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A special issue of Science on one of today's most important and exciting research areas

Recombinant DNA

Edited by
John Abelson and
Eleanore Butz

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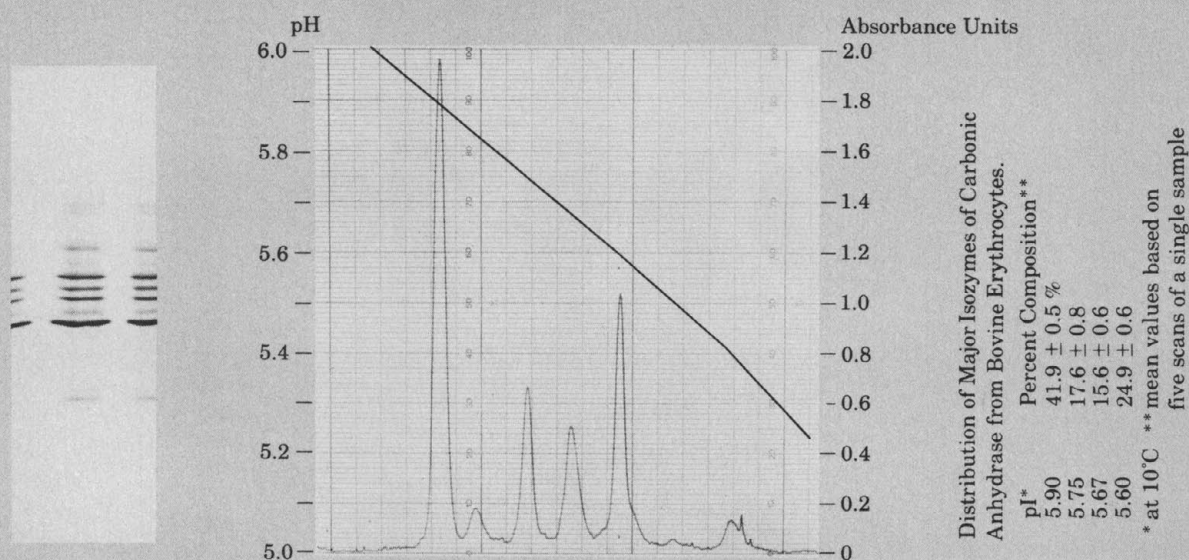
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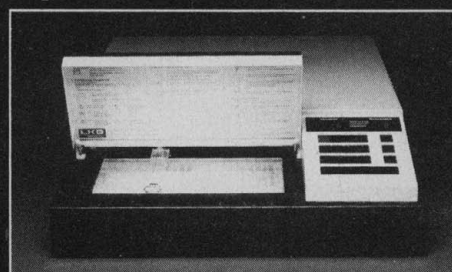
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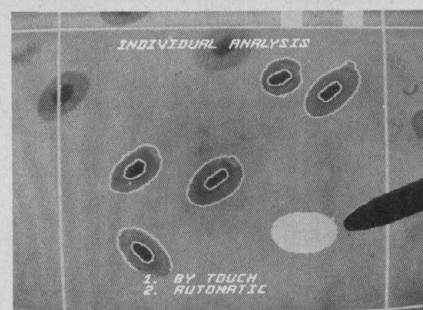
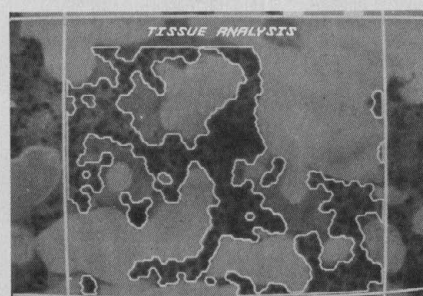
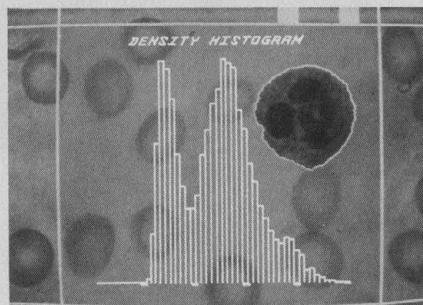
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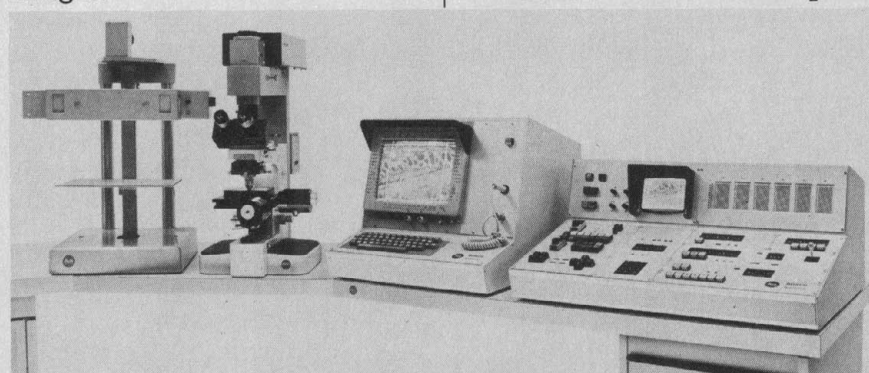
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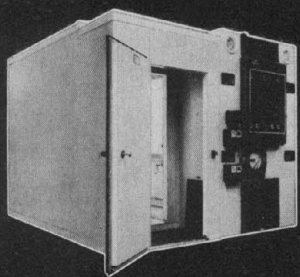


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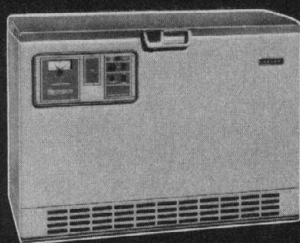


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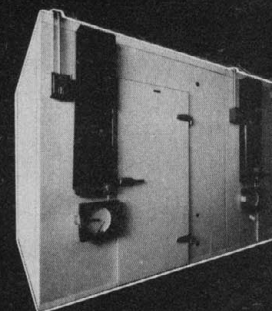
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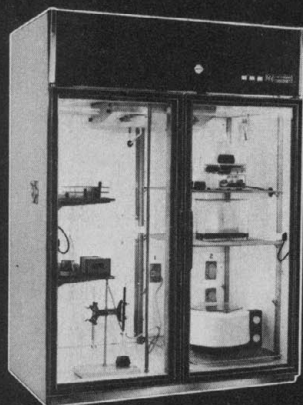
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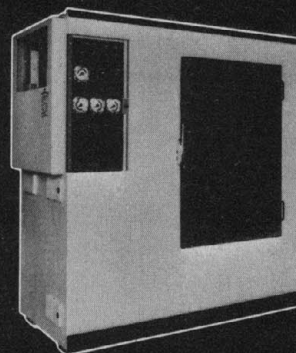
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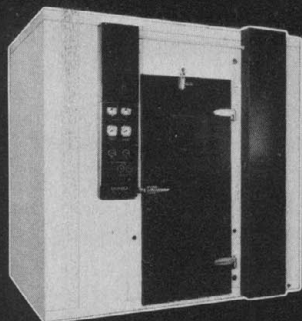
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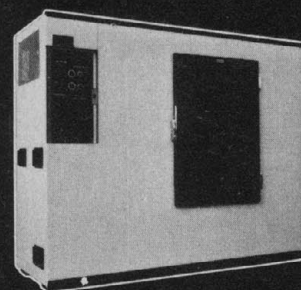
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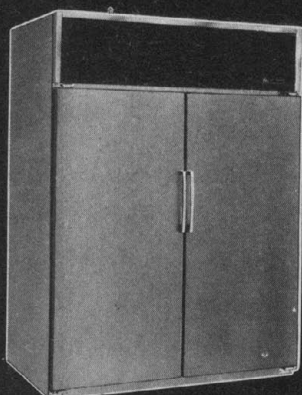
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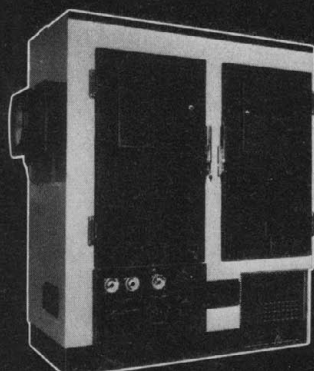
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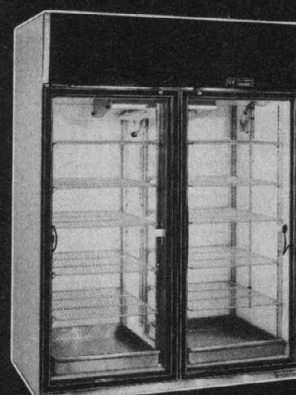
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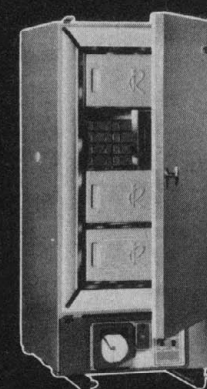
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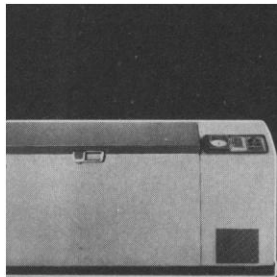
Sherer
CEC 4-4



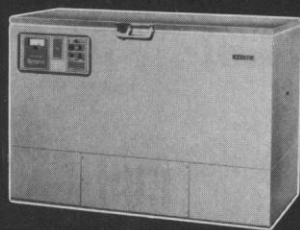
Puffer-Hubbard
Rx 50G



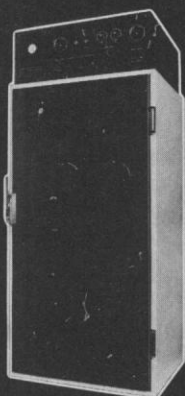
Reico
ULT 1185



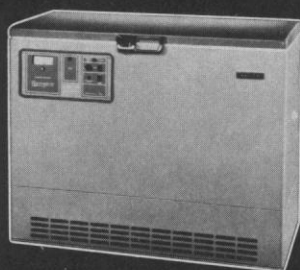
*Revco
ULT 1985*



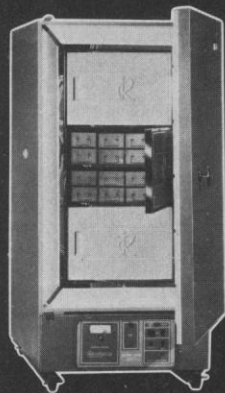
*Revco
ULT 1785*



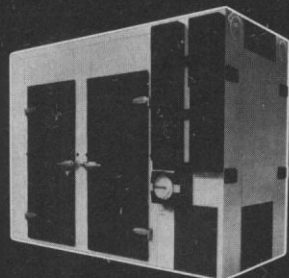
*Sherer
CEC 25 Incubator*



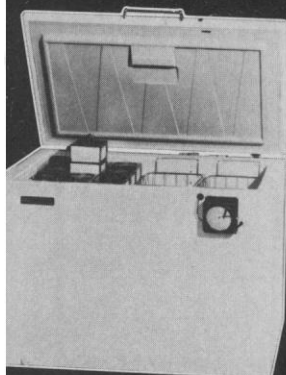
*Revco
ULT 900 Series*



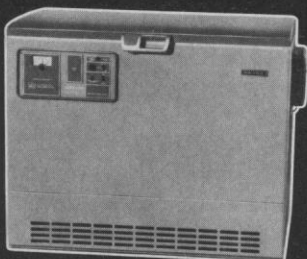
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Since the air in the rack is exhausted into the main exhaust system and does *not* re-enter the animal room itself, research workers are effectively isolated from animal dander or other allergens, odor, pheromones, microorganisms, and food and bedding dust. Even with the doors of the unit open, the direction of air flow tends to be *from* the room and *into* the unit which helps to contain contaminated air *within* the unit. Result: virtual elimination of allergic reactions and generally, a cleaner, safer, odor-free work environment for the research people.

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Because this system greatly reduces the chance of cross-contamination, and because it provides a much less stressful environment generally (e.g., it tends to reduce the amount of animal handling required), the chances of jeopardizing expensive research programs are substantially minimized.

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*Many of these systems are already installed in major research institutions... and conversion to these ventilated animal racks is accelerating.



The VR-1 is the subject of one or more pending patents.

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21-23 October, 1981 — San Francisco, California
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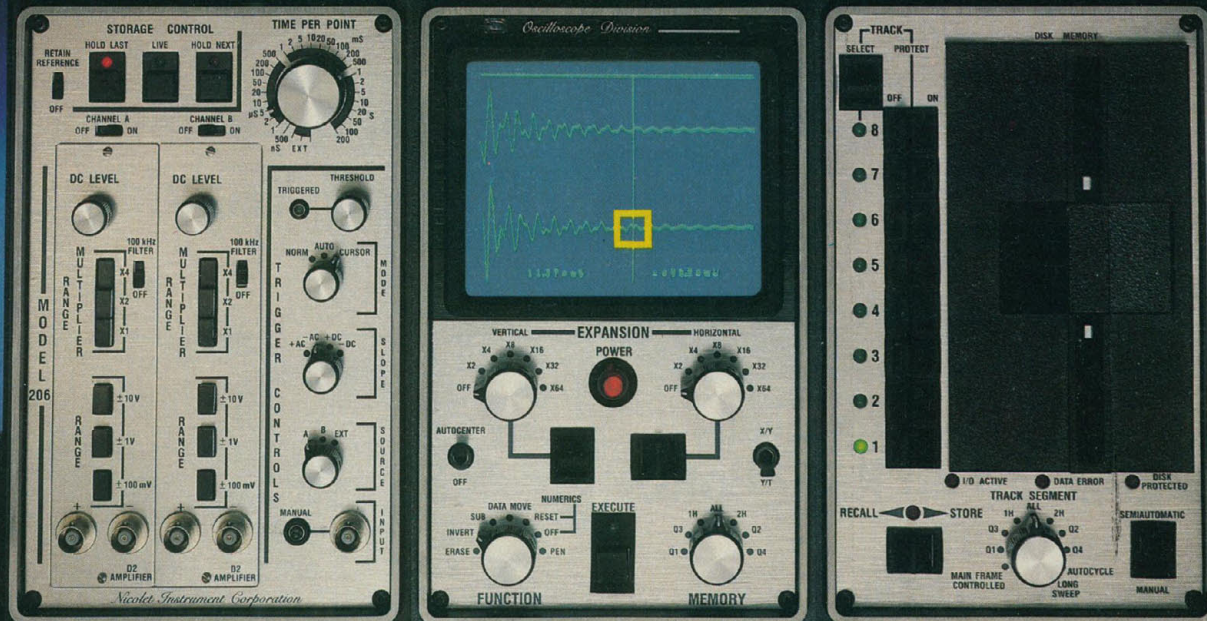
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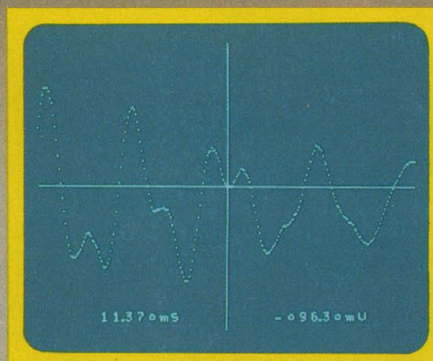




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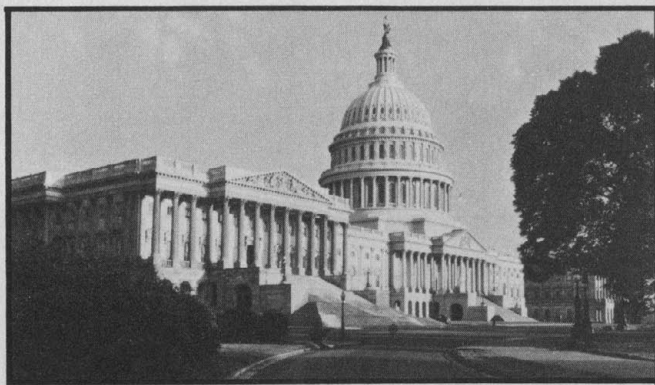


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25-26 June 1981
The Shoreham Hotel
2500 Calvert Street, NW
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The 6th Annual AAAS Colloquium on R&D and Public Policy, sponsored by the AAAS Committee on Science, Engineering, and Public Policy, will convene 25-26 June 1981 in Washington, D. C.

You are invited to participate in this Colloquium and in discussions with leaders in government, industry, and the scientific and technical communities on issues of current concern relating to R&D and public policy-making in the new administration.

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What will be the focus of federal R&D funding? Which programs are being cut back and which increased? What philosophical tenets underlie this set of policies? How is Congress reacting to the new administration's budget recommendations for R&D? What impacts will the new budgets have on the R&D community? Speakers and panelists will provide answers and highlight problems as they address the following topics:

- *Federal R&D* • R&D issues in the FY 1982 budget • Outlook for FY 1983 and the future • R&D policies and budgets of federal agencies
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- *R&D Outlook in the Scientific and Engineering Community* • Impacts of new R&D budgets and policies on engineering; physical, social, and biomedical sciences; science and engineering education • Short- and long-range outlook for health of U. S. science and technology

Research and Development: AAAS Report VI, by Willis H. Shapley, Albert H. Teich, and Gail J. Breslow, will be provided in advance to colloquium registrants. The *Report* covers R&D in the federal budget for FY 1982, and other topics on R&D and public policy. Registrants will also receive the published proceedings of the conference.

For further details, write: R&D Colloquium, AAAS Office of Public Sector Programs, 1776 Massachusetts Avenue, NW, 8th Floor, Washington, DC 20036, or call (202) 467-4310



6th R&D Colloquium

Washington, 25-26 June 1981

The sixth AAAS R&D Policy Colloquium will be held on Thursday and Friday, 25 and 26 June 1981, at the SHOREHAM HOTEL, 2500 Calvert St., NW, Washington, DC 20008.

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AAAS Colloquium Advance Registration—enclosed is check or purchase order for:

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- ☐ Lunch on Thursday, 25th; ☐ Dinner on Thursday, 25th; ☐ Lunch on Friday, 26th

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- ☐ R&D: FY 81 ☐ R&D: FY 80 ☐ R&D: FY 79 ☐ R&D: FY 78 ☐ R&D: FY 77
☐ Proc. 80 Col. ☐ Proc. 79 Col. ☐ Proc. 78 Col. ☐ Proc. 77 Col. ☐ Proc. 76 Col.

Program, badge, meal tickets, and R&D: FY 82 Report will be sent about 12 June. Registrations received after 12 June will be held at the AAAS Registration Desk at The Shoreham Hotel. Previous reports ordered will be sent as soon as possible. Proceedings of 81 Colloquium will be sent as soon as available.

Mail to: AAAS Meetings R&D, 1776 Massachusetts Ave., NW, Washington, DC 20036

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(Reservations received after 24 May cannot be guaranteed)

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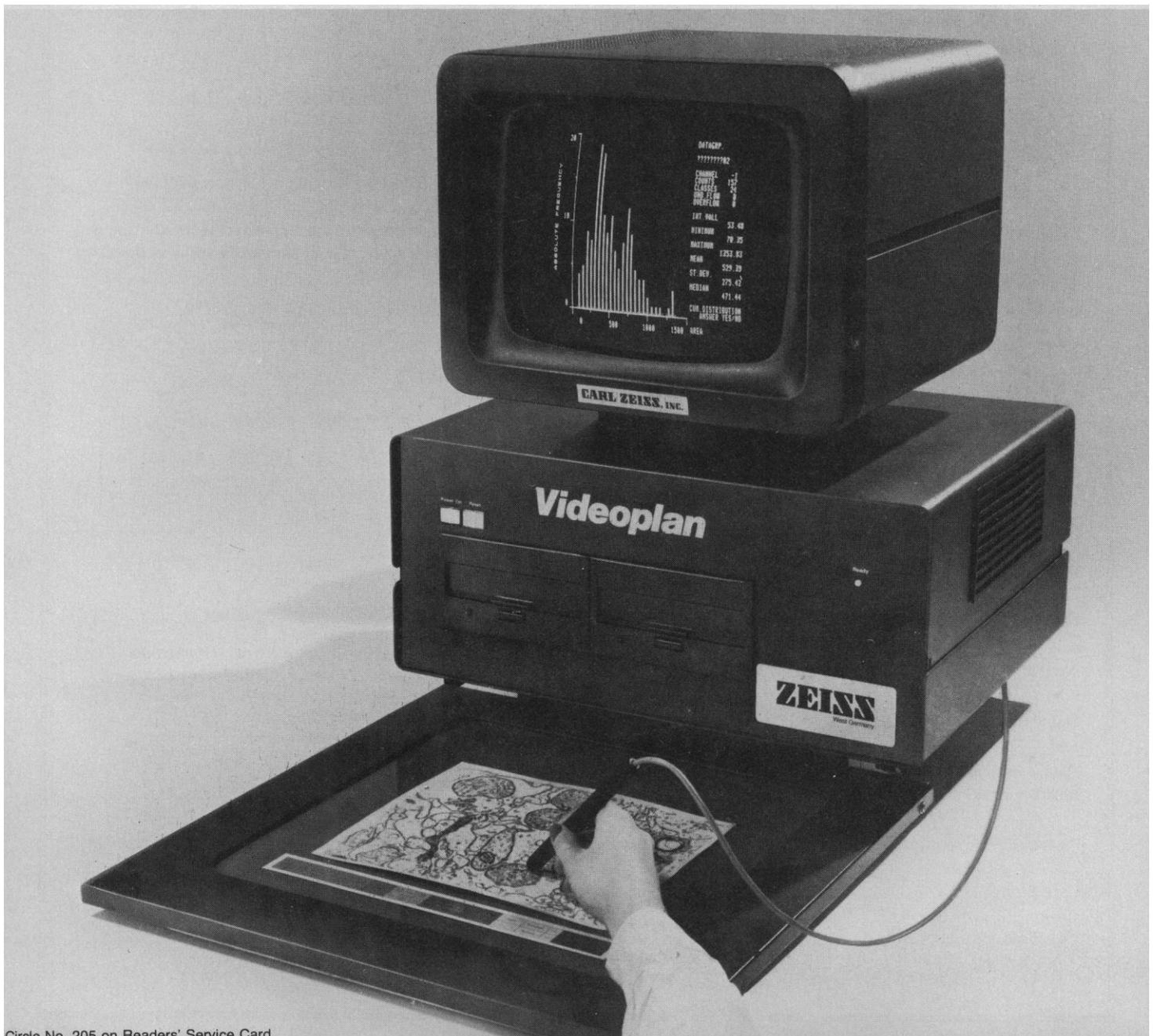
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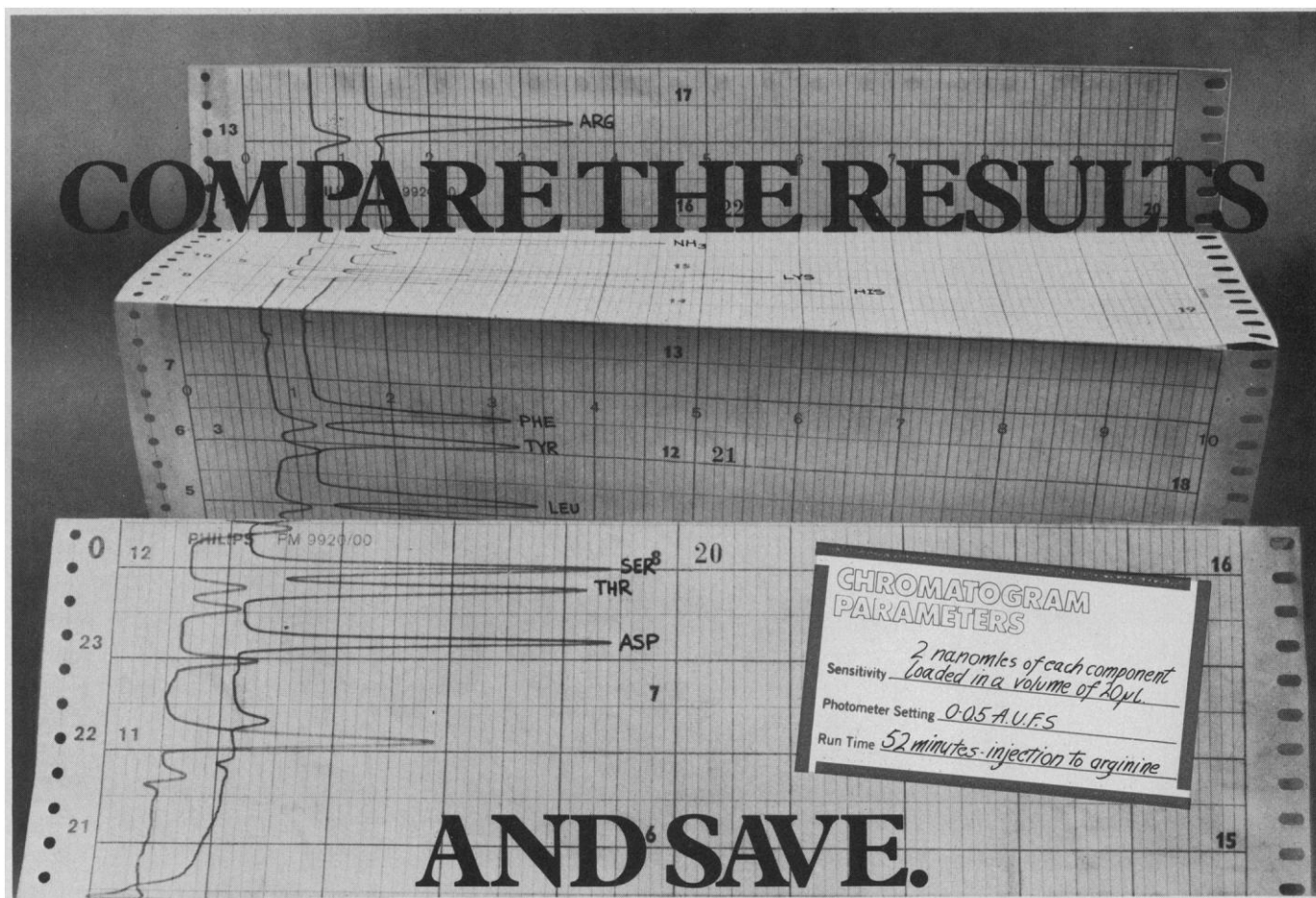
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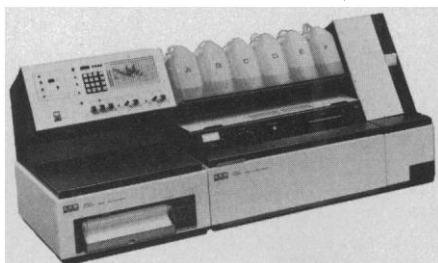
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TECHNICAL DATA SHEET

Product Name: POLYNUCLEOTIDE KINASE (T_4)
EC 2.7.1.78
ATP: 5'-diphosphopolynucleotide 5'-phosphotransferase

Recommended Storage Conditions: -20°C (DO NOT FREEZE)

Specific Lot Data: NEE-101 Lot Number: 1473-119
Catalog Number: 5000 units/ml Date of Assay: 12/7/80
Concentration: 10 mM Tris-Cl (pH 7.5); 1 mM dithiothreitol; 50 mM KCl;
Storage Buffer: 0.1 mM EDTA; 0.1 M ATP and 50% glycerol (v/v).

Assay Conditions: The enzyme is assayed according to the method of Richardson (1) using 5'-hydroxyl-terminated salmon sperm DNA as substrate in a buffer containing: 30 mM Tris-Cl (pH 7.5); 10 mM MgCl₂; 5 mM dithiothreitol; 65.4 μM ATP; 0.64 μM [³²P]-ATP.
One unit of enzymatic activity is defined as that amount of enzyme catalyzing the formation of one nmol of acid-insoluble [³²P] in 30 minutes at 37°C.

Purity: Specific Activity: 65,000 units/mg protein
Electrophoresis Data: An aliquot of polynucleotide kinase was found to migrate as a single species in SDS-polyacrylamide gel electrophoresis according to the method of Laemmli (2).

Assays for Contaminating Activities:
(1) 3'-Phosphatase (according to the method of Cameron and Uhlenbeck (3)). 10 units of enzyme are incubated with 16 mM 3'-cytidine monophosphate in a buffer consisting of: 100 mM imidazole-Cl (pH 6.0); 10 mM MgCl₂; 10 mM β-mercaptoethanol and 20 μg/ml bovine serum albumin. Inorganic phosphate (P_i) released is measured colorimetrically after 30 minutes of incubation at 37°C. Less than 0.3 nmol of phosphate were found to be released per unit of enzyme. Limit of detection: 0.3 nmol of phosphate released per unit of enzyme.
(2) Ribonuclease Activity: 5 units of polynucleotide kinase are incubated with 1.7 μg RNA (4S + 16S + 23S) (NEC-714) at 37°C for 90 minutes in 50 mM Tris-HCl (pH 7.5); 10 mM MgCl₂ and 10 mM β-mercaptoethanol. The weight of the RNA was analyzed by sedimentation through a sucrose gradient. No change in the molecular weight distribution was observed.

(Continued on Next Page)

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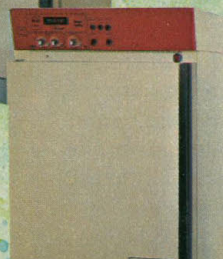
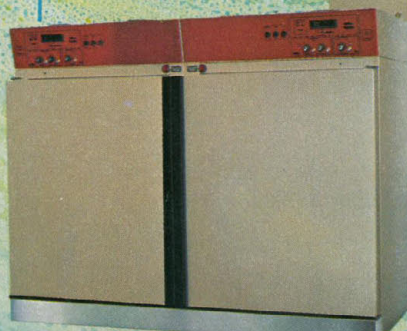


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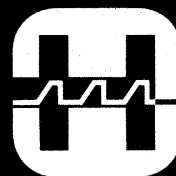
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Research Equipment Acquisition

Instrumentation defines the cutting edge of experimental and observational science. Scientists invent their own tools of discovery, quickly incorporating new phenomena into new instrumentation with which to press forward the search. Concurrently, the new analytical principles are reversed to provide new tools for design and process control. Thus yesterday's scanning electron microscope becomes tomorrow's electron beam mask generator for integrated circuits. The dynamics of the concurrent advances in scientific instrumentation and industrial technology lies at the heart of the American success story in both arenas.

Unhappily, this process is no longer as healthy in the United States as it once was. Instrumentation leadership has migrated abroad in one class of instruments after another. The obsolescence of research equipment in our universities threatens the rapid progress of science itself. Few engineering schools provide their students access to the equipment they should be expected to master in industry. Technical progress in materials science and engineering now requires access to a large number of sophisticated instruments, costing \$100,000 and up. Scientists have had to learn to share expensive instruments and to set priorities for major facilities within their fields.

The National Science Board has for several years sought to give priority to critical equipment and facilities. Unfortunately, a \$100-million addition to the National Science Foundation budget for research and instructional equipment came at a time when the pressures to bring government expenses under control have forced it out of the revised budget for fiscal year 1982.

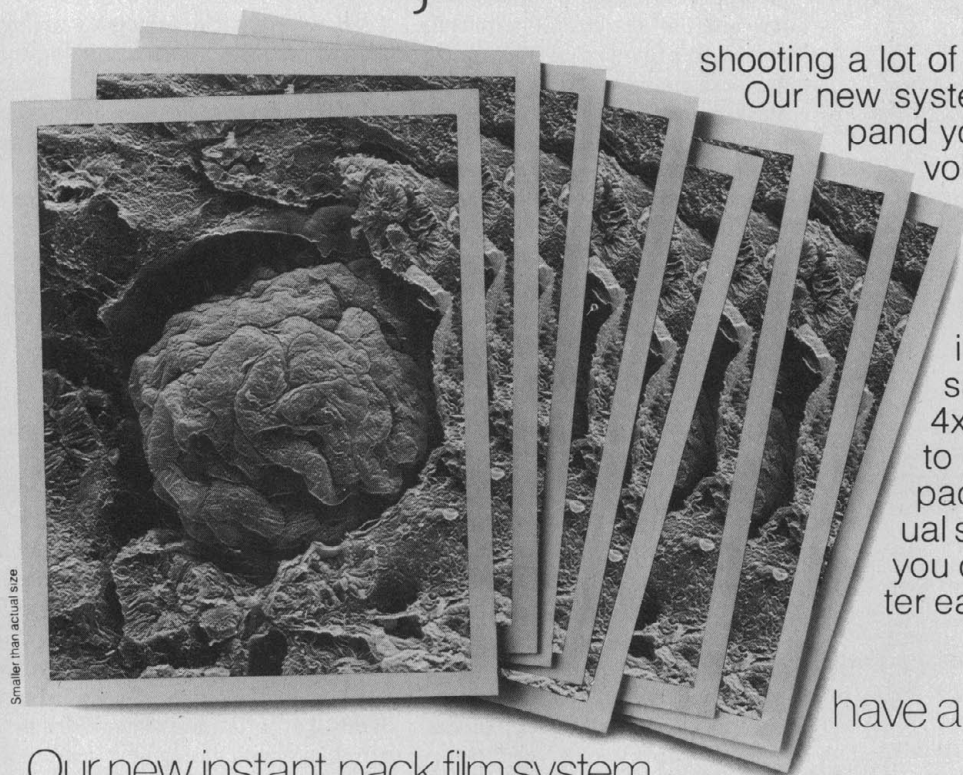
The pattern of periodic national equipment crisis must be broken. Universities must find more responsive and flexible means of allocating their limited research funds between salary and equipment costs. They need new sources of capital to supplement federal appropriations. The instrument industry needs to be given incentive to innovate with daring new instrumentation ideas, knowing that they will be rapidly tried out by demanding and expert researchers.

One way to help achieve this would be to make the Administration's investment tax credit for equipment used in research clearly available to companies offering leased equipment to nonprofit institutions. This would stimulate the leasing of scientific instrumentation to the research community. Universities might be able to capture some of the financial benefit and make equipment acquisition decisions in response to current needs with lower initial cost and without permanent commitments. New instrumentation ideas would be more readily tested in the marketplace. Older instruments would find their way out of the university research laboratory into less demanding environments.

None of this will work, however, unless the university community takes a different point of view toward equipment acquisition. Many universities purchase instrumentation as though the cost of capital were zero. Motives for purchasing equipment for permanent use by a small group are rational enough—a hedge against discontinuities in research support, administrative simplicity, and the opportunity to modify the equipment without concurrence from others. But a shift to leasing obviates the government's need to appropriate all of the capital investment up front, diminishes the role of the government contract monitor in equipment selection, and could reduce acquisition time from years to weeks.

Congress must provide sufficient funds to keep our science competitive, and the scientific community needs to look to its instrumentation acquisition strategy in the light of the changing economic environment. For if we cannot keep the U.S. instrumentation industry and the experimental scientists who depend on its capabilities in dynamic good health, not only science but economic progress will suffer.—LEWIS M. BRANSCOMB, *Chief Scientist, International Business Machines Corporation, Armonk, New York 10504, and Chairman, National Science Board*

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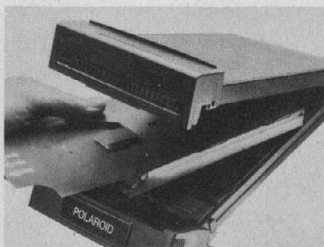
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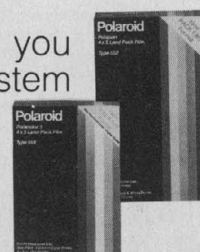
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