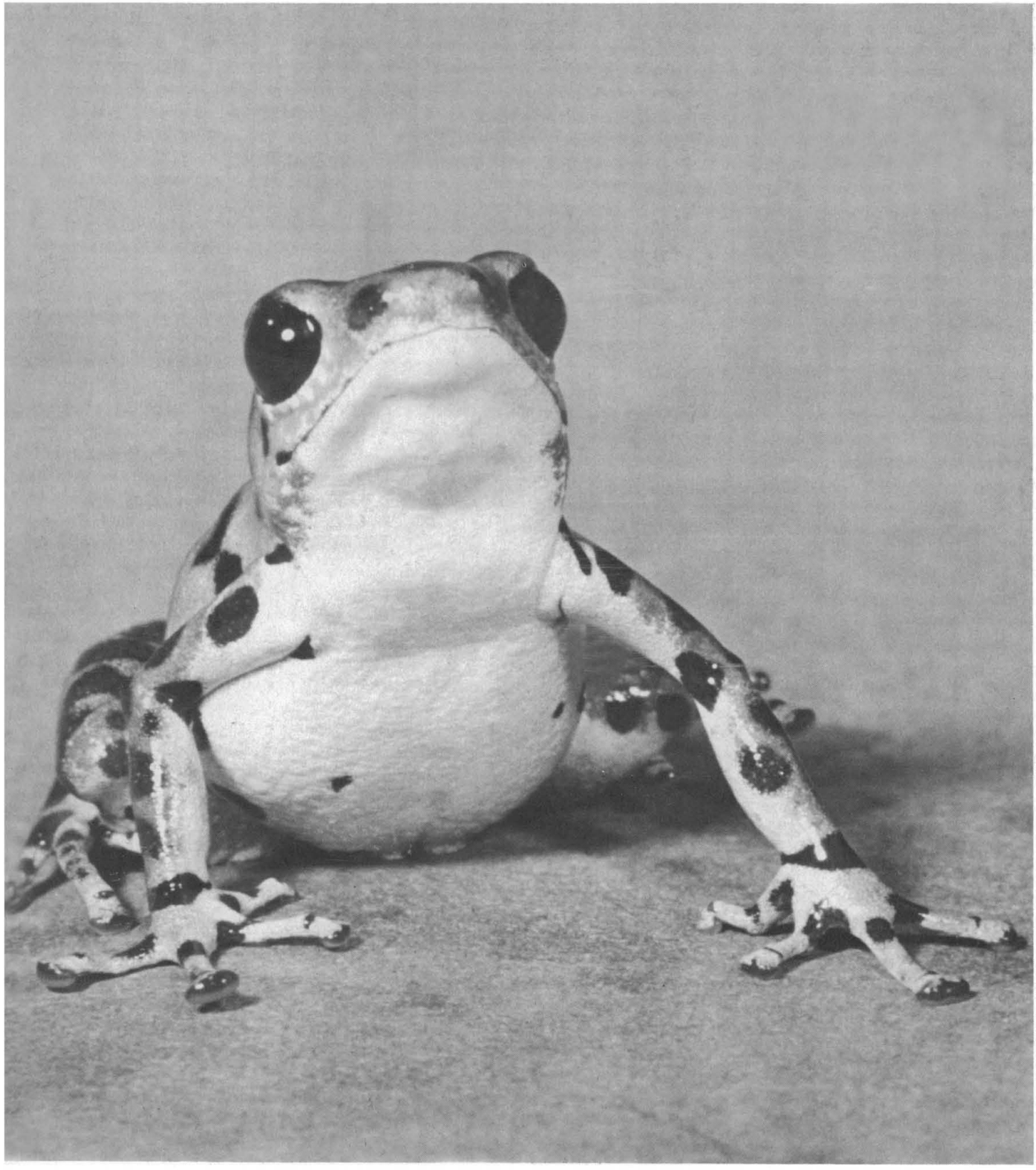
SCIENCE

19 May 1967
Vol. 156, No. 3777

AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE



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Now—a cooled, high-performance liquid scintillation system for under $9900.

Just about all the good things that could come your way in liquid scintillation counting are yours in our new bench-top system—the Unilux® II.

Unilux II is a *constant-temperature* system controlled by cooling. And cooling is the best way to control the counting environment for stability and reproducibility—sample after sample.

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Unilux II is designed for *your needs*. You don't have to be an electronics expert to know that Unilux II's integrated circuits mean the ultimate in reliability. Its bench-top format (pioneered by Nuclear-Chicago) is a proved design—for convenient, simplified operation. You can choose either barium-133 or radium-226 external standardization. The barium-133 standard most closely approximates the beta spectrum.

And Unilux II is priced *under $9900*. At last you can cut the cost of a liquid scintillation system to the bone without sacrificing performance.

Consult your local Nuclear-Chicago sales engineer or write to us about application-matched liquid scintillation systems that can be tailored to your specific needs. And please ask about our other performance-planned products and services for liquid scintillation counting.

More and more life-science researchers come to Nuclear-Chicago first. Performance is why.

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SIXTH IN THE RENOWNED P SERIES OF METTLER TOP-LOADERS

New fully-automatic P6 balance is first to offer digital and analog readout

The new Mettler P6 top-loading balance is the first to offer true digital and analog reading over its full 6000-gram optical scale range. It provides readability of 0.5 gram with ±0.25 gram precision. Digital reading is preferable for high accuracy; analog reading is better for rapid weighings.

To weigh an unknown, the operator merely places his sample on the balance pan and reads the result. There are no weights to dial, beam arrestments to release, or weights to add. A single weighing takes only a few seconds. Results are presented either in all-digital form or in combination digital-analog form – whichever the operator chooses.

The P6, like the other versatile Mettler P series top-loaders, permits five different types of weighings: weighing unknowns, rapid weighing-in, rapid and convenient batching, check-weighing to over-under values, and weighing below the balance.

Ask your laboratory supply dealer for a demonstration of the P6 or, better yet, a free trial in in your own laboratory. Product literature is available from your dealer or write Mettler Instrument Corporation, 20 Nassau Street, Princeton, New Jersey 08540.

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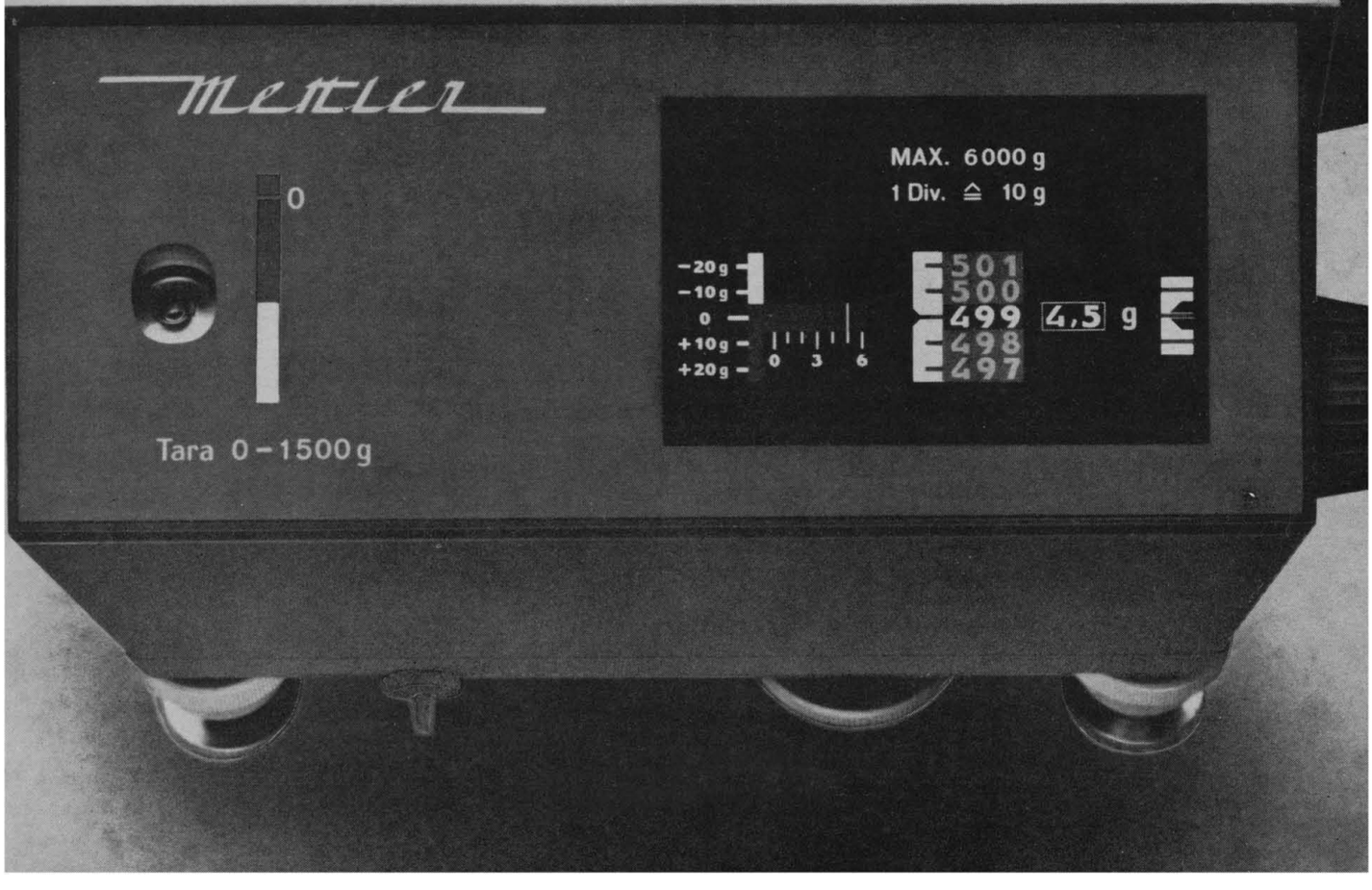

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SCIENCE

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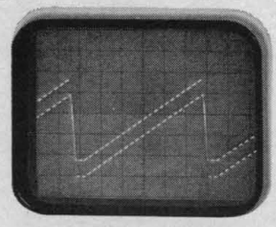
AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE

COVER

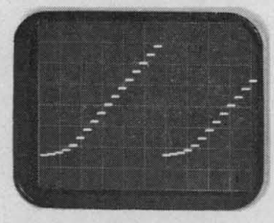
Dendrobates pumilio, originally collected on Bastimentos Island, Panama. The color of the dorsal surface of this population of frogs ranges from pale green to red, with varying degrees of black spotting. The ventral surfaces are usually white, but an occasional frog has blotches of orange. The toe pads allow the frog to climb well, but only certain populations have adopted an arboreal life. The extreme variations in color and markings, habits, and toxicity of skin secretions makes *D. pumilio* one of the most variable species of vertebrates known (average body length, 17 mm.) See page 970. [Frank T. Caporael, NIH]

4 ways to view displays with the Tektronix Type 564

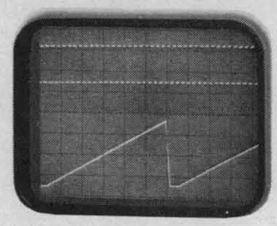
split-screen storage oscilloscope



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).

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

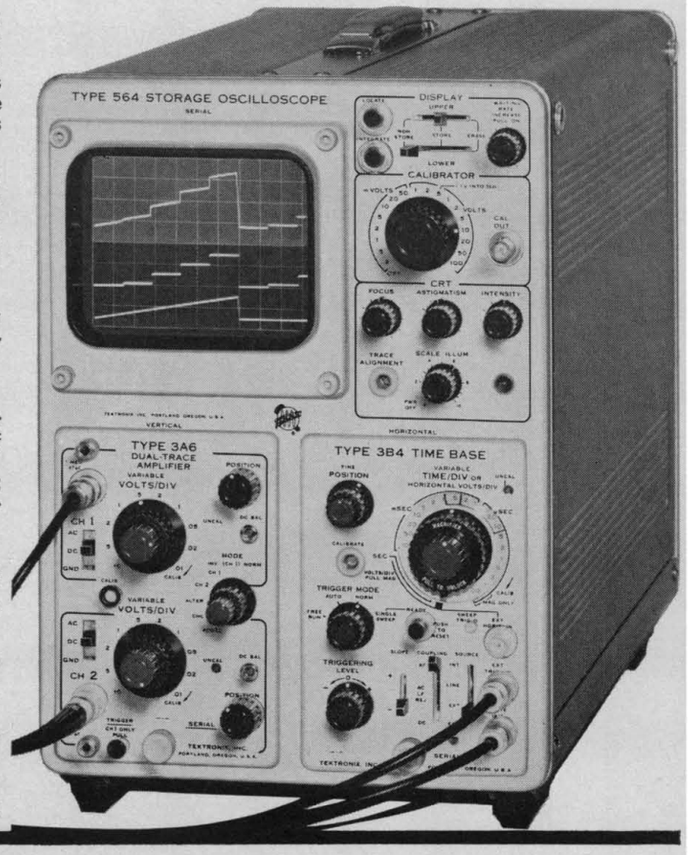
With bistable storage oscilloscopes, such as the Type 564 and Type 549, the contrast ratio and brightness of stored displays are constant and independent of the viewing time, writing and sweep speeds, or signal repetition rates. This also simplifies waveform photography. Once initial camera settings 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 locater 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 Similar electrical characteristics to Type 564, 7″ high.	$960
Type 3A6 Dual-Trace Amplifier Unit DC to 10 MHz from 10 mV/div to 10 V/div. 5 display modes. Internal signal delay line.	$525
Type 3B4 Time Base Unit Sweep speeds from 0.2 μs/div to 5 s/div. Single sweep. Up to X50 direct-reading magnifier extends fastest sweep to 50 ns/div.	$400

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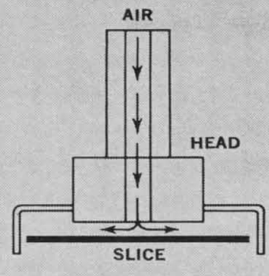
How Western Electric gets uplift from a downdraft



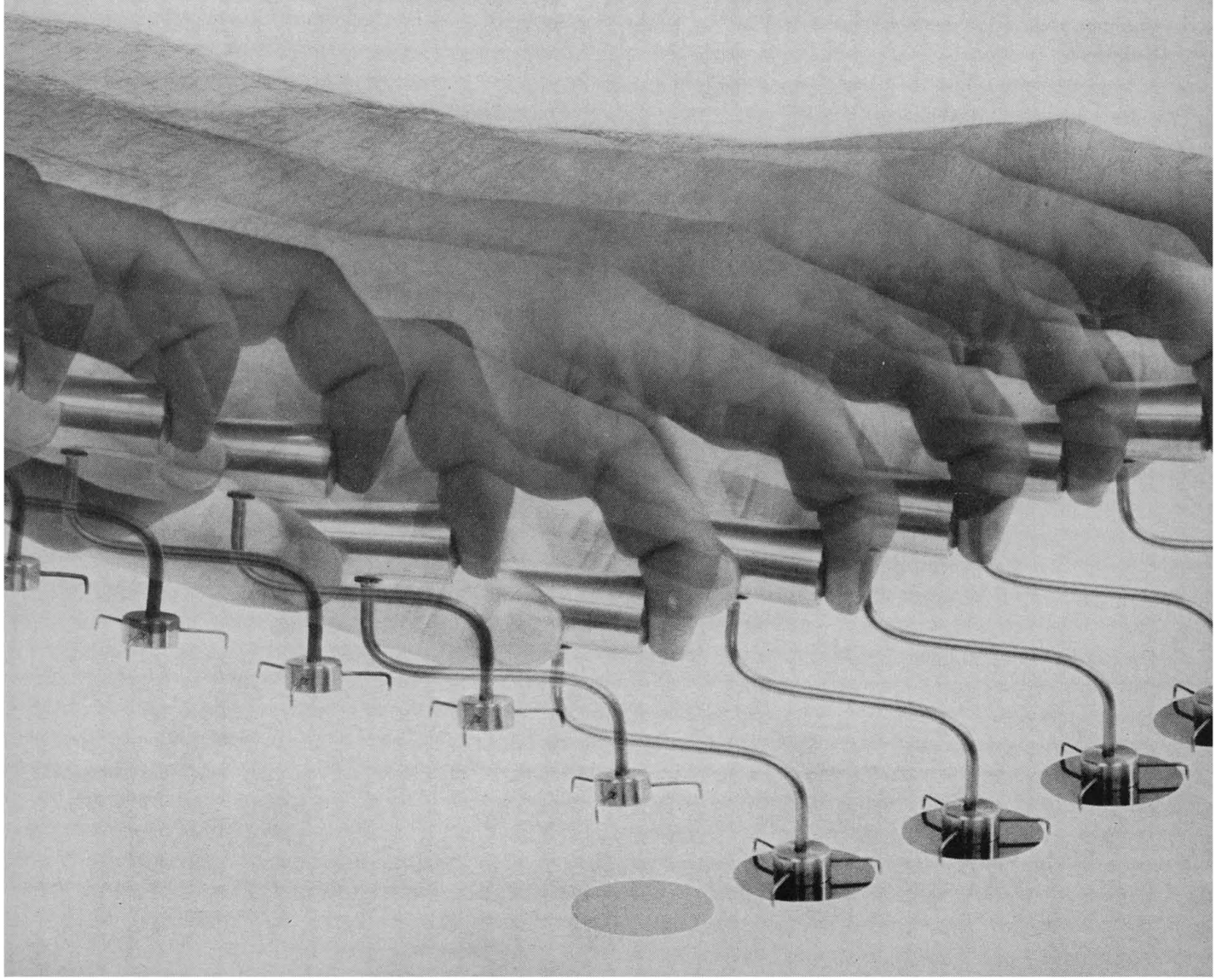
Picking something up by blowing a stream of air down on it may seem rather roundabout. But if you want to pick that something up without touching it, it turns out to be a most successful way.

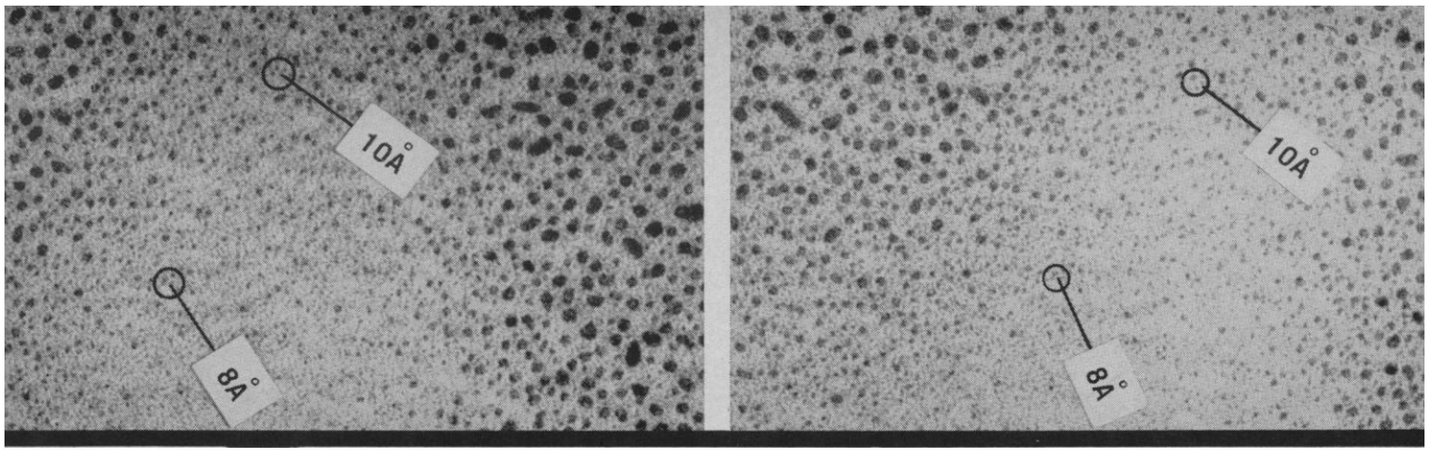
The something in question is a paper-thin, eggshell-fragile slice of silicon destined for transistors. To touch it is likely to contaminate it, and probably to break it. Tweezers are extremely risky. Even a vacuum pickup is dangerous.

And so the engineers at Western Electric's Engineering Research Center invoked the Bernoulli principle and solved the problem. They developed a pickup device that directs a thin stream of air down onto the slice. The air flows out across the slice and since *it* is moving and the air below the slice is not, the pressure below is greater than the pressure above and the slice floats. And it doesn't touch the head because the air is, after all, blowing *down*. Wire guides keep the slice from slipping off.

So now the workers in our transistor plants can pick up silicon slices handily, without worrying about breaking or contaminating them. That our engineers reached back to a classical principle of physics to help them do it only shows the extent of the ingenuity Western Electric applies in its job of manufacturing communications equipment for the Bell System.

Western Electric
MANUFACTURING & SUPPLY UNIT OF THE BELL SYSTEM





TWO CONSECUTIVE EXPOSURES SHOWING 8 A POINT RESOLUTION.

NEW FROM HITACHI: THE HS-7S--THE FIRST HIGH RESOLUTION COMPACT ELECTRON MICROSCOPE

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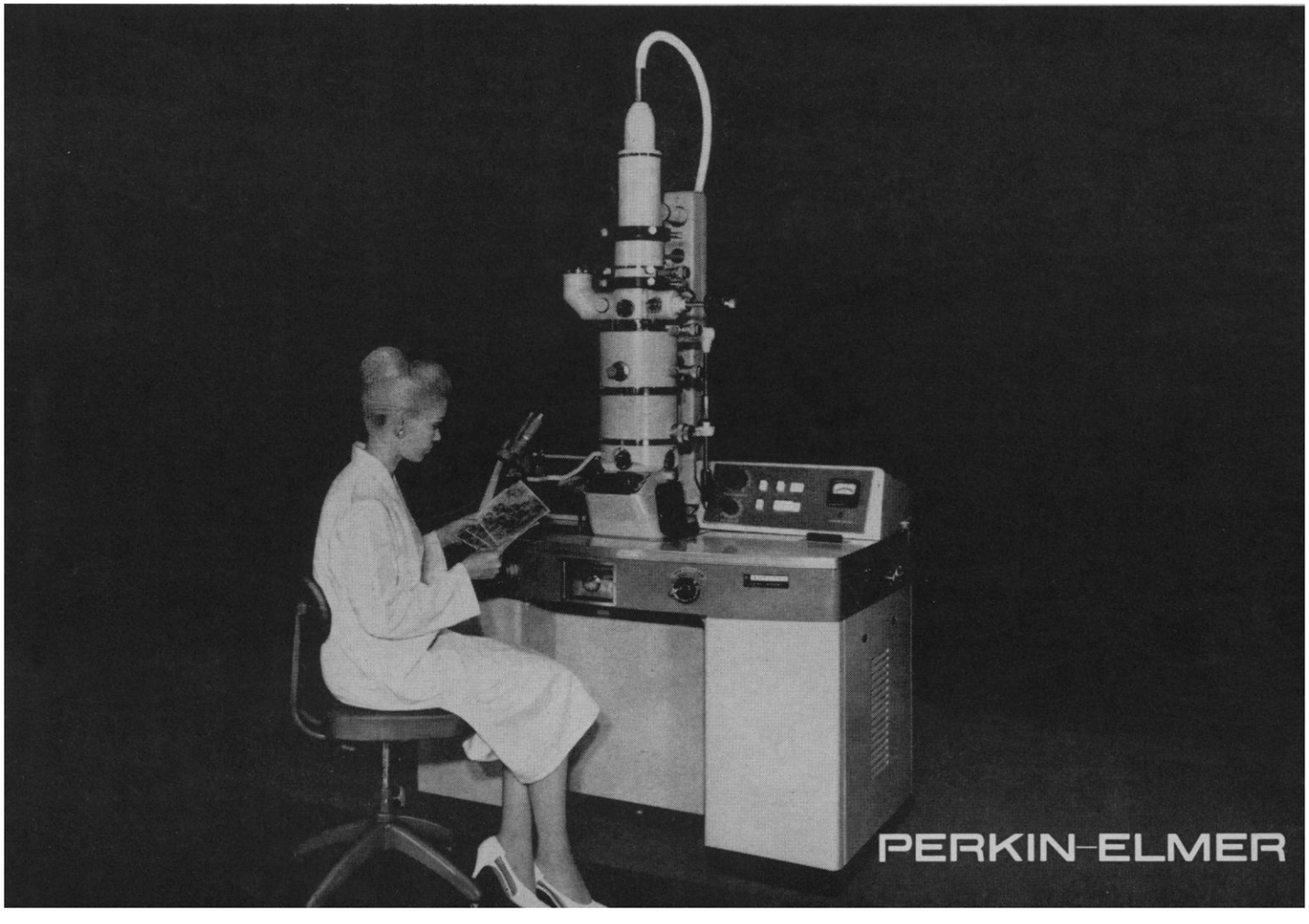
(Prices subject to change without notice.)



a potentiometric titrator for really difficult analytical problems

The Swiss have done it again... developed an analytical titrator to meet the specific needs of the research chemist in science or industry who is faced with establishing standards or other difficult analytical problems.

It's the E-436 Potentiometric Titrato by Metrohm of Switzerland.

This instrument not only measures and records potential changes du to pH. It also automatically adapts titration speed to the slope of the curve. When a pre-selected potenti is reached, it stops automatically. Other features include increased sensitivity (with ranges of 1 pH or 50 mV spread over a recording width of 250 mm.), temperature compensation for pH measuremen and built-in constant current and voltage sources for voltametry and amperometry. Accessories fo conductometric, photometric and coulometric titrations are also available.

The E-436 Potentiograph comes equipped with the E-436E Titratin Set, consisting of motor-driven piston buret (with quick-change, bayonet-mounted glass cylinders) and swing-out magnetic stirrer. The results of the analysis are recorded either on individual shee or on a continuous strip chart for later evaluation.

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E-436 Potentiometric Titrator by Metrohm of Switzerland

abstract stating explicitly his view of the scientific location and linkages of his work? But more fundamental is the need to recognize that science needs a whole new corps of specialists to play a role in relation to science similar to that of the critics and historians of the arts.

KENNETH O. MAY
Department of Mathematics, University of Toronto, Ontario, Canada

Citation indexing seems certain to gain widespread use because it reduces the untidy process of library searching almost to a rote method. But we must beware of the possibility that the procedure will replace old, less systematized, search methods to the extent that the busy worker, hurrying to publish ever faster, will avoid the responsibility of a truly complete library search. In some cases the referees will point out an overlooked paper, but they too may be using the same method, and papers overlooked by one author will be overlooked again many times as others follow his citation-lead.

Another objection discussed by Margolis concerns evaluation of the method. He states, "A new scale of values based upon citations is by no means infallible or, in many cases, even fair, but at least it provides an alternative to the existing one, which is at the root of the crisis." I would say that the existing method, paper-counting, is not considered a respectable method by most, whereas weighted citation counting has the sound of enough respectability to insure its acceptance by most (commonly cited) workers as well as by the paper counters. Therein lies its danger.

In general, people concerned with making evaluations are going to accept, without effective qualification, Margolis' statement, "It is reasonable to expect that the best contributions would have been among those cited most, while relatively unimportant papers would have attracted few, if any citations." There remains an obvious inequity owing to papers, however bad, being heavily cited, while other papers remain uncited because they are too far ahead of their time. When the method is used for evaluation, these refinements must be safeguarded.

N. C. JANKE
Department of Physics and Physical Science, Sacramento State College, Sacramento, California 95819

Will, Money, and Giantism

Nelson's report on dramatic developments at State University of New York at Albany (News and Comment, 24 Mar., p. 1521), explains everything as a miracle produced by a peculiar vitality shared by the governor, the president of the state system, and an aggressive academic vice president. He notes that it exudes a "sweet smell of money." What Nelson misses, however, is the background of strenuous, and often embittered, struggle for a broad and rigorous system of public higher education in a rich but laggard state.

A recent system president, Carlson, advocated dramatic development just a trifle prematurely, and he had to leave the state. Dean Blegen of Minnesota issued a research report on the New York lag in higher education and research and it received scanty attention in official circles. Faculty members who, as recently as 4 years ago, advocated or even predicted a fraction of the support that is now provided the university were distinctly unpopular with powers which still wield substantial authority. That power is now shared with newcomers. . . . Meanwhile the Albany student body remains, as Nelson indicates, extremely homogeneous in class and regional background. Few come from other states, few from the metropolis, and, of course, the percentage of minority racial or religious elements is vanishingly small. If pluralism stimulates intellectual alertness, this is a sign of continued lag.

Nelson correctly assessed the architectural giantism of Edward Durell Stone as a contribution to university vitality and lure. It is true that there is a will to attract to Albany both scientists and humanists who have "an edge" over the average men in their respective fields. And all this would be less important if it were not evidence that the academic motivation in the Empire State resembles that of several other states, as well as half a dozen other nations. Everywhere there is the will to "do better." If an unclassified university is to aspire to the higher ranks, is the combination, then, of will, money, and giantism the winning formula?

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19 May 1967, Volume 156, Number 3777 **SCIENCE**

Control by Accountants

Science is coming more and more under the influence of accountants. Here are some examples:

1) The *Administration of Government Supported Research at Universities*, a compilation of much information on federal grant programs and many recommendations on the management of grants, was written by the Bureau of the Budget. One of the principal spokesmen for universities was the National Association of College and University Business Officers.

2) The Department of Health, Education, and Welfare has recently appointed a Grant Administration Advisory Committee, a majority of whose members occupy positions of financial and administrative, rather than research or educational, responsibility.

3) The Department of Health, Education, and Welfare has announced the availability of a pamphlet of instructions, *Time or Effort Reporting*, to aid universities and other grant recipients in complying with the requirements of Bureau of the Budget *Circular A-21*, the controlling document on financial records of government grants to universities.

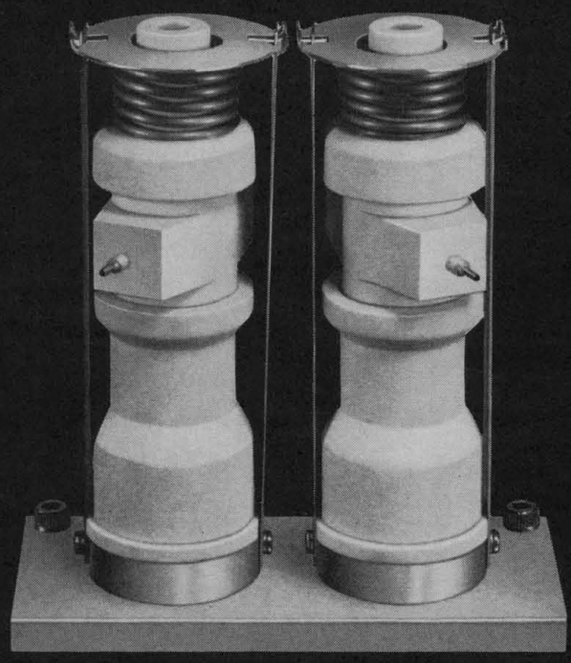
4) National Science Foundation auditors are in some cases extending the principle of time or effort reporting, which now applies widely to staff members working directly on project activities, to others who are only indirectly involved. In other cases, NSF requires separation of those expenses of a project the NSF auditors classify as "off-site" from those expenses of the same project they classify as "on-site," so that indirect charges can be paid at different rates on the two categories.

5) Additional accounting records will have to be kept by universities and scientific associations if the Internal Revenue Service succeeds in imposing a proposed regulation (*Science*, 21 April) whereby nonprofit organizations would be taxed on the advertising income of scientific (and other) journals they publish.

Records must be kept; government funds must be accounted for; carelessness in grant administration and the use of public funds cannot be condoned. It is therefore necessary to have close understanding between the auditors and accountants in government agencies and the administrative and business staffs of their grantees. Nevertheless, the original purposes of the federal grant programs are endangered by having too many of the rules written by accountants. Although scientists and accountants, in and out of government, are aware of the other's point of view, they consider scientific activities and the grants that support them from fundamentally different vantage points. The scientific interest is primarily in the purposes for which funds are granted and in the accomplishments made possible by grants. The accounting interest is primarily in seeing that the accounts balance accurately and that there is a proper piece of paper on file to justify each expense item. The danger of having too many of the rules written by accountants is the obvious one that the form will be given more weight than the substance. Accountants, however, are not solely responsible for this situation; they have been filling a gap the scientists have allowed to develop.

Twenty or more universities in the United States are now developing programs of research and study on "science and government" or "science and society." Most seem to be concentrating on political theory, political science, congressional responsibility, social philosophy, or kindred matters. It may seem cynical, but it is realistic to suggest that it would be timely for at least one of these universities to study the effects on science of current accounting practices.—DAEL WOLFLE

A sensitive object.



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17–18. American **Diabetes** Assoc., Atlantic City, N.J. (J. R. Connelly, The Associaton, 18 E. 48 St., New York 10017)

17–18. Society for **Surgery of the Alimentary Tract**, Atlantic City, N.J. (J. Van Prohaska, The Society, 950 E. 59 St., Chicago, Ill. 60637)

17–19. **Reliability and Maintainability**, 6th annual conf., Cocoa Beach, Fla. (Meetings Dept., American Inst. of Aeronautics and Astronautics, 1290 Sixth Ave., New York 10019)

18–21. **Botanical** Soc. of America, Northeastern Section, summer field mtg., Tuxedo, N.Y. (R. K. Zuck, Dept. of Botany, Drew Univ., Madsion, N.J.)

18–22. American **Medical** Assoc., 116th annual conv., Atlantic City, N.J. (The Association, 535 N. Dearborn St., Chicago, Ill. 60610)

18–22. **Health Physics** Soc., 12th annual mtg., Washington, D.C. (J. C. Villforth, Radiological Health Lab., 1901 Chapman Blvd., Rockville, Md.)

18–22. Society for **Investigative Dermatology**, Atlantic City, N.J. (G. W. Hambrick, Jr., The Society, Johns Hopkins Hospital, 601 N. Broadway, Baltimore, Md. 21205)

18–23. American Soc. of **Ichthyologists and Herpetologists**, annual mtg., San Francisco, Calif. (W. I. Follett, California Acad. of Sciences, Golden Gate Park, San Francisco 94118)

18–30. **Electron Microscopy**, workshop, Northeastern Univ., Boston, Mass. (C. Youse, Continuing Education, Northeastern Univ., 360 Huntington Ave., Boston)

19. **Scombroid Phylogeny**: Ideas and Approaches, symp. of American Soc. of Ichthyologists and Herpetologists, San Francisco, Calif. (B. J. Rothschild, Tuna Ecology Program, Bureau of Commercial Fisheries, P.O. Box 3830, Honolulu, Hawaii 96812)

19–21. Automatic **Data Processing Systems in Local Government**, 3rd annual conf., New York, N.Y. (H. Sellin, School of Continuing Education, New York Univ., New York 10003)

19–21. **Colloid**, 41st natl. symp., Buffalo, N.Y. (P. Becher, Chemical Research Dept., Atlas Chemical Industries, Wilmington, Del. 19899)

19–21. **Heat Transfer** and **Fluid Mechanics** Inst., La Jolla, Calif. (D. B. Olfe, Dept. of Aerospace and Mechanical Engineering Sciences, Univ. of California at San Diego, La Jolla)

19–21. **Microelectronics**, symp., St. Louis, Mo. (R. Pellin, Inorganic Chemicals Div., Monsanto Co., 800 N. Lindbergh Blvd., St. Louis 63166)

19–22. American Soc. for **Engineering Education**, 75th annual mtg., East Lansing, Mich. (L. Winner, 152 W. 42 St., New York 10036)

19–22. Western Soc. of **Soil Science**, annual mtg., Los Angeles, Calif. (J. L. Young, 100 Agricultural Hall, Oregon State Univ., Corvallis)

19–23. **Automating State and Local Records Making and Records Keeping**, American Univ., Washington, D.C. (P. W. Howerton, Director, Center for Technology and Administration Inst., 2000 G St., NW, Washington 20010)