraves. Prentice-Hall, Englewood Cliffs, N.J., 1976. xvi, 560 pp., illus. $14.50.

Physics. Foundations and Frontiers. George Gamow and John M. Cleveland. Prentice-Hall, Englewood Cliffs, N.J., ed. 3, 1976. xvi, 606 pp., illus. $14.95.

Physiology. Ewald E. Selkurt, Ed. Little, Brown, Boston, ed. 4, 1976. xvi, 880 pp., illus. Cloth, $17.50; paper, $12.50.

Plutonium. Health Implications for Man. Proceedings of a symposium, Los Alamos, N.M., May 1974. J. W. Healy, Ed. Pergamon, New York, 1976. vi pp. + pp. 441–640, illus. $20. Reprinted from *Health Physics*, vol. 29, No. 4.

Polymer Grafts in Biochemistry. Papers from a symposium, Los Angeles, Apr. 1974. Harry F. Hixson, Jr., and Eugene P. Goldberg, Eds. Dekker, New York, 1976. xvi, 366 pp., illus. Paper, $29.75. Reprinted from *Journal of Macromolecular Science-Chemistry*, vol. A10 (1 and 2).

Precalculus Mathematics for Technical Students. Panayotis D. Mavrommatis and Philip Reichmeider. Prentice-Hall, Englewood Cliffs, N.J., 1976. viii, 408 pp., illus. $13.50. Prentice-Hall Series in Technical Mathematics.

Pregnancy as a Disease. The Pill in Society. Donald H. Merkin. Kennikat Press, Port Washington, N.Y., 1976. xvi, 134 pp. $9.95. National University Publications.

A Primer of Verbal Behavior. An Operant View. Stephen Winokur. Prentice-Hall, Englewood Cliffs, N.J., 1976. xii, 164 pp., illus. $7.95. Prentice-Hall Series in Experimental Psychology.

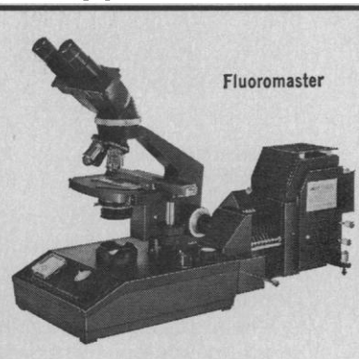
The Privacy Act of 1974. A Reference Manual for Compliance. Arthur A. Bushkin and Samuel I. Schaen. System Development Corporation, McLean, Va. 1976. xiv, 184 pp. Paper, $15.

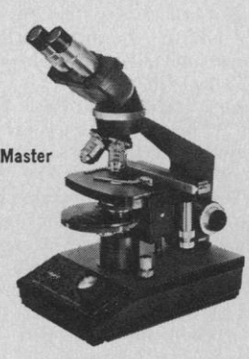
Proceedings of the Eighth International Conference on Numerical Taxonomy. Oeiras, Portugal, Aug. 1974. George F. Estabrook, Ed. Freeman, San Francisco, 1976. xviii, 430 pp., illus. $12.50.

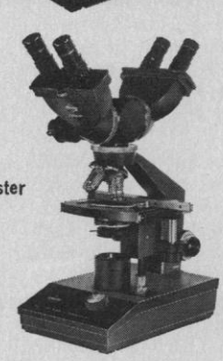
Proceedings of the 1st International Symposium on Nitrogen Fixation. Pullman, Wash., June 1974. William E. Newton and C. J. Ny-

Straight to the point of the matter – SWIFT Laboratory-Research Microscopes

Modular concept, custom assembly, and immediate interchangeability are keynote characteristics of the SWIFT line of laboratory-research microscopes. Applicable to every area of microscopy, including photo-micrography, they will accommodate all types of illumination, critical through Koehler, and optical combinations for brightfield, darkfield, or phase. In the case of the Fluoromaster, the special SWIFT Illuminator provides for the full range of fluorescence microscopy for pure scientific investigation and evaluation.







WRITE TODAY FOR LITERATURE AND NAME OF NEAREST DEALER FOR DEMONSTRATION

SWIFT®

SWIFT INSTRUMENTS, INC. (MAIN OFFICE: Boston, MA)

Technical Instrument Division

P.O. BOX 562, SAN JOSE, CA 95106 • 408/293-2380

SWIFT AGENCIES are located throughout the U.S. and in most foreign countries.

Circle No. 39 on Readers' Service Card

INCUBATORS

CO_2 large capacity 24 & 50 cu ft

mechanically convected . . . double doors retain more CO_2 on openings . . . direct set 0 to 20% CO_2 . . . auto CO_2 recovery

24 cu ft cap One or two doors. 0° to 60°C or 35° to 60°. Solid state proportional control ±0.1°C. ±0.2°C temp stability. Direct set amb to 98% RH ±2%. 91 sq ft load area. Optional self-decontamination.

50 cu ft cap Two or four doors. 208 sq ft of load area in 10.3 sq ft of floor space. 35° to 55°C or 2° to 55°C. 70% RH.

Always the right incubator for the application.

Hotpack

HOTPACK CORPORATION (215) 333-1700 — 800-523-3608
COTTMAN AVENUE AT MELROSE STREET, PHILADELPHIA, PA. 19135
H-128 IN CANADA: HOTPACK (CANADA) LTD., WATERLOO, ONT.

Circle No. 272 on Readers' Service Card

>1500Ci/mmol
ICTP [^{125}I]

>900Ci/mmol
IdCTP [^{125}I]

For sequencing and hybridization studies. Each lot tested enzymatically to insure biological activity.

Iodocytidine 5′-triphosphate, tetra (triethylammonium) salt, 5-[^{125}I]– >1500Ci/mmol
Ethanol: water solution, 1:1, shipped in dry ice.
NEX-073 $125/100μCi $240/500μCi $420/1mCi

Iododeoxycytidine 5′-triphosphate, tetra (triethylammonium) salt, 5-[^{125}I]– >900Ci/mmol
Ethanol: water solution, 1:1, shipped in dry ice.
NEX-074 $100/100μCi $220/500μCi $390/1mCi

Also: Iododeoxyuridine, 5-[^{125}I]– >2000Ci/mmol

NEN New England Nuclear
549 Albany Street, Boston, Massachusetts 02118
Customer Service 617-482-9595

NEN Canada Ltd., Lachine, Quebec; NEN Chemicals GmbH, Dreieichenhain, W. Germany

Circle No. 328 on Readers' Service Card

CORVUS 500

SCIENTIFIC CALCULATOR

with Reverse Polish Notation

$69.95

More calculating power than the HP21
More memory registers than the SR51
Get the best for less!

This new entry in the Scientific Calculator field offers the best package available today . . . the efficiency and simplicity of Reverse Polish Notation, a powerful 4-register stack with 9 memory registers, a 12 digit display for exacting accuracy, (scientific format of 10-digit mantissa, 2-digit exponent), total capability in scientific functions plus additional capabilities in statistics, conversions and business.

Combining ease of entry with the most versatile keyboard available, the best viewing angle, brightness and readability with the most calculating power available . . . the Corvus 500, at its $69.95 price is the best buy of any comparable equipment on the market today.

PROVE IT TO YOURSELF! Try the Corvus 500 for 10 days . . . FREE! Prove to yourself that it meets your every calculating need. If you are not satisfied, for any reason, your full purchase price will be refunded.

The Corvus 500 is Complete! Everything you need to use your new Corvus 500 is in the package:
- ✓ Rechargeable nickel Cadmium Batteries
- ✓ Adaptor/Charger
- ✓ Soft Carrying Case
- ✓ Instruction Manual

The compact, contoured case is 5½″ long, 3″ wide, 1¼″ high and weighs only 8 oz.

The Corvus 500 is guaranteed! The Corvus 500 is warranteed against defects in materials and workmanship for a period of one year from the date of delivery. The Corvus 500 is warranteed both by the manufacturer and by Global, a company with 18 years of outstanding service to the data field.

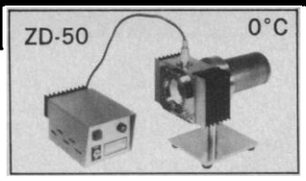
TOLL-FREE ORDERING
NATIONAL: 800/621-2307
ILLINOIS: 800/972-2668

Both phone and mail orders accepted. Postage prepaid with Check or Money Order. BankAmericard or Master Charge Cards accepted. Illinois residents add 5% Sales Tax. Add $2.50 for postage and handling.

GLOBAL Division of Global Tabulating Co., Inc.
1231 W. Washington Blvd., Chicago, Ill. 60607

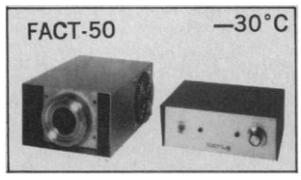
Name _____
Address _____
City _____ State _____ Zip _____
☐ Cash Payment: Check or Money Order enclosed. I understand that cash payment entitles me to Postage Prepaid
☐ BankAmericard ☐ Master Charge
Credit Card No. _____ Expiration Date: _____
Signature: _____

ADVANCED DESIGN COOLED HOUSINGS FOR PHOTOMULTIPLIERS

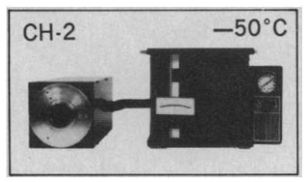


Each of these EMI Gencom cooled housings provides RFI shielding for photon counting, improved signal to noise ratio, and stable environment for data aquisition.

Convection cooled thermoelectric cooler maintains 0°C (22° ambient) with unattendent operation.



Forced air-cooled to −30°C with 20° ambient. Temperature can be preset and controlled to ±0.5°C. Dew-free without additional equipment.



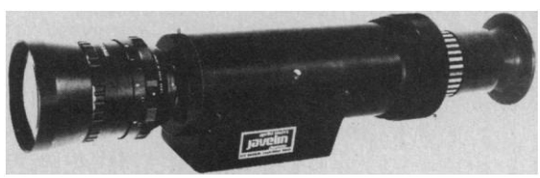
Maintains temperatures to −50°C with ±1°C accuracy. Model CH-25 to ±0.5°C. These housings are especially desirable for use with S-20 and S-1 tubes.

All coolers are complete with power supply, RFI shielding, thermal window and mounting flange. FACT-50 and CH-2 complete with temperature controllers.
When you order a PMT and cooled housing, your tube is tested under actual operating conditions, and test data is furnished.

EMI GENCOM INC.
80 Express St., Plainview, N.Y. 11803
(516) 433-5900, TWX 510-221-1889

Circle No. 199 on Readers' Service Card

SEE, OBSERVE, PHOTOGRAPH Your Experiments In Almost Total Darkness



With Javelin Night Viewing Devices

Passive systems that amplify light on an average of 60,000 times and currently in use in hundreds of Universities and research facilities around the world.

Call or write Javelin today for complete information on seeing in the dark. Units available from $3,250.

apollo lasers
javelin
division

Javelin Electronics
Department S44
6357 Arizona Circle
Los Angeles, Calif. 90045
(213) 641-4490
Telex: 69-8204

Circle No. 34 on Readers' Service Card

man, Eds. Washington State University Press, Pullman, 1976. 2 vols., illus. viii pp. + pp. 1–312, and iv pp. + pp. 313–718. Paper, $25.

Processed Foods and the Consumer. Additives, Labeling, Standards, and Nutrition. Vernal S. Packard, Jr. University of Minnesota Press, Minneapolis, 1976. viii, 360 pp., illus. Cloth, $12; paper, $5.95.

Public Grazing Lands. Use and Misuse by Industry and Government. William Voigt, Jr. Rutgers University Press, New Brunswick, N.J., 1976. xiv, 360 pp. $19.95.

Quasilinear Hyperbolic Systems and Waves. A. Jeffrey. Pitman, San Francisco, 1976. viii, 230 pp., illus. Paper, $15.90. Research Notes in Mathematics, 5.

Research in Neurosis. Proceedings of a symposium, Amsterdam, Sept. 1975. H. M. van Praag, Ed. Bohn, Scheltema and Holkema, Utrecht, the Netherlands, 1976. viii, 206 pp., illus. Paper, $17.

The Research Status of Spinal Manipulative Therapy. Papers from a workshop, Bethesda, Md., Feb. 1975. Murray Goldstein, Ed. National Institute of Neurological and Communicative Disorders and Stroke, Bethesda, Md., 1975 (available from the Superintendent of Documents, Washington, D.C.). viii, 310 pp., illus. Paper, $4.75. NINCDS Monograph No. 15. DHEW Publication No. (NIH)76-998.

Screening Tests in Chemical Carcinogenesis. Proceedings of a workshop, Brussels, Belgium, June 1975. R. Montesano, H. Bartsch, L. Tomatis, and W. Davis, Eds. International Agency for Research on Cancer, Lyon, 1976 (U.S. distributor, Q Corp., Albany, N.Y.). xx, 666 pp., illus. Paper, $48. IARC Scientific Publications, No. 12.

Second Reference Catalogue of Bright Galaxies. Containing Information on 4,364 Galaxies with References to Papers Published between 1964 and 1975. Gerard de Vaucouleurs, Antoinette de Vaucouleurs, and Harold G. Corwin, Jr. University of Texas Press, Austin, 1976. vi, 396 pp. $50.

Societal Directions and Alternatives. A Critical Guide to the Literature. Michael Marien. Information for Policy Design, La Fayette, N.Y., 1976. viii, 400 pp. Paper, $16.50.

Soil Chemistry. Part A, Basic Elements. G. H. Bolt and M. G. M. Bruggenwert, Eds. Elsevier, New York, 1976. xiv, 282 pp., illus. $16.50. Developments in Soil Science 5A.

Solute-Solvent Interactions. Vol. 2. J. F. Coetzee and Calvin D. Ritchie, Eds. Dekker, New York, 1976. xiv, 460 pp., illus. $38.50.

Space Activity Impact on Science and Technology. Proceedings of a congress, Baku, Soviet Union, Oct. 1973. L. G. Napolitano, P. Contensou, and W. F. Hilton, Eds. Pergamon, New York, 1976. vi, 408 pp., illus. $50.

Space Stations Present and Future. Proceedings of a congress, Amsterdam, Sept. 1974. L. G. Napolitano, P. Contensou, and W. F. Hilton, Eds. Pergamon, New York, 1976. vi, 438 pp., illus. $50.

Squeaking By. U.S. Energy Policy since the Embargo. Richard B. Mancke. Columbia University Press, New York, 1976. x, 182 pp. $8.95.

Strasburger's Textbook of Botany. Dietrich von Denffer, Walter Schumacher, Karl Mägdefrau, and Friedrich Ehrendorfer. Translated from the 30th German edition (Stuttgart, 1971) by Peter Bell and David Coombe. Longman, New York, 1976. xviii, 878 pp., illus. $25.

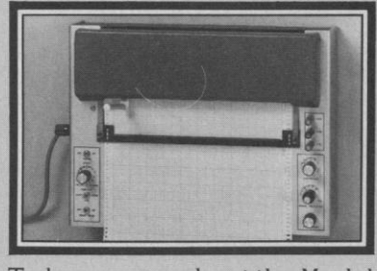
Statistical Indicators of Scientific and Techni-

Your best buy in strip chart recorders

Bio-Rad's new Model 1310

If you've been looking for a reliable, reasonably-priced recorder for your chromatographic separations, here it is. Model 1310 has strip chart features rarely found at $695. It can be wall or bench mounted and offers all the attractions listed below:

1. Accuracy: ±0.25%
2. Repeatability: 0.1%
3. Linearity: ±0.5% full scale
4. 12 chart speeds:
   0.5, 1.0, 2.0, 5.0, 10.0 and 20.0 inches/hour
   0.5, 1.0, 2.0, 5.0, 10.0 and 20.0 inches/minute
5. Accessory power outlet. Lets you run other apparatus in conjunction with the recorder.
6. Ranges. 16 calibrated full scale ranges from 1 mV to 100V.
7. Scale expansion. Up to 3X on all ranges. Any input from 1 mV to 300V can be accepted for full scale reading.
8. Zero adjust. Twice full scale reading.
9. Automatic pen lift.
10. Cold room compatible.



To learn more about the Model 1310 and other good buys in chromatographic instruments such as Bio-Rad's UV Monitor and Fraction Collector, request Bulletin 1040.

BIO-RAD Laboratories

2200 Wright Avenue
Richmond, CA 94804
Phone (415) 234-4130
Also in: Rockville Centre, N.Y.; Toronto, Ontario; London; Milan; Munich; Sao Paulo.

Circle No. 241 on Readers' Service Card

cal Communication (1960–1980). Vol. 2, A Research Report. Prepared by D. W. King, F. W. Lancaster, D. C. McDonald, N. K. Roderer, and B. L. Wood. King Research, Rockville, Md., 1976 (available as PB 254060 from National Technical Information Service, Springfield, Va.). xxiv, 477 pp., illus. Paper, $12.75; microfiche, $2.25.

The Structure of Communication in Early Language Development. Patricia Marks Greenfield and Joshua H. Smith. Academic Press, New York, 1976. xii, 238 pp. $14.50. The Child Psychology Series.

The Structure of Human Memory. Charles N. Cofer, Ed. Freeman, San Francisco, 1976. x, 214 pp., illus. Cloth, $10; paper, $5.50. A Series of Books in Psychology.

Syntax. Peter W. Culicover. Academic Press, New York, 1976. xii, 316 pp., illus. $12.50.

Teaching Metrics Simplified. James B. Cunningham. Prentice-Hall, Englewood Cliffs, N.J., 1976. viii, 184 pp., illus. Cloth, $10.95; paper, $5.95.

Tektites and Their Origin. John A. O'Keefe. Elsevier, New York, 1976. xii, 254 pp., illus. $36.50. Developments in Petrology, 4.

Theories of Vision from al-Kindi to Kepler. David C. Lindberg. University of Chicago Press, Chicago, 1976. xii, 324 pp., illus. $20. University of Chicago History of Science and Medicine.

Thyroid Research. Proceedings of a conference, Boston, June 1975. Jacob Robbins, Lewis E. Braverman, F. J. G. Ebling, and I. W. Henderson, Eds. Excerpta Medica, Amsterdam, and Elsevier, New York, 1976. xiv, 638 pp., illus. $82.75.

Transistor Circuit Analysis and Application. Ben Zeines. Reston (Prentice-Hall), Reston, Va., 1976. x, 374 pp., illus. $16.95.

The Ultrastructure of the Animal Cell. L. T. Threadgold. Pergamon, New York, ed. 2, 1976. xxiv, 516 pp., illus. Cloth, $30; paper, $18. International Series in Pure and Applied Biology, Zoology Division, vol. 55.

Urban America. The Policy Alternatives. David A. Caputo. Freeman, San Francisco, 1976. xvi, 236 pp. Cloth, $11.95; paper, $5.95.

Variational Methods in Theoretical Mechanics. J. T. Oden and J. N. Reddy. Springer-Verlag, New York, 1976. x, 304 pp. Paper, $14.80.

The View from Lincoln Hill. Man and the Land in a New England Town. Paul Brooks. Drawings by the author. Houghton Mifflin, Boston, 1976. xii, 274 pp. $8.95.

Wissenschaftliche Forschung und elektronische Rechentechnik. Werner Schulze. Akademie-Verlag, Berlin, 1975. xii, 140 pp. Paper, 15 M. Beiträge zur Forschungstechnologie, 2.

. . . Y Venimos a Contradecir. Los Campesinos de Morelos y el Estado Nacional. Arturo Warman. Centro de Investigaciones Superiores, Instituto Nacional de Antropología e Historia, Tlalpan, Mexico, 1976. 352 pp. Paper, Mex$100. Ediciones de la Case Chata, 2.

The Year Book of Drug Therapy 1976. Dale G. Friend, Ed. Year Book Medical Publishers, Chicago, 1976. 424 pp. $23.50.

The Year Book of Pathology and Clinical Pathology 1976. Frank A. Carone and Rex B. Conn, Eds. Year Book Medical Publishers, Chicago, 1976. 450 pp., illus. $25.

Year-book of World Problems and Human Potential. Union of International Associations/Mankind 2000, Brussels, Belgium, 1976. 1136 pp., illus. $65.

for platinum* biomedical chemicals

Call us toll-free 800-523-7792

(in Pa.: 800-362-7985)

Platinum Blues...cell staining agents used in cancer research.

Osmium Tetroxide...fixative and stain for animal and plant cell and tissue section examination by microscopy.

Chloroplatinic Acid...reagent used in body-fluid analysis.

Platinum Coordination Complexes...for gas chromatography column, olefin separation, and biochemical research.

Available literature gives analysis and other details. Just pick up your phone and call.

MBI

*Platinum, palladium, rhodium, ruthenium, iridium, osmium

MATTHEY BISHOP, INC.
Chemicals Division
MALVERN, PENNSYLVANIA 19355
A Johnson Matthey Affiliate
"Your Platinum Connection"

Circle No. 331 on Readers' Service Card

The high-capacity refrigerated bath:
It can hit and hold ±.02°C stability ...guaranteed!

The cooling capacity of Neslab's 8-liter bath is 20-30% greater than most baths—because of its extra large ¼-hp compressor.

The temperature stability of the RTE8 is an extraordinary ±.02°C with water; we're so certain that we guarantee it—or your money back. There's no need to put up with a large bath to achieve this level of stability.

Cools fast. The RTE8 can cool alcohol from 25°C to zero in just 20-minutes! So, you'll have no start-up or change-over delays.

Compact. At 11", it's half the height of most baths, and much easier to use on top of your bench.

Versatile. The operating range of -30 to +100°C is greater than most—for extra versatility. And talk about versatility, the RTE8 handles internal work in the immersion area as well as external work. If you have a problem, phone or write for application assistance.

Refrigerated Circulating Bath

NESLAB
INSTRUMENTS, INC.
871 Islington St., Portsmouth, N.H. 03801
Tel. (603) 436-9444

Circle No. 296 on Readers' Service Card

Book Order Service

A Science *Book Order Service, based on the Books Received column, has been established. It is scheduled for each issue in which there is a Readers' Service Card. To order any of the books listed, circle the corresponding number on the Readers' Service Card (pages 250A and 346A); the participating publisher(s) will ship the title(s) ordered and send you a bill.*

Advances in Computers. Vol. 14. Morris Rubinoff and Marshall C. Yovits, Eds. Academic Press, New York, 1976. xii, 288 pp., illus. $24.50. *To order this book circle No. 480 on Readers' Service Card*

Advances in Heterocyclic Chemistry. Vol. 19. A. R. Katritzky and A. J. Boulton, Eds. Academic Press, New York, 1976. xii, 376 pp., illus. $38.50. *To order this book circle No. 481 on Readers' Service Card*

Advances in Librarianship. Vol. 6. Melvin J. Voigt and Michael H. Harris, Eds. Academic Press, New York, 1976. xviii, 292 pp. $16. *To order this book circle No. 482 on Readers' Service Card*

Advances in Radiation Biology. Vol. 6. John T. Lett and Howard Adler, Eds. Academic Press, New York, 1976. xiv, 342 pp., illus. $29.50. *To order this book circle No. 483 on Readers' Service Card*

Applications of Mössbauer Spectoscopy. Vol. 1. Richard L. Cohen, Ed. Academic Press, New York, 1976. xii, 350 pp., illus. $24.50. *To order this book circle No. 484 on Readers' Service Card*

Artificial Organs. W. J. Kolff. Halsted (Wiley), New York, and Israel Universities Press, Jerusalem, 1976. xii, 180 pp., illus. $22.50. *To order this book circle No. 485 on Readers' Service Card*

Biochemical and Biophysical Perspectives in Marine Biology. Vol. 3. D. C. Malins and J. R. Sargent, Eds. Academic Press, New York, 1976. xvi, 448 pp., illus. $35.50. *To order this book circle No. 486 on Readers' Service Card*

Computer Networking. Robert P. Blanc and Ira W. Cotton, Eds. IEEE Press, New York, 1976 (distributor, Wiley, New York). viii, 368 pp., illus. Cloth, $17.95; paper, $8.95. IEEE Press Selected Reprint Series. *To order this book circle No. 478 on Readers' Service Card*

Contemporary Issues in Experimental Phonetics. Norman J. Lass, Ed. Academic Press, New York, 1976. xiv, 498 pp., illus. $19.50. Perspectives in Neurolinguistics and Psycholinguistics. *To order this book circle No. 487 on Readers' Service Card*

Determination of Organic Structures by Physical Methods. Vol. 6. F. C. Nachod, J. J. Zuckerman, and Edward W. Randall, Eds. Academic Press, New York, 1976. xiv, 454 pp., illus. $47. *To order this book circle No. 488 on Readers' Service Card*

The Dissent of the Governed. Alienation and Democracy in America. James D. Wright. Academic Press, New York, 1976. x, 332 pp. $16.50. Quantitative Studies in Social Relations. *To order this book circle No. 489 on Readers' Service Card*

Dynamic Stochastic Models from Empirical Data. R. L. Kashyap and A. Ramachandra Rao. Academic Press, New York, 1976. xvi, 334 pp. $34.50. Mathematics in Science and Engineering, vol. 122. *To order this book circle No. 490 on Readers' Service Card*

Family Therapy. Theory and Practice. Philip J. Guerin, Jr., Ed. Gardner Press, New York, 1976 (distributor, Halsted [Wiley], New York). xii, 554 pp. $24.50. *To order this book circle No. 491 on Readers' Service Card*

High-Energy Photons and Electrons. Clinical Applications in Cancer Management. Proceedings of a symposium, Philadelphia, May 1975. Simon Kramer, Nagalingam Suntharalingam, and George F. Zinninger, Eds. Wiley, New York, 1976. xiv, 364 pp., illus. $25. Wiley Series in Diagnostic and Therapeutic Radiology. A Wiley Medical Publication. *To order this book circle No. 492 on Readers' Service Card*

Histocompatibility. George D. Snell, Jean Dausset, and Stanley Nathenson. Academic Press, New York, 1976. xiv, 402 pp., illus. $29.50. *To order this book circle No. 493 on Readers' Service Card*

Integrated Aircraft Navigation. James L. Farrell. Academic Press, New York, 1976. xvi, 352 pp., illus. $35. *To order this book circle No. 494 on Readers' Service Card*

International Review of Experimental Pathology. Vol. 16. G. W. Richter and M. A. Epstein, Eds. Academic Press, New York, 1976. xiv, 346 pp., illus. $36. *To order this book circle No. 495 on Readers' Service Card*

Introduction to Materials Science and Engineering. Kenneth M. Ralls, Thomas H. Courtney, and John Wulff. Wiley, New York, 1976. xvi, 638 pp., illus. + index. $18.95. *To order this book circle No. 496 on Readers' Service Card*

Ion Implantation, Sputtering and Their Applications. P. D. Townsend, J. C. Kelly, and N. E. W. Hartley, Academic Press, New York, 1976. x, 334 pp., illus. $32.25. *To order this book circle No. 503 on Readers' Service Card*

The Juvenile Hormones. Proceedings of a symposium, Lake Geneva, Wis., Nov. 1975. Lawrence I. Gilber, Ed. Plenum, New York, 1976. x, 572 pp., illus. $45. *To order this book circle No. 504 on Readers' Service Card*

Perspectives on Cognitive Dissonance. Robert A. Wicklund and Jack W. Brehm. Erlbaum, Hillsdale, N.J., 1976 (distributor, Halsted [Wiley], New York). xvi, 350 pp. $16.50. Complex Human Behavior. *To order this book circle No. 497 on Readers' Service Card*

Physiology of the Amphibia. Vol. 3. Brian Lofts, Ed. Academic Press, New York, 1976. xiv, 644 pp., illus. $58.50. *To order this book circle No. 498 on Readers' Service Card*

Recent Progress in Hormone Research. Vol. 32. Proceedings of a conference, 1975. Roy O. Greep, Ed. Academic Press, New York, 1976. xviii, 690 pp., illus. $45. *To order this book circle No. 499 on Readers' Service Card*

The Scandinavian Languages. An Introduction to Their History. Einar Haugen. Harvard University Press, Cambridge, Mass., 1976. 508 pp., illus. $25. *To order this book circle No. 479 on Readers' Service Card*

Spectroscopy. B. P. Straughan and S. Walker, Eds. Chapman and Hall, London, and Halsted (Wiley), New York, ed. 2, 1976. 3 vols., illus. x, 304 pp.; x, 362 pp.; and x, 324 pp. Each vol., $22.50. *To order this book circle No. 500 on Readers' Service Card*

Spectroscopy. Part A. Dudley Williams, Ed. Academic Press, New York, 1976. xviii, 366 pp., illus. $37.50. Methods of Experimental Physics, vol. 13. *To order this book circle No. 501 on Readers' Service Card*

The Theory of Auger Transitions. D. Chattarji. Academic Press, New York, 1976. xii, 266 pp., illus. $29. *To order this book circle No. 502 on Readers' Service Card*