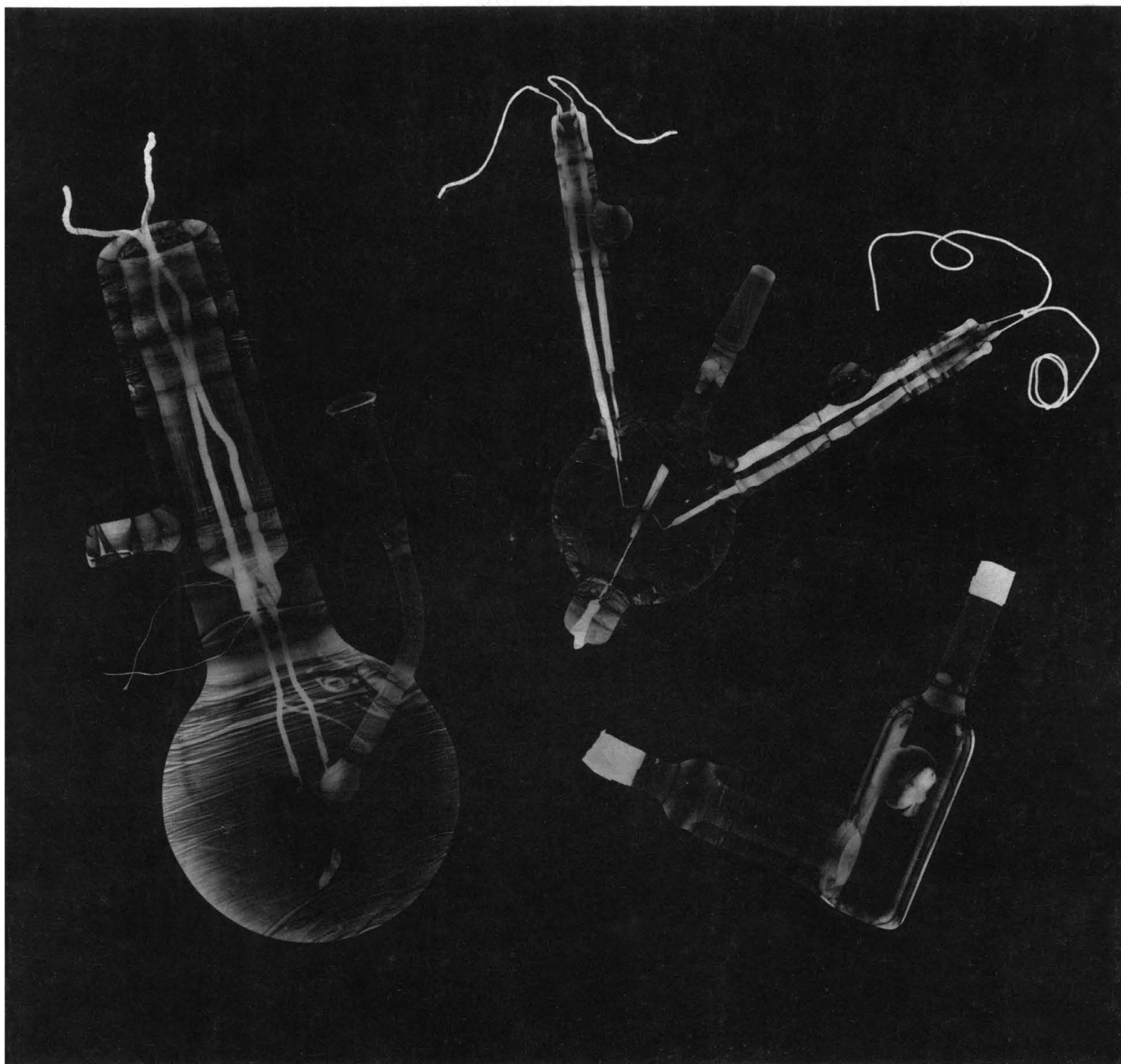


SCIENCE

26 March 1965
Vol. 147, No. 3665

AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE



ULTRAHIGH VACUUM COMPONENTS

Index Issue



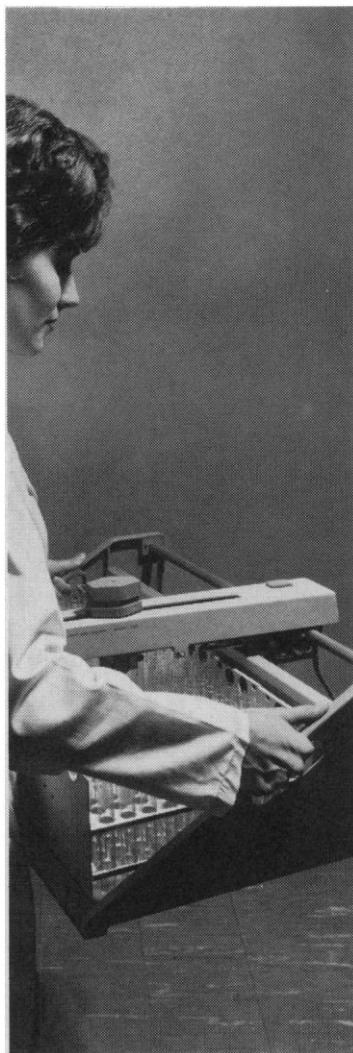
collect confidently

Whatever method of fraction collection you use (time, drop or volumetric), the delivery head of the Beckman 132 Fraction Collector will shut off automatically between tubes—to keep from spilling even a drop of valuable sample. Drip-proof delivery also makes it practical to fill tubes (there are 250 of them) in logical order, from front to back, row by row, for easier identification.



control remotely

The electronic control of this Fraction Collector (an expensive part of any collector) is a separate entity. You can keep it safely out of the way—to avoid damage by accidental spillage when tubes are handled. Equally important, the collector can be cooled completely while the control unit is kept outside the cooling area.



carry handily

Having the control unit separate also allows this Fraction Collector to be carried easily—it has convenient grip-slots on either side.



cool completely

This Fraction Collector has a companion Mobile Refrigeration Unit to save you cold room space. The unit holds fractions at 4° C, and cools an external column. Caster-mounted and easy to move, it permits refrigerated chromatographic analyses to be conveniently made anywhere in the laboratory. For more information about the refrigeration unit and the most advanced of Fraction Collectors, write for Data File 132-5.

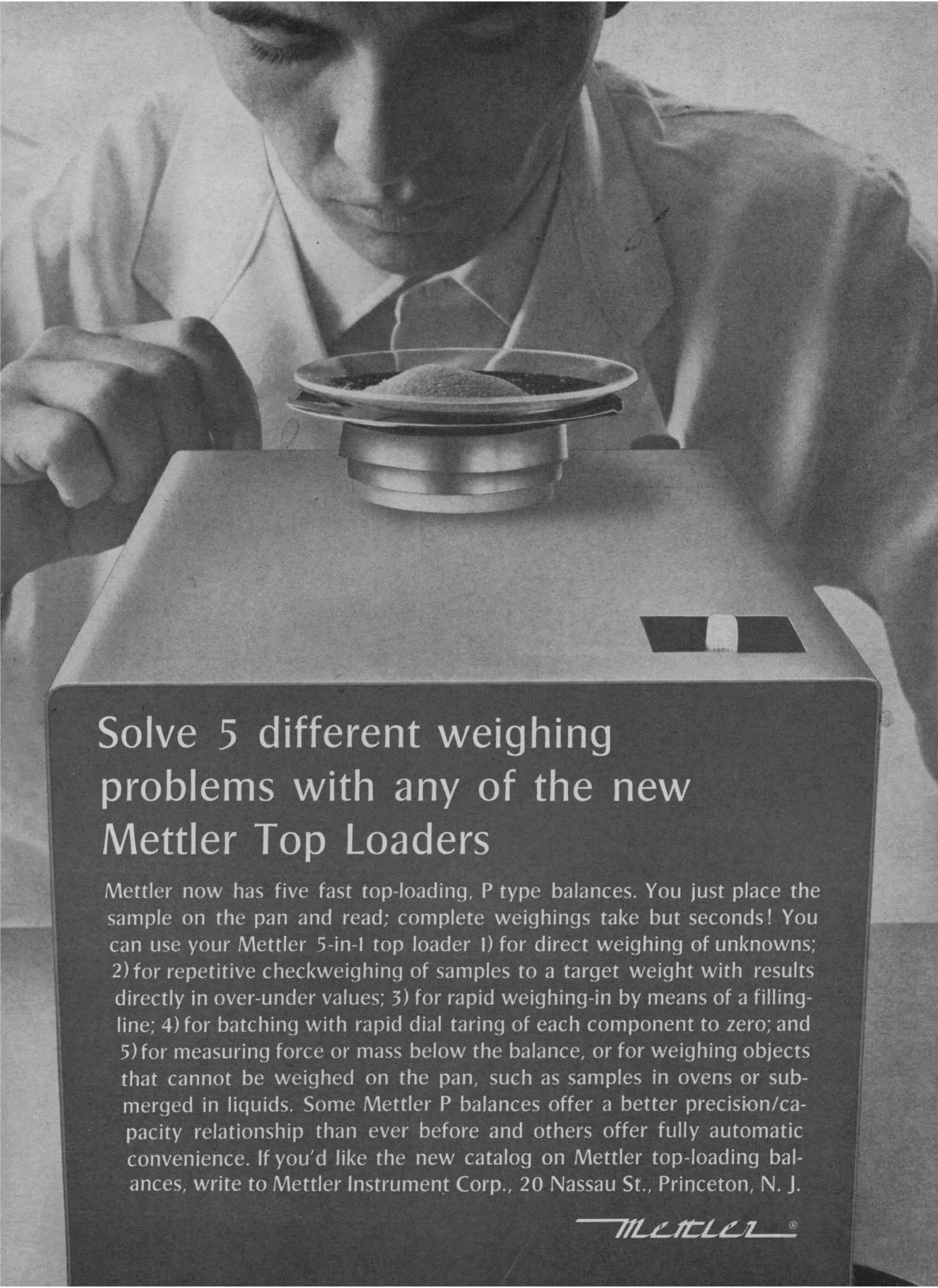
it could only be the Fraction Collector from **Beckman**

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A black and white photograph of a scientist in a lab coat, looking down intently at a sample placed on the weighing pan of a Mettler top-loading balance. The balance is a large, dark, rectangular unit. The scientist's face is partially visible, showing concentration. The background is slightly blurred, emphasizing the scientist and the balance.

Solve 5 different weighing problems with any of the new Mettler Top Loaders

Mettler now has five fast top-loading, P type balances. You just place the sample on the pan and read; complete weighings take but seconds! You can use your Mettler 5-in-1 top loader 1) for direct weighing of unknowns; 2) for repetitive checkweighing of samples to a target weight with results directly in over-under values; 3) for rapid weighing-in by means of a filling-line; 4) for batching with rapid dial taring of each component to zero; and 5) for measuring force or mass below the balance, or for weighing objects that cannot be weighed on the pan, such as samples in ovens or submerged in liquids. Some Mettler P balances offer a better precision/capacity relationship than ever before and others offer fully automatic convenience. If you'd like the new catalog on Mettler top-loading balances, write to Mettler Instrument Corp., 20 Nassau St., Princeton, N. J.

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COVER

Components of a laboratory ultra-high vacuum system used to study chemical reactions between simple gases and atomically clean metal or semiconductor surfaces. (Left to right) Reaction bulb for preparing these surfaces, a bakeable thermistor pressure gage, and a glass valve. See page 1529. [Walter B. Halstead, General Electric Research Laboratory]

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.

Let's explore two questions you might have about SYSTEM/360 as a scientific computer.

QUESTION #1:

Isn't SYSTEM/360 basically a commercial machine that must be adapted to work on scientific or mathematical data processing problems...and doesn't it come with a lot of features scientific workers don't need?

QUESTION #2:

Don't scientists and engineers have special needs that the all-purpose SYSTEM/360 does not meet?

THE FACTS:

SYSTEM/360 is a binary machine—a *word* machine—well suited to scientific computing.

Many of its special features are tailored to your needs.

SYSTEM/360 is an all-purpose ma-

chine because it adapts to many special purposes. Everything about it, machines, programming, system organization, is modular.

You are free to select or reject its many optional features.

SYSTEM/360 has the speed you need. It gives you a choice of speeds.

It works like a word machine for fast computing...or a character machine for fast compiling.

It handles big problems without segmentation because it has the giant memories you need—modular memories. You choose the right size for your application.

SYSTEM/360 has the interrupt, program relocation and automatic checking and protection features you need to

process information reliably in real time...to time-share processors, memory or files.

Two new models are specially designed for time-sharing applications.

This system lets you use either of two precisions in fixed point and floating point arithmetic...and variable field length in decimal arithmetic.

It lets you quickly and easily expand your system...or reduce its size and complexity when your needs change.

All these abilities interact to make SYSTEM/360 the most powerful and versatile scientific problem-solving tool we ever created.

That makes it difficult to describe the system a feature at a time.

But we'll try. Right now.

Speed isn't everything—but we have it

Solid Logic Technology—our name for the advanced microcircuits used in SYSTEM/360—is the most practical combination of speed and performance available today.

But we designed SYSTEM/360 so that new technologies can be incorporated without changing the way you use the system.

In fact, IBM engineers have already developed advanced circuits with switching speeds as fast as one and one-half nanoseconds.

Our fastest processor accesses a full 64-bit double word in half a microsecond. Interleaved memory on this processor gives you even faster effective access time.

SYSTEM/360 has the raw speed you need, whether you're inverting a large matrix, designing by iterative methods or applying heuristic techniques,

But raw memory speed doesn't buy you much all by itself.

Today, registers operate faster than memory. So we designed SYSTEM/360 with a full set of register-to-register instructions to reduce the number of times the system must move data out of memory. Even in a relatively simple polynomial evaluation, such as:

$$Y = A + X(B + X(C + X(D + X(E))))$$
an ordinary computer would be moving the value, X, out of memory repeatedly. In SYSTEM/360, you'd move X out of memory only once and solve the problem faster.

SYSTEM/360 contains sixteen 32-bit general registers. You use these registers for binary arithmetic as well as for indexing and address arithmetic. (In SYSTEM/360, you can address over sixteen-million 8-bit bytes using only 16 addressing bits per instruction.)

The system also includes four 64-bit floating-point registers. These registers can handle either 32-bit or 64-bit floating point operands.

Data channels also help speed problem-solving. They are, in effect, small computers that relieve the main processor of time-consuming I/O operations and allow computing and I/O operations to go on at the same time.

The selector channels handle up to 256 high-speed input/output devices, like tape drives. Each channel can handle one device at a time. Data rates range from 250,000 to 1.2 million 8-bit bytes per second.

The multiplexor channel permits up to 256 low-speed devices—such as data communications terminals for remote computing—to time-share the data path to the central processor. All 256 can be operating simultaneously.

You need new kinds of memory—and you get them

It took real ingenuity to shoe-horn large programs into the limited memory space in past computers.

We've fixed that in SYSTEM/360.

In main memory, you can get from 1,024 to 131,072 64-bit words, depending on the model.

And you can add up to a million words of directly addressable, 8-microsecond core memory to the largest models of the system. Through interleaving, you cut effective speed to as little as one microsecond. This bulk memory can be addressed as an extension of main memory or as an I/O device with practically zero access time.

This large memory helps you speed solution of big problems.

You no longer have to segment large

application programs and arrays. You can solve partial differential equations without bouncing data back and forth, to and from I/O gear.

You can create new algorithms and use old ones that weren't feasible on previous systems. You now can consider the use of "bordering" techniques in matrix inversion and alternating direction implicit schemes for partial differential equations.

In numerical analysis, you have had to spend an exorbitant amount of time devising sophisticated methods to make up for the lack of adequate data storage space. For example, you previously had to combine relatively sparse tables of values with high-order approximations to estimate intermediate points. Now,

with SYSTEM/360, you can use dense tables and linear approximations to save processing time.

On-line, magnetic tapes give you data rates up to 340,000 bytes per second. Interchangeable direct-access disk files can store over 8 million words of data or programs.

You can get even greater auxiliary storage in the new IBM Data Cell Drive.

You can attach up to eight drives, each with ten interchangeable data cells. This gives you direct access to more than 24 billion bits, in milliseconds. This equipment is especially useful in storing graphic information in digital form—medical X-rays, for example, or bubble chamber photographs or engineering drawings.

Every SYSTEM/360 is a special-purpose computer

All features of SYSTEM/360 adapt to suit your needs... and then adapt again, easily, when your needs change.

The standard instructions—basic processing and logical operations—let you handle bits, bytes (8-bit characters) or words (16, 32 or 64 bits) depending on your needs. Instructions are two, four or six bytes long. The standard set plus floating-point instructions form the scientific set.

The floating-point field contains a sign bit, seven characteristic (exponent) bits and either 24 or 56 fraction bits (the decision on precision is up to you).

We use the hexadecimal number system for floating point. This gives a characteristic range several orders of magnitude higher than binary with the same number of bits. It also makes it possible to represent numbers closer to zero.

Instructions in the standard set sim-

plify conversion from any character code to any other. They will be useful in processing input from laboratory and test stand instruments... from data communications terminals... and other external sources, as well as in number-base conversions.

Character-oriented instructions speed compiling and list processing. Direct control instructions synchronize CPU's in multiprocessor systems.

We also have designed the programming systems to save you time and to adapt to your problems.

Operating SYSTEM/360, our supervisory control program, calls in compilers, utility programs and sub-routines as needed to process your job. Two levels of Operating SYSTEM/360—with modular features that you can use or leave out—let you tailor the system to your needs.

Programs prepared for use on any

SYSTEM/360 can be recompiled for use on other models, including the specialized time-sharing models.

You can write your programs in any of four major programming languages: FORTRAN IV... Assembler Language... COBOL... or the more powerful new programming language.

Other features include automatic storage protection and program relocation for multiprogrammed systems... a powerful five-level interrupt system... a new film recorder, scanner and display unit for all forms of graphic data processing—from experiment monitoring to computer-aided design.

The point is that the particular kind of SYSTEM/360 you get is up to you and your needs.

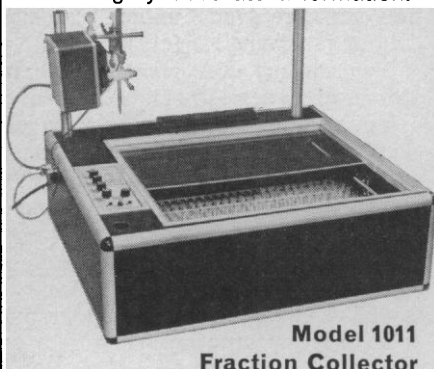
With this modular system, we can give you the one special-purpose scientific system your problems require.



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**Model 1011
Fraction Collector**

Time, drop, or volumetric operation. Time range 0-100 minutes in increments of 1/10 minute. Drop range 0-1000 drops in each tube. 400 standard test tube capacity. 8 removable stainless steel trays. Glass dust cover. 2 digital indicators. Available with Model 1012 Refrigeration unit.



**Model 1063-OD
Automatic Multi-Channel Ultra-
Violet Analyzer**

Presents recording at three different wave lengths. Provides a recording of the ratio of the optical density of

the effluent at two of these wave lengths. Space-saving design. Completely transistorized. Detection system completely self-contained and light shielded.



**Model 880D
Dual Channel Low
Background Autoscanner**

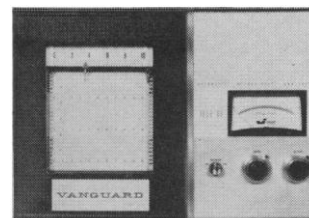
Each channel has independent range and time constant selectors. Recorder provides two 5" charts on one 10" strip. Can examine simultaneously intense and weak areas of radioactivity. Completely transistorized. Better than 2% accuracy on all ranges. Adaptable to direct digital quantitation.



**Model 885 Glass Plate Scanner
for Thin Layer Chromatography**

Extends the range and operates in conjunction with the Autoscanner. Assays TLC glass plates with greater accuracy and sensitivity. Sits on top of Model 880. Provides 2 pi window-

less detection for tritium, carbon-14, sulphur-35 and other beta-emitting radioisotopes.



**Model 1056-OD Automatic Ultra-
Violet Analyzer**

Provides chart recording of the optical density of the effluent from a chromatographic column. A plane diffraction grating monochromator enables the operator to select any wave length from 200 millimicrons into the visible spectrum. Completely transistorized. Detection system self-contained and light shielded.

**Model 1000
Volumetric Fraction Collector**

Completely self-contained and transistorized. Compact design. Model 1000 for volumetric control. Model 1010 for time-drop control.



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This is a system. Not to be confused with a camera.

"The system" does what cameras never dreamed of. Because "the system" is just that. A system. A unique and complete system of interchangeable components that gives you greater



*Hasselblad 500 C
with 150 mm lens,
focusing handle,
light meter knob.*

precision, greater versatility than anything called "camera".

Take interchangeable lenses, for instance. "The system" has six. 50, 80, 120, 150, 250, and 500 mm. All Zeiss. All with Synchro-Compur shutter, automatic and manual diaphragm and cou-



Eye-level pentaprism (left), magnifying hood (right.)

pled EVS system. All with resolving powers that permit greater enlargements than any other lenses made.

And take film backs. Ever see a "camera" that lets you switch from black and white to color mid-roll? We think not. But that's "the system" for you. A choice of 4 separate and interchangeable magazines. 3 for roll film. Each in a different format. 1 for cut film. And viewfinders. "Cameras" have them, right? One. "The system"—five. Eye-level prisms,

sports viewfinders, magnifying hoods—the works. And sunshades. And filters. And proxars. And extension tubes. Exposure meters. Microscope adaptors. You name it.

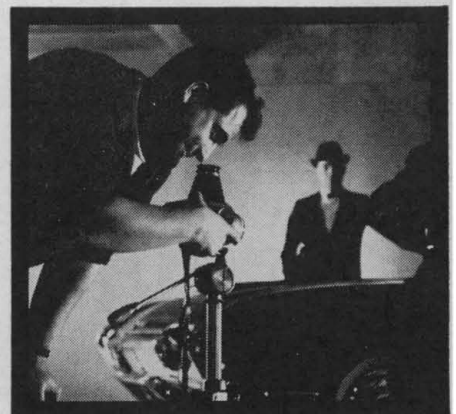
Now you might ask "why the system?" Why an interchangeable everything? We did. We asked Timothy Galfas. His answer: "Versatility. 'The system' lets me do what I want, when I want. I don't find myself wishing for something extra. Or scraping to make do. I know that it will be optically right. You



Left to right: Zeiss 150 mm; 250 mm; 80 mm; and film magazine.

might say that 'the system' is versatile enough to act as an extension of myself. I can't ask for more than that."

Now you know what we mean by "the system". And you know why we cringe when people confuse us with our more limited look-alikes. Let there be no confusion. "Cameras" take pictures, "the system" takes pictures, the resemblance stops there. Write for literature to your dealer or to Paillard Incorporated, 1900 Lower Road, Linden, N. J.



Timothy Galfas, noted New York editorial and fashion photographer, with "the system."

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Proceedings of the First Annual Symposium held under the Provisions of the Wayne State Fund Research Recognition Award

edited by Laurence Levine

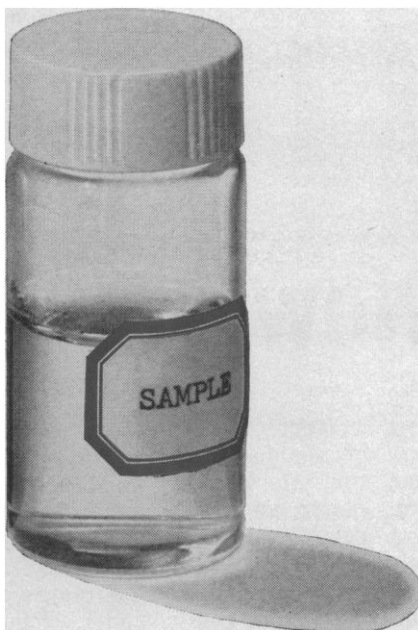
CONTENTS: L. R. CLEVELAND, Function of Flagellate and Other Centrioles in Cell Reproduction. R. C. BUCK, The Central Spindle and the Cleavage Furrow. L. I. REBBUM, Saltatory Particle Movements and Their Relation to the Mitotic Apparatus. A. M. ELLIOTT, The Fine Structure of *Tetrahymena pyriformis* during Mitosis. O. H. SCHERBAUM, Chemical Pre-requisites for Cell Division. A. M. ZIMMERMAN, Chemical Aspects of the Isolated Mitotic Apparatus. G. B. WILSON, Studies on the Disruption of the Mitotic Cycle. D. P. BLOCH, The Histones: Syntheses, Transitions, and Functions. A. G. SZENT-GYÖRGYI, Contractility. *Author Index—Subject Index.*

(L345) 1963, 274 pp., \$10.00

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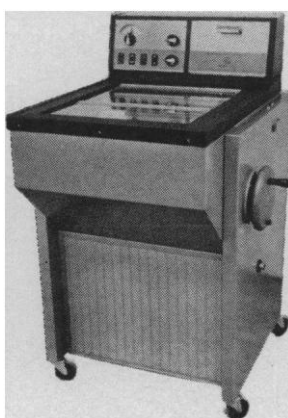
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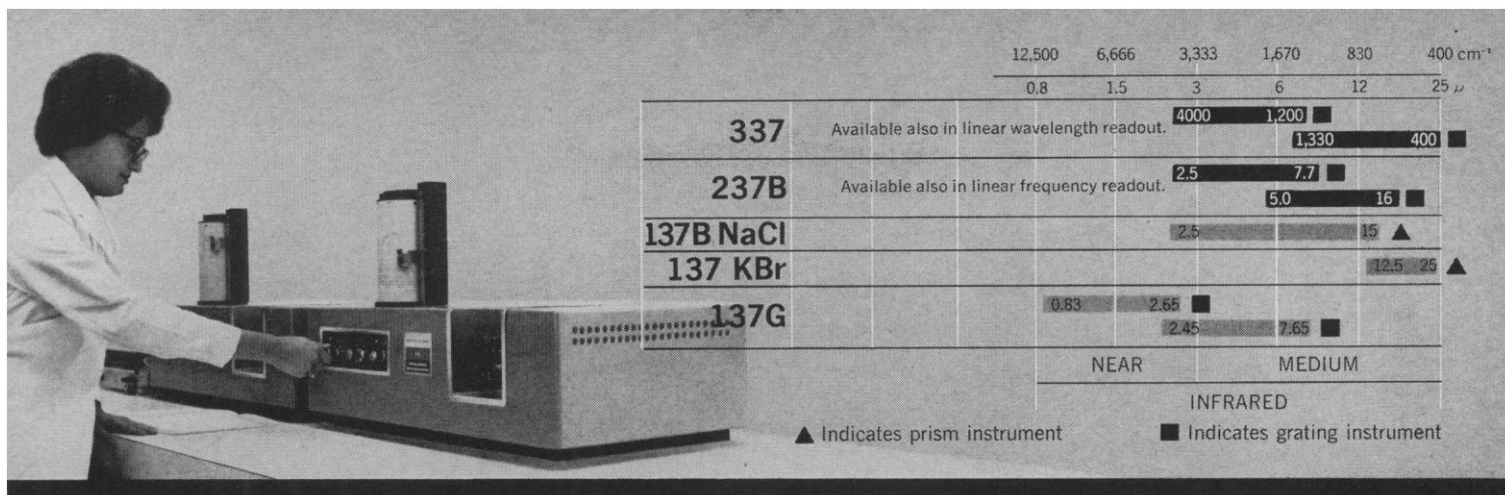
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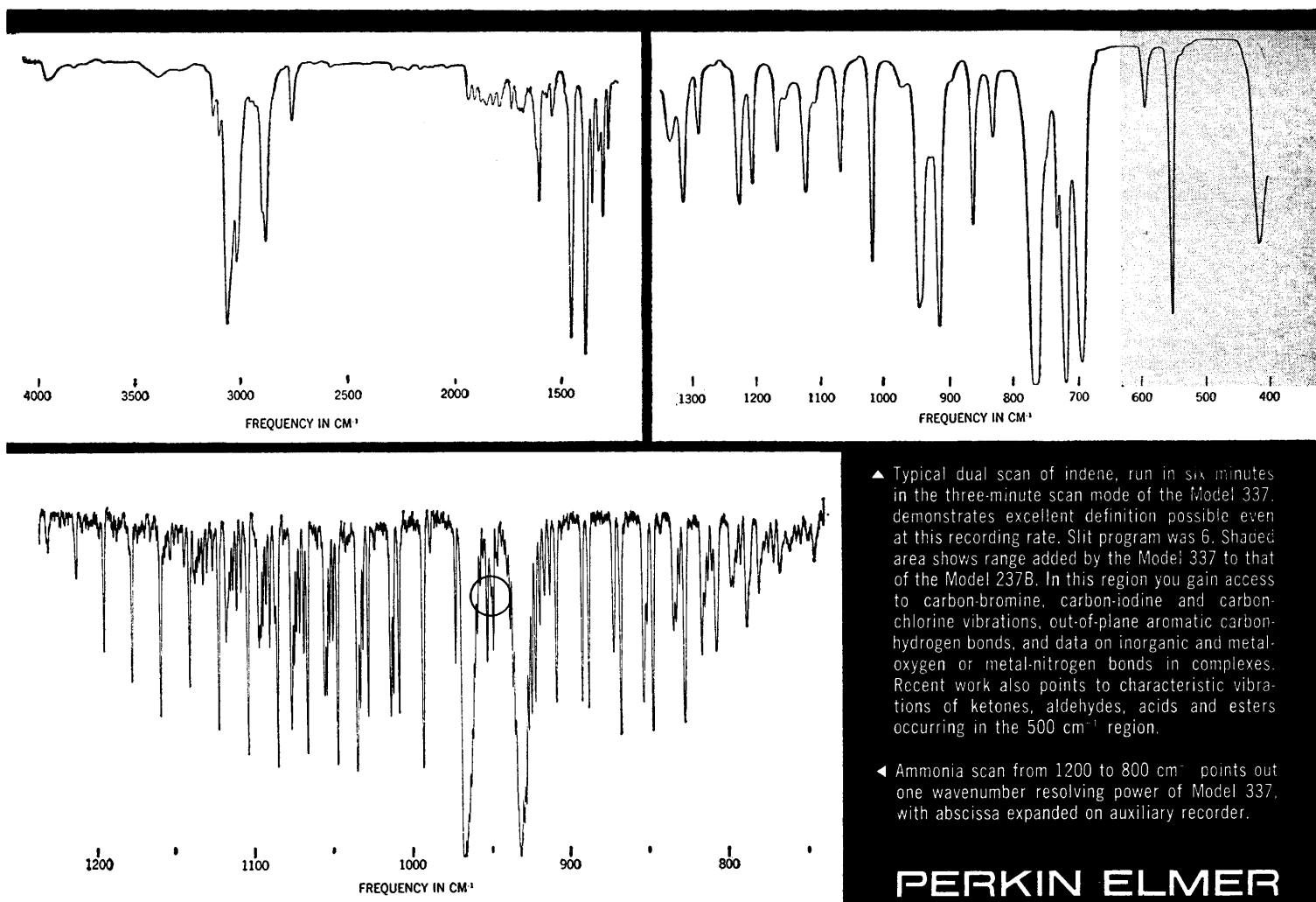
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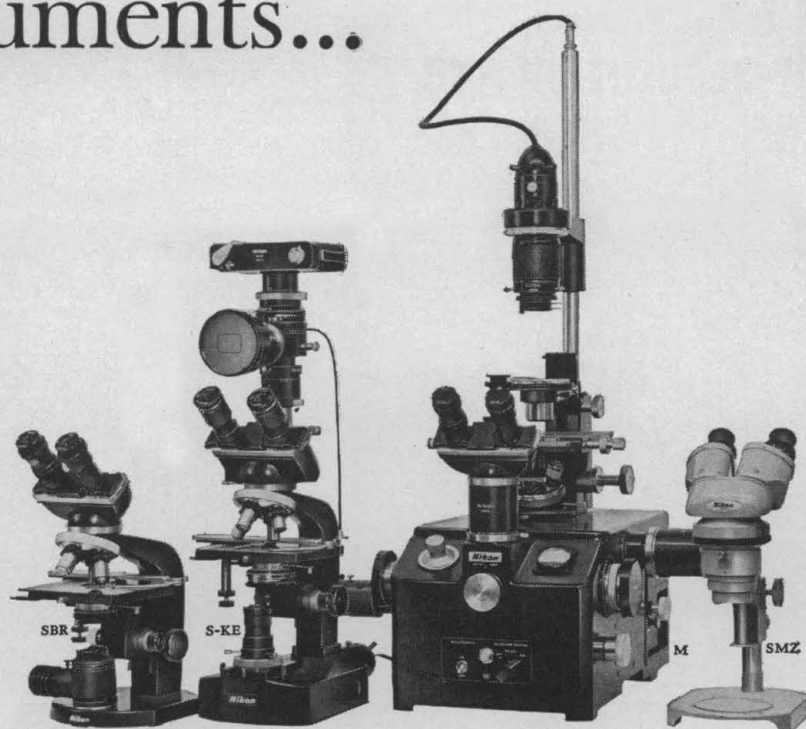
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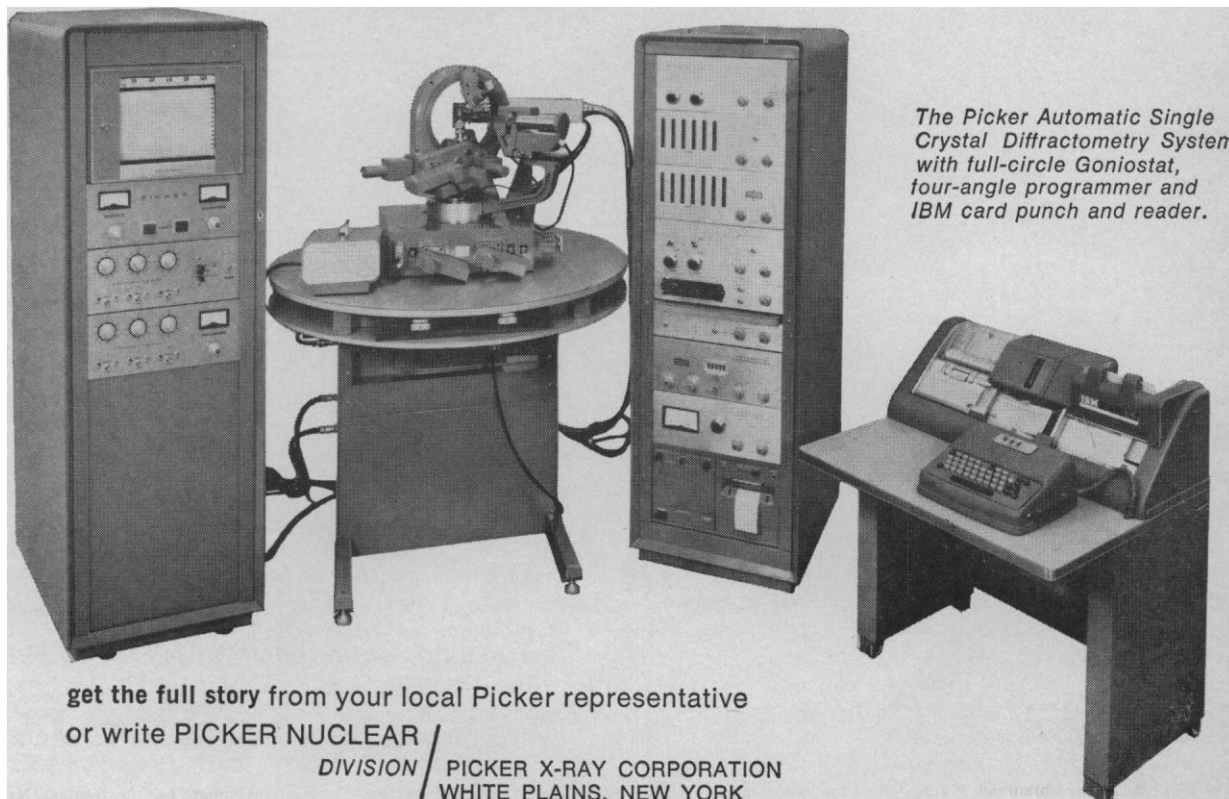
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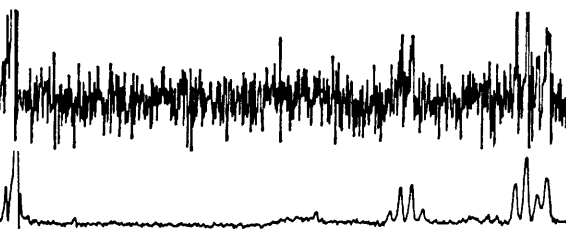


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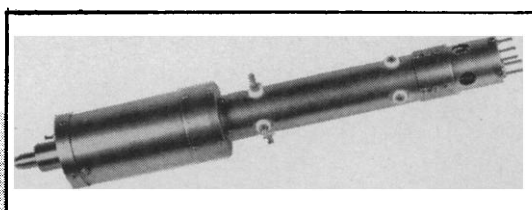
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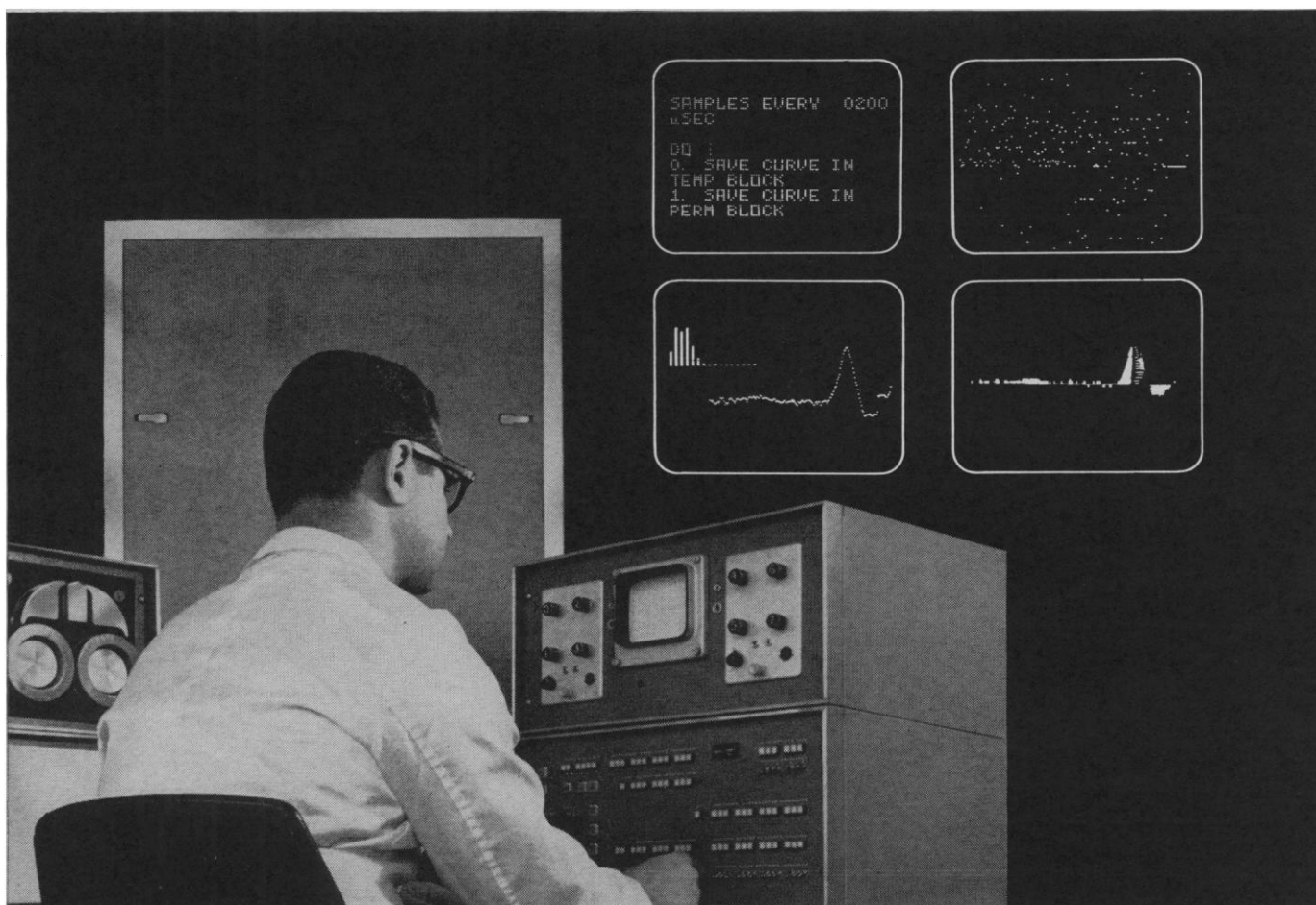
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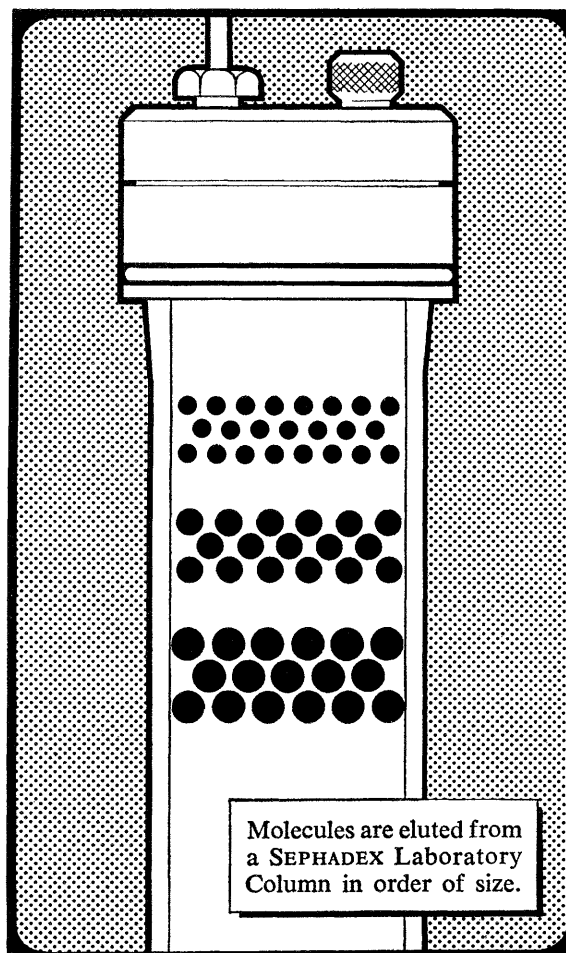
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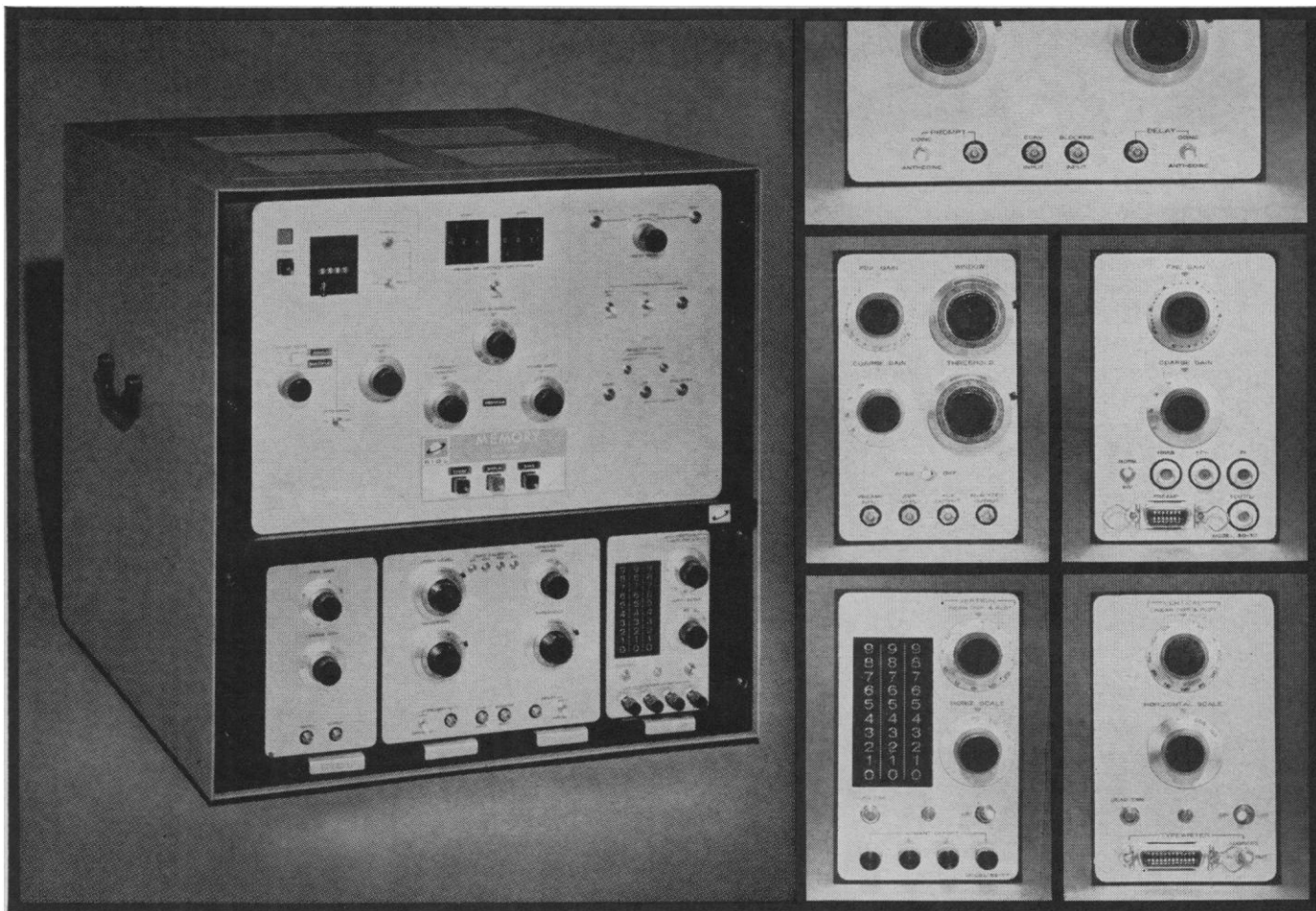
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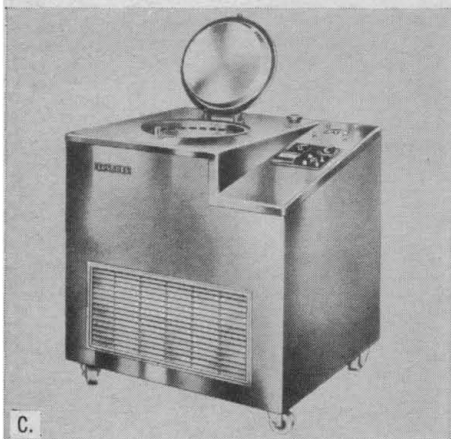
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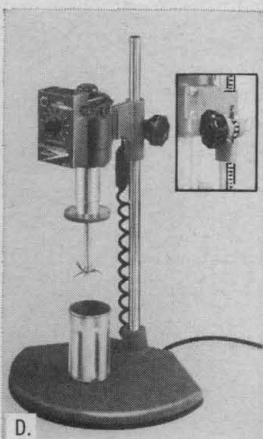
A.



B.



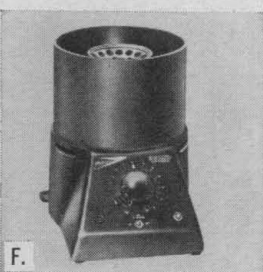
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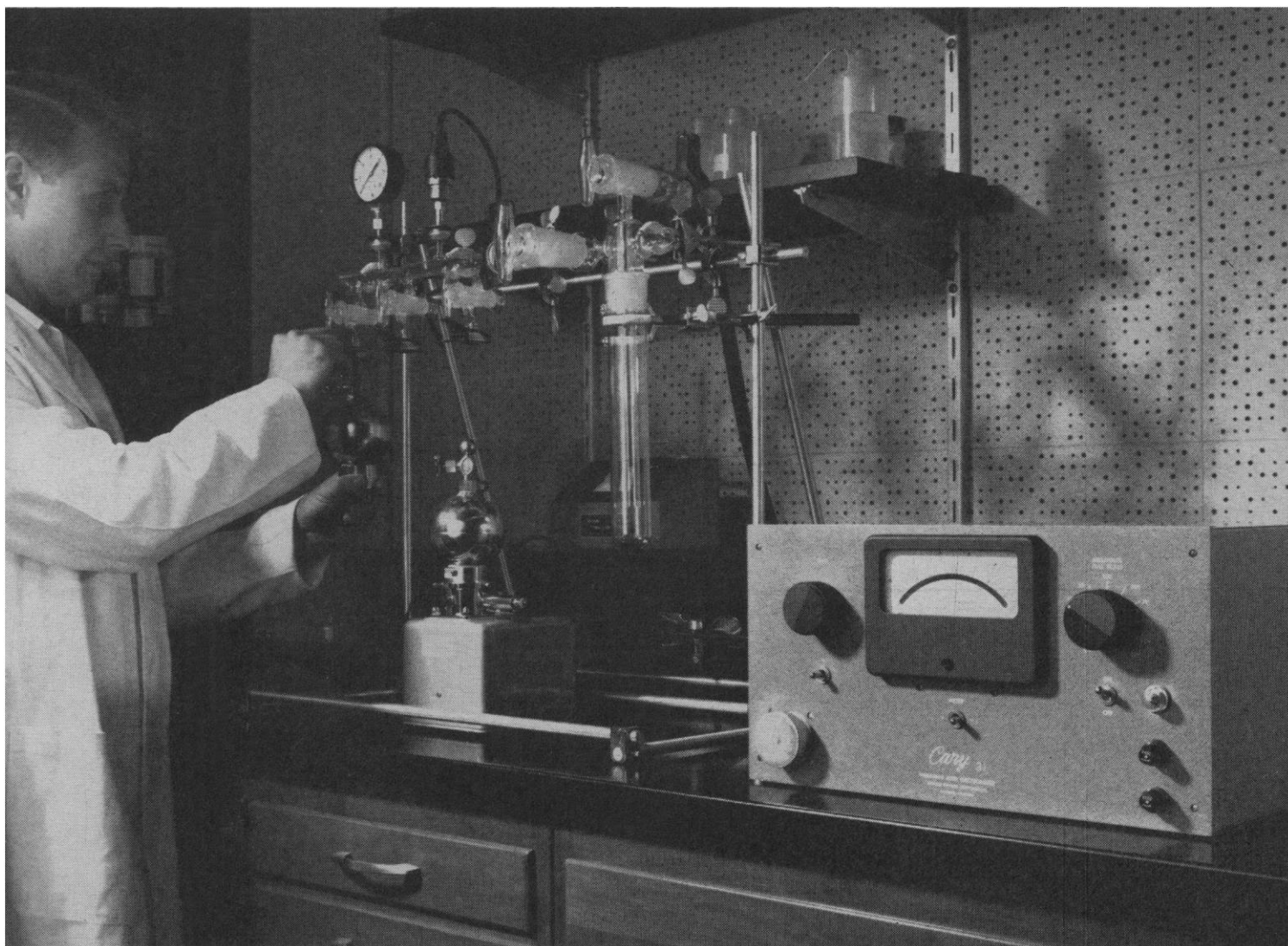
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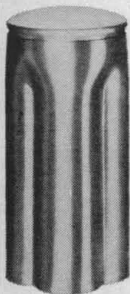
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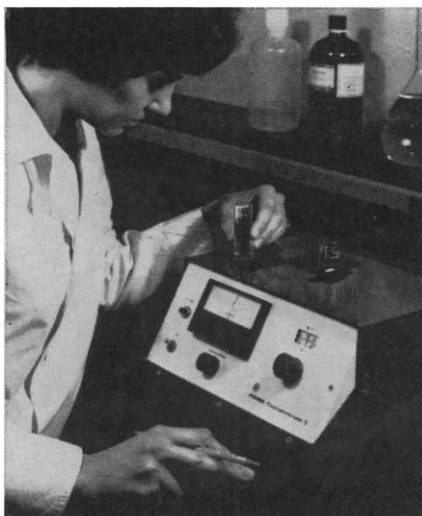
March, 1965

FISHER PRODUCT REPORT

News about instruments, apparatus and reagent chemicals that make your work quicker, surer, safer and easier.

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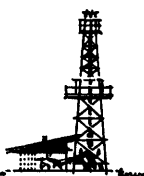


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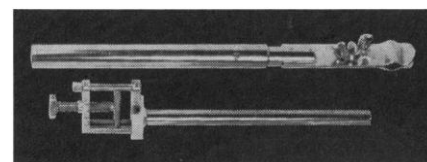


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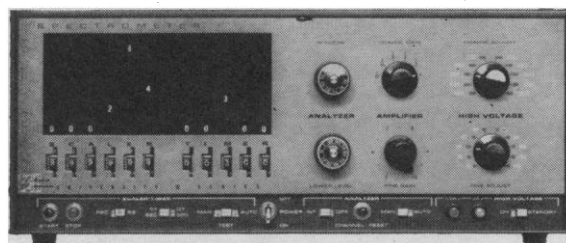
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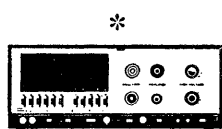


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FEATURES:

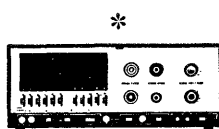
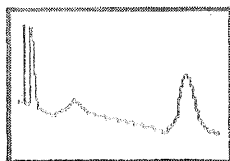
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- 5 ma Current (use with multiple detectors)
- Automatic Background Subtract
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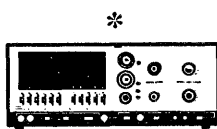
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Print out sample number, count, and time

1	0	1	2	1	4	5	3	2	1	6
0	0	1	2	1	5	4	4	1	0	7
0	0	1	2	1	7	7	1	7	3	2
0	7	1	2	1	3	6	2	9	5	4
0	6	1	2	1	2	5	4	3	7	6
0	5	1	2	1	1	1	3	1	2	9
1	1	0	0	0	0	0	0	0	0	1



WITH DUAL BASELINE

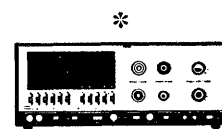
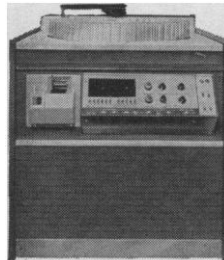
For counting two isotopes sequentially in one sample, manually or automatically

0	1	3	1	0	0	6	7	3	2	4	1
1	1	2	1	0	0	7	6	0	4	3	1
0	1	1	1	0	0	8	2	0	9	0	2
1	1	0	1	0	0	5	7	1	0	2	1
0	0	9	1	0	0	4	0	3	2	1	4
1	0	0	1	0	0	2	1	1	3	0	1
0	0	7	0	0	0	1	6	9	0	7	6



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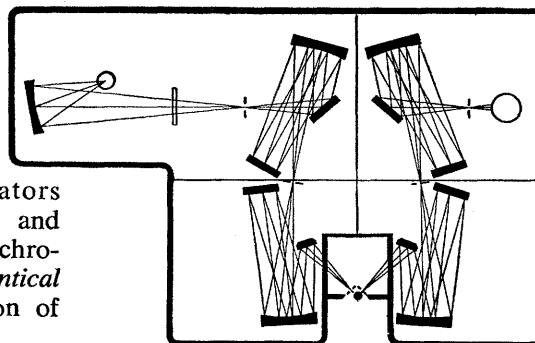
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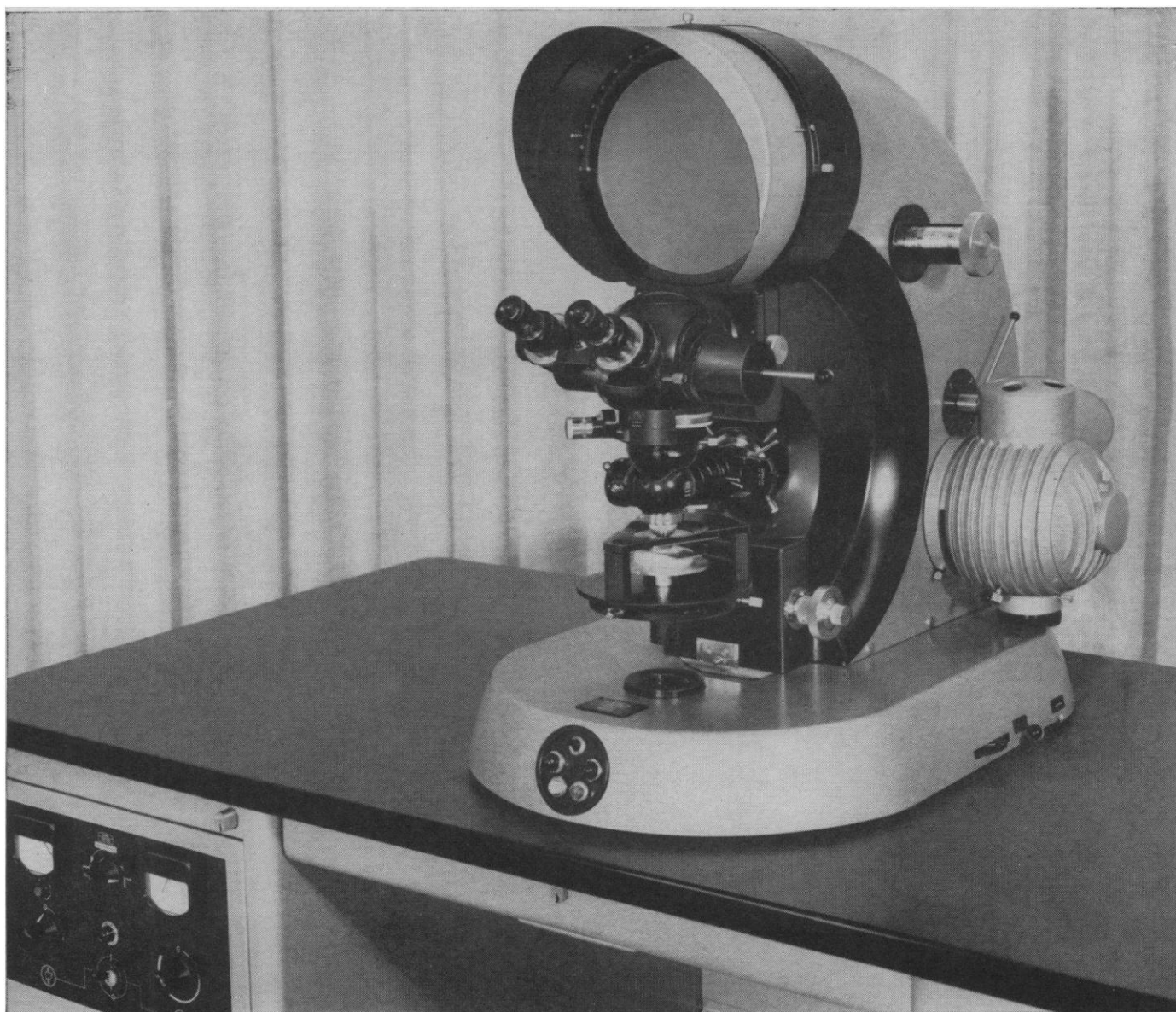


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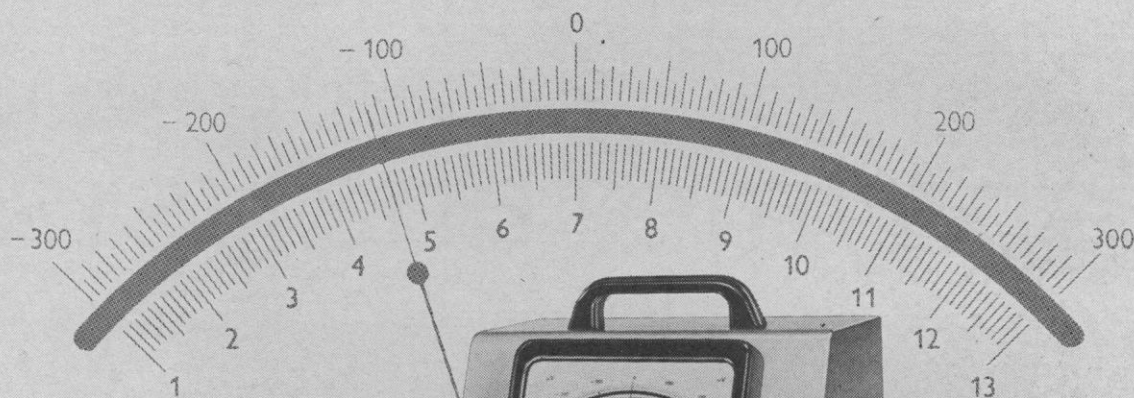
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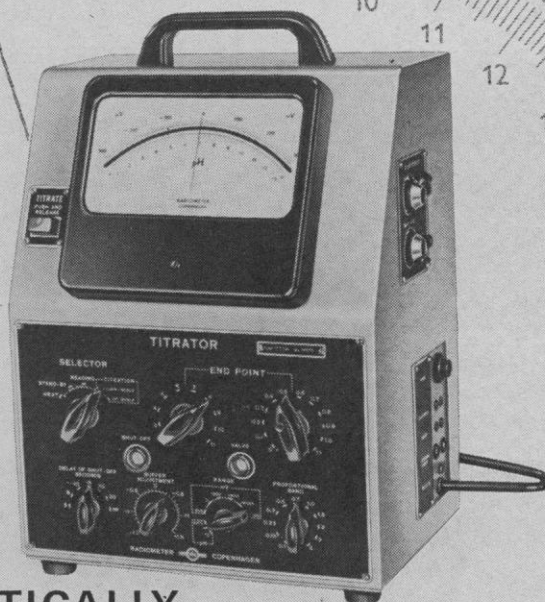
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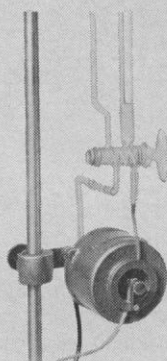
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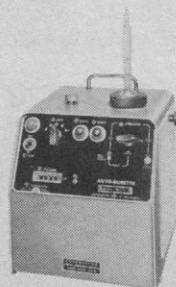
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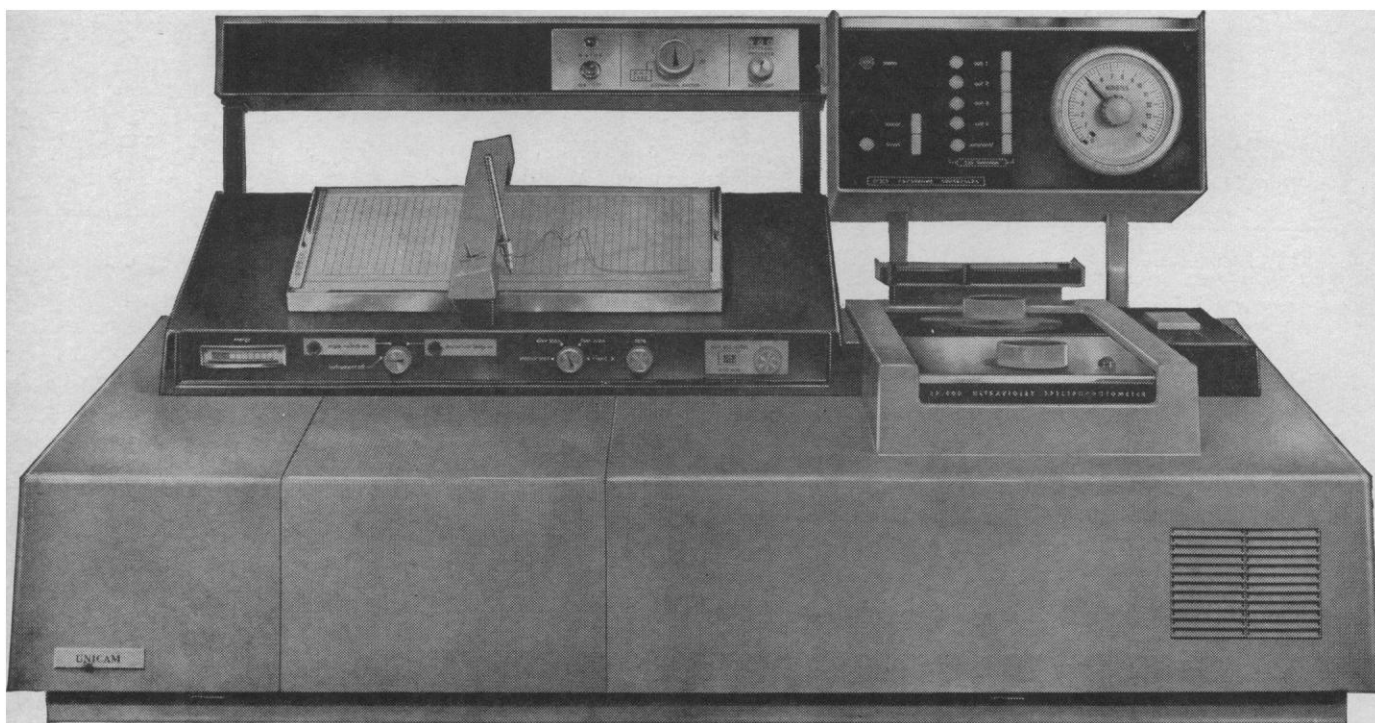
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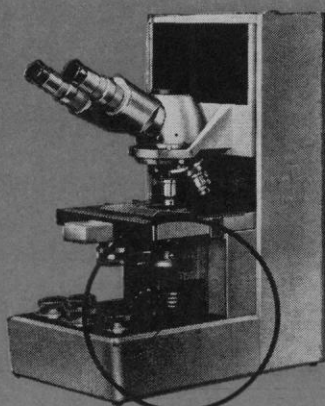
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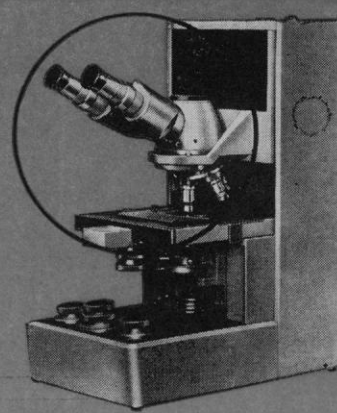
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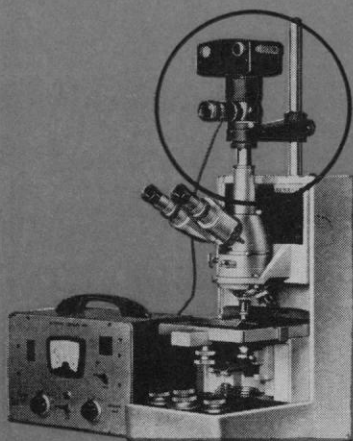
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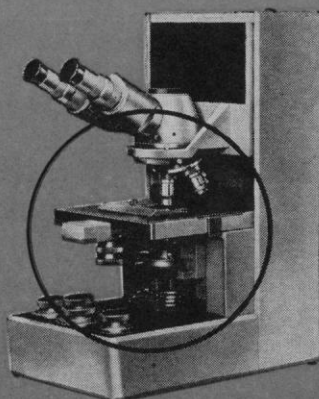
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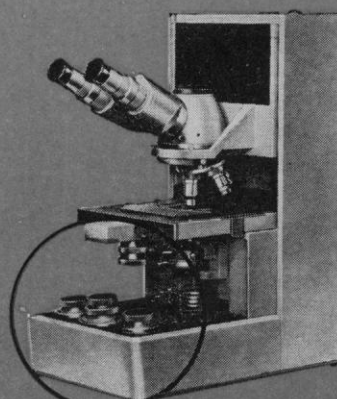
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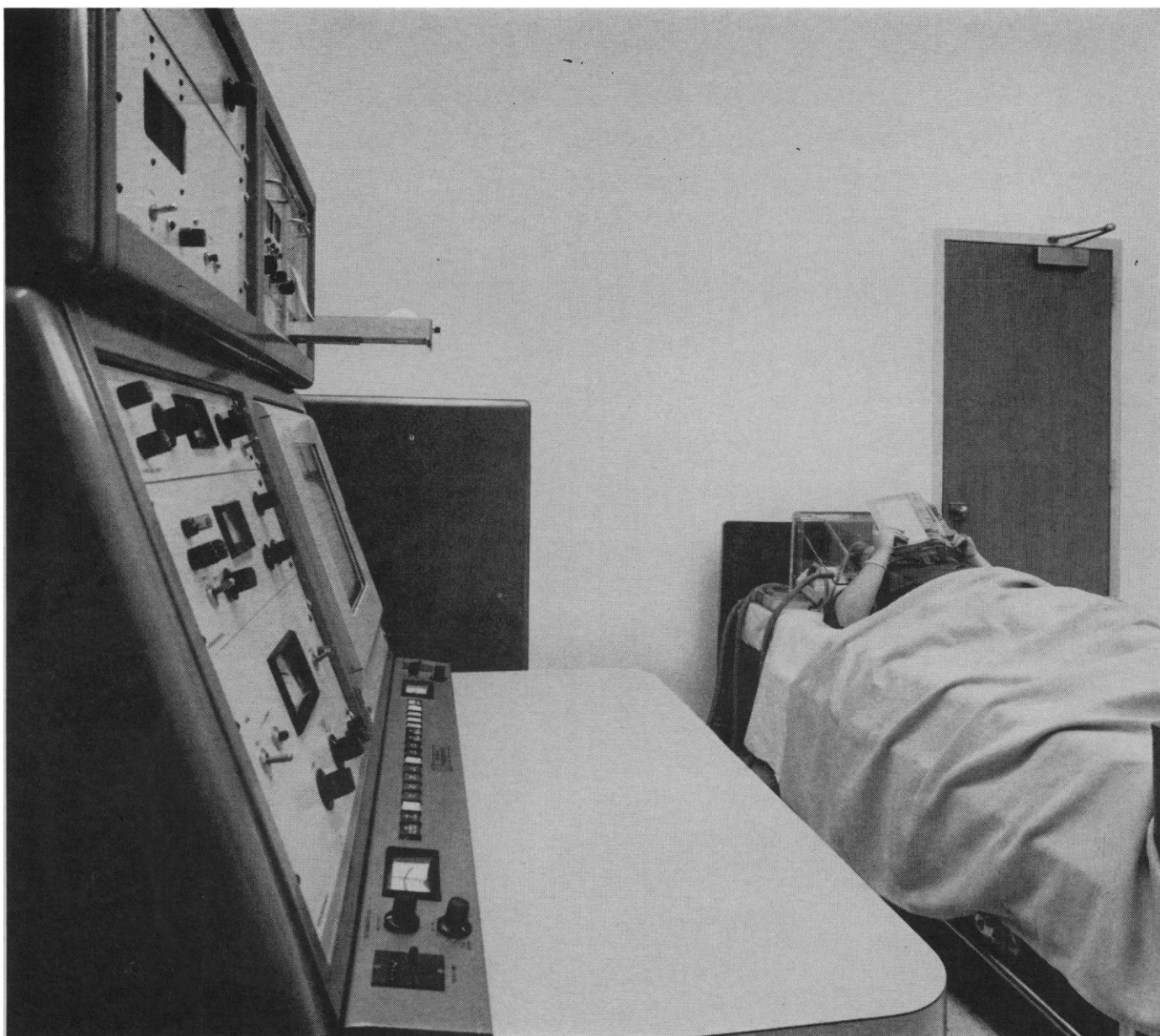


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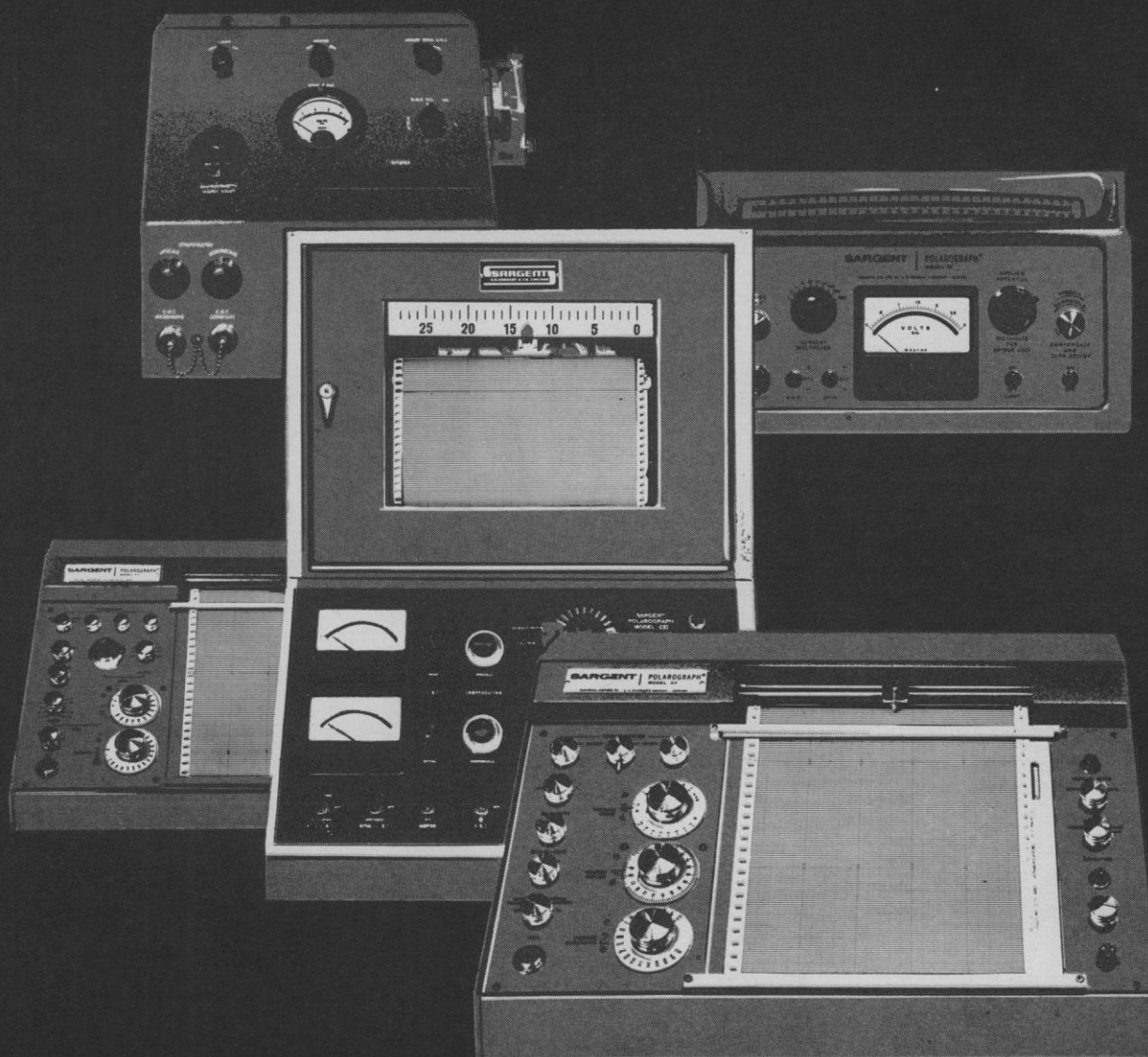
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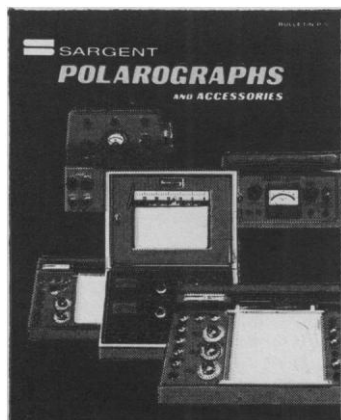
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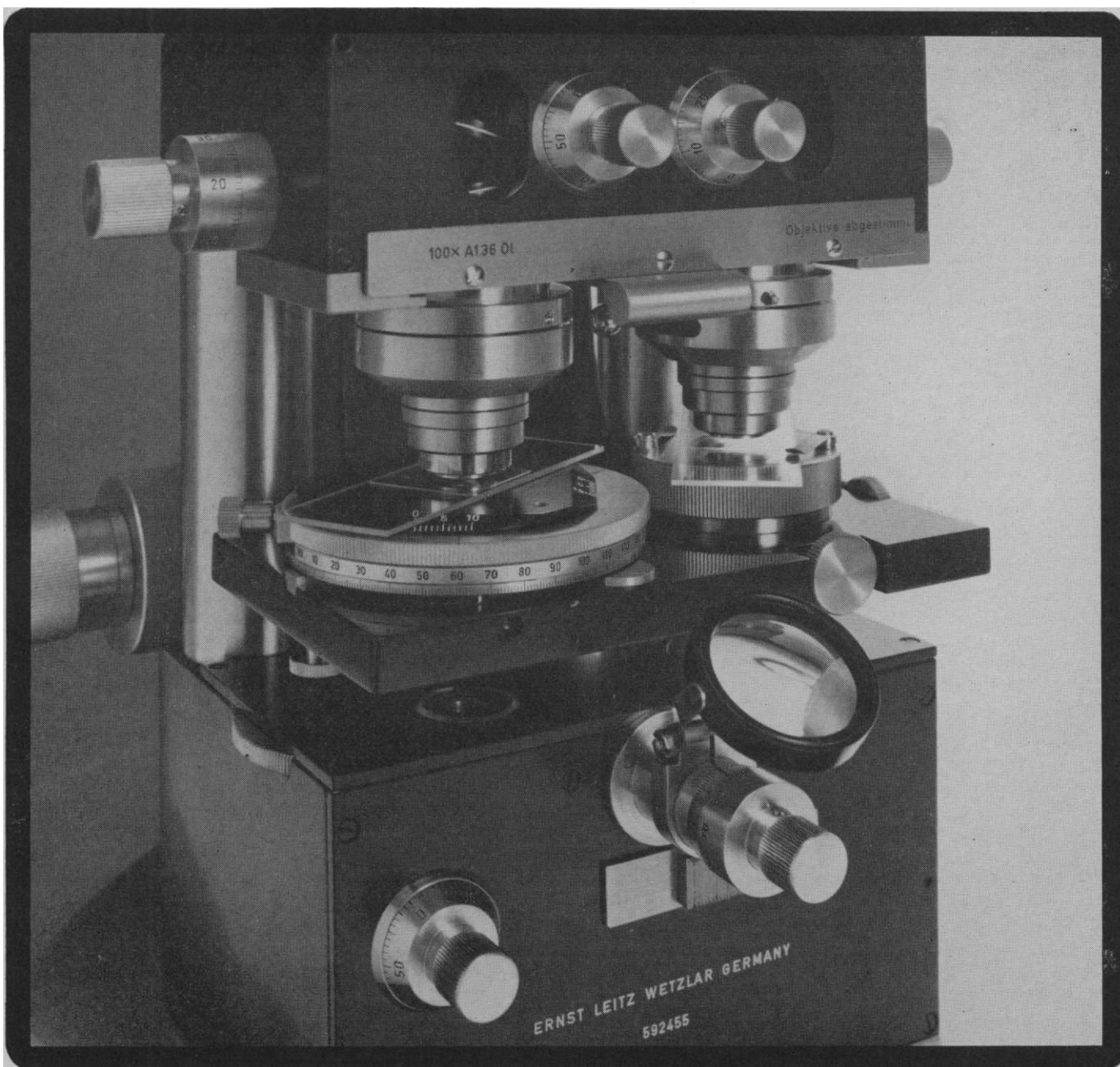


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Air Pollution

Air pollution is becoming a serious national problem. Formerly it was a local issue largely connected with industry, but today a principal source of increasing pollution is the ubiquitous automobile.

When motor vehicles burn fuel they produce a number of products in addition to carbon dioxide and water. Important amounts of carbon monoxide and nitrogen oxides are formed. The fuel is not entirely consumed. Part is exhausted unchanged, part appears as hydrocarbons of smaller molecular weight, including reactive olefins.

At a concentration of slightly more than 1000 parts per million carbon monoxide kills quickly. Most people experience dizziness, headache, and other symptoms at approximately 100 ppm. Concentrations as high as 72 ppm have been observed in Los Angeles, and values above 100 ppm have been measured in Detroit. In almost every metropolitan area peak concentrations of carbon monoxide approach the 100-ppm level.

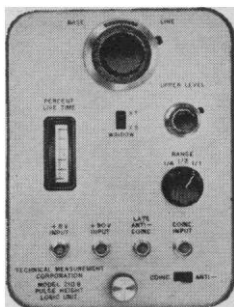
In California efforts have been made to decrease the amounts of carbon monoxide emitted by motor vehicles by use of devices such as catalytic after-burners. At the same time there has been a trend toward higher combustion-chamber temperatures. These efforts result in more complete combustion but also contribute to an increase in the production of oxides of nitrogen. Nitrogen dioxide is a poisonous brown gas. The threshold level for toxic effects is not well known, but it appears to be about 5 ppm. On one occasion a concentration of nitrogen oxides of nearly 4 ppm was observed in Los Angeles.

Automobile exhaust products interact to produce physiological and chemical effects which are greater than the sum of the parts. Synergistic effects of carbon monoxide and nitrogen oxides on respiration have been noted. Light hydrocarbons alone are not very toxic, but in the presence of nitrogen dioxide and sunlight hydrocarbons give rise to noxious substances. Nitrogen dioxide acts as a photoreceptor and is decomposed to nitrogen oxide plus atomic oxygen. This reactive form of oxygen attacks hydrocarbons. The products may react with molecular oxygen to form peroxy radicals. These in turn react with oxygen to form ozone. The oxidants react further with the original materials as well as with their reaction products. The result is a complex mixture of toxic substances.

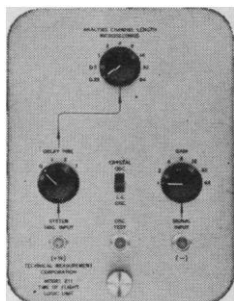
As yet there is little evidence of chronic effects from air pollution. However, a large fraction of our population is now being exposed to significant concentrations of a variety of toxic chemicals. These levels are often a substantial fraction of those which produce acute effects. There is a possibility that our people may be sustaining cumulative insidious damage. If genetic injury were involved, the results could be especially serious.

At present we cannot accurately evaluate the hazards of air pollution. The toxicity of even some of the simple important chemicals is not well established. It is clear that there are acute synergistic effects, but these have not been thoroughly examined. Even so basic a problem as establishment of good methods for measuring the concentrations of pollutants has not been completely dealt with.

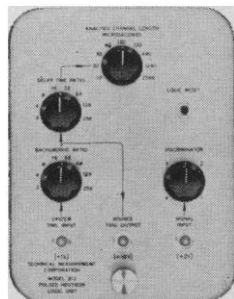
The automobile and the automotive industry are central to our way of life and to our economy. Can we live with a constantly increasing level of pollution, or will we be forced to take drastic steps to protect the nation's health? At present the federal government is spending about \$24 million a year on the study of all aspects of air pollution. Considering the potential seriousness of the problem, this sum seems much too small.—PHILIP H. ABELSON



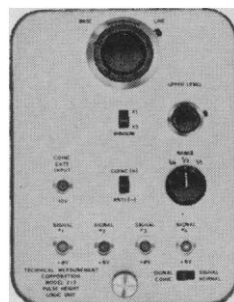
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As a single purpose spectrum analyzer, the CN-1024 stands out. But the fact is that it can be quickly changed from pulse height analysis to time-of-flight measurements, pulse neutron studies, multi-parameter analysis, even to a 1024 address Computer of Average Transients — simply by changing the plug-in logic units. With the CAT plug-in, the system will isolate and measure periodic signals masked by random background noise, on-line, in real time and in 1024 addresses at rates up to 31.25 microseconds per address. Plug-ins include units for pulse height analysis, time-of-flight studies, multiscaling, mass spectrometry and coincidence pair spectrometry, and the computer of average transients.

For two parameter measurements the Model 242 input unit, which accepts two logic plug-ins, is used. In this case, the logic units are paired for PHA vs. PHA, PHA vs. TOF, and TOF vs. TOF studies. Additional 242 units may be added to increase the number of parameters.

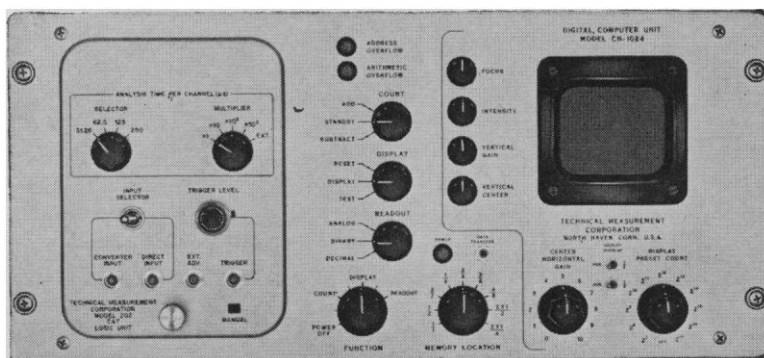
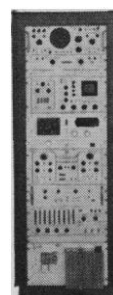
To further extend the capabilities of the 1024, other data handling units are available. The Model 245 Eight Channel Sorter digitally selects up to eight bands of variable widths, 8 x 128, 4 x 256, 2 x 512 or 1 x 1024. The Display Control Unit, Model 240, provides map or contour display of accumulated data. The Model 220C Data Output Unit drives a paper tape punch or a paper tape printer for readout and also functions as a timer, source trigger and analysis cycle counter, or binary to decimal converter.

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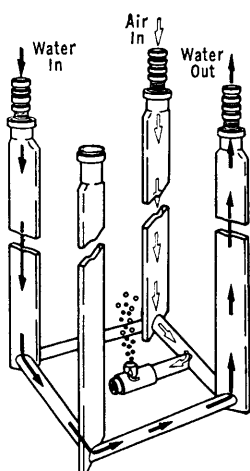


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*Patent Pending

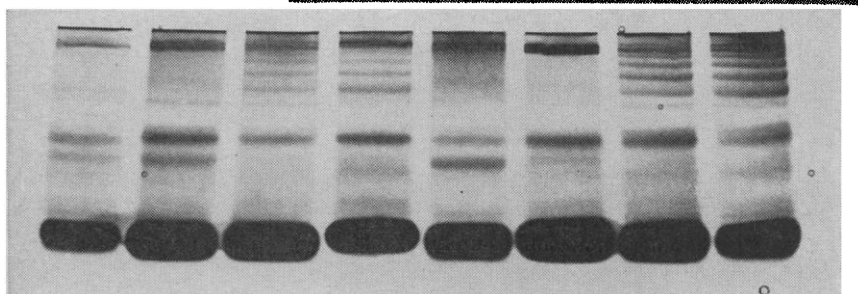
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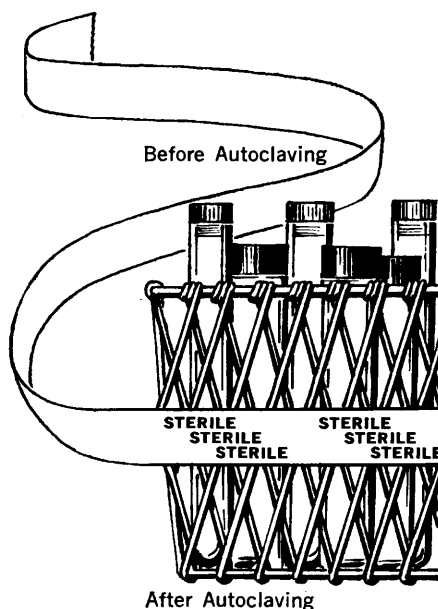
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level of irradiation are: (i) it allows the survival of microorganisms capable of producing recognizable evidence of spoilage in the product at the end of its storage life; (ii) bacterial spoilage probably will occur if the product is mishandled in storage or shipping; (iii) bacterial spoilage will occur before degradation from other causes which would affect product odor, flavor, and texture; (iv) the cost of irradiation per pound of product would be kept at a minimum.

Dassow also reported a study of the amount and rate of production of trimethylamine, total volatile bases, and volatile acids in irradiated and unirradiated marine products to evaluate their usefulness as objective indices of product quality. Volatile acids were considered to be the best index of quality. The rate of nucleotide degradation and accumulation of hypoxanthine in three species of fish was studied. It was found that these measurements could be made rapidly and showed a good correlation with fish freshness during the first 8 days of storage.

The economic outlook for radiation-preserved foods was discussed by Anthony A. Bertsch (U.S. Department of Commerce), chairman of the U.S. Interdepartmental Committee on Radiation Preservation of Foods. He reported that products and processes which appear most favorable at this point are: (i) sterilization of ham for domestic and foreign markets and of bacon, pork, and beef for foreign markets; (ii) pasteurization of strawberries, poultry, and seafood products for both domestic and foreign markets; (iii) disinfection of liquid eggs; (iv) disinfestation of wheat and wheat products and pork, especially for foreign markets, and of mangoes for domestic markets; (v) the inhibition of sprouting of potatoes, especially for foreign markets; (vi) improvement in the quality of dehydrated vegetables for both domestic and foreign markets.

Howard Hembree (U.S. Army General Equipment Test Activity) reported that in a series of soldier-consumer preference tests, irradiated and nonirradiated pork products, chicken, beef, and seafood items were fed as part of normal meals. Results in general showed that nonirradiated control foods were preferred over their irradiated counterparts. However, irradiated and nonirradiated pork chops and had-dock were equally preferred. The results also showed that radiation doses of 0.25 Mrad will prolong the storage,

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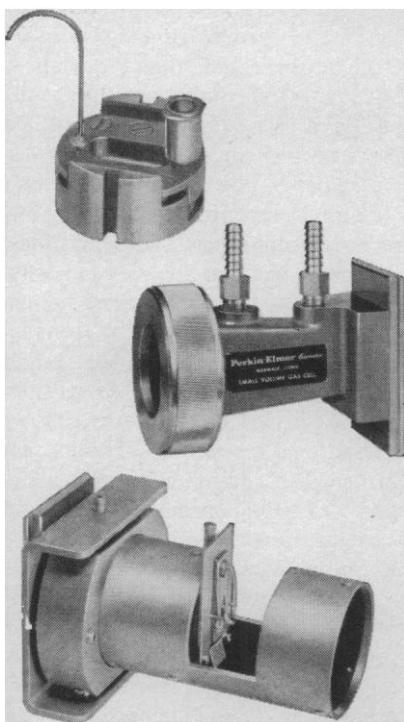
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at 0.5° to 1.7°C, of haddock for 14 days and shrimp for 7 days, without adversely affecting consumer preference.

W. T. L. Neal (Ministry of Agriculture, Fisheries and Food, Great Britain) indicated that the principal interest of European countries is in the use of radiation to pasteurize foods to eliminate salmonella infection. He indicated that there is a potential in Britain for the application of radiation to the processing of imported frozen eggs, frozen horse meat imported for pet foods, coconuts, meat and fish meals, and chicken.

Lloyd L. Kempe (University of Michigan) reported on the unusual problems in studying Type E botulism in connection with the radiation preservation of foods. Citing studies on the heat resistance of Type E spores, he pointed out an apparent anomaly in the temperature at which they are inactivated. He reported on a study using spore suspensions of the Beluga strain in sealed ampules in which the number of spores was reduced by 5 cycles in 3 minutes at 78°C but survivors remained at 60 minutes. These remaining spores produced Type E toxin upon subculture. Kempe said that this indicates the existence of the so-called "tail" on the heat-survivor curves and that the surviving spores are Type E. Studies to confirm this are continuing.

The conference was sponsored jointly by the National Academy of Sciences-National Research Council, the U.S. Atomic Energy Commission, and the U.S. Army Natick Laboratories. Proceedings of the conference will be published by NAS-NRC.

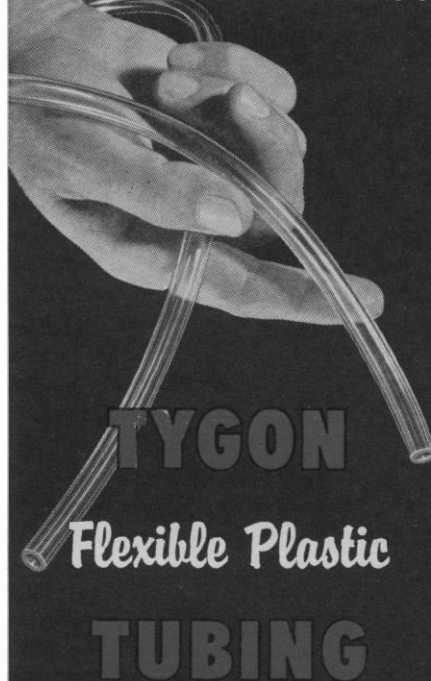
FERDINAND P. MEHRLICH
Food Division, U.S. Army Natick Laboratories, Natick, Massachusetts

Vesalius Commemoration at Brussels

Vesalius was born in 1514 and died in 1564. His activities took him from his native Belgium, through France, Switzerland, Germany, Austria, Italy, Spain, the Holy Land, and the Greek islands. The widespread impact of his work amply justified the international celebration of the fourth centennial of his death which was held in Brussels 19-24 October 1964.

The meeting comprised two programs, one historical and humanistic, and the other concerned with contemporary biology. An elegant facsimile

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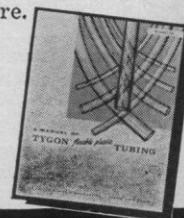


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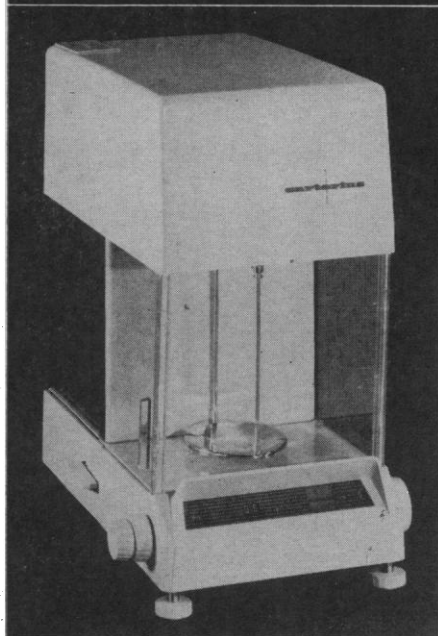
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edition of the *Fabrica* (1543) was published for the occasion, while C. D. O'Malley's biography of Vesalius had appeared shortly before the meeting. The week opened with a ceremonial session in the presence of King Baudouin; there were visits to Vesalius's birthplace and other historical sites, concerts of 16th-century music in the old city hall, and joint lunches and dinners.

The inaugural session of the combined programs was devoted to general addresses in honor of Vesalius and concluded with the formal opening of an exhibition of Vesaliana gathered from all over Belgium and from Switzerland and Spain; this was unquestionably the largest such exhibition ever presented.

The succeeding humanistic sessions were of a more specialized nature, with speakers invited from those European countries with which Vesalius had some relation, and from America, in order to stress the international character of the commemoration. With Heymans (president of the organizing committee) presiding, Belloni (Milan) discussed Vesalius's great-grandfather, Johannes de Vesalia, his medical training at Pavia, his study of the plague in Italy, and his relations with the Duke of Milan, Francesco Sforza. Kellett (Newcastle-upon-Tyne) dealt with influences on Vesalius during his medical studies in Paris (1533-36), and Boeynants (Antwerp) discussed the same theme as it related to Vesalius's further studies in Louvain. O'Malley (University of California, Los Angeles) spoke on the evolution of Vesalius's scientific method during his years in Padua.

A paper by Steudel (Bonn) on Vesalius's contribution to the development of anatomical nomenclature was followed by more general considerations of "The Vesalian man in the world of Copernicus" by Canguilhem (Paris), the evolution of scientific-technical relations by Auger (Paris), and a paper by Florkin (Liege) on "The renaissance of Vesalian studies in the 20th century." There is no question of the increasing interest in Vesalius and the growing recognition of his achievement.

The scientific sessions, in the form of a symposium on "Cell, form and function," represented an effort to view the contemporary scene in biology. Under the title "The cell and its environment," there were presentations by Danielli (Buffalo) and Koch (Lou-

vain), Chapman-Andresen (Copenhagen), Curtis (London), and Kleinzeller (Prague), centered around cell membranes and transport phenomena. Under "Energy production," there were broad discussions by Slater (Amsterdam) and Duysens (Leiden) on respiratory and photosynthetic processes, and by André (Paris) on the structure of mitochondria. Discussion on the "Utilization of energy" was opened by Chantrenne (Brussels) who spoke on "Polyribosomes, agents of protein synthesis." Gibbons (Harvard) then spoke on ciliary movement, and was followed by Huxley (Cambridge) and Mommaerts (UCLA) discussing the structure and function of muscle. Under the general heading "Catabolism," Berthet (Louvain), speaking for himself and DeDuve, discussed "Physiological adaptations of the phenomena of intracellular digestion." Levi-Montalcini (St. Louis) treated "Growth control of nerve cells by a protein factor and its antiserum," and Glucksmann (Cambridge) spoke on "Cell death in normal development."

At a meeting on "Morphogenesis and differentiation," Pasteels (Brussels) discussed the structural aspects of fertilization; Monroy (Palermo) spoke on the activation of protein synthesis in that process, and Curtis (London) discussed the cortical control of embryogenesis. The last special session was devoted to "Genetical aspects of embryonic development," with lectures by Thomas (Brussels) on the control of genetic replication, Sirlin (Edinburgh) on nucleolar RNA, and Signoret (Caen) on nuclear transplantations and embryonic differentiation.

The closing session was opened by Brachet (Brussels) with a masterful summary of the entire scientific program. The symposium indeed provoked an active discussion of contemporary currents in biology; one may say that among these are the problems with which Vesalius would occupy himself today, the more so since the emphasis was on embryonic development, often regarded as the next frontier of molecular biology. As a result of the conference all participants were aware of the great scientific tradition perpetuated by Vesalius.

The proceedings of the conference and a catalog of the exhibition will be published.

W. F. H. M. MOMMAERTS
C. D. O'MALLEY

University of California, Los Angeles

26 MARCH 1965



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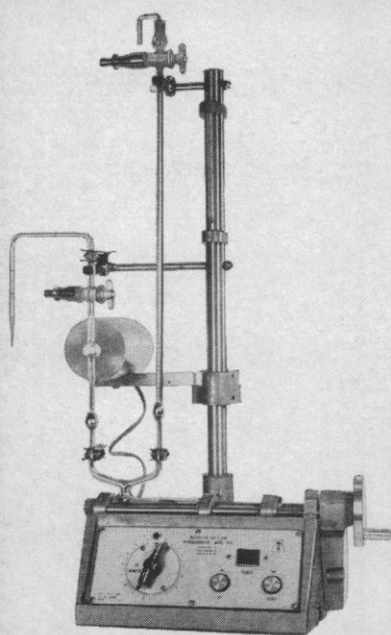
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Forthcoming Events

March

29-29 Apr. **Genito-Urinary Diseases**, symp., Univ. of Kentucky, Lexington. (N. J. Pisacano, Continuation Medical Education, Univ. of Kentucky, Lexington)

30-31. **Formulation of Pesticides**, symp., London, England. (Assistant Secretary, Soc. of Chemical Industry, 14 Belgrave Sq., London, S.W.1)

30-1. **Non-conventional Electron Microscopy**, Cambridge, England. (Inst. of Physics and the Physical Soc., 47 Belgrave Sq., London, S.W.1, England)

31-2. **Corrosion by Hot Gases and Combustion Products**, symp., European Federation of Corrosion, Frankfurt am Main, Germany. [DECHEMA, 6 Frankfurt (Main) 7, Postfach 7746, Germany]

31-2. **Optical Soc. of America**, Dallas, Tex. (M. E. Warga, 1155 16th St., NW, Washington, D.C. 20036)

31-2. **Recent Developments in Heat Treatment of Food**, 2nd European symp., Frankfurt am Main, Germany. [Gesellschaft Deutscher Chemiker, Dr.rer. nat. Wolfgang Fritzsche, 6000 Frankfurt (Main), Postfach 9075, Warrentappstr. 40-42, Germany]

31-2. **Electron Beam**, 7th annual symp., University Park, Pa. (A. B. El-Kareh, Dept. of Electrical Engineering, Pennsylvania State Univ., University Park)

April

1-3. **Association of Surgeons of Great Britain and Ireland**, annual, London, England. (Joint Secretariat, 47 Lincoln's Inn Fields, London, W.C.2)

1-3. **Dermovenereology**, 7th meeting Univ. of Catania, Italy. (Direzione della Clinica Dermosifilopatica, Piazza S. Agata La Vetere 5, Catania, Sicily, Italy)

1-4. **British Medical Assoc.**, annual clinical meeting, Dundee, Scotland. (D. Gullick, BMA, Tavistock Square, London, W.C.1, England)

1-15. **Theoretical Chemistry**, NATO Advanced Study Inst., Frascati, Italy. (C. A. Coulson, Mathematical Inst., 10 Parks Rd., Oxford, England)

2-3. **Alabama Acad. of Science**, Florence State College, Florence. (W. B. DeVall, Forestry Dept., Auburn Univ., Auburn, Ala.)

2-3. **Arkansas Acad. of Science**, Univ. of Arkansas, Fayetteville. (G. E. Templeton, Dept. of Plant Pathology, Univ. of Arkansas, Fayetteville)

2-3. **Chemistry Facilities for the Two-Year College**, Junior College Chemistry Roundtable, conf., Dearborn, Mich. (W. T. Mooney, Jr., El Camino College, Via Torrance, Calif. 90506)

2-3. **Alexander Graham Bell Assoc. for the Deaf**, Southeastern regional meeting, New Orleans, La. (G. W. Fellendorf, 1537 35th St., Washington 20007)

2-3. **Pennsylvania Acad. of Science**, 41st annual, Villanova Univ., Villanova. (G. E. Grube, Lock Haven State College, Lock Haven, Pa.)

2-4. **Society for Applied Anthropology**, annual, Lexington, Ky. (SAA, Rand Hall, Cornell Univ., Ithaca, N.Y.)

2-4. **American Soc. for the Study of Sterility**, San Francisco, Calif. (H. H.

Thomas, 944 S. 18th St., Birmingham, Ala.)

2-7. **West African Science Assoc.**, 5th biennial conf., Freetown, Sierra Leone. (M. M. Anderson, Geology Dept., Fourah Bay College, Freetown)

4. **Chest Disease**, symp., Arizona Acad. of General Practice. (Cardiopulmonary Section, Tucson Medical Center, P.O. Box 6067, Tucson, Ariz. 85716)

4-7. **American College of Obstetricians and Gynecologists**, annual, San Francisco, Calif. (ACOG, 79 W. Monroe St., Chicago, Ill. 60603)

4-9. **Division of Chemical Literature**, American Chemical Soc., Detroit, Mich. (B. M. Davis, Cabot Corp., Concord Rd., Billerica, Mass.)

4-9. **American Chemical Soc.**, spring natl. meeting, Detroit, Mich. (ACS, 1155 16th St., NW, Washington, D.C. 20036)

5-7. **Atomic Energy Soc. of Japan**, annual, Kyoto, Japan. (M. Masamoto, Atomic Energy Soc. of Japan, c/o Japan Atomic Energy Research Inst., 1, 1-chome, Shibamura-cho, Minato-ku, Tokyo, Japan)

5-7. **Hormonal Effects of Cutaneous Structure and Function**, New York Univ., New York, N.Y. (Office of the Recorder, New York Univ. Post-Graduate Medical School, 550 First Ave., New York 10016)

5-7. **Elementary Particles**, conf., Birmingham, England. (Administration Asst., Inst. of Physics and the Physical Soc., 47 Belgrave Sq., London, S.W.1, England)

5-7. **Fission Product Release and Transport** under Accident Conditions, intern. symp., Oak Ridge, Tenn. (C. J. Barton, Oak Ridge Natl. Laboratory, P.O. Box X, Oak Ridge 37831)

5-7. **Nuclear Engineering: Neutron Dynamics and Control**, 4th annual symp., Univ. of Arizona, Tucson. (D. L. Hetrick, Dept. of Nuclear Engineering, Univ. of Arizona, Tucson 85721)

5-7. **New Dimensions in Space Technology**, 2nd space congr., Cocoa Beach, Fla. (L. E. Mertens, RCA Missile Test Project, M.U. 741 Bldg. 423, Patrick AFB, Fla.)

5-7. **Structures and Materials**, AIAA 6th natl. conf., Palm Springs, Calif. (J. E. Hove, Materials Sciences Laboratory-F/2323, Aerospace Corp., Box 95805, Los Angeles, Calif.)

5-8. **American Acad. of General Practice**, annual, Seattle, Wash. (M. F. Cahal, AAGP, Volker Blvd. at Brookside, Kansas City, Mo.)

5-8. **High Energy Physics**, symp., Birmingham, England. (Administration Asst., Inst. of Physics and the Physical Soc., 47 Belgrave Sq., London, S.W.1, England)

5-8. **Industrial Health**, American conf., Miami Beach, Fla. (American Industrial Health Conf., 55 East Washington St., Chicago, Ill.)

5-9. **American College of Allergists**, seminar and 21st annual congr., Las Vegas, Nev. (Administrative Office, 2141 14th St., Boulder, Colo.)

5-9. **Clean Air**, congr. and exhibition, Dusseldorf, Germany. (Nordwestdeutsche Ausstellungs-und Messe-Gesellschaft mbH, Nowea 5, Dusseldorf, Messelgelände, Germany)

5-9. **Phenomena in the Neighborhood of Critical Points**, Washington, D.C. (M. S. Green, Statistical Physics Section, Natl.

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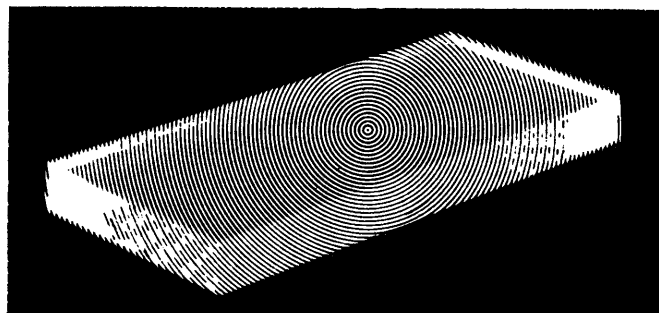
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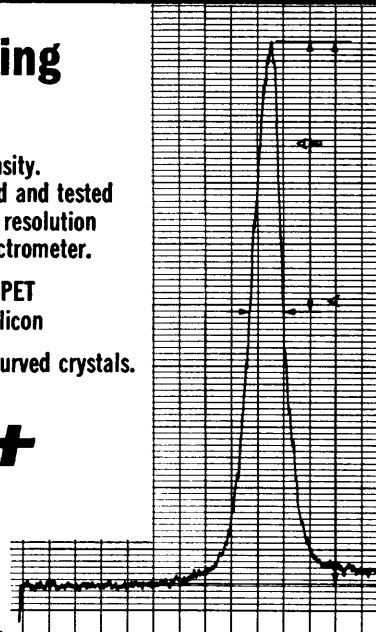
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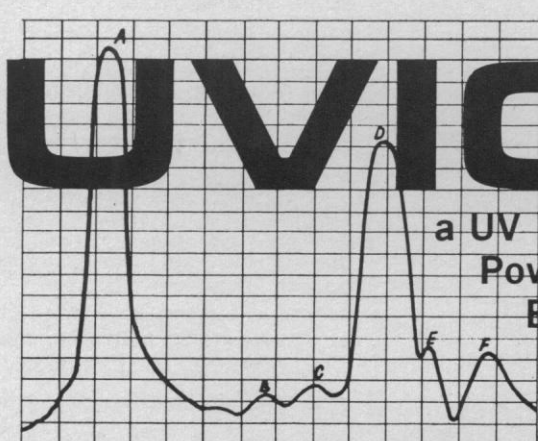
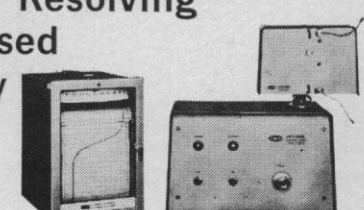
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5-10. **Nuclear Developments**, 1st intern. congr., Brighton, England. (J. B. Pinkerton, Inst. of Nuclear Engineers, 147 Victoria St., London, S.W.1, England)

5-12. **Large Telescopes**, symp., Pasadena and San José, Calif. (I. S. Bowen, c/o Mt. Wilson Observatory, 813 Santa Barbara St., Pasadena)

5-24. **World Meteorological Organization**, Regional Assoc. VI (Europe), 4th session, Paris, France. (WMO, 41 Avenue Giuseppe Motta, Geneva, Switzerland)

6-8. **Biomathematics and Computer Science** in the Life Sciences, 3rd annual symp., Houston, Tex. (Office of the Dean, Div. of Continuing Education, Univ. of Texas Graduate School of Biomedical Sciences, 102 Jesse Jones Library Bldg., Texas Medical Center, Houston 77025)

6-9. **Royal Aeronautical Soc.**, conf., Nottingham, England. (H. Umpleby, Institution of Mechanical Engineers, 1 Birdcage Walk, Westminster, London, S.W.1, England)

6-9. **Automatic Control**, conv., Nottingham, England. (H. Umpleby, Institution of Mechanical Engineers, 1 Birdcage Walk, Westminster, London, S.W.1, England)

7-9. **American Assoc. for Cancer Research**, 56th annual, Philadelphia, Pa. (AACR, 7701 Burholme Ave., Fox Chase, Philadelphia 19111)

7-9. **The Chemical Soc.**, anniversary meetings, Glasgow, Scotland. (CS, Burlington House, London, W.1, England)

7-9. **Nucleation Phenomena**, intern. symp., Cleveland, Ohio. (A. G. Walton, Dept. of Chemistry, Case Inst. of Technology, University Circle, Cleveland 6)

7-9. **Pesticides**, U.S.-Japan Cooperative Science program, Honolulu, Hawaii. (Office of Intern. Science Activities, Natl. Science Foundation, Washington, D.C.)

7-9. **Stress Analysis**, conf., Bristol, England. (Administration Asst., Inst. of Physics and the Physical Soc., 47 Belgrave Sq., London, S.W.1, England)

7-16. **Instrumentation for Hydraulic Research**, U.S.-Japan Cooperative Science Program seminar, Tokyo, Japan. (Office of Intern. Science Activities, Natl. Science Foundation, Washington, D.C.)

8-9. **Histochemical Soc.**, 16th annual, Philadelphia, Pa. (S. S. Spicer, Natl. Inst. of Health, Bethesda, Md. 20014)

8-9. **Microbiological Deterioration in the Tropics**, symp., London, England. (Secretary, Soc. of Chemical Industry, 14 Belgrave Sq., London, S.W.1, England)

8-9. **British Inst. of Radiology**, annual congr., London, England. (BIR, 32 Welbeck St., London, W.1)

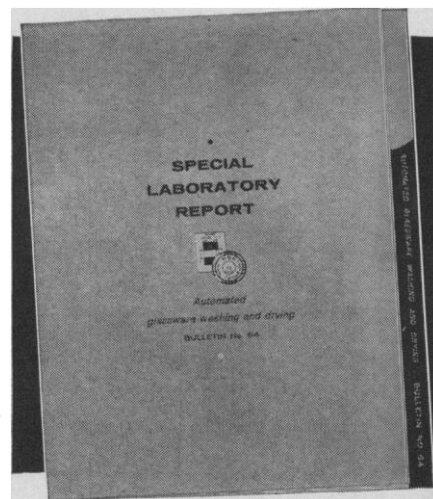
8-9. **X-ray Analysis**, Conf., Inst. of Physics and the Physical Soc., Edinburgh, Scotland. (Administration Asst., Inst. of Physics and the Physical Soc., 47 Belgrave Sq., London, S.W.1, England)

8-10. **North Pacific Soc. of Neurology and Psychiatry**, Portland, Ore. (W. W. Thompson, 3300 S.W. Dosch Rd., Portland)

8-10. **American Radium Soc.**, New Orleans, La. (J. L. Pool, 444 E. 68 St., New York 10021)

8-14. **American Soc. for Biological Chemists**, annual, Atlantic City, N.J. (K.

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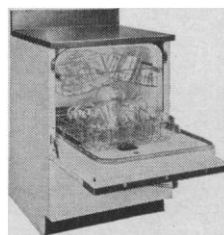
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9-10. American Assoc. of **University Professors**, Washington, D.C. (W. P. Fidler, AAUP, 1785 Massachusetts Ave., NW, Washington, D.C.)

9-11. Southwestern **Psychological Assoc.**, annual, Oklahoma City, Okla. (O. Parsons, Dept. of Psychiatry, Neurology, and Psychology, Oklahoma Medical Center, Oklahoma City)

9-13. Mediterranean Cooperation for **Solar Energy**, Istanbul, Turkey. (M. Perrot, c/o Faculte des Sciences, Pl. Victor Hugo, Marseilles, France)

9-14. Federation of American Societies for **Experimental Biology**, 46th annual, Atlantic City, N.J. (Mrs. T. C. Heatwole, FASEB, 9650 Wisconsin Ave., Washington, D.C. 20014)

10. New Mexico Acad. of Sciences, Socorro. (K. S. Bergstresser, 739 42nd St., Los Alamos, N.M.)

10-12. **Aerospace Electronics**, natl. conf., Dayton, Ohio. (Inst. of Electrical and Electronics Engineers, Dayton Office, 1414 E. 3 St., Dayton)

10-14. American Soc. for **Experimental Pathology**, Atlantic City, N.J. (H. D. Moon, Univ. of California School of Medicine, San Francisco 94122)

10-14. American Inst. of **Nutrition**, annual, Atlantic City, N.J. (O. Mickelsen, Dept. of Foods and Nutrition, Michigan State Univ., East Lansing)

10-14. American **Physiological Soc.**, Atlantic City, N.J. (R. G. Daggs, 9650 Wisconsin Ave., Washington, D.C.)

10-16. American Assoc. of **Immunologists**, Atlantic City, N.J. (B. H. Waksman, Massachusetts General Hospital, Boston 14)

11-15. **Calcified Tissues**, 3rd European symp., Davos, Switzerland. (H. Fleisch, Laboratorium für Experimentelle Chirurgie, Schweizerisches Forschungsinstitut, Davos)

12-13. **Inorganic Single Crystals**, symp., London, England. (Asst. Secretary, Soc. of Chemical Industry, 14 Belgrave Sq., London, S.W.1)

12-13. **Seismological Soc. of America**, annual, St. Louis, Mo. (C. Kisslinger, Dept. of Geophysics and Geophysical Engineering, St. Louis Univ., 3621 Olive St., St. Louis 63108)

12-14. **Atomic Spectra and Radiation Processes**, conf., Oxford, England. (Administration Asst., Inst. of Physics and the Physical Soc., 47 Belgrave Sq., London, S.W.1, England)

12-14. **Ballistocardiography and Cardiovascular Dynamics**, 1st world congr., Amsterdam, Netherlands. (A. A. Knoop, Physiological Laboratory, Free Univ., Valeriusplein 11, Amsterdam)

12-15. American **College Personnel Assoc.**, Minneapolis, Minn. (A. H. Hitchcock, 1605 New Hampshire Ave., NW, Washington, D.C. 20009)

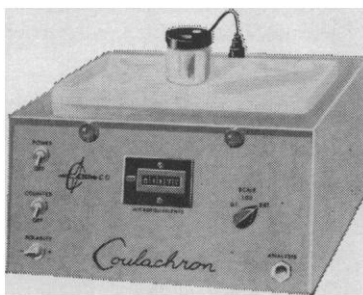
13-14. Kinetics of **Proton Transfer Processes**, Faraday Soc., Univ. of Newcastle-upon-Tyne, England. (FS, 6 Gray's Inn Square, London, W.C.1, England)

13-14. **Thermal Analysis**, symp., Lon-

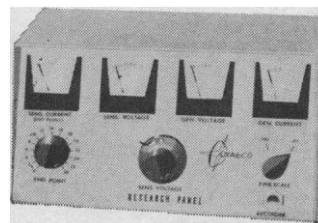
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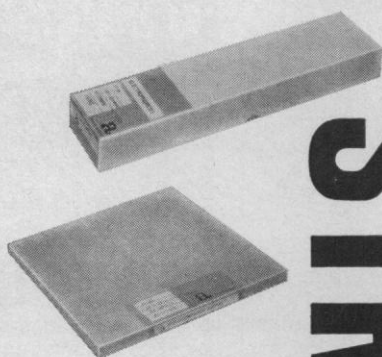
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don, England. (B. R. Currell, Dept. of Chemistry, Mathematics, Biology, and Geology, Northern Polytechnic, Holloway Rd., London, N.7)

13-15. **Telemetering**, natl. conf., Houston, Tex. (R. W. Towle, Advanced Technology Laboratories, 369 Winsman Ave., Mountain View, Calif.)

13-17. American Soc. of **Parasitologists**, 40th annual, Atlanta, Ga. (F. J. Kruidenier, Dept. of Zoology, Univ. of Illinois, Urbana)

13-17. **Rehabilitation**, Pan Pacific conf., Tokyo, Japan. (Intern. Soc. for Rehabilitation of the Disabled, 701 First Ave., New York 10017)

14. **Programmed Instruction in Medical Education**, symp., Newark, N.J. (A. Krosnick, Div. of Chronic Illness Control, New Jersey State Dept. of Health, Box 1540, Trenton 25)

14-16. **Water Resources and Pollution Control**, 14th, Raleigh, N.C. (C. M. Weiss, Box 899, Chapel Hill, N.C.)

15-16. **Heat Transfer** at Cryogenic Temperatures, Oklahoma State Univ., Stillwater. (J. D. Parker, Dept. of Mechanical Engineering, Oklahoma State Univ., Stillwater 74075)

15-16. **Programming and Control**, intern. conf., U.S. Air Force Academy, Colorado Springs, Colo. (O. J. Mancini, G. B. Dantzig Operations Research Center, Univ. of California, Berkeley)

15-17. American **Ethnological Soc.**, Lexington, Ky. (N. F. S. Woodbury, Office of Anthropology, U.S. Natl. Museum, Washington, D.C.)

15-17. Southern Soc. for **Philosophy and Psychology**, Atlanta, Ga. (E. A. Alluisi, Psychology Dept., Univ. of Texas, Austin 78712)

16-17. **Montana Acad. of Sciences**, Montana State College, Bozeman. (L. H. Harvey, Dept. of Botany and Microbiology, Montana State Univ., Missoula)

16-18. Association of **Southeastern Biologists**, annual, Charlottesville, Va. (J. N. Dent, Room 270, Gilmer Hall, McCormick Rd., Charlottesville 22903)

18-22. Association of American **Geographers**, annual, Columbus, Ohio. (E. Taafee, Dept. of Geography, Ohio State Univ., Columbus)

18-24. **Tsunami Run-up**, U.S.-Japan Cooperative Science Program mtg., Sapporo, Japan. (Office of Intern. Science Activities, Natl. Science Foundation, Washington, D.C.)

19-21. **Nondestructive Evaluation of Aerospace and Weapons System Components and Materials** (unclassified), San Antonio, Tex. (J. R. Barton, Southwest Research Inst., 8500 Culebra Rd., San Antonio 6)

19-21. **Biomedical Sciences Instrumentation**, 3rd natl. symp., Instrument Soc. of America, Dallas, Tex. (D. R. Stearn, ISA, 530 William Penn Place, Pittsburgh, Pa. 15219)

19-21. **Mechanics, Physics, and Chemistry of Solid Propellants**, Purdue Univ., Lafayette, Ind. (A. C. Eringen, School of Aeronautics, Astronautics and Engineering Sciences, Purdue Univ., Lafayette)

19-22. **Modern Trends in Activation Analysis**, intern. conf., Texas A&M Univ., College Station. (R. E. Wainardi, Texas A&M Univ., College Station)

19-22. American **Geophysical Union**, annual, Washington, D.C. (W. E. Smith, AGU, 1145 19th St., NW, Washington, D.C. 20036)

19-22. **Nuclear Magnetic Resonance**, 2nd annual workshop, Washington, D.C. (A. J. Rosen, Dept. of Chemistry, Georgetown Univ., Washington, D.C.)

20-22. **Frequency Control**, 19th annual symp., Atlantic City, N.J. (Director, U.S. Army Electronics Laboratories, Headquarters, U.S. Army Electronics Command, Attn: AMSEL-RD-PF, Fort Monmouth, N.J. 07703)

20-22. **Great Plains**, symp., North Dakota State Univ., Fargo. (S. W. Russell, North Dakota State Univ., Fargo)

20-22. **Physics of Solids at High Pressures**, 1st intern. conf., Tucson, Ariz. (C. T. Tomizuka, Dept. of Physics, Univ. of Arizona, Tucson 85721)

20-22. **Photochemical Aspects of Air Pollution**, symp., Cincinnati, Ohio. (A. P. Altshuler, Taft Sanitary Engineering Center, 4676 Columbia Parkway, Cincinnati 45226)

20-22. **System Theory**, symp., Polytechnic Inst. of Brooklyn, Brooklyn, N.Y. (J. Fox, Polytechnic Inst. of Brooklyn, 333 Jay St., Brooklyn 1)

20-23. American Assoc. of **Anatomists**, annual, Miami, Fla. (R. T. Woodburne, Dept. of Anatomy, Univ. of Michigan, Ann Arbor 48104)

20-23. American **Meteorological Soc.**, spring meeting, Washington, D.C. (K. C. Spengler, 45 Beacon St., Boston 8, Mass.)

20-23. U.S. Natl. Committee, Intern. **Scientific Radio Union/Inst. of Electrical and Electronics Engineers**, spring meeting, Washington, D.C. (A. T. Waterman, Stanford Electronics Laboratories, Stanford Univ., Stanford, Calif.)

21. **Oral Cancer**, 3rd annual symp., Poughkeepsie, N.Y. (M. A. Engelman, 1 East Academy St., Wappingers Falls, N.Y. 12590)

21-22. **Mathematical Geodesy**, symp., Turin, Italy. (A. Marussi, Univ. of Trieste, Trieste, Italy)

21-23. American Inst. of **Chemists**, 42nd annual, Richmond, Va. (R. E. Anderson, Albemarle Paper Manufacturing Co., Richmond 23217)

21-23. **Cognitive Processes and Clinical Psychology**, 3rd symp., Univ. of Colorado, Boulder. (R. Jessor, Dept. of Psychology, Univ. of Colorado, Boulder)

21-23. **Combustion Inst.**, western states section, spring meeting, Hollywood, Calif. (A. S. Gordon, Forrestal Research Center, Princeton Univ., Princeton, N.J.)

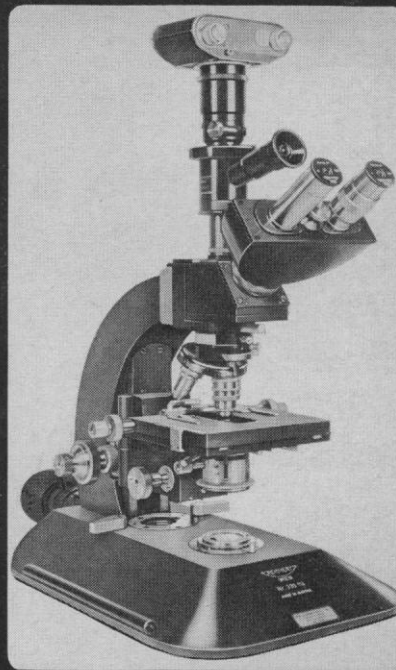
21-23. Institute of **Environmental Sciences**, 11th annual, Chicago, Ill. (IES, 34 Main St., Mount Prospect, Ill. 60057)

21-23. **Engineering Aspects of Magneto-hydrodynamics**, 6th symp., Pittsburgh, Pa. (E. Reshotko, Div. of Electrical Engineering, Case Inst. of Technology, Cleveland, Ohio 44106)

21-23. **Support for Manned Flight**, conf., Dayton, Ohio. (G. L. Schwarz, Headquarters, AF Logistics Command (MCO), Wright-Patterson Air Force Base, Ohio)

21-23. **Marine Sciences Instrumentation**, 3rd natl. symp., Instrument Soc. of America, Univ. of Miami, Miami, Fla. (H. A. Cook, Airpax Electronics, Inc., P.O. Box 8488, Fort Lauderdale, Fla.)

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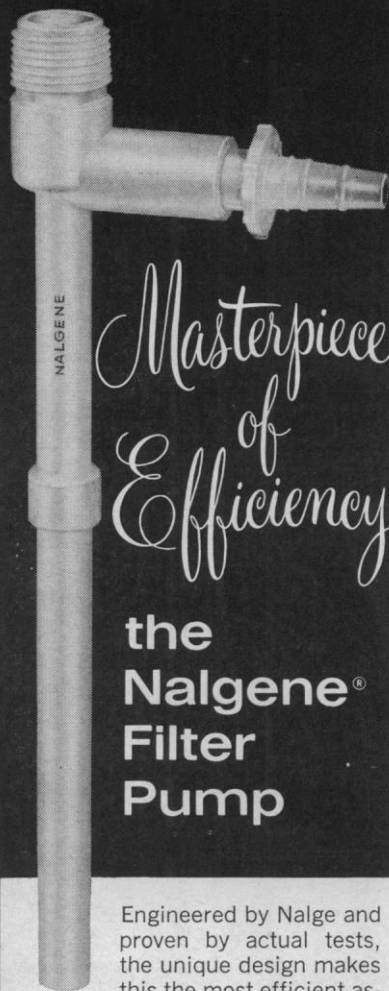
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21-23. **Ophthalmological Soc.** of the United Kingdom, annual, London, England. (Joint Secretariat, 47 Lincoln's Inn Fields, London, W.C.2)

21-23. **Optimization Techniques**, symp., Pittsburgh, Pa. (Inst. of Electrical and Electronics Engineers, Box A, Lenox Hill Station, New York, N.Y.)

21-23. **Pulse Radiolysis**, symp., Manchester, England. (M. Ebert, Paterson Laboratories, Christie Hospital and Holt Radium Inst., Withington, Manchester 20, England)

21-24. Federation of European **Biochemical Societies**, Vienna, Austria. (The Secretariat, Alserstr. 4, Vienna 9)

21-24. **British Paediatric Assoc.**, Scarborough, England. (E. W. Hart, Hospital for Sick Children, Great Ormond St., London, W.C.1, England)

21-2. **Industrial Chemistry**, 26th intern. congr., Paris, France. (Soc. of Industrial Chemistry, 28 rue St. Dominique, Paris 7)

22-23. **Nondestructive Testing** of Materials, intern. conf., Vienna, Austria. (Firma Gebr. Böhler & Co., A.G., Kapfenberg, Austria)

22-23. **Chemistry of Polymerization Processes**, symp., London, England. (W. R. Moore, Dept. of Chemical Technology, Bradford Inst. of Technology, Bradford 7, Yorkshire, England)

22-24. **Eastern Psychological Assoc.**, 36th annual, Atlantic City, N.J. (M. A. Iverson, Queens College, Flushing, N.Y. 11367)

22-24. **Role of the Solvent in Chemical Kinetics**, E. A. Moelwyn-Hughes symp., Univ. of Arkansas, Fayetteville. (A. Fry, Dept. of Chemistry, Univ. of Arkansas, Fayetteville 72701)

22-24. **Wildflower Pilgrimage**, 15th annual, Great Smoky Mountains Natl. Park. (E. E. C. Clebsch, Dept. of Botany, Univ. of Tennessee, Knoxville)

23-24. **Georgia Acad. of Science**, Oglethorpe Univ., Atlanta. (J. T. May, School of Forestry, Univ. of Georgia, Athens)

23-24. **Information Retrieval**, 2nd annual natl. colloquium, Univ. of Pennsylvania, Philadelphia. (Inst. for Scientific Information, 325 Chestnut St., Philadelphia 19106)

23-24. **Iowa Acad. of Science**, Univ. of Dubuque, Dubuque. (G. W. Peglar, Dept. of Mathematics, Iowa State Univ., Ames)

23-24. **Mississippi Acad. of Sciences**, Biloxi. (C. Q. Sheely, Mississippi State Univ., State College)

23-24. **Ohio Acad. of Science**, annual, Ohio Univ., Athens. (J. H. Melvin, 505 King Ave., Columbus, Ohio 43201)

23-24. **Parasitism**, colloquium, Oregon State Univ., Corvallis. (J. E. McCauley, Dept. of Oceanography, Oregon State Univ., Corvallis 97331)

23-24. **Population Assoc. of America**, annual, Chicago, Ill. (A. J. Coale, PAA, Office of Population Research, 5 Ivy Lane, Princeton, N.J.)

23-24. **South Dakota Acad. of Science**, Black Hills State College, Spearfish. (T.

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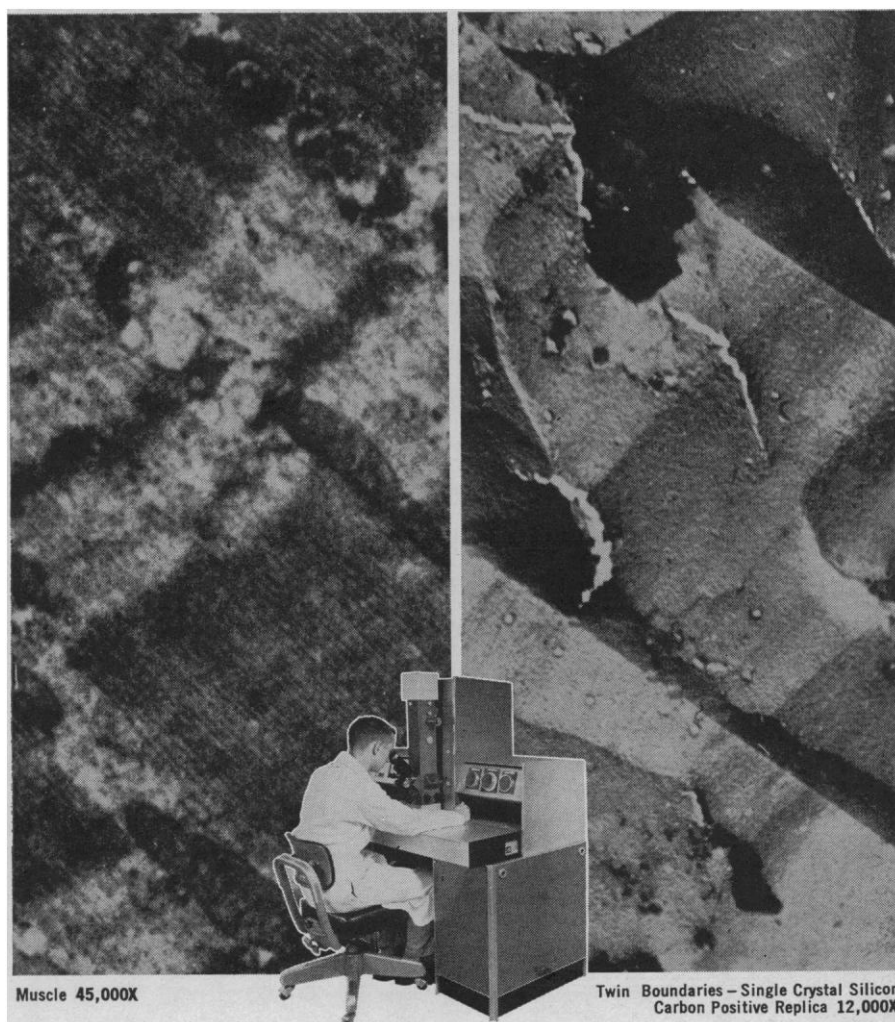
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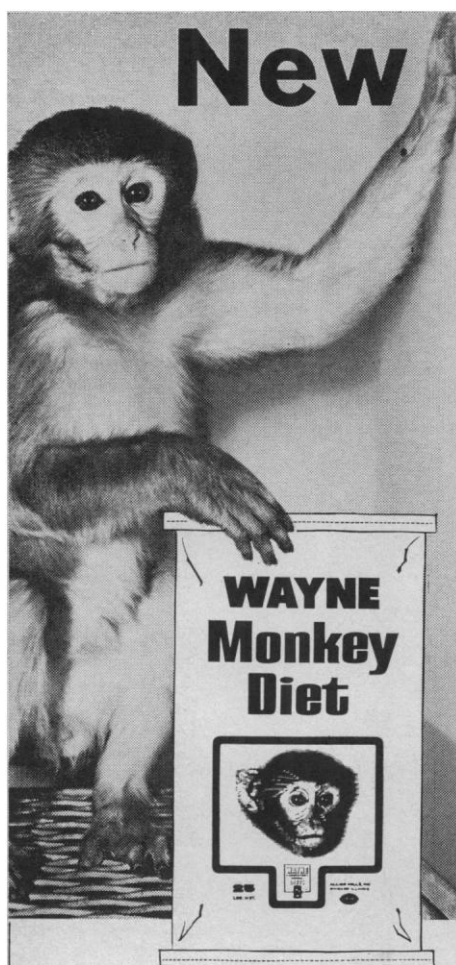
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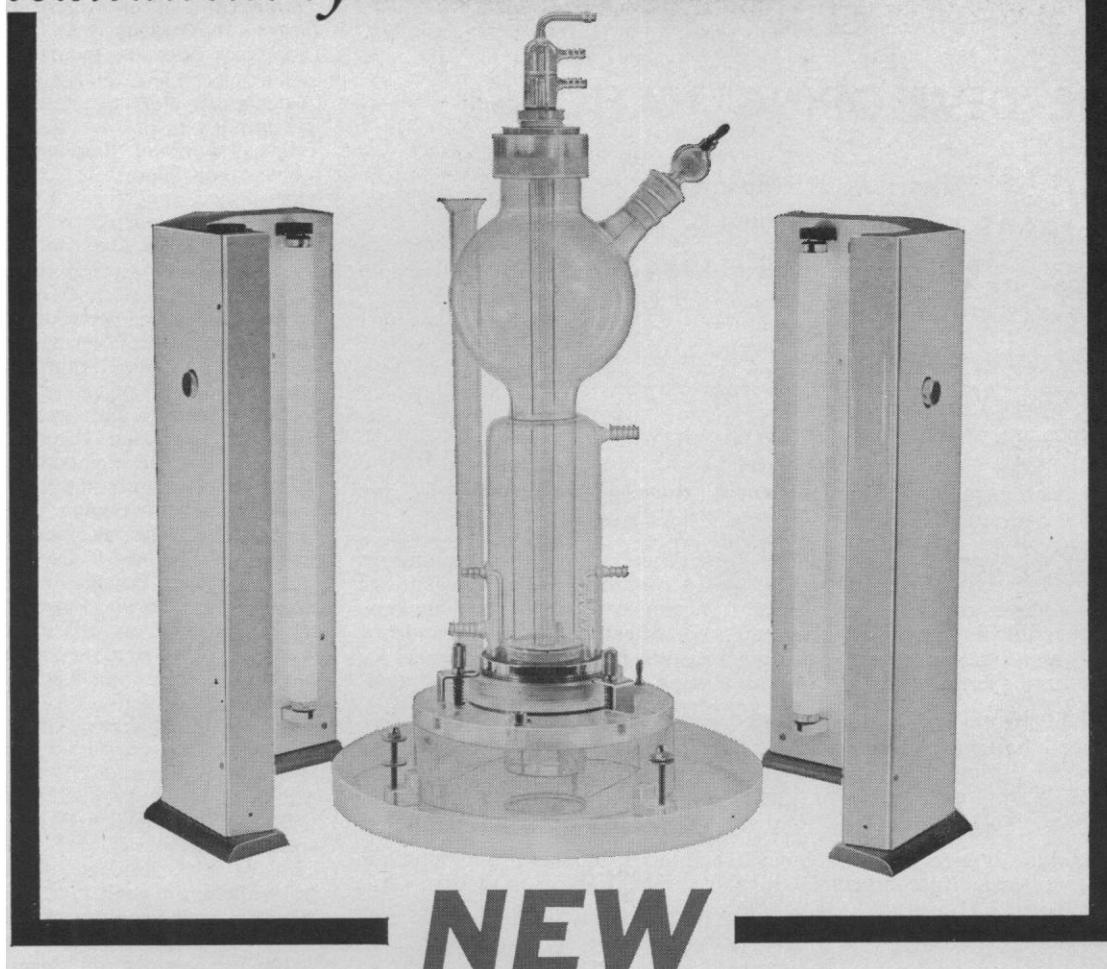
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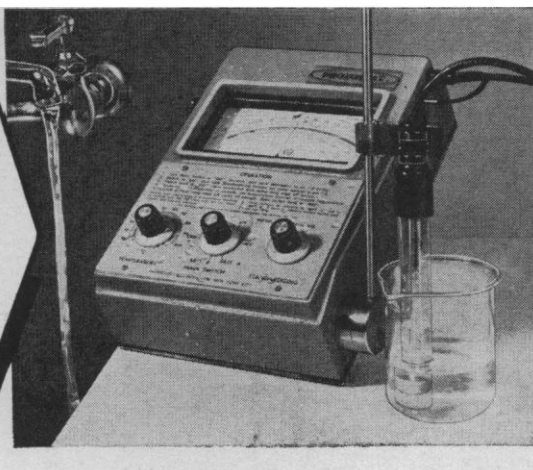
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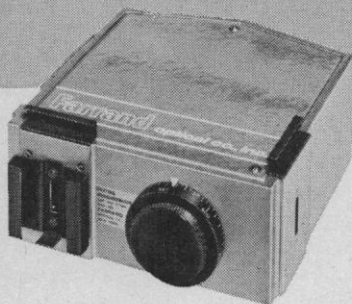
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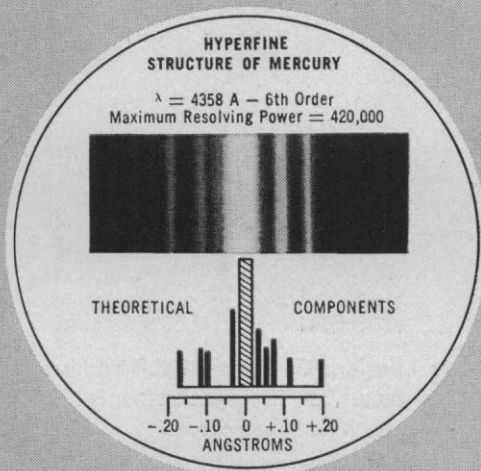
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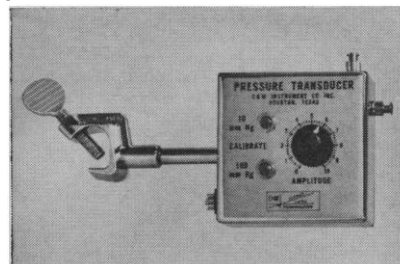
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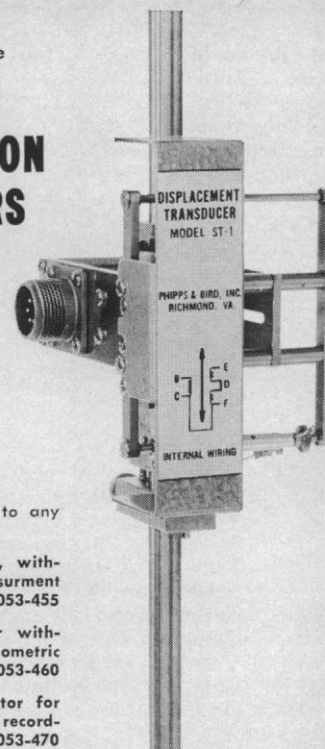
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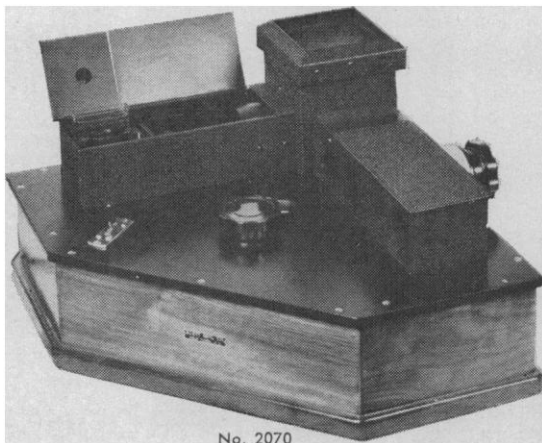


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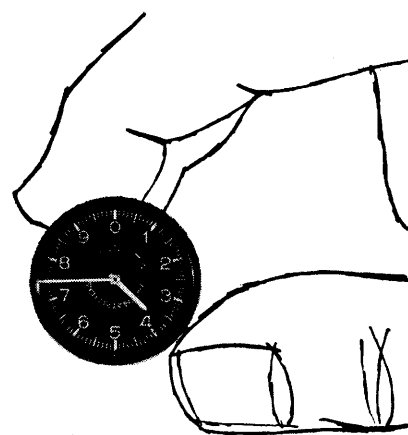
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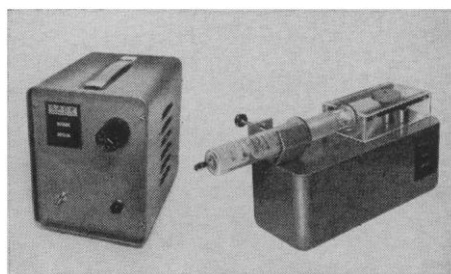
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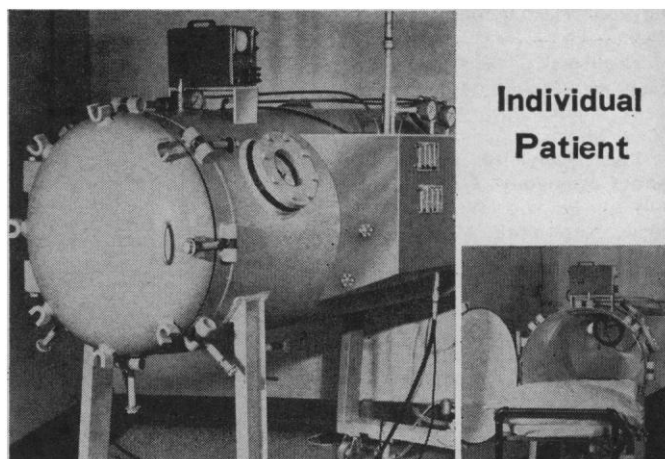
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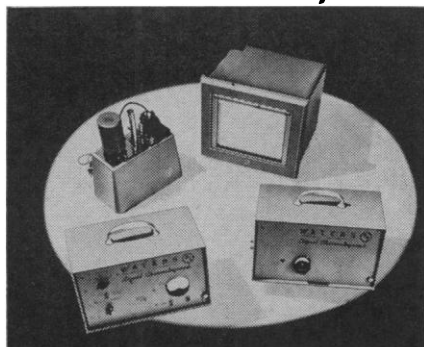
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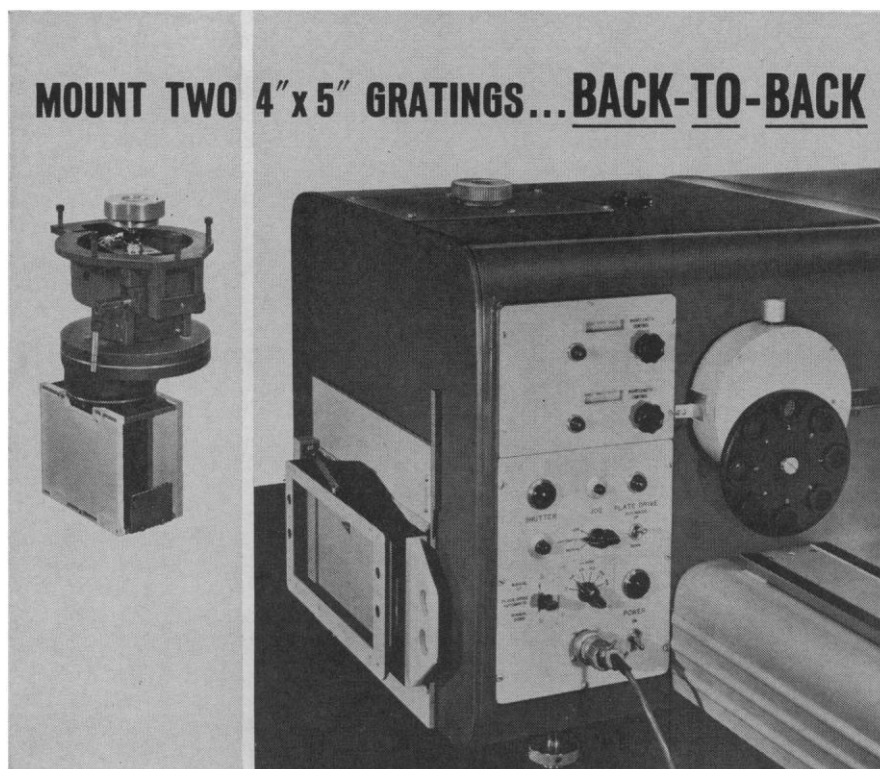
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