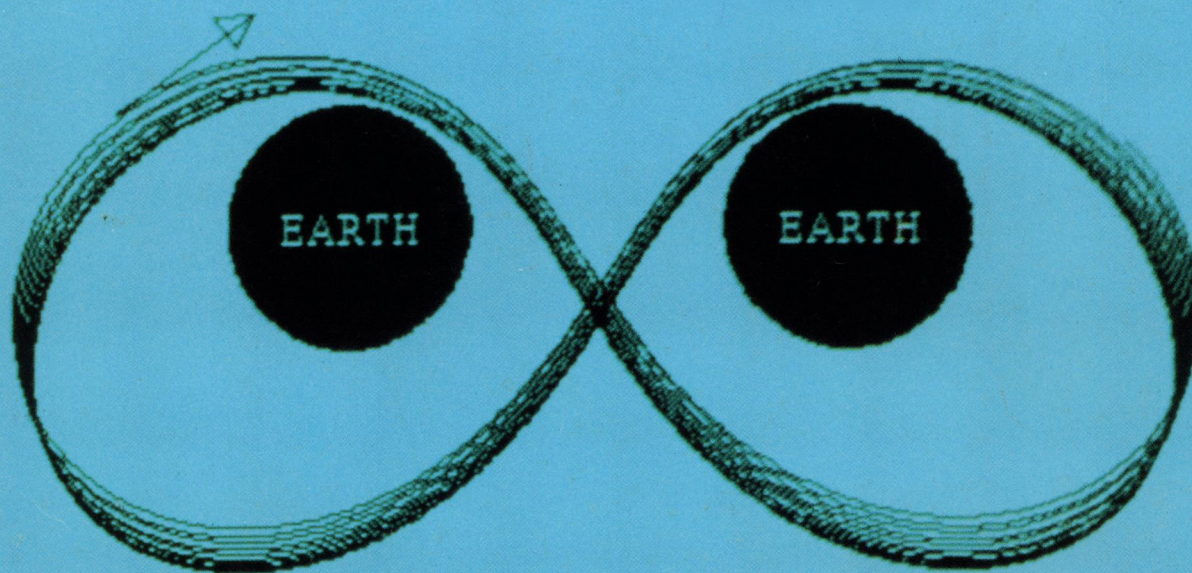


AMERICAN
ASSOCIATION FOR THE
ADVANCEMENT OF
SCIENCE

SCIENCE

28 FEBRUARY 1986
VOL. 231 ■ PAGES 897-1044

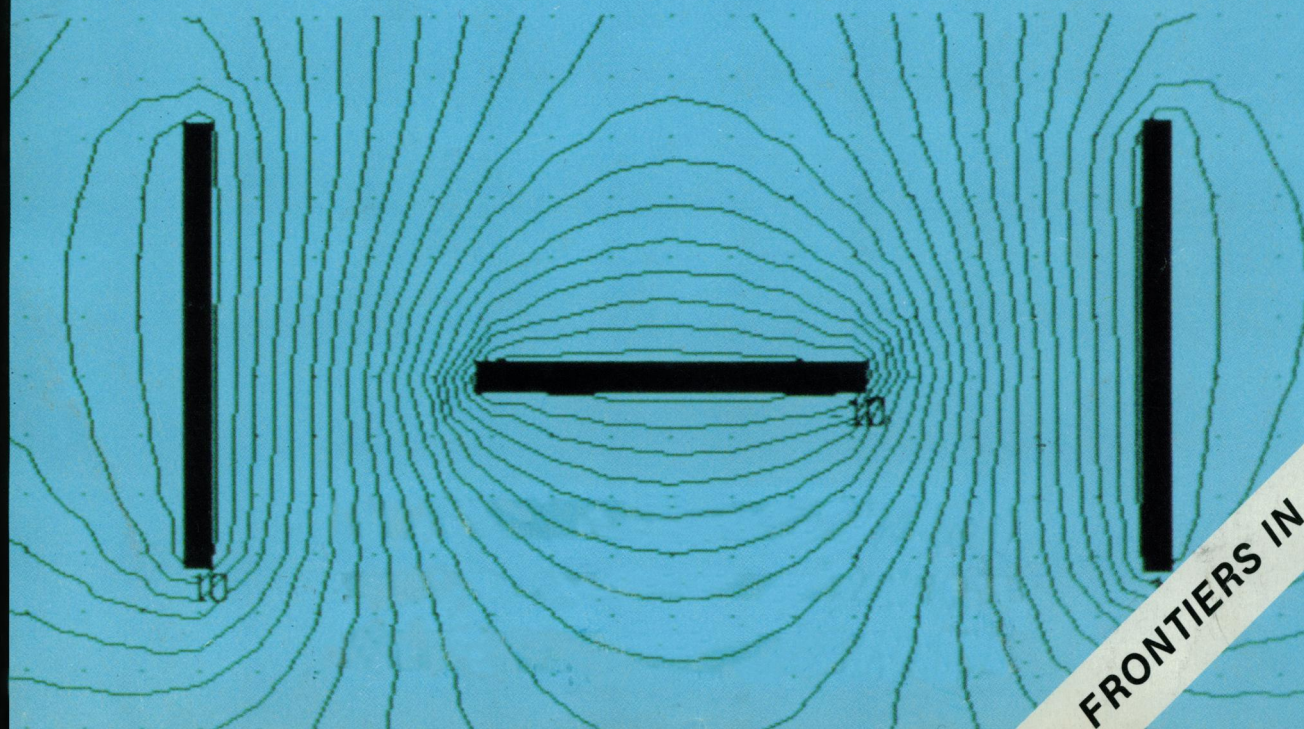
\$2.50



potentials

Relaxation Method

rttleb



FRONTIERS IN COMPUTERS



New System 7300 Amino Acid Analyzer Plots, Labels, Calculates, Prints, Remembers

The System 7300 from Beckman features a new dual-channel data system that offers you important new capabilities for amino acid analysis.

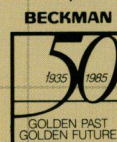


It automatically labels each peak on the chromatogram with the name of the amino acid, so there is no need for time-consuming correlations with elution times. It calculates and prints out both 440 and 570 nm colorimeter signals for greater quantitative accuracy at picomole levels. And its floppy disc memory not only stores up to 40 analyses, but permits reassignment of baselines and reformatting of data.

Like the System 6300, the new System 7300 is a dedicated high-performance ion-exchange chromatograph featuring a single, prepacked stainless steel column operating at up to 3000

psi. It performs hydrolyzate analyses in a half hour, and physiological analyses in 2 hours. These results are guaranteed by Beckman, with detailed methods, applications back-up, and field service second to none.

No wonder the System 7300 has been received so enthusiastically by researchers the world over. For details, call your Beckman representative or write Beckman Instruments, Inc., Spinco Division, 1050 Page Mill Road, Palo Alto, CA 94304. Offices in principal cities worldwide.



BECKMAN

Circle No. 155 on Readers' Service Card

Linking Value to Performance.



AA by the numbers.

Introducing push-button selection for optimum operating conditions. Pick an element. Any element of 61. Then just push a button. The new Shimadzu AA-670 atomic absorption spectrophotometer will automatically set the optimum operational conditions for that element. Plus nine more sets of user-selected operational parameters can be stored and easily accessed from the unit's battery-protected memory.

Flame and flameless models feature advanced safety and high S/N ratio. Whether it's flame emission or graphite furnace—the AA-670 series does more than save time and ensure accuracy: High frequency modulation of the light sources, mechanically simple/high light energy optics, high-speed sampling of the detector signal, and the unique beam-combining function all provide a high

signal-to-noise ratio and high precision automatic background correction. Gas flow rates are digitally displayed and a gas leakage detector is standard, maximizing operator safety.

Advanced data processing and total automation assure highest accuracy. Recording of all data, including the working curve is automatic. Correction of sensitivity drift, exclusion of deviant value in repeated analyses and peak-holding of transient signals are carried out automatically.

The new alternative to AA system selection. Again Shimadzu sets the standard in cost/performance. The AA-670 comes with all these features plus the unmatched Shimadzu warranty and support. So if you want to do AA by the numbers, here's ours: (301) 997-1227.

Shimadzu Scientific Instruments, Inc.
7102 Riverwood Drive, Columbia, MD 21046



SHIMADZU

Shimadzu Corporation International Marketing Div.: Shinjuku-Mitsui Building, 1-1, Nishishinjuku 2-chome, Shinjuku-ku, Tokyo 160, Japan. Tel: Tokyo 03-346-5641 Telex: 0232-3291 SHMDT J.
Shimadzu (Europa) GmbH: Acker Strasse 111, 4000 Düsseldorf, F.R. Germany. Tel: (0211) 666371 Telex: 08586839

Circle No. 147 on Readers' Service Card

903 This Week in *Science*

Editorial

905 Computers: J. I. BRAUMAN

Letters

907 U.S. Science and Technology: J. F. KERRY ■ "Money Pot" Clarified: L. YOUNG
■ Filamentary Structures: H. ALFVÉN ■ Human Rights and Credibility: C. DAVIS

News & Comment

909 Shuttle Inquiry Focuses on Weather, Rubber Seals, and Unheeded Advice
911 Education Makes Comeback at NSF
913 A SWAT Team for Nuclear Accidents
915 *Briefing*: DOD Proposes Rules for Reviewing Scientific Papers ■ UN
Biotechnology Center Mired in Politics

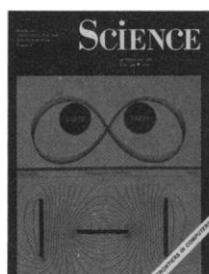
Research News

916 Voyage to a Blue Planet
919 "*Viruses and Cancers*" *Briefing*: Virus-Associated Cancers Can Be a Major Problem
in the Tropics ■ Progress on a Vaccine for Epstein-Barr Virus ■ Human
Papilloma Virus and Cervical Cancer

Articles

935 The Next Generation of Personal Computers: J. P. CRECINE
943 Computer Networking for Scientists: D. M. JENNINGS, L. H. LANDWEBER,
I. H. FUCHS, D. J. FARBER, W. R. ADRION
951 Perspectives on Artificial Intelligence Programming: D. G. BOBROW and
M. J. STEFIK
957 Knowledge-Based Systems: R. DAVIS
963 Small Shared-Memory Multiprocessors: F. BASKETT and
J. L. HENNESSY
967 Parallel Supercomputing Today and the Cedar Approach: D. J. KUCK,
E. S. DAVIDSON, D. H. LAWRIE, A. H. SAMEH
975 Massively Parallel Computers: The Connection Machine and NON-VON:
R. P. GABRIEL

- **SCIENCE** is published weekly on Friday, except the last week in December, by the American Association for the Advancement of Science, 1333 H Street, NW, Washington, DC 20005. Second-class postage (publication No. 484460) paid at Washington, DC, and at an additional entry. Now combined with **The Scientific Monthly**® Copyright © 1986 by the American Association for the Advancement of Science. Domestic individual membership and subscription (51 issues): \$60. Domestic institutional subscription (51 issues): \$98. Foreign postage extra: Canada \$24, other (surface mail) \$27, air-surface via Amsterdam \$65. First class, airmail, school-year, and student rates on request. Single copies \$2.50 (\$3 by mail); back issues \$4 (\$4.50 by mail); Biotechnology issue, \$5.50 (\$6 by mail); classroom rates on request. **Change of address:** allow 6 weeks, giving old and new addresses and seven-digit account number. Authorization to photocopy material for internal or personal use under circumstances not falling within the fair use provisions of the Copyright Act is granted by AAAS to libraries and other users registered with the Copyright Clearance Center (CCC) Transactional Reporting Service, provided that the base fee of \$1 per copy plus \$0.10 per page is paid directly to CCC, 21 Congress Street, Salem, Massachusetts 01970. The identification code for *Science* is 0036-8075/83 \$1 + .10. **Postmaster:** Send Form 3579 to *Science*, 1333 H Street, NW, Washington, DC 20005. *Science* is indexed in the *Reader's Guide to Periodical Literature* and in several specialized indexes.
- The American Association for the Advancement of Science was founded in 1848 and incorporated in 1874. Its objects are to further the work of scientists, to facilitate cooperation among them, to foster scientific freedom and responsibility, 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 in human progress.



COVER Computer display of two introductory physics simulations—an orbiting satellite around two fixed planets and equipotential field lines surrounding charged conductors—used by students at Carnegie-Mellon University. Such displays are made possible by “Andrew,” experimental software being developed for Carnegie-Mellon’s integrated personal computing environment for educational computing. See page 935. [Carnegie-Mellon University, Pittsburgh, Pennsylvania 15213]

Reports

- 979 Evolution of the Ratio of Strontium-87 to Strontium-86 in Seawater from Cretaceous to Present: J. HESS, M. L. BENDER, J.-G. SCHILLING
- 984 Evidence for the Involvement of *GM-CSF* and *FMS* in the Deletion (5q) in Myeloid Disorders: M. M. LE BEAU, C. A. WESTBROOK, M. O. DIAZ, R. A. LARSON, J. D. ROWLEY, J. C. GASSON, D. W. GOLDE, C. J. SHERR
- 987 Selectivity of the Parkinsonian Neurotoxin MPTP: Toxic Metabolite MPP⁺ Binds to Neuromelanin: R. J. D’AMATO, Z. P. LIPMAN, S. H. SNYDER
- 990 Male-Killing Bacteria in a Parasitic Wasp: J. H. WERREN, S. W. SKINNER, A. M. HUGER
- 992 Three-Year Incidence of AIDS in Five Cohorts of HTLV-III-Infected Risk Group Members: J. J. GOEDERT, R. J. BIGGAR, S. H. WEISS, M. E. EYSTER, M. MELBYE, S. WILSON, H. M. GINZBURG, R. J. GROSSMAN *et al.*
- 995 Parvalbumin in Most γ -Aminobutyric Acid-Containing Neurons of the Rat Cerebral Cortex: M. R. CELIO
- 997 Tripeptide Structure of Bursin, a Selective B-Cell-Differentiating Hormone of the Bursa of Fabricius: T. AUDHYA, D. KROON, G. HEAVNER, G. VIAMONTES, G. GOLDSTEIN
- 999 Hyperacuity in Cat Retinal Ganglion Cells: R. SHAPLEY and J. VICTOR
- 1002 Gonadotroph-Specific Expression of Metallothionein Fusion Genes in Pituitaries of Transgenic Mice: M. J. LOW, R. M. LECHAN, R. E. HAMMER, R. L. BRINSTER, J. F. HABENER, G. MANDEL, R. H. GOODMAN

AAAS Meetings

- 1014 *R&D Colloquium: R&D and the Budget Crisis* ■ *Annual Meeting: Preliminary Program, II*; Advance Registration Form

Book Reviews

- 1021 The Great American Biotic Interchange, *reviewed by* M. J. NOVACEK ■ Physical Meteorology, M. NEIBURGER ■ Cerebral Lateralization in Nonhuman Species, M. C. CORBALLIS ■ Books Received

Products & Materials

- 1024 HPLC Gradient Module ■ Large-Scale HPLC ■ Laboratory Robotics ■ Characterization of Catalysts ■ Multichannel Analyzer for Nuclear Spectroscopy ■ Evaporometer ■ Microwave Digestion System ■ Computer-Simulated HPLC ■ Infrared Spectrometer

Board of Directors

David A. Hamburg
*Retiring President,
Chairman*

Gerard Piel
President

Lawrence Bogorad
President-elect

Robert McC. Adams
Robert W. Berliner
Mildred Dresselhaus
Donald N. Langenberg
Dorothy Nelkin
John E. Sawyer
Shelia E. Widnall
Linda S. Wilson

William T. Goldenberg
Treasurer

William D. Carey
Executive Officer

Editorial Board

David Baltimore
William F. Brinkman
Ansley J. Coale
Joseph L. Goldstein
James D. Idol, Jr.
Leon Knopoff
Seymour Lipset
Walter Massey
Oliver E. Nelson
Allen Newell
Ruth Patrick
David V. Ragone
Vera C. Rubin
Howard E. Simmons
Solomon H. Snyder
Robert M. Solow

Board of Reviewing Editors

Qais Al-Awqati
James P. Allison
Luis W. Alvarez
Don L. Anderson
Kenneth J. Arrow
C. Paul Bianchi
Elizabeth H. Blackburn
Floyd E. Bloom
Charles R. Cantor
James H. Clark
Bruce F. Eldridge
Stanley Falkow
Douglas J. Futuyma

Theodore H. Geballe
Robert B. Goldberg
Stephen P. Goff
Roger I. M. Glass
Patricia S. Goldman-Rakic
Richard M. Held
Gloria Heppner
Eric F. Johnson
Konrad B. Krauskopf
Joseph B. Martin
John C. McGiff
Alton Meister
Mortimer Mishkin
John S. Pearce
Yeshayau Pocker
Frederic M. Richards
James E. Rothman

Ronald H. Schwartz
Otto T. Solbrig
Robert T. N. Tjian
Virginia Trimble
Geerat J. Vermeij
Martin G. Weigert
George M. Whitesides
William B. Wood
Harriet Zuckerman

In 18 years, we built over 25,000 custom balances. This year we'll build only one.

Since 1968, we've solved some pretty tough weighing problems. Like measuring honeybee productivity and discerning diaper absorption rates. From weighing diamonds for Tiffany, to counting dollars for Disney.

25,000 balances later, we made an important discovery.

Our new 5000 Series. It's a line of lab balances with the custom built in. We solved problems like digit flutter and zero drift. And achieved a stability others only talk

about. This 5000 Series is really 18 years of problem solving, in one capable balance line.

A line with dual ranges (50.000g/ 500.00g and 500.00g/ 5000.0g).

Autorange and auto-calibration. Seven different units of measure. Below-balance weighing. An abuse-resistant front panel. And fine range resolution through full capacity performance (thanks to our Floating Range™). With a

heat-free design for performance that won't drift.

After all that, you've got options. Like up to three communications

ports. And an input keyboard that takes your lab projects right into the 21st century.

Now, our new 5000 Series may have a lot of virtues for just a balance.

But we promise. Price is one of them.

Ask for our 5000 Series brochure. It's crammed with 18 years of problem solving facts that

prove, once and for all, it's not just the name. It's the history behind it.



SCIENTECH® *5000 Series.*

Scientech, Inc., 5649 Arapahoe Avenue,
Boulder, Colorado 80303-1399,
(303) 444-1361, TWX 910 940-0994,
(800) 525-0522.

This Week in SCIENCE

Pathology in Parkinsonism

How parkinsonism develops in humans and experimental animals is becoming clearer (page 987). Parkinsonism is characterized by selective destruction of pigmented cells in one region of the brain, the substantia nigra. Certain illicit drugs produce parkinsonism because they are contaminated with MPTP (methylphenyltetrahydropyridine), a substance that is oxidized in the brain to methylphenylpyridine (MPP⁺). D'Amato *et al.* found that MPP⁺ binds with high affinity to the natural pigment neuromelanin of the substantia nigra and to synthetic melanin. Although the pigmented locus coeruleus region of the brain also contains melanin, MPP⁺ does not concentrate there; the region is richly supplied with catecholamine (dopamine, norepinephrine, and epinephrine) nerve terminals that take up MPP⁺ as it accumulates, leaving little for uptake by pigmented cell bodies in the region. The substantia nigra is not similarly protected because nerve terminals are not plentiful. MPP⁺ is instead taken into cells by the dopamine uptake system and becomes available to destroy the cell body through its toxic effects. Environmental toxins, implicated in the etiology of Parkinson's disease, may, like MPTP, accumulate in the brain and damage dopamine neurons.

Male-killing bacteria

GENETIC and nongenetic factors can cause wasps to produce unequal numbers of male and female progeny; one nongenetic factor is a bacterium that kills developing males, causing surviving progeny of infected females to be, almost exclusively, females (page 990). Werren *et al.* isolated the as-yet-unnamed bacterium from infected tissues of *Nasonia vitripennis* wasps and from infected hemolymph of fly pupae on which the wasps breed and feed. Typically a female drills a hole through the fly pupa to deposit her eggs, and the eggs develop into larvae

that feed on the pupa's hemolymph. Next a wasp pupa forms, mature wasps leave the fly pupa, mate, and disperse to reinitiate the cycle by laying eggs on other pupae. Inside pupae, maturing of females (from fertilized eggs) goes on normally, but maturing of males (from unfertilized eggs) is inhibited at the egg stage if the egg is laid by an infected female. This system is of interest for exploring what might be the selective advantage—to either microorganism or host—of sex-ratio distorters (known to exist in many other animals and plants) and for understanding development by parthenogenesis (from unfertilized eggs). In comparable systems involving insect pests, a microorganism of this sort may be genetically modifiable for use in biological control.

Visual hyperacuity

THE brain receives more information than it can use from cells in the eye that detect changes in the positions of visual stimuli (page 999). Shapley and Victor studied nerve impulses of cat retinal ganglion cells in response to a grating pattern that moved back and forth on a screen. The cells detected tiny movements; behavioral studies by others indicate that the brain does not make discriminations as fine as those made by the retinal cells. This fine discrimination is termed hyperacuity and is a consequence of the high signal-to-noise ratio coming from the stimulus. Although hyperacuity has been considered a brain phenomenon, a consequence of processing and integrating information from many sensory cells, some forms of hyperacuity do reside in the retinal cells themselves.

Networking networks

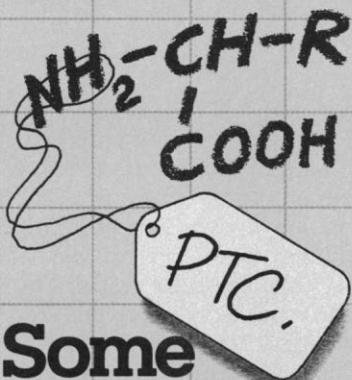
A network of networks is the latest concept for improving computer usage and usefulness among scientists (page 943). By linking supercomputers to each other, to smaller databases, and to users, and by linking users to each other, the maximum bene-

fit from computer and communications technology can be obtained for the maximum number of users. Jennings *et al.*, in one of seven articles in this special computer issue, review the development, management, capabilities, and spread of networks in recent years. Networks have been used to link facilities within institutions and to link those from separate institutions to each other. Now the push is for a network of networks, with gateways providing access to the whole system. Computer use and value would be optimized and the gap closed between scientists who fortuitously are situated at institutions with supercomputers and those currently excluded from the supercomputer community.

Strontium isotope dating of marine samples

THE ratio of strontium isotopes (⁸⁷Sr/⁸⁶Sr) in fossils of some marine organisms reflects strontium isotope abundances in seawater at the time the organisms were alive (page 979). Strontium enters the water from rivers, from undersea hydrothermal sources, and from submarine recycling of limestone and carbonates. At any period, strontium isotopes are uniform in the sea, because the mixing time of the ocean (1000 years) is much less than the strontium residence time (5 million years). Hess *et al.* analyzed ⁸⁷Sr and ⁸⁶Sr abundances in fossil foraminifera from dated cores of the Atlantic and Pacific oceans. Overall, the strontium ratio increased during the last 100 million years. The high-resolution analyses provided a curve of strontium signatures through time that should help date and correlate marine fossils and sediments more accurately. The ratio rose briefly across the Cretaceous/Tertiary boundary, but this feature is not readily accounted for by the impact of an extraterrestrial object (one explanation for the mass extinctions that took place at the boundary), unless current assessments of the object's size or the extent of its vaporization upon impact are gross underestimates.

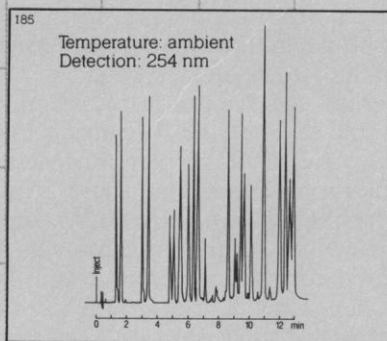
Optimal
Chromatography **6**
IN A SERIES



Some call it PICO-TAG™ analysis

And some simply call it PITC. But what you call PTC-amino acid analysis isn't as important as the results. And results are what you'll get from Beckman's system AA-1.

The AA-1 is optimized for PTC-AA analysis. It's as fast, sensitive and easy to use as the so-called "exclusive" method. But since you don't need expensive special purpose columns or reagents, it's more cost-efficient.



The System AA-1...just one of a complete line of Beckman HPLC systems optimized for amino acid analysis. Call us. Or send for our new guide to amino acid analysis by HPLC.

Beckman Instruments, Inc.,
Altex Division 1716 Fourth Street,
Berkeley, CA 94710 (415) 527-5900
Offices in major cities worldwide.

BECKMAN

PICO-TAG™ is a trademark of Waters Associates.
©1985 Beckman Instruments, Inc. AX85-2035A

Optimal
Chromatography **7**
IN A SERIES

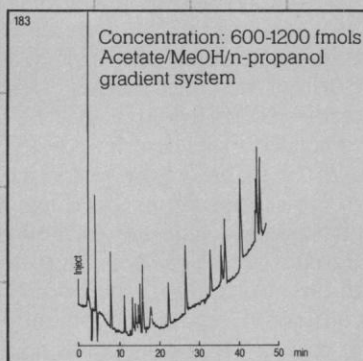


Pin down your sequence

Pin down high femtomole PTH amino acids fast with the AA-4 HPLC System from Beckman.

It's optimized for gradient PTH analysis in protein micro-sequencing.

Results are quick, quantitative and convenient, too. With high-precision pumping, zero dead volume injections, proven Ultrasphere® C₁₈ microbore columns, and a controller that makes it easy to store and link methods.



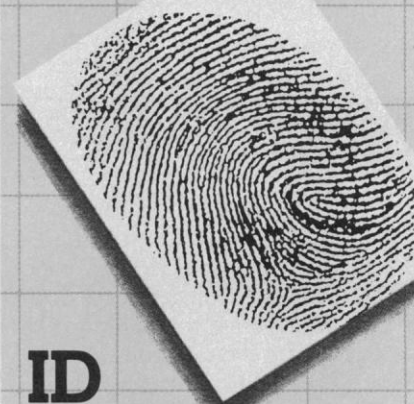
The System AA-4...just one of a complete line of Beckman HPLC systems optimized for amino acid analysis. Call us. Or send for our new guide to amino acid analysis by HPLC.

Beckman Instruments, Inc.,
Altex Division 1716 Fourth Street,
Berkeley, CA 94710 (415) 527-5900
Offices in major cities worldwide.

BECKMAN

©1985 Beckman Instruments, Inc. AX 85-2035C

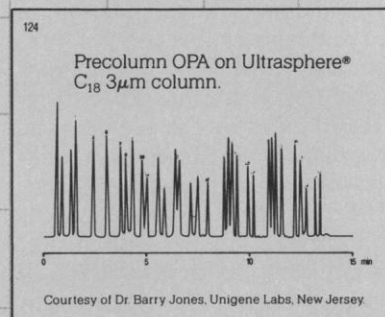
Optimal
Chromatography **8**
IN A SERIES



ID amino acids fast

Now you have a choice of HPLC systems optimized for OPA amino acid analysis.

For pre-column derivatization, choose the Beckman System AA-2. It's optimized for fast OPA analysis with excellent resolution.



For quantitative results, the Beckman System AA-3 gives you high sensitivity with post-column derivatization. Ideal for profiling amino acids in complex samples such as cell culture media, physiological fluids, and foods.

With both systems, you are assured optimal results.

Systems AA-2 and AA-3... just two of a complete line of Beckman HPLC systems optimized for amino acid analysis. Call us. Or send for our new guide to amino acid analysis by HPLC.

Beckman Instruments, Inc.,
Altex Division, 1716 Fourth Street,
Berkeley, CA 94710. (415) 527-5900.
Offices in major cities worldwide.

BECKMAN

©1985 Beckman Instruments, Inc. AX 85-2035B

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.

Publisher: William D. Carey

Editor: Daniel E. Koshland, Jr.

Deputy Editors: Philip H. Abelson (*Engineering and Applied Sciences*); John I. Brauman (*Physical Sciences*); Gardner Lindzey (*Social Sciences*)

EDITORIAL STAFF

Managing Editor: Patricia A. Morgan

Assistant Managing Editors: Nancy J. Hartnagel, John E. Ringle

Senior Editors: Eleanor Butz, Lawrence I. Grossman, Ruth Kulstad

Associate Editors: Martha Collins, Sylvia Eberhart, William Greaves, Barbara Jasny, Katrina L. Kelner, Edith Meyers

Letters Editor: Christine Gilbert

Book Reviews: Katherine Livingston, *editor*; Linda Heiser-
man

This Week in Science: Ruth Levy Guyer

Chief Production Editor: Ellen E. Murphy

Editing Department: Lois Schmitt, *head*; Caitilin Gordon, Stephen Kepple, Lisa McCullough

Copy Desk: Isabella Bouldin, *chief*; Mary McDaniel, Sharon Ryan, Beverly Shields

Production Manager: Karen Schools

Graphics and Production: John Baker, *assistant manager*; Holly Bishop, Kathleen Cosimano, Eleanor Warner

Covers Editor: Grayce Finger

Manuscript Systems Analyst: William Carter

NEWS STAFF

News Editor: Barbara J. Culliton

News and Comment: Colin Norman, *deputy editor*; Mark H. Crawford, Constance Holden, Eliot Marshall, R. Jeffrey Smith, Marjorie Sun, John Walsh

Research News: Roger Lewin, *deputy editor*; Deborah M. Barnes, Richard A. Kerr, Gina Kolata, Jean L. Marx, Arthur L. Robinson, M. Mitchell Waldrop

European Correspondent: David Dickson

BUSINESS STAFF

Chief Business Officer: William M. Miller, III

Business Staff Supervisor: Deborah Rivera-Weinhold

Associate Business Supervisor: Leo Lewis

Membership Recruitment: Gwendolyn Huddle

Member and Subscription Records: Ann Ragland

Guide to Biotechnology Products and Instruments Editor: Richard G. Sommer

ADVERTISING REPRESENTATIVES

Director: Earl J. Scherago

Production Manager: Donna Rivera

Advertising Sales Manager: Richard L. Charles

Marketing Manager: Herbert L. Burkland

Sales: New York, NY 10036: J. Kevin Henebry, 1515 Broadway (212-730-1050); Scotch Plains, NJ 07076: C. Richard Callis, 12 Unami Lane (201-889-4873); Chicago, IL 60611: Jack Ryan, Room 2107, 919 N. Michigan Ave. (312-337-4973); Beverly Hills, CA 90211: Winn Nance, 111 N. La Cienega Blv. (213-657-2772); San Jose, CA 95112: Bob Brindley, 310 S. 16 St. (408-998-4690); Dorset, VT 05251: Fred W. Diefenbach, Kent Hill Rd. (802-867-5581).

Instructions for contributors appears on page xi of the 20 December 1985 issue. Editorial correspondence, including requests for permission to reprint and reprint orders, should be sent to 1333 H Street, NW, Washington, DC 20005. Telephone: 202-326-6500.

Advertising correspondence should be sent to Tenth Floor, 1515 Broadway, NY 10036. Telephone 212-730-1050.

Computers

An issue of almost any scientific journal shows the impact of computers on the practice of research. The computer has become a required and common tool in many fields. We find applications, for example, in some of the purest mathematics, in particle physics, in organic synthesis, and in molecular biology.

This issue of *Science* focuses on computers. Since it is not desirable, or even possible, to present the whole range of the enterprise of computers and computing, we have chosen to highlight some aspects of computing that are likely to show rapid development and that are likely to have great and immediate impact on a large number of scientists. There are, obviously, a number of other topics that might have been covered; these we hope to look at in individual articles in the future.

The articles in this issue concentrate on three thematic areas: interfaces, languages, and hardware. Each of these overlaps and affects the others. Indeed, a number of the articles address some common problems and issues, although one can see major advances occurring in each field.

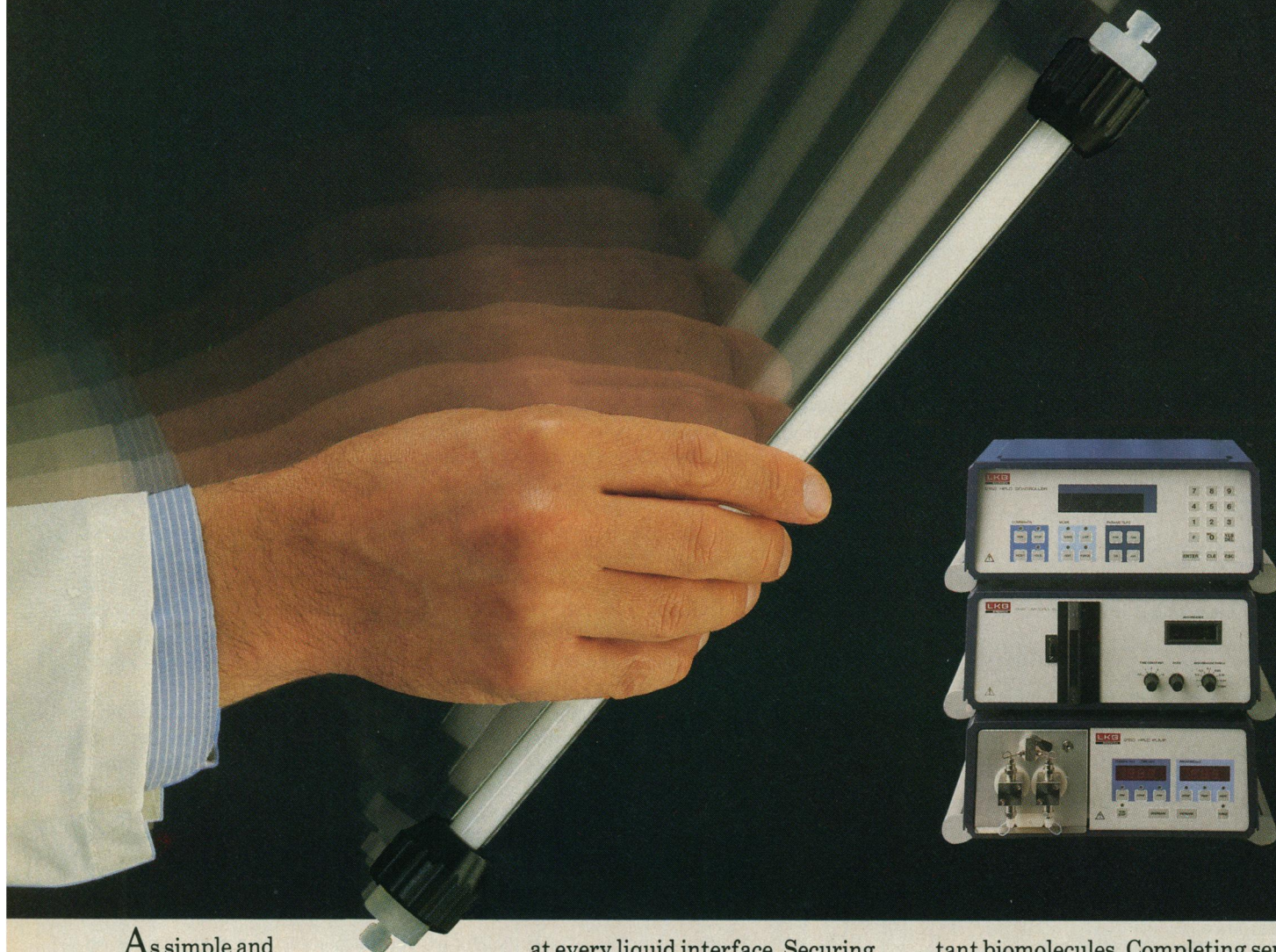
We begin with the most personal of the subjects, interfaces, an area related to how we can best take advantage of our computational resources. Jennings *et al.* address networks and networking. It is networks that will allow communication between remote locations and that will enable us to use expensive resources in an efficient and convenient way. Their planning and implementation require careful thought, since the decisions will affect almost all users. Crecine discusses the development of standardized workstations. With these the scientist will be able to manipulate data and produce manuscripts with a uniform and efficient set of standardized protocols. Programs written in one location will be transportable and will function on someone else's machine. Again, the combination of human and machine interactions as well as the emphasis on uniformity require that decisions be made correctly because the consequences are far-reaching.

Languages are a critical component in the use of computers. (We do not address here the issue of the long-term viability of FORTRAN, or even Ada.) Two major, serious problems present themselves. What kinds of languages are required to get the most out of new computer architecture? What kinds of languages will allow us to solve problems related to the processing of massive amounts of data in problems that by nature are too diffuse or broad to be handled easily or intuitively by an individual or group? Bobrow and Stefik address the question of new languages and programs and an environment in which to produce them. Davis discusses knowledge-based systems and questions of artificial intelligence.

Finally, hardware makes things possible. As we approach some of the limitations on computing speed that are due to such physical constraints as the speed of light, ingenious developments in architecture can provide remarkable benefits. Gabriel discusses one of the most dramatic aspects, massive parallel computing. He points out, also, the language problems inherent in effective use of such constructions. Baskett and Hennessy address the problem of using many microprocessors together in a "small" machine, thereby providing unusual power at the user's desk. Finally, Kuck *et al.* describe some of the advances to be expected in the area of supercomputers, the frontier of the largest and most expensive calculations.

It is everyone's hope and many people's expectation that all of these advances will further the scientific enterprise and make life more productive and, possibly, more pleasant. We can be certain that with inevitably lower costs and improved computing capability we will see the solution of many scientific problems at an increasingly rapid rate. The future of much of the activity of science is bound up in the development of computers, and all of us will be affected.—JOHN I. BRAUMAN, Department of Chemistry, Stanford University, Stanford, CA 94305

The fast way to get active proteins



As simple and friendly as soft gel chromatography. Powerful and productive as HPLC. Now uniquely combined into one totally new and radically different system. ULTRO-CHROM GTi. To separate, purify, quantitate and recover proteins, peptides, nucleic acids and even carbohydrates. With biological activity that can reach 100%. And in runs that only take minutes. From pump heads to fraction collector, GTi means glass, titanium and inactive polymers. Giving you biocompatibility for complex protein mixtures. Replacing stainless steel

at every liquid interface. Securing protection against buffers. Against corrosion by halide ions. Against denaturation by organic solvents. But with all the performance of a truly advanced and highly proven HPLC pump. Meeting all your needs for multi-dimensional separation. Beginning with GFC. Switching columns for Ion Exchange, and then again for Hydrophobic Interaction Chromatography. Getting you higher resolution and increased purity all the way. With rapid analysis of sample complexity, continuously progressive purification and successful isolation of your impor-

tant biomolecules. Completing separation strategies in hours instead of days. Solving particular problems with the most appropriate chromatography. Even reversed phase including microbore and fast LC. On just one system with unlimited potential. Giving you the most versatile chromatography in the world. Already being used by hundreds of biochemists. Getting them more results. Much faster. Much simpler. More reliably. One word says it all. GTi. You'll find it solving problems faster and better than any other separation system available. Get in touch with LKB. You're in for a winner.



LKB-Produkter AB, Box 305, S-161 26 Bromma, Sweden. Tel. +46(8)98 00 40, telex 10492
 Antwerp (03) 218 93 35 · Athens-Middle East +30 (1) 894 73 96 · Copenhagen (01) 29 50 44 · Hongkong (852) 5-555555
 London (01) 657 88 22 · Lucerne (041) 57 44 57 · Madras (044) 45 28 74 · Moscow (095) 255-6984 · Munich (089) 85 830
 Paris (01) 64.46.36.36 · Rome (06) 39 90 33 · Stockholm (08) 98 00 40 · Tokyo (03) 293-5141 · Turku (021) 678 111
 Vienna +43 (222) 92 16 07 · Washington (301) 963 3200 · Zoetermeer (079) 31 92 01
 Over 60 qualified representatives throughout the world.

Circle No. 50 on Readers' Service Card

chapters III and IV.8), they may tell us how energy and momentum are transferred and clarify the hydromagnetic state of the galactic core.

HANNES ALFVÉN
Department of Electrical Engineering
and Computer Sciences,
University of California,
San Diego, La Jolla 92093

REFERENCES

1. H. Alfvén, *Cosmic Plasma* (Reidel, Dordrecht, Netherlands, 1981).

Human Rights and Credibility

Readers may be led to take the letter of Thomas H. Stix (16 Aug. 1985, p. 600) as speaking for all of us who work for campaigns in defense of the human rights of scientists in other countries. It does not.

"Somehow, some way," writes Stix, "we must get the Soviet leadership to recognize that their continued violation of human rights provides a *moral* basis to the West for the arms race." Moral? Could there be a moral basis for preparing weapons "for a battle that, should it occur, will end human life" (Stix's words)?

Furthermore, Stix's promise that Soviet compliance with his human rights conditions will bring U.S. disarmament appears to be unauthorized. Reagan, Weinberger, and Shultz do not make this promise. When they seem to imply it, their sincerity is cast in doubt by their record. If the condition for U.S. disarmament were that Soviet democracy be superior to that in El Salvador and Guatemala, then this country would have disarmed long ago.

All of us working for human rights should understand that to join this struggle with the struggle against the arms race can only undermine both. Putting muscle into the appeal by invoking the American nuclear arsenal, which the Soviet government rightly regards as a grave threat to world survival, would only identify us with the menace and discredit us as independent voices.

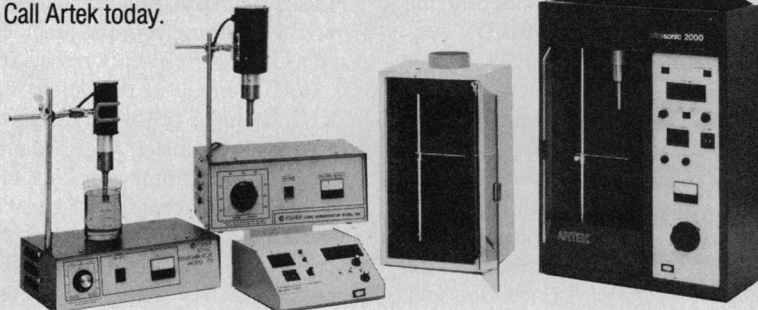
CHANDLER DAVIS
Department of Mathematics,
University of Toronto,
Toronto M5S 1A1,
Canada

Erratum: In the Table of Contents of the issue of 14 February (p. 653), the title of the report on page 731 by R. S. Ostrow *et al.* should have been "Detection of papillomavirus DNA in human semen."

BREAK IT UP WITH A WINNING COMBINATION

Artek Sonic Dismembrators and Accessories.

Break up, homogenize and prepare lab samples with remarkable ease and accuracy. While keeping your budget totally intact. Artek helps you do both with the most complete line of sonic dismembrators and accessories. Mix and match our modular components to build just the system you need. Our Ultrasonic 2000 Dismembrator system makes it easy for you. It includes our 300-watt Ultrasonic Dismembrator, 109A Temperature Controller and timer—all built into a sound-abating workstation. Each component can be purchased separately. Artek also offers a huge array of accessories. So add a winning combination to your lab team. Call Artek today.



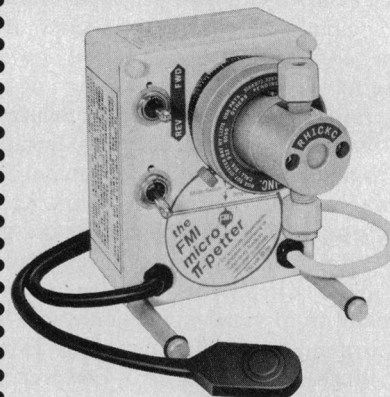
ARTEK[®]
SYSTEMS CORPORATION
SUBSIDIARY OF DYNATECH CORPORATION

170 Finn Ct., Farmingdale, N.Y. 11735 USA
Tel: 516-293-4420 Telex: 221219 ARTKUR
FAX: 516-293-4461

Circle No. 190 on Readers' Service Card

PIPETTING? SINGLE-SHOT MICROLITER DISPENSING?

*Try the all-new
FMI
micro Tt-petter!*



It provides a simple, low-cost means of dispensing very small amounts of fluids for applications such as pipetting, reagent preparation, syringing, precision sampling, repetitive and volumetric dispensing. The variable displacement, valveless RR piston design makes it possible to dispense volumes of 2 to 100 μ l per shot with incremental adjustment of less than 0.5 μ l. PiP units are also reversible for aspirating fluids or back flushing the system.

A simple, sealed pushbutton hand/foot pendant switch makes a momentary contact for one dispense per push when the mode switch is in the down (Singles) position, or it may be held down for purging or reagent rinsing when the mode switch is in the up (Repeat) position. Using a combination of forward and reverse modes makes dilutions especially easy. Wetted surfaces of ceramic and fluorocarbon provide for maximum chemical compatibility. A three-speed 110 VAC 60 Hz synchronous motor provides three shot velocities to meet your fluid and vessel requirements.

Two standard models are available at a price of \$450 each. F.O.B. FMI:

Model PiP0CKC—0 to 50 μ l;
Model PiP1CKC—0 to 100 μ l.

Available for same day shipment.

FMI FLUID METERING, INC.

P.O. Box 179
29 Orchard St., Oyster Bay, NY 11771
516-922-6050 • Telex 5101001281

See us at the Pittsburgh Conference: Booth #922, 924

Circle No. 119 on Readers' Service Card



5th World Congress on Medical Informatics October 26-30, 1986

❖ MEDINFO 86 will promote all aspects of medical and health care computing from all countries of the world. Participants will be health information scientists, medical computing specialists, public health and hospital administrators, physicians, nurses, dentists, allied health personnel, and consultants in the various health fields.

❖ MEDINFO 86 will be held at the Sheraton Washington Hotel in Washington, D.C. This is the largest hotel/exhibit hall complex in the U.S. capital, and is linked by subway or short taxi ride to more than 15 other hotels, which will provide accommodations at a wide range of prices and styles. Three airports, Dulles International, Baltimore-Washington International, and National, serve the Washington, D.C. area. The meeting site is central to international embassies, cultural and historic locations, and scientific facilities that will host social and technical excursions.

To obtain registration information and a Preliminary Program, write:

MEDINFO 86
Secretariat: George Washington University Medical Center
Office of Continuing Medical Education
2300 K St, NW, Washington, DC 20037 USA
(202) 676-8929

NAME _____

ORGANIZATION _____

ADDRESS _____

TELEPHONE _____

(Country Code/Area Code & Number)

Have you ever had an idea that could change the world, only to have someone else beat you to it? After months of painstaking research, there's nothing more frustrating than reinventing the wheel. Again.

DIALOG® is the online information system that can give you a flying head start on your competition. Dialog

goes right to the source, with 10 to 15 years of data on every subject, from aerospace to zoology. Even if you're in a specialized area of research, you never know when you'll need something from another field. With Dialog, it's all available instantly.

Anyone can learn to use Dialog, too. In fact, Dialog is so useful if it didn't

already exist, you'd just have to invent it.

To find out about Dialog now, call 800-3-DIALOG. Or write: Dialog, Dept. 21, 3460 Hillview Ave., Palo Alto, CA 94304.

DIALOG® Find out about it.

A subsidiary of Lockheed Corp.
®Dialog Information Services, Inc. 1985

Guess who didn't use Dialog.



See us at Pittsburgh Conference, Booth #12021, and FASEB Show Booth H-60

Circle No. 181 on Readers' Service Card

GENZYME'S FAMILY OF INTERLEUKIN-2 REAGENTS. TOGETHER WE COULD MAKE HISTORY.



As investigators at laboratories and medical centers around the world search for a cancer cure through the use of Interleukin-2, Genzyme has all the reagents needed to support your work.

Our complete line consists of Ultrapure Interleukin-2 (human), Recombinant Interleukin-2 (human), Recombinant Interleukin 2 (mouse), Monoclonal Anti-Interleukin-2, and Rabbit Anti-Interleukin-2.

For further information, or to order, call TOLL-FREE in the United States 1-800-332-1042, or write today. Together we could make history.



Genzyme Corporation
75 Kneeland Street
Boston, Massachusetts 02111
(617) 451-1923, TLX: (U.S. 25) 201223
FAX: (617) 451-2454

Australia: Laboratory Supply Pty., Ltd., P.O. Box 447, Marrickville,
N.S.W. 2204, TEL: (02) 519-6626 TLX: AA 20043

Austria: Zoltan Szabo, Kalbeckgasse 5
A-1180 Wien XVIII, TEL: 0222/47 74 91 TLX: 116667

Benelux: Sanbio bv, Heinsbergerstraat 50
P.O. Box 540, 5400 AM Uden, Holland, TEL: 04132-51115

Canada: Inter Medico, Suite 307, 150 Consumers Road,
Willowdale, Ontario M2J 1P9 TEL: (800) 268-3178, (416) 491-8926

France: Tebu S.A., 39 Rue de Houdan
78610 Le Perray-en-Yvelines, TEL: (3) 484 62 52 TLX: 698 622

Germany: I C Chemikalien GMBH, Sohnkestrasse 17, 8000
Munich 17, TEL: (089) 791-4647 TLX: 5 212 206

Italy: Omnia Res. s.r.l., Via A Martini, 17, 20092 Cinisello, Balsamo,
Milan, TEL: 61 27 621 TLX: 313686 Omresl

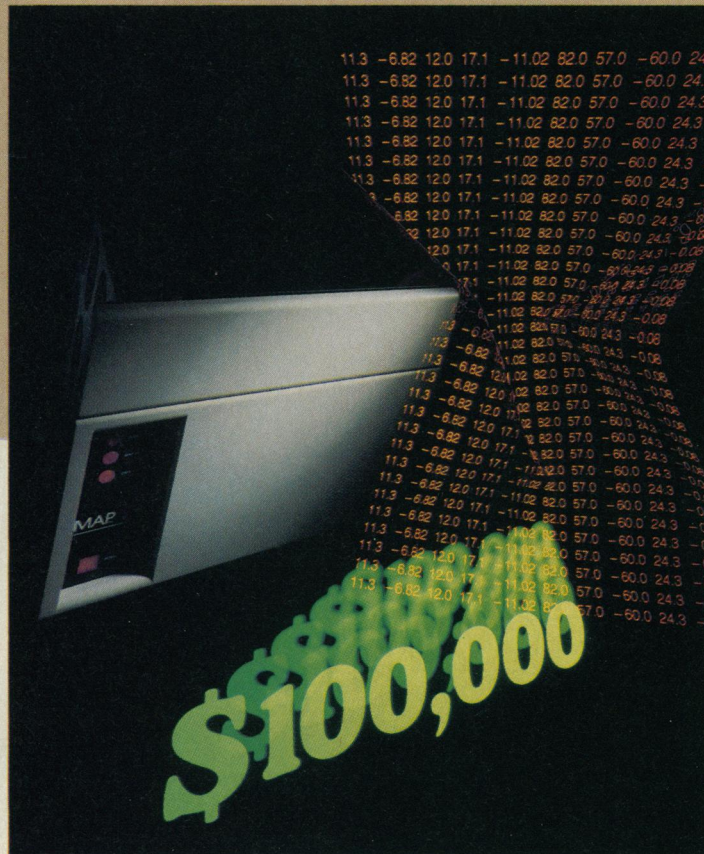
Japan: Maruzen Oil Biochemical Co. Ltd., 1-1, Chome, Shibaura
Minato-Ku, Tokyo 105, TEL: (03) 798-3882 TLX: 242-2511

Scandinavia: Novakemi AB, Getfotsvägen 38-40
Box 6021, S-12206 Enskede, Sweden
TEL: 08-390490 TLX: 19081

Switzerland: Lucerna-Chem AG, P.O. Box 126
CH-6000 Lucerne 14, TEL: 041-4493 44 TLX: 865 237

United Kingdom: Koch-Light Ltd.
Hollands Road, Haverhill, Suffolk CB9 8PU
TEL: (0440) 702436 TLX: (U.K. 851) 817756

A Supercomputer you can REALLY Afford.



Supercomputer number crunching power in a compact package—that's the new MAP-6420. First CSPI set the goal of making 64-bit double-precision computation truly accessible to scientific and engineering users in laboratory environments. Then we enhanced computation and condensed array processor size and cost to produce the MAP-6420. Small in size—up to 16 megabytes of memory will fit in a 21-inch rack-mountable chassis. Small in price—our 4 megabyte unit starts at a low \$100,000. And packed with computational muscle—MAP-6420 speeds up your VAX by a factor of 5 to 15, and at the same time, frees it for other tasks, so the overall response time for every VAX user is improved.

The MAP-6420 has the configurational range to handle

At \$100,000*, 64-bit Scientific Number Crunching is NOW Accessible.

your large scale applications. Its low component count yields high reliability and offers the benefits of low power, low cooling, and minimal space requirements.

For users who can program in FORTRAN, high performance is virtually assured. We planned MAP's hardware around its FORTRAN compiler so the programs the user writes will deliver the performance paid for. Parallel units process algo-

gorithms efficiently, even if they're not vector-oriented. In addition, we offer a Scientific Subroutine Library of 120 optimized math functions. Uniform, versatile performance delivered from FORTRAN—that's MAP-6420!

*USA price

VAX is a U.S. trademark of Digital Equipment Corporation

MAP-6420 is a U.S. trademark of CSPI

CSPI
THE ARRAY PROCESSORS

40 Linnell Circle, Billerica, Massachusetts 01821 • 617/272-6020 • TWX: 710-347-0176

Circle No. 123 on Readers' Service Card

NEW AND RECENT TITLES FROM CAMBRIDGE

The Cambridge Atlas of Astronomy

Jean Audouze and Guy Israel, General Editors

"... the best and most beautiful modern astronomy book for the general public that has been published in decades." — *Forbes*
"... a beautifully produced book of great pedagogic value... which is both arresting and informative." — *Nature*
1985 26369-7 Cloth \$90.00

The Cambridge Astronomy Guide

A Practical Introduction to Astronomy
William Liller and Ben Mayer

Anyone with an interest in astronomy or photography will delight in this engaging guide which offers the amateur an opportunity to make lasting contributions to the field of astronomy.
1985 25778-6 Cloth \$24.95

Supernovae

Paul Murdin and Lesley Murdin

From a review of the first edition, *The New Astronomy*, (1978):
"This book belongs on the shelf of all serious amateurs, weekend astronomers, and college librarians... close to achieving the ideal of a book with a perfect plan and style, one that is entertaining as well as enlightening."
— *Sky and Telescope*
1985 30038-X Cloth \$24.95

Astrophotography for the Amateur

Michael Covington
1985

25391-8 Cloth \$24.95

From Quark to Quasar

Peter H. Cadogan

A pictorial journey that spans forty-two orders of magnitude to provide unique insights into the scale of our universe.
1985 30135-1 Cloth \$24.95

Rationality and Intelligence

Jonathan Baron

1985 26717-X Cloth \$32.50

Astronomy with your Personal Computer

Peter Duffett-Smith

1985 26620-3 Cloth \$44.50
31976-5 Paper \$14.95

Seven Clues to the Origin of Life

A Scientific Detective Story

A.G. Cairns-Smith

1985 27522-9 Cloth \$17.95

Extraterrestrials

Science and Alien Intelligence

Edward Regis, Editor

Twelve original and reprinted articles present the latest scientific ideas on the possible existence and nature of the intelligent extraterrestrial life.
1985 26227-5 Cloth \$39.50

Spherical Astronomy

Robin Green

1985 23988-5 Cloth \$69.50
31779-7 Paper \$27.95

Recent Advances in Planetary Meteorology

Garry E. Hunt, Editor

1985 25886-3 Cloth \$39.50

Rotating Fields in General Relativity

J.N. Islam

1985 26082-5 Cloth \$34.50

Cepheids: Theory and Observations

Proceedings of the IAU Colloquium Number 82

Barry F. Madore, Editor

1985 30091-6 Cloth \$39.50

Darwin's Metaphor

Nature's Place in Victorian Culture

Robert M. Young

1985 30083-5 Cloth \$44.50
31742-8 Paper \$15.95

Einstein as Myth and Muse

A.J. Friedman and Carol Donley

1985 26720-X Cloth \$39.50

Groups: a Path to Geometry

R.P. Burn

1985 30037-1 Cloth \$49.50

Introduction to the Construction of Class Fields

Harvey Cohn

Cambridge Studies in Advanced Mathematics 6

1985 24762-4 Cloth \$44.50

Syzygies

E.G. Evans and P. Griffiths

London Mathematical Society Lecture Note Series 106
1985 31411-9 Paper \$15.95

Surveys in Combinatorics

I. Anderson, Editor

London Mathematical Society Lecture Note Series 103
1985 31524-7 Paper \$18.95

Plant Genetic Engineering

John H. Dodds, Editor

1985 25966-5 Cloth \$39.50

Biophysics and Biochemistry at Low Temperatures

Felix Franks

1985 26320-4 Cloth \$44.50

Evolution

Essays in Honour of John Maynard Smith

P.J. Greenwood, P.H. Harvey, and

Montgomery Slatkin

1985 25734-4 Cloth \$49.50

A Dictionary of Genetic Engineering

S.G. Oliver and J.M. Ward

1985 26080-9 Cloth \$19.95

At bookstores or from:

Cambridge University Press
32 East 57th Street, New York, NY 10022

When it comes to references, we wrote the software.



The Sci-Mate® software system. For the professional who relies on information.

Now there's an easy-to-use software system that gets the job done from initial research to correctly referenced manuscripts. Each of the three Sci-Mate® components can work for you separately—but use them together as the most complete, most powerful tool available for those who create and use journal literature.

Here's how Sci-Mate® works to save you time:

The 'Searcher' finds your references.

This is the easiest way ever to access journal literature. Your micro-

computer, a modem, and Sci-Mate are all you need to search hundreds of online databases. No need to know computer languages because the Searcher speaks English.

The 'Manager' files your references.

Forget about index cards. Enter your references or capture them from online searches. Everything you enter—references, lab notes, addresses—is permanently stored and easy to find.

The 'Editor' writes your references.

This newest component of the Sci-Mate® Software System functions like an expert copy editor. The Editor formats your references

to fit standard publication styles and renumbers references in your manuscript.

Alone or together, The Sci-Mate® components furnish the best references. For further information, write us or call toll free (U.S.A. only)

1-800-523-4092

Pennsylvania residents call 1-215-386-0100, EXT. 1418. We'll be glad to answer your questions.

29-4104 · ©1985 ISI

ISI®

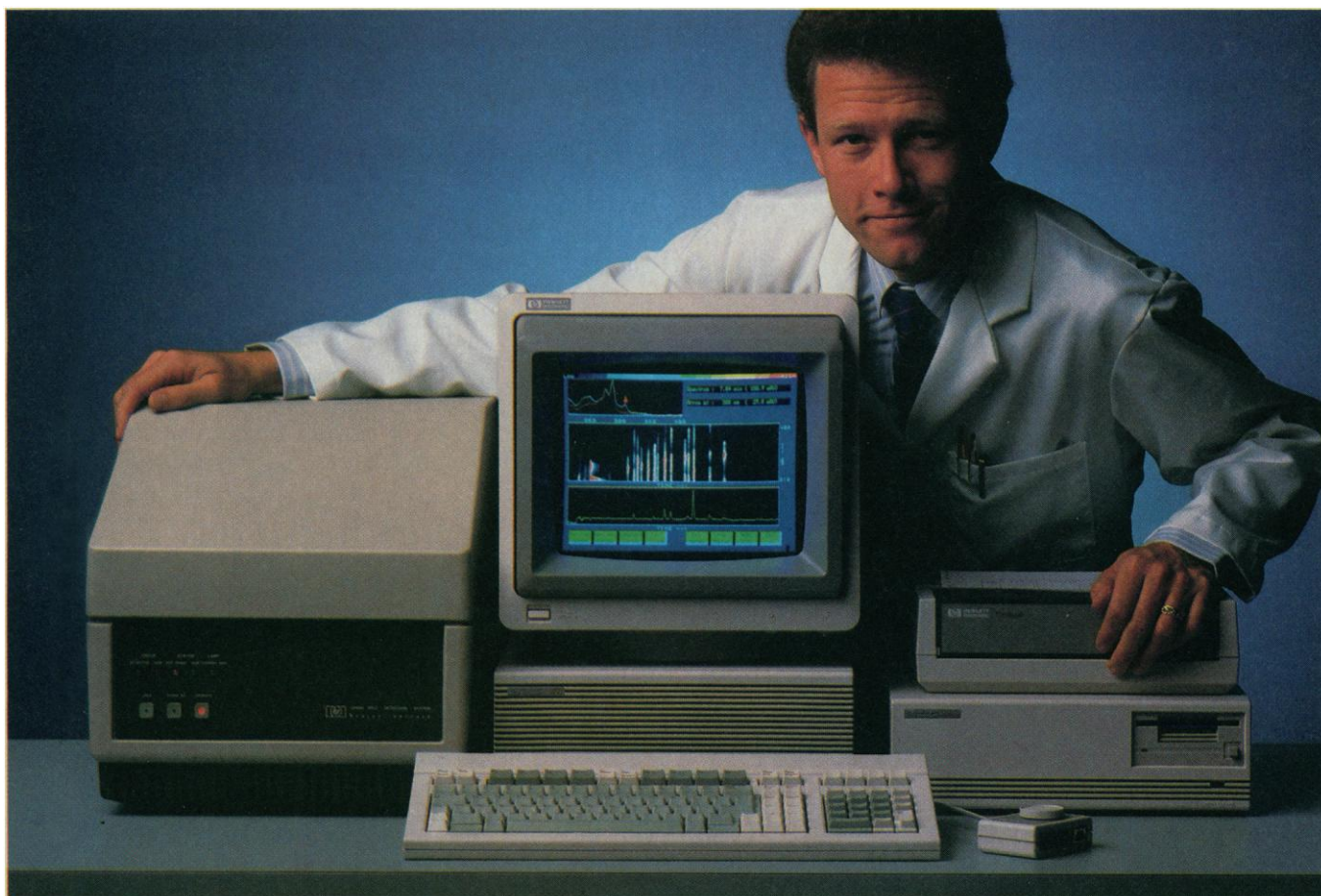
Institute for Scientific Information®

3501 Market Street
Philadelphia, PA 19104 U.S.A.

In the U.K.: 132 High Street
Uxbridge, Middlesex UB8 1DP
44-895-70016, Telex: 933693 UKISI

Circle No. 177 on Readers' Service Card

Resourceful.



The HPLC detection system for interactive problem-solving.

Maybe you're like Richard, who works in an analytical lab running samples for both R&D and manufacturing. Sometimes he has to be pretty resourceful.

Using equipment from a variety of manufacturers, Richard has configured each of his six HPLC systems for a special type of analysis.

For maximum confidence in his quantitative results, his HP 1040M diode-array detection

system is an important part of his lab. And he can move it from one HPLC to another—wherever it's needed most.

This new detection system provides the sensitivity and qualitative information Richard requires for both his R&D and quality control work. It gives him the resources he needs to check suspicious peaks for purity and identity. Fast color graphics make it easy.

Interactive software allows him to store spectral data and evaluate it in a variety of ways

without rerunning his samples—an invaluable feature, particularly when his time or sample is limited.

Whether your needs are similar to Richard's or very different, there's an HP system to match your requirements. Exactly.

For more information, call the HP office listed in your white pages and ask for an analytical product representative. Or write Hewlett-Packard Analytical Group, 1820 Embarcadero Road, Palo Alto, CA 94303.

*See us at the
Pittsburgh Conference.*



**HEWLETT
PACKARD**

For literature circle reader service number 142.
To have an HP representative contact you circle reader service number 143.

MSDS.

*Fisher Scientific
Believes In Your
Right To Know.*

800-647-5573*

*A Free Fisher
MSDS Is Only A
Phone Call Away.*

*In Pennsylvania call 800-443-4092.

Complying with OSHA's recent right-to-know requirements doesn't have to be a challenge. As a leading manufacturer of laboratory chemicals, Fisher has assembled the most complete and comprehensive database available anywhere.

We've gone the extra step by compiling information from OSHA, EPA and the National Library of Medicine, plus from many of the leading toxicology and hazardous chemical substances publications. The result is a total information package. Each MSDS profile is easy to read, the information is easy to find, and it's complete.

Call our toll-free MSDS Hot Line and we'll send you a MSDS profile on any one of our over 1,300 chemicals. Just tell us which chemical you're interested in and the package will be in the mail.

Compare our MSDS profile with any other manufacturer's sheet. You'll see for yourself that Fisher offers the most complete chemical information available anywhere.

Fisher Scientific 

Prize competition

announced by the

Anna Monika Foundation

for the investigation of the physical substrate and functional disturbances of endogenous depressions
by approval of the Minister of the Interior of Nordrhein-Westfalen, Düsseldorf, 9th of June, 1965.

The Foundation announces the following prizes:

First Prize	US-Dollar 15.000,-
Second Prize	US-Dollar 5.000,-
Third Prize	US-Dollar 2.500,-

preferably for studies of biochemical, histological, neurophysiological, neuropathological, psychopharmacological, psychiatric or psychosomatic nature. The studies should be carried out in close cooperation with a psychiatric clinic, an university or an equivalent scientific institution. As far as possible, the papers should give information about recent advances in knowledge that should be helpful in promoting treatment and would open up new paths of progress. The papers may be written in German, French or English and should be submitted to the Chairman of the Committee, *Professor Dr. P. Kielholz, Basle/Switzerland*. Besides hitherto unpublished studies, papers published in the past two years in a German or international professional journal may also be submitted. *Deadline for submission to the Committee is 30th of September, 1986.* To help the Committee to come to a speedy decision it is requested that a maximum of three publications in four copies as well as a summarizing report (approx. 600 words) of the studies submitted for the competition should be included. *Prizes will be awarded on 30th of June, 1987.* If, in the opinion of the Committee, no papers of sufficient merit are submitted, it reserves the right to make no award. Prizes and their amounts will be awarded according to the merits of the study in question. Subject to the Committee's decision, each prize can be divided between two papers.

The Committee of Judges:

Chairman: Professor Dr. med. P. Kielholz, Psychiatrische Universitätsklinik Basel, Wilhelm-Klein-Straße 27, CH-4056 Basle/Switzerland

Members:

Professor Dr. G. Baumgartner, Neurologische Universitäts- und Poliklinik, Zürich / Switzerland

Professor Dr. Max Burger, Biozentrum, Basle/Switzerland

Professor Dr. Otto Creutzfeldt, Max-Planck-Institut für Biophysikalische Chemie, Göttingen/Fed. Rep. of Germany.

Professor Dr. H. J. Dengler, Medizinische Universitätsklinik, Bonn-Venusberg / Fed. Rep. of Germany.

Professor Dr. Alfred M. Freedman, Department of Psychiatry, New York Medical College Valhalla, New York / U.S.A.

Professor Dr. K. Heinrich, Psychiatrische Universitätsklinik, Düsseldorf / Fed. Rep. of Germany.

Professor Dr. Albert Herz, Max-Planck-Institut für Psychiatrie, München / Fed. Rep. of Germany.

Professor Dr. H. Hippus, Psychiatrische Klinik und Poliklinik der Universität München / Fed. Rep. of Germany.

Professor Dr. Horst Jatzkewitz, Max-Planck-Institut für Psychiatrie, München / Fed. Rep. of Germany.

Professor Dr. D. Palm, Zentrum für Pharmakologie der Johann-Wolfgang-Goethe-Universität, Frankfurt/Main.

Professor Pierre Pichot, Chaire de Physiologie Médicale, Centre Psychiatrique Sainte-Anne, Paris / France.

Professor Dr. Dr. Wilhelm Stoffel, Institut für Physiologische Chemie der Universität Köln / Fed. Rep. of Germany.

Managing Director: Professor Dr. Benno Hess, Töllnerstraße 9-11, D-4600 Dortmund 1 / Fed. Rep. of Germany.

Straightforward.



The HPLC system that's easy to use.

Like you perhaps, Sam looks for the most straightforward way to get results from his lab. He's finally found an HPLC system that anyone on his staff can use — without training. The HP 1090 Series L.

Everything is controlled from a single keyboard. And each of his systems is set up to run a variety of methods on 100 samples per shift, completely unattended. With full documentation of the results.

What's more, Sam's HP system provides a level of chromato-

graphic performance you wouldn't expect from a system this easy to use. Or this economical.

Sam's particularly pleased with the performance of the new built-in diode-array detector, which gives him both the sensitivity and peak purity information he needs for his applications.

For data handling, he selected the new HP 3393A computing integrator. Its multilevel calibration and BASIC programming eliminate time-consuming manual calculations and improve his quantitative accuracy.

Whether your needs are as straightforward as Sam's or more complex, there's a Hewlett-Packard HPLC system to match your requirements. Exactly.

For more information, call the HP office listed in your white pages and ask for an analytical product representative. Or write Hewlett-Packard Analytical Group, 1820 Embarcadero Road, Palo Alto, CA 94303.

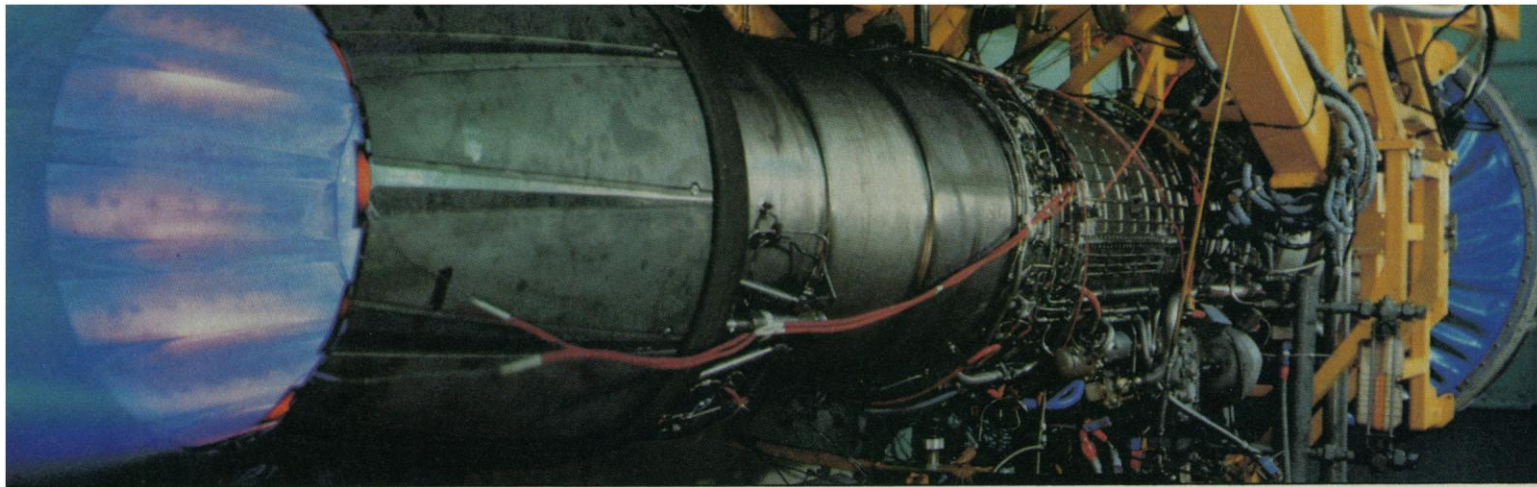
*See us at the
Pittsburgh Conference.*



**HEWLETT
PACKARD**

AG04513

For literature circle reader service number 140.
To have an HP representative contact you circle reader service number 141.



MASSCOMP's new Micro Supercomputers. You never know where they'll turn up.

Now you can take affordable supercomputing power to any high speed data acquisition site.

From jet engine test cells to remote oil explorations, you can count on the MC5000 family of micro supercomputers for faster, more accurate data acquisition at a lower cost. And as your productivity skyrockets, you spend less time waiting for critical data from mainframes, FM tapes and test instrumentation.

Our unique one megahertz sampling rate and high precision real-time interfaces deliver the performance required for laser optics, acoustic research, shock and vibration monitoring, and many other high speed transient applications.

PRICE:
\$15,000—\$250,000

PERFORMANCE:
.7 to 10 MIPS
625K to over 12,000K Whetstones/second
Up to 13 Mflops
1,000,000 samples/second — data acquisition
1-4 CPU multiprocessing

RELIABILITY:
Less than 1 hardware failure per year average

UNIQUE FEATURES:
Realtime UNIX™ operating system
68020 multiprocessing
Triple Bus™ architecture
Multiple graphics, networking options

They're in a class by themselves.



Thanks to MASSCOMP's real-time version of the UNIX™ operating system (RTU™) and concurrent 32-bit multiprocessing technology, these new machines perform parallel data acquisition, computation, graphics, and networking. All without one task degrading the other.

Choose from five systems you can tailor to your evolving needs. With hardware options like real-time interfaces, floating point and array processors, and high resolution graphics displays.

If your application requires high speed data acquisition, compare our price/performance to the competition's. Your next acquisition will be a MASSCOMP micro supercomputer.

For more information call us or send this coupon.

SCI 2-28

NAME and TITLE _____

COMPANY _____ PHONE _____

ADDRESS _____

CITY _____ STATE _____ ZIP _____

APPLICATION _____

MASSCOMP

The Micro Supercomputer Company

800-451-1824

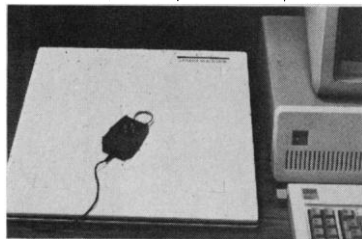
617-692-6200

One Technology Park, Westford, MA 01886

MASSCOMP, RTU, and Triple Bus are trademarks of the Massachusetts Computer Corporation. UNIX is a trademark of AT&T Bell Laboratories.

Circle No. 150 on Readers' Service Card

AUTOMATE ^{NEW} MEASUREMENT ON YOUR IBM PC



**New digitizing tablet with
Sigma-Scan™ measurement
software. \$1195**

Cat #3011 — 12" x 12" system

Resolution of .025 mm, accuracy of at least .25 mm. Comes with state-of-the-art software for area, linear, perimeter, length of curvy line, and angular measurements. X, Y point or stream digitizing. Descriptive statistics. Transfer data to other programs in standard ASCII or DIF format.

This and other new Microcomputer Tools for the Scientist. Call or write today for FREE catalog.

JANDEL SCIENTIFIC

2656 Bridgeway, Sausalito, CA 94965
800-874-1888

(In Calif. call 415-331-3022)

Circle No. 91 on Readers' Service Card

THE IMAGE OF PERFECTION

Artek's New 982B Image Analyzer. It's the perfect addition for your lab. Using a unique combination of hardware and software, the Artek 982B provides highly accurate, reproducible total counts as well as aperture or object area in less than one second. Change simultaneously from edge to density detection. Select circular, square and rectangular apertures. Set size detection thresholds (down to increments of .025mm in the macro mode). And/or switch from positive to negative images. All without interrupting statistical software routines. The Artek 982B is ideal for all kinds of micro and macro applications, from analyzing petri dishes to counting 96 cell well plates. It's also available with an X,Y stage mover. For more information, write or call Artek today.

ARTEK®
SYSTEMS CORPORATION
SUBSIDIARY OF DYNATECH CORPORATION
170 Finn Ct., Farmingdale, N.Y. 11735 USA
Tel: 516-293-4420 Telex: 221219 ARTKUR
FAX: 516-293-4461



Circle No. 189 on Readers' Service Card

SCIENCE

Posters

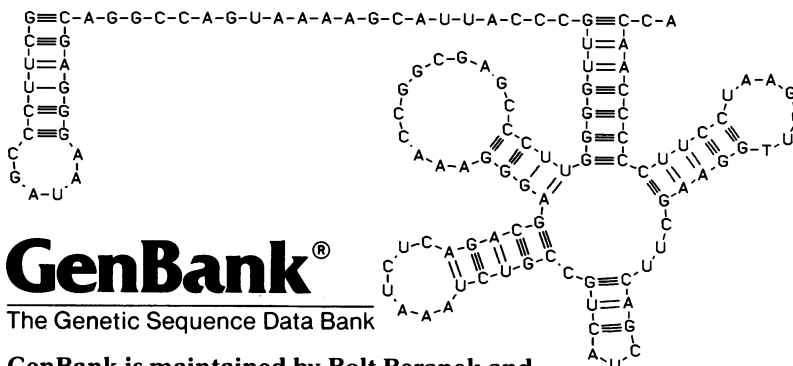
The following posters of *Science* covers are available:

- 30 March 1979, Tropical flowering tree;
- 23 February 1983, Landsat photo of Detroit, Michigan;
- 29 July 1983, Cheetah;
- 2 December 1983, Snowshoe hare;
- 23 December 1983, Cathedral window/DNA molecule.

Combination of space covers in scroll format: 1 June 1979, 23 November 1979, 10 April 1981.

Price is \$5 each (**prepaid**).

Write to AAAS, Department POST,
1333 H Street, NW, Washington,
D.C. 20005.



GenBank®

The Genetic Sequence Data Bank

GenBank is maintained by Bolt Beranek and Newman Inc. and the Los Alamos National Laboratory, under NIH (NIGMS) contract.

Available on Floppy Diskettes

- IBM PC-compatible
- Contains all published nucleic acid sequences
- Annotated for sites of biological interest
- Nominal fee

*Tape, on-line & printed
versions also available*

GenBank® Software Clearinghouse

- Over 50 sequence analysis software packages listed
- All computer types plus timesharing

To order, call or write:

GenBank
BBN Laboratories Incorporated
10 Moulton Street
Cambridge, MA 02238
(617) 497-2742

© Registered U.S. Patent Office

Circle No. 182 on Readers' Service Card

Announcing a new book from AAAS

AIDS

**Papers from *Science*,
1982–1985**

Edited by
Ruth Kulstad, *Science*



Some of the most frequently cited papers on acquired immune deficiency syndrome (AIDS) that appeared in *Science* between August 1982 and September 1985 are included in this volume. Arranged chronologically, these 108 research papers and *Science* news reports show how far AIDS research has come and provide an indication of the directions in which it might go.

This fully indexed collection is useful not only for the experimental data and conclusions, but also as an excellent source of references to AIDS work in other major journals worldwide. An overview of research in AIDS to date is provided in the introduction by Dr. Myron Essex, chairman of the Department of Cancer Biology, Harvard University School of Public Health.

ca. 640pp.; fully indexed and illustrated
Hardcover \$32.95, AAAS member price \$26.35
Softcover \$19.95, AAAS member price \$15.95

Order from AAAS Marketing, Dept. A, 1333 H St., NW, Washington, DC 20005. Add \$1.50 postage and handling per order. Allow 4–6 weeks for delivery.

American Association for the Advancement of Science

SONNY KLEINFELD:

A MACHINE CALLED INDOMITABLE

The fascinating story of the development of MR. The events leading up to the headline making jury verdict that upheld the pioneer inventor of MR and his patent against industry giants*.

A Machine Called Indomitable is the remarkable, inspirational story of a visionary scientist who, against incalculable odds in a lonely pursuit lasting more than twelve years, doggedly, successfully, fulfilled his dream. In the end, Dr. Raymond Damadian had constructed a machine—*Indomitable* was the name of the prototype, nuclear magnetic resonance (NMR) the process employed—that today is accelerating our ability to detect cancer and other diseases in the human body, saving untold lives and hardship due to early discovery.

Dr. Damadian's machine was to become front-page news in *The New York Times*. *Newsweek* would call the process "the most exciting breakthrough in the vanguard of medicine today."

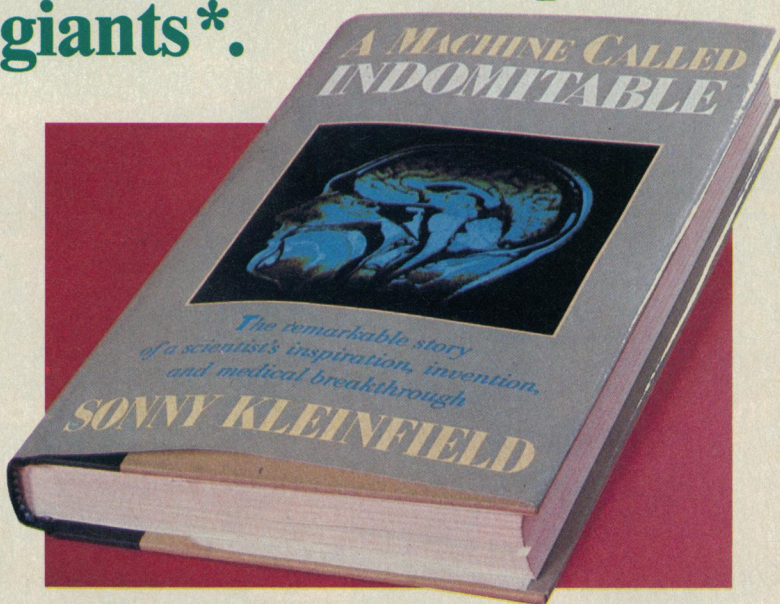
A Machine Called Indomitable is a gripping, uplifting story of an incredible achievement; of dedication, hard work and courage—of invention in the finest American tradition.

"The backbiting, the infighting, the nastiness, the greed, the need for money, and the genius *A Machine Called Indomitable* has it all. It's the way science really works."

Frank Field—Senior science editor, CBS-TV

Sonny Kleinfeld is a reporter for *The New York Times* and the author of several books, including *The Traders* and *The Biggest Company on Earth: A Profile of AT&T*.

*The first infringer taken to court, Technicare a subsidiary of Johnson & Johnson, was found guilty of infringement by the Boston Federal District Court. The judge in the case held FONAR'S patent to be valid. He reversed the jury's verdict on infringement. The U.S. Court of Appeals has been asked by FONAR Corporation to restore the jury's verdict on infringement. According to *Businessweek* of 16 December 1985 "FONAR Could Be Awarded Punitive Damages, And Its Competitors Will Be Forced To License The Technology". There are 15 active companies which include General Electric, Siemens, Philips, Picker International, Toshiba, etc.



Available at bookstores everywhere, or mail this coupon to:

Times BOOKS

Mail Service, Dept. RM1
201 East 50th Street, New York, N.Y. 10022

Please send me _____ copy(ies) of
A MACHINE CALLED INDOMITABLE: The Remarkable Story of a Scientist's Inspiration, Invention, and Medical Breakthrough (1234-9) @ \$16.95 each.
(Publisher pays all postage and handling charges.) If I am not satisfied I may return it postpaid within 10 days for a full refund.

☐ Enclosed is my check or money order payable to Times Books.

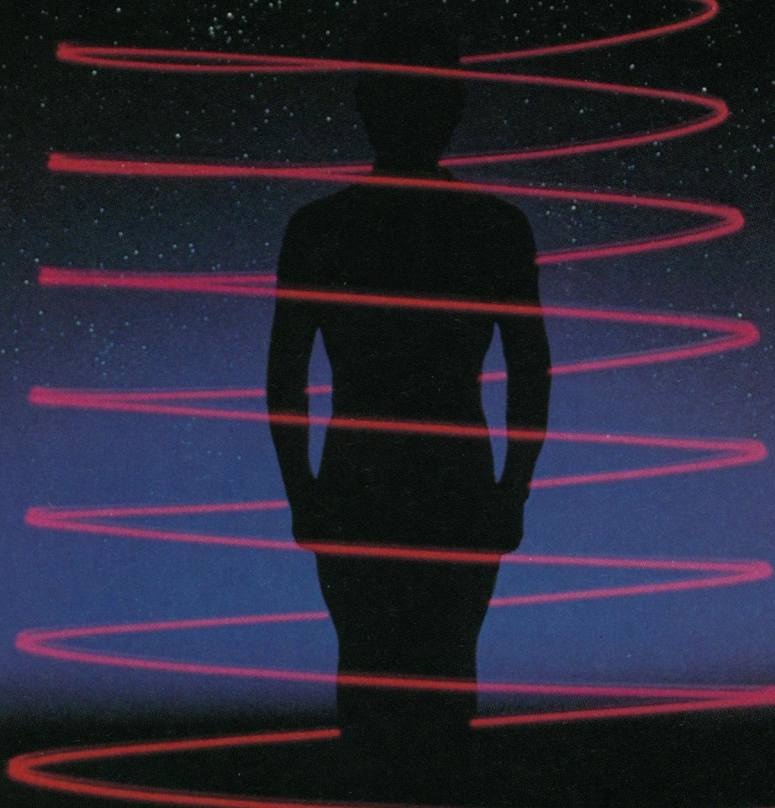
NAME _____
(PLEASE PRINT)
ADDRESS _____
CITY _____ STATE _____ ZIP _____
CR. CARD # _____
EXP. DATE _____ MONTH/YEAR _____
SIGNATURE _____

☐ Charge my account with
☐ American Express
☐ Visa
☐ MasterCard

PHONE ORDERS:
1-800-638-6460

The search for better visual research systems knows no end

...only new beginnings.



Introducing a complete line of medical video imaging systems from Ikegami—the world leader in sophisticated camera systems.



HIGH-RESOLUTION
COLOR CAMERA
SYSTEMS



COMPACT AND
ULTRA-COMPACT
COLOR CAMERA
SYSTEMS



ULTRA-HIGH AND
HIGH-RESOLUTION
BLACK-AND-WHITE
SYSTEMS



A COMPLETE LINE OF
HIGHEST-PERFORMANCE
COLOR AND BLACK-AND-
WHITE MONITORS



AUTOMATED ADAPTERS
AND ATTACHMENTS
TO FIT YOUR
IMAGING NEEDS

If you've never heard the name Ikegami, you're in for a pleasant surprise. Introducing, Ikegami's full line of medical video imaging systems, designed to meet the growing imaging needs of surgeons, researchers and educators. Fully integrated, highest quality video imaging systems for microsurgery, general surgery, research microscopy and teaching, are here at last.

Suddenly...dramatically...every subtle detail of a procedure, or any image visible through a microscope, springs to life on monitor screens, to be recorded as necessary on videotape or hard-copy. Your findings and techniques can be visually shared and documented

with the highest performance quality available.

Only Ikegami, the recognized world leader in the professional broadcast industry, offers you a complete family of products and systems for all your medical video needs. Plus, all Ikegami medical video systems combine technical superiority with ease-of-operation, total flexibility, maintenance-free engineering and a complete line of automatic adapters and attachments to allow your system to grow with each and every specific requirement.

See our complete video imaging line for yourself. It has the answers for all your new beginnings.

Ikegami®

For more information, call Ikegami Electronics (USA), at (201) 368-9171, or write:
Ikegami Electronics (USA) Inc., Medical Products Division, 37 Brook Avenue, Maywood, NJ 07607 Phone: (201) 368-9171

Circle No. 103 on Readers' Service Card

SCIENCE

News Department Reprint Series

European Missile Deployment

No defense decision has so strained the Western alliance and awakened the average citizen to the risks of nuclear destruction as the decision made by NATO in 1979 to install new nuclear missiles in Western Europe. Although the initial phase of the deployment has been successfully carried out, it has left in its wake an unforeseen series of painful and potentially lasting military and political consequences.

In a compelling 4-part series in *Science*, R. Jeffrey Smith describes the genesis of the deployment decision, the course of arms negotiations that followed, and the choices that lie ahead for NATO—choices that may influence the direction of future U.S. military expenditures as well as the potential risk of a superpower conflict. This reprint collection is available now.

Single copies \$5.00; twenty or more \$2.50 each. Orders must be prepaid.

Write to AAAS, Dept. EMD, 1333 H Street, NW, Washington, D.C. 20005.

NEW AAAS PUBLICATION

Scientists and Human Rights Present and Future Directions

Proceedings from a 1984 AAAS Annual Meeting Workshop

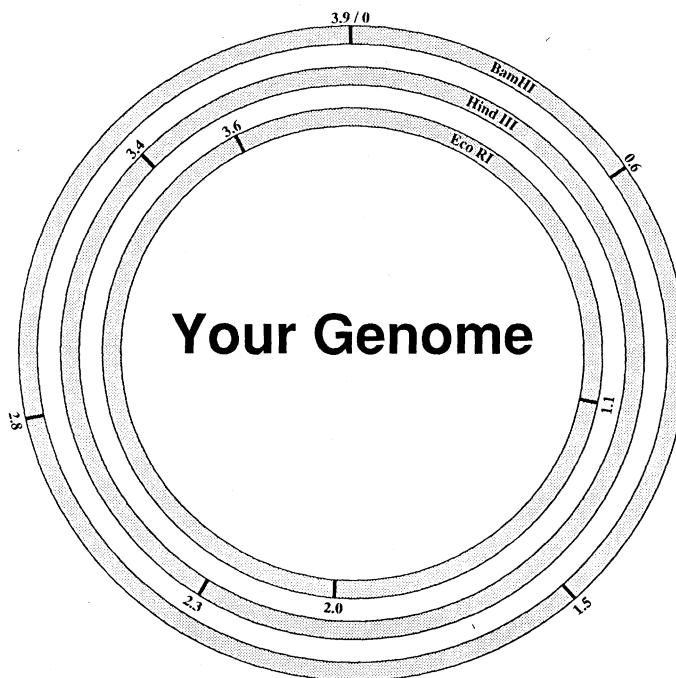
The second workshop report of the AAAS Clearinghouse on Science and Human Rights, a project of the AAAS Committee on Scientific Freedom and Responsibility, examines the activities of scientific societies in the human rights field. Workshop speakers also review mechanisms available within international inter-governmental organizations to address human rights violations of scientific and medical professionals.

Prepared by Kathie McCleskey, Senior Program Associate, AAAS Clearinghouse on Science and Human Rights.

\$3.00, paperbound, 70 pp.

Order from AAAS Sales Department, 1333 H St., NW, Washington, DC 20005. Please add \$1.50 postage and handling per order. Make checks payable to AAAS.

LOST?



Available on the Apple LaserWriter

YOU NEED R-MAP.

R-map derives restriction maps of DNA molecules directly from enzyme digestion data.

*F*ragment data may be derived from the digitizer or typed in from the keyboard.

*T*he new DNASTAR algorithm quickly and automatically finds all solutions consistent with user specified fragment error limits.

*M*aps are presented in order of accuracy of fit to the data (least squares method).

*C*ircular or linear maps can be solved.

*A*ny number of enzymes and any number of cutsites can be used (depending on memory).

*A*vailable for IBM personal computers PC, XT or AT.

ANALYZE YOUR DATA TODAY WITH PROGRAMS DESIGNED FOR TOMORROW BY DNASTAR.

DNASTAR

DNASTAR, Inc. EUROPE
8 Walpole Gardens
Chiswick
London, W4 4HG UK
(UK)-1-994-0619

DNASTAR, Inc.
1801 University Ave.
Madison, WI 53705
(608) 251-9685

U.S. Department of Energy OFFICE OF FUSION ENERGY

MAGNETIC FUSION COLLABORATIVE RESEARCH OPPORTUNITIES

- On fusion energy R&D projects
- At fusion energy centers and DOE laboratories
- For appropriate science and engineering disciplines
- Stipend based on background
- Travel or moving reimbursement

POSTDOCTORAL RESEARCH PROGRAM

- Up to 2 years of support for recent Ph.D.s

PROFESSIONAL DEVELOPMENT PROGRAM

- One month to one year of support for university faculty members and DOE/OFE— supported contractor employees

INFORMATION AND APPLICATIONS

- Please request materials by program name



Fusion Postdoctoral Research Program or
Fusion Professional Development Program
University Programs Division
Oak Ridge Associated Universities
P.O. Box 117
Oak Ridge, Tennessee 37831-0117
(615) 576-3190

DEADLINE March 15, 1986

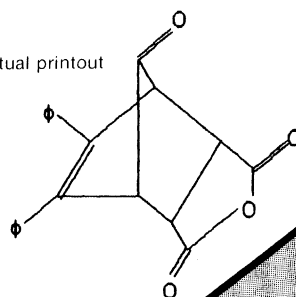
TechWriter®

SCIENTIFIC WORD PROCESSING

- Complete, easy-to-use word processor with optional 120,000 word spelling checker*.
- Displays and prints Greek alphabet, sub- and superscripts, oversize math and technical symbols, boldface, underlining.
- Screen vs. printout accuracy.
- Easily create and save equations and chemical* structures. Embed in text or stand alone. Recall with two-key ease.

$$\sum_{n=1}^{\infty} \int_0^1 \frac{\lambda(x)}{\eta(x)} dx = \left[\sqrt{\omega_1^2 + \tilde{\alpha}^2} \right]^m$$

Actual printout



Dot matrix, letter quality, and laser* printers.
For IBM PC, XT, AT and compatibles; Apple IIe, II+, DEC Rainbow, Northstar Advantage.

*MS-DOS only

CMI
Software

1395 Main St.
Waltham, MA 02154
(617) 899-7244

For more information,
call toll free:
(950-1088) 899-3848



Order by March 1
Get 120,000 Word Spell
Checker FREE!!
\$100 Value

Circle No. 188 on Readers' Service Card

Martz —

**B
I
B
L
I
O
G
R
A
P
H
I
C
F
I
L
E**™

The
Professional's
Bibliographic
System


Rated "Best Bet" by
Dr. James H. Beach,
*Science Software
Quarterly*, 1:47-69
1984.

- ★ Searches your reference database
 - on up to 60 personal key words/reference
 - on author, title, year, and journal fields
- ★ Formats your bibliography for any journal
- ★ Renumbers citations within your manuscript and forms corresponding bibliography
- ★ Use your word-processing system (compatible with Wordstar™, Perfect Writer™)*
- ★ Available for IBM-PC, MS-DOS, or CP/M-80
- ★ Only \$250 (PO, MC, or Visa)

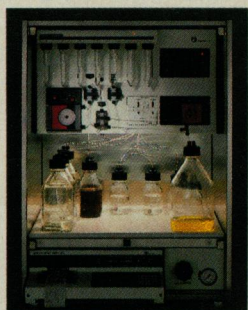
For detailed brochure call
413-256-0751 or write
Martz Software Inc.,
48 Hunters Hill Circle,
Amherst, MA 01002

*Wordstar™ Micropro, Perfect Writer™
Perfect Software

Circle No. 174 on Readers' Service Card



At last! An easy to use gene machine at an affordable price.



Now any laboratory working with oligonucleotides can perform automated DNA synthesis simply, reliably and affordably — whatever the volume demand — with the new Pharmacia Gene Assembler™. This high-quality system combines state-of-the-art technology and chemistry with simplicity of design and operation.

Integral

The Gene Assembler is a complete system. The compact, bench-top unit contains everything you need to synthesize active DNA: hardware, software, Pharmacia's own reagents, and a comprehensive handbook. It even includes automatic colorimetric monitoring and a built-in printer/plotter that gives you a permanent record of each synthesis in both peaks and print.

Simple

The Gene Assembler was designed for maximum ease of operation. You just insert a ready-to-use cassette of unique, new MonoBeads™ into one of the two column reactors, type in the desired sequence, and let the machine do the rest. It's not only self-contained, it's very nearly self-sufficient!

Flexible

You don't need any peripheral hardware (an expensive "option" with some competitors).

Pharmacia products will be on display at the Pittsburgh Conference—Booths 4005, 4007, 4009

Circle No. 192 on Readers' Service Card

The Gene Assembler is preprogrammed for everything from standard syntheses to sophisticated mixed bases. And it's versatile enough to allow user-determined reprogramming — e.g. for modified nucleotides. It can also easily interface with a variety of other microcomputers for even greater capacity.

Reliable

As with all Pharmacia equipment, the Gene Assembler consists of high-quality components, each designed to give you years of dependable service. Of course, it's also backed by Pharmacia's established, worldwide service network and warranty.

Affordable

Pharmacia's expertise in biotechnology enabled us to optimize components to form a dedicated system. Therefore, designing and manufacturing the Gene Assembler cost substantially less than competitive machines. That saving is passed along to you. All in all, this high-quality, high-performance system is the most cost-effective and efficient DNA synthesizer you can buy.

Available

To find out more, ask your Pharmacia representative to send you the comprehensive, illustrated brochure. Do it today.

Pharmacia Headquarters: Pharmacia AB, S-751 82 Uppsala, Sweden. Tel: (018) 16 30 00.

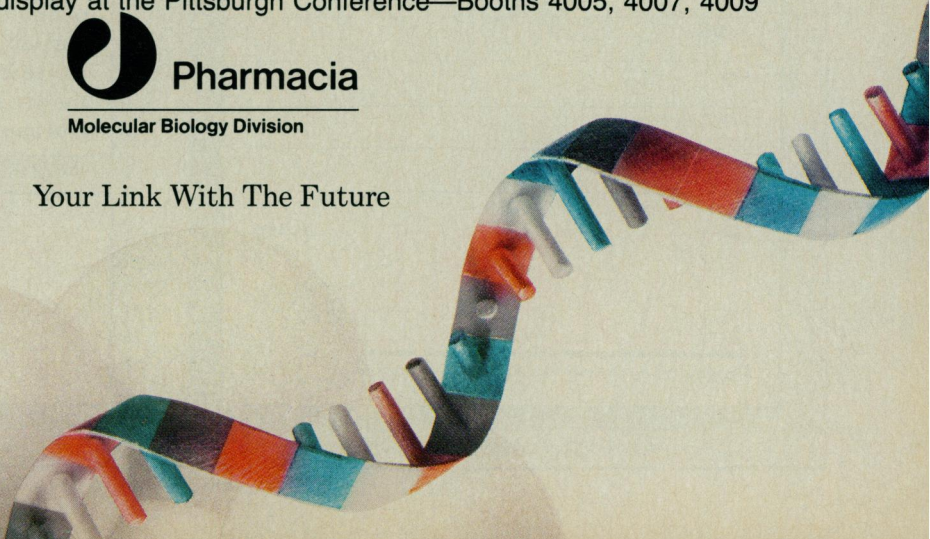
In North America: Pharmacia Inc., 800 Centennial Avenue, Piscataway, NJ 08854, USA. Tel: (201) 457-8121.



Pharmacia

Molecular Biology Division

Your Link With The Future



In Mathematical and Statistical FORTRAN Programming **IMSL** Gets You to the Solution **Faster**

There is a faster way to get from problem to solution. A way to reduce development time, simplify maintenance, improve accuracy. A way to measurably increase productivity by selecting from hundreds of complete, fully tested mathematical and statistical FORTRAN subprograms:

IMSL subroutine libraries

Comprehensive, economical, and supported by the world's leading supplier of FORTRAN libraries for mathematics and statistics.

Calling a routine from an IMSL library is faster than writing it. It's a simple fact, but it can mean a big improvement in the productivity of both people and computers. It's why professional problem solvers in more than 60 countries have chosen IMSL libraries as their standard resource for FORTRAN programming. **IMSL libraries get you to the solution faster.**

Return this coupon to:

IMSL Sales Division
2500 ParkWest Tower One
2500 CityWest Boulevard
Houston, Texas 77042-3020, USA.

Telephone: (713) 782-6060

Telex: 791923 IMSL INC HOU

**In the U.S. (outside Texas) call toll-free
1-800-222-IMSL.**

- ☐ The IMSL Library ☐ MATH/PC-LIBRARY
☐ SFUN/LIBRARY ☐ STAT/PC-LIBRARY

Name _____

Department _____

Title _____

Organization _____

Address _____

City _____

State _____

Postal Code _____

Area Code/Phone _____

Telex _____

Computer Type _____

SC18602

IMSL®

Problem-Solving Software Systems

Broad Scope.

IMSL libraries provide the most comprehensive selection of mathematical and statistical FORTRAN subprograms available. In almost any numerical programming application, IMSL libraries will meet your current and future needs with over 700 high-quality subprograms.

Standard User Interface.

Uniform calling conventions and documentation for all supported computer environments make IMSL libraries easy to learn and easy to use. Programs developed using IMSL libraries are much simpler to de-bug and maintain than programs containing undocumented, non-standard or unverified code.

Wide Compatibility.

IMSL libraries are affordably priced and compatible with most computing environments, from supercomputers to personal computers. Making IMSL libraries available on all of your computer systems can expand development flexibility and enhance application portability in your multiple-computer environment.

Comprehensive Support.

IMSL product support includes expert consultation, regular software enhancement, and maintenance. These services are performed entirely by IMSL personnel to ensure quality and consistency. IMSL's systematic, comprehensive support is the best way to protect the value of your software investment.

Accuracy and Reliability.

IMSL subroutines are designed, and exhaustively tested, for accuracy and reliability—and continually verified through thousands of hours of computation by customers around the world. Using IMSL libraries not only increases productivity, but can also enhance the accuracy and robustness of your programs and applications.

The IMSL Library

MATH/PC-LIBRARY

STAT/PC-LIBRARY

SFUN/LIBRARY

Over 500 mathematical and statistical subroutines
Subroutines for mathematical applications (for IBM personal computers)
Subroutines for statistical analysis (for IBM personal computers)
Subprograms for evaluating special functions

HELLMA®

There are no better CELLS.

Ask for our literature on Cells, Filters, and Optics. Also UV and Laser Light Sources.

For 20 years...
HELLMA
 tomorrow's designs today.
 Hellma Cells Inc.
 Box 544, Borough Hall Station
 Jamaica, New York 11424
 Telephone (718) 544-9534



Come see us at The Pittsburgh Conference. Booth #2050-2052.

Circle No. 107 on Readers' Service Card

BURN YOUR REFERENCE CARDS!

REF-11™

Computerizes your REFERENCES
 and prepares your BIBLIOGRAPHIES

- ☐ Maintains a data base of references
- ☐ Searches for any combination of authors, years of publication, reference title (or any words in the title), and topics covered by the reference
- ☐ Formats bibliographies exactly as you want them
- ☐ Alphabetizes references
- ☐ Abbreviates journal titles
- ☐ Runs on any video terminal and printer
- ☐ Menu driven dialogue
- ☐ Compact storage format
- ☐ 20 lines of comments for each reference

IBM PC/XT/AT, MS-DOS, CP/M 80 ... **\$195⁰⁰**

RT-11, TSX-Plus, RSX-11, P/OS **\$250⁰⁰**

VAX/VMS (native mode) **\$350⁰⁰**



ANY MANUAL **\$15⁰⁰**

ANY MANUAL & DEMO **\$20⁰⁰**

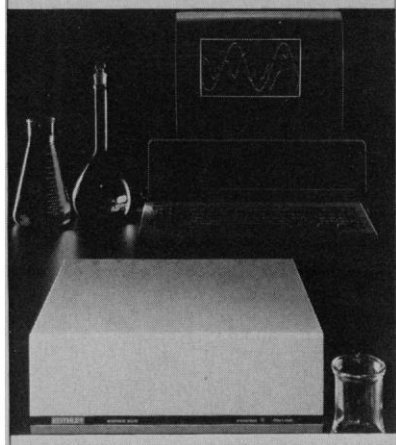
322 Prospect Ave., Hartford, CT 06106
 (203) 247-8500

Connecticut residents add 7 1/2% sales tax.

Circle No. 172 on Readers' Service Card

THE KEITHLEY SERIES 500
 SCIENTIFIC WORKSTATION

KEITHLEY



SYSTEM
501
 DATA
 ACQUISITION
 AND
 CONTROL

- 12-bit PC-based system
- Large library of input/output modules
- Soft500 software included

\$2245

Call or write for **FREE** brochure

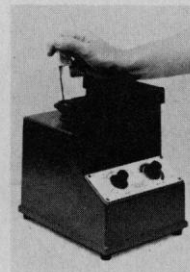
KEITHLEY

Keithley Data Acquisition
 and Control, Inc.
 28775 Aurora Road
 Cleveland, Ohio 44139
 (216) 248-0400 Telex: 98-5469

Circle No. 114 on Readers' Service Card

Mix The Unmixable With
The WIZARD

a super powerful vortex
 mixer that develops 7
 times more centripetal
 acceleration than other
 leading products.



For information contact:

REES
 SCIENTIFIC

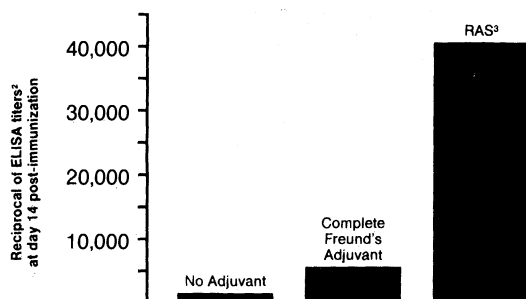
8 MOUNT HOPE STREET, LAMBERTVILLE, NJ 08530 (609) 397-3474

Circle No. 179 on Readers' Service Card

Boost Antibody Titers

with the
**Ribi Adjuvant System
(RAS)**

ELISA Activity of Serum from BALB/c Mice Immunized
with 25ug Bovine Galactosyltransferase¹
Alone or with Adjuvants



¹ Mice were injected with 25 ug of bovine galactosyltransferase.

² ELISA titers were determined with a solid-phase plate assay according to standard methods.

³ Monophosphoryl Lipid A (MPL) + Trehalose Dimycolate (TDM)

J.T. Ulrich, unpublished data

NEW! READY TO USE!

SIMPLY ADD YOUR ANTIGEN AND MIX

Preparation of RAS has been simplified. Ribi adjuvants are now available as lyophilized emulsions. To reconstitute, add your antigen in saline or PBS, warm the vial, and emulsify with a syringe or by vortexing.



P.O. Box 1409
Hamilton, Montana 59840 USA

CALL TOLL FREE 1-800-548-RIBI
In Montana, Hawaii and Alaska call (406) 363-6214

©Copyright 1985, Ribi ImmunoChem Research, Inc.

Circle No. 185 on Readers' Service Card

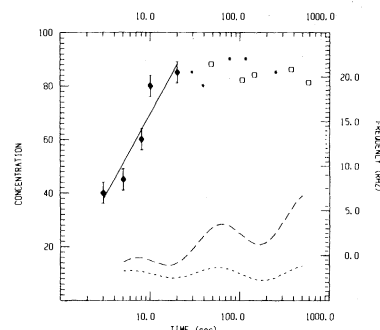
SCIENTIFIC/ENGINEERING GRAPHICS TOOLS for the IBM PC

FORTRAN/Pascal tools: **GRAFMATIC** (screen graphics) and **PLOTMATIC** (pen plotter driver)

These packages provide 2D and 3D plotting capabilities for programmers writing in a variety of FORTRAN/Pascal environments. We support MS, R-M and IBM FORTRAN and more. PLOTMATIC supports HP or Houston Instrument plotters.

Don't want to program? Just ask for **OMNILOT!** Menu-driven, fully documented integrated scientific graphics. Write or call for complete information and ordering instructions.

GRAFMATIC – PLOTMATIC – OMNILOT [S] & [P]



Microcompatibles, 301 Prelude Drive, Silver Spring, MD 20901
(301) 593-0683

Circle No. 77 on Readers' Service Card

ATTENTION WEST COAST AAAS MEMBERS

The AAAS Pacific Division
announces a special

Conference on R&D and the
FY 1987 Federal Budget

Thursday, April 10, 1986

*Palo Alto Holiday Inn
Palo Alto, California*

Conducted in collaboration with the Office of Public Sector Programs, AAAS, Washington, DC, this conference will present timely information on the outlook for R&D funding in the current federal budget crisis. Advance registration is \$80 (students, \$50). For information, and registration and housing forms, contact: AAAS Pacific Division, California Academy of Sciences, Golden Gate Park, San Francisco, CA 94118 (Telephone: 415/752-1554).

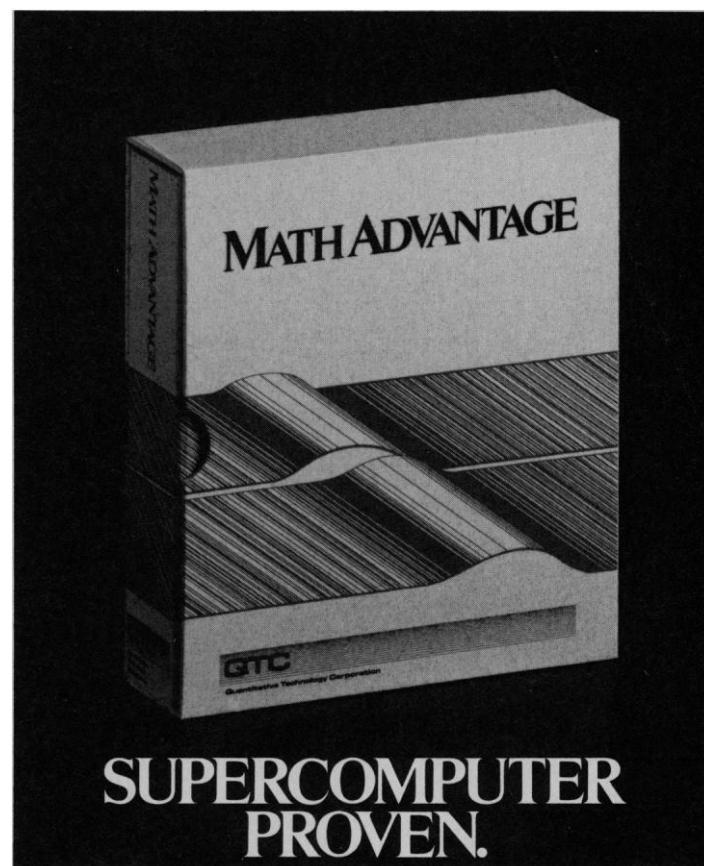


PRECISION- CONTROL PUMP

TRIS™ is the peristaltic pump that's different. You get three channels, precision control with 2% reproducibility, robust metal construction, electronic intercommunication with your other instruments, a three-year warranty, and a price lower than you're asked to pay for someone else's single channel plastic model. The removable, computer-designed tubing cassettes give you uniform channel-to-channel flow and long tubing life — all without manual adjustment.

TRIS' price is just \$695. But if you buy it with an Isco detector or fraction collector, the pump you've been waiting for costs only \$595.

To order or get more information, phone toll free [800]228-4250. Or write Isco, P.O. Box 5347, Lincoln, NE 68505.



WORKSTATION READY.

Once this powerful library of over 170 key scientific subroutines ran only on supercomputers. Now Math Advantage™ speeds application development on more than 30 systems—from the IBM PC family and DEC VAX™ to the biggest Cray™.

Coded in "C" or FORTRAN, Math Advantage algorithms are designed by our software engineers for smooth embedding in simulation, science, CAD, signal and image processing programs.

All are fully documented and supported by Quantitative Technology Corporation, the leader in application development tools for high-performance architectures. For a catalog, write: 8700 SW Creekside Place, Beaverton, Oregon 97005. (503) 626-3081.

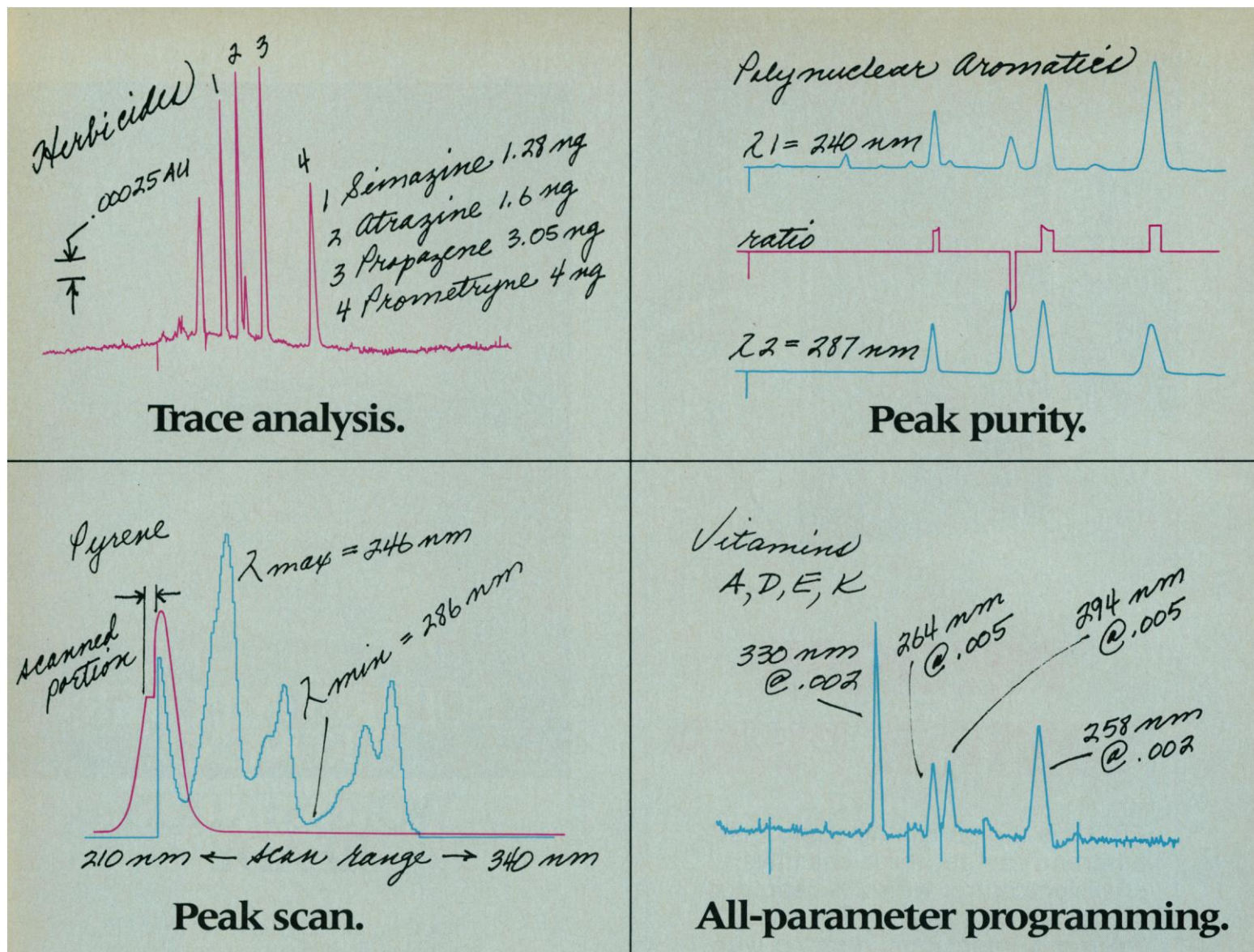
Math Advantage:
The new standard
in scientific sub-
routine libraries.

Toolsmith Series™



Copyright © 1985 by Quantitative Technology Corporation.
Math Advantage and Toolsmith Series are registered trademarks of
Quantitative Technology Corporation.
VAX is a trademark of Digital Equipment Corporation.
Cray is a trademark of Cray Research, Inc.

Circle No. 100 on Readers' Service Card



Every other detector that does all four costs much more.



The 116 UV Detector

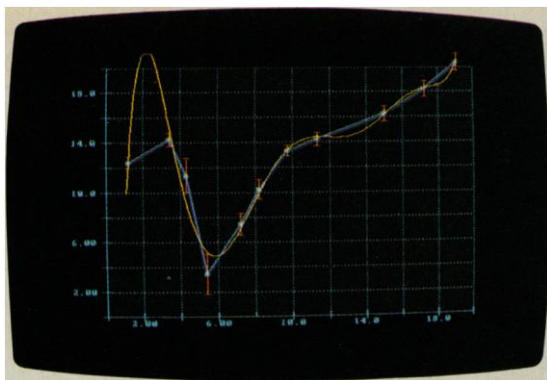
Find out what the 116 can do for you.
Contact your local Gilson representative
or call us toll-free at (800) 445-7667.



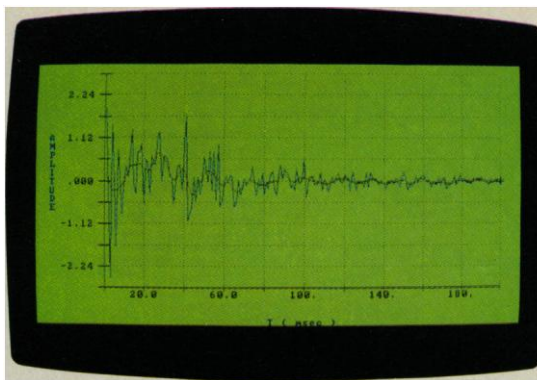
GILSON
INTERNATIONAL

Gilson Medical Electronics, Inc., Box 27, 3000 W. Beltline, Middleton, WI 53562 USA, Tel: 608/836-1551 or 800/445-7667
Gilson Medical Electronics, (France) S.A., 72 rue Gambetta, B.P. No 45, 95400 Villiers-le-Bel, FRANCE, Tel: (3) 990.54.41, Telex: 696682

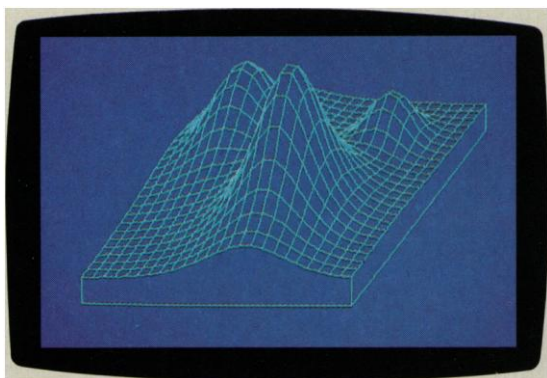
For literature circle reader service number 132.
To have representative call circle reader service number 133.



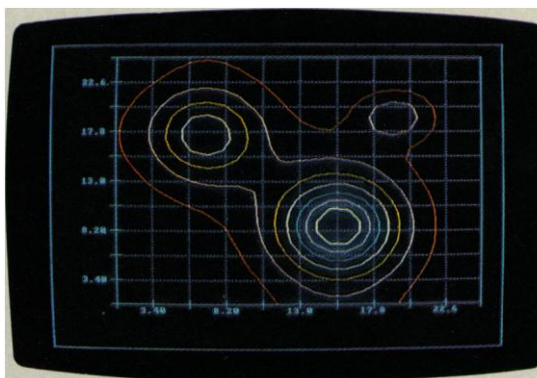
ASYST high-resolution graphics now include error bars, labels, axes, grids, and multiple colors.



New color graphics enhance comparison of experimental data with filtered data.



ASYST axonometric plots simplify analysis of complicated 3-dimensional surfaces.



Contour plotting adds an alternative approach to meaningful 3-D representation.

Copyright 1985 by Macmillan Software Company

ASYST adds new muscle.

More hardware support, more analysis capabilities for the IBM PC.

ASYST™ Scientific Software turns your IBM PC, XT,™ AT, or compatible into a complete scientific workstation. And now it's even more versatile, with:

- Expanded analysis capabilities
- High-resolution color graphics
- GPIB/IEEE-488 hardware support
- Axonometric and contour plotting
- Additional A/D hardware support

Minicomputer speed and precision – at a fraction of the cost.

ASYST on an IBM PC does a 1024-pt. FFT in less than 3 seconds (as fast as 1.2 on some compatibles). For the same task, an optimum performance routine on a DEC 11/23+ minicomputer using FPF 11™ took 2 seconds—at 5 times the price!

Built-in routines. Full programmability.

Straightforward, pre-programmed commands, such as XY.DATA.PLOT, FFT, and A/D.IN, put you in total control right away. Commands can be used interactively, or combined and modified as needed—from simple macros to fully customized programs. And all com-

mands co-reside in memory—no disk shuffling.

ASYST is four separate, fully-integrated modules:

Module 1: System/Graphics/Statistics establishes the environment. It provides basic mathematics operators, descriptive statistics, array manipulation and control, automatic plotting and color graphics support (including IBM standard/enhanced and Hercules boards), a text editor, file I/O, and a built-in programming language.

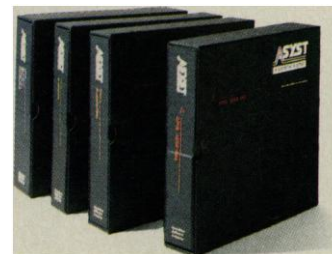
Module 2: Analysis reduces and analyzes data. Includes eigenvalues, eigenvectors, polynomials, ANOVA, axonometric and contour plotting, least squares approximations, curve fitting, convolutions, integration, differentiation, smoothing, and fast Fourier transform.

Module 3: Data Acquisition allows communication with lab equipment and analog signal sources. Includes A/D and D/A conversions, digital I/O, timing, and triggering. Supports standard interface boards including IBM DACA.

Module 4: GPIB/IEEE-488 allows additional interfacing to some 10,000 instruments through a variety of plug-in cards.

- Purchase Module 1 alone—or with any combination of the other modules—to tailor the system to your specific applications.

Try ASYST for 30 days. For details, call (800) 348-0033; in NY, (212) 702-3241.



ASYST

MACMILLAN SOFTWARE CO.
An Affiliate of Macmillan Publishing Company
866 Third Avenue, New York, NY 10022

See us at The Pittsburgh Conference. Booth 27035-37.

Circle No. 35 on Readers' Service Card