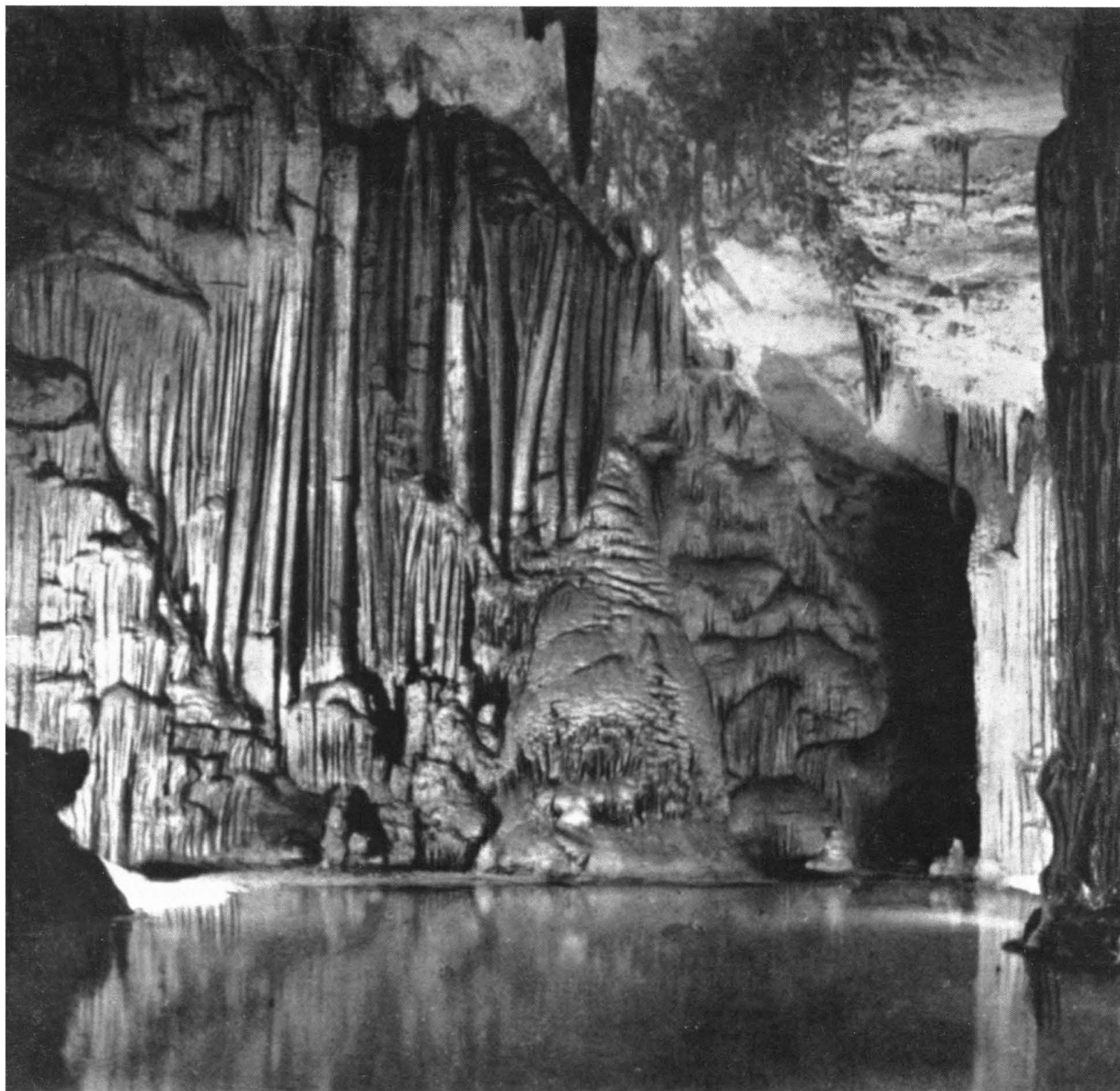


# SCIENCE

24 February 1967

Vol. 155, No. 3765

AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE



GROTTA NETTUNO

**Family traits:  
reproducibility,  
sensitivity,  
reliability.**

**Family name:  
Nuclear-Chicago  
Planchet Counting  
Systems.**

One of Nuclear-Chicago's new family of Planchet Counting Systems can deliver the answer to your counting problems. For example, with the gas flow detector in each system, you can get, in many cases, improved  $E^2/B$  for samples that quench highly in liquid scintillation systems.

That these new planchet counting systems do their job so well is the result of a number of operating innovations. For reproducible results, the *new* gas flow detector is uniformly sensitive up to the edge of the window. During windowless operation, the detector is automatically flushed by the gas for a predetermined period before counting starts and is protected by an electrostatic dust shield. The detector has low background (12-15 cpm in the standard systems) and easily replaceable windows.

Then too, the sample changer is all solid-state with no electromechanical relays and offers a wide variety of sample-changing programs. The powerful, reliable changer handles up to 150 samples.

You have a total of five systems to choose from—for normal or low-background counting, for 1¼ or 2-inch diameter planchets.

Consult your Nuclear-Chicago sales engineer for full details or write directly to us.

NUG-19-7-811

SHOWN AT RIGHT (TOP TO BOTTOM):

*Model 4338. 1¼-inch Standard System with print-out of sample number, time, and count.*

*Model 4342. 1¼-inch Low-Background System with print-out of sample number, time, and count.*

*Model 4330. 2-inch Standard System with print-out of sample number, time, and count.*

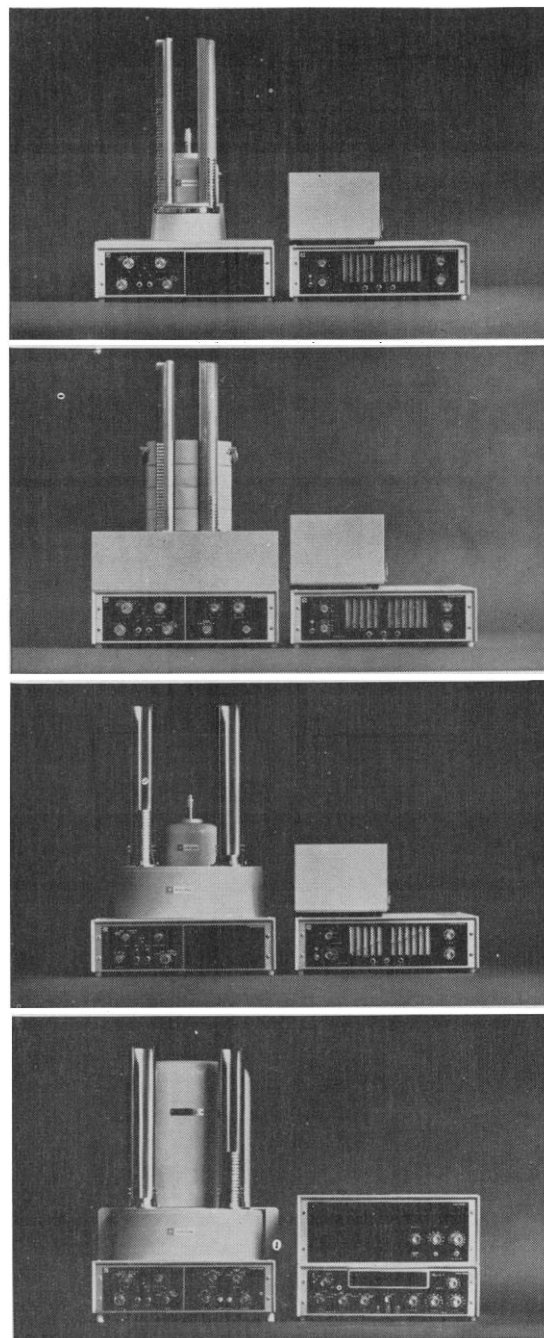
*Model 4336. 2-inch Low-Background System with print-out of sample number, time, counts, cpm, and scaler ratio.*



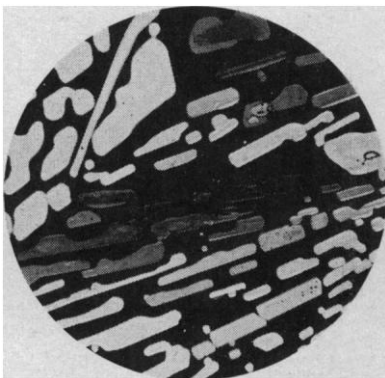
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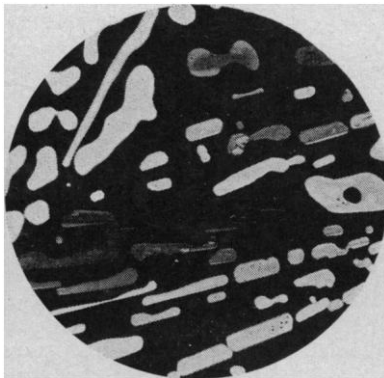
*Scientists and engineers interested in challenging career opportunities are invited to contact our personnel director.*



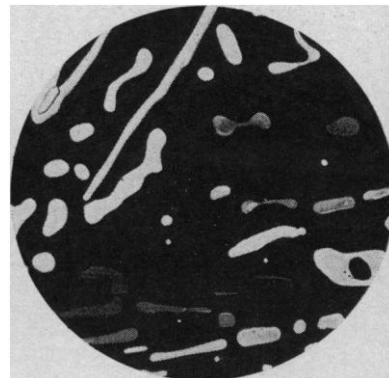
WITH CONVENTIONAL TECHNIQUES, YOU MUST DECIDE  
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NOW?



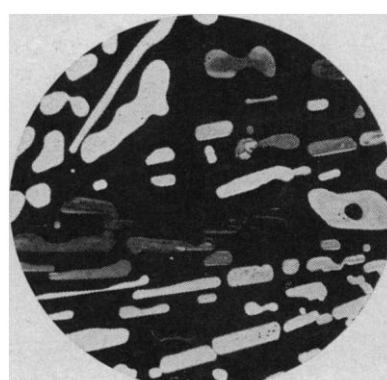
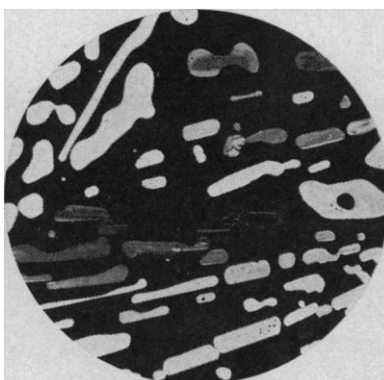
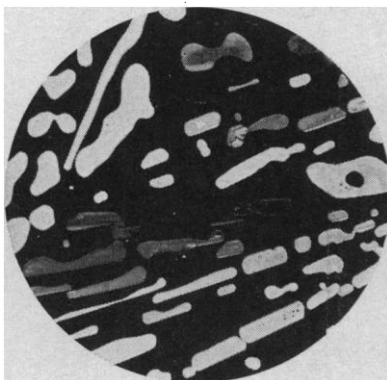
NOW?



NOW?

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WITH THE NEW METTLER FP-1 SYSTEM, THE DECISION  
IS MADE FOR YOU EXACTLY THE SAME WAY EVERY TIME



60X PHOTOMICROGRAPHS

The Mettler FP-1 is an automated instrument for the rapid and precise determination of melting and boiling points with complete objectivity. Results are presented completely in numerical form, eliminating the need for interpreting data from thermometers or tedious extraction of data from charts.

The instrument provides electronic sensing and automatic selection of the endpoint, thus removing the subjective element of human choice as a source of error. Calibrated to select the exact melting or boiling point time after time, it eliminates the need for the operator's constant attention and close visual observation during the determination.

The Mettler FP-1 can perform three melting point determinations simultaneously under exactly the

same conditions, presenting the results of all three determinations on the same digital readout panel. Thus, it is the only instrument particularly adapted to identity determinations by the mixed melting point method.

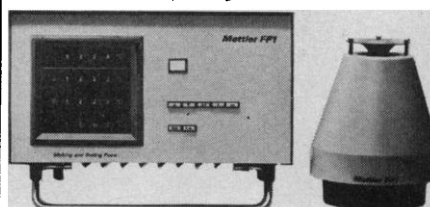
Operation of the Mettler FP-1 is simple and convenient. The operator uses the simple pushbutton controls to program the instrument, inserts the samples, and presses the start button. The instrument then completes the determination, and retains the digital results until reset for the next run.

The instrument operates over the temperature range of  $-20^{\circ}$  to  $+300^{\circ}$  C. Its electronic temperature increase program gives it a precision as high as  $\pm 0.1^{\circ}$  C. For

sub-ambient operation, its furnace unit is placed in a cold box.

Dynamics of the melting process of individual samples can be recorded simply by connecting the Mettler FP-1 to a standard time-base recorder. A recording of the melting range is a valuable aid to estimating the sample's purity.

Ask your Mettler dealer for literature describing the new Mettler FP-1 or request a demonstration or trial in your own laboratory. Write Mettler Instrument Corp., 20 Nassau St., Princeton, N. J. 08540.





24 February 1967  
Vol. 155, No. 3765

# SCIENCE

<b>LETTERS</b>	Oral Contraception Dropout Rate: <i>H. Ratner; N. B. Ryder and C. F. Westoff</i> ; Wine-Making: An Eternal Art: <i>R. D. Gerard</i> ; Methods in Parapsychology: <i>G. Murphy; C. W. Churchman</i> ; University of Western Oconomowoc: <i>C. N. Barnum</i> ; Studies of Nonrandom Groups: <i>J. C. Stanley</i> ; Astronomy's Crucial Requirements: <i>L. H. Aller</i> ; Freight Train Entries: <i>J. C. Fineman</i> ; A Biblical Tornado: <i>P. A. Chenoweth</i> ; Write a Book!: <i>P. M. Hurst</i> . . . . .	951
<b>EDITORIAL</b>	International Biological Program . . . . .	957
<b>ARTICLES</b>	The Ever Widening Gap: <i>P. M. S. Blackett</i> . . . . .	959
	Membrane Structure and Ion Permeation: <i>G. Eisenman, J. P. Sandblom,</i> <i>J. L. Walker, Jr.</i> . . . . .	965
	Innovation in Undergraduate Teaching: <i>E. M. Williams</i> . . . . .	974
	Peter Debye—An Appreciation: <i>F. A. Long</i> . . . . .	979
<b>NEWS AND COMMENT</b>	Vice President Humphrey: His Scientific Role; 200 Bev: Harmony among the Physicists; NATO: May Tackle Technology Gap; Academic Freedom: Court Upsets Loyalty Law . . . . .	981
<b>BOOK REVIEWS</b>	<i>The Politics of Conservation</i> , reviewed by <i>E. R. Richardson</i> ; other reviews by <i>F. B. Churchill, E. Kirsteuer, G. D. Mahan, C. T. Walker, R. B. MacLeod,</i> <i>T. Botts, P. M. Morse, R. W. Hamming, E. LeGoff, N. L. Johnson</i> . . . . .	989
<b>REPORTS</b>	Hexagonal Diamonds in Meteorites: Implications: <i>R. E. Hanneman, H. M. Strong,</i> <i>F. P. Bundy</i> . . . . .	995
	Molecular Beams with Energies above One Electron Volt: <i>N. Abuaf et al.</i> . . . . .	997
	Potassium-Argon Dating of Iron Meteorites: <i>L. Rancitelli et al.</i> . . . . .	999
	Radiation of Hemocyanin: Inactivation and Reactivation of Oxygen-Carrying Capacity: <i>J. Schubert and E. R. White</i> . . . . .	1000
	Fossil Actinomycetes in Middle Precambrian Glacial Varves: <i>T. A. Jackson</i> . . . . .	1003
	Ostracod "Living Fossils": New Finds in the Pacific: <i>K. G. McKenzie</i> . . . . .	1005
	American Jurassic Symmetrodonts and Rhaetic "Pantotheres": <i>A. W. Crompton</i> and <i>F. A. Jenkins, Jr.</i> . . . . .	1006

BOARD OF DIRECTORS	ALFRED S. ROMER Retiring President, Chairman		DON K. PRICE President		WALTER ORR ROBERTS President-Elect		BARRY COMMONER DAVID R. GODDARD		HUDSON HOAGLAND GERALD HOLTON	
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# AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE

Equilibration Temperatures of Iron and Magnesium in Chondritic Meteorites: <i>W. R. Van Schmus and D. M. Koffman</i> .....	1009
Kiaman Magnetic Interval in the Western United States: <i>B. E. McMahon and D. W. Strangway</i> .....	1012
Composition of the Ancient North American Crust: <i>K. C. Condie</i> .....	1013
Gravity Increase at the South Pole: <i>J. C. Behrendt</i> .....	1015
Fibrinogen from Human Plasma: Preparation by Precipitation with Heavy-Metal Coordination Complex: <i>M. E. Brown and F. Rothstein</i> .....	1017
Sarcoplasmic Reticulum of Striated Muscle: Localization of Potential Calcium Binding Sites: <i>C. W. Philpott and M. A. Goldstein</i> .....	1019
Deuterium Oxide: Direct Action on Sympathetic Ganglia Isolated in Culture: <i>M. R. Murray and H. H. Benitez</i> .....	1021
Photoinduced DNA-Protein Cross-Links and Bacterial Killing: A Correlation at Low Temperatures: <i>K. C. Smith and M. E. O'Leary</i> .....	1024
Nobiletin Is Main Fungistat in Tangerines Resistant to Mal Secco: <i>A. Ben-Aziz</i> ....	1026
Sex Chromosomes in Lizards: <i>C. J. Cole, C. H. Lowe, J. W. Wright</i> .....	1028
Depression in Infant Monkeys Separated from Their Mothers: <i>I. C. Kaufman and L. A. Rosenblum</i> .....	1030
Hibernation Disruption Caused by Hypothalamic Lesions: <i>E. Satinoff</i> .....	1031
Phenylketonuria: Enduring Behavioral Deficits in Phenylketonuric Rats: <i>R. L. Schalock and F. D. Klopfer</i> .....	1033
Fighting and Death from Stress in a Cockroach: <i>L. S. Ewing</i> .....	1035
Technical Comments: Tornadoes: Puzzling Phenomena and Photographs: <i>L. B. Loeb</i> ; Partial Pressure of Anesthetic Gases and Their Mode of Administration: <i>S. C. Glauser et al.</i> .....	1037
<b>MEETINGS</b> Mathematics: International Congress: <i>L. Lorch</i> ; Chromosomes and Leukocytes: <i>M. A. Kelsall</i> ; Forthcoming Events .....	1038

MINA S. REES ATHELSTAN F. SPILHAUS	H. BURR STEINBACH JOHN A. WHEELER	PAUL E. KLOPSTEG Treasurer	DAEL WOLFLE Executive Officer
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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 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

Grotta Nettuno on Sardinia in the Mediterranean Sea is, by its enormous size and its location between land and sea, one of the extreme forms of marine caves. The lake shown is one of the largest known subterranean bodies of sea water which is still connected (but very slightly) with the open sea. In such caves the effect of partial isolation and the influence of fresh water on marine biota can be studied. See review of *Biologie der Meereshöhlen*, page 990. [With permission of Paul Parey Publishers, Hamburg and Berlin; from Sommaruga 1964]

# 4 ways to view displays with the Tektronix Type 564

## split- screen storage oscilloscope

The Tektronix Type 564 is virtually two instruments in one. It offers all the advantages of a storage oscilloscope plus those of a conventional oscilloscope.

### Split-Screen Displays

An unique split-screen display area enables you to simultaneously use either half of the screen for storage and the other half for conventional displays, or use the entire area for stored or conventional displays.

Independent control of both halves of the screen permits you to take full advantage of the storage facilities. For example, you can use half the screen to store a reference waveform, the other half to display waveforms for comparison. You can erase or retain either half of the display area as you choose.

### Bistable Storage Advantages

With bistable storage oscilloscopes, such as the Type 564 and Type 549, the contrast ratio and brightness of stored displays are constant and independent of the viewing time, writing and sweep speeds, or signal repetition rates. This also simplifies waveform photography. Once initial camera settings are made for photographs of one stored display, no further adjustments are needed for photographs of subsequent stored displays.

Storage time is up to one hour, and erase time is less than 250 milliseconds. An illuminated 8 cm by 10 cm graticule facilitates measurements and aids in taking photographs with well-defined graticule lines. Adding to the operating ease is a trace position locator that indicates, in a nonstore area, the vertical position of the next trace or traces.

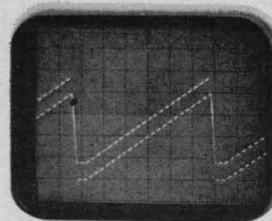
Tektronix bistable storage cathode ray tubes are not inherently susceptible to burn-damage and require only the ordinary precautions taken in operating conventional oscilloscopes.

### Plug-In Unit Adaptability

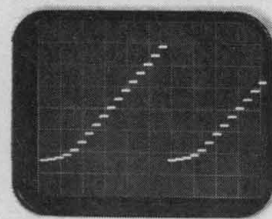
The Type 564 accepts Tektronix 2 and 3-series plug-in units for both vertical and horizontal deflection. Display capabilities of these units include single and multi-trace with normal and delayed sweep; single and multiple X-Y; low-level differential; dual-trace sampling; spectrum analysis, and many other general and special purpose measurements.

Type 564, without plug-in units . . . . .	\$875
Rack-Mount RM564 . . . . .	\$960
Similar electrical characteristics to Type 564. 7" high.	
Type 3A6 Dual-Trace Amplifier Unit . . . . .	\$540
DC to 10 MHz from 10 mV/div to 10 V/div. 5 display modes. Internal signal delay line.	
Type 3B4 Time Base Unit . . . . .	\$400
Sweep speeds from 0.2 $\mu$ s/div to 5 s/div. Single sweep. Up to X50 direct-reading magnifier extends fastest sweep to 50 ns/div.	

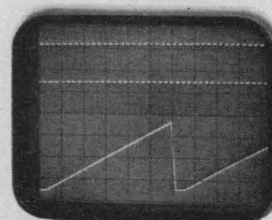
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Entire screen can be used for a stored display.

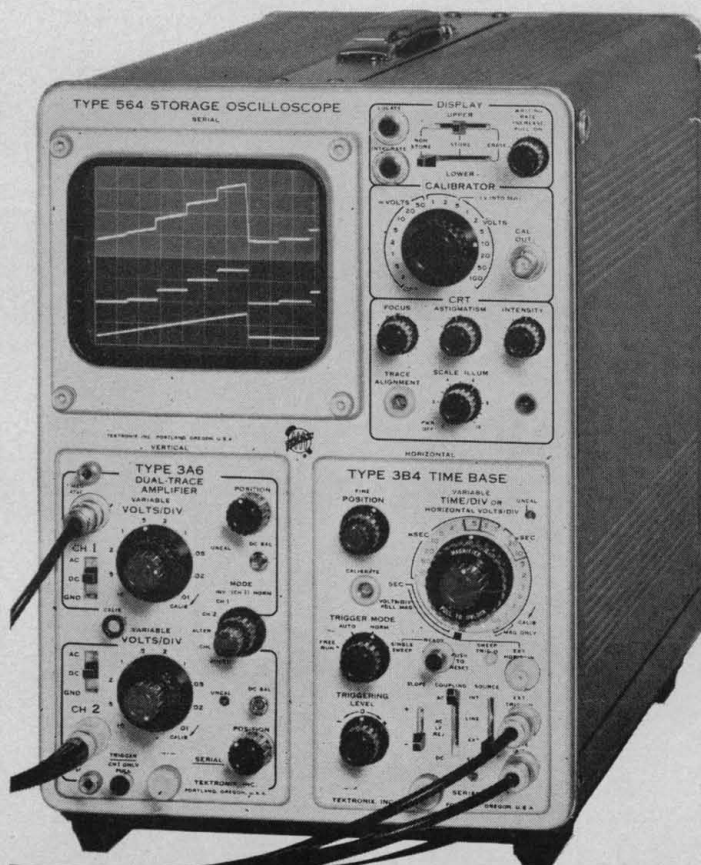


Entire screen can be used for a nonstored display.



Each half of split-screen can be used independently for stored displays.

Either half of the split-screen can be used for a stored display, the other half for a nonstored display. (Shown below).

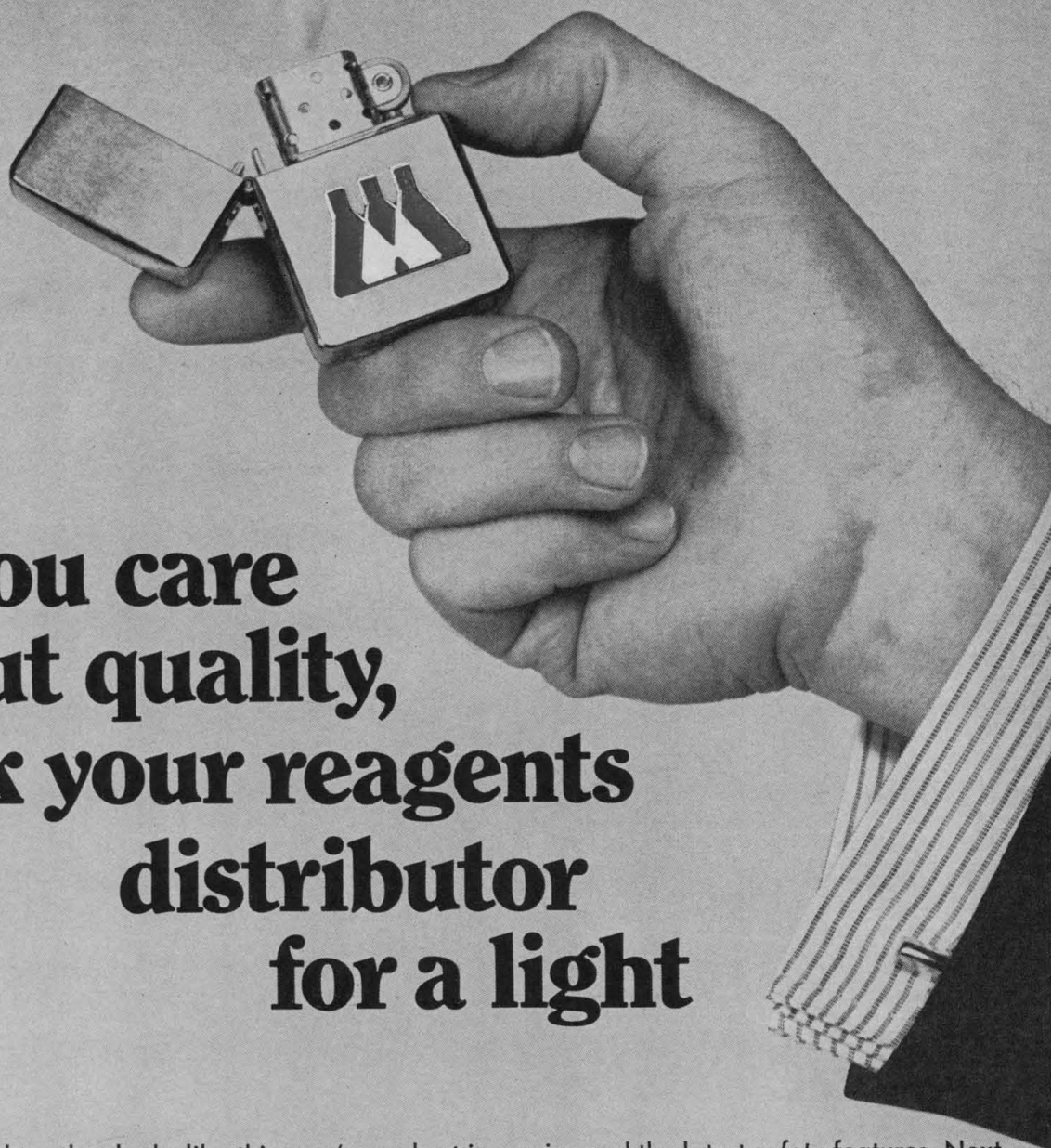


**Tektronix, Inc.**



For complete information, contact your nearby Tektronix field engineer or write:  
Tektronix, Inc., P.O. Box 500, Beaverton, Oregon 97005





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**2. Clinical affiliation for occupational therapists.** Occupational Therapy Students may be selected for participation in the 36-week Army clinical affiliation. This unique program includes supervised training and experiences second to none. As a second lieutenant, you may accumulate creditable time towards pay and longevity while receiving your training.





**3. Physical therapy program for college graduates.** The Army offers college graduates one of the finest physical therapy programs in the Nation. As a commissioned officer you will attend the Medical Field Service School at Fort Sam Houston, Texas. After completing this curriculum you will be fully qualified for military or civilian practice.

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on cases seldom seen in civilian practice. You will work on the finest professional staffs. You will have broad opportunities for continuing education, professional advancement and travel that are designed to meet your professional and personal interests.

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## Army

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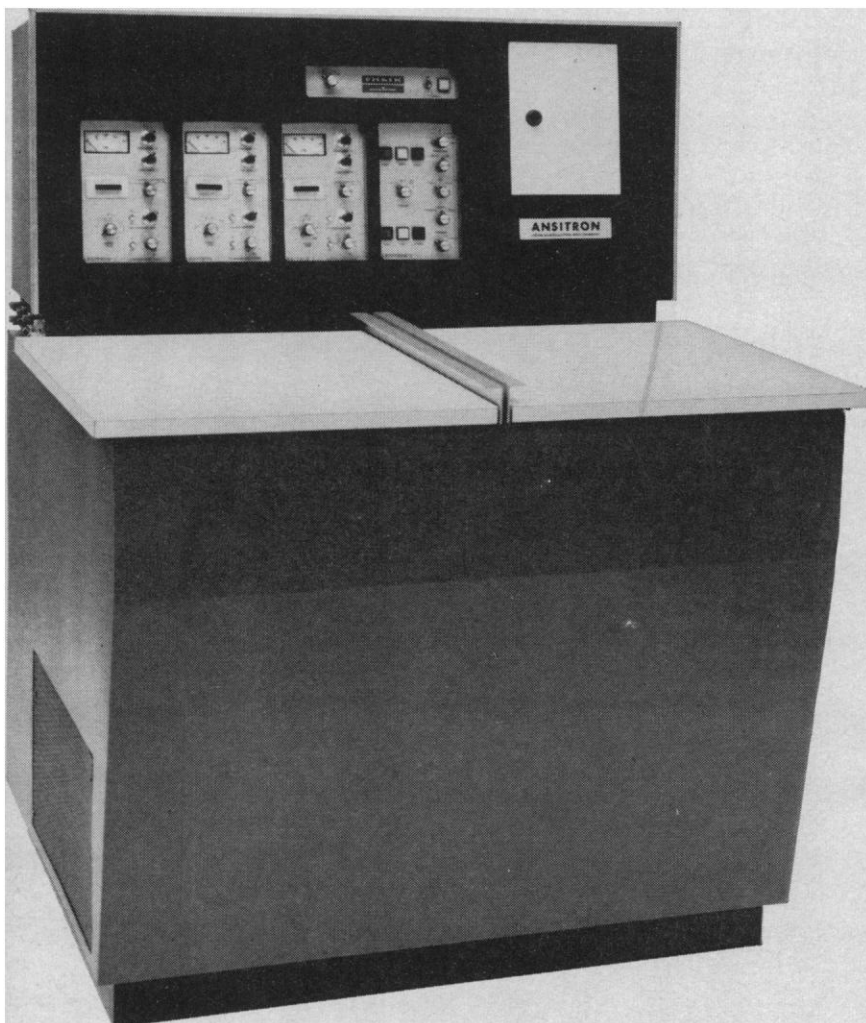
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My major is \_\_\_\_\_  
I expect to graduate in \_\_\_\_\_

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My major was \_\_\_\_\_  
I am interested in  
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☐ physical therapy.

☐ I am a qualified physical therapist.  
☐ I am a qualified occupational therapist.

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**LOGARITHMIC AMPLIFICATION**... as stable as the linear type. Combined with pulse summation, it enables pulses from 2 keV to 2 MeV to be processed without distortion, overload, or any need for HV and gain controls. Special "B-Set" plug-in discriminator modules insure instant, repetitive, error-free setting of channel windows.

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- 200 sample capacity in temperature-controlled compartment
- Channels-ratio capability
- Live timing
- All silicon solid-state circuitry

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1275 Mamaroneck Avenue  
White Plains, N.Y.

**PICKER**  
nuclear

# high-contrast, high-definition electron micrograph enlargements

The S-45EM is a special version of the Durst S-45, a 4x5 enlarger widely used in commercial, industrial and scientific photography. Both share the same quality of performance, the same ruggedness of construction and ease of operation. The S-45EM offers additional features of special advantage in electron photomicrography.

Chief among these is provision for point-source illumination with complete facilities for centering and focusing the lamp. Three types are available: 100-watt and 200-watt mercury arcs and 100-watt tungsten, all interchangeable.

The use of an adjustable, specular light source, in conjunction with clear, striae-free condensers, surface-coated reflex mirror and high-resolution lenses, assures the contrast quality and definition so essential in electron micrographs.

Seven negative carriers are available, all of the glassless type. Four are for plates: 2x10", 6.5x9cm, 3 1/4x4", 3 1/4x4 1/4"; three for film: 35mm with sprocket holes, 35mm without sprocket holes, and 2x10". Other sizes are obtainable on special order. Enlarging lens and condensers can be readily changed to cover the needs of any negative size used.

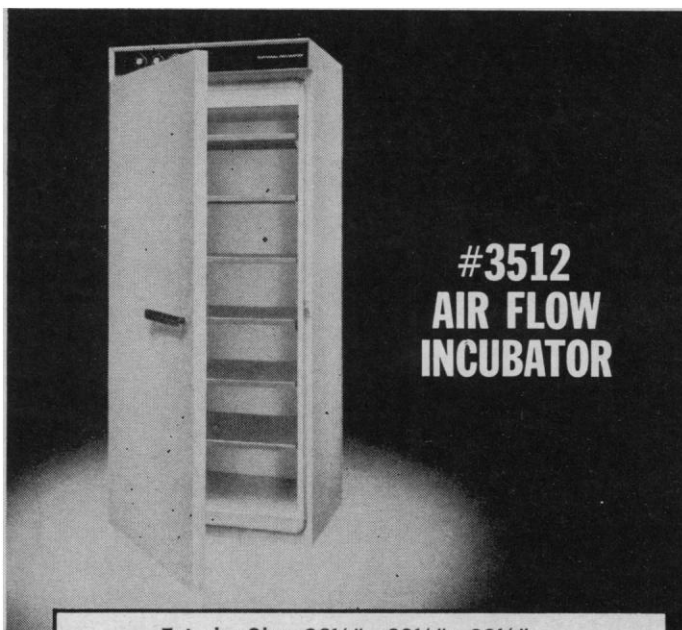
The quality capabilities of the S-45EM are not limited to micrographic needs alone. They are equally commendable for conventional photographic work, especially where critical sharpness is required.

The EM-45 is not sold through regular photographic outlets but through specially qualified dealers. For the name of the one nearest you, and other information, write:

Durst (usa) Inc., Photo Technical Div.  
Garden City, N.Y. 11533.  
Subsidiary of Ehrenreich  
Photo-Optical  
Industries, Inc.

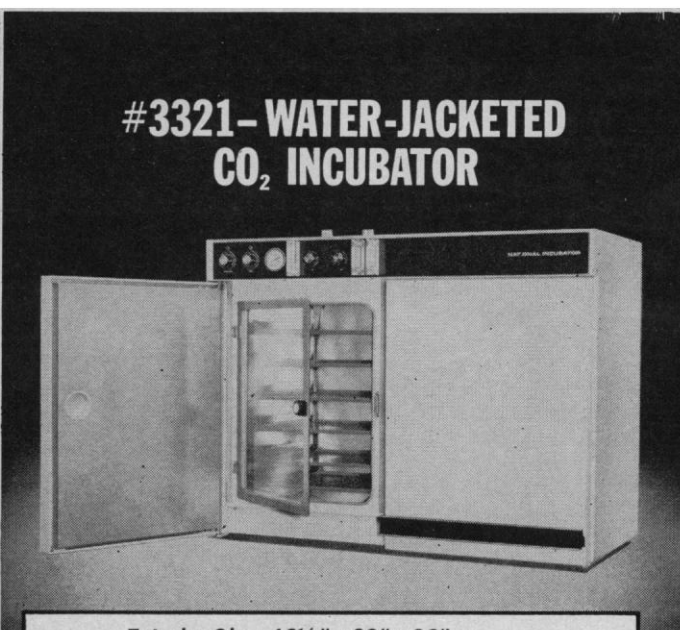






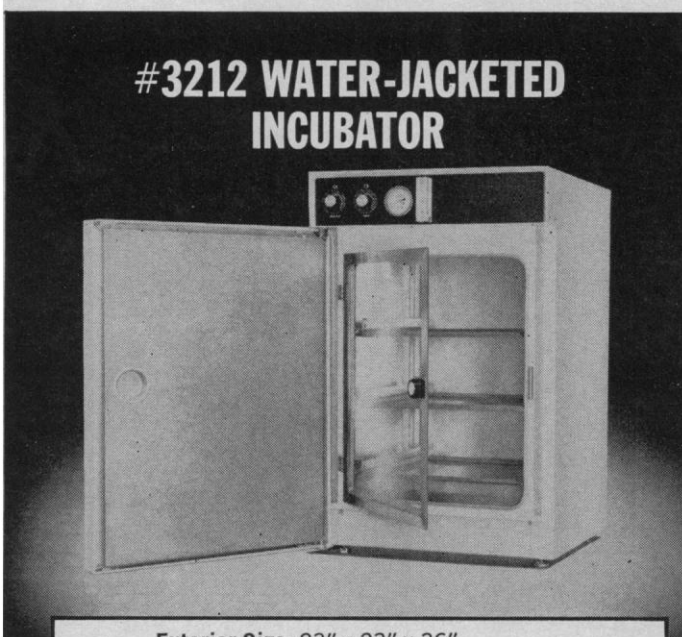
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Exterior Size: 36 $\frac{1}{8}$ " x 29 $\frac{1}{8}$ " x 88 $\frac{1}{2}$ "  
 Interior Size: 31" x 24 $\frac{1}{2}$ " x 72 $\frac{1}{2}$ "  
 Temperature Range: Room to 65°C  
 Temperature Variation:  $\pm 0.5^{\circ}\text{C}$   
 Shelf Capacity: 30 square feet  
 Electrical: 1500 watts; 115, 208, 230 volts



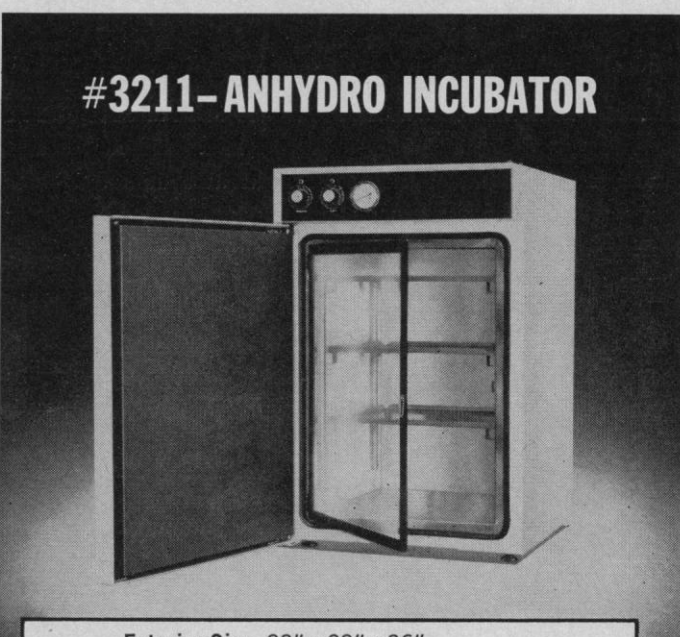
### #3321 - WATER-JACKETED CO<sub>2</sub> INCUBATOR

Exterior Size: 46 $\frac{1}{4}$ " x 23" x 36"  
 Interior Size, Left: 19" x 18" x 26 $\frac{3}{4}$ "  
 Right: 19" x 18" x 26 $\frac{3}{4}$ "  
 Temperature Range: Room to 65°C  
 Temperature Variation:  $\pm 0.3^{\circ}\text{C}$   
 Shelf Capacity: 20.5 square feet  
 Electrical: 500 watts, 115 volts



### #3212 WATER-JACKETED INCUBATOR

Exterior Size: 23" x 23" x 36"  
 Interior Size: 18 $\frac{7}{8}$ " x 18" x 26 $\frac{3}{4}$ "  
 Temperature Range: Room to 65°C  
 Temperature Variation:  $\pm 0.3^{\circ}\text{C}$   
 Shelf Capacity: 10 square feet  
 Electrical: 250 watts; 115 volts



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Exterior Size: 23" x 23" x 36"  
 Interior Size: 18" x 17 $\frac{1}{2}$ " x 26"  
 Temperature Range: Room to 65°C  
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 Shelf Capacity: 5 square feet  
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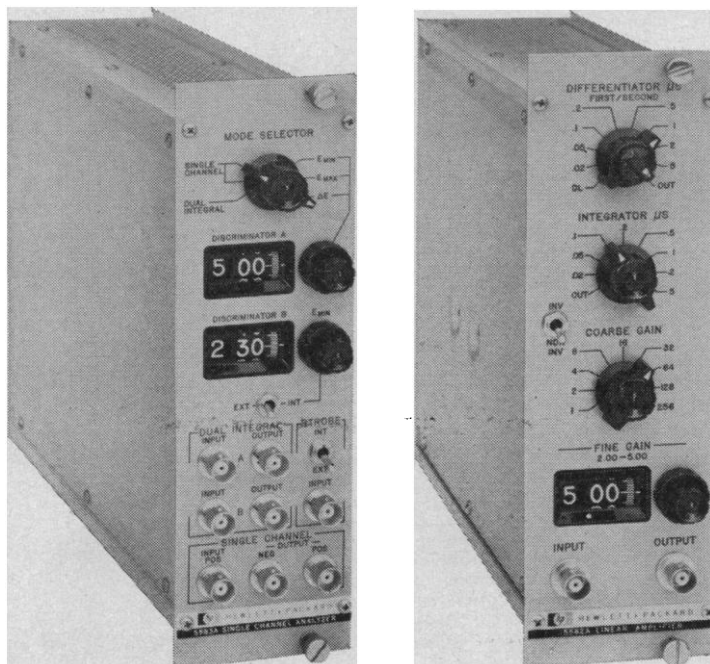
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# New facts to change a lot of old ideas

Check out the latest in pre-coated preparative and analytical TLC:  
The new E. Merck (Darmstadt) high-capacity, abrasion-resistant glass plates

## Fact I

### Pre-coated Preparative Layer Chromatography.

A new fact in itself. For the first time a complete set of apparatus and pre-coated glass plates are available for separation of larger quantities—up to 0.5 gm. on a single 20 x 20 cm. plate.

## Fact II

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Dry layer thickness is 2 mm. Abrasion-resistance is equal to that of Merck pre-coated analytical glass plates. Because of the remarkable stability of the layer, conventional pipets may be used for streaking samples. Packaged in lots of 12 (20 x 20 cm.).

## Fact III

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1) Much shorter developing times—less than one day. 2) Sharper, clearly distinct separations because of the higher activity of the layer (smaller particle size range from 10-40 microns). 3) Substances are localized as a band on one surface, rather than in an undefined area. 4) The procedure requires only a fraction of the solvent volume necessary for column separations, and quantities ranging from 0.01 to 0.5 gm. can be separated on a single 20 x 20 cm. plate. 5) Identification of

substances is possible after each individual development (column separations are identified only after eluting the zones). 6) Zones are easily removed. 7) Ideal developing conditions can be selected by rapid pretesting on an analytical thin-layer plate.

## Fact IV

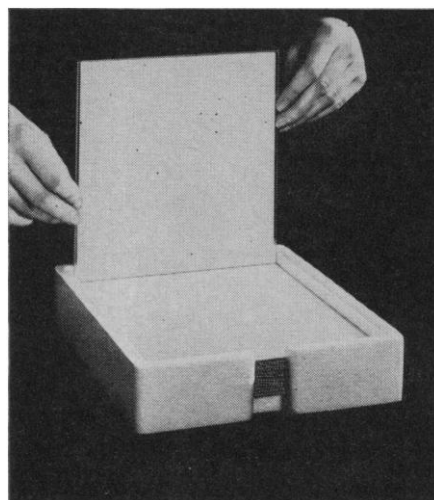
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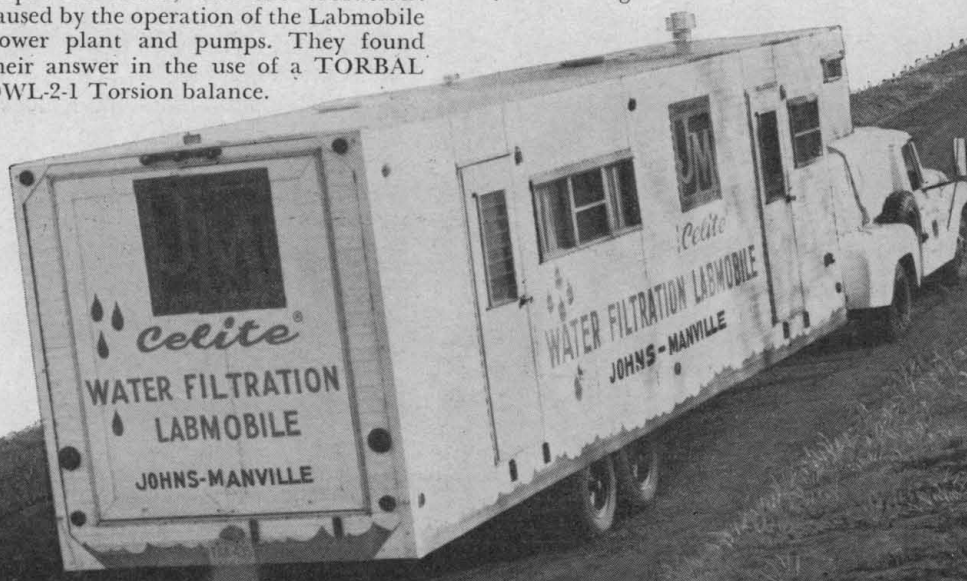
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7. Phosphodiesterase (bovine spleen)
8. Phosphodiesterase, venom
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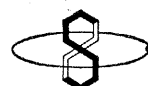
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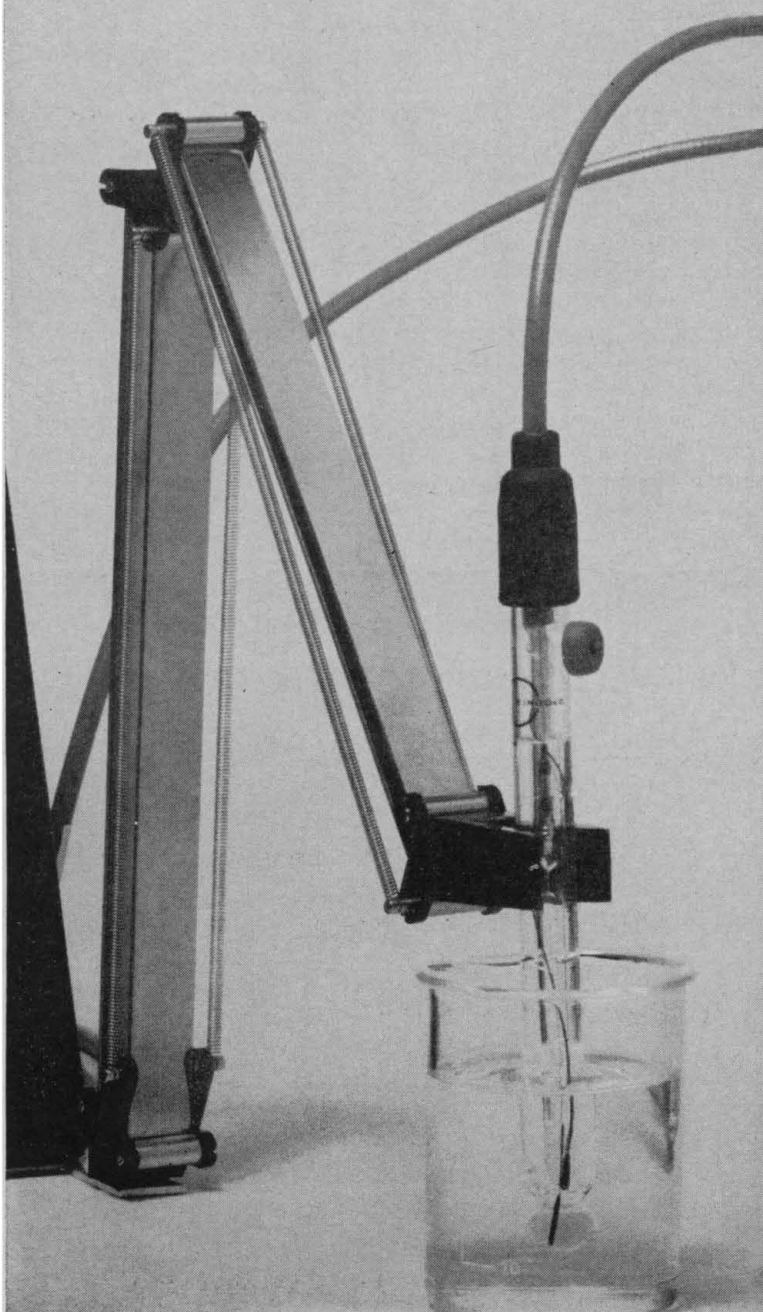


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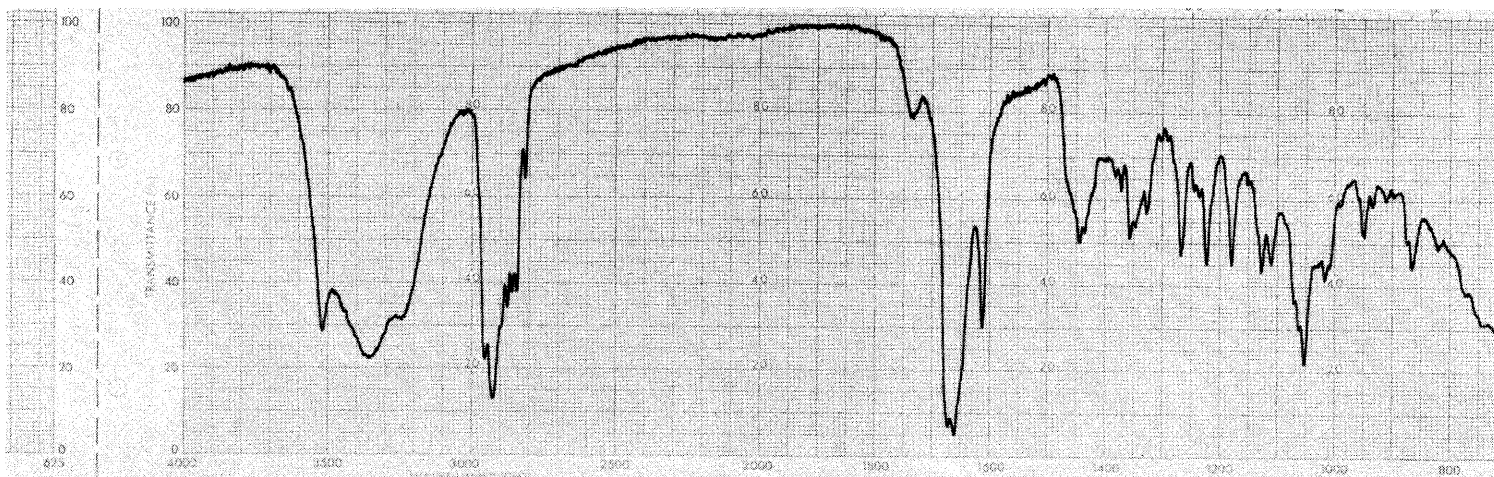
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**TESTOSTERONE.** The sample was prepared as a 0.5 KBr disc in a Perkin-Elmer microdie using two micrograms of the hormone in 1.1 mg. of KBr powder. The scan took 12 minutes, using reference attenuation at 10% and a 1 x 4 beam condenser. Excellent resolution and low noise level are demonstrated.

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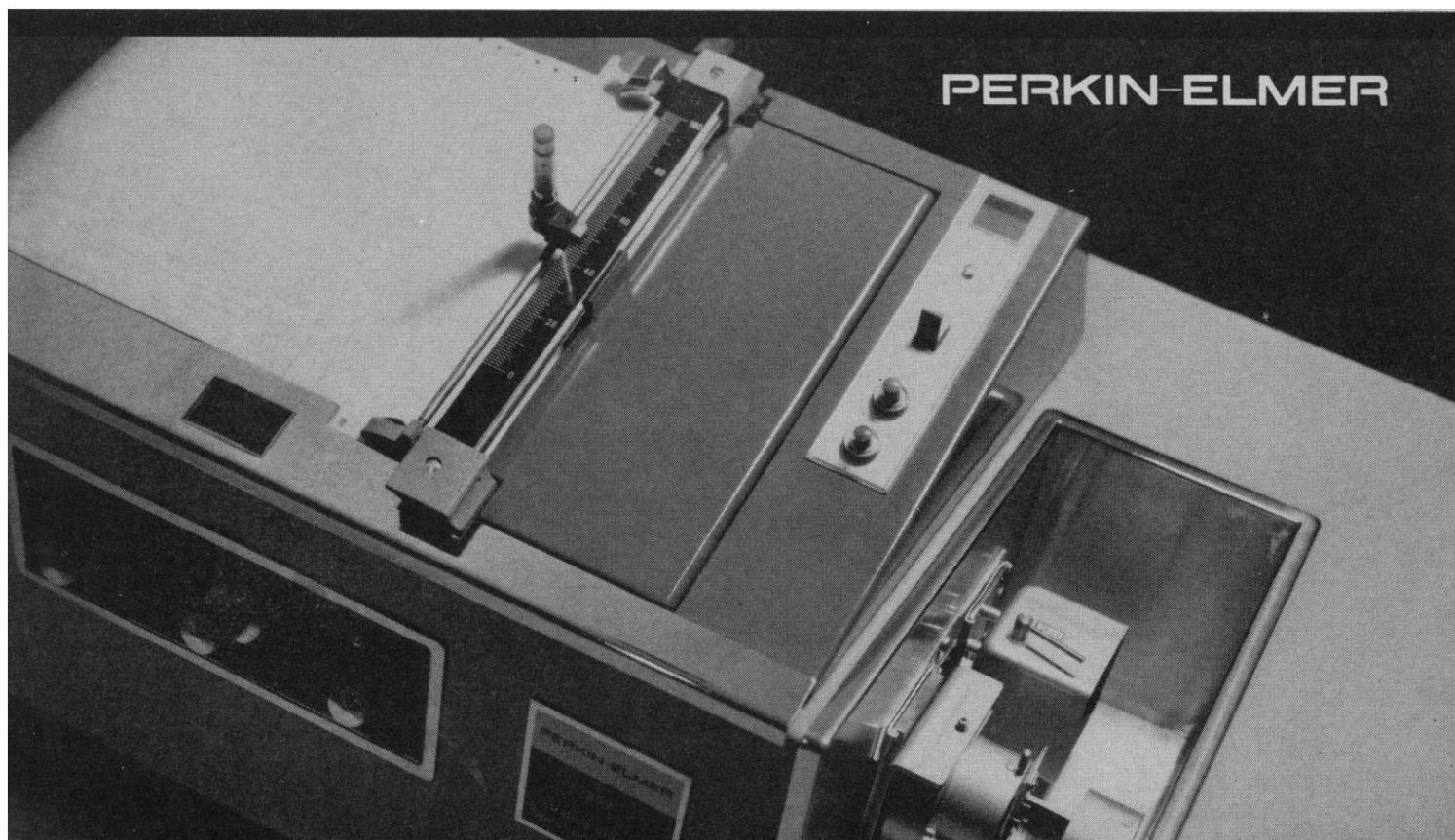
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million over a period of 5 or 6 years. None of these proposals has found support.

Meanwhile, a joint project sponsored by West European countries to build a 140-inch (356-centimeter) telescope in Chile is well along, and it seems likely a 150-inch telescope in Australia will soon be started with joint British-Australian support. In the northern hemisphere the Canadians are building a 150-inch telescope in British Columbia.

Thus, it appears, the great American contribution to observational astronomy—the large reflecting telescope at an excellent mountain site—is being taken over by alert scientists in other parts of the world with support from their governments. A significant shift in leadership may result in this area of astronomy. Similarly no progress must be reported with respect to support for the plans of American radio astronomers for large paraboloids and arrays.

We can look ahead to exciting discoveries from the orbiting observatories that are to be provided by the space program. But when it comes to equally exciting follow-up—the sort of cream that went to the optical astronomers who used the radio clues to make the identifications and astounding discoveries of the quasars—we have to record with considerable sadness, especially for the younger astronomers, that when these discoveries are in the southern hemisphere (and we can guarantee that many will be made there) we may be limited to congratulating our fortunate colleagues in other lands.

LAWRENCE H. ALLER  
Department of Astronomy,  
University of California,  
Los Angeles 90024

## References

1. *Ground-Based Astronomy, A Ten-Year Program* (National Academy of Sciences, Washington, D.C., 1964).
2. *Physics, Survey and Outlook* (National Academy of Sciences, Washington, D.C., 1966).

## Freight Train Entries

I was amused by Miller's proposal (Letters, 6 Jan.) for a "Freight Train Award," and am grateful to Peoples for the provision of a name by which this construction may be known and ridiculed. I submit a few examples which the readers of *The Physical Review* have narrowly escaped in the last 2 years:

"... the Bloch function modulated effective mass envelope wave functions.

A distorted-wave single-particle excitation with charge exchange calculation. . . .

"... the constant pressure heat capacity temperature maxima and minima. . . .

"... the rare-earth local moment-free electron-like conduction electron exchange integral coupling. . . ."

The hyphens, if any, are the author's. Hyphens are generally avoided in the freight train construction except where they add significantly to the confusion.

J. C. FINEMAN  
The Physical Review, Brookhaven  
National Laboratory, Upton, New York

## A Biblical Tornado

Add to the early sightings of luminous tornadoes (Letters, 6 Jan.) the report of Ezekiel (1:4):

"And I looked, and, behold, a whirlwind came out of the north, a great cloud, and a fire infolding itself, and a brightness was about it, and out of the midst thereof as the colour of amber, out of the midst of the fire."

PHILIP A. CHENOWETH  
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Tulsa, Oklahoma 74105

## Write a Book!

In commenting upon Abelson's editorial (11 Nov., p. 727), van Bavel (Letters, 6 Jan.) alludes to additional ways of circumventing the editorial review process, namely, publication of "transactions" in bound form. He fails to mention, however, an even sneakier gambit employed by those who wish to present findings or theories that are repugnant to the highest arbiters of scientific thought: Write a book! The crafty entrepreneurs of commercial publishing firms are seldom disposed to seek the critical review necessary to ensure that data and interpretations are acceptable to the various editorial panels in the author's field. Choice of this medium not only permits expression of heresies, but also adds ill-gotten financial gain to the considerable number of brownie points accruing to the malefactor.

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## International Biological Program

In our times of unprecedented change, biologists tend to be conservative. They are well aware of the rapidly growing abilities of their fellow human beings to alter the face of the earth through the enormous physical power of technology. But they are equally aware that the physical alterations produced by technology can bring about unknown, far-spreading, and often destructive changes in the web of life that is stretched so thinly over the surface of our planet. Our technology has outpaced our understanding; our cleverness is growing faster than our wisdom.

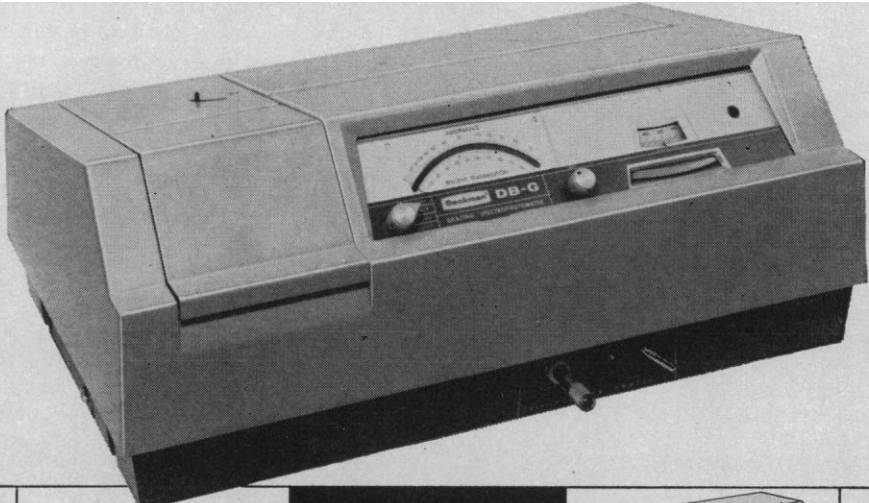
Our goal should be, not to overcome the natural world, but to live in harmony with it. To attain this goal we must learn how to control not only the external environment but ourselves. Especially we need to learn how to avoid irreversible change if we are going to be able to assure for future generations the opportunity to choose the kind of world in which they want to live. Biologists realize they understand too little about the complex interrelationships among living things to be able to predict the effects of technical change or to help the technologists in conserving the values and utilizing the abundance of the world of life. They believe greater understanding will make it possible for man to respond to opportunity as well as to react to need. To gain such understanding is the underlying purpose of the International Biological Program.

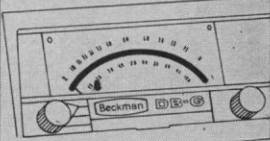
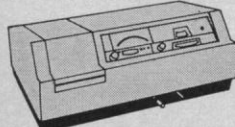
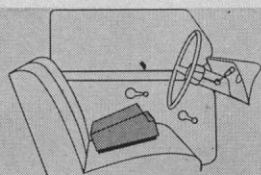
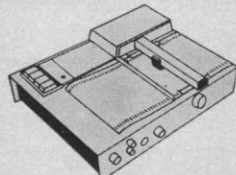
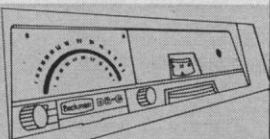



This Program has three related objectives: human welfare, scientific advance, and the development of international scientific cooperation. These three objectives cannot be separated. Biologists can contribute uniquely to human welfare only by advancing scientific understanding, and the basic premise of the International Biological Program is that the growth of understanding will be accelerated by international cooperation among the world's biologists.

To be effective, the program must have a certain concentration. It should focus on those aspects of human welfare that will most benefit from international cooperation in biological research. Our scientific objectives are similarly limited. Our basic interest is the development of scientific ecology in its broadest sense, with special emphasis on the genetics and dynamics of populations; the factors that control biological productivity; the ways in which plants and animals, and especially men, adapt to their environment; and the changing distribution of living things in the sea and the air, and on the land.

If scientific opportunities are to be created for the future, scientists of different countries will need to cooperate in the conservation of natural areas as well as in research. New research methods must be developed and old ones greatly extended. In the past, ecologists have studied particular limited communities; now, work on a few large-scale systems is needed to test and extend our understanding. New approaches to worldwide biological surveys are needed to improve the level of description of the biosphere. If the United States is to play its part, individual American biologists, working by themselves or with groups of colleagues, must take the lead. The chief purpose of this editorial is to call attention to some of the opportunities and to encourage American biologists to think of others.—ROGER REVELLE, *Chairman, U.S. National Committee for the International Biological Program*

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simple, and accurate method for indicating hormonal changes during pregnancy and the postpartum period. However, the cause and effect relations between LAPA and sex hormones are not known. An elevated LAPA index was considered a better test for pregnancy than the *Rana pipiens* or the human chorionic gonadotrophin tests.

Several hypotheses on regulatory mechanisms of LAPA were presented. The gene-dosage hypothesis would account for the abnormalities resulting in trisomy-21 in children and in strains of cultured leukocytes from patients with trisomy-21. Other suggestions on the mechanism of LAPA control included the possibilities of a complex interaction of physiological and genetic determinants, hormonal action on granules of neutrophils, the presence of several types of granulocytes in blood, and a shorter half-life of neutrophils in Down's syndrome.

Leukocyte glucose-6-phosphate dehydrogenase (G6PD), which is sex-linked in man and other animals, is also elevated in Down's syndrome. Three lines of evidence indicate that genetic control of G6PD is the same in leukocytes as erythrocytes.

A monograph containing the 30 papers will be published by the New York Academy of Sciences, the sponsor of this conference.

MARGARET A. KELSALL  
Cleveland Psychiatric Institute,  
Cleveland, Ohio

## Forthcoming Events

### March

8-10. **Viscoelastic Response of Engineering Materials**, Boston, Mass. (R. H. Supnick, 4 Mercer Rd., Natick, Mass.)

9-11. **National Medicolegal Symp.**, Miami Beach, Fla. (Miss B. Spies, Law Dept., American Medical Assoc., 535 N. Dearborn St., Chicago, Ill. 60610)

10-11. **National Conf. on Rural Health**, Charlotte, N.C. (B. L. Bible, Secretary, American Medical Assoc., 535 N. Dearborn St., Chicago, Ill. 60610)

10-12. **American Assoc. of Pathologists and Bacteriologists**, Washington, D.C. (J. L. Orbison, School of Medicine and Dentistry, Univ. of Rochester, 260 Crittenden Blvd., Rochester, N.Y.)

10-15. **American Assoc. of Pathologists and Bacteriologists**, 64th annual mtg. and Intern. Acad. of Pathology, 56th annual mtg., Washington, D.C. (Miss J. Graves, Intersociety Committee on Pathology Information, 1501 New Hampshire Ave., NW, Washington, D.C. 20036)

12. **Mental Depression**, symp., Washington, D.C. (Dr. Z. M. Lebensohn, 2431 K St., NW, Suite 215, Washington, D.C. 20037)

13-14. **Astronautics**, symp., Ottawa, Ont., Canada. (The Secretary, Canadian Aeronautics and Space Inst., 77 Metcalfe St., Ottawa 4, Ont.)

13-14. State Univ. of New York, Downstate Medical Center, "Visiting Scholar Lecture Series," **Arnold J. Toynbee**, Brooklyn, N.Y. (Office of Public Relations, Downstate Med. Ctr., 450 Clarkson Ave., Brooklyn, N.Y. 11203)

13-15. **32nd North American Wildlife and Natural Resources Conf.**, San Francisco, Calif. (Wildlife Management Inst., 709 Wire Building, Washington, D.C. 20005)

13-17. **International Laboratory Apparatus and Materials Exhibition**, London, England. (U.T.P. Exhibitions Ltd., 3 Racquet Court, Fleet St., London E.C.4)

13-17. **Use of Plutonium as a Reactor Fuel**, intern. symp., Brussels, Belgium. (J. H. Kane, Div. of Technical Information, U.S. Atomic Energy Commission, Washington, D.C. 20545)

14-15. **American Astronautical Soc. 5th Goddard Memorial Symp.**, "The Voyage to the Planets," Washington, D.C. (M. B. Lees, General Electric Co., Defense Programs Div., 777 14th St., NW, Washington, D.C. 20005)

14-15. **Space**, natl. mtg., Los Angeles, Calif. (D. P. Chandler, 3370 Miraloma Ave., Anaheim, Calif. 92803)

# Optical Rotary Dispersion

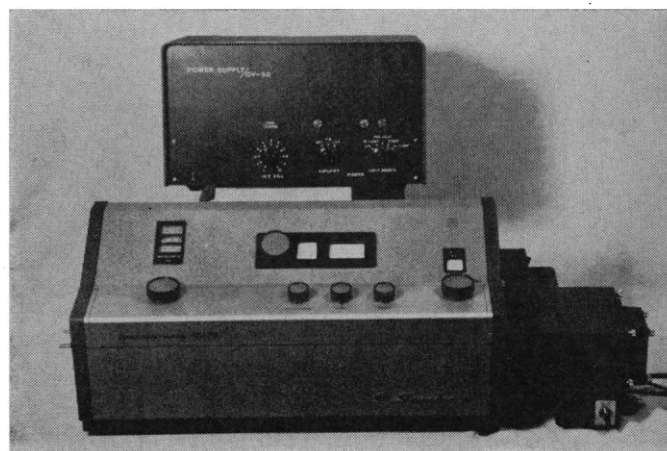
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