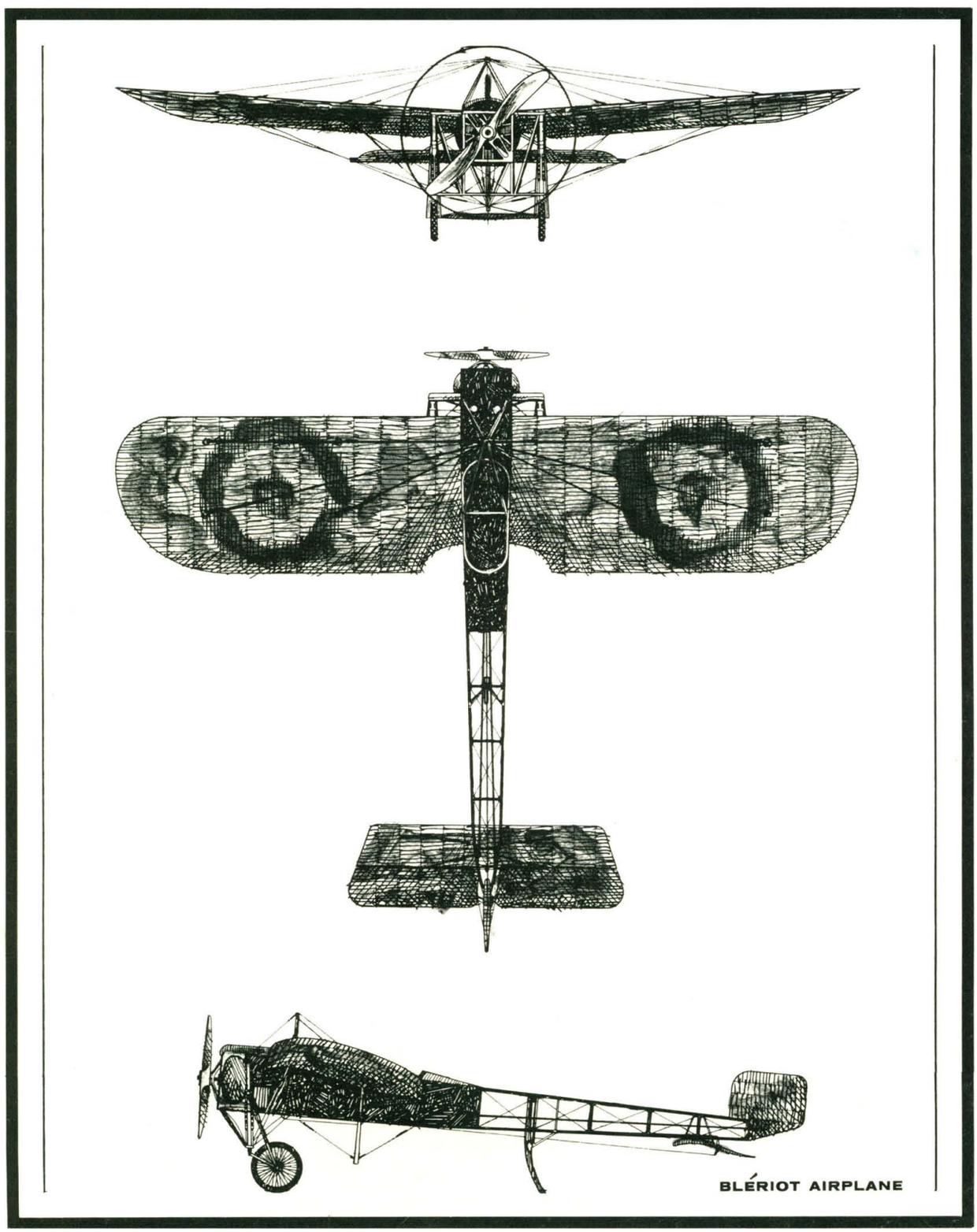
SCIENCE 4 November 1966
Vol. 154, No. 3749
AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE



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Even less if you already have a controller.

Here's a bargain. With this handsome new Lindberg Hevi-Duty split-tube furnace, you can run complex tests with a low-cost furnace.

The Mini-Mite has temperature repeatability of ±4°F. It heats to the maximum 1850°F in just 30 minutes. And temperature recovery is rapid.

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Want to know more about Mini-Mite—or other furnaces in the broad line of Lindberg Hevi-Duty precision laboratory heating equipment? See your laboratory supply dealer, or write to us in Watertown, Wisc.

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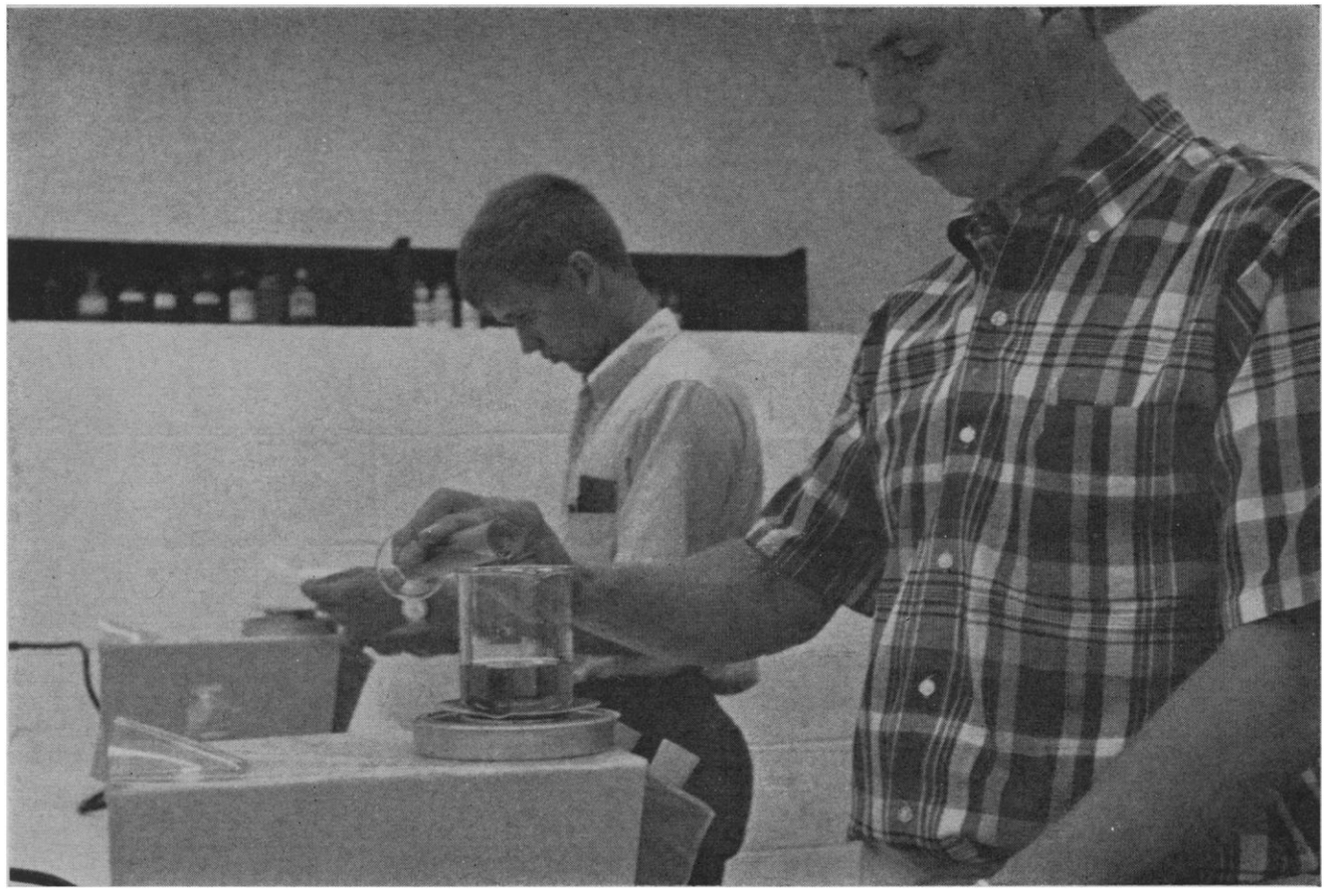

AT THE UNIVERSITY OF NEBRASKA...

Mettler top-loaders prevent dropping quantitative work

The freshman chemistry program, into which everyone tries to cram "just one more" quantitative experiment, had reached flood stage at the University of Nebraska. The program was hampered by a group of obsolete and well-worn two pan analytical balances.

Students, who often had to wait an hour to use a balance, found that erratic weighing results made quantitative work more a hope than a reality. Even the best of students was discouraged.

According to Freshman Chemistry Coordinator, John R. Demuth, "We had either to abandon quantitative experiments or obtain better balances... and we certainly were unwilling to give up quantitative work."

Dr. Demuth's chance to replace the old balances came with a move to new quarters. He quickly discarded the idea of two-pan analytical balances in favor of modern single-pan analytical balances of the Mettler H6 type.

"Then we tried the Mettler P120. We were immediately impressed by its simplicity, its ruggedness and its ability to produce results almost instantaneously. A student could make a weighing faster with a P120 than an experienced operator with a modern single-pan analytical balance.

"We found that we could accomplish more with two P120's than with three or four single-pan analytical units. The one-milligram readability of the P120 fills all the needs of the freshman program.

"Instead of sacrificing important quantitative experimentation, we have actually been able to add new experiments. Students, who formerly took two periods for an experiment, now complete it in one.

"Then," Dr. Demuth said, "came the element of economics. Because two P120's cost about as much as three of the cheapest single-pan units, we broke about even on dollars. We found, however, that we gained in terms of speed, ruggedness and simplicity of operation. Having used the P120's for more than a year, we are delighted with our choice."

Ask your Mettler dealer for a demonstration or a P120 to try in your own laboratory. In the meantime, ask for the brochure describing its use in general chemistry. Write Mettler Instrument Corporation, 20 Nassau Street, Princeton, New Jersey 08540.

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4 November 1966
Vol. 154, No. 3749

SCIENCE

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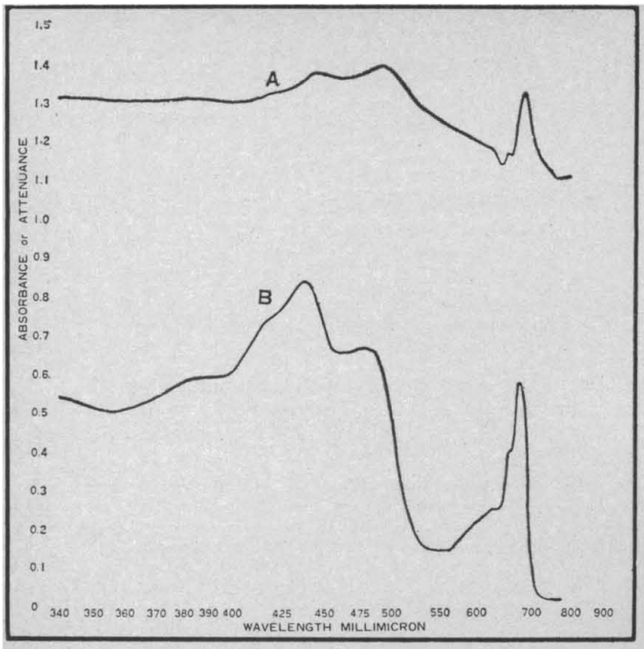
AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE

COVER

Early 20th-century monoplane constructed by Louis Blériot, designer and aviator who made the first flight across the English Channel in 1909. Slow but reliable, the Blériot actually contained many design features of a far more advanced craft. See review of *The Invention of the Aeroplane* 1799–1909, page 635. [©Custom Component Switches, Inc., Chatsworth, California; Harleyford Publications Ltd., Letchworth, England]



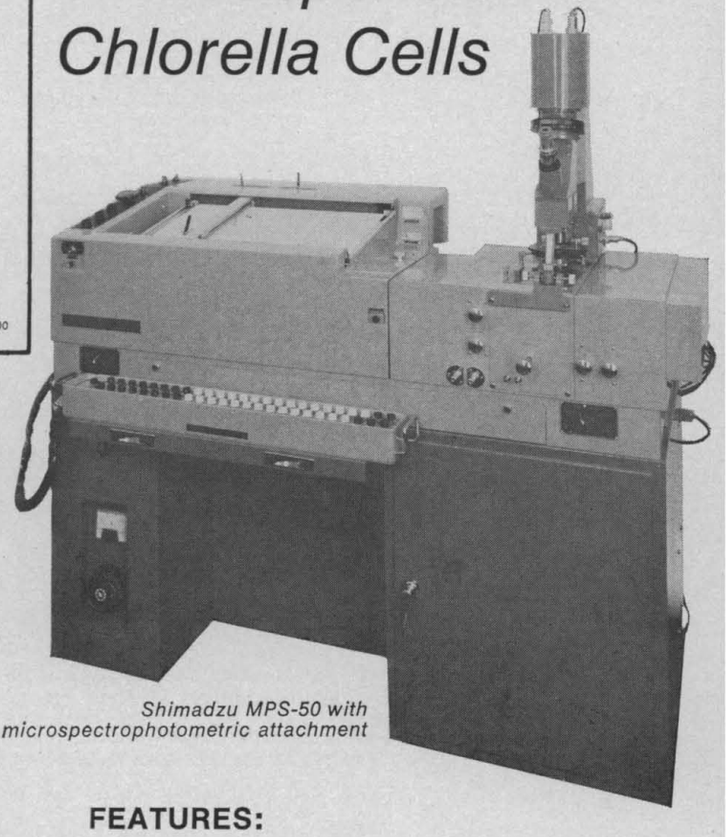
A *produced by a conventional spectrophotometer*
B *produced by the*

Compare These Absorption Spectra of a Suspension of Chlorella Cells

Shimadzu MPS-50

Multipurpose Recording Spectrophotometer

The **Shimadzu Model MPS-50** Multipurpose Recording Spectrophotometer provides distinct absorption bands of highly turbid, translucent, and opaque, as well as transparent, materials, over a range of 190 to 2500 mμ.



Shimadzu MPS-50 with microspectrophotometric attachment

An important feature is the double detection system, utilizing two large end-on photomultiplier tubes located in close proximity to the sample and reference cells. This configuration increases greatly the fraction of light incident upon the photomultiplier, permitting the analysis of highly turbid media.

An equally important feature is a microspectrophotometric attachment (shown mounted on instrument) that utilizes reflecting optics, and has its own separate detector and baseline adjusting system. This accessory provides unique capabilities, e.g., it permits scanning a single red blood cell as it is moved across a light beam of fixed wavelength, or recording the absorption of a portion of a cell as the wavelength is varied.

FEATURES:

- **Baseline compensation** over the entire range (190 mμ to 2500 mμ) by easily adjustable potentiometers
- **Makes possible** the measurement of high absorbance values (A = 0 — 5)
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- **Accessories are available** for microspectrophotometry, derivative spectrophotometry, chromatogram scanning, double-beam fluorometry, absolute turbidimetry, photometric titration, flow dichromism, etc.

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The **Shimadzu Model MPS-50 Spectrophotometer** is distributed exclusively in North America by the American Instrument Co., Inc. To arrange for a demonstration and/or demonstration sample analysis contact the Analytical Instruments Applications Laboratory at Aminco.

Write Aminco to receive literature describing the MPS-50 in full detail.

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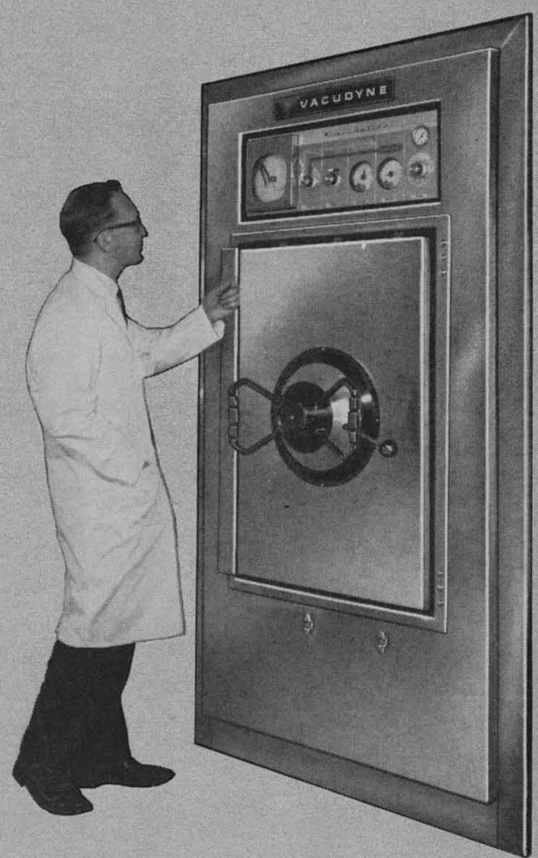

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Meet the fastest, most accurate strip chart recorder on record: The new Brush Mark 250. When you read about all the features you'll know why we call it the first recorder for the perfectionists of the world!

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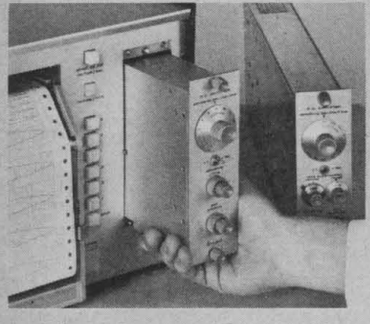
2 Wide selection of signal conditioners. Choose from 21 interchangeable preamps. Use one today; plug in a different one when your recording requirements change.

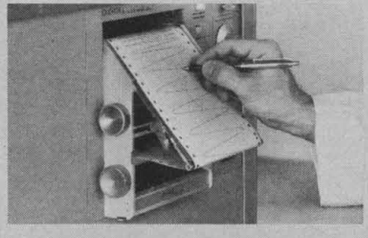


3 Crisp, clean rectilinear writing. Patented, pressurized inking system puts smudge-proof trace *into* the paper not just on it.

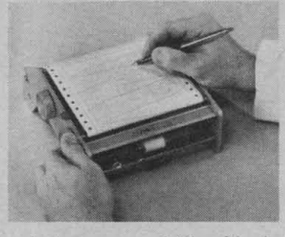
4 Contactless, non-wearing feedback system. Same one used in our multi-channel Mark 200 recorders. (No slide wires!) Accuracy? Better than ½%!

5 Multiple chart speeds. Push-button choice of twelve . . . from 5 inches/second to 1/10 of an inch/minute (up to 8 days of continuous recording).

6 Portable or Rack mounting. And either way you get the exclusive new dual position writing table.



7 Removable chart paper magazine. Great for desk top record reviews. Man-sized manual winding knobs let you roll chart forward *and* back. Chart reloading is a cinch.



See what we mean? The Mark 250 is for the perfectionists of the world. Ask your Brush Sales Engineer for a demonstration. Or, write for chart sample and specifications. Clevite Corporation, Brush Instruments Division, 3633 Perkins Ave., Cleveland, Ohio 44114.

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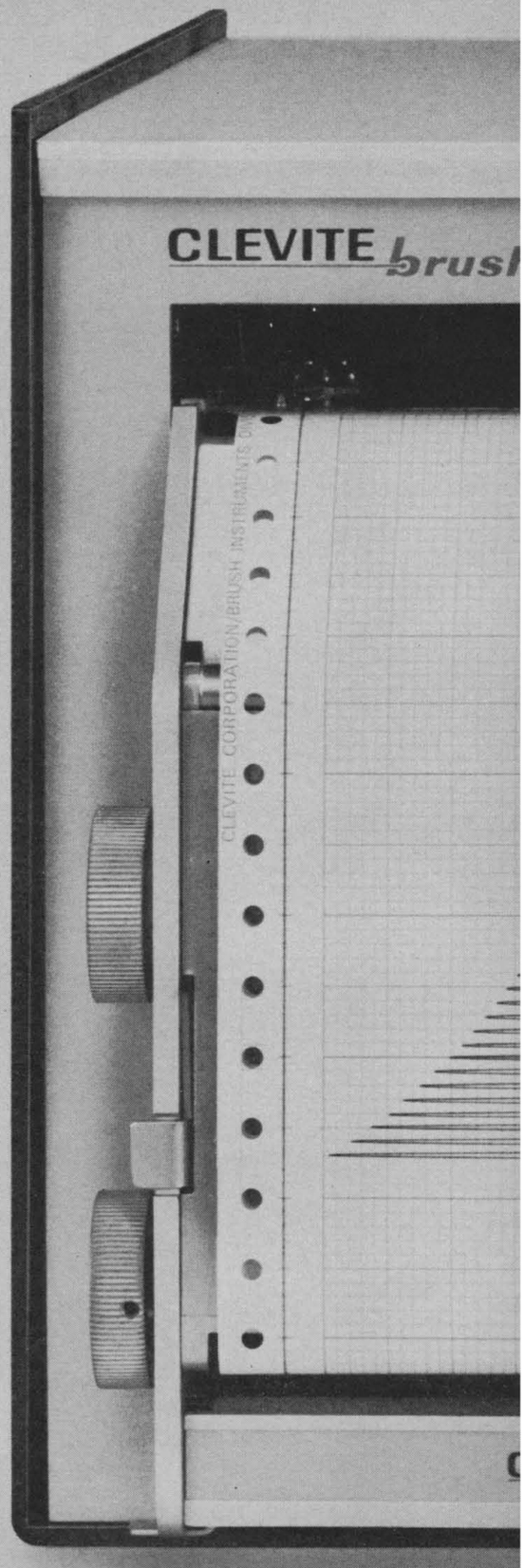
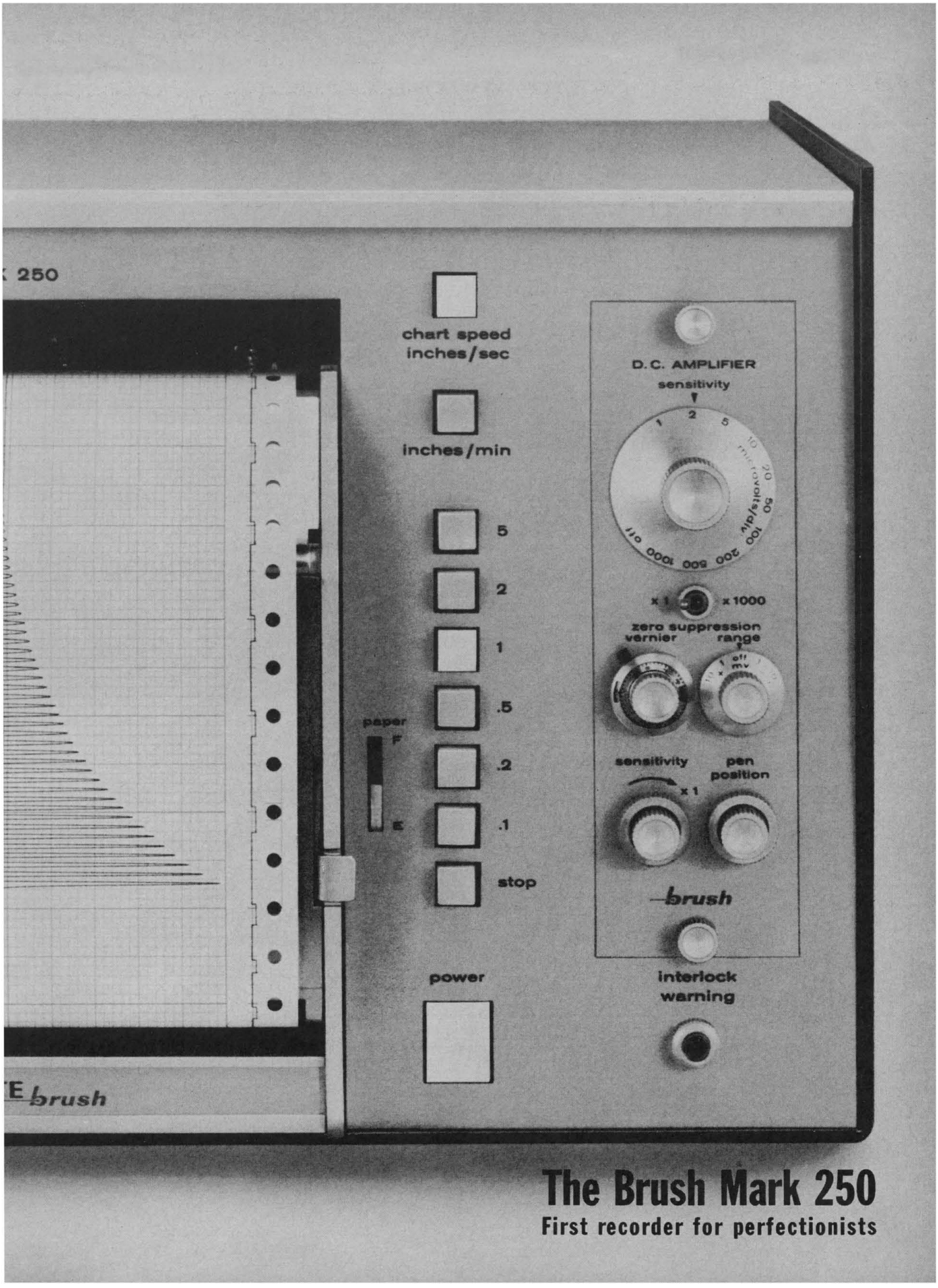


Shown approx. 76% of actual size with 1 μv preamplifier RD 4215-70; event markers optional.



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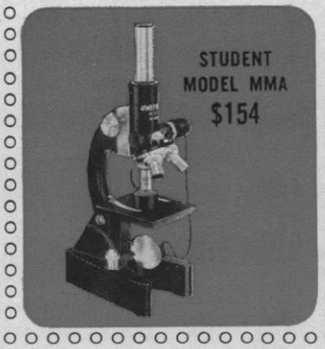

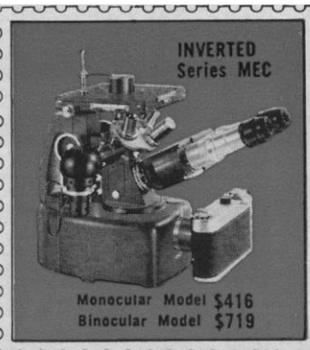

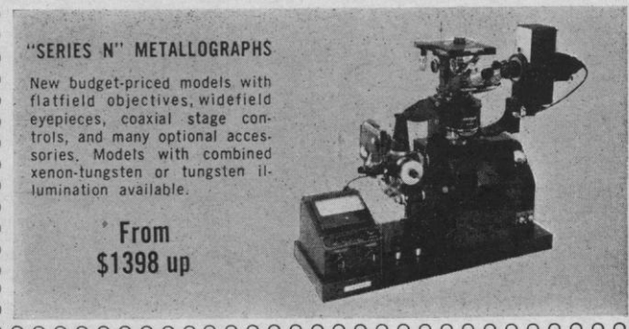

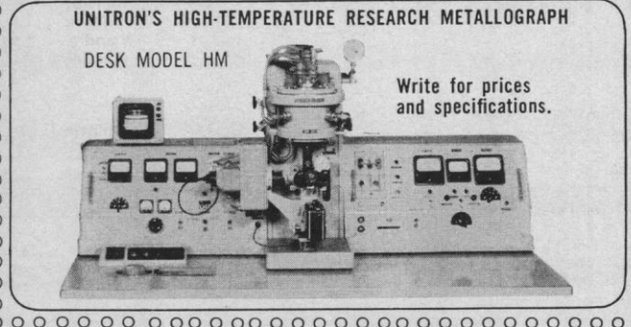

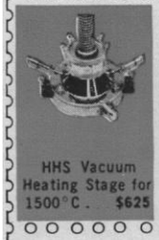

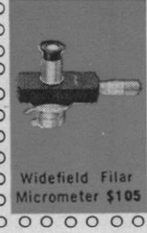

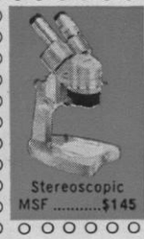

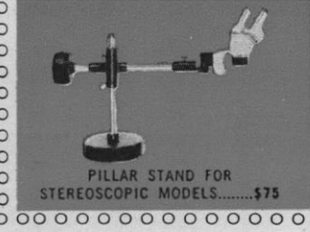

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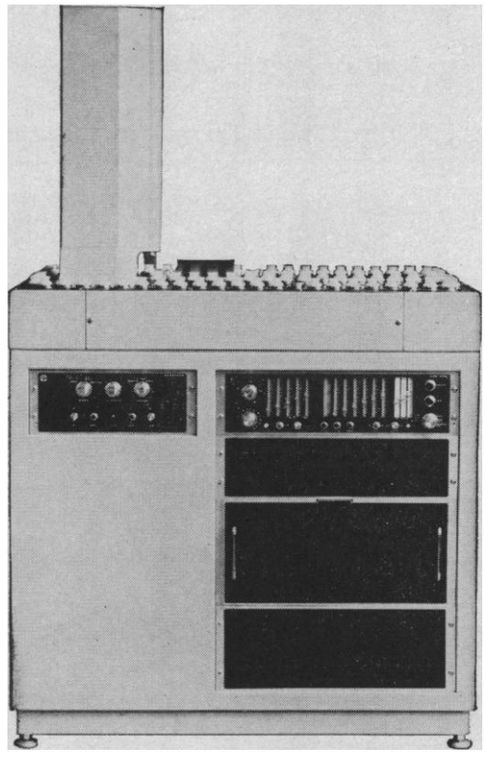
What are your chances of picking this gamma counting system?



Only one in six.

Of course, if you want a single-channel, 100-sample automatic gamma counting system, then our Model 4216 (shown above) is your best bet. It has a fully automatic sample changer, heavily shielded 2-inch well-type detector, and a built-in printing lister that permanently records sample number, time, and count on paper tape.

Not quite what you want? Then there's our Model 4218. It has all the features we've mentioned, but it's supplied with a 3-inch detector.

For dual-channel counting, choose between Model 4220 (2-in. crystal) and Model 4222 (3-in. crystal). Again the same performance features. And either of these systems is also available with an automatic printing calculator that, in addition to listing, will print cpm for each channel and the ratio of the scaler counts.

Two more systems: Model 4350 for highly uniform, efficient counting of large- or variable-volume samples; and Model 4454 for economical, single-channel counting of small-volume samples.

There you have them—a half-dozen systems for gamma counting in the life sciences. So the odds are in your favor when you call your Nuclear-Chicago sales engineer or write to us for complete information. NUC:8-8-838

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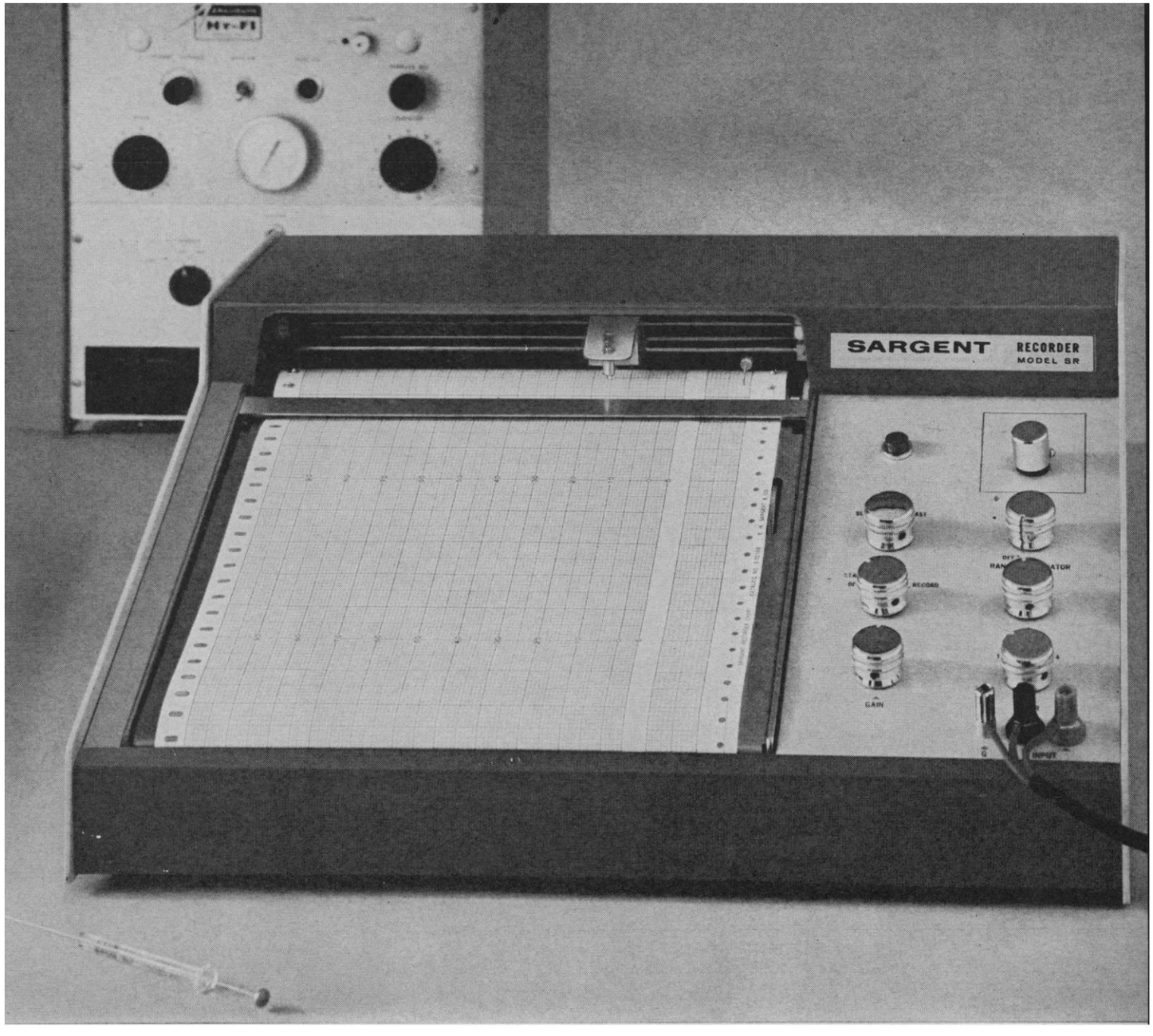

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MATCH YOUR DOLLARS to your requirements with this expandable signal averaging system. Basic unit is the new ND-801 Enhancetron 1024—a versatile signal averaging device with all the features of its predecessor (the field-proven ND-800) plus a host of new capabilities.

For example, the ND-801 includes an improved triggering circuit. This permits operation to be initiated by external signals with a wider range of amplitude and rise times. Also new in the ND-801: variable speed for plotter readout.

Compatible ancillary units

To help you make full use of Enhancetron capabilities, Nuclear Data offers four supplemental units:

1. ND-801FD Fast Digitizer—for fast definition where a signal of interest must be resolved with relatively few sweeps. The 4 megacycle (Mhz) voltage to pulse-train converter augments the patented comparison digitizer built into the Enhancetron.

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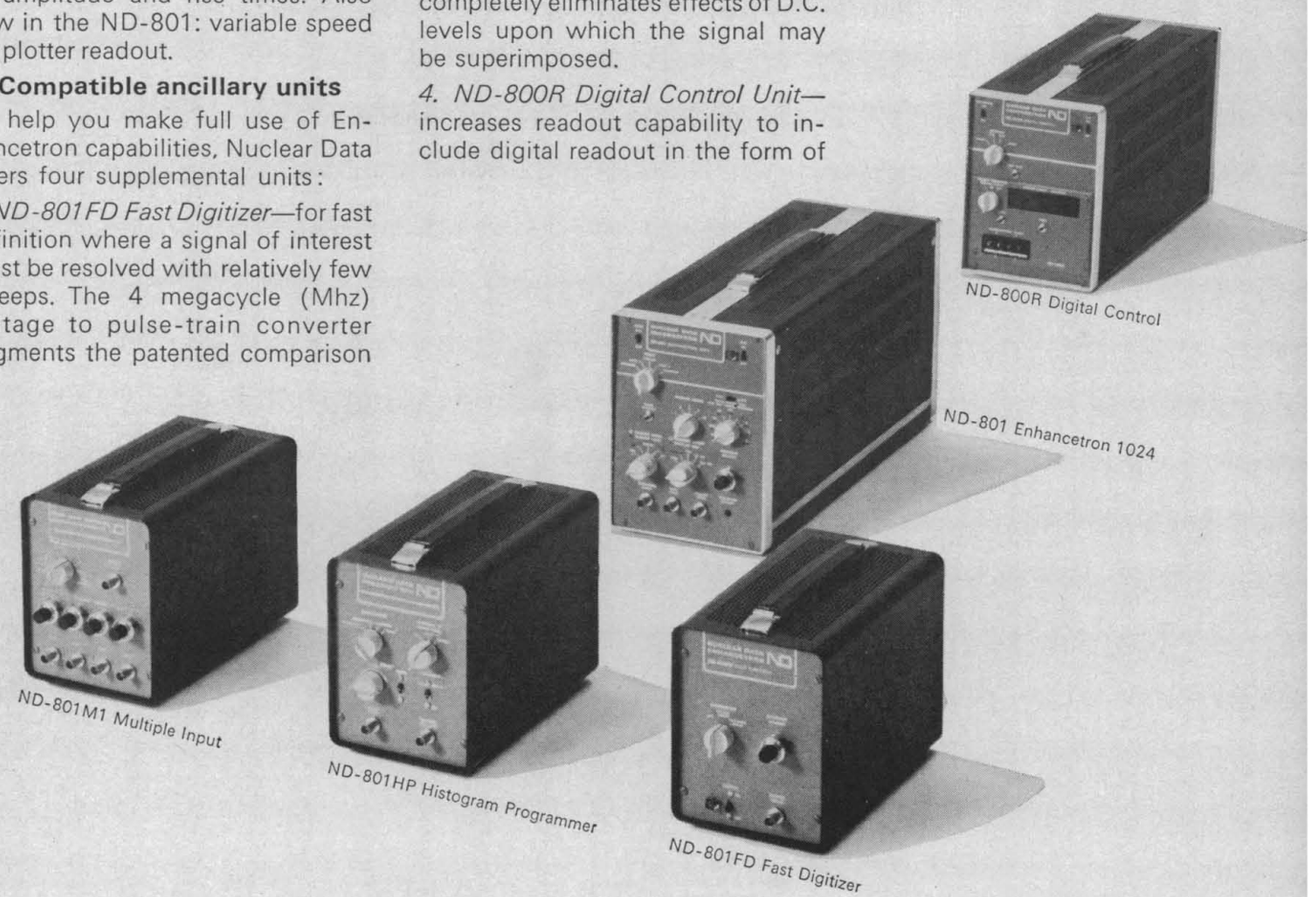
4. ND-800R Digital Control Unit—increases readout capability to include digital readout in the form of typewritten numerical data, punched paper tape and punched cards to provide computer compatibility.

Learn more about the new Enhancetron signal averaging component system and how it meets your needs (and budget) precisely. Write:

NUCLEAR DATA INC
120 West Golf Road, Palatine, Illinois 60667



For those who buy precisely what they need...

the new Enhancetron signal averaging component system

200X in 10 seconds

With a Polaroid Land camera back and Polaroid Land film, you can see your photomicrographs of metal specimens 10 seconds after you take them.

You are always sure of your picture. If you don't get exactly the picture you want the first time, you'll know immediately, and can take another then and there.

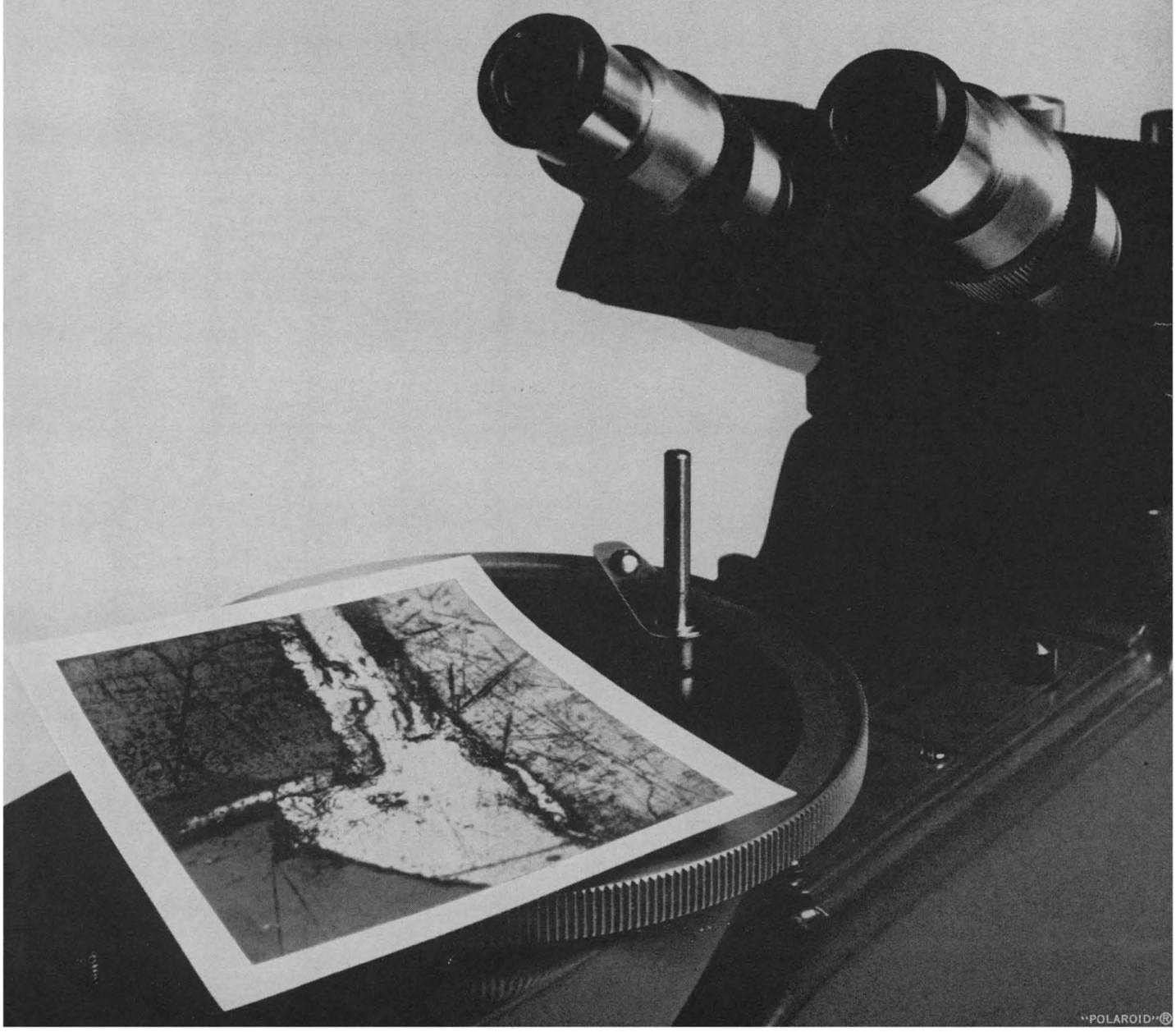
You don't have to waste any time in a darkroom only to find out the picture isn't right—that illumination, or filtration, or focus, or field coverage is not perfect. And you never run the risk of having to repeat a difficult and time-consuming photomicrographic setup at a later date.

Because 10-second metallography has proven itself an invaluable laboratory tool, Polaroid Land camera backs (or the Polaroid 4x5 Land Film Holder) are offered as standard equipment with most well known metallographs.

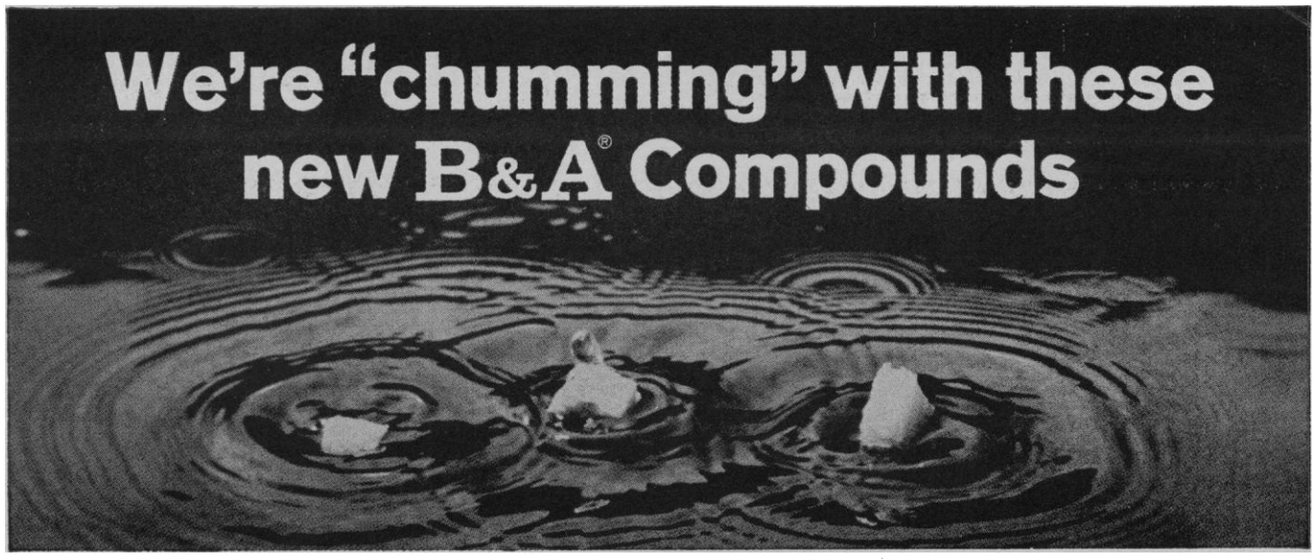
Land camera backs are available for our roll or pack film formats. The 4x5 film holder, of course, accepts our 4x5 sheet films.

There are two basic Polaroid Land films for metallography, and they are available in all formats. There's a panchromatic black and white film, rated at A.S.A. 3000, which lets you shoot at low light levels with fast shutter speeds, and gives you a finished print in 10 seconds. And there's Polaroid color film which gives you an accurate full-color recording in 60 seconds.

The system is well worth looking into, don't you think? We'll be happy to supply more information. **Polaroid Corporation, Cambridge, Mass.**



We're "chumming" with these new B&A® Compounds



chum (chŭm), *n.* (Origin obscure) Chopped fish, or bait, thrown overboard to draw fish.

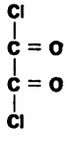
chum, *v. i.* To fish with the aid of chum.

We're using these new compounds as "chum" to see if we can arouse any interest from you. Some of the products that we advertised in earlier "fishing trip" ads proved so useful to readers that we're now supplying them in pilot and production quantities.

Monochloroacetyl Chloride: $CH_2ClCOCl$
Dichloroacetyl Chloride: $CHCl_2COCl$
Trichloroacetyl Chloride: CCl_3COCl

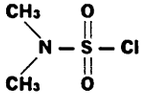
Convenient intermediates for introducing the corresponding chloroacetyl group in a variety of organic syntheses.

Oxalyl Chloride



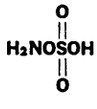
Synthesis of acid chlorides. Condensation reagent with $AlCl_3$ for ethers of aromatic hydrocarbons to form open diketones.

N,N-Dimethyl Sulfamyl Chloride



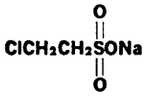
Reacts with amines, sodium alcoholates, sodium phenates, etc. to give the corresponding amides and esters.

Hydroxylamine-O-Sulfonic Acid



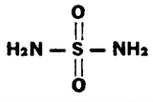
Reacts with organic amines to form hydrazines.

Sodium 2-Chloroethane Sulfonate



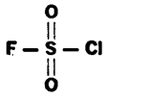
For introducing the sulfoethyl group in organic synthesis.

Sulfamide



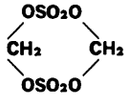
Similar to urea in many of its reactions, except it is more acidic and can act as a dibasic acid.

Sulfuryl Chlorofluoride



Gives selective reactivity between SO_2F_2 & SO_2Cl_2. Reacts with phenol or substituted phenols forming the corresponding aryl fluorosulfonates.

Methylene Sulfate



Reacts with alcohols & glycols to give formals; with tertiary amines such as pyridine, quinoline & dimethylaniline compounds of a type analogous to betaine results.

Sulfur Trioxide Pyridine Complex
Sulfur Trioxide Trimethylamine Complex
Sulfur Trioxide Triethylamine Complex

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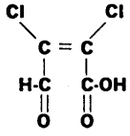

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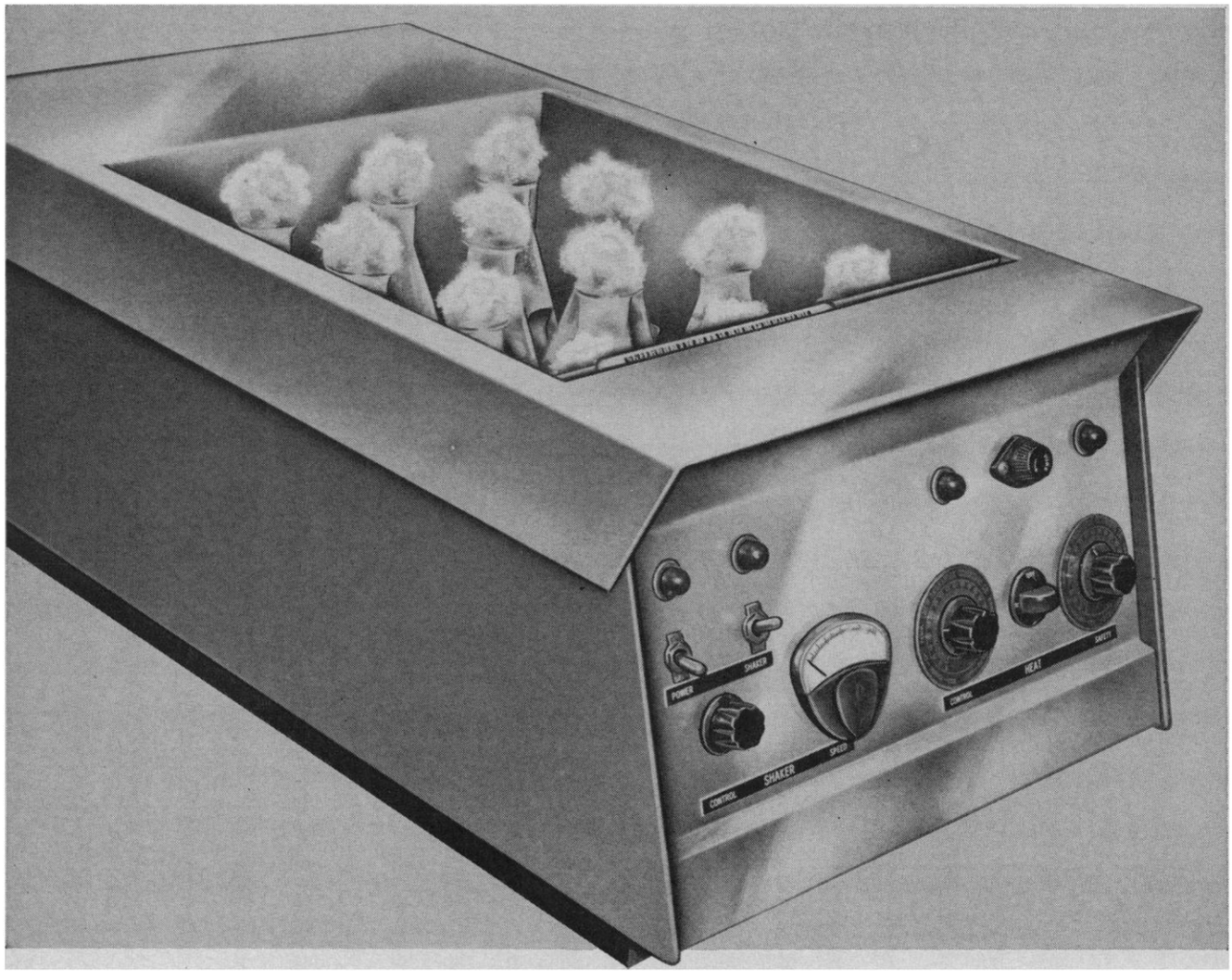

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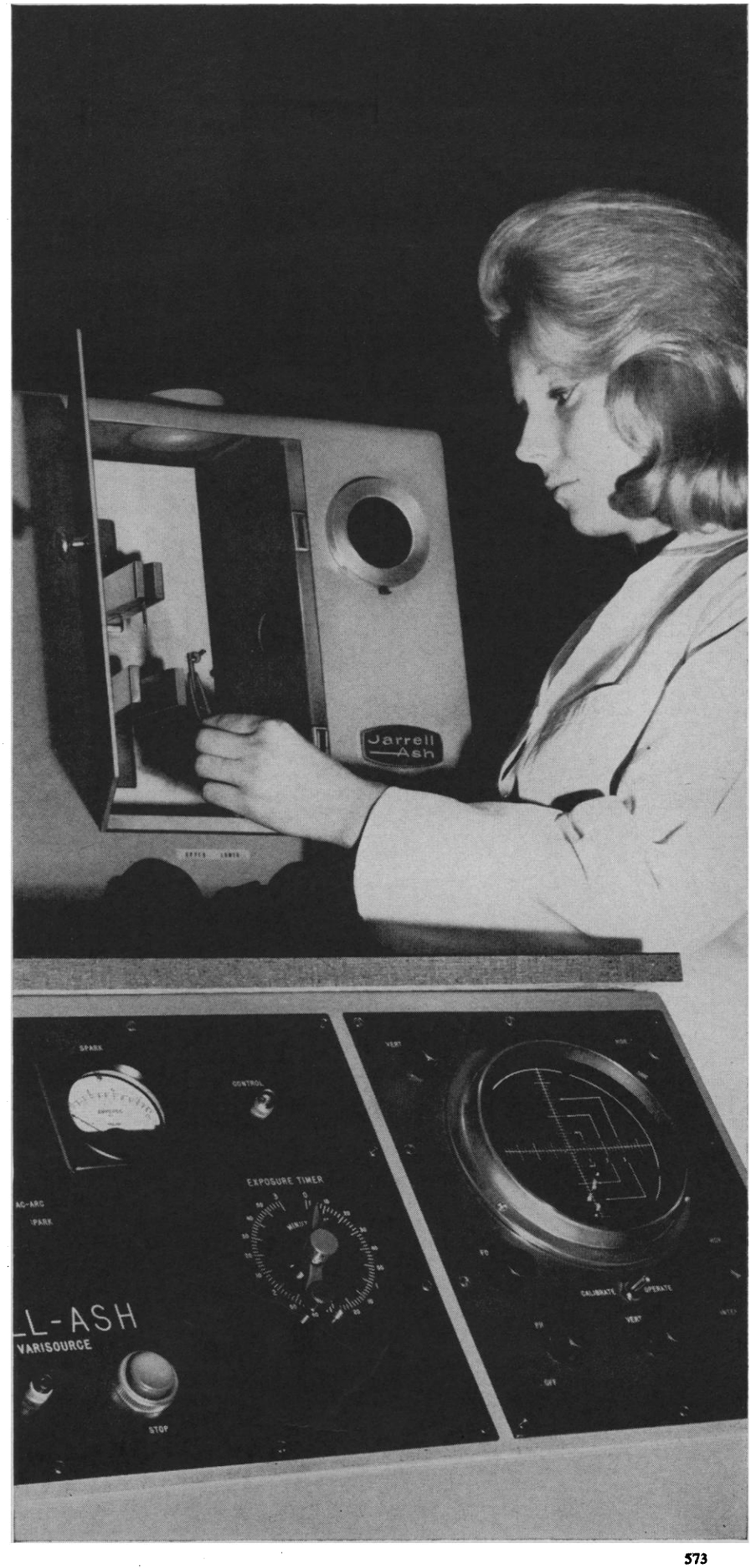

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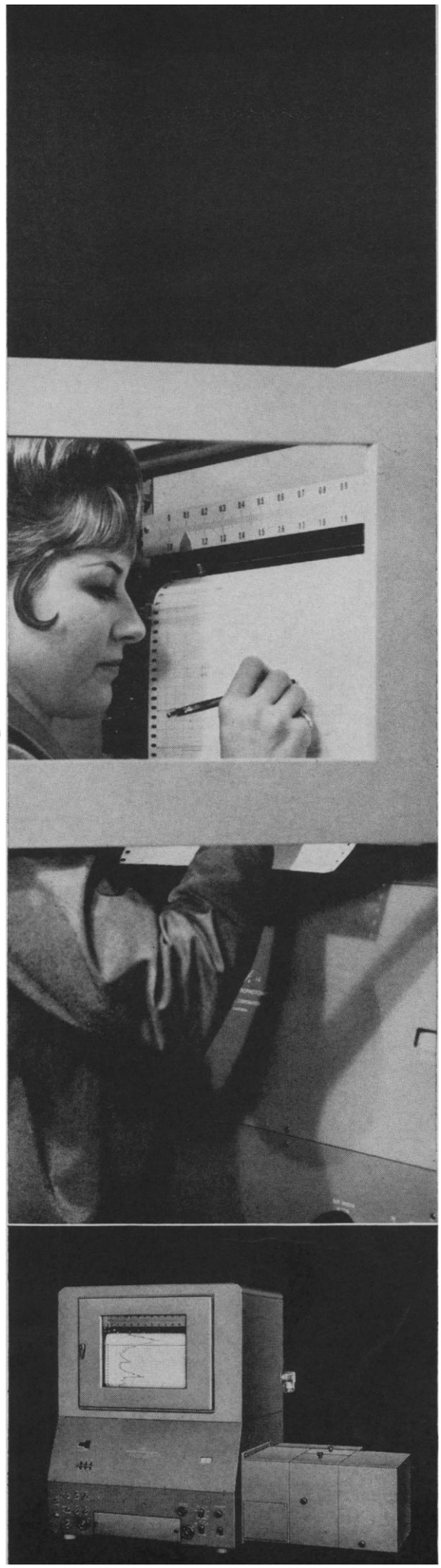

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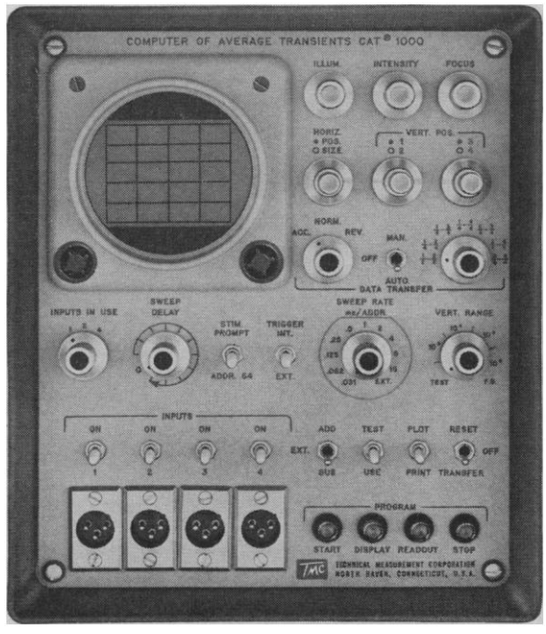

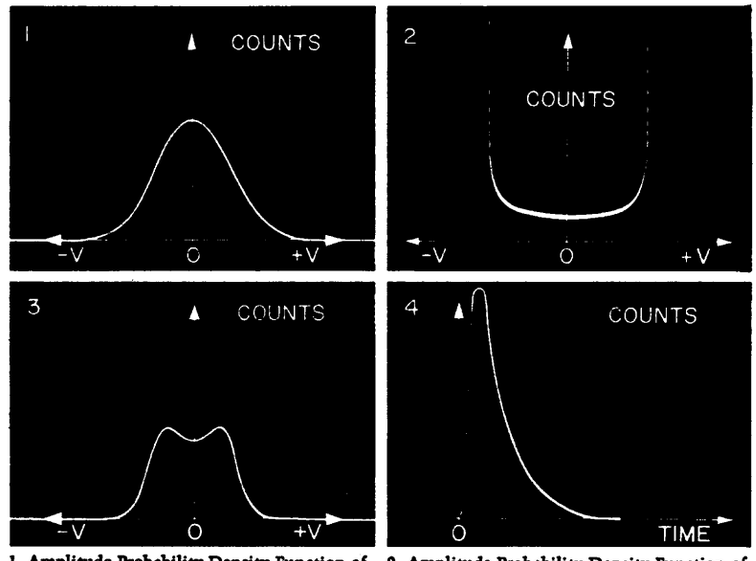

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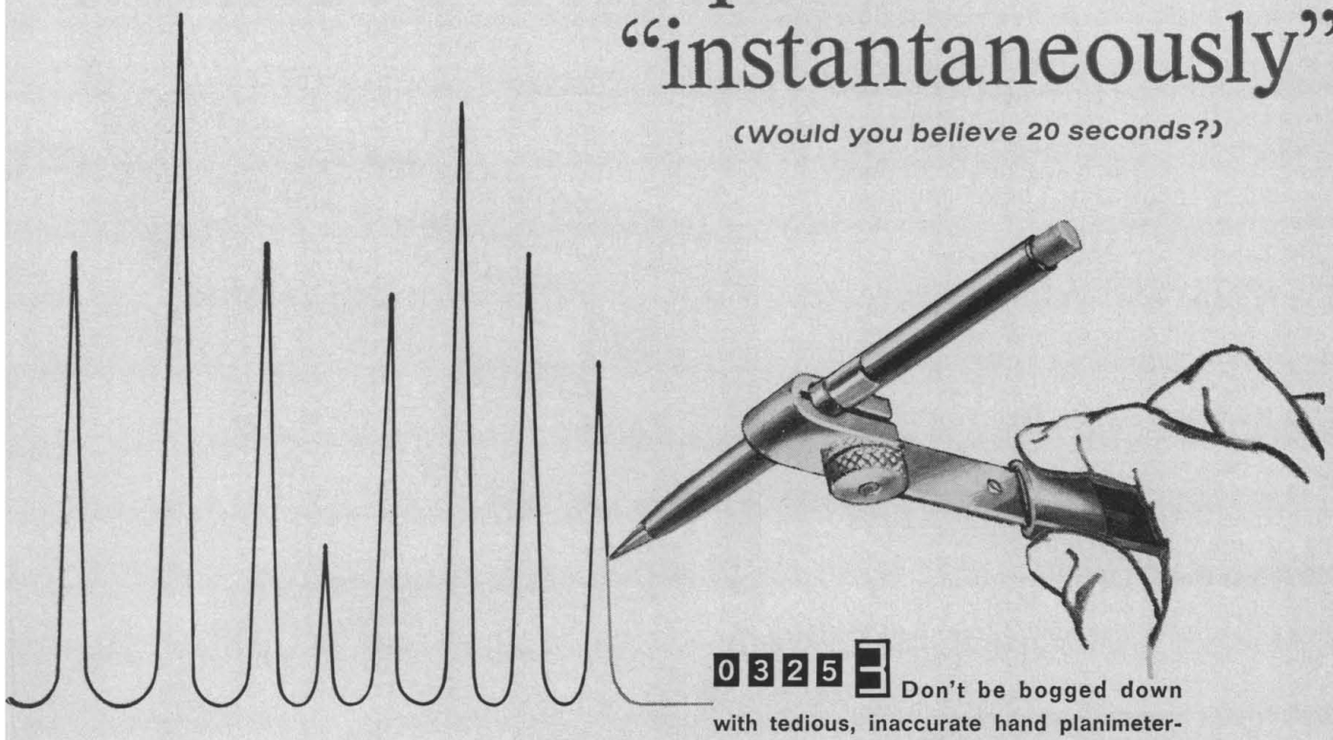

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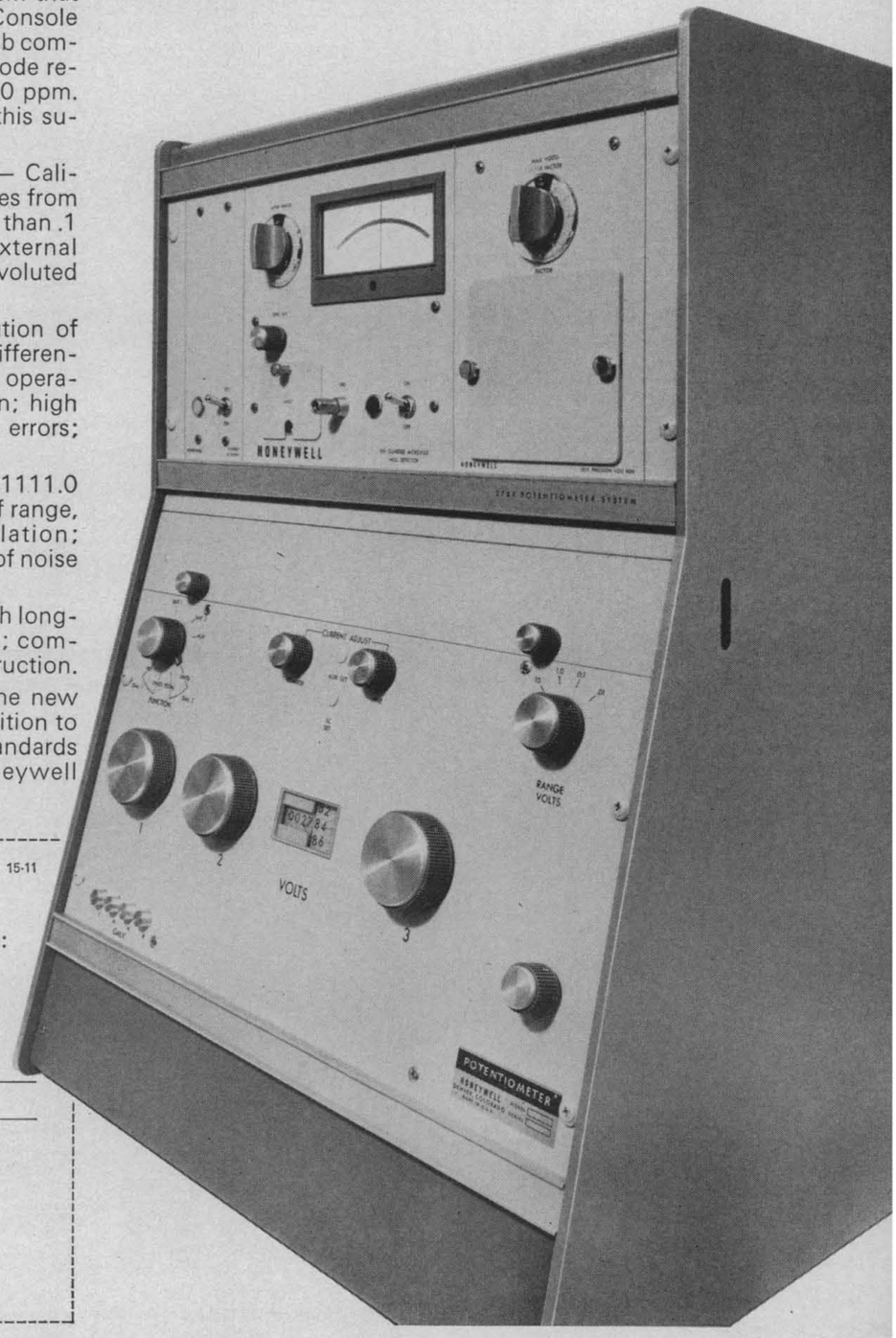

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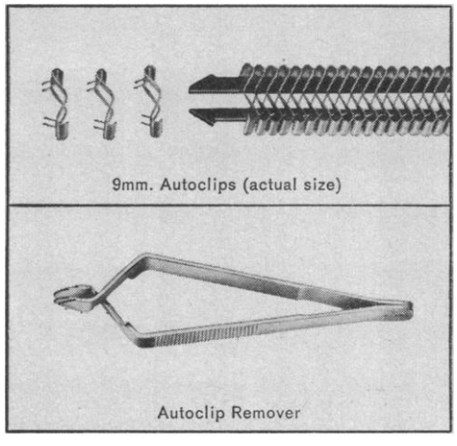

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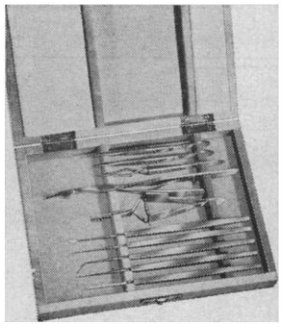

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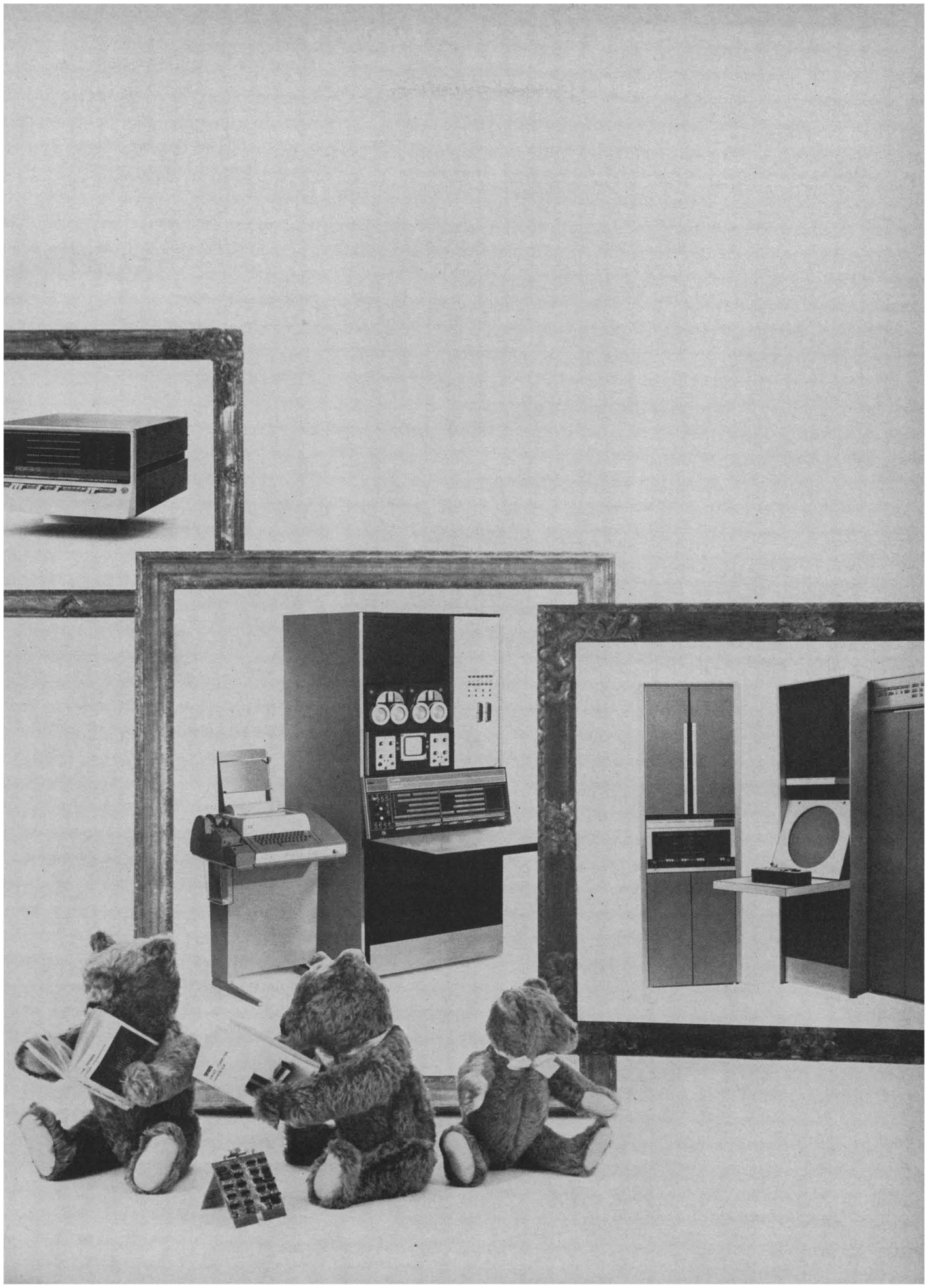

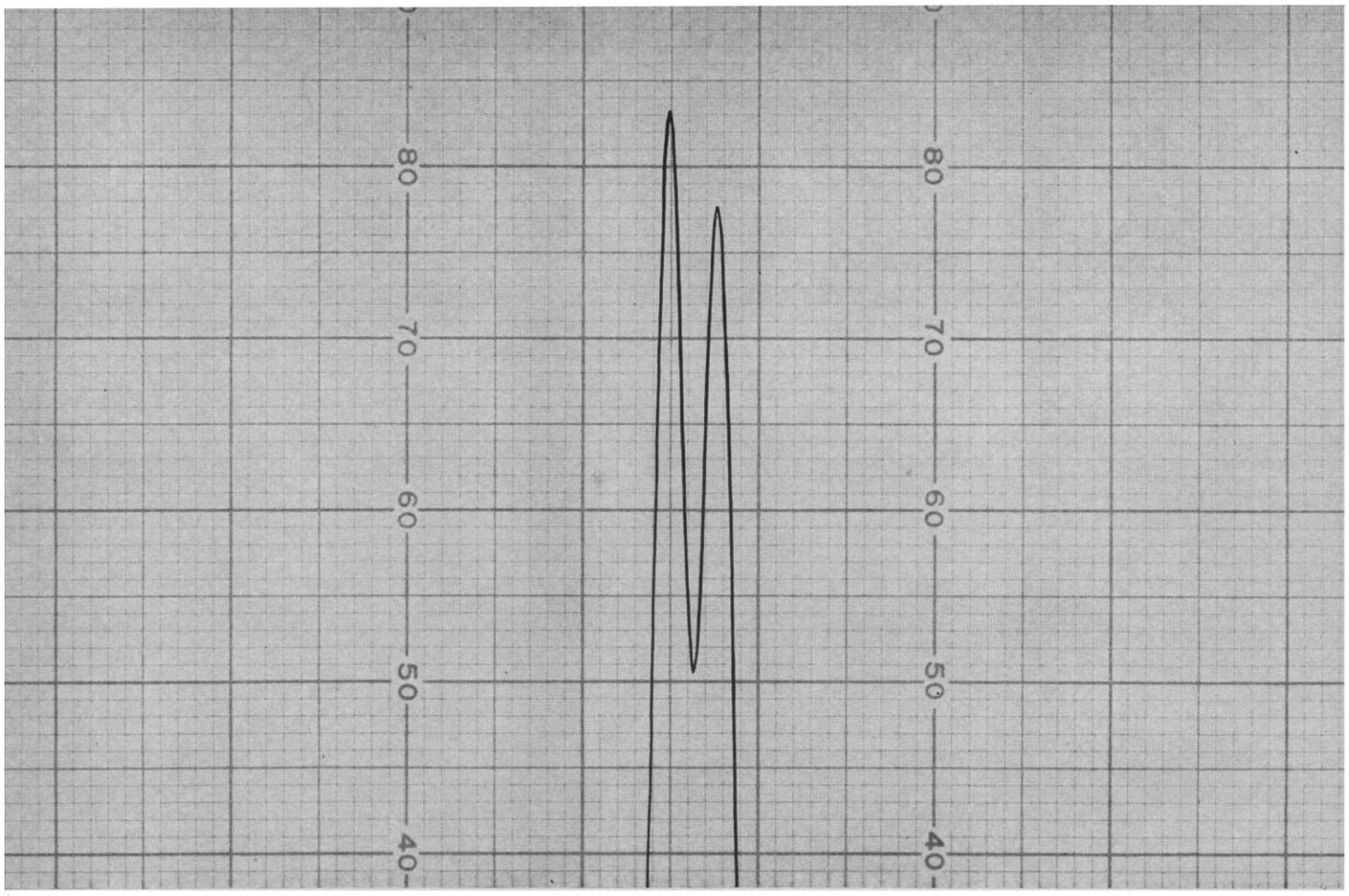

Since the sodium doublet falls at the most compressed point of the spectrum, isn't it impossible to split it with a single prism spectrophotometer? Indeed it is, with one exception—the Zeiss Spectrophotometer PMQ II. Above is an actual PMQ II resolution of the most demanding doublet. Distance between peaks is approximately 6 Å.

You're looking at an impossibility

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Detroit Fluoride Conference

In his article, "Fluoridation: A meeting in Detroit raises some questions" (23 Sept., p. 1499), Greenberg focused attention on some important aspects of the continuing controversy over water fluoridation, not the least of which is the urgent need for top-level scientific symposia on the physiological properties of fluoride at which all sides are adequately and competently represented. He correctly pointed out that the newly formed American (name now changed to International) Society for Fluoride Research must still prove itself worthy of being considered a proper scientific organization for this or any other legitimate purpose.

With respect to the "curious" timing of the recent conference, it is pertinent to note that such a meeting was actually proposed over a year ago, long before there was even any intimation that there would be a referendum on fluoridation in Detroit this fall. However, owing to the problem of raising funds, final plans could not be made until late spring. My letters of invitation were composed and signed by me as a member of the program committee. At least a half dozen of those scientists who attended the conference were invited personally by Waldbott. Several others who came in response to his invitation would probably be considered "pro-fluoridationists."

The comments about Waldbott and his new book neglected to indicate that since 1955 he has published detailed clinical reports of reversible ill effects from fluoridated drinking water. These have appeared in such distinguished medical journals as *Acta Medica Scandinavica, International Archives of Allergy and Applied Immunology, Acta Allergologica, Confinia Neurologica, Deutsche Medizinische Wochenschrift, Hautarzt, Nordisk Medicin*, and others. Without this fact being stated, many readers might gain the impression that touring the country "proclaiming an association between fluorine and an immense catalog of misfortunes" is Dr. Waldbott's sole activity concerning the medical aspects of fluoride.

Actually, for anyone who is thoroughly familiar with Waldbott's clinical findings, it is clear that they present evidence for reproducible toxic effects from fluoride in drinking water, which has been disputed but not refuted. Those findings certainly appear to be as valid, say, as those of Ignaz Semmelweis who charged that unsanitary delivery room instruments and procedures were the primary cause of childbed fever. The weight of prevailing medical opinion was against Semmelweis, but that did not prove him wrong! After all, a physician does have a duty to his profession and to society to report any previously unnoticed side effects from an accepted medical practice. He is considered derelict if he does not do so, and justly so.

By the same token, was it not a little presumptuous to imply that the conference in Detroit would probably produce "little but scientific-sounding scare stories" without having knowledge of the actual content of the papers that were to be presented and discussed? Science cannot be expected to make advances if it can operate only in a climate of conformity to viewpoints that rest on older, rather than newer, data.

ALBERT W. BURGSTAHLER
Department of Chemistry, University of Kansas, Lawrence 66044

Graduate Training in Astronomy

From 1930 to early 1957, I was active in training graduate students in astronomy at Harvard. From 1957 until last April, I was in Australia, establishing a graduate school of astronomy at the Australian National University, and I am now head of the department of astronomy at the University of Arizona. During my absence abroad, I visited the United States several times to attend meetings of the American Astronomical Society and kept closely in touch with graduate schools of astronomy at several universities. Last spring when I returned, I was impressed by the great increase in the number of graduate students. Further, it seemed to me that, while many new universities have entered the graduate training picture, the admission standards appear to have been lowered, and that there are, at the end of the first and second years, fewer dropouts now than there were 10 to 20 years ago. Moreover, the quality of the education does not seem as high as it was formerly. I have found also that many graduate students do not seem to be putting forth their maximum effort. The 1966 student is not so fully committed to his training for a future career as was the graduate student of the early and middle fifties.

The number of fellowships for gradu-

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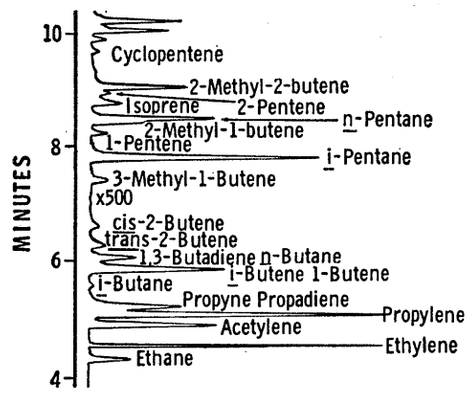

Section of chromatogram of hydrocarbons in exhaust gas—from a recent paper.

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ate study has fortunately increased, especially through the programs of NSF, NASA, and NDEA. With this new affluence, stability, and opportunity, something seems to have been lost. The better graduate students of 10 to 20 years ago were young people in a hurry, whereas the 1966 model seems to take his time. In the past, most students who did graduate work in astronomy felt that it was a real privilege to be admitted to graduate school and be awarded a fellowship or assistantship. From the start, there was a sense of urgency. The few who did not try hard enough, or who lacked ability, were dropped after 1 year or, at most, 2 years in graduate school. The pressures on the student to work during the initial years should not be less than those on students in professional schools of medicine and law.

Predoctoral examinations in the field of astronomy seem to require more time for preparation than they did in the past and, as a result, the start of work on the doctoral thesis is delayed. Thesis work is often not really begun until 3 years after the student enters graduate school. It is not at all unusual now to see a student take 5 to 7 years to complete the work for the doctorate. The normal time, I believe, should be 4 years. If the student enters graduate school with an adequate preparation in physics and mathematics and with a fair knowledge of one or two foreign languages, the 2 years should suffice for his formal course work, which would leave 2 years for completing the doctoral thesis. The search for a thesis topic should start in earnest early in the second year.

Another example of the leisurely approach to the doctorate is the time consumed to fulfill the foreign language requirement. This has become such a major undertaking that students often spend most of a summer getting ready for the language examination, and, during that time, they suspend all their professional graduate study.

The generous fellowship support programs have had one further unfortunate side effect. In the past, a graduate student generally spent at least 1 year as an assistant teaching an elementary or intermediate course related to his field of study. It is now difficult to get promising students to do any teaching and this is leading to a generation of professional astronomers with practically no background in teaching. This is a pity, since I know of no better way for a graduate student to learn the general background for his professional work.

Under the present system a student is not thoroughly examined as to his capabilities for future professional work until 2 or 3 years after he has entered graduate school. We used to be able to eliminate our poor prospects generally at the end of the first year, and certainly at the end of the second year. But if a student remains in graduate school for as long as 3 years, he is generally firmly ensconced and it is difficult to get rid of him.

I wish to comment briefly on another discouraging development. Ten to twenty years ago, graduate students were active questioners and spoke up regularly in colloquia and at AAS meetings. Now, even though the student goes through the ordeal of presenting his own paper, first in the departmental colloquium, and then in a professional meeting, he is inclined to become less engaged in open question periods than he did formerly. Questioning is generally limited to the staff members in the first few rows at colloquia and to a few distinguished astronomers at professional meetings. This is too high a price to pay for bigness.

Since I have taken on the responsibility for a relatively young graduate school of astronomy, I have naturally given thought to improving these matters. In summary, it seems obvious that strict admission standards must be set, and that each student's case must be reviewed thoroughly and comprehensively at the end of the first and second year of graduate study. It should not be assumed as a matter of course that a student will spend 5 or more years in graduate school; 4 years on the average should suffice. Students should be urged increasingly to participate in scientific discussions and most would benefit from 1 year of teaching elementary or intermediate courses. Finally, the foreign language requirements should be fulfilled preferably during the undergraduate years.

Two concluding comments: it has been a source of regret to return to the United States after 10 years and find, first, that there are still very few graduate schools in which the study of optical and radio astronomy is naturally interwoven, and second, that women graduate students in astronomy are still so rare.

BART J. BOK

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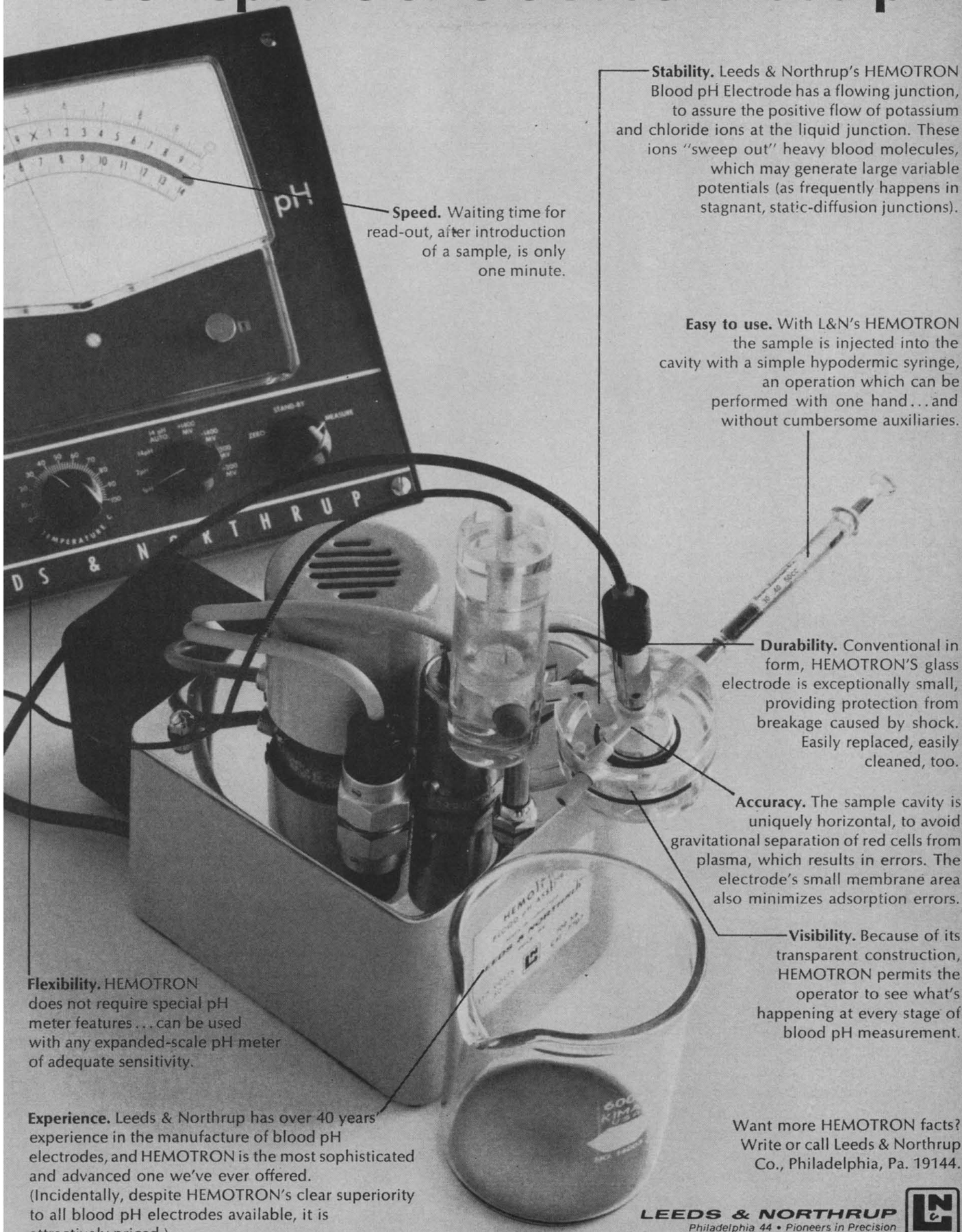

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4 November 1966, Volume 154, Number 3749 **SCIENCE**

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Science Critics*

Scientific problems should be presented to the general public from several points of view. Factual knowledge must, of course, be communicated through articles, books, lectures, and exhibits in terms that are meaningful for the nonscientist yet do not distort the truth. Great progress has been made in such popularization of science during the past decades; the Pacific Science Center in Seattle is a notable example of achievement in this direction.

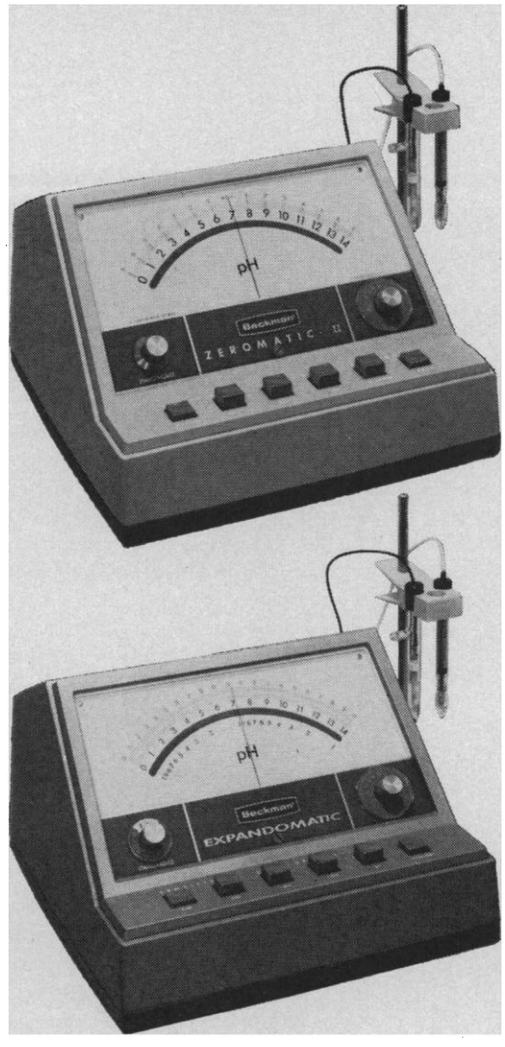
It is essential also that scientists discuss more thoroughly in public the implications of their findings with regard not only to the practical applications of science but also to its influence on the concepts of man's place in the order of things. The philosophical and social uncertainties that are emerging from scientific progress must be emphasized just as much as the prospects of technological breakthroughs. Science and the technologies derived from it will increasingly create economic, educational, and ethical problems for which our communities can make responsible choices only if steps are taken to increase general scientific awareness. A few organizations, such as Scientists' Institute for Public Information, have begun developing a public forum for the social implications of science, but much more will have to be done before the relation between science and society can develop on a basis of mutual understanding.

Most importantly, perhaps, public discussions of the sociology of science should reach into the organization of the scientific enterprise itself. The congressional hearings, in the Senate and in the House, have made clear that new social techniques must be developed to determine more rationally the relative amount of support for free basic research, mission-oriented research, and applied research. There is no doubt, furthermore, that certain fields of science are neglected even though their exploration would be of benefit to human understanding and welfare. For a balanced and orderly development of knowledge, it is essential that the public be given the opportunity to participate in the formulation of the overall strategy of scientific research.

All important human activities have given rise to a highly sophisticated profession concerned with the criticism of their values, achievements, trends, and potentialities. The professional critics of art, music, literature, economics, government, and so on play an essential and creative role even when they do not themselves contribute directly to the fields of activity they evaluate. Science would certainly benefit from the kind of evaluation that professional critics give to other human activities. Whether scientific criticism should develop from within the community of experimental scientists or outside of it remains a moot question. But what is certain is that the higher criticism of science cannot have much vitality without public participation.

A society that blindly accepts the decisions of experts is a sick society. The time has come when we must produce, alongside specialists, another class of scholars and citizens who have broad familiarity with the facts, methods, and objectives of science and thus are capable of making judgments about scientific policies. As Warren Weaver has repeatedly emphasized, persons who work at the interface of science and society have become essential because almost everything that happens in society is influenced by science.—RENÉ DUBOS, *Rockefeller University*

* From the response by Dr. Dubos to the first public announcement that he had been named winner of the 1966 Arches of Science Award of the Pacific Science Center. The award was presented in Seattle on 19 October.



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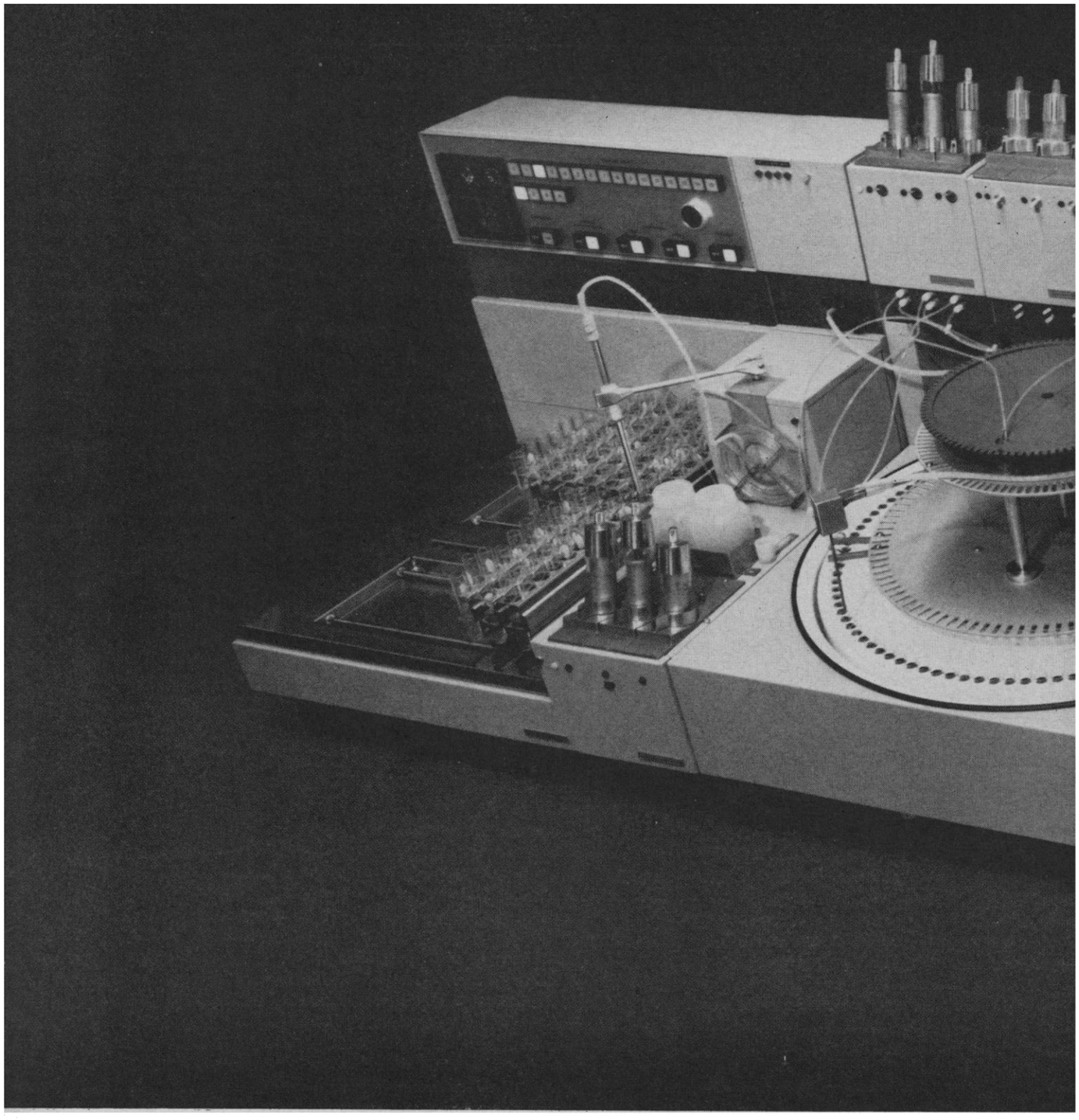

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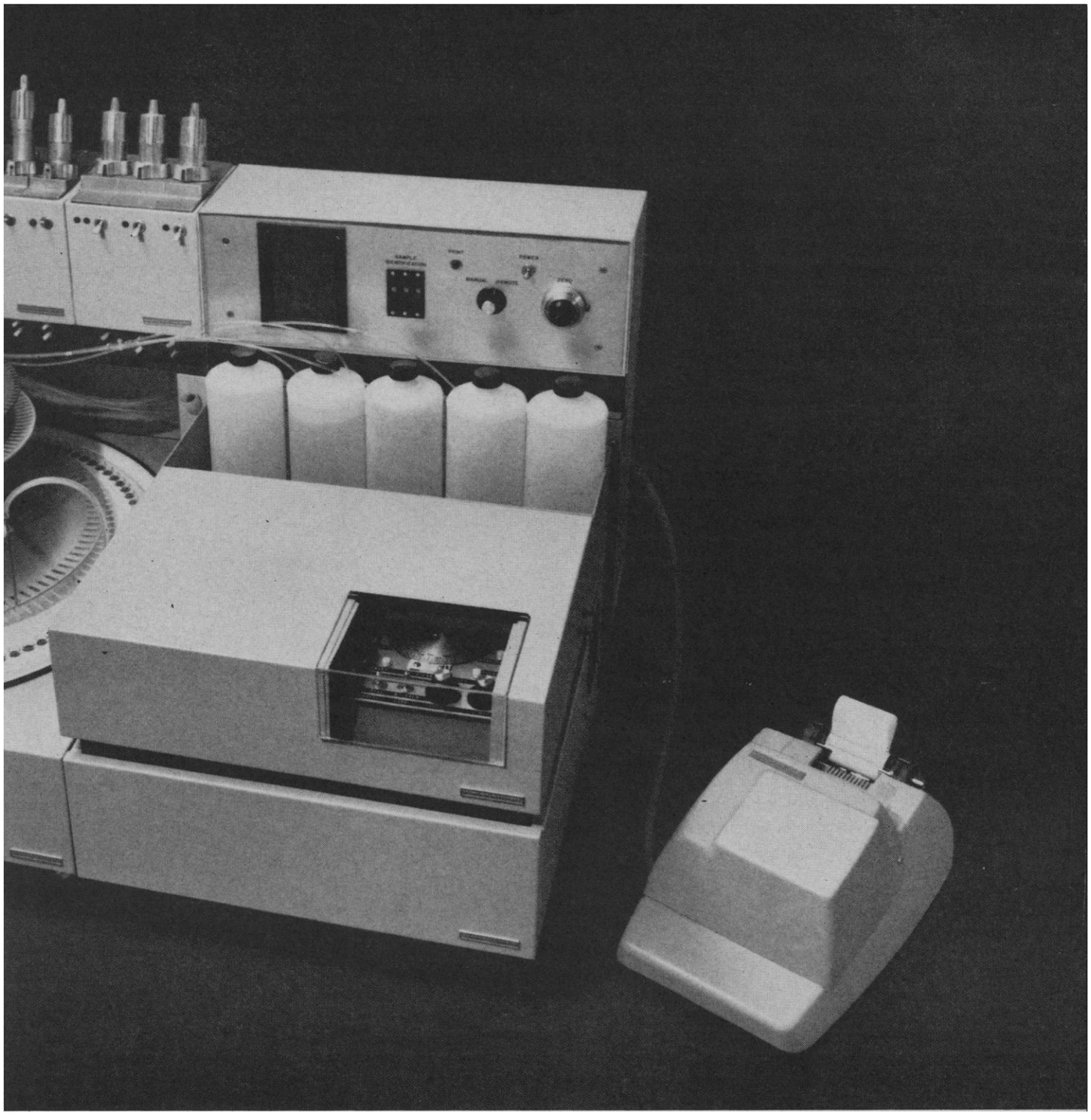

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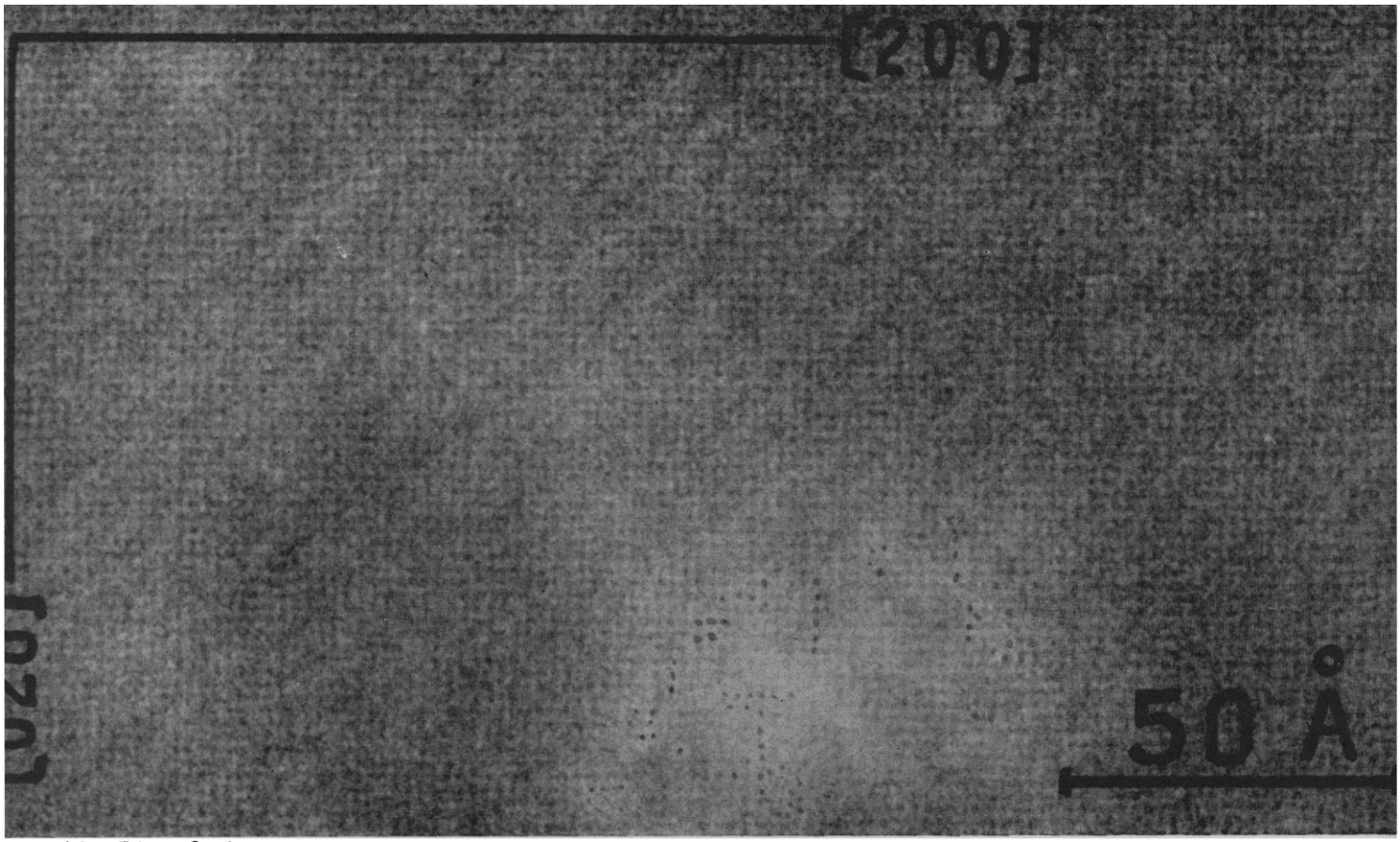

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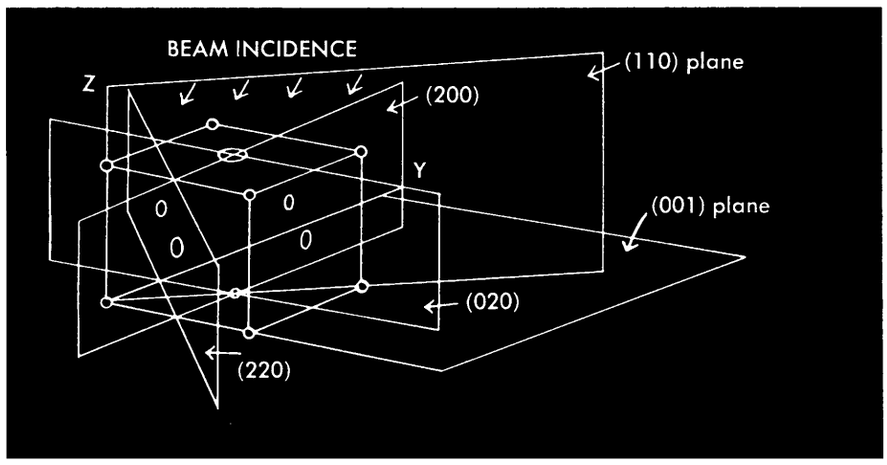

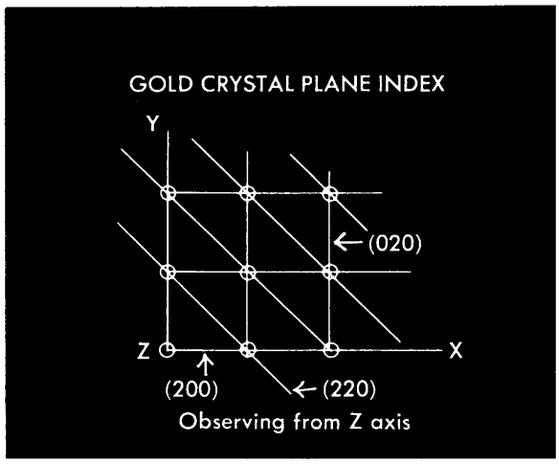

Calif. (Manpower Research Group, Center for Interdisciplinary Studies, San Jose State College, San Jose, Calif.)

20–22. **Water Resources**, 2nd annual conf., Univ. of Chicago, Chicago, Ill. (American Water Resources Assoc., P.O. Box 434, Urbana, Ill. 61801)

21–23. American Physical Soc., Div. of **Fluid Dynamics**, mtg., Stanford Univ., Palo Alto, Calif. (R. J. Emrich, Dept. of Physics, Lehigh Univ., Bethlehem, Pa.)

21–24. Communications in Science: **Documentation and Automation**, Ciba Foundation symp., London, England. (Ciba, 41 Portland Pl., London, W.1)

21–24. Central American **Geologists**, 2nd conf., Guatemala City, Guatemala. (G. Dengo, Central American Inst. of Research and Industrial Technology, Apt. Postal 1552, Guatemala City)

21–25. **Radioisotope Tracers** in Industry and Geophysics, symp., Prague, Czechoslovakia. (J. H. Kane, Conferences Branch, Div. of Technical Information, U.S. Atomic Energy Commission, Washington, D.C. 20545)

22. **Manufacturing Chemists** Assoc., 16th semiannual mtg. and midyear conf., New York, N.Y. (The Association, 1825 Connecticut Ave., NW, Washington, D.C.)

23. Chemical Economics Div., Chemical Inst. of Canada, mtg. on **Internationalization of the Chemistry Industry** and Its Effect on Canada, Montreal, Quebec. (H. A. Bowler, Central Development Dept., Dotmar, 1155 Dorchester Blvd. W., Montreal 2)

26–4. **Pharmacy and Biochemistry**, 7th Pan American congr., Buenos Aires, Argentina. (Z. M. Lugones, Univ. of Buenos Aires, Calle Viamonte 444, Buenos Aires)

28–29. **Parkinson's Disease** Information and Research Center, 3rd research conf., College of Physicians and Surgeons, New York, N.Y. (M. D. Yahr, New York Neurological Inst., 710 W. 168 St., New York 10032)

28–30. American Soc. of **Hospital Pharmacists**, 1st annual midyear mtg., Washington, D.C. (J. A. Oddis, The Society, 4630 Montgomery Ave., NW, Washington 20014)

28–30. **Reticuloendothelial** Soc., 3rd natl. mtg., Natl. Institute of Health, Bethesda, Md. (M. Landy, Laboratory of Immunology, Natl. Inst. of Allergy and Infectious Diseases, NIH, Bethesda, Md. 20014)

28–1. **Aerospace Medicine**, intern. mtg., Sydney, Australia. (Secretariat, Aviation Medical Soc. of Australia, G.P.O. Box 1207, Sydney)

28–2. **Alkali Metal Coolants**—Corrosion Studies and System Operation Experience, Intern. Atomic Energy Agency symp., Vienna, Austria. (J. H. Kane, Conferences Branch, Div. of Technical Information, U.S. Atomic Energy Commission, Washington, D.C. 20545)

28–3. Methods of Preparing and Storing **Labelled Compounds**, 2nd intern. conf., Brussels, Belgium. (J. Sirchis, European Atomic Energy Community, 51-53 Rue Belliard, Brussels)

29–30. Treatment and Control of **Injection Waters**, 3rd biennial symp., Anaheim, Calif. (A. J. Bogart, Oilwell Research, Inc., 1539 W. 16 St., Long Beach, Calif. 90813)

December

1–2. **UNESCO**, 75th executive board session, Paris, France. (Pl. de Fontenoy, Paris 7)

1–3. **Medicine and Sociology**, intern. symp., East Berlin, Germany. (K. Winter, Hygiene-Institut Humboldt-Universität, Otto-Grotewohl-str. 1, 108 Berlin, East Germany)

1–8. **Heads of National Research Insts.**, mtg., Bangkok, Thailand. (U.N. Economic Commission for Asia and the Far East, Sala Santitham, Rajadamnern Ave., Bangkok)

2. American **Industrial Hygiene** Assoc., mtg., Metropolitan New York, New Jersey, Delaware sections, Sterling Forest, N.Y. (O. M. Banks, Shell Chemical Co., 110 W. 51 St., New York 10020)

2–3. Perspectives in **Leukemia**, symp., New Orleans, La. (W. Dameshek, Leukemia Society, 211 E. 43 St., New York 10017)

2–3. **Nuclear Power Stations Operation,** conf., Bern, Switzerland. (Swiss Assoc. for Atomic Energy, P.O. Box 2613, 3001 Bern)

3–4. **Space Flight,** conf., Bremen, Germany. (Secretariat, Hermann Oberth Soc., Fritz-Beindorff-allee 9, 3000 Hanover, West Germany)

3–8. American Acad. of **Dermatology and Syphilology,** 25th annual mtg., Miami Beach, Fla. (The Academy, 636 Church St., Evanston, Ill.)

3–11. **Aviation and Aerospace**, intern. exposition, New York, N.Y. (F. S. Doman, Aviation and Aerospace Exposition, Inc., 500 Fifth Ave., New York 10036)

4–7. American Inst. of **Chemical Engineers,** 59th annual mtg., Detroit, Mich. (E. B. Chriswell, California Research Corp., Room 807, 200 Bush St., San Francisco, Calif.)

4–8. American Inst. of **Chemical Engineers,** 59th annual mtg., Detroit, Mich. (R. E. Greenhaigh, Dow Corning Corp., Midland, Mich.)

5–7. **Antennas and Propagation**, intern. symp., Palo Alto, Calif. (R. L. Deadabrand, Radio Physics Laboratory, Stanford Research Inst., Menlo Park, Calif.)

7. **American Institute of the City of New York**, mtg., New York. (Mrs. G. E. Peterson, American Institute of the City of New York, 2 E. 63 St., New York 10021)

5–7. Theory and Application of **Gas Chromatography** in Industry and Medicine, Hahnemann Medical College, Philadelphia, Pa. (H. S. Kroman, Dept. of Medicine, Medical College and Hospital, 230 N. Broad St., Philadelphia 19102)

5–8. **Magnesium in Biophysiopathology and Therapeutics**, intern. congr., Buenos Aires, Argentina. (A. Vidal Freyre, Ayacucho 1427, Buenos Aires)

5–8. **Polarized Targets and Ion Sources,** intern. conf., Saclay, France. (A. Abragam, Direction de la Physique, Centre d'Etudes Nucleaires de Saclay, B.P. 2, Gif-sur-Yvette, Seine-et-Oise, France)

5–9. **Operating Metallurgy**, 2nd conf. and exposition, Philadelphia, Pa. (C. L. Hopkins, American Inst. of Mining, Metallurgical, and Petroleum Engineers, 345 E. 47 St., New York 10017)

6–7. **Unconventional Inertial Sensors,** symp., Washington, D.C. (J. W. Lindberg, AIR 53321G, Naval Air Systems Command, Washington, D.C. 20360)

7–9. **International Scientific Radio Union,** fall mtg., Palo Alto, Calif. (R. A. Helliwell, Radioscience Laboratory, Stanford Univ., Stanford, Calif. 94305)

8–11. **Rodents,** Indian symp., Calcutta. (D. W. Parrack, Johns Hopkins Univ. Center for Medical Research and Training, All-India Inst. of Hygiene and Public Health, 110 Chittaranjan Ave., Calcutta 12)

9–10. **Contractile Process,** symp., New York Heart Assoc., New York. (The Association, 10 Columbus Circle, New York 10019)

9–11. American Acad. of **Psychoanalysis,** mtg., New York, N.Y. (M. Carroll, The Academy, 125 E. 65 St., New York 10021)

12–14. **Air Pollution,** natl. conf., Washington, D.C. (A. C. Stern, Div. of Air Pollution, U.S. Public Health Service, Washington, D.C. 20201)

12–14. **Renal Failure,** 17th symp., Hahnemann Medical College, Philadelphia, Pa. (A. N. Brest, Section of Vascular Diseases and Renology, Hahnemann Medical College and Hospital, 230 N. Broad St., Philadelphia 19102)

12–17. **History of Oceanography,** intern. congr., Monte Carlo. (R. Novella, Villa Girasole, 16, boulevard de Suisse, Monaco)

12–19. **Heads of National Standards Institutes,** mtg., Bangkok, Thailand. (U.N., Economic Commission for Asia and the Far East, Sala Santitham, Rajadamnern Ave., Bangkok)

14–16. Fundamentals of **Gas-Surface Interactions,** symp., San Diego, Calif. (H. Saltsburgh, General Dynamics/General Atomic, P.O. Box 608, San Diego 92112)

14–16. **Fluid Logic and Amplification,** 2nd intern. conf., Cranfield, England. (H. Stephens, British Hydromechanics Research Assoc., South Rd., Harlow, Essex, England)

15–16. International **Brain Research** Organization, central council and executive committee, mtg., Paris, France. (UNESCO, Pl. de Fontenoy, Paris 7)

16–18. American **Psychoanalytic** Assoc., fall mtg., New York, N. Y. (American Psychoanalytic Assoc., 1 E. 57 St., New York 10022)

19–20. British **Biophysical** Soc., winter mtg., London, England. (W. Gratzer, Biophysics Dept., King's College, 26 Drury Lane, London W.C.2)

19–21. **Acceleration Biology,** Sunnyvale, Calif. (Univ. of California Extension, Berkeley 94720)

26–31. **American Assoc. for the Advancement of Science,** 133rd annual Washington, D.C. (R. L. Taylor, AAAS, 1515 Massachusetts Ave., Washington, D.C. 20005)

27–30. American **Astronomical** Soc., 123rd mtg., University of California, Los Angeles, (G. C. McVittie, American Astronomical Soc. Univ. of Illinois Observatory, Urbana)

28–30. **Econometric** Soc., winter mtg., San Francisco, Calif. (Box 1264, Yale Station, New Haven, Conn.)

NEW BOOKS

(Continued from page 642)

Electron Radiation Damage in Semiconductors and Metals. James W. Corbett. Academic Press, New York, 1966. 420 pp. Illus. $16.50. Solid State Physics Series, Suppl. 7.

Elements of Thermodynamics. D. ter Haar and H. Wergeland. Addison-Wesley, Reading, Mass., 1966. 174 pp. Illus. $9.75. Addison-Wesley Series in Advanced Physics.

First Concepts of Topology: The Geometry of Mappings of Segments, Curves, Circles, and Disks. W. G. Chinn and N. E. Steenrod. Random House, New York, 1966. 168 pp. Illus. Paper, $1.95.

Fourier Transforms and the Theory of Distributions. J. Arsac. Translated from the French edition (Paris, 1961) by Allen Nussbaum and Gretchen C. Heim. Prentice-Hall, Englewood Cliffs, N.J., 1966. 334 pp. Illus. $14.

Gas Phase Reaction Rate Theory. Harold S. Johnston. Ronald, New York, 1966. 372 pp. Illus. $10. Modern Concepts in Chemistry.

Gases and Plasmas. Paul D. Thompson. Lippincott, Philadelphia, 1966. 176 pp. Illus. $4.25.

Gear Lubrication. Proceedings of a symposium organized by the Mechanical Tests of Lubricants Panel of the Institute of Petroleum (Brighton, England), October 1964. Published for The Institute of Petroleum, London. Elsevier, New York, 1966. Unpaged. Illus. $20. There are 40 papers.

Hill's Equation. Wilhelm Magnus and Stanley Winkler. Interscience (Wiley), New York, 1966. 135 pp. Illus. $8.50.

Infra-red Instrumentation and Techniques. A. E. Martin. Elsevier, New York, 1966. 190 pp. Illus. $12.

Intelligent Life in the Universe. I. S. Shklovskii and Carl Sagan. Based on a translation of the Russian edition by Paula Fern. Holden-Day, San Francisco, 1966. 525 pp. Illus. $8.95.

Introduction to Free Radical Chemistry. William A. Pryor. Prentice-Hall, Englewood Cliffs, N.J., 1966. 128 pp. Illus. Paper, $2.50; cloth, $5.50 Prentice-Hall Foundations of Modern Organic Chemistry Series.

Introduction to Real Analysis. Casper Goffman. Harper and Row, New York, 1966. 174 pp. Illus. $7.50. Harper's Series in Modern Mathematics.

Introduction to the Chemical Process Industries. Richard M. Stephenson. Reinhold, New York, 1966. 480 pp. Illus. $14.75.

A Laboratory Manual for Experimental General Chemistry. C. R. McLellan and W. C. Tucker. Davis, Philadelphia, 1966. 317 pp. Illus. Paper, $4.50.

The Laser. William V. Smith and Peter P. Sorokin. McGraw-Hill, New York, 1966. 510 pp. Illus. $15.50.

Linear Spaces of Analytic Functions. Pasquale Porcelli. Rand McNally, Chicago, 1966. 168 pp. Illus. $8.

Liquids and Solutions. Dale Dreisbach. Houghton, Mifflin, Boston, 1966. 204 pp. Illus. Paper, $2.95. Classic Researches in General Chemistry Series.

Mathematics for Electronics Techni-

cians. Paul L. Evans. Wiley, New York, 1966. 400 pp. Illus. $7.

Modern Foundations of Systems Engineering. William A. Porter. Macmillan, New York 1966. 509 pp. Illus. $14.95.

Modern University Calculus: With Coordinate Geometry. Stoughton Bell, J. R. Blum, J. Vernon Lewis, and Judah Rosenblatt. Holden-Day, San Francisco, 1966. 1975 pp. Illus. $11.75.

A New Look at Geometry. Irving Adler. Day, New York, 1966. 414 pp. Illus. $7.95.

Organic Insertion Reactions of Group IV Elements. Edmund Yanovich Lukevits and Mikhail Grigor'evich Voronkov. Translated from the Russian edition (Riga, 1964) by Michael J. Newlands. Consultants Bureau, New York, 1966. 425 pp. Illus. $25.

Outline of Historical Geology. A. K. Wells and J. F. Kirkaldy. Murby, London; Barnes and Noble, New York, ed. 5, 1966. 503 pp. Illus. $7.75.

Perspectives in Geometry and Relativity. Essays in honor of Václav Hlavatý. Banesh Hoffmann, Ed. Indiana Univ. Press, Bloomington, 1966. 505 pp. Illus. $15. There are 47 papers.

The Physics and Astronomy of Galaxies and Cosmology. Paul W. Hodge. McGraw-Hill, New York, 1966. 189 pp. Illus. Paper, $2.95; cloth, $4.95.

Plasma Physics in Theory and Application. Wulf B. Kunkel, Ed. McGraw-Hill, New York, 1966. 512 pp. Illus. $15.50. There are 13 papers.

Plastics Extrusion Technology and Theory. Gerhard Schenkel. Translated from the second German edition (Munich, 1963) by L. A. H. Eastman. B. S. Glyde, Translation Ed. Iliffe, London; Elsevier, New York, 1966. 477 pp. Illus. $24.

Principles and Methods of Sheet-Metal Fabricating. George Sachs. Revised and enlarged by Henry E. Voegeli. Reinhold, New York, ed. 2, 1966. 572 pp. Illus. $15.

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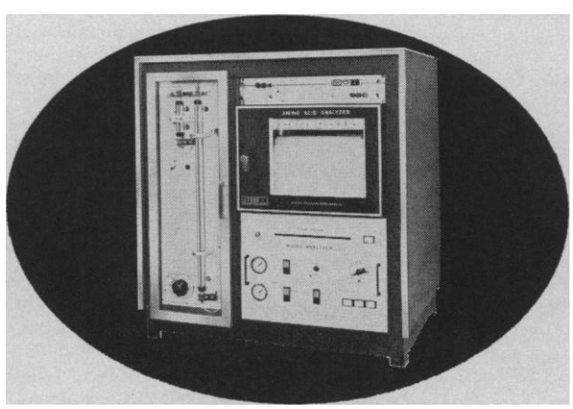

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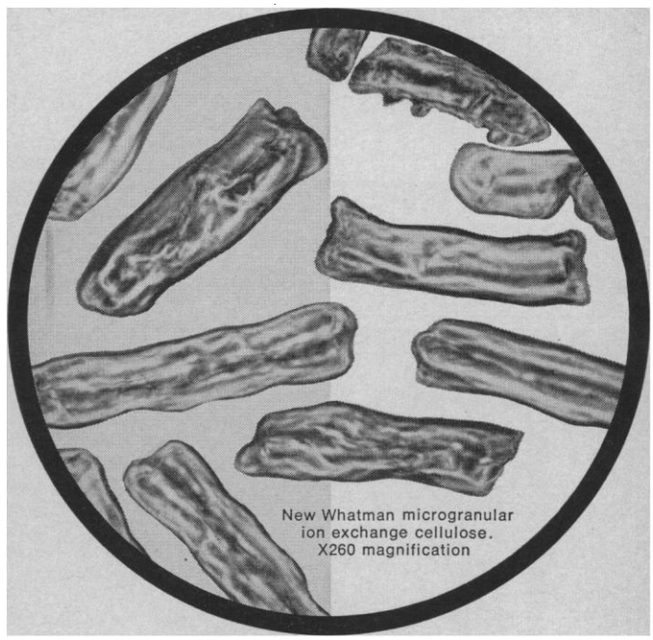

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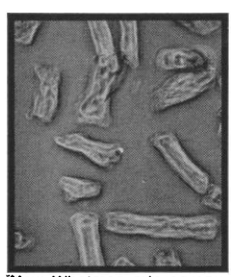

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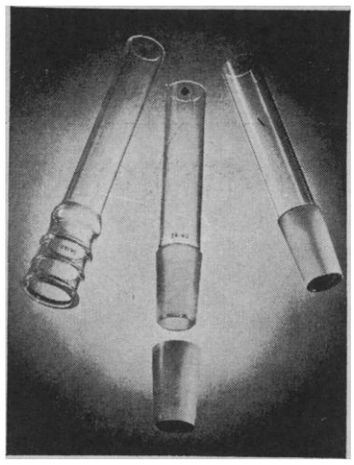

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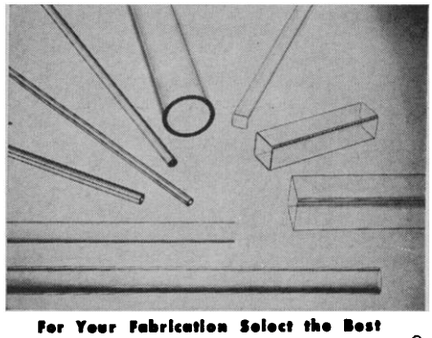

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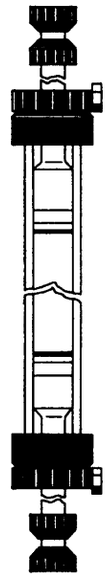

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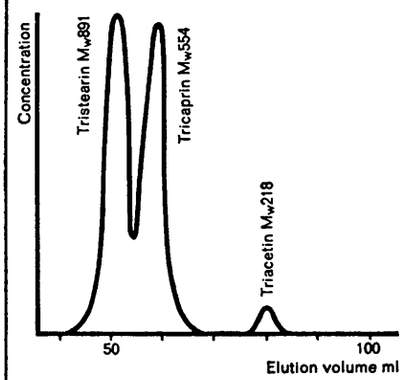

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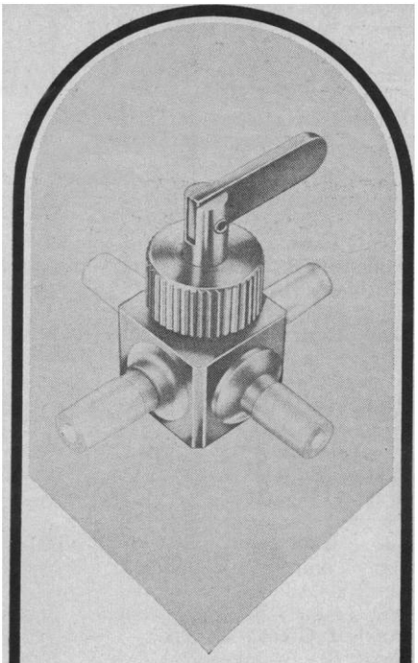

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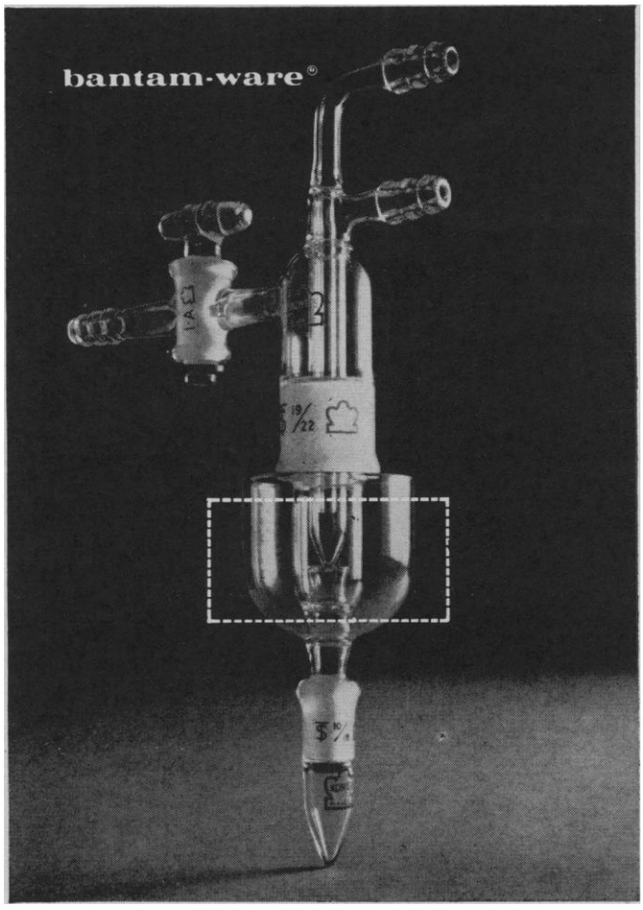

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* Kaji, et al., Ann. of N.Y. Acad. Sci., **94**, 798, (1961).

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