

12 June 1987 • Vol. 212 • No. 4500

\$2.00

# SCIENCE



# New Microfuge 11 & 12 The Little Centrifuges with Big Centrifuge Features.

Everyone's familiar with Beckman Microfuge™ centrifuges. They're indispensable in research, clinical, and industrial labs for spinning down small samples fast.

Now Beckman offers two advanced Microfuge models with features you'd expect only in larger centrifuges, plus higher speeds, forces, and increased capacity.

The Microfuge 11 holds tubes in slides, like the Microfuge B. But it generates much higher centrifugal forces—up to 11,600 g with a full load of 18 1.5/1.8 mL tubes.

The Microfuge 12 holds even more tubes—up to 60 of the 1.5/1.8 mL size—and spins them at even higher forces—up to 12,200 g. Its color-coded tube holders are also tube racks, and there is a clever holder/rack for decanting 1.5-mL tubes for such applications as RIA: you simply squeeze the sides of the holder together while inverting the tubes.

Both Microfuge 11 & 12 offer variable speed settings with precise speed control: you set the speed you want, and the 11 & 12 run at that speed no matter what the tube load. Both 11 & 12 have imbalance

detection: the motor shuts off if the rotor has been seriously misloaded. And both models have automatic reset timers, a convenience for repetitive runs.

If you're in the market for a microcentrifuge, get one with big centrifuge features. Write for brochure SB-570 to Beckman Instruments, Inc., Spinco Division, 1117 California Avenue, Palo Alto, CA 94304.



**Special Offer:** As an introductory offer, we'll give you \$200 off the price of a new Microfuge 11 or 12 with trade-in of any Beckman, Eppendorf, or Fisher microcentrifuge, regardless of its condition. Offer limited to one trade-in per new Microfuge 11/12, valid in the U.S. and Canada only; expires June 30, 1981.

# BECKMAN

Circle No. 362 on Readers' Service Card

ANOTHER TECHNOLOGICAL ADVANCE FROM SHARP.

# A REAL COMPUTER YOU CAN PUT IN YOUR POCKET.

It was a pipe dream only a few short years ago. A computer you could carry around in your pocket, so you could run programs at home or while traveling; a computer small enough both for your pocket *and* your pocketbook.

Herewith, the pipe dream made real: the Sharp PC-1211 Pocket Computer.

Not a fancy pocket calculator. A computer. With 1.9K RAM memory. Programmed conventionally through the keyboard. Or, using an optional cassette interface, able to load and unload programs using almost any cassette recorder around.

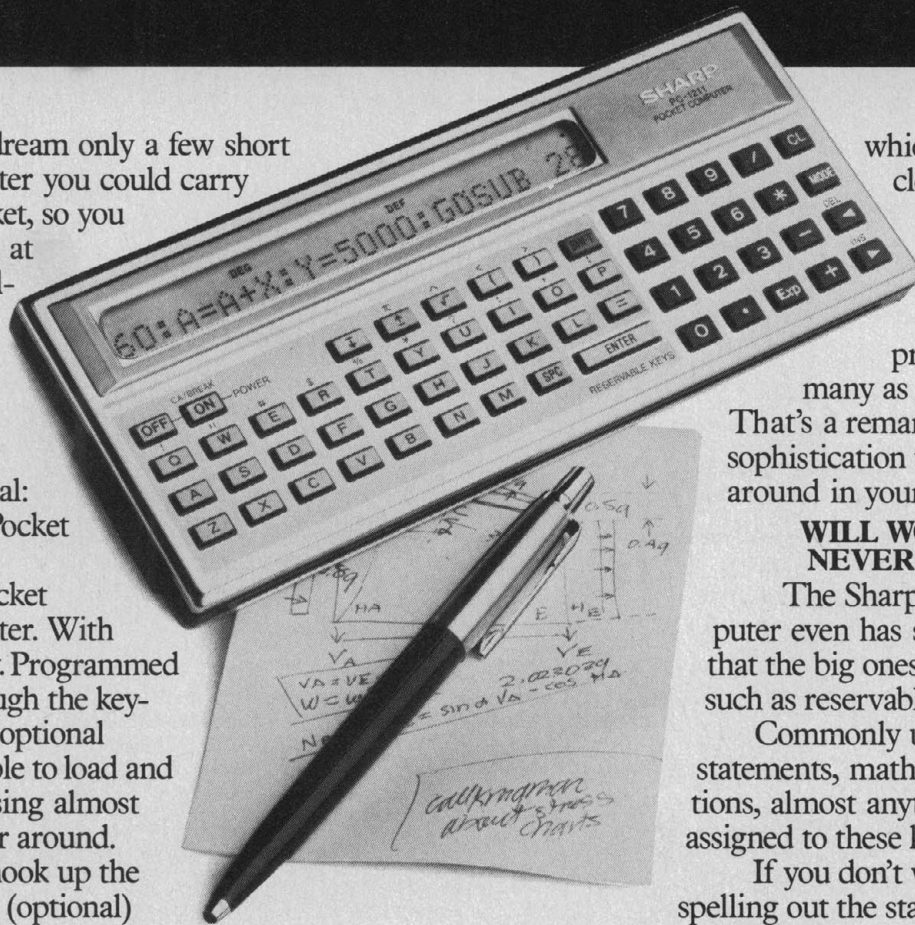
You can even hook up the PC-1211 to a printer (optional) and print out the program results or the program listing itself.

## BASIC SPOKEN HERE.

The PC-1211 Pocket Computer has a dot matrix display that scrolls right or left, handling up to 24 alphanumeric characters.

This allows the program to display instructions asking for data, as well as any other prompting the program requires. It also allows you to look at the program listing, line by line.

If you don't know Basic, the PC-1211 is a good way to learn. There are 22 statements and 12 commands at your disposal,



which comes pretty close to the flexibility of a conventional size microcomputer.

It will run programs of as many as 30 or 40 lines. That's a remarkable degree of sophistication to be carrying around in your pocket.

## WILL WONDERS NEVER CEASE?

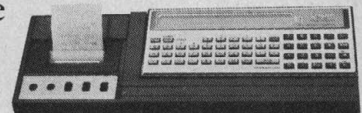
The Sharp Pocket Computer even has some features that the big ones don't have, such as reservable keys.

Commonly used commands, statements, mathematical functions, almost anything can be assigned to these keys.

If you don't want to keep spelling out the statement PRINT, for example, you simply assign it to, say, letter "A." Thereafter you press one key instead of five. Mathematical functions like COS can be assigned. Or  $A^2 + B^2$ . Or RUN. And so on.

The PC-1211 has many more fascinating features. It's more than a fantastic tool. It's an intellectual adventure.

Go to your local computer store and fool around with one. You'll see that we haven't exaggerated in the least about the Sharp PC-1211 Pocket Computer.



The PC-1211 with optional printer.



Sharp Electronics Corp., 10 Keystone Place, Paramus, N.J. 07652  
Circle No. 296 on Readers' Service Card

# SCIENCE

<b>LETTERS</b>	Days of Wine and Lasers: <i>P. J. Wyatt</i> ; Koop's Candidacy: <i>J. Baggott</i> ; Owl Monkey Cell Line: <i>S. J. O'Brien</i> ; Meeting Requirements: <i>H. F. Long</i> ...	1212
<b>EDITORIAL</b>	Resources for Research Medicine: <i>S. Muller</i> .....	1219
<b>ARTICLES</b>	CP Symmetry Violation: The Search for Its Origin: <i>J. W. Cronin</i> .....	1221
	Role of MHC Gene Products in Immune Regulation: <i>B. Benacerraf</i> .....	1229
	Tsukuba Science City: Japan Tries Planned Innovation: <i>J. L. Bloom</i> and <i>S. Asano</i> .....	1239
<b>NEWS AND COMMENT</b>	Nuclear Pulse (III): Playing a Wild Card.....	1248
	Shunning Cryptocensorship.....	1250
	Utilities Choke on Asthma Research.....	1251
	<i>Briefing</i> : Resins Raise Problems for TMI Cleanup; Soviet Oil Decline Put Off 3 Years; Amniocentesis: Be Prepared; Gene Therapy Pioneer Draws Mikadoesque Rap.....	1252
<b>RESEARCH NEWS</b>	Natriuretic Hormone Linked to Hypertension.....	1255
	<i>Mount St. Helens</i> : Volcanoes, Quakes, and the Connectedness of Things; The Mountain Is Behaving Itself—For Now; Gauging Volcanic Blast Hazards Not So Simple.....	1258
<b>BOOK REVIEWS</b>	Alaska Native Culture and History, reviewed by <i>R. H. Jordan</i> ; Culture Contact and Culture Change, <i>S. L. Dyson</i> ; Interstellar Molecules, <i>M. Jura</i> ; Underwater Minerals, <i>J. R. Moore</i> ; The Role of Peptides in Neuronal Function, <i>L. L. Iversen</i> ; Books Received.....	1260

**BOARD OF DIRECTORS**

<b>FREDERICK MOSTELLER</b> Retiring President, Chairman	<b>D. ALLAN BROMLEY</b> President	<b>E. MARGARET BURBIDGE</b> President-Elect	<b>ELOISE E. CLARK</b> <b>EDWARD E. DAVID, JR.</b>	<b>NANCIE L. GONZALEZ</b> <b>DAVID A. HAMBURG</b>
--	--------------------------------------	--	---	--

**CHAIRMEN AND SECRETARIES OF AAAS SECTIONS**

<b>MATHEMATICS (A)</b> Ralph P. Boas Ronald Graham	<b>PHYSICS (B)</b> Maurice Goldhaber Rolf M. Sinclair	<b>CHEMISTRY (C)</b> Robert W. Parry William L. Jolly	<b>ASTRONOMY (D)</b> Owen Gingerich Donat G. Wentzel
<b>PSYCHOLOGY (J)</b> George A. Miller Meredith P. Crawford	<b>SOCIAL, ECONOMIC, AND POLITICAL SCIENCES (K)</b> James G. March Gillian Lindt	<b>HISTORY AND PHILOSOPHY OF SCIENCE (L)</b> Harry Woolf Diana L. Hall	<b>ENGINEERING (M)</b> Michael Michaelis Donald E. Marlowe
<b>EDUCATION (Q)</b> Ann C. Howe Roger G. Olstad	<b>DENTISTRY (R)</b> Maynard K. Hine Harold M. Fullmer	<b>PHARMACEUTICAL SCIENCES (S)</b> Anthony P. Simonelli Robert A. Wiley	<b>INFORMATION, COMPUTING, AND COMMUNICATION (T)</b> George W. Tressel Madeline M. Henderson

**DIVISIONS**

<b>ALASKA DIVISION</b>	<b>PACIFIC DIVISION</b>	<b>SOUTHWESTERN AND ROCKY MOUNTAIN DIVISION</b>
John Bligh President	T. Neil Davis Executive Secretary	Beatrice M. Sweeney President
		Alan E. Leviton Executive Director
		Max P. Dunford President
		M. Michelle Balcomb Executive Office

SCIENCE is published weekly on Friday, except the last week in December, by the American Association for the Advancement of Science, 1515 Massachusetts Avenue, NW, Washington, D.C. 20005. Second-class postage (publication No. 484460) paid at Washington, D.C., and at an additional entry. Now combined with *The Science Monthly*® Copyright © 1981 by the American Association for the Advancement of Science. Domestic individual membership and subscription (51 issues): \$43. Domestic institutional subscription (51 issues): \$80. Foreign postage extra: Canada \$24, other (surface mail) \$27, air-surface via Amsterdam \$55. First class, airmail, school-year, and student rates on request. Single copies \$2 (\$2.50 by mail); back issues \$3 (\$3.50 by mail); classroom rates on request. **Change of address:** allow 6 weeks, giving old and new addresses and seven-digit account number. **Postmaster:** Send Form 3579 to *Science*, 1515 Massachusetts Avenue, NW, Washington, D.C. 20005. *Science* is indexed in the *Reader's Guide to Periodical Literature* and in several specialized indexes.


<b>REPORTS</b>	Deep-Seated Gas Emission Induced by the Earth Tide: A Basic Observation for Geochemical Earthquake Prediction: <i>R. Sugisaki</i> .....	1264
	Homogeneous Fluorescent Immunoassay: <i>J. Briggs, V. B. Elings, D. F. Nicoli</i> ...	1266
	Fly Ash-Derived Strontium as an Index to Monitor Deposition from Coal-Fired Power Plants: <i>I. R. Straughan et al.</i> .....	1267
	Magnetotactic Bacteria at the Geomagnetic Equator: <i>R. B. Frankel et al.</i> .....	1269
	Prostacyclin: A Potent Antimetastatic Agent: <i>K. V. Honn, B. Cicone, A. Skoff</i> .....	1270
	Light Modulates Voltage-Dependent Potassium Channels in <i>Limulus</i> Ventral Photoreceptors: <i>R. J. Leonard and J. E. Lisman</i> .....	1273
	Absence of Correlation Between Base-Pair Sequence and RNA Conformation: <i>S. R. Holbrook, J. L. Sussman, S.-H. Kim</i> .....	1275
	Human Muscle Phosphoglycerate Mutase Deficiency: Newly Discovered Metabolic Myopathy: <i>S. DiMauro et al.</i> .....	1277
	Somatomedin-C Mediates Growth Hormone Negative Feedback by Effects on Both the Hypothalamus and the Pituitary: <i>M. Berelowitz et al.</i> .....	1279
	Infant Carrying by Male Chacma Baboons: <i>C. Busse and W. J. Hamilton III</i> .....	1281
	Vagotomy Abolishes Cues of Satiety Produced by Gastric Distension: <i>M. F. Gonzalez and J. A. Deutsch</i> .....	1283
	Predatory Salamanders Reverse the Outcome of Competition Among Three Species of Anuran Tadpoles: <i>P. J. Morin</i> .....	1284
	Auditory Intensity Discrimination After Selective Loss of Cochlear Outer Hair Cells: <i>C. A. Prosen et al.</i> .....	1286
	Reward-Induced Stereotypy: Modulation by the Hippocampus: <i>L. D. Devenport, J. A. Devenport, F. A. Holloway</i> .....	1288
	Phosphatidate as a Molecular Link Between Depolarization and Neurotransmitter Release in the Brain: <i>R. A. Harris et al.</i> .....	1290
	Two-Hundred-Million-Year-Old Chromosomes: Deceleration of the Rate of Karyotypic Evolution in Turtles: <i>J. W. Bickham</i> .....	1291
	Serum Lipoproteins Modulate Oxygenated Sterol Insertion into Human Red Cell Membranes: <i>R. A. Streuli et al.</i> .....	1294
	<i>Technical Comments: Natural Explosive Noises: D. J. Stierman; T. Gold and S. Soter</i> .....	1296
<b>PRODUCTS AND MATERIALS</b>	Microcomputer Education; Autoclaves; Digital Thermometers; Digitizers; pH Electrodes; Calculator Expander; Recorder; Literature .....	1300

WILLIAM J. HARRISON ALTER E. MASSEY	RUSSELL W. PETERSON HARRIET ZUCKERMAN	WILLIAM T. GOLDEN Treasurer	WILLIAM D. CARFY Executive Officer
--	--	--------------------------------	---------------------------------------

GEOLOGY AND GEOGRAPHY (E) A. Simon Thomas Dutro, Jr. CHEMICAL SCIENCES (N) Gordon D. Bogdonoff M. Lowenstein STATISTICS (U) Stephen E. Fienberg Robert Glaser	BIOLOGICAL SCIENCES (G) John A. Moore Walter Chavin AGRICULTURE (O) Martin A. Massengale Coyl T. Wilson ATMOSPHERIC AND HYDROSPHERIC SCIENCES (W) Julius London Glenn R. Hilst	ANTHROPOLOGY (H) Alan R. Beals Priscilla Reining INDUSTRIAL SCIENCE (P) John Diebold Robert L. Stern GENERAL (X) Herman Pollack S. Fred Singer
---	--	--

**COVER**

Adult male chacma baboon (*Papio ursinus*) inspects an infant as the mother watches. These baboons live in multi-male, multifemale groups. Dominant males mate with females and subsequently protect their probable offspring in the presence of potentially infanticidal immigrant males. See page 1281. [William J. Hamilton III, Institute of Ecology, University of California, Davis 95616]



The round black part shown below is the Teflon®-coated vacuum seal from a Büchi/Brinkmann Rotary Evaporator. Inspecting this seal periodically for wear and replacing it when necessary is virtually the only maintenance most Büchi Evaporators will ever require in normal use.

Manufactured in Switzerland by skilled craftsmen, Büchi Evaporators are designed to give years of trouble-free service. The motor and drive mechanism are built to stand up to the rigors of daily laboratory use. Glass and metal components fit together perfectly and have the finish of quality equipment. Jacks

work smoothly and make raising and lowering the unit with its flasks an easy matter. In short, ask any user why he likes his Büchi. He'll confirm the qualities that have made Büchi the world's most widely used rotary evaporator, unsurpassed in versatility, durability and safety of operation.

Büchi makes a full range of models and accessories for evaporating liquid volumes from 5ml to 50 liters, including pilot plant and explosion-proof models. For a brochure describing them all, write: Büchi Division, Brinkmann Instruments, Inc., Cantiague Road, Westbury, N.Y. 11590. In Canada: Brinkmann Instruments (Canada), Ltd.

**On a Büchi Rotary Evaporator,  
this is the only part you may  
ever need to replace.**

 **Büchi/Brinkmann  
Rotary Evaporators**

For literature circle R S #327  
For demonstration circle R S #328

Teflon® is a Du Pont trademark

# When you search for a needle in a haystack, Leitz fluorescence technology makes it shine brightly.

**Y**ou can expect a twenty-fold increase in image brightness, under favorable conditions as compared with conventional darkfield illumination with glass filters, when you use a Leitz® Ploem illuminator. So the countless research programs and hospital diagnostic procedures that depend on fluorescence microscopes, can depend on them for considerably more reliable performance. Beyond the substantial increase

in brightness, the Leitz Ploem illuminator provides these four significant advantages.

#### **Innovative Filter Turret**

Leitz fluorescence microscopes today have highly fluorochrome-specific filter systems. There are 18 easily interchangeable application-specific Leitz modules. You can rapidly change from one to the next, for the two wave-length method. And for switching from wide to narrow band excitation.

#### **Fluorescence Objectives**

Objectives precisely formulated for fluorescence are now available as oil immersion 10 to 100x, water immersion 25 to 100x, and dry objectives of many magnifications. Most are available as phase contrast objectives as well. Leitz innovative research has reduced image damaging auto-fluorescence of optical glass and lens cement to virtual insignificance.

#### **Interchangeable Light Sources**

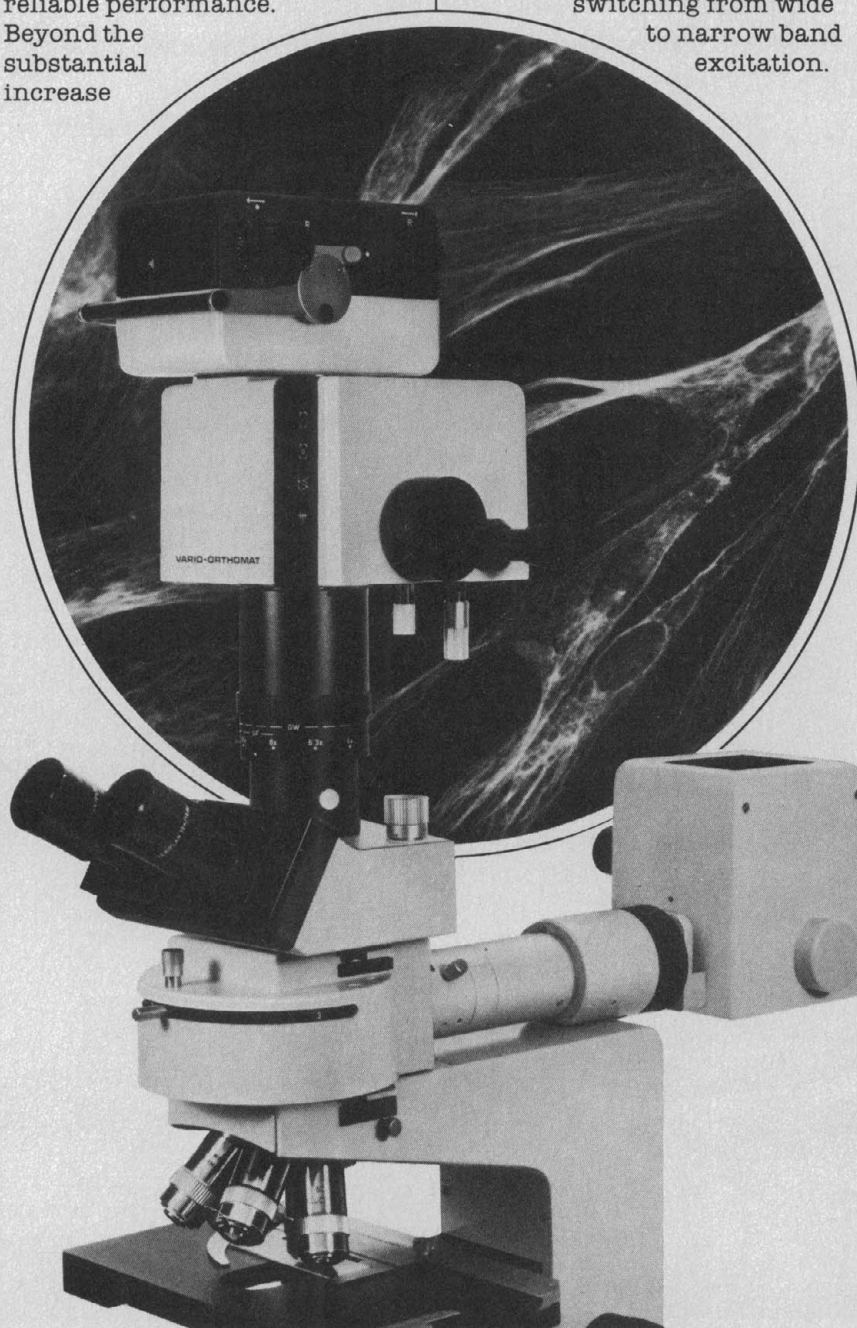
You can choose 100W tungsten halogen or 50W mercury arc for routine clinical applications. Xenon arcs from 75W to 450W and mercury arcs from 50W to 200W are available for increased brightness.

#### **Fluorescence Photomicrography**

All the problems of fluorescence photomicrography are solved by the new Leitz Vario-Orthomat.<sup>®</sup> It can automatically read any 1% of the film format with a movable spot meter. Light is measured during exposure which compensates for possible specimen fading. The format outlines are projected into the eyepiece in bright yellow and rotate with the movement of the camera for composition. A zoom eyepiece allows optimizing of the photograph. We began perfecting our fluorescence microscopes exactly 50 years ago. And perfecting your fluorescence results.



**Leitz**  
means precision.  
Worldwide.



E. Leitz, Inc. S-612  
Rockleigh, New Jersey 07647  
Please send me more information  
about Leitz fluorescence technology.

NAME \_\_\_\_\_

ADDRESS \_\_\_\_\_

CITY \_\_\_\_\_

STATE \_\_\_\_\_

ZIP \_\_\_\_\_

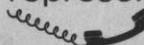
# VWR presents:

**A complete family of constant temperature equipment of the highest caliber.**

VWR® can meet all your constant temperature requirements with our top quality family of instruments—very precisely.

In addition to our excellent temperature uniformity, our very extensive line of precision products is designed for easy use and long-term reliability. Compare the value that the VWR Constant Temperature family offers you.

They are as near as your nearest VWR warehouse. And all are backed by a nationwide network of service representatives.

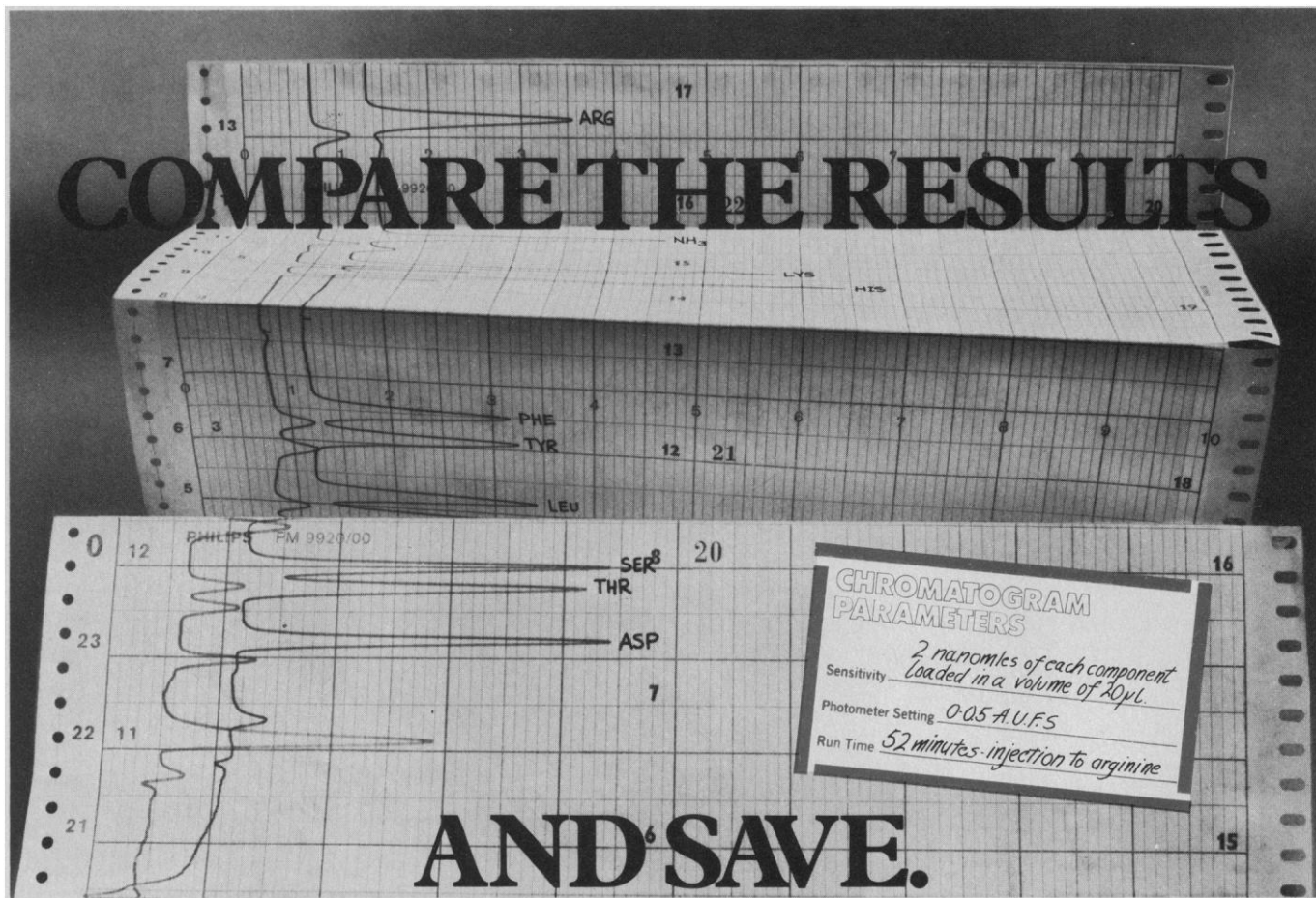
 Call or write your nearest VWR sales office for all your constant temperature requirements.  
VWR delivers.



**VWR Scientific Inc.**  
subsidiary of **Univar**

P. O. BOX 3200 • SAN FRANCISCO, CA 94119





## Introducing the LKB 4400 Amino Acid Analyser.

With its modern modular design, the LKB 4400 marks a new beginning in amino acid analysis. Providing tomorrow's technology at today's price.

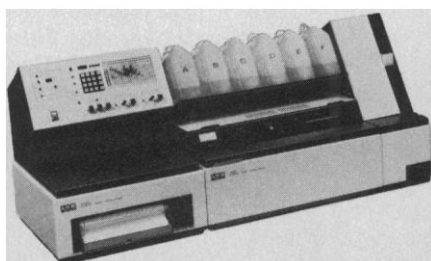
### Fast Analysis Time

The results you get from this fast-working analyser can be seen in a matter of minutes. Just 65 min. to be exact for a complete protein hydrolysate analysis. And physiological fluid analysis in under 3 hours.

### High Sensitivity

The LKB 4400 is highly sensitive to all your analyzing needs. It has the unique ability to detect less than 100 picomoles of amino acids. Low Sample Volume: An Automatic Convenience

Any volume from 5-160  $\mu$ l can be used to load the sample capsules. And you get built-in convenience with the standard 72-sample autoloader. Data handling accessory is optional.



12 JUNE 1981

### Modern Modular Design

More attractive. More accessible. More compact. Made of stainless steel instead of plastic, the LKB 4400 has a higher resistance to chemical corrosion. And its easily serviceable modular design enables the operator to achieve maximum results with minimum downtime.

### Integral Refrigeration Unit

Preserves samples and prolongs ninhydrin reagent lifetime to obtain optimal use and economies. The reagent receives additional protection from a blanket of nitrogen gas.

### High Temperature Reaction Coil

A unique design feature of the LKB 4400, this high temperature reaction coil develops the color in under two minutes while maintaining the resolution achieved on the analytical column.

### Solid-state Column Heating

The latest liquid chromatography technology eliminates the need for circulating water baths by providing fast temperature rise capability. This improves chromatographic performance, reduces analysis time, and increases cost effectiveness.

Circle No. 369 on Readers' Service Card

### Full Safety System

Particular emphasis has been placed on safety. In the event of any irregularity, a warning is immediately flashed on the readout panel and the system automatically shuts down until the problem is solved.

### Stop. Look. Compare.

Before you buy an amino acid analyser, compare the LKB 4400 against its competition. Feature for feature. Dollar for dollar. You'll find the results speak for themselves.

**LKB**

LKB Instruments, Inc.  
12221 Parklawn Drive  
Rockville, Md 20852  
Tel. 301-881 2510

### Yes, I want to compare and save.

- Please have a representative contact me for a demonstration.
- Please send me additional information on the LKB 4400.

Name \_\_\_\_\_ Title \_\_\_\_\_

Institution \_\_\_\_\_

Address \_\_\_\_\_

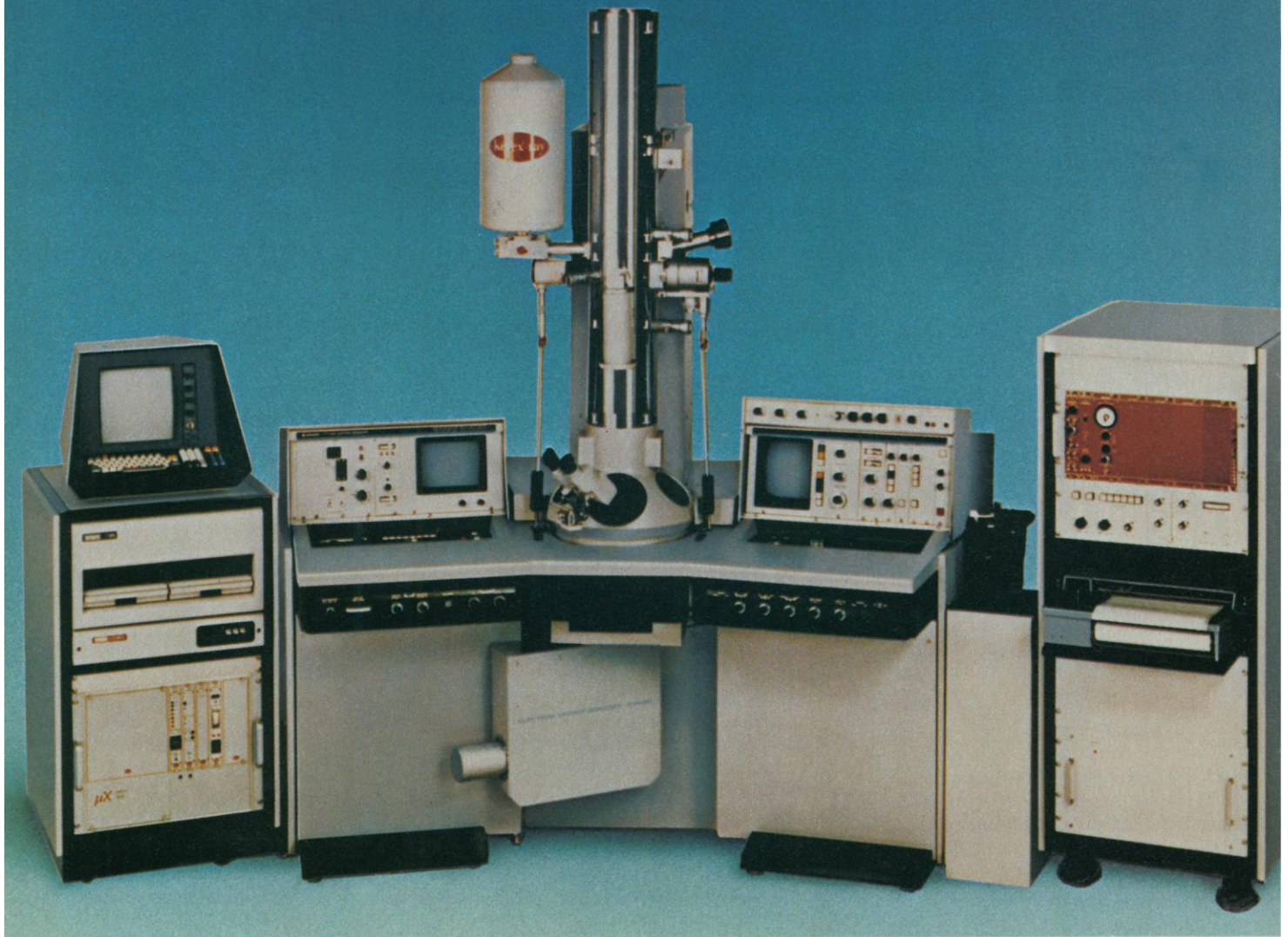
City \_\_\_\_\_ State \_\_\_\_\_ Zip \_\_\_\_\_

Phone \_\_\_\_\_

1201

# H-600

## The first analytical TEM with true microcomputer control



It's the H-600-1, an exceptionally powerful analytical tool featuring:

- LaB<sub>6</sub> Gun
- Pushbutton-selectable microscope modes: TEM (2.0 Å), SEM (20 Å), and STEM (10 Å)
- Triple condenser lens—all 7 lenses microcomputer controlled
- Ultra high ( $5 \times 10^{-7}$  torr) vacuum system

The system is available with EDX, Energy Loss Spectroscopy, Diffraction, Beam Rocking, and Spot Scanning. The analytical modes require no specimen repositioning. And,

probe sizes down to 15 Å are easily achieved for exceptional analytical capability. What's more, the H-600-1 is easy to operate. Routine setups and adjustments are done automatically by the built-in microcomputer. As for cost, you'll be happy to know that prices for the H-600 series start at less than \$140,000 F.O.B. San Francisco.

The H-600-1 is just part of the most complete TEM lineup in the industry. For full details about a TEM that matches your application and your budget, call or write today. Hitachi Scientific Instruments Division, 460 East Middlefield Road, Mountain View, California 94043. Phone (415) 961-0461.

 **HITACHI**  
SCIENTIFIC INSTRUMENTS  
NISSEI SANGYO AMERICA, LTD.

Nissei Sangyo Co., Ltd., Tokyo, Japan, Tel: 03-504-7111; Nissei Sangyo Co., Ltd., London, United Kingdom, Tel: 567-2242;  
Nissei Sangyo G.M.b.H., Dusseldorf, W. Germany, Tel: 0211-450982; Nissei Sangyo Canada Inc., Toronto, Canada, Tel: 416-675-5860.

FOR TODAY'S FACULTY AND COLLEGE STAFF MEMBERS\* FROM 18 TO 80.

# Whether you're thinking retirement or not, review the plan that provides for cash withdrawal and/or a lifetime income.

**TIAA-CREF Supplemental Retirement Annuities (SRAs) offer you substantial flexibility including cash withdrawal and/or lifetime retirement income. You can even reduce your income taxes now!**

You can begin contributions to an SRA at any age and begin benefits at any age up to age 71 unless you are still employed (then you can delay beginning benefits until age 80). For example, you could start contributions at age 25, and choose to begin benefits or withdraw cash at age 34, 40 or 50, regardless of your employment status.

### Get your money at any time.

You can receive benefits as a lifetime income or over a fixed period of from 2 to 10 years. What's more, if you need it (even while employed by your current employer), you can withdraw all the money you have accumulated by surrendering your contracts. Or, you can withdraw \$1,000 or more every six months. There is never a cash surrender charge.

### Contributions are tax-deferred, so you pay less income taxes now.

The federal income tax on your contributions is deferred until they are paid to you as benefits. So, you pay less tax now.

### Changing employers? Take SRAs with you.

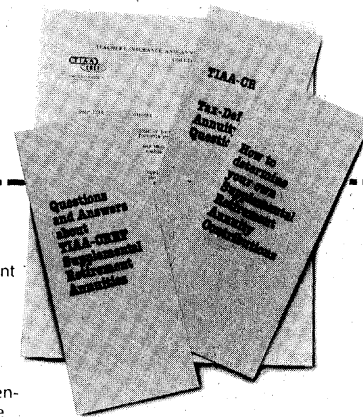
Since you own your Supplemental Retirement Annuities, you take them with you if you leave your current employer. You can make contributions through any institution that makes Supplemental Retirement Annuities available to staff members. Contributions can be as little as \$25 a month.

### Full information.

Complete and mail the coupon for an SRA Information Kit today. You'll get full details about all the advantages SRAs have to offer, why this plan suits so many financial situations and age groups and how much you may contribute to the plan.

\*TIAA-CREF provides annuities and other services for employees of colleges, universities, private schools and certain other nonprofit tax-exempt educational and research institutions.

**HELP YOURSELF TO A BRIGHTER FINANCIAL FUTURE  
... SEND FOR A FREE INFORMATION KIT.**



Teachers Insurance and Annuity Association of America—College Retirement Equities Fund  
730 Third Avenue  
New York, N.Y. 10017

Please send me full details about TIAA-CREF Supplemental Retirement Annuities, the flexible tax-deferred annuity plan that offers the opportunity to accumulate funds for additional retirement income and the option for cash withdrawal.

Name \_\_\_\_\_

Address \_\_\_\_\_

City \_\_\_\_\_

State \_\_\_\_\_ Zip \_\_\_\_\_ Date of Birth \_\_\_\_\_

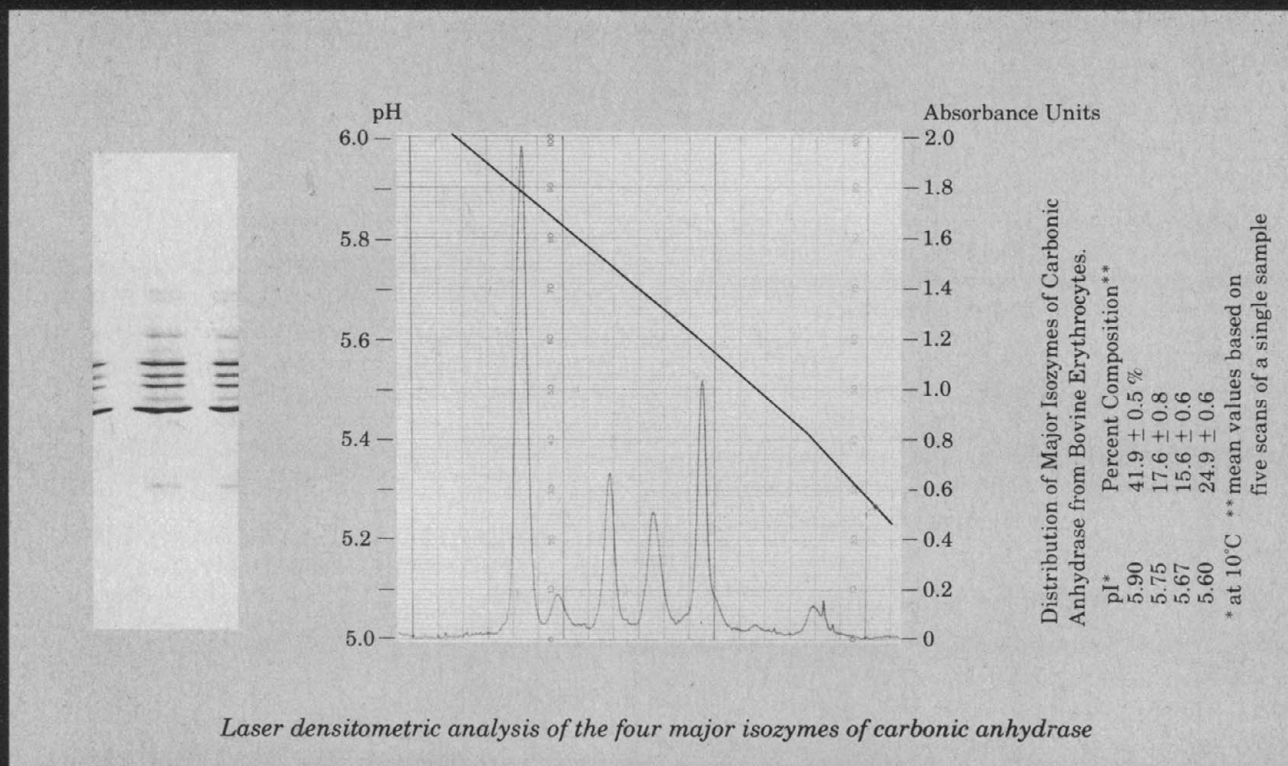
Name of Institution \_\_\_\_\_

Please let us know if you are participating in a TIAA-CREF retirement plan at your institution.  YES  NO

S 61281

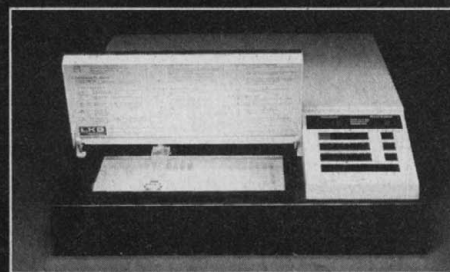
# Reveal the secrets hidden in your high resolution gels with a beam of laser light

Penetrate the closely stacked bands of an electrofocusing gel with an intense laser beam only microns in width and uncover a wealth of quantitative information.



*Laser densitometric analysis of the four major isozymes of carbonic anhydrase*

There's more information to be gained than meets the eye. Looking at carbonic anhydrase on a stained electrofocusing gel will show you the four major isozymes. But it takes laser densitometry to tell you that the predominant isozyme represents 41.9% of the total. Sure, there can be problems with stains. But this analysis was valid over a concentration range covering two orders of magnitude, from 0.1 to 10.0 mg/ml. And isozymes bind with very similar staining affinities. For precision, the gel was scanned in different positions five times, automatically. It took less than six minutes, including the integration. How was it done? With the new UltraScan Laser Densitometer, from LKB – the experts in electrofocusing. Contact them today, to see what a laser can do for your gels.



**LKB**

Head office: LKB-Produkter AB, Box 305, S-161 26 Bromma, Sweden. Tel. 08-98 00 40, telex 10492  
Main US sales office: LKB Instruments, Inc. 12221 Parklawn Drive, Rockville, MD 20852. Tel. 301-881 25 10, telex 230 89 682  
UK sales office: LKB Instruments Ltd, 232 Addington Road, S. Croydon, Surrey CR2 8YD, England. Tel. 01-657 8822, telex 264414  
Other sales offices in: Athens (for Middle East), Copenhagen, Ghent, The Hague, Hong Kong, Munich, Paris, Rome, Turku, Vienna

# Olympus introduces the universal system for automatic exposure photomicrography: Olympus PM-10AD.



Photomicrography takes a quantum leap forward, with the introduction of PM-10AD, a fully automated camera system incorporating a built-in microcomputer, for photomicrography and cinemicrography.

Utilizing the latest advances in microelectronics, the PM-10AD offers a universal, fully integrated multi-format system with automatic controls for precision exposures with read-out, reciprocity failure correction, film and specimen characteristics and color temperature. And only from Olympus, a time lapse unit for both 35mm photomicrography and 16mm cinemicrography.

For a fascinating demonstration of this state-of-the-art system, contact the Olympus Microscope Dealer listed in your Yellow Pages, or Olympus Corporation of America, 4 Nevada Drive, New Hyde Park, NY 11042.

**OLYMPUS**  
The Science Company

In Canada: W. Carsen Co., Ltd., Ontario  
Circle No. 290 on Readers' Service Card

# Can you be sure of purity in peptides?



## YES. WITH THIS SEAL.

- Bioactive Peptides
- Custom Peptide Synthesis
- Polymeric Amino Acids
- Enzyme Substrates
- Merrifield AA Resins
- Protected Amino Acids

Our catalog gives a complete listing. It's free for the asking.

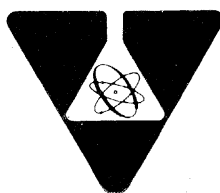
Recently synthesized, immediately available:

21087 NEUROTENSIN

pGLU-LEU-TYR-GLU-ASN-LYS-PRO  
ARG-ARG-PRO-TYR-ILE-LEU  
M.W. 1673

21070 OXYTOCIN

CYS-TYR-ILE-GLN-ASN-CYS-  
PRO-LEU-GLY-NH<sub>2</sub>  
M.W. 1007



### Vega Biochemicals

Division of Vega Biotechnologies, Inc.  
P.O. Box 11648 Tucson, Arizona 85734  
Telex 165511 (Vegabio)

Questions? Call us toll-free at 1-800-528-4882

# Head of the class!

## The Zeiss Universal does more

When it comes to "head-on" competition, the others can't touch Zeiss Universal Microscopes. Built into the tube head of the Universal and UEM are the optional "Optovar" magnification changer; a completely flexible beamsplitter that will send all the light to the observer, or all to a camera, or divide it; and slots for analyzers, filters, wave plates and compensators.

## Promises...promises? Deliveries...deliveries!

With Universals you won't have to wait for the development of accessories. Everything needed for every technique in transmitted and reflected light already exists and is proven in use. And, of course, the quality of Zeiss optics has been the goal toward which others have been striving for generations. Today, Zeiss optics are still at the head of the class.

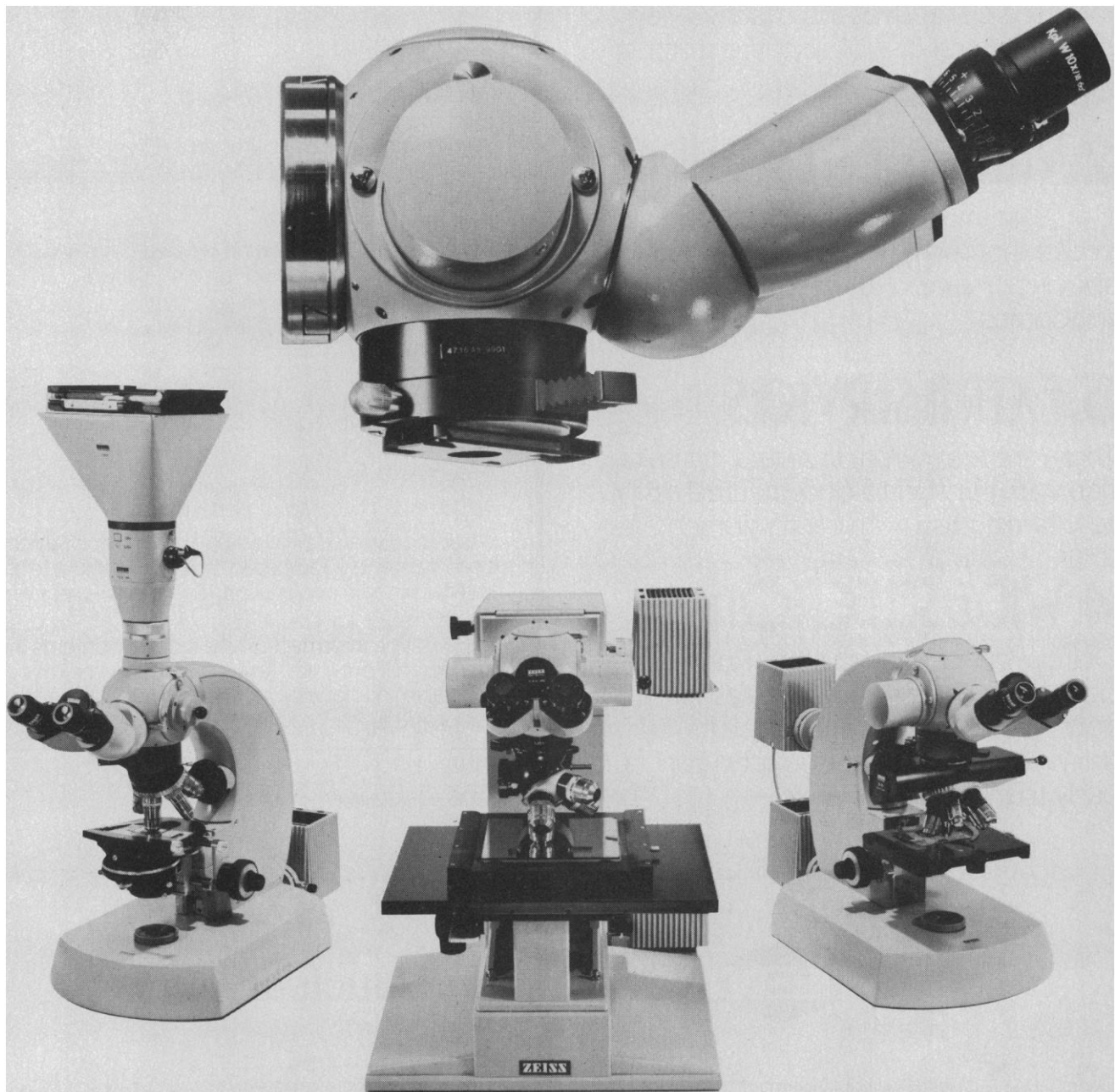
**Quality service—Expert dealers.**

The great name in optics

**ZEISS**

West Germany

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



# WHY BUY MONOCLONALS FROM THE RADIOCHEMICALS COMPANY?

## 1. HIGH STANDARDS

Making biologically active radiochemicals for research requires a company-wide quality control discipline of the strictest kind.

## 2. VALUABLE RESOURCES

Our large, multi-disciplined staff assures you of thoroughly evaluated, carefully specified, state-of-the-art monoclonal antibodies.

## 3. EXTRA SERVICES

There are many, from technical consultation with our staff to documented assay results included with each shipment.

## 4. WIDE SELECTION

Our current offering of monoclonal antibodies has been selected in response to your research needs and requests. New monoclonals will be introduced continuously to meet these needs.

### HUMAN

Anti-human Lyt 1\*  
Anti-human Lyt 2\*  
Anti-human Lyt 3\* (Pan T)  
Anti-human Ia  
Anti-human IgE

### VIRAL

Anti-murine leukemia virus gp70  
Anti-murine leukemia virus p15 (E)

### MOUSE

Anti-mouse Thy 1.2  
Anti-mouse Thy 1.2, biotin labeled  
Anti-mouse Thy 1.2, fluorescein labeled  
Anti-mouse Thy 1.1  
Anti-mouse Lyt 1.1  
Anti-mouse Lyt 1.2  
Anti-mouse Lyt 2.1  
Anti-mouse Lyt 2.2  
Anti-mouse Lyb 2.1  
Anti-mouse Lyb 2.3  
Anti-mouse TL

ALSO: Anti-horseradish peroxidase

In addition we offer over a dozen monoclonal antibody reagents – iodinated, enzyme conjugated, and fluorescein conjugated. This family is growing fast, too.

To keep you informed of latest developments in our monoclonal program, let us put your name on our special monoclonals mailing schedule and send you our product line brochure.

\*Indicates order of clone isolation, not target cell function

Not for use in humans or clinical diagnosis

 **New England Nuclear**

549 Albany Street, Boston, Massachusetts 02118  
Call toll free: 800-225-1572 Telex: 94-0996  
(In Massachusetts and International: 617-482-9595)

**NEN Chemicals GmbH:** D-6072 Dreieich, W. Germany, Postfach 401240, Tel. (06103) 85034, Telex 4-17993 NEN D  
**NEN Canada:** 2453 46th Avenue, Lachine, Que. H8T 3C9; Tel. 514-636-4971, Telex 05-821808



# Image analysis with a human touch

## Extract information at a touch

The Zeiss Videoplan is a compact system combining the capabilities of a powerful microcomputer with the discrimination faculties of the operator's own eyes and intelligence. Analyze directly through a microscope, or from photographs, negative material, projections, drawings, X-rays, even directly from video cameras mounted on electron or light microscopes.

## Display information at a touch

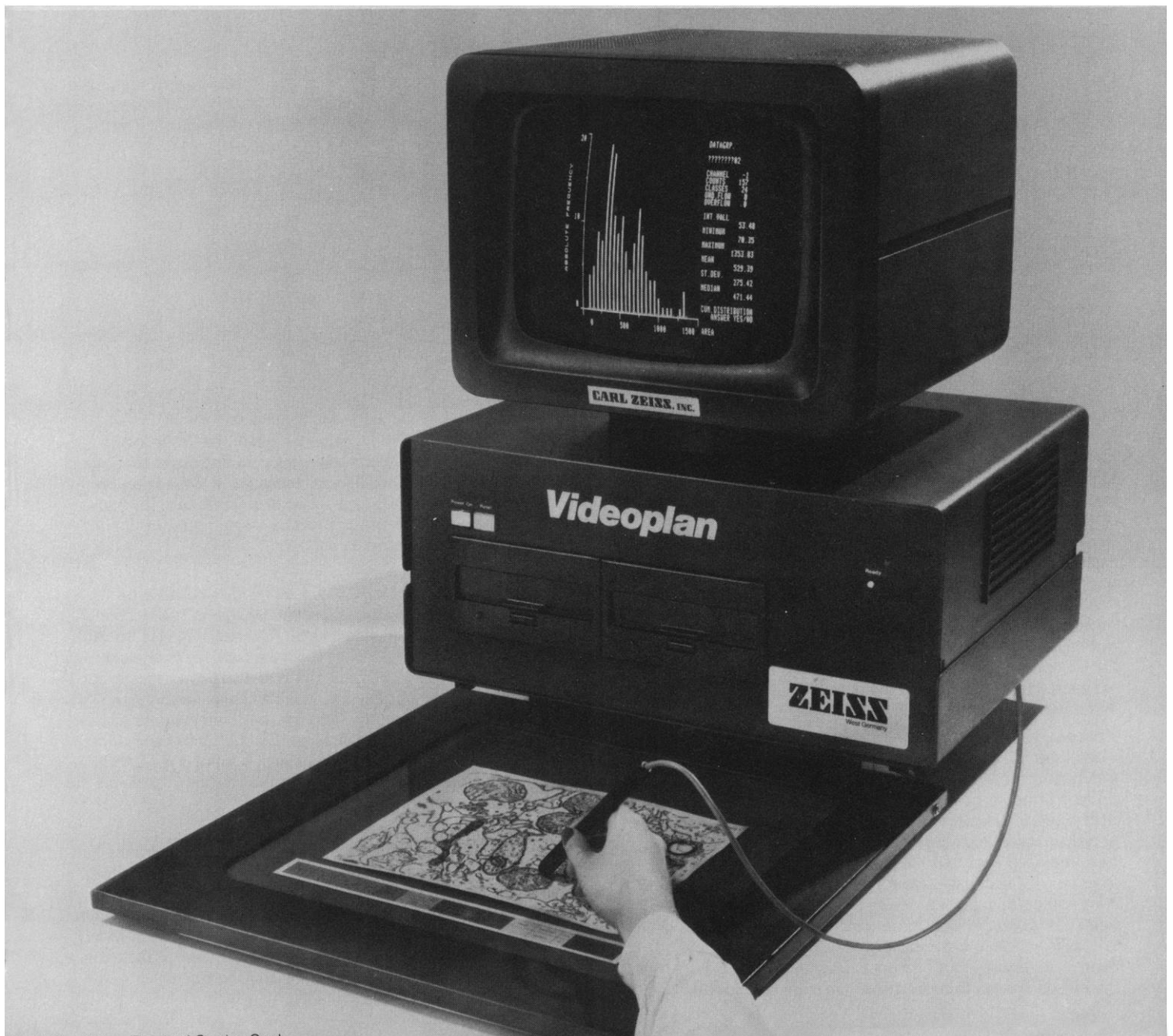
A single touch provides direct access to all instructions and subroutines of several programs, including Basic Measurement and Evaluation, High-level Statistics, Distribution, and Stereology. A 64K computer memory coupled with dual floppy disc drives is designed for maximum storage, speed, and flexibility. **Nationwide service.**

The great name in optics

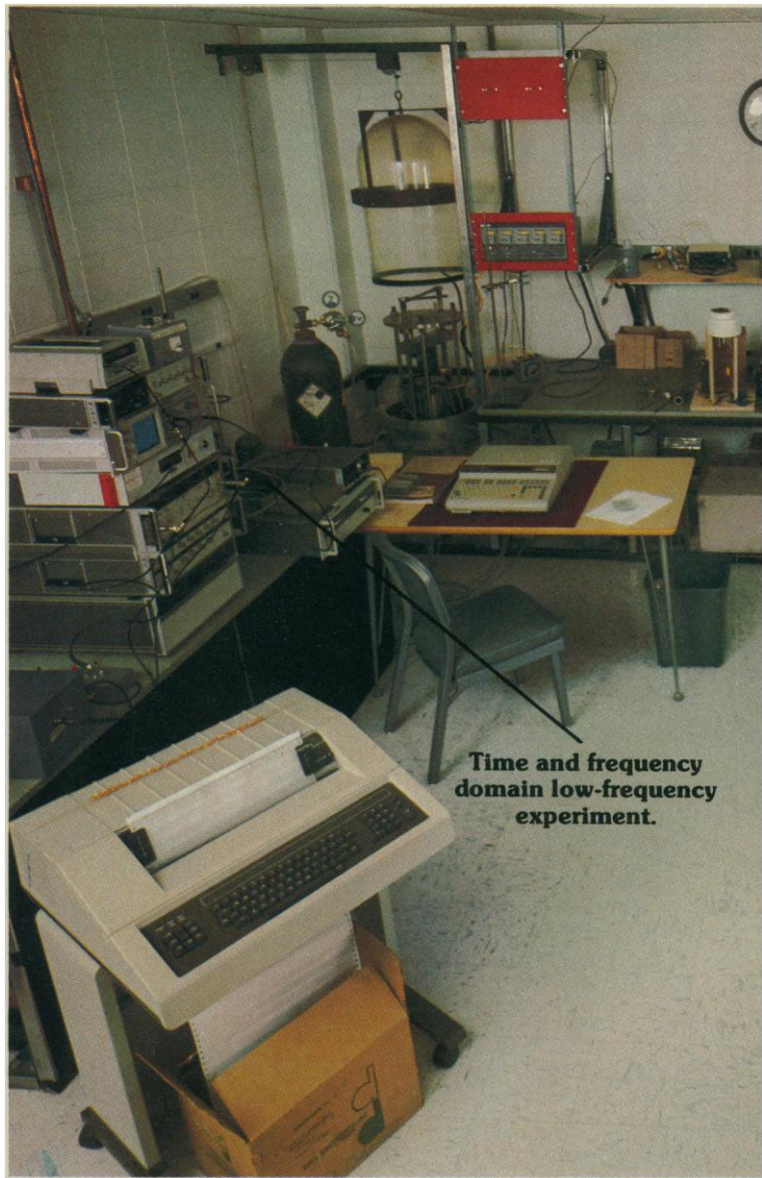
# ZEISS

West Germany

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



## An HP-IB system helped generate—in three months. . .



Time and frequency domain low-frequency experiment.

For Colorado State University's Department of Electrical Engineering, contracts and grants are a hectic game. The competition is stiff, funds must be utilized to the maximum, and contracts unfailingly completed on time.

Professor Joel DuBow, head of the Department's Energy and Materials Group, recommended the use of an HP-IB system for experimental programs involving fossil fuels, because "we have enough problems understanding the measurements without having to worry about interfacing. By using HP-IB compatible instruments and computers, we were able to get right to the data analysis, without first having to do research on research."

### Processing the unseen.

The in situ oil shale processing, now considered the most promising oil extraction technique, utilizes underground processing. Since the material cannot be seen, it is critical that the process be monitored and diagnosed accurately. CSU's HP-IB system has permitted Professor DuBow and his colleagues to devise — and test — conceptual schemes for accomplishing this. For example, when oil shale is heated, it goes through three structural changes: from an "as is" state to a transition zone, to a retorting zone, and, finally, to a combustion zone. By using the HP-IB system to monitor temperature coefficients

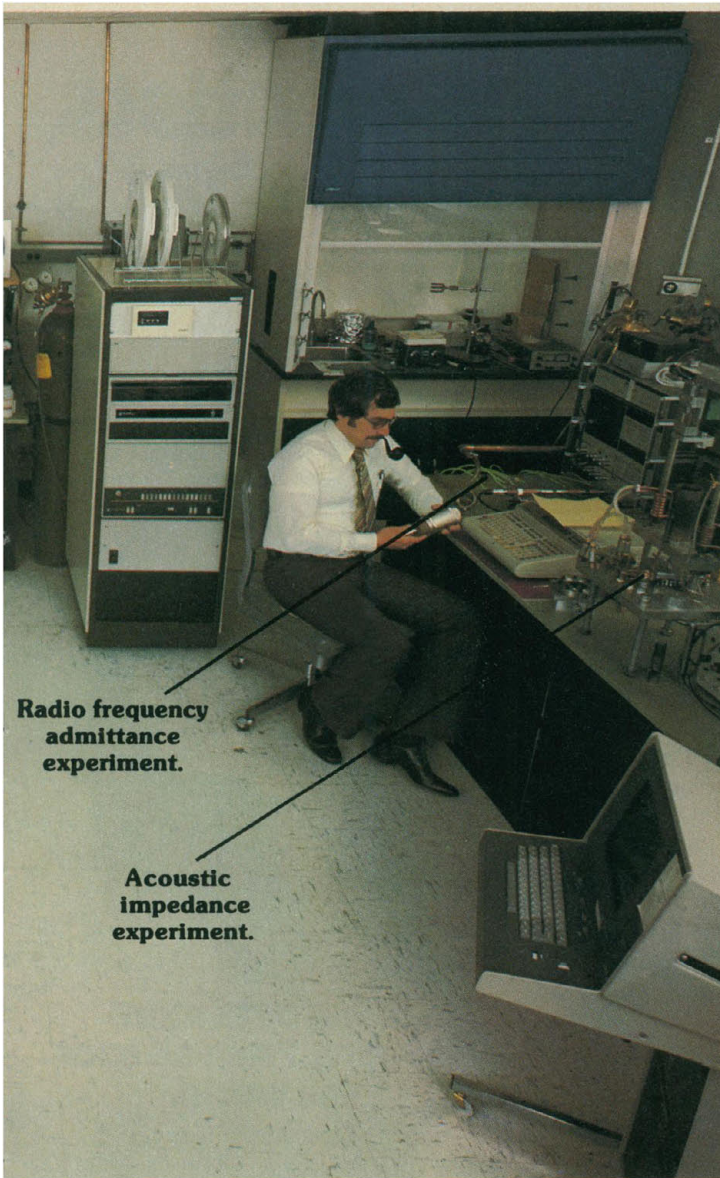
of the shale properties, Prof. DuBow has been able to delineate the location of these zone boundaries. Process engineers can then use this data to detect the position and velocity of these reaction zones, and to determine the shape of each zone. In turn, this tells them whether or not the desired process is being followed. If not, corrective action can be immediately taken.

### A hierarchy of machines.

Another reason why Prof. DuBow chose HP-IB is because of the flexibility provided. "We use three HP 9825s, in conjunction with an HP 1000," Prof. DuBow says. "That way, we end up with a hierarchy of machines. The 9825s have the capacity to analyze most of our data, while the HP 1000, with floppy disc drive, is faster for graphics and hard copy output. The HP 1000 also gives us the ability to store data permanently, and to compare new data against data that was generated six months ago. On the other hand, if the 1000 is busy, the 9825s can provide us with a lot of our essential data. And, since software is compatible, if one 9825 is unavailable the other two can keep the lab running."

### Flexibility for data quantity and quality.

In short, this HP-IB system made it possible for CSU engineers to assemble a system configuration quickly, so they could begin looking at data months faster than might have been possible had conventional components been used. It also permits them to analyze oil shale samples faster and obtain more data from the tests. In fact, in one three-month period, CSU has generated more oil shale test data than had ever before existed in published form.



**Radio frequency  
admittance  
experiment.**

**Acoustic  
impedance  
experiment.**

**more oil shale test  
data than had ever  
before been published.**

**“Not a new adventure every time.”**

Professor DuBow's HP-IB system now represents an investment in excess of \$250,000, and includes the computers, a low frequency network analyzer, a differential thermal analyzer, printer, four-pen plotter, five disc drives, tape drive, measurement process controller, terminals, and ten other HP instruments. "With HP," Prof. DuBow reports, "I can modify, upgrade or expand the system as our needs change; I have a system where I can hook up specialized and expensive analytical instruments (such as an HP GCMS) rapidly and not have a new adventure every time. Aid from HP people was crucial at certain times. In fact, if it hadn't been for them, the whole program might have failed. One of their applications engineers was especially helpful not only in the interfacing, but his intimate knowledge of the instrument system helped us design our experiment to get the data we wanted accurately."

**Getting to know more.**

Could HP-IB be the solution to your test and measurement needs? To learn more about HP-IB, send for our brochure, "Do your own system design in weeks, instead of months." Simply write to: Hewlett-Packard, 1507 Page Mill Road, Palo Alto, CA 94304. Or call the HP regional office nearest you: East (201) 265-5000, West (213) 970-7500, Midwest (312) 255-9800, South (404) 955-1500, Canada (416) 678-9430.



**HP-IB: Not just a  
standard, but a  
decade of experience.**



Circle No. 341 on Readers' Service Card

# There's only one answer to your questions about disposable filter units.

**What disposable, presterilized filter units have the most filter surface area for more efficient filtration?**

Nalgene Filter Units (17.4 cm<sup>2</sup>)

**What disposable, presterilized filter units are the simplest, most convenient to use?**

Nalgene Filter Units. (The 3-piece design eliminates the extra parts that can cause error or contamination.)

**What disposable, presterilized filter units have the longest performance record?**

Nalgene Filter Units. (Only Nalgene Filter Units have been proven reliable in over 15 years of laboratory use.)

**What disposable, presterilized filter units give you the choice of three membrane porosities using a proven nontoxic membrane?**

Nalgene Filter Units. (Their membrane is nontoxic to cell cultures and comes in 0.20 $\mu$ , 0.45 $\mu$ , and 0.80 $\mu$  porosities.)

**What disposable, presterilized filter units cost least and can be purchased from laboratory supply dealers everywhere?**

Nalgene Filter Units. (Ask your dealer.)

**Specify NALGENE® filter units from your laboratory dealer. The one right answer to your filtering needs.**

## SYBRON | Nalge

Nalge Company,  
Division of Sybron Corporation  
P. O. Box 365  
Rochester, N. Y. 14602

Circle No. 284 on Readers' Service Card

## LETTERS

### Days of Wine and Lasers

The proliferation rate of small, independent wineries in California and throughout the world is exceeded only by activity in the publication of books and periodical articles on wine and wine tasting. A mystique has thereby evolved which renders the consumer frustrated in the selection and judgment of wines that he might buy. Is a knowledge of the myriad qualitative wine parameters really needed and, furthermore, is there any means by which the consumer may determine that a particular analysis by an expert is more hype than fact? Since the qualities of a wine (taste, aroma, color, and clarity) exist only by virtue of particle types present, be they molecules, bacteria, or even grapes, it is reasonable to expect that an answer to these questions might be achieved by looking at wine particles by means of laser light scattering (1). Described here are the results of a very limited experiment in which the light-scattering properties of carefully decanted and diluted wines were compared with the opinions of a nonprofessional consumer panel. The results clearly show that, had the wines been judged initially by the quality of their differential light-scattering (DLS) patterns, the entire panel would have concurred.

All measurements were performed with seven different West Coast varietal Pinot Noir wines using a Differential III light-scattering photometer (2) equipped with a nominal 3-milliwatt, vertically polarized, helium-neon laser. The wine samples, diluted 10 to 1, are placed individually in special cuvettes at the center of the beam. The logarithm of the scattered intensity is recorded as a function of scattering angle, and the data are presented as shown in Figs. 1 and 2. The wines, labeled A through G, cover a

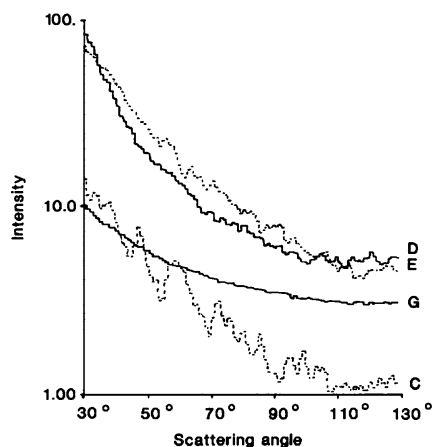
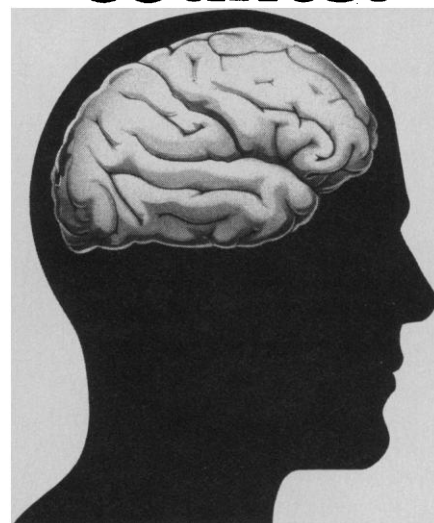


Fig. 1. DLS patterns of wines C, D, E, and G.

# For Scientists it's what's up here that counts.



## Dialog puts more up there. From all over the world.

Knowledge—and thinking of ways to use it—is a scientist's stock in trade. But most of the knowledge in your field is probably scattered throughout the world. How can you get your hands on it?

Use that instant clearinghouse of knowledge, Dialog. It's the world's largest online information retrieval system. It puts more databases, more abstracts of articles, more references, by far, at your fingertips than any other system.

What just happened in your field? Dialog tells you. What happened 10 years ago? Dialog tells you. And it tells you inexpensively. A search can cost as little as \$5. You can search Dialog from terminals in your office, or your librarian probably already uses Dialog.

Write Lockheed Information Systems, Dept. 52-80SM, 3460 Hillview Avenue, Palo Alto, CA 94304. In the U.S. call toll-free (800) 227-1927 or (800) 227-1960. In California, (800) 982-5838.

 Lockheed Dialog

Circle No. 378 on Readers' Service Card

Table 1. Wine qualities (Pinot Noir).

Identification	Cost* (\$)	Panel† rank	Comments‡
A	3.75	4	NR
B	3.75	5	NR
C	5.00	3	Y, T
D	3.15	7	SP, T, H
E	6.50	6	T, V, H
F	7.00	2	P, N
G	12.00	1	G, N, Y

\*Cost varies from store to store. These were prices at one store on date of purchase. †Physicist, mathematician, electrical engineer, office manager, x-ray technician, coin dealer, electromechanical assembler, and attorney. ‡G, good; SP, soda pop aftertaste; T, thin; P, pleasant; N, nice flavor; NR, no resemblance to a Pinot; V, vegetable taste; H, horrible; and Y, young.

retail price range from \$3.15 to \$12 per standard three-quarter liter bottle (Table 1). Because the natural "pigmentation" of all these wines is red, the use of a red laser wavelength ( $\lambda = 632.8$  nanometers) ensures that virtually no light is absorbed and all recorded patterns characterize the scattering properties of the ensemble of molecules and particles present.

As may be seen from Figs. 1 and 2, the degree of unpleasant taste as determined by the panel of nonprofessionals (Table 1) correlates well with the degree of noise and relative amplitude in the recorded signals. The smoother and flatter curves correspond to better-tasting wines, a predominance of large particles tending to affect simultaneously both taste and light-scattering properties.

The total material present within each sample is manifest from the vertical position of the DLS pattern. Thus if two samples contained identical types and distributions of molecules and other particulates, the sample containing the greatest concentration would yield the pattern of greatest intensity. The relative height of the pattern, however, is not necessarily proportional to the number of particles present. Indeed, in the molecular regime (3), the scattered intensity

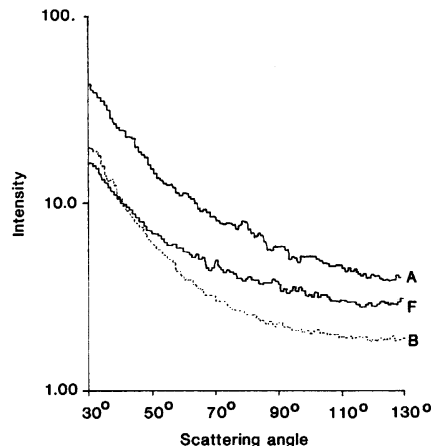


Fig. 2. DLS patterns of wines A, B, and F.

# NEW for HP Desk Top Computer Users

If you use HP 9800\* series Desk Top Computers you should get to know Infotek. We are now in our fifth year of producing powerful enhancements for the HP 9825, 9830 and 9831.

Infotek now introduces add-in memory and floppy disk systems for the HP 9835 and 9845.

As always, Infotek's add-in memory is fully compatible to your HP Desk Top system. The only differences are **immediate availability, lower cost and a one year warranty.**

Infotek's new floppy disk system for the HP 9825, 9835 and 9845 is similar to HP's 9885\* in two ways, quality and 100% software compatibility—but that's where the similarity ends. And...you'll like the differences.

First, the Infotek FD 9885 Floppy System is several times **faster**, and has **more storage capacity**. Next, it does things like **duplication, verification** and **diagnostics** by itself so you get a lot more work out of your computer during these operations. Also, Infotek's floppy systems provide you with three **I/O ports** so you actually gain two more I/O ports when using our system.

Contact Infotek NOW for a demonstration of this very extraordinary disk system. You will be amazed at the computing power you gain.



**Infotek  
Systems**

1400 North Baxter Street  
Anaheim, California 92806  
(714) 956-9300/Telex 182283

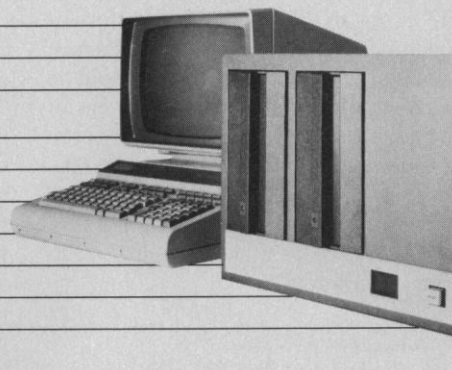
Circle No. 302 on Readers' Service Card

\*PRODUCTS OF HEWLETT-PACKARD CO.

Tell me more about INFOTEK products. I have the following mainframe:

- 9825; number of systems \_\_\_\_\_  
 9835; number of systems \_\_\_\_\_  
 9845; number of systems \_\_\_\_\_

NAME \_\_\_\_\_  
 COMPANY \_\_\_\_\_  
 STREET \_\_\_\_\_  
 CITY \_\_\_\_\_  
 STATE \_\_\_\_\_ ZIP \_\_\_\_\_  
 COUNTRY \_\_\_\_\_  
 PHONE \_\_\_\_\_



SC1/80

# 0.1g for under \$1G.

Sartorius lowers the cost of fully electronic weighing to under \$1,000. Now you can get a Sartorius 1206 Electronic Balance with 1200g capacity/0.1g accuracy for only \$995 ... the price you'd expect to pay for a conventional (mechanical) balance.

The 1206 incorporates such advanced features as instant electronic taring/memory, large bright 7-segment digital display, reading stability indicator and all-metal balance housing. At slight additional cost, the 1206 can be equipped with BCD output to accept Keyboard Programmable, Data Printers or to connect with Data Processing Equipment. Even with the extra cost of BCD output, the 1206 is still priced less than comparable electronic balances without this feature.

For larger capacity requirements, the Sartorius 1203 (4000g capacity/0.1g accuracy) or the Dual Range 1213 (300g/0.01g and 3000g/0.1g) provide comparable value.

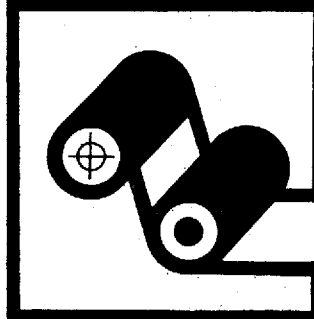
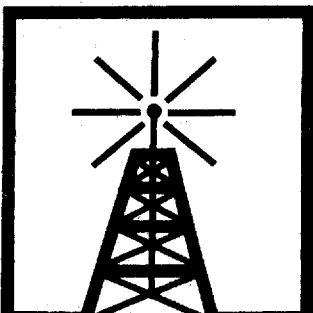
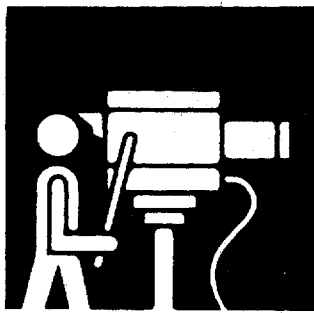
For literature, write Sartorius Balances Division, Brinkmann Instruments, Inc., Subsidiary of Sybron Corporation, Cantiague Rd., Westbury, New York 11590; or call 516/334-7500.

## Electronic Balances from \$995.

**sartorius**

For literature circle P S #329

# 1981 AAAS Westinghouse Science Journalism Awards



**Television**  
**Radio**  
**Print**

## Rules

The aim of this competition is to encourage and recognize outstanding reporting on the sciences and their engineering and technological applications in newspapers, general circulation magazines, radio, and television. The following categories are not eligible: items on the field of medicine, items published originally in AAAS publications or produced by AAAS; reports by employees of the AAAS or Westinghouse Electric Corporation.

- Each entrant may submit three entries for any one category.

### Print

- An entry for a newspaper competition may be any of the following: a single story; a series of articles; or a group of three unrelated stories, articles, editorials, or columns published during the contest year. A magazine entry may be a single story or series published during the contest year.

- A completed entry blank must be submitted together with seven copies of each entry in the form of tear sheets, clippings, reprints, or syndicate copy (not over 8½" x 11"), showing name and date of the publication. **ENTRIES MUST NOT BE ELABORATE!**

### Broadcast

- An entry for the radio or television competition may be an individual news story, feature, or a series, regardless of length, broadcast during the contest year on either public or commercial stations. Entries must be comprised of scripted material. Interviews are not eligible.

- A completed entry blank must be submitted together with a cassette in the case of radio and copy of the script or a ¼" videocassette in the case of television and copy of the script.

- Each entry must have been published or broadcast within the United States during the contest year—1 October 1980 through 30 September 1981. (In case of a series, more than half of the items comprising it must have been published or broadcast during the contest year.) The date on the issue in which an article appeared will be considered as the date of publication. All entries must be postmarked on or before midnight, 15 October 1981.

- Persons other than the author may submit entries in accordance with these rules. Entries will not be returned.

- Winners of the 1980 Awards are not eligible for the 1981 awards. Persons winning three times are no longer eligible.

- The Judging Committee, whose decisions are final, will choose the winners. There are five awards of \$1,000: for the winning entry in the over 100,000 daily circulation newspapers competition; for the winning entry in the under 100,000 circulation newspapers competition; for the winning entry in the general circulation magazine competition; for the winning entry in the radio competition; and for the winning entry in the television competition. For award purposes, newspaper circulation will be sworn ABC daily circulation as of 30 September 1981. The Judging Committee may cite other entries for honorable mention.

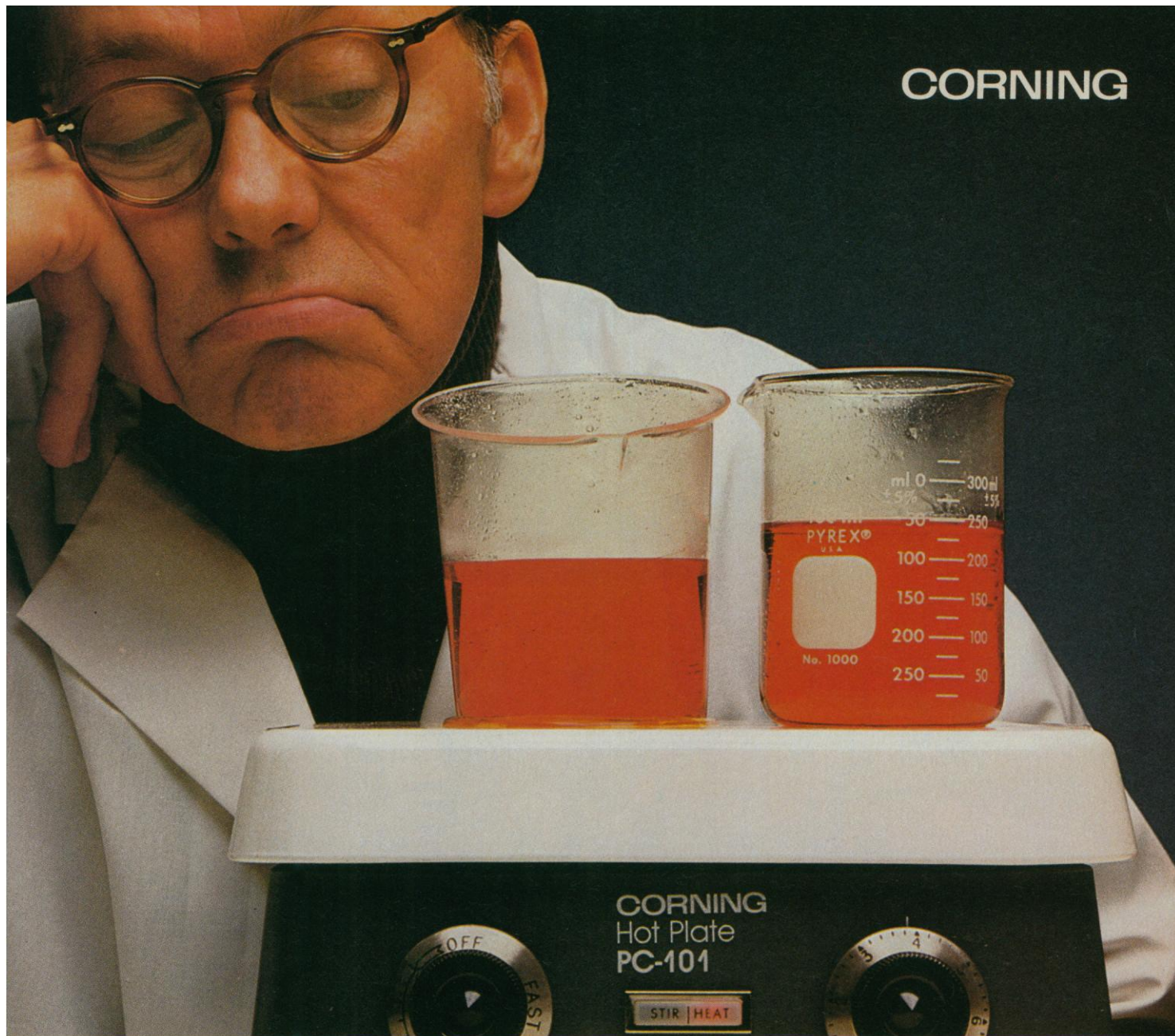
- The awards will be presented at the dinner meeting of the National Association of Science Writers during the Annual Meeting of the American Association for the Advancement of Science in January 1982. Travel and hotel expenses of the awards winners will be paid. Entrants agree that, if they win, they will be present to receive their awards, unless prevented by circumstances beyond their control.

Grayce A. Finger

AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE

1515 Massachusetts Avenue, N.W. Washington, D.C. 20005

CORNING



# WE DARE YOU TO COMPARE BEAKERS

**FIRST, COMPARE PRICES.** The PYREX® Beaker shown costs less than the leading polymethylpentene beaker.

For example, most popular sizes of PYREX borosilicate beakers are priced very competitively with the leading plastics, and in many cases are lower.

**NOW, COMPARE PERFORMANCE.** The plastic people tell you to keep their beakers away from flames and hot plates. PMP beakers are rated only up to 150°C for continuous use. They list over 150 common reagents and solvents that might damage plastic at room temperature.

You can heat PYREX beakers to 490°C. The only things we ask you not to put in them are hydrofluoric and hot

phosphoric acids or a strong hot alkali. Aside from that, PYREX labware lets you boil, freeze, store or centrifuge any chemical or combination of chemicals you want.

**COMPARE QUALITY.** Total value combined with performance is the reason PYREX labware outsells any other brand, glass or plastic. It's the reason why we produce far more reusable beakers and more types of beakers than anyone in the world. Some have imitated us, but there still is really no comparison. It's been that way since we originated PYREX labware in 1915. PYREX® is a registered trademark. Corning Glass Works, Corning, NY

**PYREX**  
LABWARE  
**ONLY FROM CORNING**

## DARE TO COMPARE?

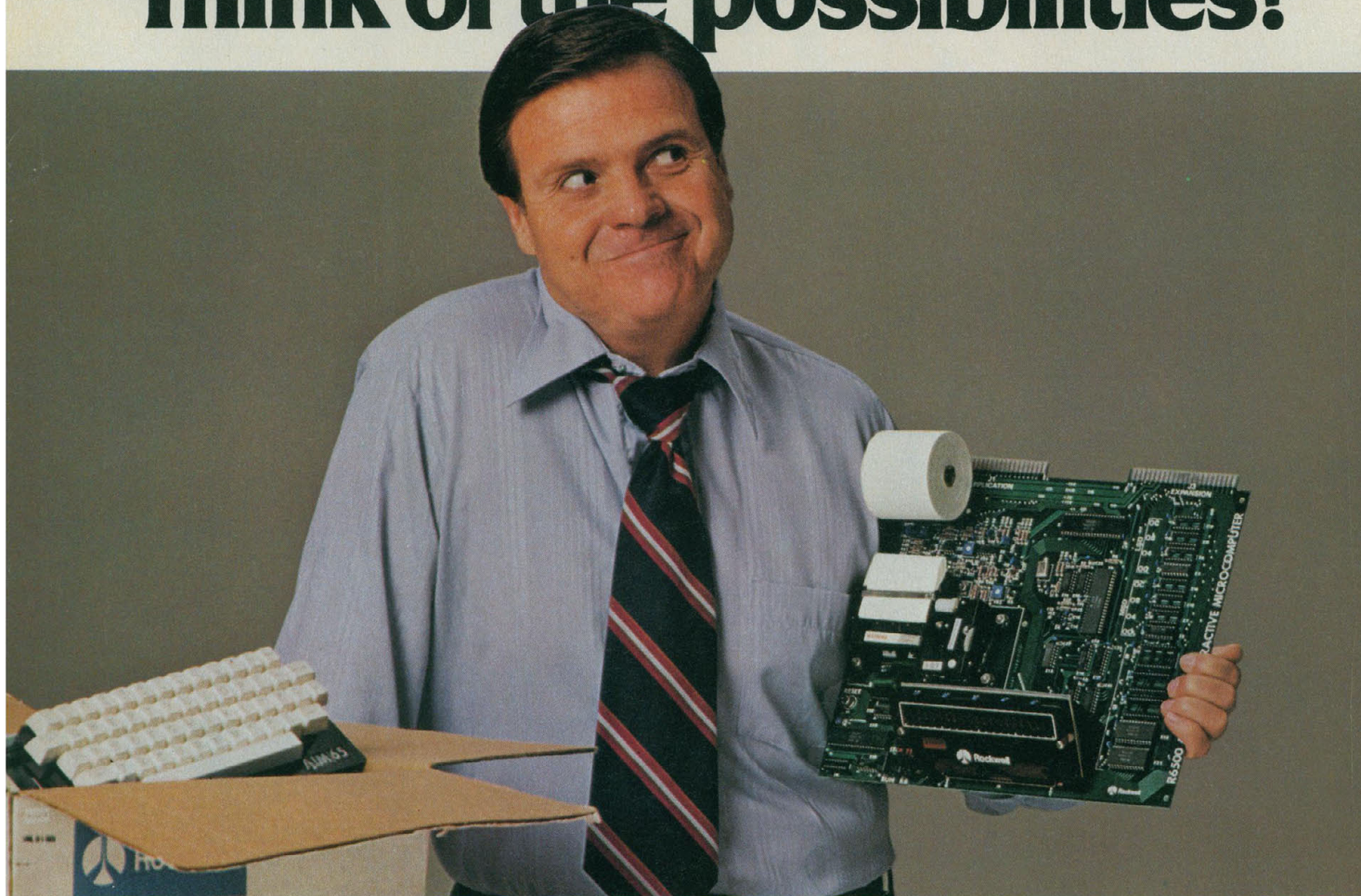
Discover for yourself why we've been the leader in the lab for sixty-six years. We'll send you a handy wall chart to help you in your labware comparisons. Attach this to your letterhead with your name and address. Send to: Corning Medical and Scientific, Attn: WTJ, MS-21510, Corning Glass Works, Corning, N.Y. 14831.



SE-06-81-DE



# Your product. Our computer. Think of the possibilities!



If you're planning on computerizing your product, there's already a microcomputer designed to do the job — economically, quickly, easily.

The AIM 65 microcomputer.

Designed for professional work, it has a full keyboard. A 20-

character display. A thermal printer. I/O ports. Timers and counters. Programmable intelligence. Optional languages — BASIC, Assembly, PL65, FORTH. Lots of readily available documentation packages and application support.

In many cases it does the work of a minicom-

puter. Yet retail list starts at only \$425.00 (less in OEM quantities). It's available off-the-shelf at distributors nationwide now. And, the new standard Microflex 65 line of versatile modules lets you expand to fit even the toughest custom needs.

Whether you're computerizing a single machine in your factory or designing a manufactured product, AIM 65 may be the most cost-effective solution ever.

Take a moment. And think of all the possibilities. Then, ask Rockwell. Rockwell International, Electronic Devices Division, P.O. Box 3669, Anaheim, CA 92803. (800) 854-8099 (in California 800-422-4230).

**MICRO  
POWER**



...where science gets down to business

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**

1981: PETER BELL, BRYCE CRAWFORD, JR., E. PETER GEIDUSCHEK, EMIL W. HAURY, SALLY GREGORY KOHLSTEDT, MANCUR OLSON, PETER H. RAVEN, WILLIAM P. SLICHTER, FREDERIC G. WORDEN

1982: WILLIAM ESTES, CLEMENT L. MARKERT, JOHN R. PIERCE, BRYANT W. ROSSITER, VERA C. RUBIN, MAXINE F. SINGER, PAUL E. WAGGONER, ALEXANDER ZUCKER

**Publisher**

WILLIAM D. CAREY

**Editor**

PHILIP H. ABELSON

**Editorial Staff**

**Managing Editor**  
ROBERT V. ORMES  
**Assistant Managing Editor**  
JOHN E. RINGLE

**Business Manager**  
HANS NUSSBAUM  
**Production Editor**  
ELLEN E. MURPHY

**News Editor:** BARBARA J. CULLITON  
**News and Comment:** WILLIAM J. BROAD, LUTHER J. CARTER, CONSTANCE HOLDEN, ELIOT MARSHALL, COLIN NORMAN, R. JEFFREY SMITH, MARJORIE SUN, NICHOLAS WADE, JOHN WALSH

**Research News:** RICHARD A. KERR, GINA BARI KOLATA, ROGER LEWIN, JEAN L. MARX, THOMAS H. MAUGH II, ARTHUR L. ROBINSON, M. MITCHELL WALDROP

**Administrative Assistant, News:** SCHERRAINE MACK;  
**Editorial Assistants, News:** FANNIE GROOM, CASSANDRA WATTS

**Senior Editors:** ELEANORE BUTZ, MARY DORFMAN, RUTH KULSTAD

**Associate Editors:** SYLVIA EBERHART, CAITILIN GORDON, LOIS SCHMITT

**Assistant Editors:** MARTHA COLLINS, STEPHEN KEPPLER, EDITH MEYERS

**Book Reviews:** KATHERINE LIVINGSTON, *Editor*; LINDA HEISERMAN, JANET KEGG

**Letters:** CHRISTINE GILBERT

**Copy Editor:** ISABELLA BOULDIN

**Production:** NANCY HARTNAGEL, JOHN BAKER; ROSE LOWERY; HOLLY BISHOP, ELEANOR WARNER; JEAN ROCKWOOD, LEAH RYAN, SHARON RYAN, ROBIN WHYTE

**Covers, Reprints, and Permissions:** GRAYCE FINGER, *Editor*; GERALDINE CRUMP, CORRINE HARRIS

**Guide to Scientific Instruments:** RICHARD G. SOMMER  
**Assistants to the Editors:** SUSAN ELLIOTT, DIANE HOLLAND

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

EDITORIAL CORRESPONDENCE: 1515 Massachusetts Ave., NW, Washington, D.C. 20005. Area code 202. General Editorial Office, 467-4350; Book Reviews, 467-4367; Guide to Scientific Instruments, 467-4480; News and Comment, 467-4430; Reprints and Permissions, 467-4483; Research News, 467-4321. Cable: *Advancesci*, Washington. For "Information for Contributors," write to the editorial office or see page xi, *Science*, 27 March 1981.

BUSINESS CORRESPONDENCE: Area Code 202. Membership and Subscriptions: 467-4417.

**Advertising Representatives**

**Director:** EARL J. SCHERAGO

**Production Manager:** GINA REILLY

**Advertising Sales Manager:** RICHARD L. CHARLES

**Marketing Manager:** HERBERT L. BURKLUND

Sales: NEW YORK, N.Y. 10036: Steve Hamburger, 1515 Broadway (212-730-1050); 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. (312-337-4973); BEVERLY HILLS, CALIF. 90211: Winn Nance, 111 N. La Cienega Blvd. (213-657-2772); DORSET, VT. 05251: Fred W. Dieffenbach, Kent Hill Rd. (802-867-5581).

ADVERTISING CORRESPONDENCE: Tenth floor, 1515 Broadway, New York, N.Y. 10036. Phone: 212-730-1050.

## Resources for Research Medicine

Research medicine has come far, and it has farther yet to go. The pace of biomedical discovery, of developments in technology and technique, has been explosive, and has been correlated with the explosion in NIH research funding since 1950—the latter distorted by inflation but impressive even in constant dollars.

Since 1979, however, annual NIH appropriations have not increased when measured in constant dollars. But the constant-dollar cost of biomedical research keeps on increasing. Will the resources be available to allow us to advance, and without breaking stride? If federal support declines, will industry and private investment pick up the slack? And if so, on what terms? These are our current problems, and we do not yet have solutions. Our hope must be that we can go forward. That hope, however, rests on a simple recognition: neither a miracle nor a happy accident produced our recent progress—billions of dollars of public investment made it possible. Our future has an obvious price tag attached to it.

A second hope I have is that we will be flexible enough to keep adjusting responsibly and effectively to changes of bewildering proportions. Medicine is rooted in the present but must well serve the future. No prophecy is needed to anticipate the shock of impact of trends already fully visible. Our increased ability to prevent disease will produce shifts in kinds of patients in hospitals. The aging of our population will produce a demand for greater and different resources for medical care. Changes in treatment may have consequences ranging from noninvasive diagnosis to the possibility that whole clinics may close as the tuberculosis hospitals closed in the 1950's. Our hope under these circumstances must be that we will neither resist the flow of change nor drown in it, but that we can and will succeed in managing and channeling change within our medical institutions.

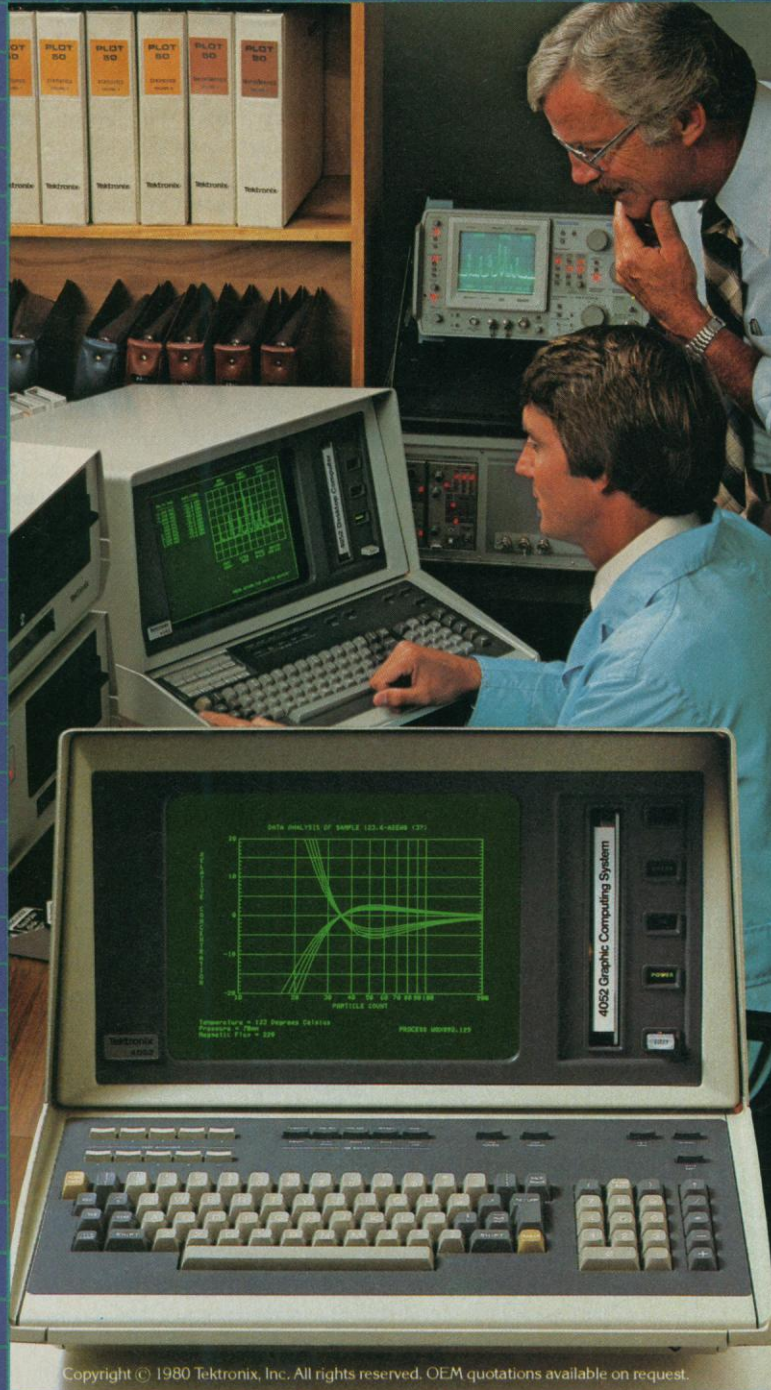
Yet another hope is that we will make the best possible use of the larger number of physicians that are coming onto the scene. It is anticipated that their number will increase by a full one-third within this decade. Will we therefore be able to reduce the scale of some medical schools to more intimate and more personal dimensions, and to achieve more effective staffing in hospitals? Can we avoid the possible negative outcomes of so great an enlargement in the supply of physician talent?

Let me now shift from hope to purpose and touch upon two points. There is harmony rather than dissonance in the marriage of private enterprise with the public interest. When committed to public service, private enterprise surrenders profit. But it retains the virtues of autonomous and responsive private governance, the efficiency and flexibility of independence in management and operation, and the discipline of competing for resources. When committed to the public benefit of private enterprise, government as the representative of public authority surrenders control. But with respect to private not-for-profit institutions, it retains the incentive of providing support for public purposes with public funds, the responsibility for the public order in which the private corporation functions much as the private citizen does, and accountability for the legitimate use of public funds. In the American tradition, it is our genius that private enterprise and public policy are linked in partnership and therefore strengthen one another.

I am also convinced that the resources needed in the private sector will depend on our own resolve to secure them. If the quality of our work and strength of our purpose merit support, we shall not fail for lack of it. But as we achieve a richer and more diverse mixture of support, let us not trap ourselves into the false notion that support from government and industry is an either-or proposition. Only the trinity of university, industry, and government can effectively support the trinity of service, training, and research.—STEVEN MULLER, *President, Johns Hopkins University and Johns Hopkins Hospital, Baltimore, Maryland 21218*

Excerpted from an address by Dr. Muller at the dedication of the North Division, Duke University Hospital, 25 April 1981.

**Solve, plot and  
label a 20-pair linear  
regression in the time it  
takes to log-on to a host!**



**The  
Tektronix  
4052  
Desktop  
Computer**

Copyright © 1980 Tektronix, Inc. All rights reserved. OEM quotations available on request.

**THE GRAPHICS  
STANDARD**

**T**ackle big problems with power and speed not previously available in a desktop computer. With convenience and economy you couldn't imagine with timesharing.

Take a problem in simple linear regression: In less time than it takes to dial a computer and log-on, the 4052 can fit 20 pairs of data to an equation and plot the answers, numerically and graphically, complete with residuals.

**Using the optional FFT ROM Pack, it takes less than 4 seconds to transform 1024 real data points into complex spectra...** with the same 14-digit accuracy found in all other 4052 computation. With fast display of text and graphics that complements the fast computation.

**Our supporting products let you shape the perfect solution.** Choose our data communications option to reach into central data bases and extra computing power. Applications software, including excellent volumes for statistics and math, minimize development costs, while our advanced peripherals—including copiers, plotters and file manager—maximize your problem-solving power.

**This is one compact computer that lets you keep thinking big!** For information call, toll-free, 1-800-547-1512 (in Oregon, 644-9051 collect).

**Tektronix, Inc.**  
Information Display Division  
P.O. Box 1700  
Beaverton, Or 97075

**Tektronix International, Inc.**  
European Marketing Centre  
Post Box 827  
1180 AV Amstelveen  
The Netherlands

**Tektronix®**  
COMMITTED TO EXCELLENCE

Circle No. 399 on Readers' Service Card