16 November 1979 • Vol. 206 • No. 4420

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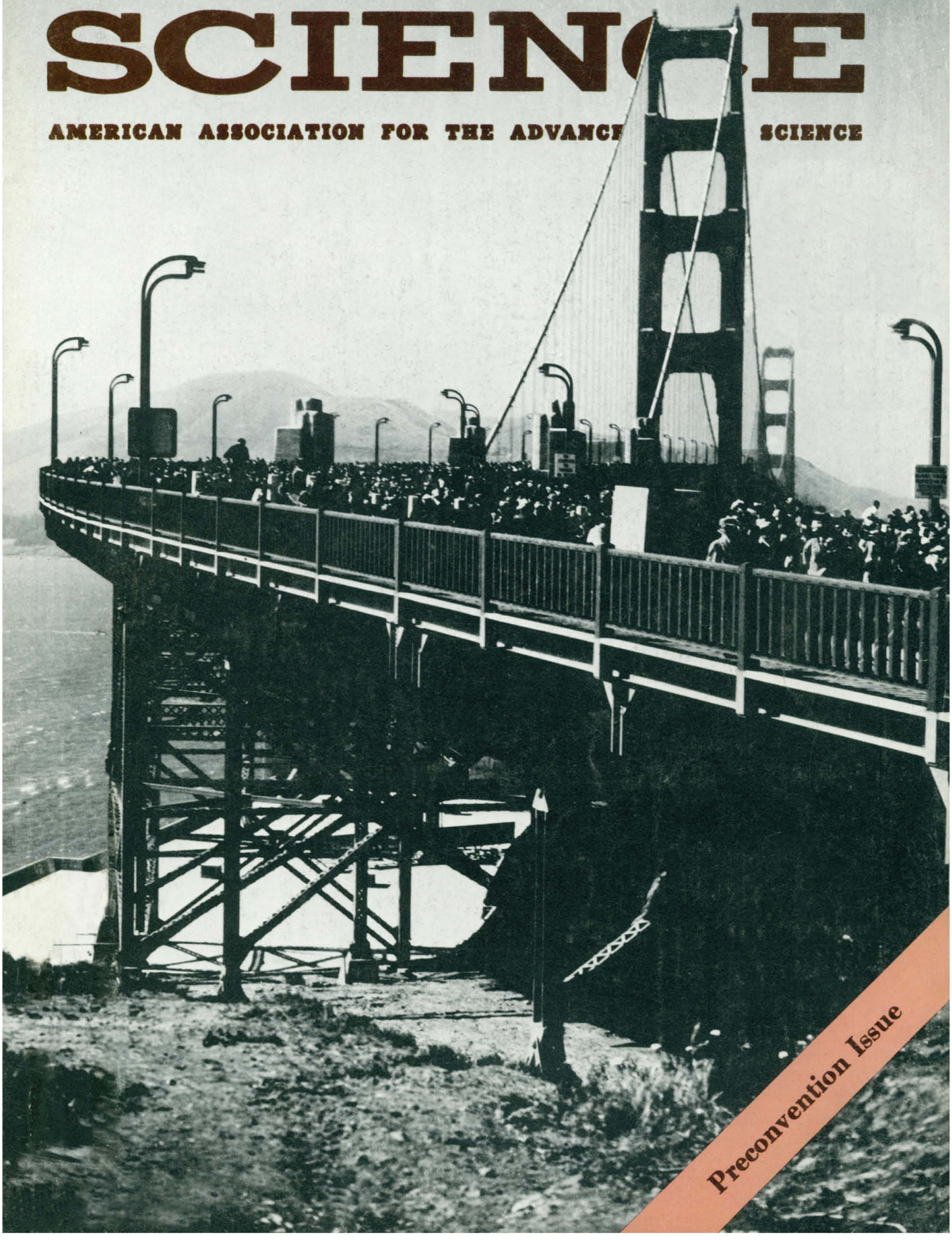
SCIENCE

AMERICAN ASSOCIATION FOR THE ADVANCE SCIENCE



Preconvention Issue

Why are the world's most advanced LS instruments tested with these nuclear supplies?

The Beckman total nuclear supply capability evolved along with our LS counting instruments to give us a constant source of fully quality-controlled cocktails, solubilizers and counting vials.

Today, the same supplies we used in our own state-of-the-art instrument R&D programs are available to LS researchers nationwide.

And whether or not you own a Beckman Instrument you'll benefit from optimized counting efficiencies, superior reliability, and the convenience of one expert source for all your nuclear needs.

Right now, orders of premixed cocktails, cocktail ingredients, and counting vials are available with 24-hour response times from a national network of shipping depots. And major cost reduction programs have been designed to meet the individual requirements of research facilities both small and large.

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Or contact Scientific Instruments Division, Beckman Instruments, Inc., P.O. Box C-19600, Irvine, CA 92713.

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There's more to the contents of this Combi-vial than just a radioactive chemical. In fact, the extra ingredient is probably more important; namely, a tradition of consistent quality 23 years in the making. On this you can base your expectation of a superior product.

Quality in radioactive chemicals is being re-defined upwards all the time—by your requirements. The ancestors of this compound didn't have to be as pure; its heirs will have to be purer. That's why we invest a good part of our resources in new testing techniques and equipment to remain the leader in this rapidly changing scene.

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ISSN 0036-8075

16 November 1979

Volume 206, No. 4420

SCIENCE

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AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE

REPORTS

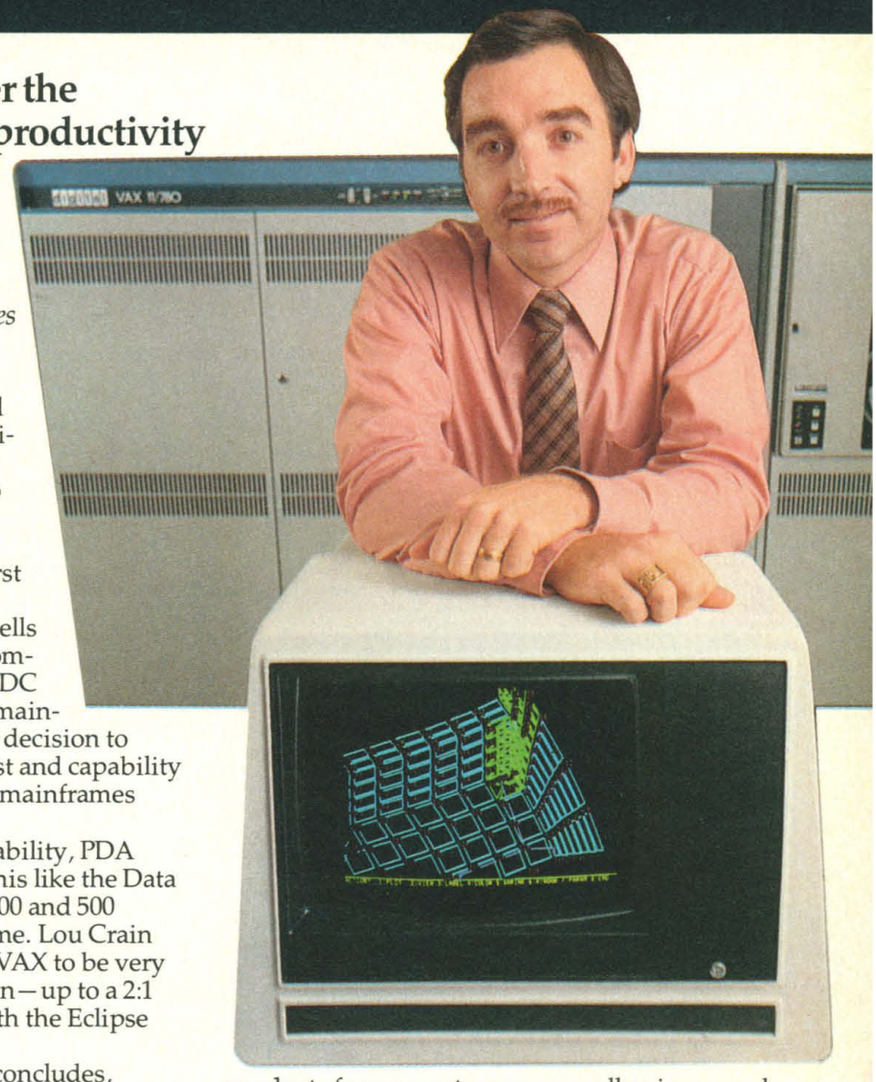
COVER

Opening of the Golden Gate Bridge, 1937, San Francisco. See page 807, AAAS Annual Meeting, 3-8 January 1980. [Courtesy of California Historical Society]

VAX Performance. Ask any user.

"VAX simply ran over the competition. In cost/productivity ratios, nothing even came close."

Lou Crain, Mgr. of Software Products
Prototype Development Associates
Santa Ana, California



PDA is an employee-owned engineering concern whose business ranges from fundamental research in structural analysis to the manufacture of critical aerospace components.

The VAX-11/780 is PDA's first in-house computer. Lou Crain, Manager of Software Products, tells us, "We've been doing all our computing through utilities using CDC 6600, Cyber 74 and Univac 1108 mainframes. The key elements in our decision to acquire the VAX-11/780 were cost and capability – compared to service bureaus, mainframes and competitive minis."

From the standpoint of capability, PDA considered traditional superminis like the Data General Eclipse and the Prime 400 and 500 series, plus a used 1108 mainframe. Lou Crain says, "Our benchmark showed VAX to be very powerful against the competition – up to a 2:1 performance advantage over both the Eclipse and the 1108."

"After installation," Crain concludes, "VAX has lived up to our expectations and has performed impressively. It's resulted in better products for our customers, as well as improved cost-effectiveness. Having our own interactive capability in-house has meant an increase in engineering productivity of up to 300%."

"VAX turns out to be twice the machine for the same amount of money."

Roger Vossler,
Section Manager and Systems Engineer
TRW Defense and Space Systems Group
Redondo Beach, California

Sensor data processing and distributed processing systems in support of real-time embedded applications are among the specialties of TRW's Defense and Space Systems Group.

To find the right computer, TRW continues to evaluate numerous machines—including Digital's VAX-11/780. They've also conducted numerous FORTRAN and PASCAL benchmarks.

In every test, VAX stands out as a clear winner.

Roger Vossler, Section Manager and Systems Engineer, says, "VAX is one of the best implementations we've seen of a successful integrated hardware and software system."

Since TRW's sensor data processing applications require enormous memories—over a million bytes to store a single image, for example—VAX's true 32-bit address space is vitally important. In addition, says Vossler, "VAX's I/O bandwidth capabilities are extremely important for effectively moving large quantities of real-time data at very high data rates."

Because TRW already had an investment in Digital technology, Vossler is particularly impressed with the relative ease of moving PDP-11 series programs onto VAX.

"But," says Vossler, "Even if I were starting all over again—without our Digital experience—I would still pick VAX, on the basis of its architecture, both hardware and software, and its impressive performance."

"Implementation was faster on VAX than on 25 other machines."

Brian Ford, Director
Numerical Algorithms Group
Oxford, England/
Downers Grove, Illinois

The Numerical Algorithms Group develops and maintains mathematical and statistical software libraries for customers in industry, science and academia.

Before VAX, NAG had implemented their complex Mark 6 Library on 25 major machines, including the Burroughs 6700, CDC 7600, Univac 1100, and the IBM 370. The average implementation time was 13 man-weeks.

VAX took five.

In Dr. Ford's words, "A successful implementation requires the correct functioning of the 345 library routines to a prescribed accuracy and efficiency in execution of NAG's suite of 620 test programs. Whilst the activity is a significant examination of a machine's conformity to the ANSI standard of the FORTRAN compiler, its main technical features are file creation, file comparison, file manipulation and file maintenance."

And implementation performance was just the start. Dr. Ford comments on VAX's impressive record of reliability after the program was up and running: "No problems were encountered in the VAX/VMS software even though approximately 3000 files were being handled. The operational availability time for the machine was close to 100%, an outstanding statistic for new hardware and a new operating system.

"VAX," Dr. Ford concludes, "is an implementor's dream."

Digital's VAX-11/780 has re-defined the level of performance you can expect from computers in its price range.

If your application requires large number crunching capability, high floating point accuracy, or lots of high-speed real-time calculations, there is simply no better system.

But don't take our word for it. Send for our new brochure. And listen to our customers.

☐ Please send me the new "VAX—Ask Any User" brochure and detailed Technical Summary.
☐ Please contact me.

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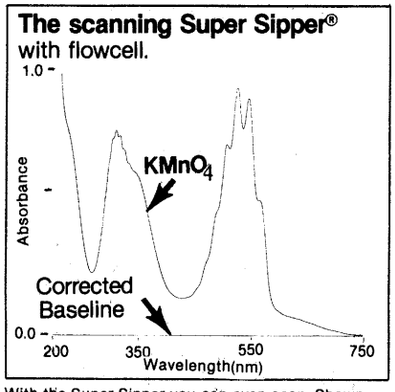
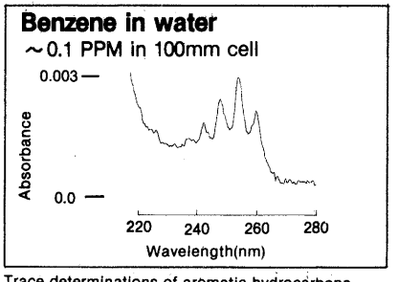


With the Super Sipper you can even scan. Shown above is a scan of $KMnO_4$ in our specially designed flowcell. A corrected baseline of the flowcell containing solvent water is shown beneath the scan.

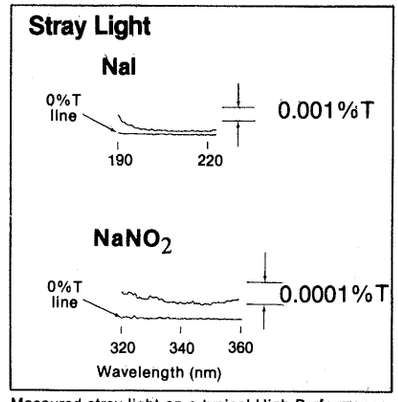
Expandable Keyboard Operation. For a few dollars more, you can add Rep Scan, 1st and 2nd Derivative, and Automatic Concentration Factor.
A high performance version is available which uses a fore-monochromator and incorporates a holographic grating to provide stray light of less than 0.002%T at 220 nm.



Trace determinations of aromatic hydrocarbons become routine with the baseline compensation power and low noise level of the M552. Benzene in water can easily be detected and quantified at the 100ppb level using 100 mm pathlength cells.

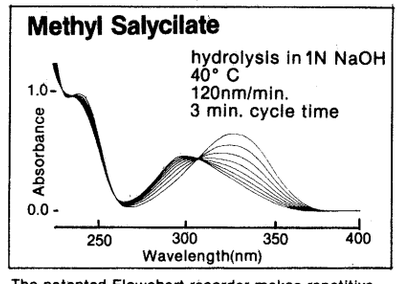
Model 559

The next member of the Perkin-Elmer family of UV-VIS Double-Beam Spectrophotometers is the Model 559. The Model 559's include keyboard control and all the features of the M552, PLUS
Holographic Grating for low stray light and enhanced photometric linearity. High performance version reduces stray light still further.



Measured stray light on a typical High Performance 559 (shown above) is well within the specification of 0.002%T at 220 nm and 0.001%T at 340 nm.

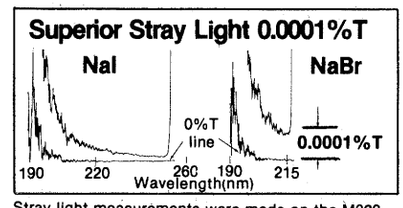
Patented Flowchart ® Recorder! The "intelligent recorder" from Perkin-Elmer automatically aligns chart to monochromator at all times.
Accessories Standard! Other instrument manufacturers make them expensive options; Perkin-Elmer provides them as standard.
1) Repetitive Scanning
2) Wavelength Programming
3) 1st and 2nd Derivative
4) Integration



The patented Flowchart recorder makes repetitive scanning fast, accurate and precise.

Model 320/330

State of the art performance and features highlight the Model 320, for those demanding a research level, completely automatic spectrophotometer.
Double Monochromator provides better than 0.0001%T stray light at 220nm.
Keyboard Control of ALL operating parameters (even slit-width). You asked for, and you expect, unsurpassed versatility in an ultra-high performance instrument.
Smart Recorder. Just position to a grid line once and the 320 remembers.
Again, accessories are standard.
1) Wavelength Programming
2) Repetitive Scanning
3) 1st, 2nd, 3rd and 4th Derivative.



Stray light measurements were made on the M320 according to the ASTM method. Measured stray light at 220 nm with sodium iodide was well within the spec of 0.0001%T at 220 nm. Also shown is stray light using NaBr.

The Model 330 is the UV-VIS-NIR version, extending the wavelength range to 2600 nm.

Information or Demonstration

(use the reader service card)

Circle 220-for a Demonstration.
Circle 221-for information on M552/559
Circle 222-for information on M320/330
Circle 225-for an Application Data Bulletin describing derivative scanning with the Models 552 and 559.

or write directly to Perkin-Elmer Corporation, M/S-12, Main Ave., Norwalk Connecticut 06856, or Bodenseewerk Perkin-Elmer & Co.,GmbH, Postfach 1120, 7770 Uberlingen, Federal Republic of Germany.

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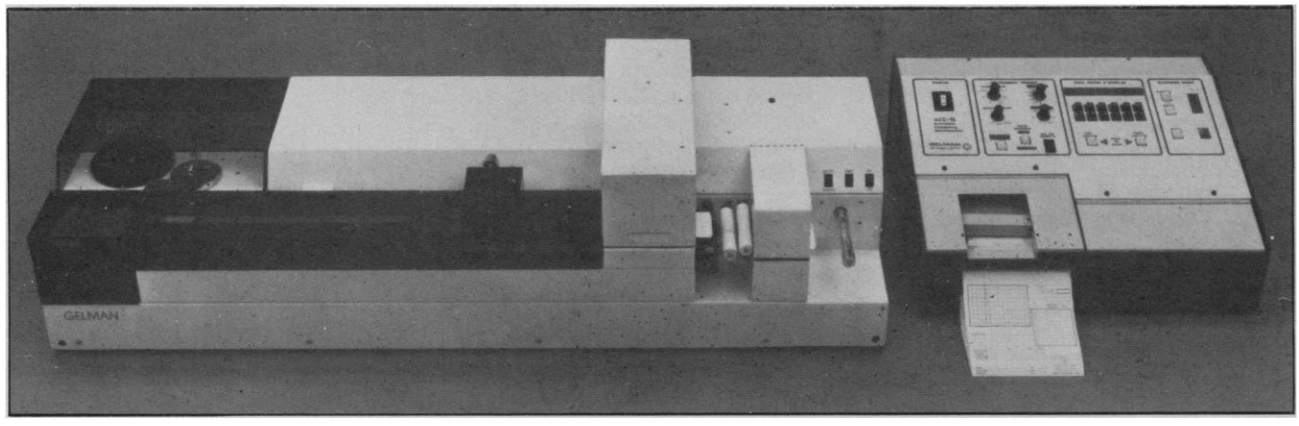
Semi-Micro Electrophoresis System
Perform up to 32 tests simultaneously. Sharp, clear separations. Save time (total technologist time 15-30 min.). Enjoy economy (kit has all you need to start except power supply).

Sepratek™ Kit
Complete kit for protein analysis. Maximum speed, and economy for large or small electrophoresis volume labs.



Automated Electrophoresis System
This system can perform up to 128 tests —either serum or hemoglobin samples —fully automatically!

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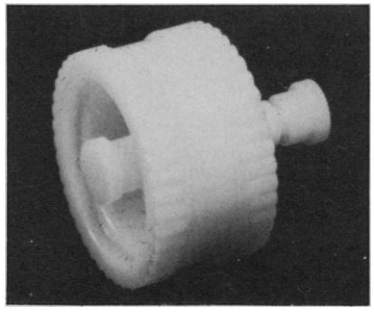
Cytology



Cytosieve®
Recovers cells for cytologic diagnosis. Preloaded with Gelman 25 mm GA-1 membrane filter. "Diagnostic Cytology by Membrane Filter" Application Bulletin available on request.

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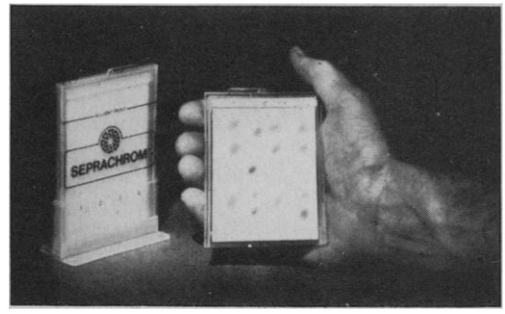
Chromatography



L/S Ratio System
Fast (5-15 min. developing times). Disposable, self-contained chamber for easy use.

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Filtration

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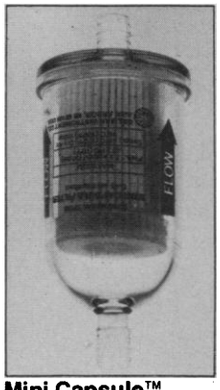
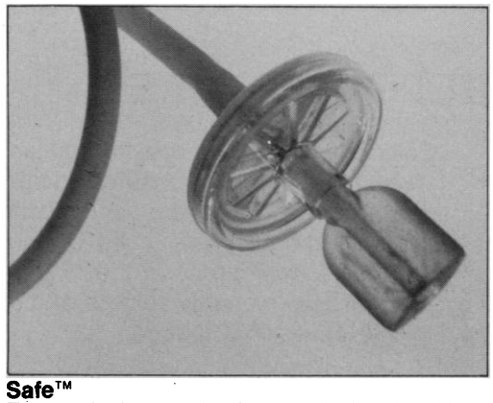
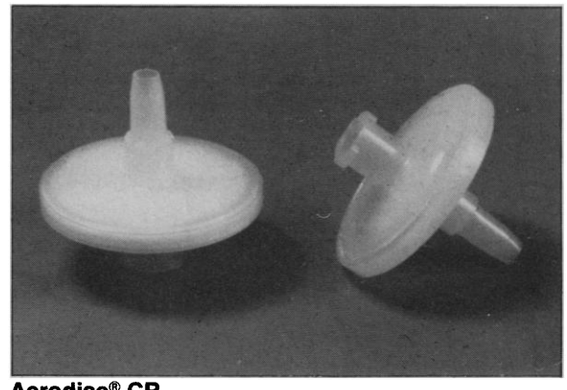


Mini Capsule™ Filter
6″ high. Replaces expensive, clumsy 293 mm disc filter system. More filtration capacity than 293 mm disc. Supplied sterile.



Safe™
Economical protection for mouth pipetting. Use with Sahli, microcapillary, or 1 ml pipettes. Stop-It™ available for 5 ml sets.



Acrodisc® CR
Ideal in-line syringe filter for small volume. Maximum resistance to chemicals/solvents. Disposable, sterilizable (autoclavable or ETO). Available in several pore sizes; filters in both directions!

Water Analysis

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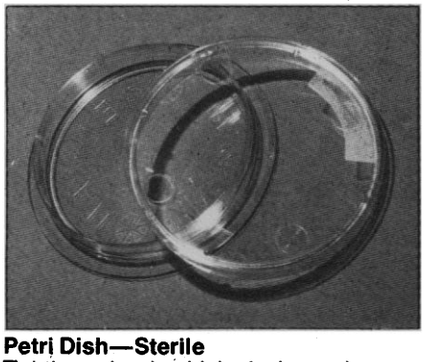

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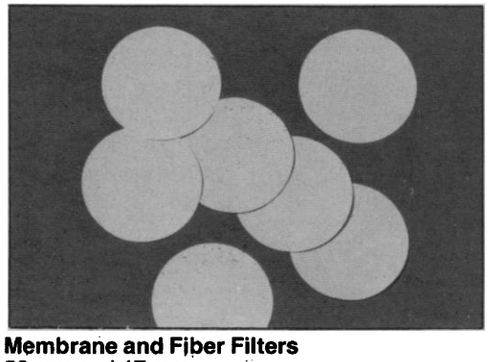
Tightly seals microbiological samples. Easy one-hand opening. 50 x 9 mm "Easy writer" cover.



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50 mm and 47 mm
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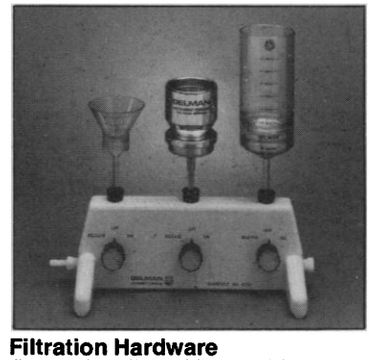

Filtration Hardware
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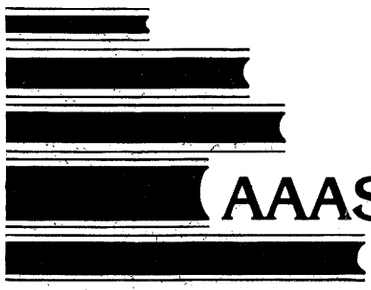

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The Ohaus Brainweigh 300 costs only $1,195 and gives you a capacity of 300g with a readability of 0.01g. (If you want to find out how much that price is going to save you, just check what our competitors are charging for balances with similar capabilities.)

And we didn't stop with just economy. We went on to design in features that would be costly "extras" on any other balance on the market—if you could even get them.

Like extended visibility

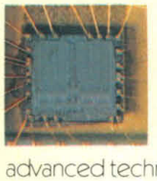
Stand up; sit down; go to the back of the room. The display on the Ohaus 300 is still easy to read. That's because the no-glare window with the big, easy-to-read digits is deliberately angled for maximum visibility wherever you are. And that can save a lot of headaches whether you're in a lab, or on the line or in a classroom.

It tells you when it's ready—and when you've goofed

No more guessing whether the balance has settled down; no more annoying digit flutter. When the "g" appears beside the digits—in 3 seconds or less—it's your guarantee that the reading is stable.

And if the pan is overloaded or dislodged, you'll get an error sign in the window.

The 300 is a new generation balance



This new, low-profile balance is only a little larger than an ordinary desk phone. But packed inside is enough advanced technology to make the Ohaus 300 a generation ahead of any other balance on the market. Its state-of-the-art electronic components are almost entirely plug-in for easy service. And there are fewer of them—for better reliability and more dependable performance.

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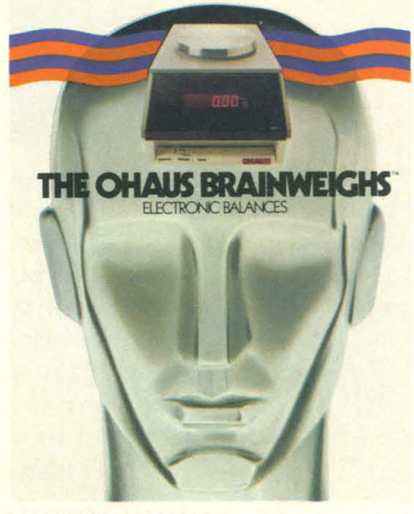
You don't have to worry about it. Unlike other electronic balances, every Ohaus Brainweigh comes equipped to handle a BCD option. You can add a BCD interface right away—or whenever you come to need it.



Parts and service are as near as your dealer

The Ohaus 300 is made right here in the U.S. And although its built-to-take-it die-cast case and solid state components put maintenance at a minimum, when the balance finally needs a little attention, it's nice to know your local dealer can do the job.

Get all the facts

If you'd like to see the rest of the reasons why the Ohaus Brainweigh 300 outclasses the competition, and the many ways it can make your operation faster, easier and more accurate, just return the coupon.

THE OHAUS BRAINWEIGHS™

The weigh of the future.

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☐ Yes, show me the weigh of the future. Send me the full-color catalog on the Ohaus Brainweighs.

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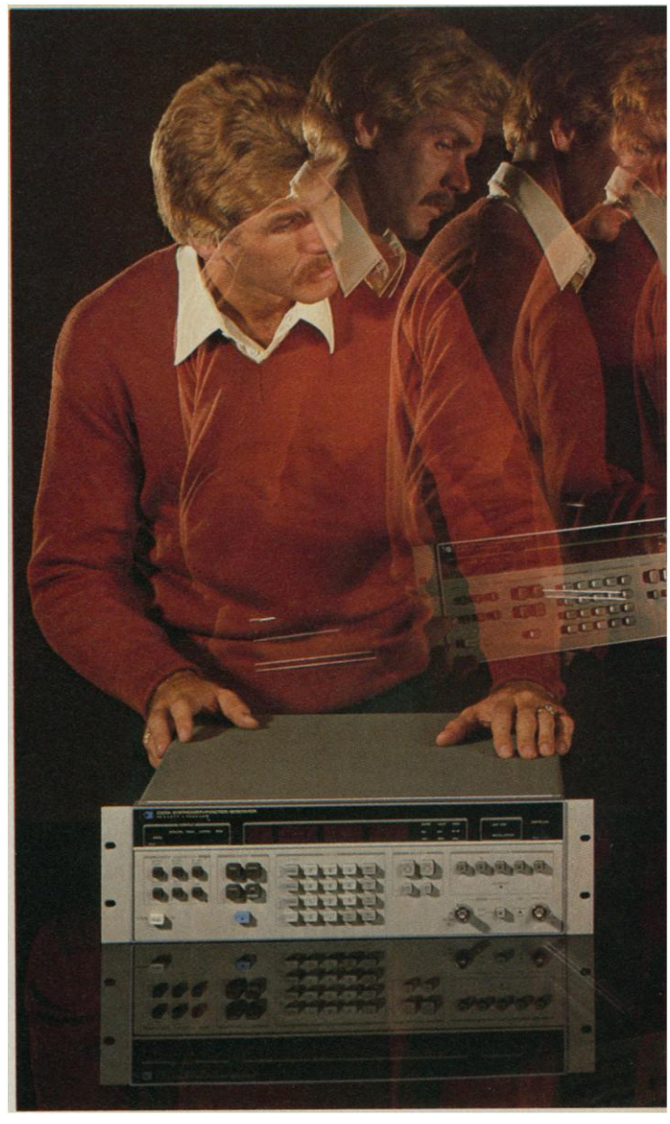
Assemble your own measurement system in weeks, instead of months . . .



You can take months to design and assemble your own bus-compatible measurement system, and get just the system you need.

Or now, you can use HP system-designed instruments and computers, and get to your application in just a few weeks.

The reason is simple: All 119 HP system-designed components incorporate HP-IB (Hewlett-Packard Interface Bus). And HP-IB isn't just HP's implementation of IEEE 488-1978.

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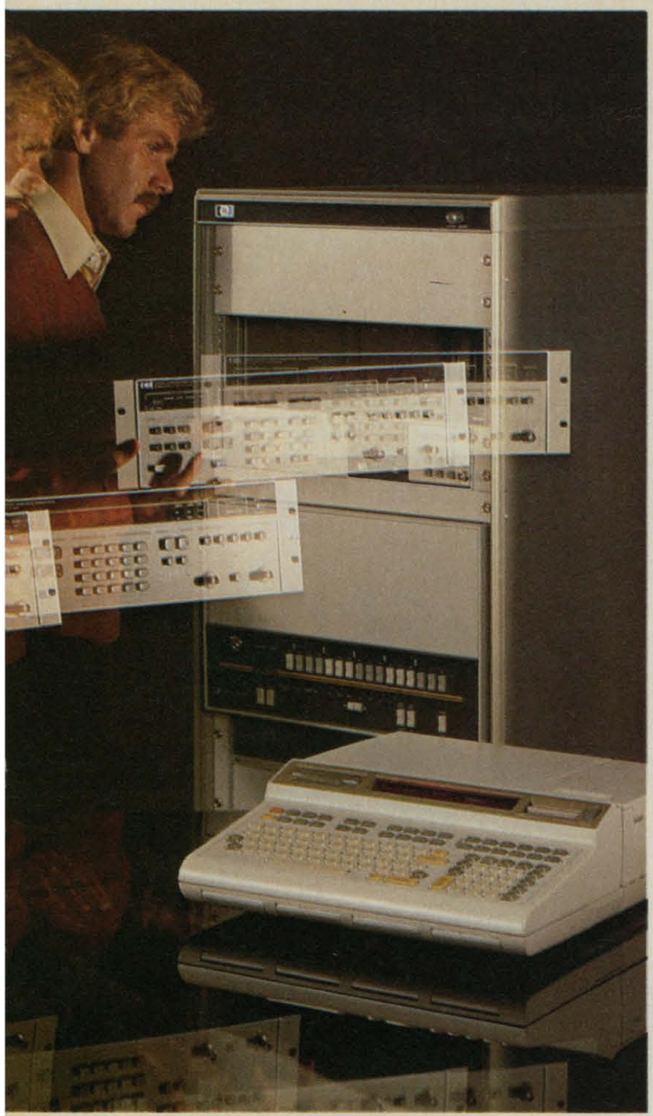

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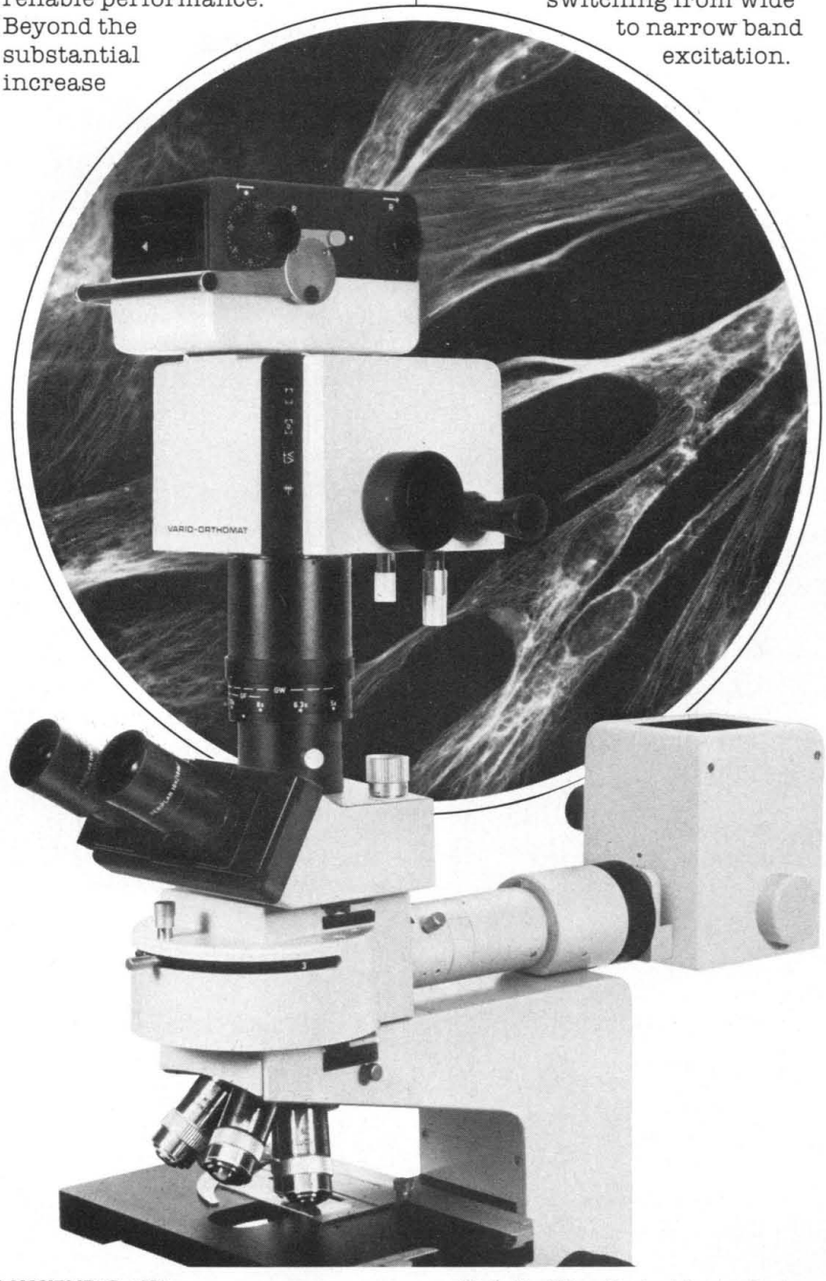

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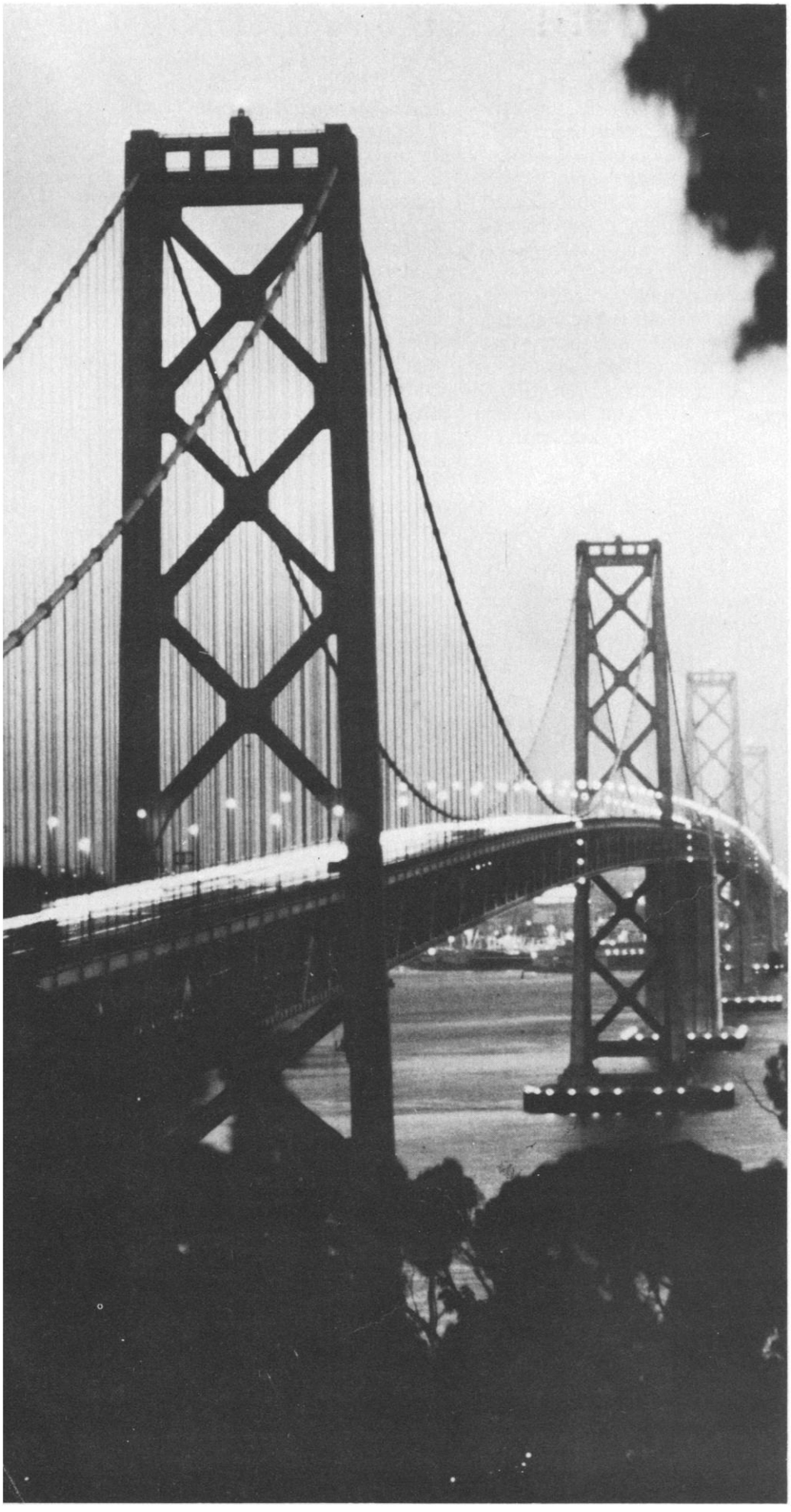

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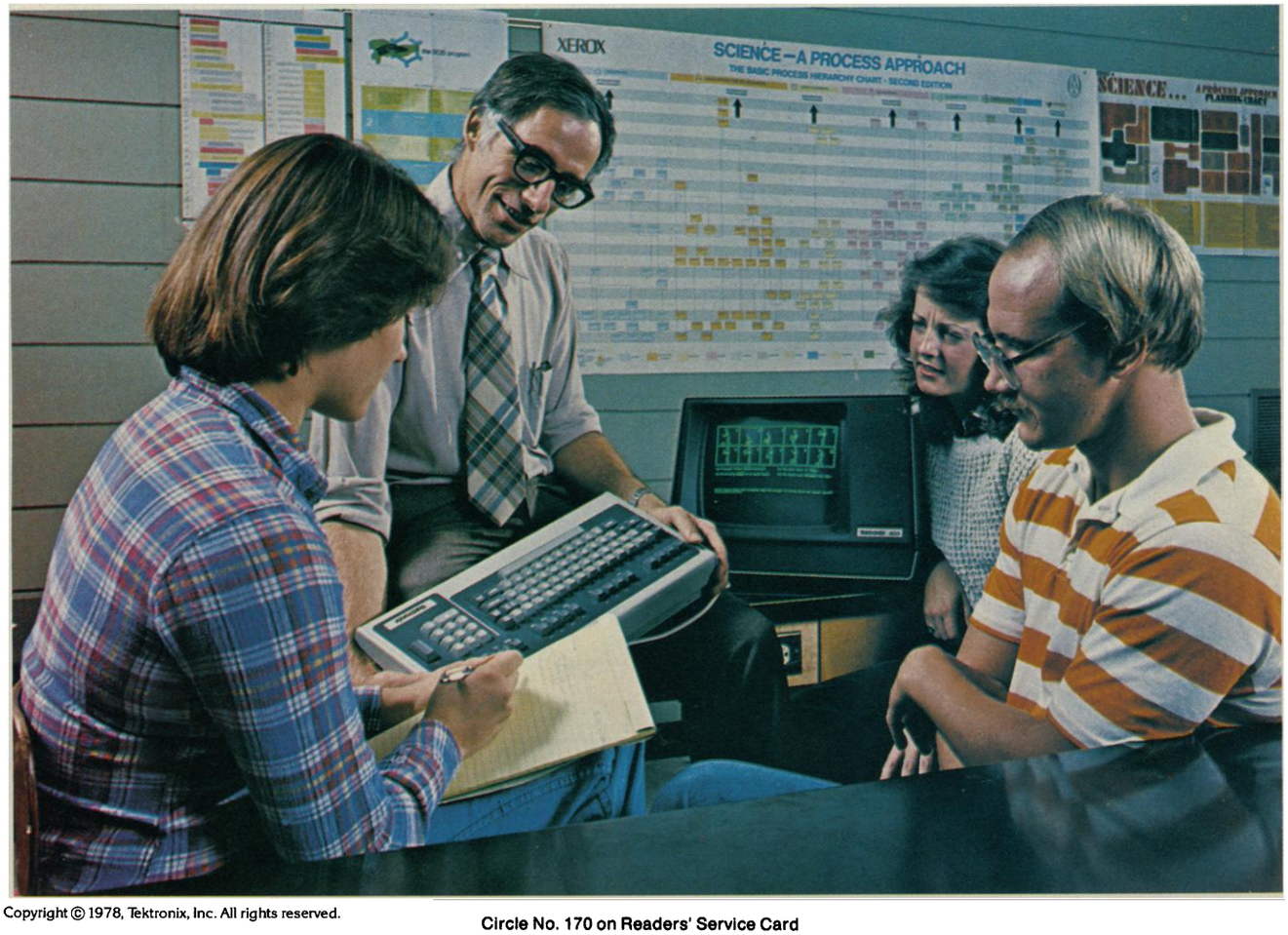

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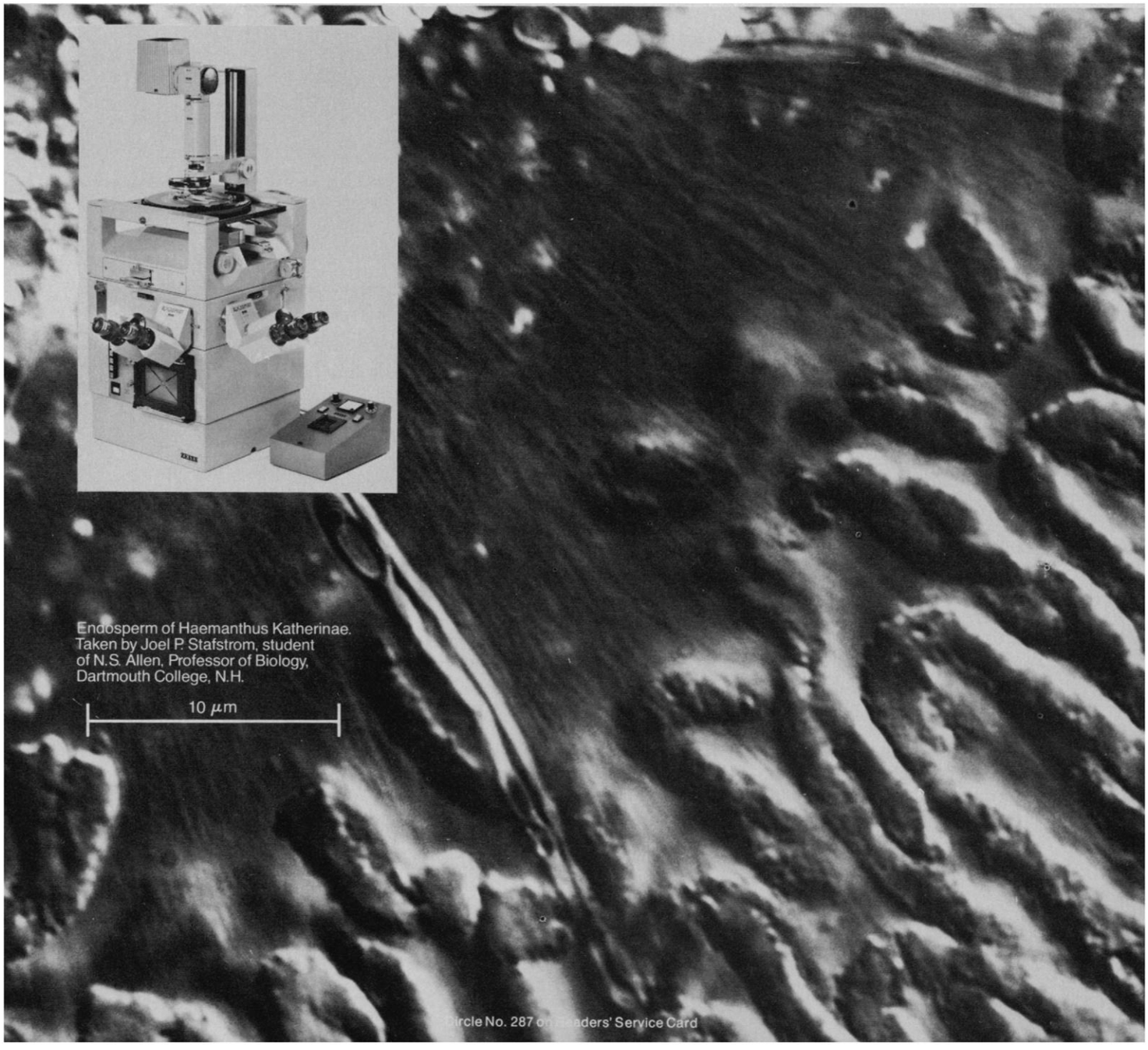

Photomicrograph of villus in section of small intestine, 125X magnification, is a simulated video image. Photomicrograph by Jack Kath, from Nikon's Small World Contest.

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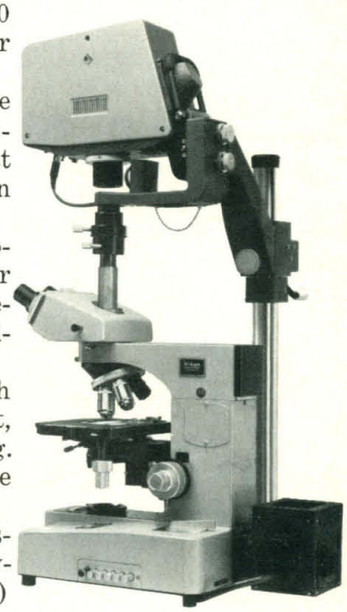

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16 November 1979, Volume 206, Number 4420 **SCIENCE**

Scientists, Engineers, and Citizens

Meeting needs for public understanding of science was adopted as federal policy in 1950 legislation creating the National Science Foundation. On the basis of currently low levels of citizen comprehension, that original NSF program can hardly be viewed as successful. But how should we expect any federal program to buck a powerful cultural tide?

Huizinga addressed this issue almost half a century ago.* As he wrote, universal education and modern publicity, instead of raising the level of culture, have produced symptoms of devitalization and degeneration. Science as new knowledge has not settled into the culture, and the aggregate of discoveries cannot be equated to culture.

Among knowledge consumers, with everyone getting a taste of everything, there is depreciation of critical judgment. And that process has been accelerated by techniques of mass entertainment wherein participation slides from active to passive mode, speeding abdication of informed judgment to others. Everyone becomes a trivial, Monday morning quarterback.

As to the scientific community, it has considered its primary role as one of acquiring and extending knowledge, leaving to others the roles both of educating the public about the social implications of science and of exercising responsibility over ways and means for adapting and controlling natural forces. The scientific community may also share in the blame for weakening of an intellectual conscience that underpins critical discernment.

Granted, various groups of scientists have become crusaders for specific issues. A few have tackled broader questions of survival. While not identified with causes as such, other scientists have become activists in their own community, applying their expertise to local issues.

Professional organizations also now get involved. Journals have carried articles on key policy issues to enlighten members. Some organizations have confirmed their tax-exempt status, then summoned up their courage and taken public positions, submitted testimony, and stepped up attention to professional activities in which ethical dimensions of social responsibilities are at stake. The concepts of technology assessment have begun to be integrated into professional engineering practice and teaching.

Looking ahead, the scientific and engineering communities could be of more direct assistance through heavier commitment of their professional societies to public interest activities and to citizen understanding. At present, organizations of scientists and engineers devote the greatest fraction of their income from dues to dissemination of technical information. The public is never excluded, but the content and style of such communication are so highly specialized as to discourage participation by any but the expert.

Thus the scientific community and the engineering professions have failed to help the other 98 percent of the population who are nonspecialists to grasp the technical foundations of modern life and associated threats to survival. Some of the difficulty arises from cultural isolation of the scientific and engineering communities. One antidote lies in a more systematic exposure to issues that concern society generally, especially regarding those whose lives seldom intersect the technical aristocracy, and whose consequently remote concerns and dreams are alien and heard vicariously, if at all. When the technical community recognizes that it must address the stark questions of who wins, who loses, and how much, then they may also recognize that the attack on these questions of cultural and psychological as well as operational effects involves a kaleidoscopic blend of technical with social knowledge. This surely will widen the perspective and enrich the value base intrinsically present in all judgments that the technical community is called upon to make on technology-intensive public policy.—EDWARD WENK, JR., *Professor of Engineering and Public Affairs, University of Washington, Seattle 98105*

This editorial is excerpted from E. Wenk, Jr., *Margins for Survival* (Pergamon, New York, 1979), pp. 144–147.

*J. Huizinga, *In the Shadow of Tomorrow* (Norton, New York, 1936), p. 79.

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(Continued from page 825)

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