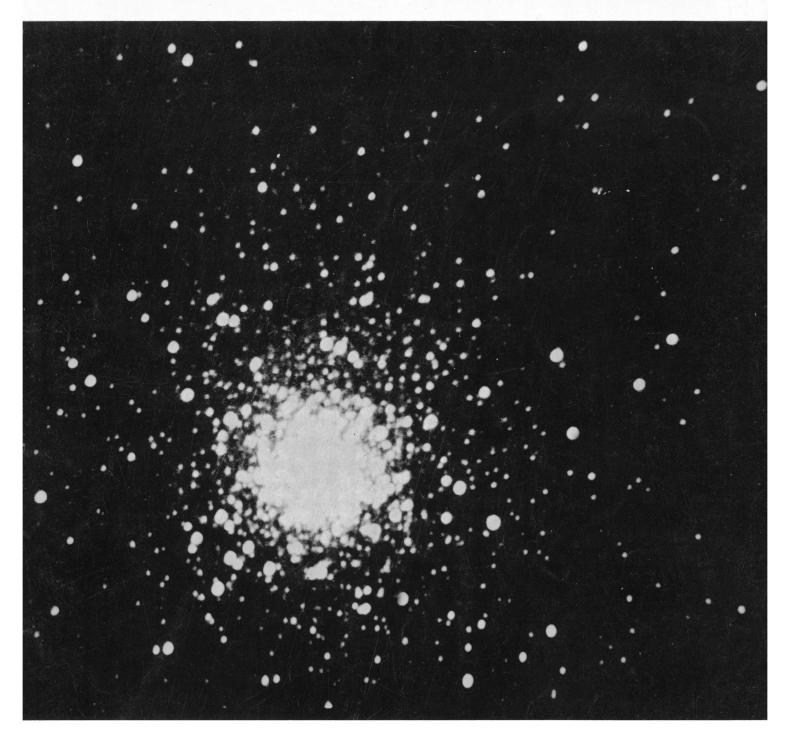
# SCIENCE 20 October 1961 Vol. 134, No. 3486

AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE



Instrument Issue



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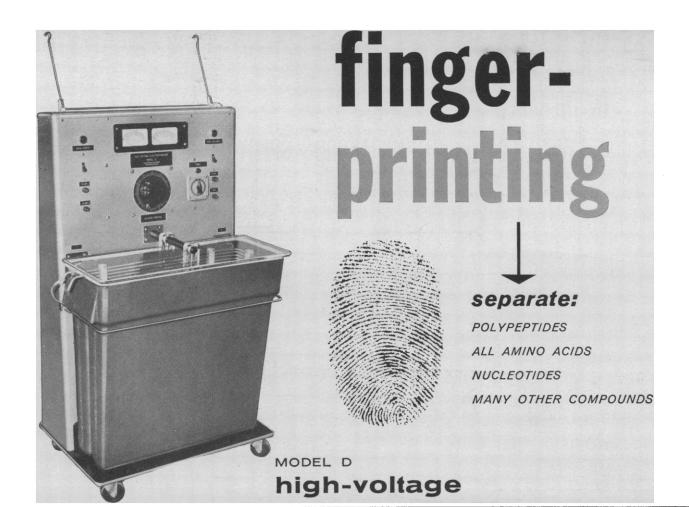
### 1 BRIGHT FIELD 2 DARK FIELD 3 PHASE CONTRAST 4 INCIDENT LIGHT 5 FLUORESCENCE 6 PHOTOMICROGRAPHY

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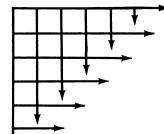
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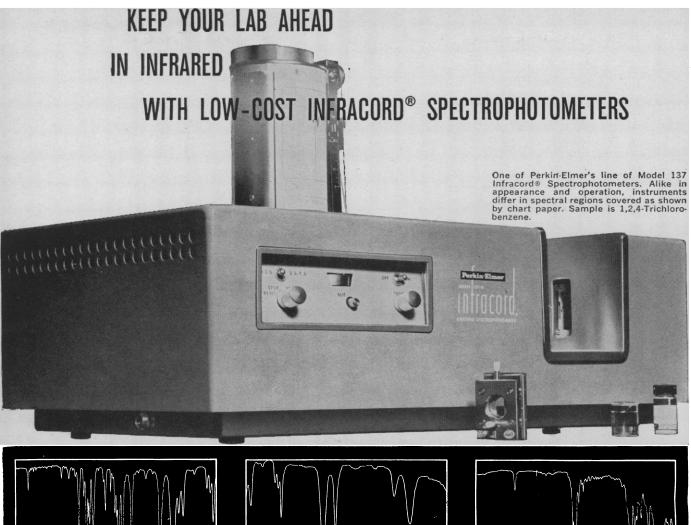
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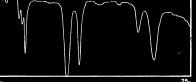
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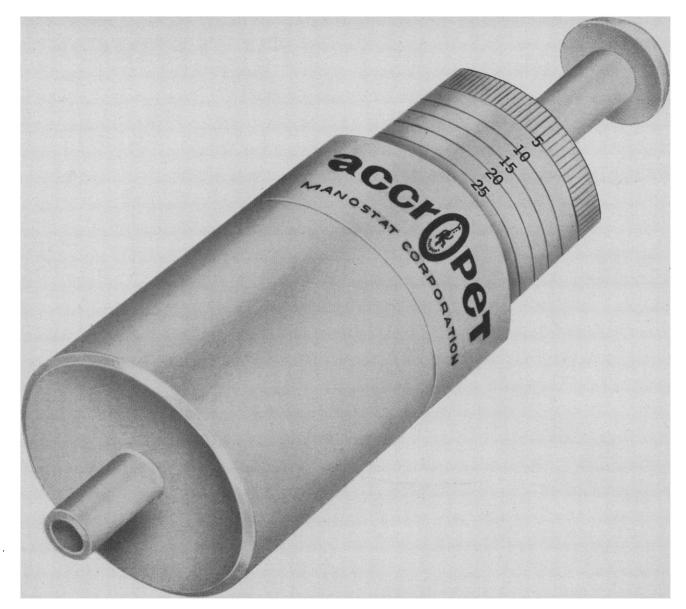
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Science

### SCIENCE

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Cover	Globular star cluster M3 in yellow light, taken at Kitt Peak 19 March 1961 with a GL-7629 image orthicon. Exposure time, 8.5 seconds. See page 1165.	



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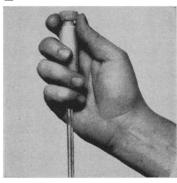
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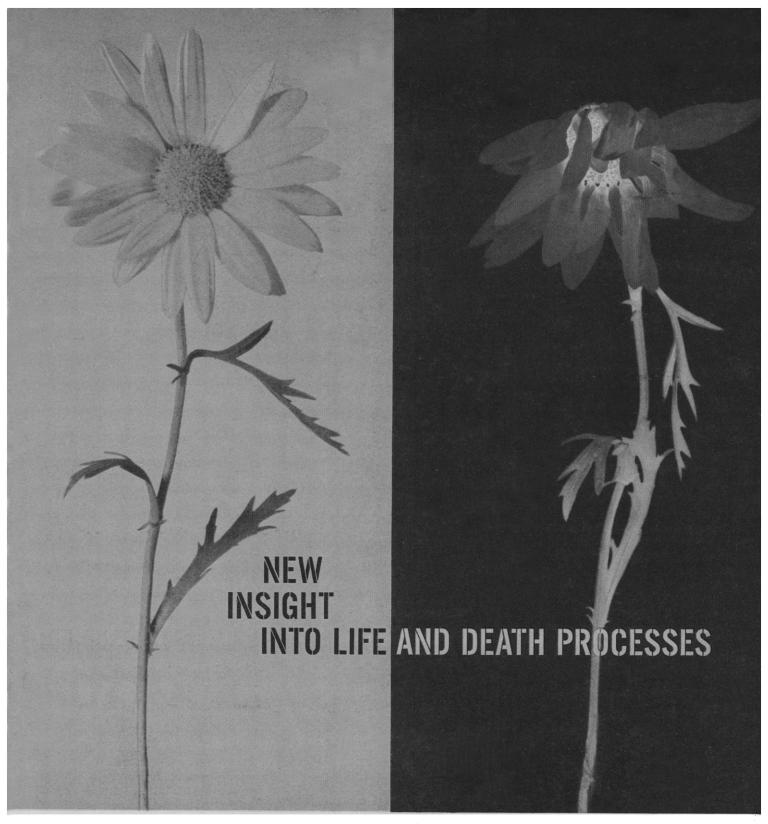
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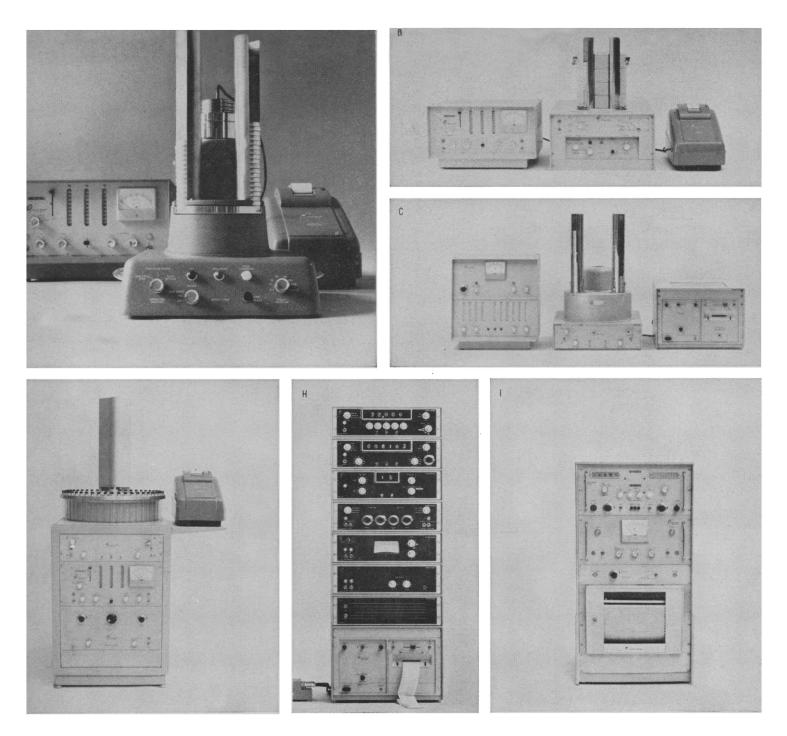
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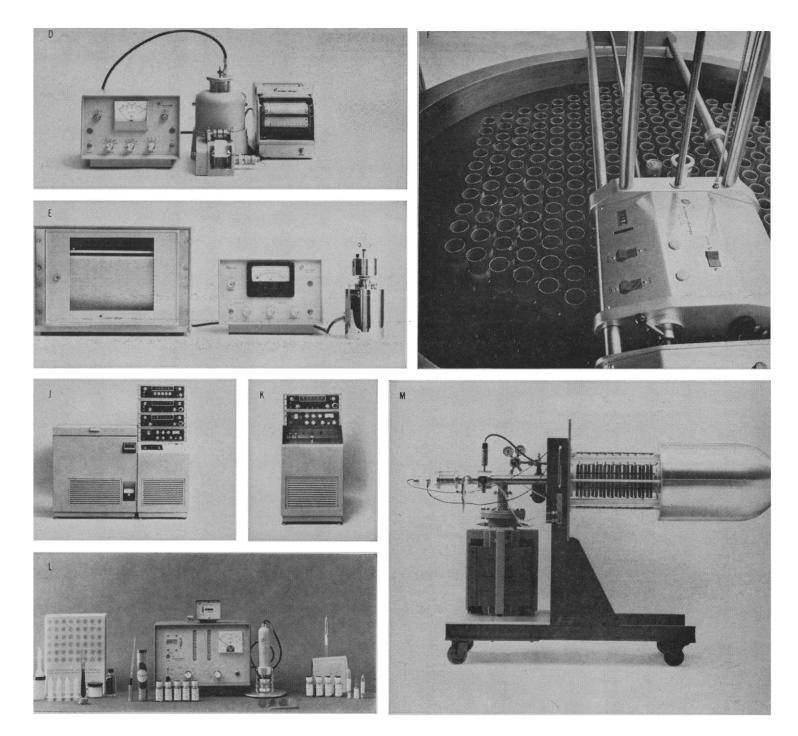


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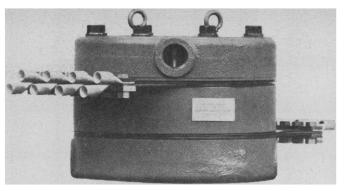
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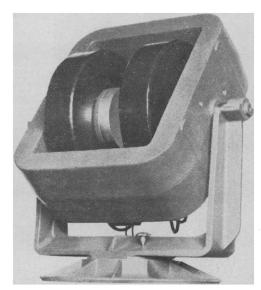
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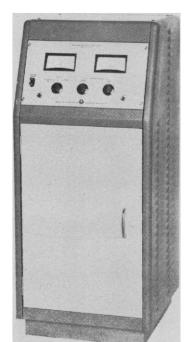


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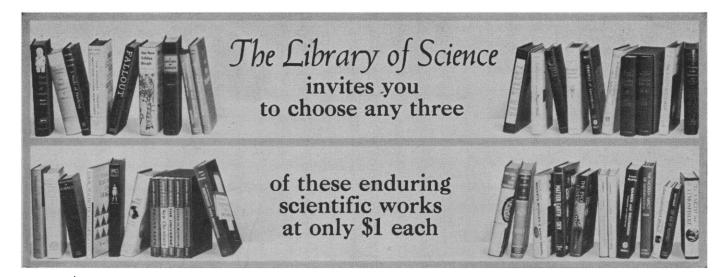


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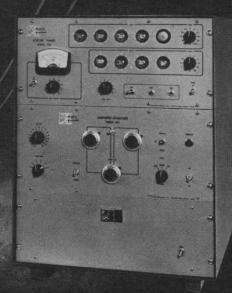
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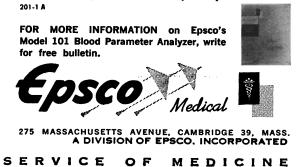


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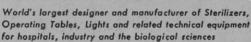
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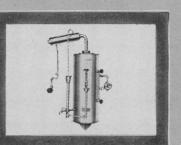
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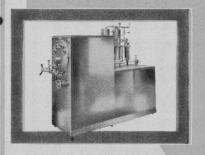
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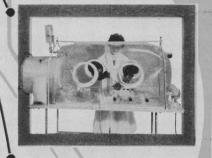




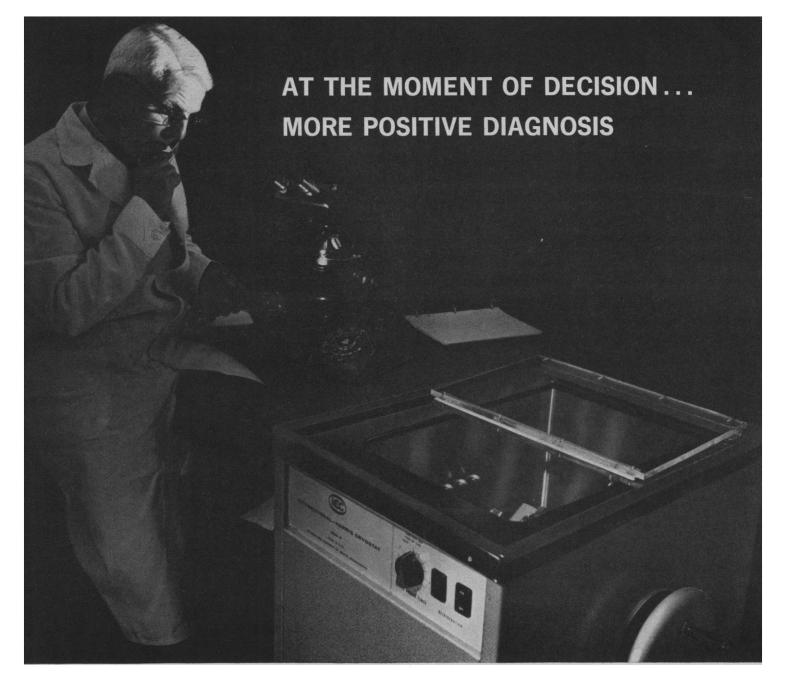












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In addition, Sanborn offers pneumograph and pulse wave attachments, heart sound microphones, linear velocity and displacement transducers, and transducers for force measurements in myographic studies. For complete information contact your nearest Sanborn Branch Office or Service Agency – or write Manager, Research Instrument Sales, Medical Division.



### ATTENUATED TOTAL REFLECTION A promising new infrared sampling technique especially suited for analyzing films and solids

At the 1959 Spectroscopy Symposium in Bologna, Dr. J. Fahrenfort of the Shell Research Laboratories in Holland discussed the application of attenuated total reflection to infrared spectroscopy. Greatly intrigued by his work, we at Connecticut Instrument Corporation have spent several months studying the technique and developing practical equipment for its routine application in the infrared laboratory. While we have just begun to scratch the surface of potential uses for the ATR method of sampling, we have learned enough to believe that it will soon become as useful to the spectroscopist as the KBr pellet technique.

In a somewhat oversimplified form, attenuated total reflection may be explained as follows:

Assume that a beam of radiation is passed into a prism so that it is totally reflected from the back face, as in Figure 1. It has been shown, both mathematically and by physical measurements, that some portion of the energy of the beam escapes from the totally reflecting face and then is returned into the prism. It is almost as though the ray had a wave front of a finite width and behaved as shown in the diagram.

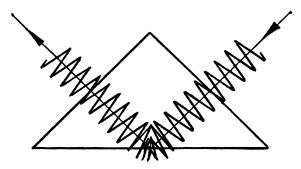


Figure 1. Schematic of attenuated reflection effect

It would appear that, if an absorbing material is placed in contact with the reflecting surface, the energy that escapes temporarily from the prism would be selectively absorbed, much as in a transmission spectrum. Under the proper conditions this is indeed the case.

The absorption-like spectra obtained by this method have two important and unique features:

1. The band intensities are the equivalent of an extremely shallow (5 microns or less) penetration into the sample.

2. They are completely independent of the sample thickness.

As manufacturers of infrared cells, it comes as a considerable relief to find a sampling procedure that eliminates precise and extremely short pathlengths as a requirement for infrared sampling!

Because of these characteristics, it is apparent that the ATR technique will have widespread application in the infrared analysis of solid materials and other strongly absorbing substances. To make practical application of the ATR technique we have developed an attachment that will fit into most commercial infrared spectrometers and which has a reflecting surface available from which the spectrometer beam may be reflected at an adjustable angle of incidence (Figure 3).

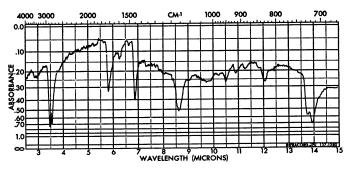


Figure 2. ATR spectrum of Carnauba wax made with a pressed plate

We have worked out several different sampling techniques for handling solids and liquids, including an expendable Frisnel type reflector plate upon which samples may be permanently deposited. The spectrum in Figure 2 shows some typical results.

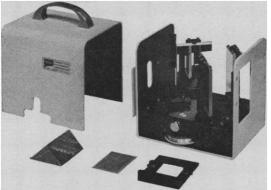


Figure 3. CIC's new ATR attachment, cover removed, showing sampling accessories

The ATR technique offers fascinating possibilities to the spectroscopist in enabling him to obtain spectra on samples that are difficult or impossible to analyze by conventional techniques — plastics in the solid state, strongly absorbing liquids, such as water solutions, naturally occuring materials and inorganics—to name a few.

The Model ATR-1 attachment developed by C I C will enable the spectroscopist to experiment with this new technique for a moderate investment. It is simply installed and extremely versatile. We will be pleased to send you full details.





### Another "Performance Plus Economy" Product by JKM

JKM Instrument Company is pleased to announce the introduction of "Stat," a new control unit to be used in maintaining a given pH in a reaction vessel.

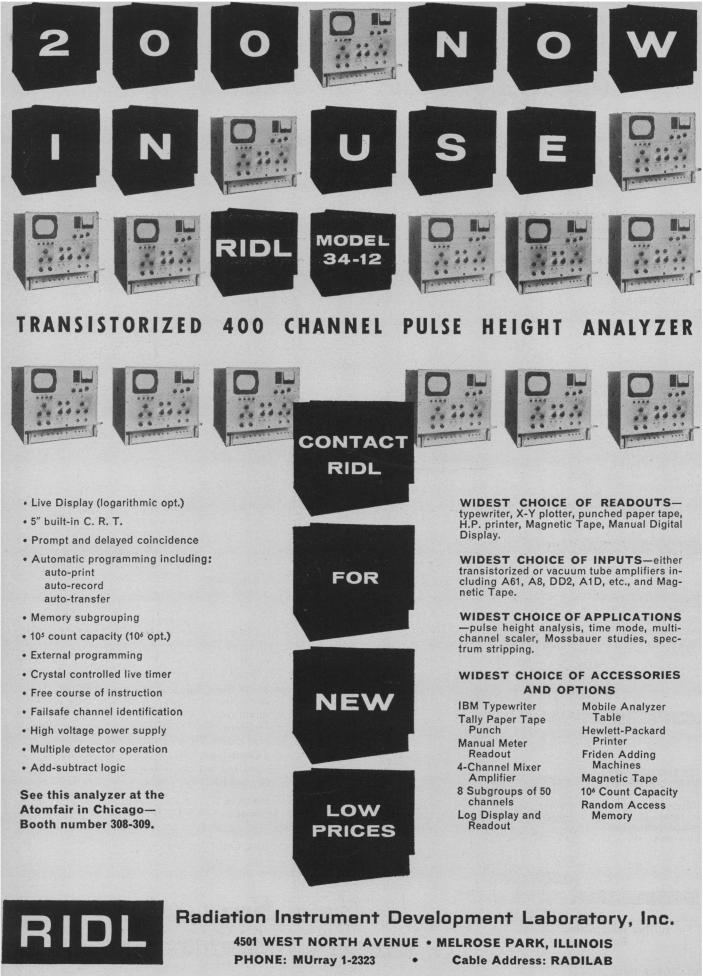
"Stat" maintains the pH level within .05 pH units and can be set at any point in the pH scale. There is virtually no dead zone since the unit has a built-in delay at the end of the equilibration to prevent overshoot. The "Stat" unit is 5" high, 12" wide, and 6" deep. "Stat" operates with any pH meter, and with any electrically controlled equilibrant addition system, such as the JKM Sample Injection Syringe.

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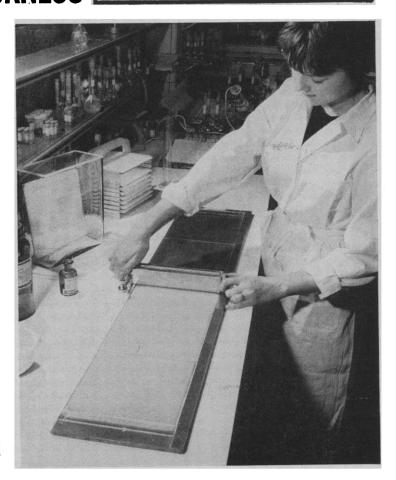
In addition to the previously offered standard applicator for TLC, already used by hundreds of laboratories in the U. S. and Canada, Desaga has now developed a variable thickness instrument — MODEL "S." By means of a micrometer screw setting any layer thickness to  $2000 \mu$ may be applied — the only applicator available which permits the selection and reproduction of a specific layer thickness. This feature not only increases the versatility of the equipment but permits its use with ordinary (high quality) window glass.

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- 3) The possibility of using highly aggressive (corrosive) sprays.
- 4) The simplicity of the technique and the limited financial investment necessary for its introduction.

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20 OCTOBER 1961



\* Mixing time required for one typical laboratory procedure reduced from 20 minutes to 11 seconds!

1111



#### ANALYTICAL and PREPARATIVE METHODS of SEPARATION GEL ELECTROPHORESIS

Electrophoresis on gel supporting media affords much improved resolution in comparison with paper-strip or free-solution electrophoresis. As many as 24 distinctlyseparated components can be obtained from serum samples. Altho equally suitable for micro quantities, gel electrophoresis also accepts much larger quantities making it a practical method for preparative separations on a semi-micro scale; up to 200 mg of protein mixture can be separated on one gel slab. If directcontact cooling of the gel slab is employed, complete serum protein patterns can be obtained in less than two hours, showing better resolution than a 20-hour pattern on paper electrophoresis.

The gel material used as supporting medium may be hydrolyzed starch, agar, or the synthetic polyacrylamide Cyanogum (Reg. American Cyanamid Co.). Each of these media gives a different type of resolution, and in many problems it will be advantageous to employ all three concurrently or successively; the procedure then becomes analogous to two-dimensional chromatography. Migration thru a gel slab in the horizontal position introduces undesirable gravitational-convection effects in the migrating zone; therefore, a vertical gel slab is preferable, providing that a proper supporting apparatus is available.

### COUNTERCURRENT DISTRIBUTION

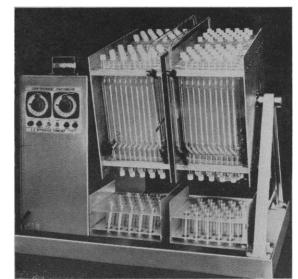
Counter-current extraction is a method of analyzing or separating the components of a mixture by dissolving in one phase of a two-phase solvent system, and extracting it with the other phase. This effects a rela-tive separation of the components accord-ing to the distribution co-efficients of each. Repeating the extraction many times in a systemic manner multiplies the effects of even small differences in distribution coefficients, so that closely similar substances can be separated. The separated volumes may be analyzed by any applicable method, preferably one which gives the total quan-tity of solute in each volume. Thus the total volume of solvent may be titrated when dealing with a mixture of acids. The most generally applicable when non-volamost generally applicable, when non-vola-tile solutes are concerned, is the determination of the weight of solute in each fraction. It should be noted, however, that macro quantities of material are not required. Extremely low concentrations may be used, which may be far below those required for weight determinations. Necessary, course, are sensitive analytical methods, such as color reactions or ultraviolet absorp-tion. With such methods, counter-current extraction can analyze quantities as small as those in any other analysis. Results using low concentrations may be even more ac-curate than those with high concentrations owing to a closer approach to the laws of ideal solutions from which the following equations are derived. Counter-current extraction follows very exactly the Distribution Law

$$Ki = \frac{(i)}{(i)}$$

(1) 2 where  $K_1$  is a constant characteristic of the compound i; (i), and (i)<sub>2</sub> are the concentrations of compound i at equilibrium in phase 1 and phase 2 of the solvent system. This fact allows a very mathematical analysis of the quantitative results obtained in counter-current extraction, and permits the direct comparison of experimental and theoretical results.

#### 20 OCTOBER 1961

### COUNTERCURRENT FRACTIONATOR

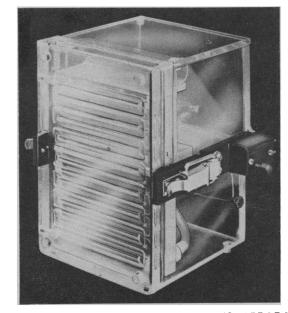


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The Apparatus was designed by Dr. John R. E. Hoover to meet official U.S.P. requirements, and offers the following outstanding features:

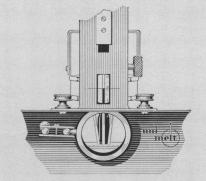
- **Safety.** Bath enclosed in cabinet except for observation port which is shielded by the magnifier. Removal of bath automatically disconnects heater and stirrer.
- **Rapid heating and cooling.** Coiled Nichrome wire heater responds rapidly to changes in input voltage, providing rapid, lagless heat. Bath temperature can be raised rapidly to within a few degrees of the anticipated melting point, i.e., to 350°C in 6½ minutes, and then raised slowly until melting occurs. Bath can be cooled rapidly for the next determination, i.e., from 300°C to 150°C in approx. 5 minutes, by attaching compressed air line.

Capillary Vibrator. Recessed in top of housing. Shakes capillaries thoroughly, insuring uniform packing of sample.

Both the Thermometer Illuminator and Periscopic Thermometer Reader are available for attachment to the basic instrument. The Reader presents a magnified scale image in a window just above the sample observation port. Fusion of sample can be observed and melting temperature noted without raising the head. Thermometer meniscus can be followed by turning knob at right. 6406-H. Melting Point Apparatus, Hoover "Uni-Melt," with armored ther-

The group of the second second

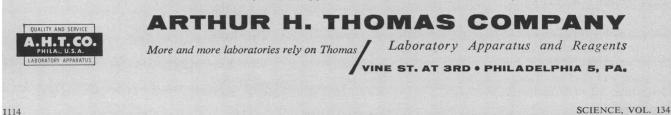
6406-M. Hoover Melting Point Apparatus, complete with Periscopic Reader and Thermometer Illuminator



Enlarged field of view when using Periscopic Reader

Accessories (For attachment to instruments already in use)

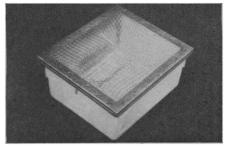
For more detailed description, see pp 624-625 of our new 1961 catalog.



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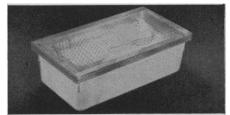
### added to the line that stands by itself

The New Disposable Econo-Cage #21, Pictured Above, Brings To Animal Care A Rigid Plastic Disposable Cage That Spells Real Economy. It Stands By Itself Requiring No Expensive Supports That Prevent Full Visibility. Designed Primarily For Mice, The Cage Is  $11\frac{1}{2}$ " X  $7\frac{1}{2}$ " X 5" Deep. The Floor Area Of 84 Square Inches Will Adequately House Up To 12 Mice. All 20 Series Lids Fit The New Disposable Econo-Cage #21.



ECONO-CAGE #50 SERIES

The new 50 Series Econo-Cages and lids are designed for Hamsters or rats. Dimensions are 12% " X 14% " X 6%" deep with room for 11 adult Hamsters per cage. The cages are available in clear Acrylonitrile-Styrene Copolymer-Econo-Cage #53, Linear Polyethylene -Econo-Cage #54 and Polypropylene-Econo-Cage #55. All 50 Series lids fit interchangeably on 50 Series cages.



### ECONO-CAGE #40 SERIES

Number 40 Series cages can be used interchangeably for Hamsters and/or rats. #43 is made of clear Acrilonitrile-Styrene-Copolymer, #44 of Linear Polyethylene and #45 of translucent Polypropylene. All 40 Series lids are standard 20 OCTOBER 1961  $\frac{1}{2}$ " mesh designed for rat housing and fit interchangeably on all 40 Series cages. All 30 Series lids also fit all 40 Series cages but have the  $\frac{5}{16}$ " for mice.



ECONO-CAGE #30 SERIES

Number 30 Series cages are designed as breeding and holding cages for mice. The over-all dimensions are  $19" \times 10^{1/2}"$  $\times 5^{1/8}"$  deep. Cage #32 is made of fiberglass, reinforced by plastic. Cage #33 is made of clear Acrylonitrile-Styrene Copolymer. Cage #34 is made of linear high density Polyethylene. Cage #35 is made of Polypropylene. All 30 Series lids are interchangeable on 30 Series cages.

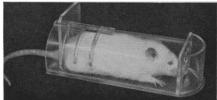


ECONO-CAGE #20 SERIES

Econo-Cages in the 20 Series are designed primarily for mice. Over-all dimensions of the cages are 111/2" X  $7\frac{1}{2}$ " X 5". This cage is used for housing animals during experimentation and also as a one-to-one and two-to-one breeding cage. The cages are available in Polvstyrene - new disposable Econo-Cage #21, Fiberglass, reinforced plastic -Econo-Cage #22, clear Styrene-Acrylonitrile Copolymer - Econo-Cage #23, transculent Linear Polyethylene-Econo-Cage #24, autoclavable Polypropylene-Econo-Cage #25 and Polycarbonate Resin-Econo-Cage #27. All 20 Series lids are interchangeable on 20 Series cages.



**GENERAL PURPOSE ECONO-CAGE** #12 Over-all dimensions of the Econo-Cage general purpose unit are  $11\frac{1}{2}$ " X 8" X 6" deep. This cage is designed especially for laboratories with changing animal use requirements. It can be used to house mice, Hamsters, rats and guinea pigs. Because of its versatility, it is ideal in teaching situations. The cage is available with or without windows. It is made of fiberglass reinforced polyester plastic. All #12 lids can be used on General Purpose Cage #12.



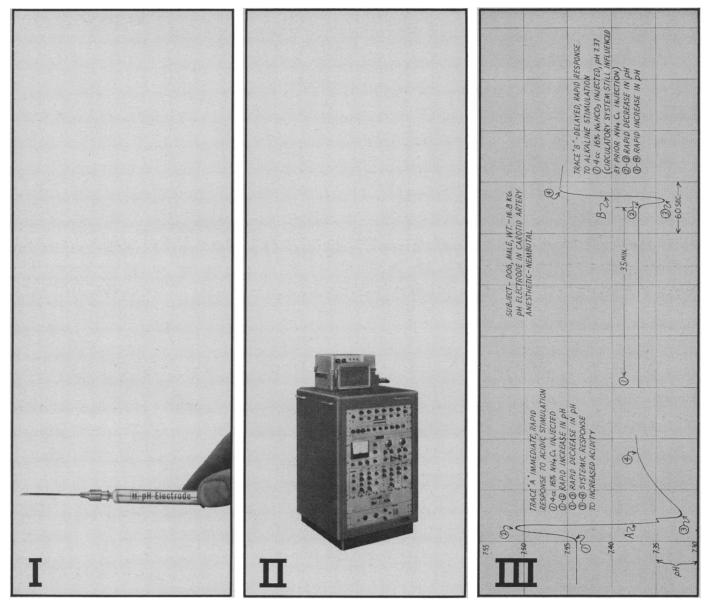
ECONO-RESTRAINING CAGES #90 SERIES

The small Restraining Cage #88 can be varied from 2" to  $3\frac{1}{2}$ " in length and is  $1\frac{1}{4}$ " wide. Econo-Cage #90 can be varied from  $4\frac{1}{2}$ " to 6" in length and is  $2\frac{1}{2}$ " wide. Econo-Cage #91 can be varied from 5" to 7" in length and is 3" wide. All these units can be cleaned chemically or with hot water. They are not autoclavable.

FOR MORE INFORMATION ABOUT THE LINE THAT STANDS BY ITSELF, write:



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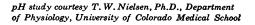
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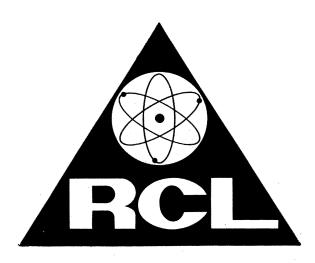
The pH record (III) is produced immediately (and simultaneously with contemporary data) on a direct-writing Honeywell multi-channel Visicorder oscillograph. Other Honeywell recorders, digital print-out devices, tape recorders, and automatic data reduction equipment are available for incorporation into any Honeywell Electronic Medical System.

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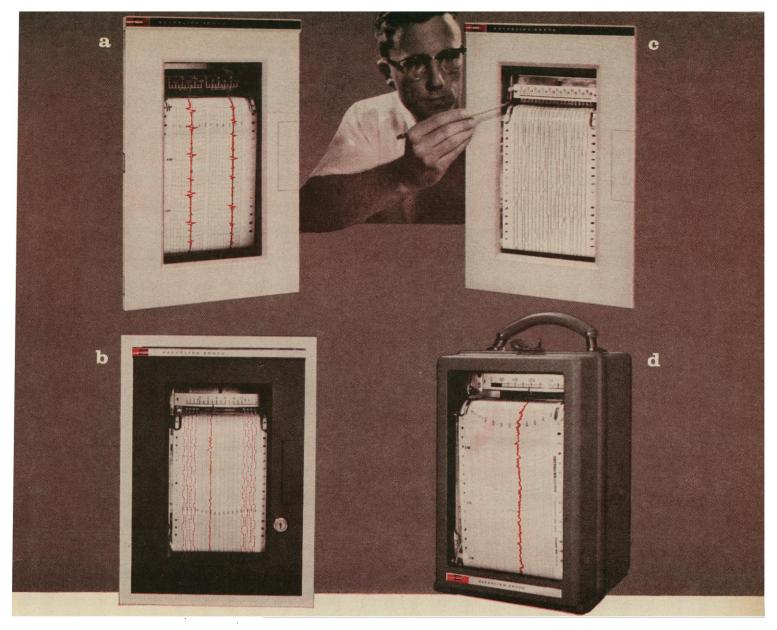
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**C** New "620" Event Recorder with Tempen • Writes without ink, using electrically-heated styluses. Simultaneously records "when," "how long" and "how many" on as many as 20 channels. Applications: productive and nonproductive time of any or all machines in a plant, circuit breaker action, qualitative analysis, missile performance.

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### **GET YOUR ADVANCE COPY** of the General Program of the AAAS Denver Meeting by first class mail – early in December

The General Program of the 128th Meeting of the AAAS in Denver, 26–31 December 1961, will be available to you, at cost, within the first week in December—whether you can attend the Meeting or not.

#### **Program Content**

- 1. The two-session AAAS General Sessions, "Moving Frontiers of Science," Part I-Speakers: Howard A. Meyerhoff and Arthur R. von Hippel; Harrison Brown, presiding. Part II-Speakers: Halton C. Arp and E. W. Fager; Harrison Brown, presiding.
- 2. The 29th John Wesley Powell Memorial Lecture. Speaker: Glenn T. Seaborg; Paul M. Gross, presiding.
- 3. On "AAAS Day," the four broad, interdisciplinary symposia-Physics of the Upper Atmosphere; Geochemical Evolution-The First Five Billion Years; Existing Levels of Radioactivity in Man and His Environment; and Water and Climate-arranged by AAAS Sections jointly.
- 4. The Special Sessions: AAAS Presidential Address and Reception; Joint Address of Sigma Xi and Phi Beta Kappa by Harrison Brown; the Tau Beta Phi Address by John A. Logan; National Geographic Society Illustrated Lecture; and the second George Sarton Memorial Lecture by Joseph Kaplan.
- 5. The programs of all 18 AAAS Sections (specialized symposia and contributed papers).
- 6. The programs of the national meetings of the American Astronomical Society, American Society of Criminology, American Nature Study Society, American Society of Naturalists, American Society of Zoologists,

Beta Beta Beta Biological Society, Biometric Society (WNAR), National Association of Biology Teachers, Scientific Research Society of America, Society for General Systems Research, Society of Protozoologists, Society of Systematic Zoology, and the Society of the Sigma Xi.

- 7. The multi-sessioned special programs of the American Astronautical Society (Hugh L. Dryden as dinner speaker), American Physiological Society, American Psychiatric Association, Association of American Geographers, Ecological Society of America, National Science Teachers Association, National Speleological Society - and still others, a total of some 70 to 80 participating organizations.
- 8. The sessions of the Academy Conference, the Conference on Scientific Communication, and the Conference on Scientific Manpower.
- 9. The sessions of the AAAS Cooperative Committee on the Teaching of Science and Mathematics, of the AAAS Committee on Science in the Promotion of Human Welfare.
- 10. Titles of the latest foreign and domestic scientific films to be shown in the AAAS Science Theatre.
- 11. Exhibitors in the 1961 Annual Exposition of Science and Industry and descriptions of their exhibits.

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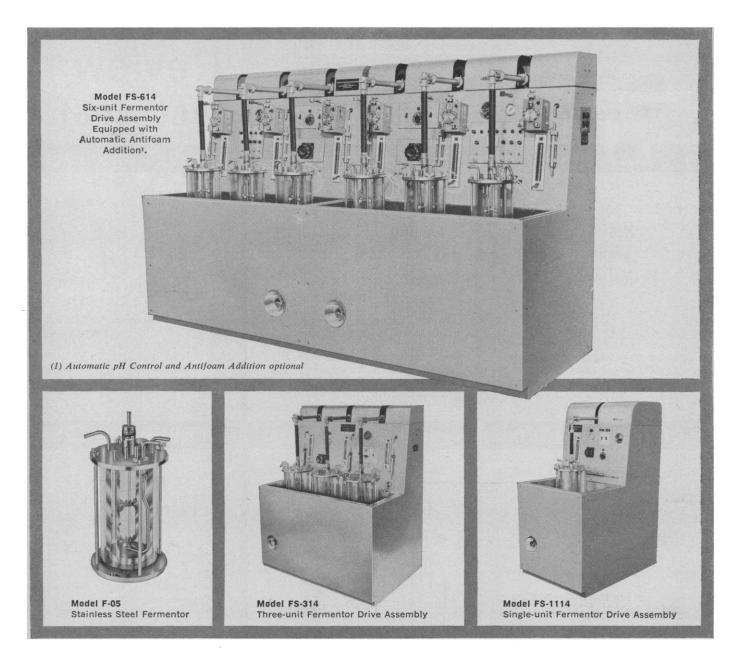
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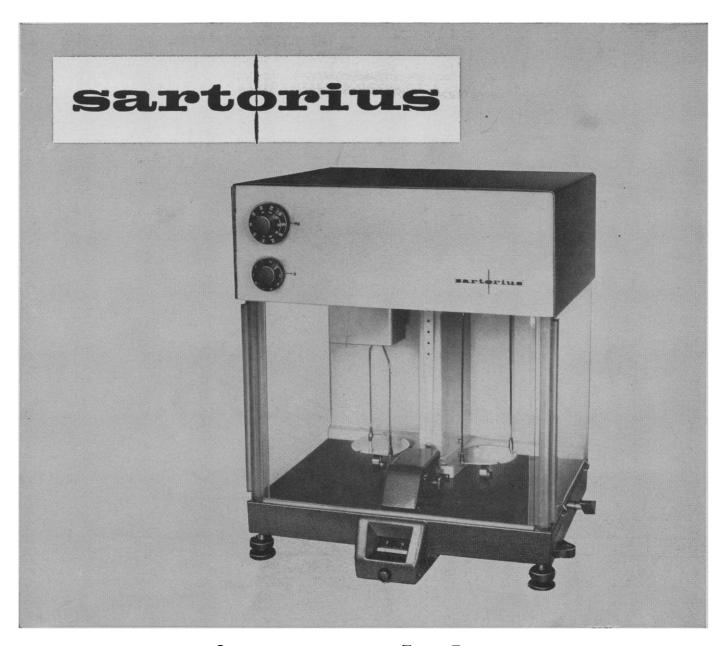
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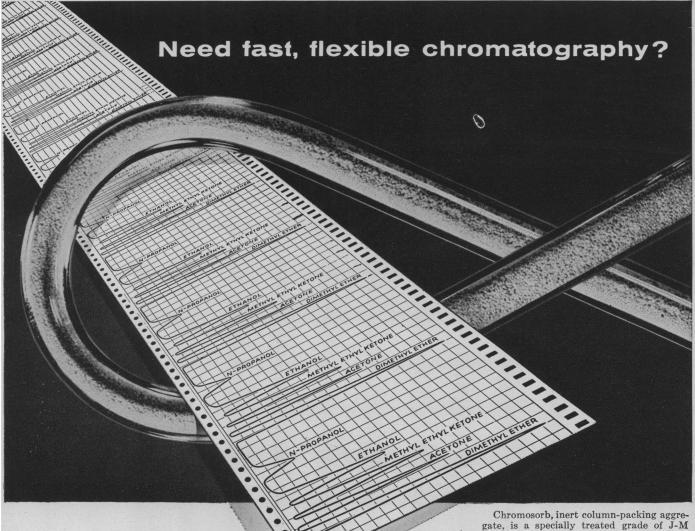
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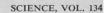
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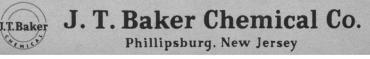
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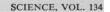
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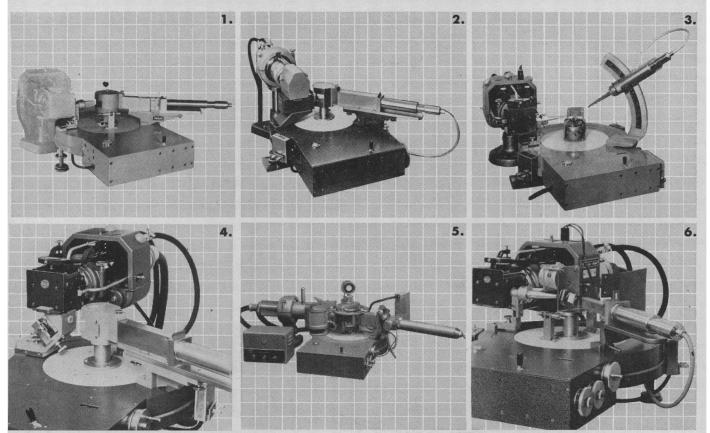
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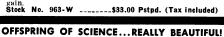
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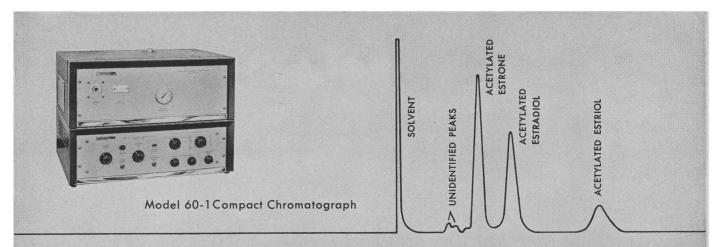
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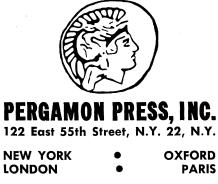
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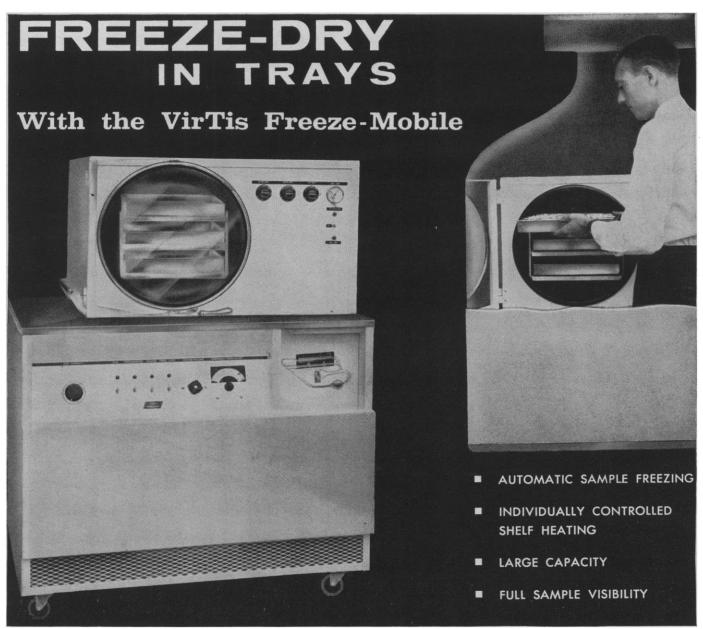
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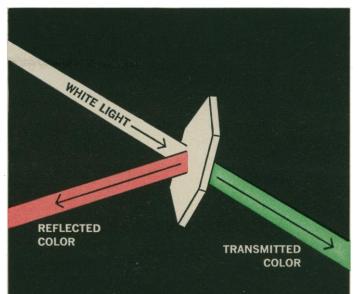
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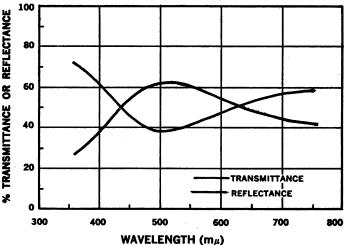


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BD	RED	GREEN
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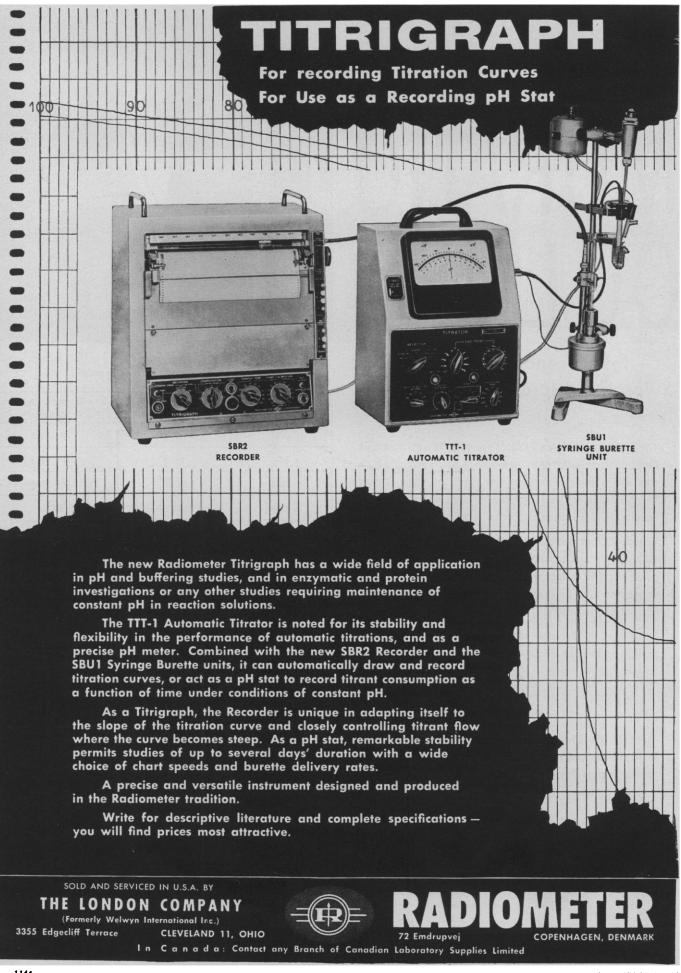


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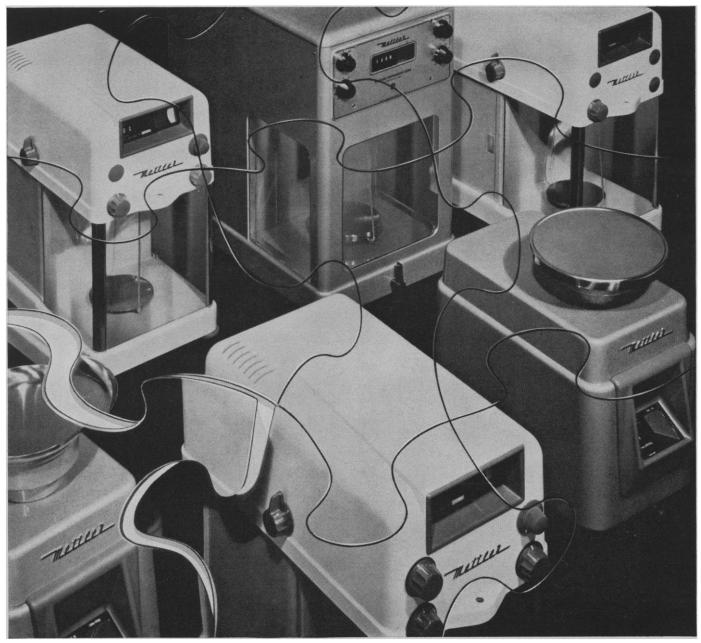
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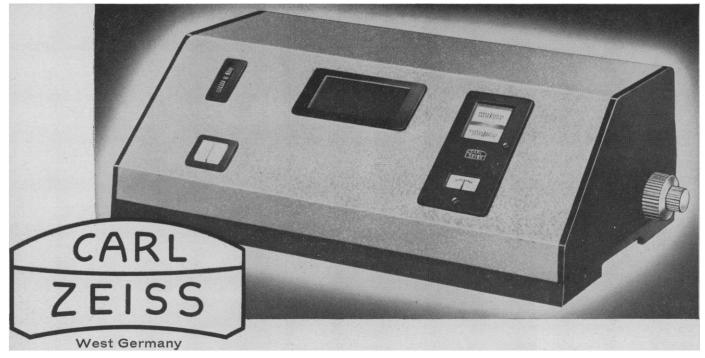
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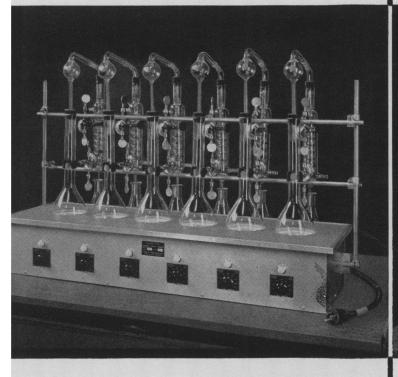
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1146

# **Two new** heating mantles from Glas-Col



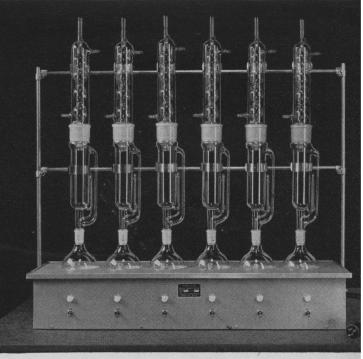
# **Kjeldahl Heating Mantle**

Heat input for each unit can be individually controlled. The mantle has rugged 3-wire cord with one wire grounded to metal housing. Since wattage requirements for distilled aqueous solutions are high, the heating mantles are made from quartz fabric for safe, dependable operation.

# SPECIFICATIONS

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Catalog No. KJ-500 Size of flask
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OCTOBER 1961

The new Soxhlet and Kjeldahl heating mantles are by-products of years of Glas-Col research in the development of safe, dependable heating equipment for pilot plant and laboratory use. Nothing has been overlooked for the safe operation of this equipment. Both new units have a beautiful anodized aluminum housing which holds six flasks. Tops are made of a resilient cork-like material to help prevent accidental mechanical flask breakage. Heating units can be individually replaced, if severely damaged by spillage of chemicals, at reasonable cost.



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### SPECIFICATIONS

Catalog No. SOX-500	
Size of flask	
Power per unit2	50 watts, 115 volts
Price	\$285.00
Replacement heating elements	\$9.50 each

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World's largest manufacturer of heating mantles for laboratory, pilot plant, and production applications.

U. S. Patents . . 2,282,078 . . 2,739,220 . . 2,231,506 . . and 2,739,221

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The hotels for the AAAS Denver meeting have established special, low rates and have reserved appropriately large blocks of rooms for this meeting. Thus everyone making room reservations for the AAAS meeting is assured substantial savings.

The list of hotels and the reservation coupons below are for your convenience in making your hotel reservation in Denver. Please send your application, *not* to any hotel directly, but to the AAAS Housing Bureau in Denver and thereby avoid delay and confusion. The experienced Housing Bureau will make assignments promptly; a confirmation will be sent you in two weeks or less.

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# AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE

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Rates for Rooms with Bath*							
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\* All rooms are subject to a 2% Colorado State sales tax.

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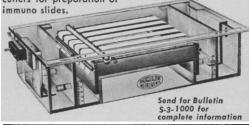
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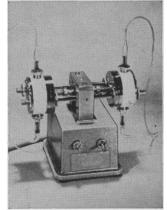
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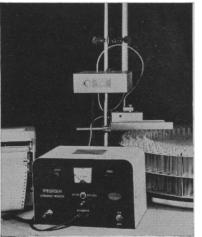
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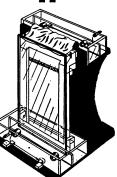
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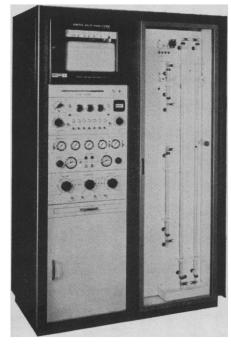
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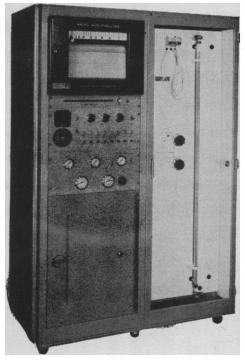
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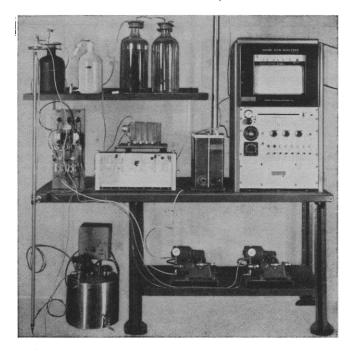
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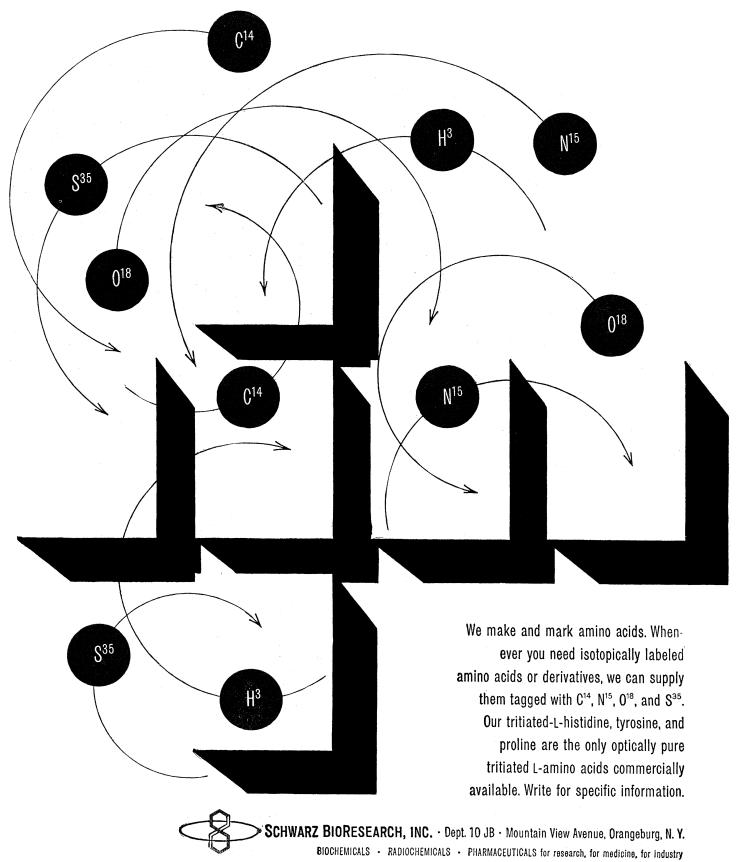


# MODEL VG-6000-B

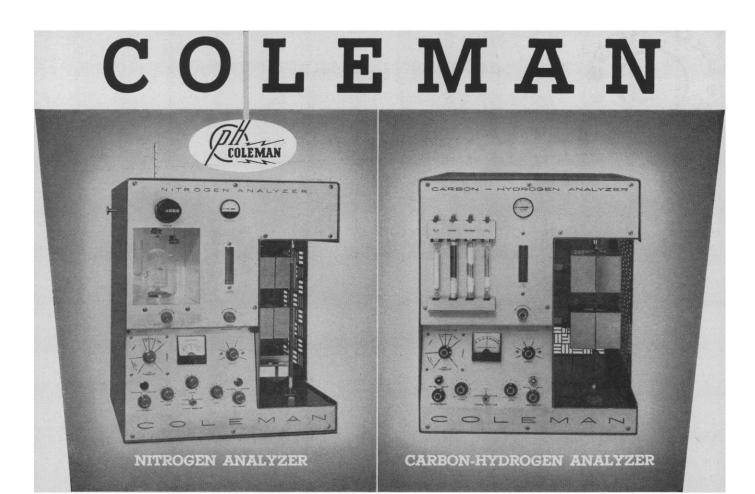
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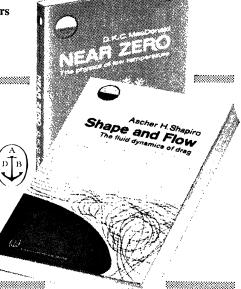
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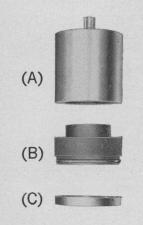
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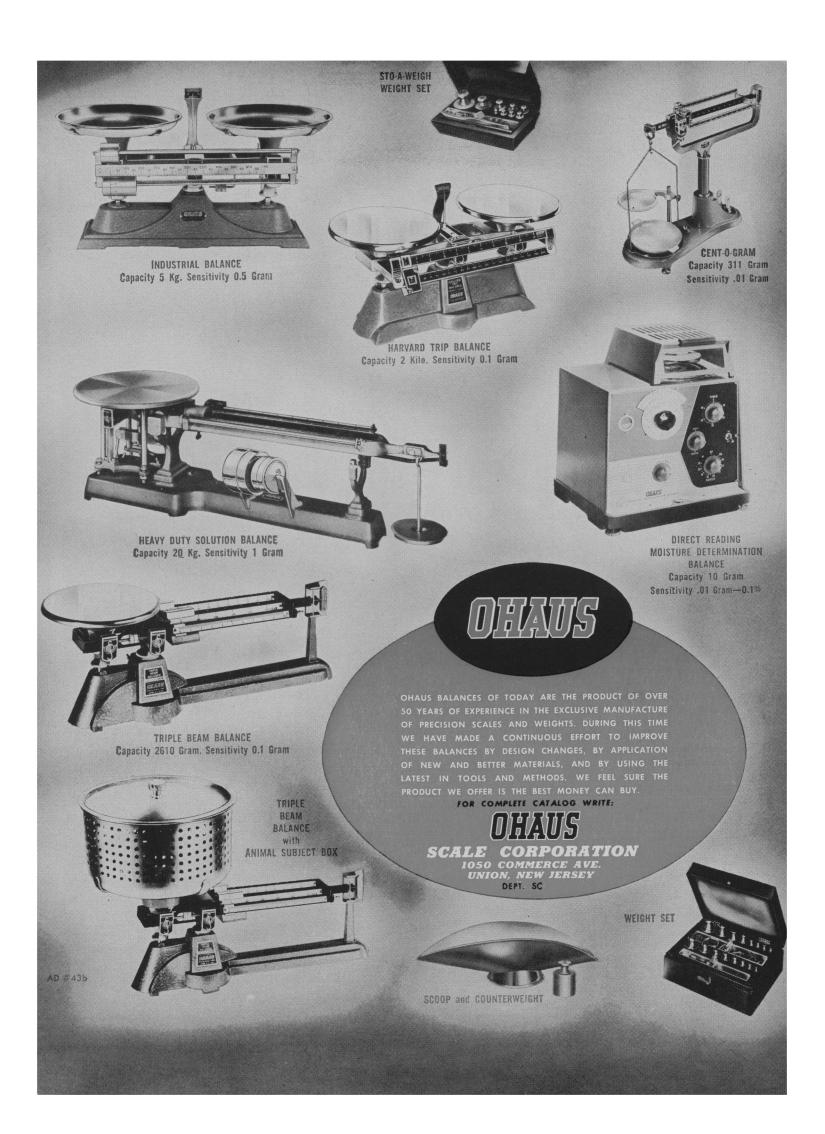
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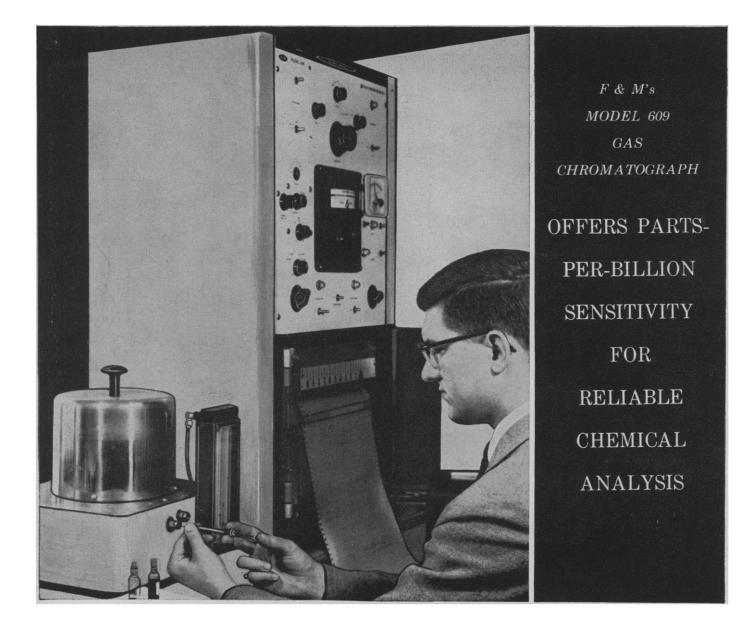
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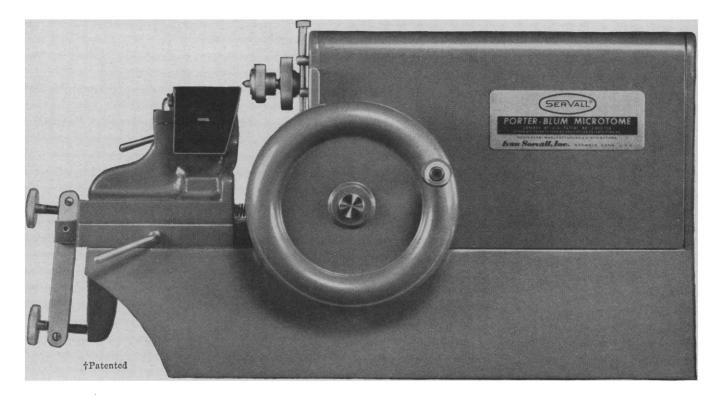
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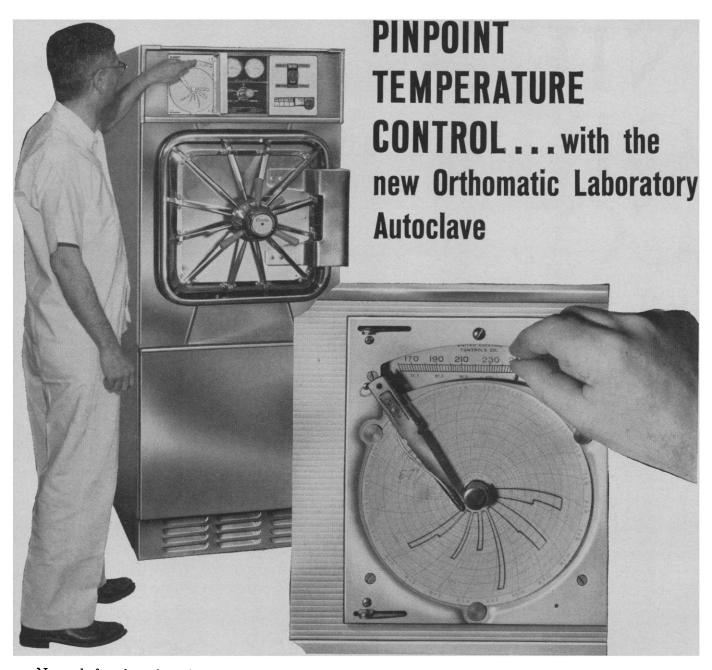
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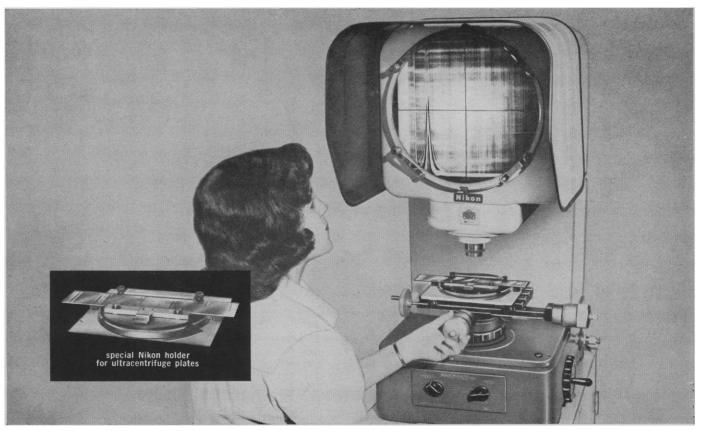
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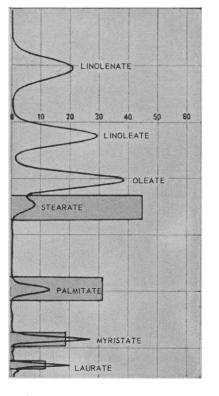
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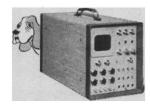


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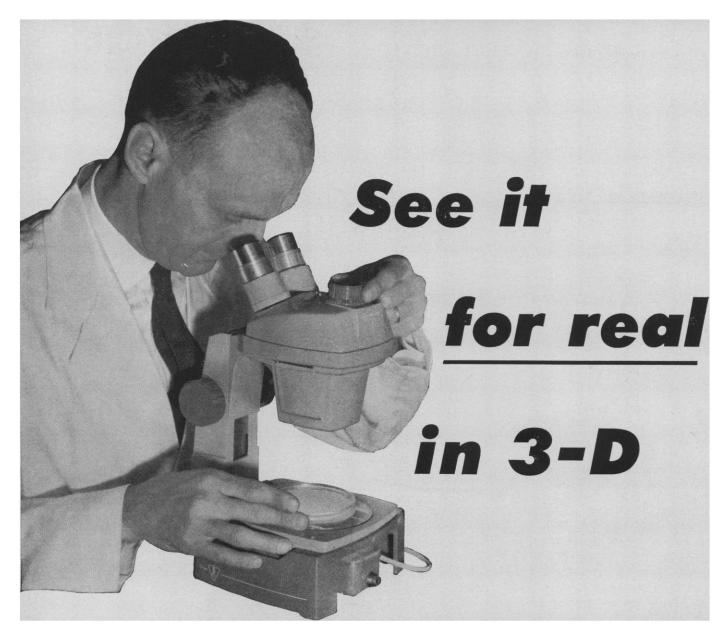
# The Other Fellows' Ball Park

There is an old saying that when one goes to play ball in the other fellows' ball park, it is incumbent upon him to learn the others' ground rules. There is no use protesting about these rules or asking that they be altered. The reasonable course is to find out what they are and proceed accordingly.

In the same way, the scientist entering into the affairs of government, and into the political arena, has the duty-if he is to be fully effectiveto find out how men in this arena actually function. It is not sufficient for him to criticize their methods, and it is fatal if he take the point of view that he is now in a section of society which is governed by rules less ethical or less advanced than his own. We live under a democratic system. An essential feature of this system is the means by which men acquire and maintain political position and authority. These means involve a thorough understanding of human nature and of mass reactions. Many men in political life are masters of this art. And in the large majority they are also devoted to the welfare of their country. As a result we have effective working of the democratic system as far as efficiency in government is possible. The democratic system creaks at its joints, it wastes time and money, it bases its decisions more on subtle influences than on rational logic, and it often irritates those who are accustomed to more orderly and systematized functioning. But it just happens that the democratic system with all its faults is the best system of government ever devised by the mind of man. Scientists today are privileged to participate in this whole affair to an extent never before true in this country, and it is certainly incumbent upon them to understand and indeed to sympathize with the local ground rules which govern the ball park in which they are now exercising important influence.

I have seen great damage done to the whole scientific community by the eminent scientist who, appearing before a congressional committee, made evident his general contempt for the individuals before whom he appeared, and who talked to them as he would to a group of school boys. Fortunately, in the years since the War, scientists have matured in this regard and this does not now occur.

We need now to go beyond this in our thinking. As scientists and engineers we nevertheless regard with admiration and respect the subtle functioning of a medical man in a difficult case, not relying upon the science which underlies his art, but relying upon the art itself, who rescues a patient from an obscure source of distress. We admire and respect also the artist who, knowing very little about the physics of color or of light reflections, produces a work of art that stirs emotions or revives long-forgotten memories. In the same way we need to learn to respect, in fact to admire, those individuals who are masters of the art of operating in the confused arena of the American political scene, especially when this subtle undefinable skill is joined with a broad altruism. In fact, if scientists are to have their full influence for the good of the country in the days to come, many of them will indeed need to learn to practice this difficult art.--VANNEVAR BUSH, Massachusetts Institute of Technology. (Excerpt from an address read at the 15th National Congress on the Administration of Research, San Juan, Puerto Rico, 10 Oct. 1961)



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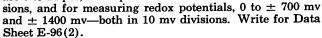
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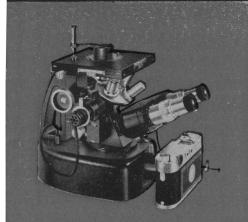
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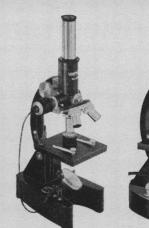
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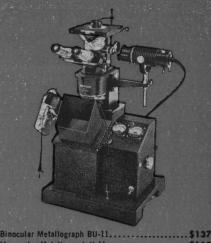




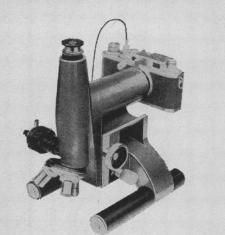
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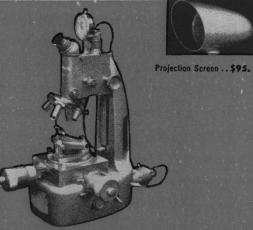
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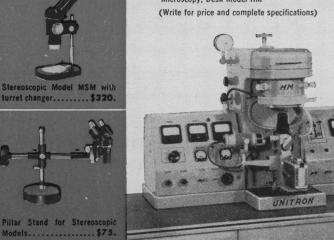
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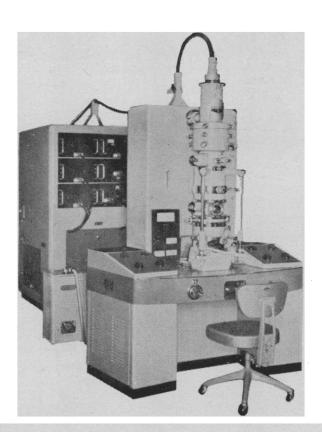
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# **HITACHI** Electron Microscopes



# featuring the new HU-11

Hitachi, Ltd. of Japan, in advance of worldwide competition, announces the successful production of the HU-11, the latest in electron microscopes.

The new HU-11 is an enlarged, high efficiency electron microscope, guaranteed 8-10 Angstrom Unit resolution, capable of probing the very basic structure of matter. This is possible in the HU-11 because it is equipped with a chromatic aberration compensating lens system, a development uniquely Hitachi.

Other improvements include an enlarged specimen chamber facilitating handling of accessories, an exhaust system trap reducing contamination to a minimum (therefore eliminating the need to disassemble the column), increased exposure area of photography permitting recording of high resolution diffraction rays.

# ... and presenting the HS-6

Hitachi's outstanding HS-6, the permanent magnet electron microscope, is equipped with four lenses (condenser, objective, intermediary, projection) with a resolving power reaching 25 A.U. upwards and ensures an electron optical magnification continuously changeable from 2,000x to 20,000x.

The HS-6 is proving itself doubly invaluable photographically as an electron diffraction camera using an additional specimen stage and as the so-called "selected area" diffraction camera. (Camera chamber is loaded with 18 cassettes permitting 36 successive exposures.)

Simplicity of operation, mechanics and circuitry make the HS-6 the ideal instrument for researchers in the most sensitive medical and biological fields.



5-6

For more detailed information get in touch with ERB & GRAY SCIENTIFIC, INC. 854 S. Figueroa St., Los Angeles 17, Calif. Solution State State

# Kodak reports on:

how a clever fellow can cheat himself ... f/1 lenses for 4.25  $\mu$  to 10  $\mu$  ... encouragement from Agnes Scott College



## **Mighty magnification**

Forty bucks for a few rings and rods to put over the front of the new Kodak Retina Reflex III Camera ?\*

A mite under, actually, at the camera shop. Also includes an auxiliary lens. All nicely fitted together. Called the Kodak Retina 1:1 Copying Kit. Switch the f/2.8 lens from the camera to the kit, snap the kit onto the camera, attach the auxiliary lens and the camera's lens hood, set the diaphragm between f/11 and f/22 and the distance scale at 5 feet. Snap, swish—just like that. Make pictures. Anything in the plane of the rectangular opening is focussed on the film same size. Depth of field at f/22 is 5.5 mm. When resulting slide is projected, magnification is mighty and can be useful for mensuration if a calibrating scale has been included in the picture. Handy for picturing platyhelminthes, coins, microcircuitry, the triumphant crystals of a new enzyme you have isolated. Kit also includes a slide holder and diffusion screen for making your own black-and-white duplicates of color slides.

If you can make this kit yourself for less than \$40, you are too clever a fellow to be working that cheap.

### A sharp eye for infrared

The decision to announce at this time the availability of f/1*Irtran-2 Aspheric Lenses* has been reached in struggle against deeply rooted inhibitions. In the photographic film and paper trade we are habituated to a longer silence before the first blast of the trumpets. Infrared technology hates to wait, however, and puts a heavy load on the phone company's long lines.

These Irtran-2 lenses transmit usefully from  $2\mu$  to  $14\mu$ . Two focal lengths, 2-inch and 3-inch, are offered off the shelf. At f/1, we seem to have done well at providing high collecting-power for energy without undue sacrifice of sharpness. Sharpness was the goal. For both lenses, the minimum circle of confusion *computes* at less than .001" for any wavelength from  $4.25\mu$  to  $10\mu$ . The italics mark where we hurt.

Much care and a valuable ingenuity have been exercised in impressing our tenth-degree equation upon the concave side of these meniscus lenses, in grinding and polishing the spherical convex side, in placing the center of the spherical curvature on the axis of the asphere, in maintaining the

\*Most versatile 35mm camera we make. Also works with Kodak Retina Reflex S and IIIS Cameras. Kit designed for f/2.8 models only.

center thicknesses at the 9.1 mm and 10.4 mm values respectively that the calculations assume, in the optical homogeneity of the Irtran-2 material. More than this we cannot claim. To the extent that the care and ingenuity have succeeded in making the calculations represent the actuality, the circle of confusion is less than .001". The customer's willingness to take a chance that we have hit it will, in good sense, depend on how badly his project needs a  $2\mu$ -14 $\mu$  infrared image of high definition and high aperture.

To demonstrate experimentally at those wavelengths that the circle of confusion is indeed that small is a task which we have simply been too busy to complete up to the time these words were written.

In the lead sulfide region, the sharpness does not compute to be as good as farther out in the infrared. Yet we have customers who use the lenses there and are happy with confusion-circle minima as large as .008".

In comparison with reflective optics hitherto used, Irtran-2 aspheres offer compactness and a wider field that doesn't even show any appreciable deterioration as far as  $2^{\circ}$  off axis. You do give up the perfect achromatism of reflective optics. In the 2-inch lens the minimum circle of confusion for  $10\mu$  radiation is located 2 mm beyond the minimum circle of confusion for  $4.25\mu$  radiation; in the 3-inch lens the separation is 3 mm.

We have said enough to establish our frankness and to indicate whether there is any need for you to burden the long lines to Rochester, N. Y., LOcust 2-6000, Extension 5166, which is one way to reach Eastman Kodak Company, Special Products Division. Bear in mind that Irtran-2 material has a hardness of 354 Knoop, is not at all brittle, withstands thermal shock and the solvent action of water, and can get very hot without losing transparency or giving off toxic fumes.

### An isonitroso more or less

In 1958 we set out to make a certain nickel reagent we had read about. Our method failed. It hung three instead of two isonitroso groups onto a monomethylated cyclohexane ring. We meekly advertised that we had 5-Methyl-1,2,3-cyclohexanetrione Trioxime for sale as Eastman 7478 and hoped somebody would discover what *it* is a reagent for. (Some are amused by our candor in these matters.) The ad mentioned that in seeking the cause of our failure we had repeated our procedure on the unsubstituted ring and had similarly obtained 1,2,3-Cyclohexanetrione Trioxime, which we designated Eastman 7660.

The sad little sigh with which we closed the discussion spread out over the world. A friendly echo has now returned from Agnes Scott College, Decatur, Ga. Four sympathetic chemists there startle us by reporting that Eastman 7660 forms a very stable and spectrophotometrically convenient complex with cobalt at an optimum concentration range of 1 to 4 p.p.m.

Reading this (*Anal. Chem. 33*, 1096), we checked to make sure old 7660 was still there and were again astonished to find that the original batch had sold down to inventory minimum! We now have a new batch, a free abstract of the cobalt determination, and a feeling that purposeful planning serves chiefly to comfort the soul.

Nevertheless, List No. 42 of some 3900 Eastman Organic Chemicals we stock can serve some useful purpose in planning. For a copy or for the cobalt determination abstract, write Distillation Products Industries, Rochester 3, N. Y. (Division of Eastman Kodak Company).

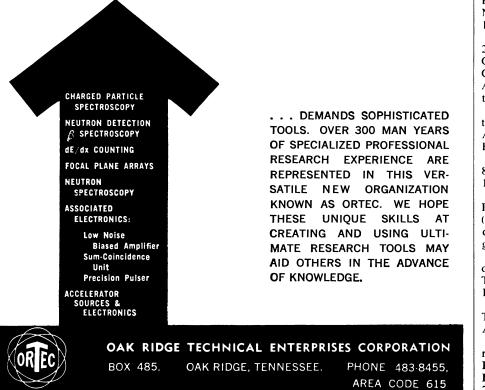
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20 OCTOBER 1961



# THE UPWARD THRUST OF RESEARCH . . .



# Meetings

# Forthcoming Events

#### November

6-8. Chemical Engineering Div., Chemcal Inst. of Canada, Toronto, Ont. (CIC. 48 Rideau St., Ottawa 2, Ont.)

6-9. Atomic Industrial Forum-9th Hot Laboratories and Equipment Conf., Chicago. III. (O. J. Du Temple, American Nuclear Soc., 86 East Randolph St., Chicago)

8. American Acad. of Arts and Sciences. Brookline, Mass. (J. L. Oncley, 280 Newton St., Brookline 46)

8-11. Acoustical Soc. of America. Cincinnati, Ohio. (W. Waterfall, American Inst. of Physics, 335 E. 45 St., New York 17)

8-11. Institute of Management Sciences. San Francisco, Calif. (W. Smith, Inst. of Science & Technology, Univ. of Michigan. Ann Arbor)

8-11. Plasma Physics. American Physical Soc., 3rd annual, Colorado Springs. Colo. (F. Ribe, Los Alamos Scientific Laboratory, P.O. Box 1663, Los Alamos, N.M.)

9-10. Operations Research Soc. of America, 20th, San Francisco, Calif. (P. Stillson, 115 Grove Lane, Walnut Creek. Calif.)

9-11. Gerontological Soc., Pittsburgh. Pa. (R. W. Kleemeier, Washington Univ.. Skinker and Lindell. St. Louis 30, Mo.)

9-12. Pacific Coast Fertility Soc., Palm Springs, Calif. (G. Smith, 909 Hyde St., San Francisco 9, Calif.)

9-20. Photography, Cinematography, and Optics, 3rd intern. biennial, Paris, France. (Comité Français des Expositions, 15 rue de Bellechasse, Paris 7)

12-17. Bahamas Conf. on Medical and Biological Problems in Space Flight, Nassau, Bahamas. (I. M. Wechsler, P.O. Box 1454, Nassau)

13-14. Exploding Wire Phenomenon, 2nd intern. conf., Boston, Mass. (W. G. Chace, Thermal Radiation Laboratory, CRZCM, Geophysics Research Directorate, Air Force Cambridge Research Laboratories. Bedford, Mass.)

13-16. Magnetism and Magnetic Materials, 7th annual intern. conf., Phoenix, Ariz. (P. B. Myers, Motorola, Inc., 5005 E. McDowell Rd., Phoenix 10)

13-17. American Public Health Assoc.. 89th annual, New York, N.Y. (APHA, 1790 Broadway, New York)

13-17. Gulf and Caribbean Fisheries Inst., 14th annual, Miami Beach, Fla. (J. B. Higman, Marine Laboratory, Univ. of Miami, 1 Rickenbacker Causeway, Virginia Key, Miami 49)

13-18. European Conf. on the Control of Communicable Eye Diseases, Istanbul, Turkey. (World Health Organization, Palais des Nations, Geneva, Switzerland)

14–16. American Meteorological Soc., Tallahassee, Fla. (Executive Secretary, AMS, 45 Beacon St., Boston 8, Mass.)

14-17. Corrosion in Nuclear Technology, symp., Paris, France. (European Federation of Corrosion, Société de Chimie Industrielle, 28 rue St. Dominique, Paris 7°)

14-18. Puerto Rico Medical Assoc., Santurce. (J. A. Sanchez, P.O. Box 9111, Santurce)

15-17. Eastern Analytical Symp., New York, N.Y. (A. Rekus, EAS, Research Dept., Baltimore Gas & Electric Co., Pratt St., Baltimore, Md.)

15-18. Society of Naval Architects and Marine Engineers, annual, New York, N.Y. (W. N. Landers, SNAME, 74 Trinity Pl., New York 6)

16-18. American Psychiatric Assoc., Milwaukee, Wis. (J. D. McGucken, 756 N. Milwaukee St., Milwaukee 2)

16-18. Etiology of Myocardial Infarction, intern. symp. (by invitation), Detroit, Mich. (T. N. James, Section on Cardiovascular Research, Henry Ford Hospital, Detroit)

16-18. Southern Thoracic Surgical Assoc., Memphis, Tenn. (H. H. Seiler, 517 Bayshore, Blvd., Tampa 6, Fla.)

16-19. American Anthropological Assoc., Philadelphia, Pa. (S. T. Boggs, 1530 P St., NW, Washington, D.C.)

17-18. Southern Soc. for Pediatric Research, Atlanta, Ga. (W. G. Thurman, Dept. of Pediatrics, Emory Univ. School of Medicine, Atlanta)

17-31. National Soc. for Crippled Children and Adults, annual conv., Denver, Colo. (NSCCA, 2023 W. Ogden Ave., Chicago 12, Ill.)

19-22. International College of Surgeons, Western regional, San Francisco, Calif. (W. F. James, 1516 Lake Shore Drive, Chicago 10, Ill.)

22–27. Automation and Instrumentation, 5th conf., Milan, Italy. (Federezione delle Societa Scientifiche e Techniche di Milano, via S. Tomaso 3, Milan)

22-1. Radioisotopes in Animal Biology and the Medical Sciences, conf., Mexico City, D.F. (International Atomic Energy Agency, 11 Kärntner Ring, Vienna 1, Austria)

23-25. Central Assoc. of Science and Mathematics Teachers, Chicago, Ill. (J. Kennedy, Indiana State Teachers College, Terre Haute)

24–25. American Soc. of Animal Production, Chicago, Ill. (C. E. Terrill, Animal Husbandry Research Div., U.S. Dept. of Agriculture, Beltsville, Md.)

24–25. National Council for Geographic Education, Philadelphia, Pa. (L. Kennamer, Dept. of Geography, Univ. of Texas, Austin)

25-26. American College of Chest Physicians, annual interim session, Denver, Colo. (M. Kornfeld, ACCP, 112 E. Chestnut St., Chicago 11, Ill.)

26. Medical Aspects of Sports, 3rd natl. conf., Denver, Colo. (F. V. Hein, AMA Committee on the Medical Aspects of Sports, 535 N. Dearborn St., Chicago 10, Ill.)

26-1. American Soc. of Mechanical Engineers, winter, New York, N.Y. (L. S. Dennegar, ASME, 29 W. 39 St., New York, N.Y.)

26-1. Radiological Soc. of North America, annual, Chicago, Ill. (R. P. Barden, 713 E. Genesee St., Syracuse 2, N.Y.)

27–28. Agricultural Meteorology, 4th conf., St. Louis, Mo. (K. C. Spengler, American Meteorological Soc., 45 Beacon St., Boston 8, Mass.)

27-29. American Soc. of Hematology,





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Manufactured under exclusive license of the French patents, the instrument consists of a manipulator and receiver. Use with any microscope . . . arranged for right or left hand operation. The microtool is mounted on the receiver; impulses from the manipulator are transmitted to the tool through sensitive pneumatic membranes. Within a range of 3 mm, the micro-instrument may be moved in any plane or angle by a single control. Ratio of displacement of control lever and micro-tool may be adjusted from 1:50 to 1:2500.

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annual, Los Angeles, Calif. (J. W. Rebuck, ASH, Henry Ford Hospital, Detroit 2, Mich.)

27-30. American Medical Assoc., Denver, Colo. (F. J. L. Blasingame, 535 N. Dearborn, Chicago 10, Ill.)

27-30. American Soc. of Agronomy, jointly with Crop Soc. of America, Council on Fertilizer Application, and Soil Science Soc. of America, St. Louis, Mo.

(ASA, 2702 Monroe St., Madison, Wis.) 27-30. Entomological Soc. of America, Miami, Fla. (R. H. Nelson, 4603 Calvert Rd., College Park, Md.)

29-1. Communication Wires and Cables, symp., Asbury Park, N.J. (H. Kingsley, U.S. Army Research and Development Laboratory, Fort Monmouth, N.J.) 29–1. Western Surgical Assoc., San

Francisco, Calif. (W. W. Carroll, 700 N. Michigan Ave., Chicago 11, Ill.)

30. American Geographical Soc., New York, N.Y. (C. W. Bastable, Columbia Univ., New York 27)

30-1. Conference on Graduate Medical Education, Philadelphia, Pa. (P. Nemir, Jr., Dean, Graduate School of Medicine, Univ. of Pennsylvania, Philadelphia)

30-1. Vehicular Communications, Minneapolis, Minn. (J. Kahnke, Minneapolis-Honeywell, Aero Div., 1541 Edgewater Ave., St. Paul 13, Minn.)

30-2. Purest Substances in Science and Technology, intern. symp., Dresden, Germany. (Sekretariat, Chemische Gesellschaft in der Deutschen Demokratischen Republik, Unter den Linden 68/70, Berlin W.8, Germany)

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1. Symposium on Insulin, New York Diabetes Assoc., New York, N.Y. (New York Diabetes Assoc., 104 E. 40 St., New York 16)

1-2. Linguistic Circle of New York, 7th annual conf., New York, N.Y. (L. Urdang, Random House, Inc., 501 Madison Ave., New York 22)

2. International College of Surgeons, intern. executive council, Chicago, Ill. (H. E. Turner, 1516 Lake Shore Dr., Chicago 11)

2. New York State Registry of Medical Technologists, annual seminar, New York, N.Y. (S. H. Keeling, 1719 Midland Ave., Syracuse, N.Y.)

2-7. American Acad. of Dermatology and Syphilology, annual, Chicago, Ill. (R. R. Kierland, Mayo Clinic, Rochester, Minn.)

3-6. American Inst. of Chemical Engineers, New York, N.Y. (F. J. Van Antwerpen, AICE, 345 E. 47 St., New York 17)

4-6. Institute of the Aerospace Sciences, Aerospace Support and Operations, natl., Orlando, Fla. (R. J. Kotowski, 318 Virginia Dr., Melbourne, Fla.)

4-8. International Colloquium on Ionic Bombardment, Bellevue, France. (Natl. Scientific Research Center, 15 Quai Anatole France, Paris 7°, France)

4-9. Mathematics Instruction at Secondary and University Levels, Inter-American conf., Bogota, Colombia. (M. Alonso, Div. of Science Development, Pan American Union, Washington 6)

4-9. World Federation of Neurology, Problem Commission of Tropical Neurology, Buenos Aires, Argentina. (P. Bailey, Natl. Inst. of Neurological Diseases and Blindness, Bethedsa, Md.) 4-16. Inter-American Conf. on Educa-

tion and Economic and Social Development, Santiago, Chile. (U.S. National Commission for UNESCO, Dept. of State, Washington 25)

4-16. Latin American Phytotechnical Meeting, 5th, Buenos Aires, Argentina. (U. C. Garcia, Organizing Committee, Rivadavia 1439, Buenos Aires)

5-7. Building Research Inst., Washington, D.C. (Scientific Liaison Office, Natl. Research Council, Sussex Dr., Ottawa, Canada)

6-7. UNESCO Intern. Non-Governmental Organizations on Extension of Intern. Collaboration in Education, Science and Culture to Africa, Paris France. (Place de Fontenoy, Paris 7°)

6-8. Electrical Furnace Steel Conf., 19th, American Inst. of Mining, Metallurgical and Petroleum Engineers, Pittsburgh, Pa. (Scientific Liaison Office, Natl. Research Council, Sussex Dr., Ottawa, Canada)

6-8. Latin-American Congr. of Pathological Anatomy, 3rd, Medellín, Colombia. (A. C. Henao, Laboratorio de Anatomía Patológica, Rua Botucatu 720, São Paulo, Brazil)

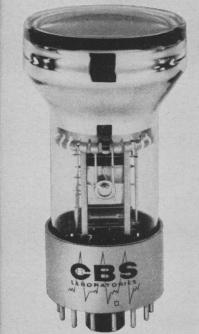
6-8. Conference on Document Copying by Photography, London, England. (A. J. O. Axford, Ozalid Co., Longston Rd., Loughton, Essex, England) 6-8. National Institutes of Health Symp.

on Neuroendocrinology, Miami, Fla. (A.



20 OCTOBER 1961

# CBS TYPE 7818 PHOTOMULTIPLIER



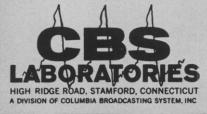
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V. Nalbandov, 102 Animal Genetics, Univ. of Illinois, Urbana)

6-12. American Acad. of Optometry, Chicago, Ill. (C. C. Koch, 1506-08 Foshay Tower, Minneapolis 2, Minn.)

6-16. Food and Agriculture Organization of the U.N. World Health Organization, Nutrition Conf. for the Far East, 5th, Hyderabad, India. (Intern. Agency Liaison Branch, Office of Director General, FAO, Viale delle Terme di Caracalla, Rome, Italy)

6-16. Food and Agriculture Organization of the U.N., Far East Meeting on Animal Production and Health, 3rd, Bangkok, Thailand. (Intern. Agency Liaison Branch, Office of Director General, FAO, Viale delle Terme di Caracalla, Rome, Italy)

7-8. Symposium on Sintered High-Temperature Oxidation-Resistant Materials, London, England. (S. C. Guilan, Powder Metallurgy Joint Group, Inst. of Metals, 17 Belgrave Sq., London)

7-9. American Chemical Soc. Southwest-Southeast regional meeting, New Orleans, La. (P. D. Accardo, California Chemical Co., Oronite Div., Belle Chasse, La.)

7-9. New York Acad. of Sciences Conf. on the Cervix, New York, N.Y. (W. R. Lang, Jefferson Medical College, Philadelphia, Pa.)

7-9. Texas Acad. of Science, Galveston. (D. E. Edmondson, Mathematics Dept., 115 Bendect Hall, Univ. of Texas, Austin 12)

8. Food and Agriculture Organization of the U.N., Advisory Group on Training in Home Economics and Social Work, Rome, Italy. (Intern. Agency Liaison Branch, Office of Director General, FAO, Viale delle Terme di Caracalla, Rome)

8-9. Symposium on Plasma Membrane, New York, N.Y. (A. P. Fishman, New York Heart Assoc., 10 Columbus Circle, New York 19)

8-9. American Rheumatism Assoc., interim session, Washington, D.C. (F. E. Demartini, 622 W. 168 St., New York 32)

8-9. Association for Research in Nervous and Mental Diseases, annual, New York, N.Y. (Scientific Liaison Office, Natl. Research Council, Sussex Dr., Ottawa, Canada)

8-10. American Psychoanalytic Assoc., New York, N.Y. (D. Beres, 151 Central Park W., New York 23)

9-10. Academy of Psychoanalysis, New York, N.Y. (J. H. Merin, 125 E. 65 St., New York 21)

10-13. American Phytopathological Soc., Biloxi, Miss. (G. A. Zentmyer, Dept. of Plant Pathology, Univ. of California, Riverside)

11-15. Agricultural and Public Health Aspects of Radioactive Contamination in Normal and Emergency Situations, technical seminar, The Hague, Netherlands. (Food and Agriculture Organization of the U.N., Intern. Agency Liaison Branch. Office of the Director General, Viale delle Terme di Caracalla, Rome. Italy)

11-15. Symposium on Organization of Agricultural Research, Muguga, Kenya. (Commission for Technical Cooperation in Africa South of the Sahara, Pvt. Mail Bag 2359, Lagos, Nigeria)

11-16. Ionospheric Soundings in the In-



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THERMOLYNE CORPORATION (formerly Thermo Electric Mfg. Co.) 568 Huff St., Dubuque, Iowa

tern. Geophysical Year/Intern. Geophysical Cooperation-1959 Symp., Nice, France. (A. H. Shapley, URSI World-Wide Soundings Commission, Central Radio Propagation Laboratory, Natl. Bureau of Standards, Boulder, Colo.)

12-14. Association for Computing Machinery, Eastern joint computer conf., Washington, D.C. (B. Oldfield, I.B.M. Corp., 326 E. Montgomery, Rockville, Md.)

12–15. American Soc. of Agricultural Engineers, Chicago, Ill. (J. L. Butt, ASAE, 420 Main St., St. Joseph, Mich.)

12-19. Latin American Congr. on Microbiology, 2nd, San Jose, Costa Rica. (J. de Abate, Apartado 1404, San Jose)

13. American Acad. of Arts and Sciences, Brookline, Mass. (J. L. Oncley, 280 Newton St., Brookline 46)

15-16. Oklahoma Acad. of Science, Stillwater. (D. Buck, Northern Oklahoma Junior College, Tonkawa)

17-18. International Congr. of Comparative Pathology, 9th, Paris, France. (L. Grollet, Comité International Permanent des Congrès de Pathologie Compareé, 63 Avenue de Villiers, Paris 17°)

19-23. Inter-American Congr. of Psychology, 7th, Monterrey, Mexico. (G. M. Gilbert, Psychology Dept., Long Island Univ., Brooklyn 1, N.Y.)

22–29. Plant Tissue and Organ Culture, intern. symp., New Delhi, India. (P. Maheshwari, Univ. of Delhi, Delhi)

26–28. History of Science Soc., annual, Washington, D.C. (J. C. Greene, 1121 Iowa Ave., Ames, Iowa)

26-31. American Assoc. for the Advancement of Science, annual, Denver, Colo. (R. L. Taylor, AAAS, 1515 Massa-chusetts Ave., NW, Washington 5)

27-29. American Folklore Soc., Cincinnati, Ohio. (T. P. Coffin, 110 Bennett Hall, Univ. of Pennsylvania, Philadelphia 4)

27–29. American Geophysical Union, 1st Western natl., Los Angeles, Calif. (A. N. Sayre, U.S. Geological Survey, Washington 25)

27-29. American Economic Assoc., New York, N.Y. (J. W. Bell, AEA, Northwestern Univ., Evanston, Ill.)

27-29. American Physical Soc., Los Angeles, Calif. (K. K. Darrow, 538 W. 120 St., New York 27)

27-29. Western Soc. of Naturalists, Eugene, Ore. (I. A. Abbott, Hopkins Marine Station, Pacific Grove, Calif.)

Station, Pacific Grove, Calif.) 27-30. Institute of Mathematical Statistics, annual, New York, N.Y. (D. C. Riley, American Statistical Assoc., 1757 K St., NW, Washington 6)

28-29. Northwest Scientific Assoc., Spokane, Wash. (E. J. Larrison, Univ. of Idaho, Moscow)

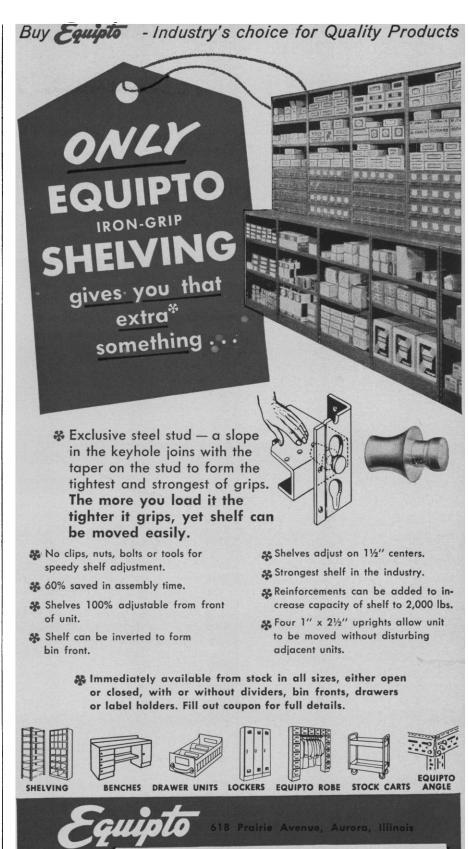
28–29. American Chemical Soc., Div. of Industrial and Engineering Chemistry, Newark, Del. (Scientific Liaison Office, Natl. Research Council, Sussex Dr., Ottawa, Canada)

28-29. Linguistic Soc. of America, annual, Chicago, Ill. (A. A. Hill, Box 7790 University Station, Austin 12, Texas)

28-30. Archaeological Inst. of America, Detroit, Mich. (L. A. Campbell, 5 Washington Square N., New York 3)

28-30. Phi Delta Kappa, Bloomington, Ind. (R. S. Merkel, Indiana Central College, Indianapolis 27)

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