

If Martian organisms have discovered a self-replicating molecule that is not a nucleic acid, how much more fascinating this would be. Perhaps there are organisms there that need their sugars in the L-form and their amino acids in the D-form. If so, they will be unable to use Gulliver's culture medium. Not only that—they might not survive competition with contaminants from the earth.

Please NASA, shoot anything you wish at the moon but hold off on Mars and Venus!

LAMONT C. COLE

Department of Zoology,
Cornell University, Ithaca, New York

The article by Levin *et al.* was primarily concerned with the development of an optimum medium for culturing microorganisms which may live on Mars. The composition of the medium being used was given in Table 1 of the article. The authors state that this medium represents the most satisfactory degree of complexity for their purpose. I assume that the term *amino acid hydrolyzate* means the mixture of amino acids obtained by hydrolyzing proteins. Therefore, the authors are assuming that organisms on Mars will metabolize L-amino acids and D-glucose just as organisms happen to do on the earth. The simple inclusion of racemic mixtures of amino acids and sugars might increase the chance of detecting life on Mars by a factor of 2. Although D-amino acids may inhibit the growth of certain microorganisms, the increased chance of detection warrants preliminary terrestrial experiments along these lines. No such experiments were mentioned.

Levin and his associates emphasize that media have been tested under "natural conditions." Although it might be argued that the inclusion of D-amino acids is not "natural," the apparent fifty-fifty chance of life's evolving with either optical antipode (*I*) would increase the probability of positive results in what will be the most expensive biological experiment in history.

Later probes might be designed to be more selective regarding the type of life forms (if any) present on Mars.

ROBERT V. RICE

Mellon Institute,
Pittsburgh, Pennsylvania

Reference

1. A. I. Oparin *et al.*, Eds., *The Origin of Life on the Earth* (Pergamon, New York, 1959), pp. 158-185.

7 DECEMBER 1962

New Technique for Continuous High Precision Recording of Basal Temperature

A report on the development of a radio thermometer for the wireless transmission and recording of basal temperature. Uses are foreseen in fertility studies to detect and record temperature changes generally associated with ovulation.

A research program conducted at American Electronic Laboratories, Colmar, Pennsylvania, has resulted in the development of several types of miniature, implantable temperature telemetering transmitters. Initially, this development was directed primarily toward the continuous monitoring of body temperature in experiments conducted with small caged animals. The tiny telemetering transmitter was implanted in the subcutaneous tissue of an animal, a rabbit for example, thus permitting the animal complete freedom and natural action while the wireless transmitter was sending its continuous signal to a nearby receiver and recorder installation. This new technique made it possible to obtain body temperature readings of greater validity than previously possible because the animal was not disturbed while readings were being made.

Further research into telemetering systems of this type has led to applications in other fields. One system that has been developed to provide for the measurements, transmission, and recording of basal temperature in women. The telemetering transmitter in this system is a miniature, transistorized, battery-operated transmitter, mounted on a domeless vaginal diaphragm rim. The telemeter-diaphragm instrument is emplaced in its normal internal location. Completing the system is a pickup antenna placed under the mattress of the bed, a receiver and a recorder. The signal picked up from the transmitter is fed into the receiver where it is converted to an analog output which is plotted on a small bedside recording instrument. This provides a permanent trace of true basal temperature.

Operating life of the diaphragm-type transmitter is in the order of one year, thus permitting it to be worn continuously and for almost indefinite periods. This tiny transmitting unit is worn without any discomfort, and does not interfere in any way with normal body functions.

During evaluation of this instrument, recordings have been obtained which indicate the temperature drop that normally occurs after a person has fallen asleep and the body is at the basal state. They also show the abrupt drop and slow rise of basal temperature that is normally indicative of ovulation.

Many applications are foreseen in basal temperature studies since the subject is unhampered by any wires and connections, and may perform all normal functions. One of the more immediate applications is in studies of the ovulatory cycle. It is also anticipated that this system will be of value in clinical sterility problems and in the study of basal metabolism.

Further technical details on the AEL Basal Temperature Recording System may be obtained by writing to American Electronic Laboratories, Inc., Medical Products Division, 303 Richardson Road, Colmar, Pennsylvania.

New Products

Strip chart recorder can record resistance of 1 to 10^6 ohms, milliamps of 0.01 to 100, and d-c volts of 0.01 to 500, full scale, directly without the use of external converters. An event marker pen may be used manually or in conjunction with external functions. Stability of the recorder is maintained by a Zener reference. Five chart speeds may be chosen by a dial on the front of the instrument, with all intermediate positions disengaging the chart drive, permitting free movement of the paper. The recorder may be operated flat, at a 30-deg desk tilt, or on a wall mount. In each of these positions, the paper may be rolled up internally or fed out through the end casing. Applications include measurement of body temperature directly, with thermistor probes; measuring light levels with silicon solar cell output; and pressure recordings measured with strain gage load cells. With modular construction of plug-in components, the recorder weighs 16 lbs. and measures $14\frac{1}{2}$ by $4\frac{3}{4}$ by $11\frac{3}{4}$ inches.—R.L.B. (Bausch and Lomb, Inc., Rochester 2, N.Y.)

Circle 1 on Readers' Service card

Programmable voltage divider (model EX-1) is a resistive divider with total resistance of 1 megohm between its terminals and calibrated taps representing voltage ratios of 1, 0.1, 0.01, and 0.001. The desired tap can be selected manually or by remote control with external circuit closures. Accuracy of division is said to be ± 0.05 percent at all settings. The divider is modular in

The material in this section is prepared by the following contributing writers:

Robert L. Bowman (R.L.B.), Laboratory of Technical Development, National Heart Institute, Bethesda 14, Md. (medical electronics and biomedical laboratory equipment).

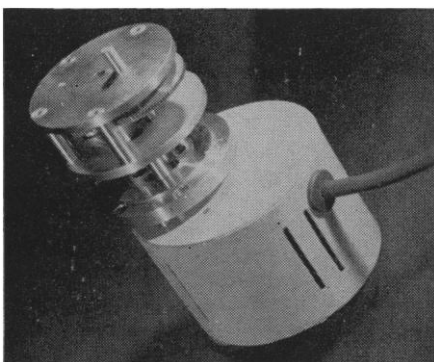
Joshua Stern (J.S.), Basic Instrumentation Section, National Bureau of Standards, Washington 25, D.C. (physics, computing, electronics, and nuclear equipment).

The information reported here is obtained from manufacturers and from other sources considered to be reliable. Neither *Science* nor the writers assume responsibility for the accuracy of the information. A Readers' Service card for use in mailing inquiries concerning the items listed is included on page 1045. Circle the department number of the items in which you are interested on this card.

design and may be used individually or cascaded for successive divisions. Maximum voltage rating is 300 v peak across the full resistance and proportionally less across ratio sets. Maximum wattage is 0.5 w in any single resistor. Ambient temperature range is 10° to 45°C , and maximum temperature coefficient is 25 ppm per degree Centigrade.—J.S. (Trio Laboratories, Inc., Plainview, N.Y.)

Circle 2 on Readers' Service card

Vacuum motor is constructed with its rotor mechanism isolated within a vacuum-tight enclosure so that only a brushless rotor and its gear-head assembly are enclosed within the vacuum system. A polished stainless-steel flange adapts the rotor enclosure to attachment to the vacuum system by means of a Viton, indium, or gold gasket. Gear heads available allow



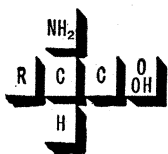
rotations from 1 to 3000 rev/min. Degassable surfaces of the motor have been kept to a minimum, and channels for high evacuation rates have been incorporated. All of the parts exposed to vacuum, except the rotor itself, are made of stainless steel. According to the manufacturer, the magnetic field of the motor is concentrated around the rotor so that no stray field results. Power is $1/20$ hp; starting torque is 1 lb in.; running torque, 0.6 lb in. Standard motors are wound for operation on 115-volt 60-cy/sec power.—J.S. (Photonetics Corp., Walker Valley, N.Y.)

Circle 3 on Readers' Service card

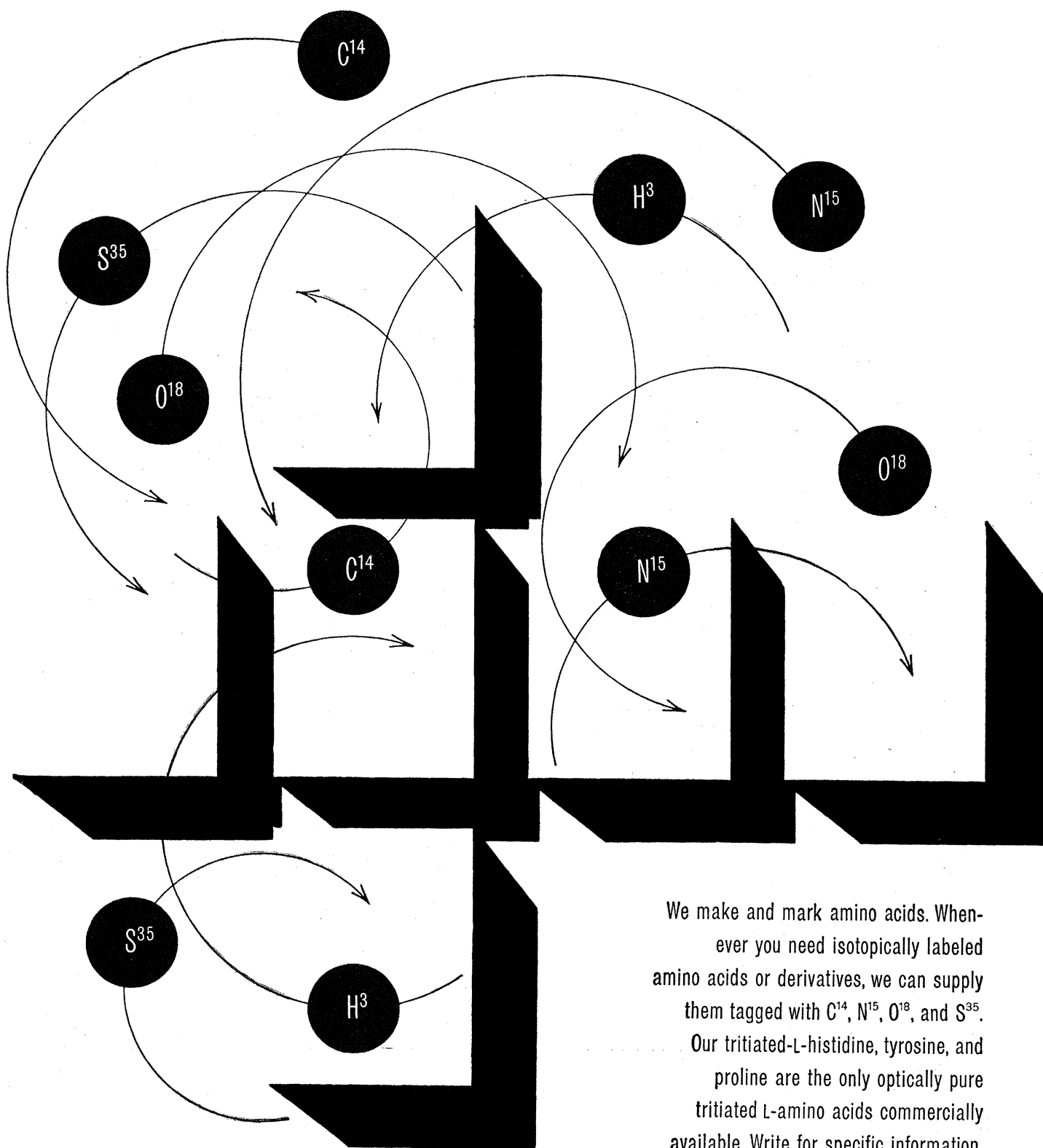
Coulometric titrator provides analysis of small quantities of materials by coulometric techniques rather than by the conventional potentiometric techniques. Reagents for the coulometric titrations are generated at controlled electrode potential rather than by controlled electrolysis current. Intermediate reagents for secondary coulometric titrations are generated. Additionally, an intermediate reagent can be prepared in excess, and if its couple is reversible, the excess reagent can be back-titrated electrolytically. Generally, any organic or inorganic substance which gives a polarographic wave may be determined by this technique. Both platinum and mercury electrodes may be used. Primary chemical standards are unnecessary because the instrument is electronically calibrated. Titrants are also eliminated as the reagents are internally generated. The instrument is designed to supply electrolysis current to the electrode system while maintaining the potential of the working electrode at some chosen value with respect to the reference electrode. Polarity of the working electrode and direction of current flow can be chosen to run either reduction or oxidation titrations. A portion of the current is integrated electronically by an operational amplifier such that the charge accumulated on a capacitor is a measure of the coulombs of electricity used. Readout may be made with either a potentiometer or a digital voltmeter.—R.L.B. (NUMEC Instruments and Controls Corp., Apollo, Pa.)

Circle 4 on Readers' Service card

Wideband voltmeter (model 120) is said to combine the low-frequency performance of vacuum-tube voltmeters with high-frequency response approaching that of diode-probe voltmeters. The wideband amplifiers are designed with epitaxial transistors to achieve maximum gain-bandwidth product. Maximum overall gain of 200 is available over the bandwidth from 10 cy to 100 Mcy/sec. The basic circuit is a conventional feedback amplifier with no inductive peaking. Gain stabilization is achieved by more than 100-db negative feedback. Subminiature-tube cathode followers are used in isolation circuits achieving input impedance of 1 megohm shunted by 25 pf. A cathode-follower probe increases input impedance to 10 megohm for signals up to 300 mv. Drift is said to be negligible after a 15-minute warmup period. Accuracy is said to be ± 3 db from 10



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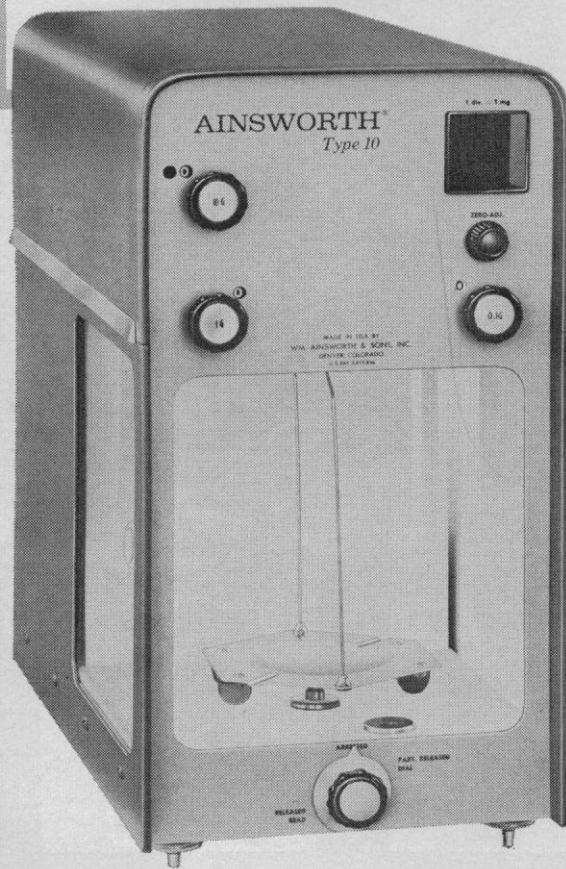
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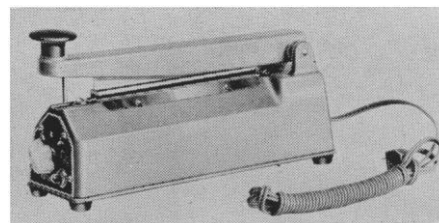
cy to 100 Mcy/sec; and ± 2 percent from 20 cy to 50 Mcy/sec; and ± 10 percent from 15 cy to 60 Mcy/sec. Twelve full-scale ranges are provided from 1 mv to 300 volts.—J.S. (Keithley Instruments, 12415 Euclid Ave., Cleveland 6, Ohio)

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Microwave source (series 1100) furnishes any fixed frequency from 8 Mcy/sec through the X band. Power output, read directly from a front-panel meter, is 3 mw at the L band, with 100 mw optionally available, and 1 mw at the X band. Power supply requiring 115 volts, 60 cy/sec, 500 w, is included. Short-term stability is said to be one part in one billion.—J.S. (Pitometer Log Corp., 237 Lafayette St., New York, N.Y.)

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Thermal impulse sealer provides seals up to 8 inches long for any of the heat-sealable plastic films. The device operates by rapidly heating a pair of sealing bars which clamp the film for sealing. While it is designed for



short-run packaging, it may have application in the laboratory or medical fields for constructing plastic film oxygenators, diffusion cells, controlled atmosphere chambers, sterile enclosures, or tailored covers for special instruments. The device is ready for instant use as soon as it is plugged into any 110-v a-c power line.—R.L.B. (National Instrument Co., Inc., 4119 Fordleigh Rd., Baltimore 15, Md.)

Circle 7 on Readers' Service card

Shielded flowmeters consisting of tapered glass tubes with glass indicating balls may be employed in systems under pressure or under conditions where exposed glass cannot be tolerated. The outer protection tube is made of annealed acrylic plastic. The bushings, which consist of polypropylene, come with standard pipe-threads along with a smooth shoulder for flexible tubing. The connection between the bushing and the glass flowmeter is made by a teflon stop with a rubber "O" ring seal. These flowmeters come

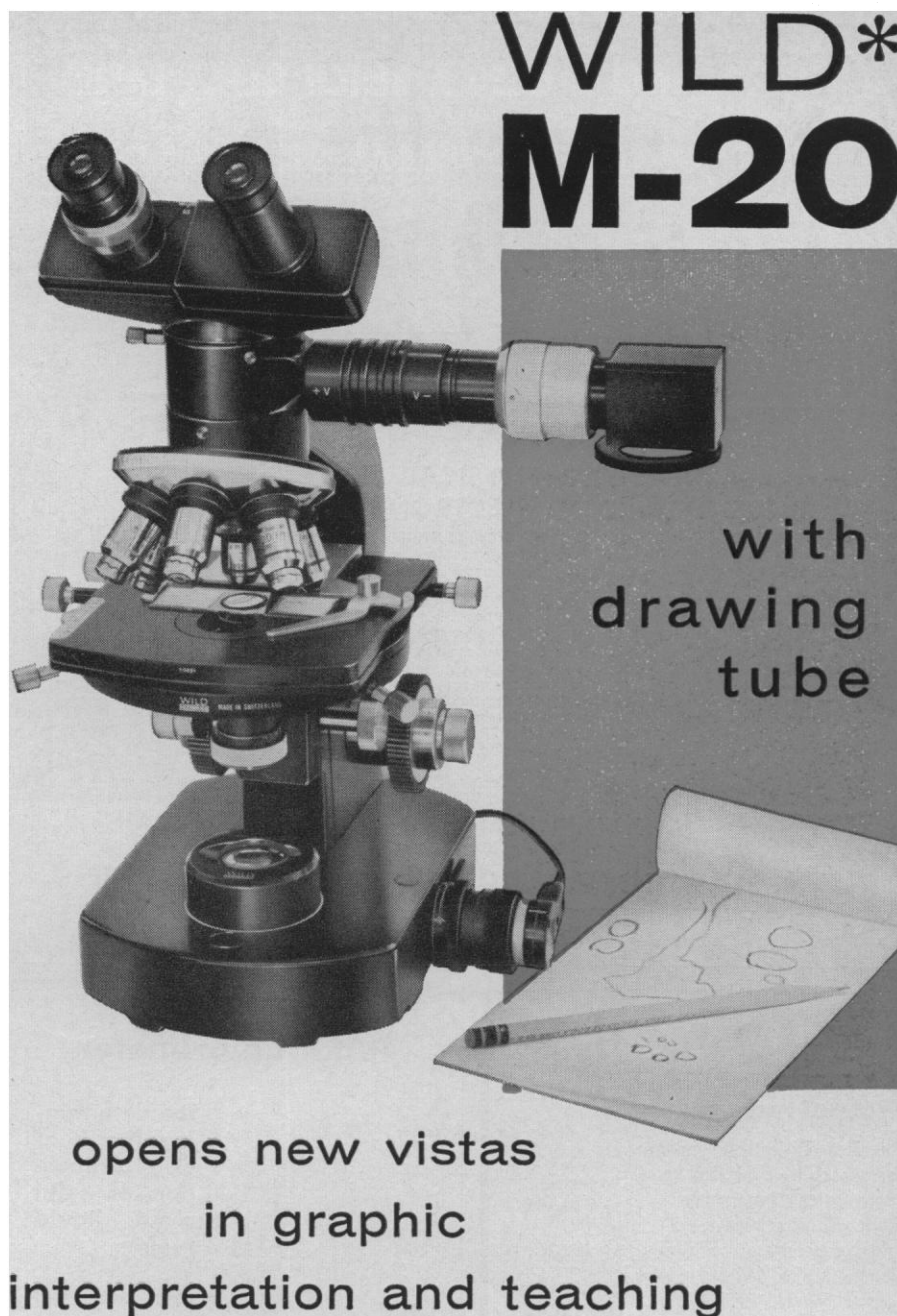
in five sizes for metering flow at pressures of 250 to 500 lb/in.² (gage). A calibration curve is supplied with each meter for air and water at standard conditions. For other fluids and other conditions, the correlation chart also supplied may be used for calculating the desired calibration curve. Shields may be purchased separately and added to flowmeters.—R.L.B. (Roger Gilmont Instruments, Inc., Great Neck Rd., Great Neck, N.Y.)

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X-ray spectrometers, "Norelco Autrometers," automatically handle a batch of samples to provide analysis for elements above atomic number 12 by comparing the characteristic fluorescent x-radiation emitted from the sample with that from a standard. Samples are deposited on a small spot on planchettes that are stacked in a holder which automatically places them one at a time into a beam of 100 Kv x-rays. A Geiger tube measures the intensity of the characteristic radiation which is dispersed by a suitable (selectable) flat crystal spectrometer. Samples can be spun in the flat plane to minimize sample or spot inhomogeneity. Programming allows each sample to be analyzed for several elements and the printed numerical data is delivered as a count ratio of unknown/standard on paper tape. The entire system is designed for adaptation to a wide variety of arrangements which are described in a free booklet.—R.L.B. (Philips Electronics Instruments, 750 S. Fulton Ave., Mt. Vernon, N.Y.)

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Image-splitting measuring eyepiece produces a double image of microscope field with a variable calibrated displacement (shear) between the two images. An object in the split image field will appear just in contact with its double image when the image is displaced one object diameter in the direction of shear. A calibrated dial permits the displacement to be read to .125 μ when high magnification is used, and for simple estimation of size uniformity or dispersion it is immediately apparent that all particles are of the same size without converting the scale to standard units of measure. A high degree of precision and accuracy is said to be possible because of the greater ease of estimating overlap of similar images over the setting of a hairline to an edge, as in filar micrometers. The compared images are al-



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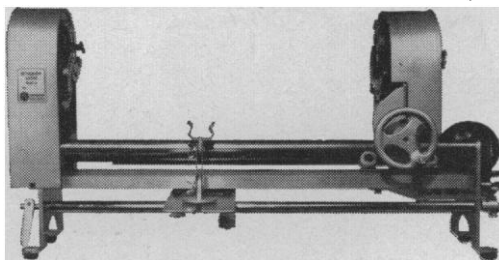
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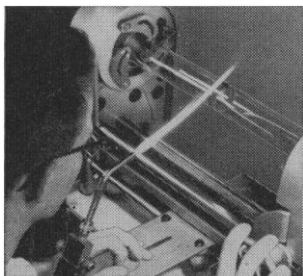
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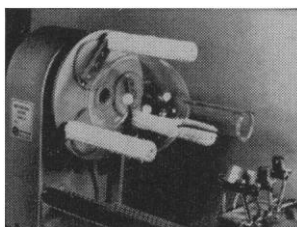


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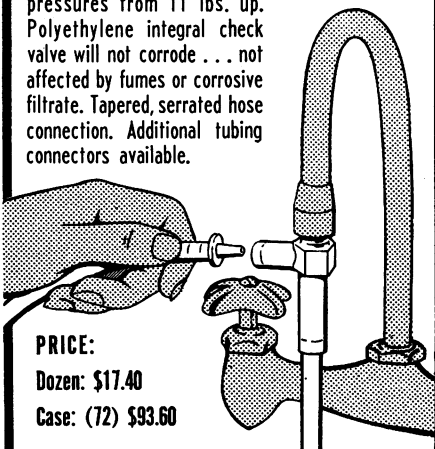
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ways in the same object plane, thus eliminating the possibility of parallax error present in improperly focused filar systems. Vibration or motion of the object does not interfere with the ability to measure, as both images move together rather than in relation to a fixed reference line. The device requires a monocular body tube with sufficient clearance to accommodate a 3.6-inch tube that replaces the ocular.—R.L.B. (Cooke, Troughton and Simms, Inc., 91 Waite St., Malden 48, Mass.)

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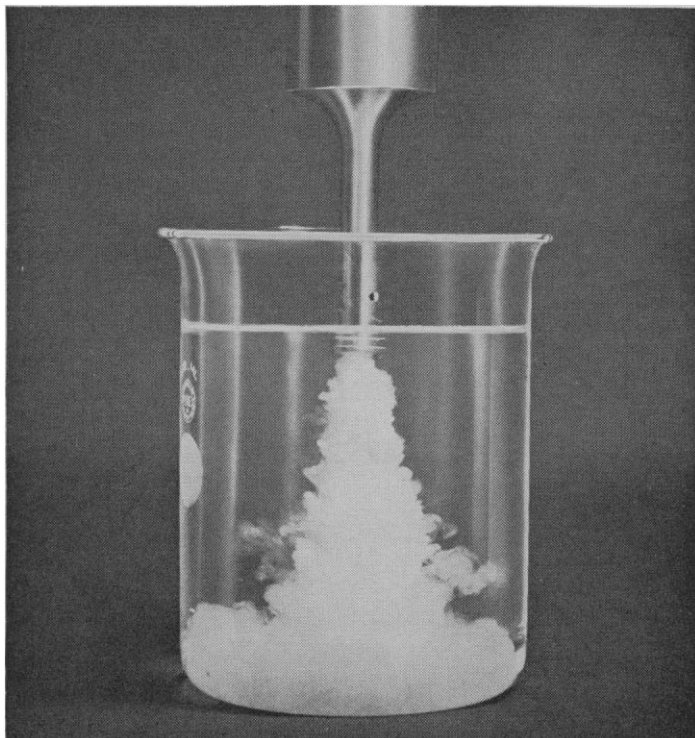
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Fiber-optics cathode-ray tube (type M1056) is a 7-inch roundfaced tube that permits recording of information displayed against accurate reference lines that have been applied directly to a rectangular fiber-bundle surface. Accuracy of the reticle is said to be better than one-tenth the spot size which is sufficiently small to resolve 1000 lines per inch. The tube combines magnetic deflection for large area scan and electrostatic deflection for small area scan at high writing speed. Custom-built versions can be supplied for specific applications.—J.S. (General Atronics Corp., 1200 E. Mermaid Lane, Philadelphia 18, Pa.)

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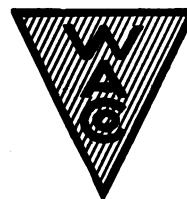
Oscilloscope photographic attachment adapts a standard Polaroid Land Camera to photograph multiple traces by utilizing the oscilloscope vertical displacement adjustment with the R-5 model or by image displacement with the R-6 model. Magnification is continuously variable from 1 : 1 to 1 : 0.7 and the adapter fits most 5-inch oscilloscopes. The camera remains available for other photographic purposes so that it is convenient to utilize split-field photographic techniques to provide a record of the experimental set-up and an oscillograph of the results on the same photo.—R.L.B. (Honing Laboratories, Inc., 2172 68th St., Brooklyn 4, N.Y.)

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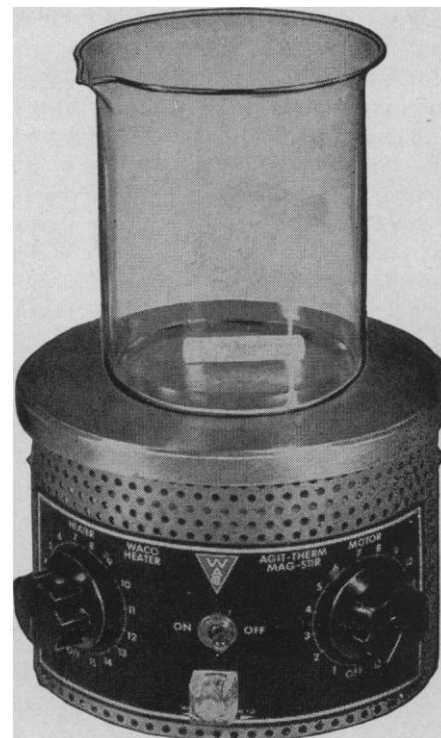
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Gaussmeter (type 729), in addition to the usual rotating coil for measurement of transverse field, has a second coil arranged to measure the field along the axis. The field can be measured in three dimensions by combining the results of measurement with the two coils. The gaussmeter features a gear-driven coil rotating at right angles to the drive shaft



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so that it can cut the flux line along the axis. Diameter of the probe is 7/16 inch and its length is approximately 20 inches. Six full-scale ranges from 0.4 to 120 kgauss are provided. Accuracy is said to be ± 1 percent of full scale and an operating life of at least 1000 hours is said to have been achieved.—J.S. (Rawson Electrical Instrument Co., 110 Potter St., Cambridge 42, Mass.)

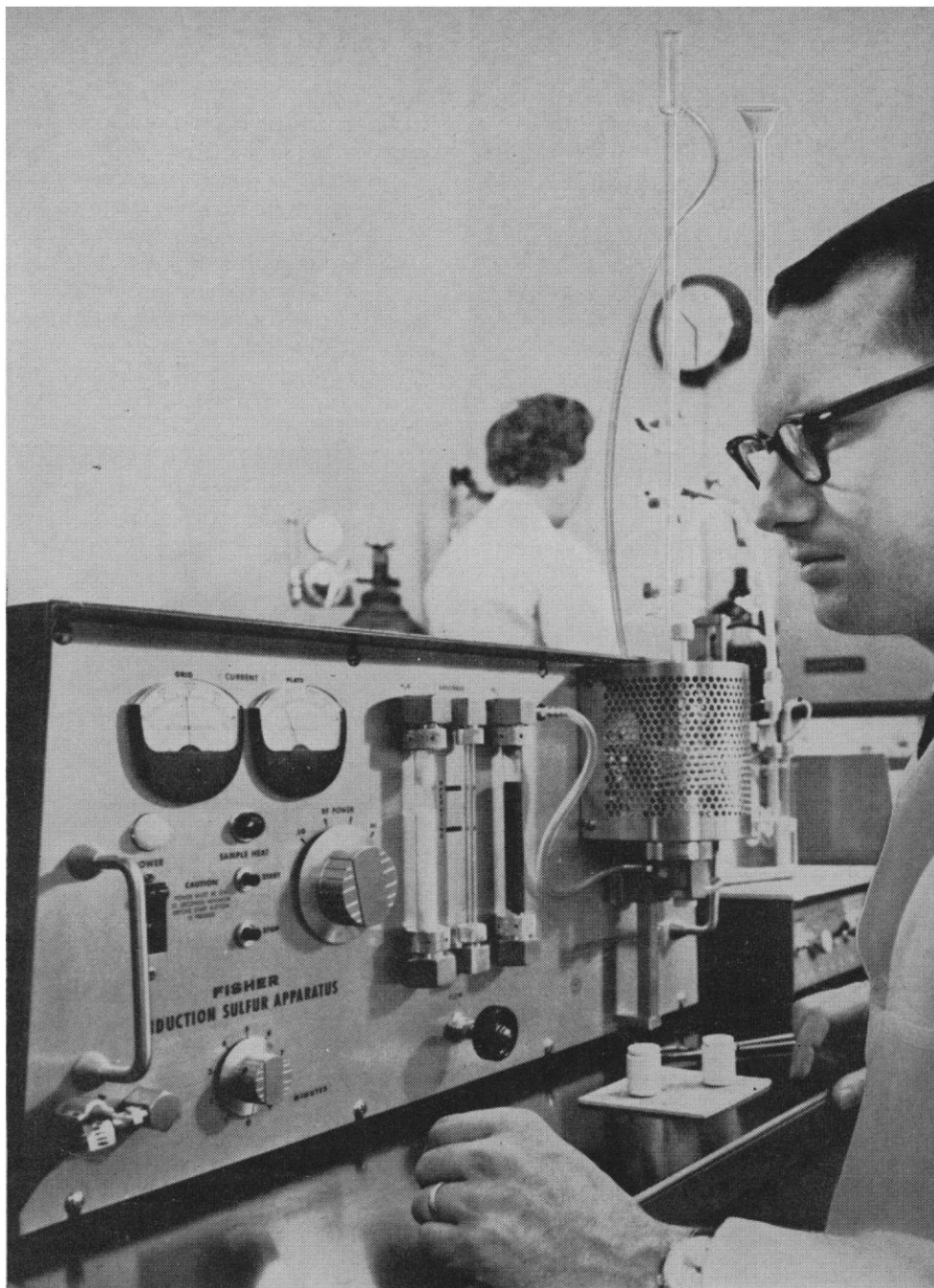
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Interference microscope objective, manufactured by W. Watson & Sons Ltd, is designed for use with the manufacturer's microscopes but may be used with instruments of other manufacture. The objective permits examination of specimens by reflected light at approximately 100 magnification and produces an interference fringe pattern corresponding to variations in height of the surface of the specimen. A beam-splitting prism divides light from the source so that the specimen and a reference mirror can be viewed simultaneously. The reference mirror can be adjusted to make the path lengths similar and can be tilted for parallelism. The objective has a focal length of 16 mm and a numerical aperture of 0.2, giving a lateral resolution of about 1.5μ . Fringes will be shifted by one fringe space for each half wavelength of height variation. Diameter of the field of view is 1.3 mm. Where the surface of the specimen is not within 1 deg of horizontal, a leveling stage should be used. Where surface discontinuities several wavelengths deep are to be measured, a white-light fringe system can be used so that the central fringe can be distinguished from all others. The source can then be changed and the displacement of the identified central fringe can be measured in terms of sodium-light fringes.—J.S. (Wm. J. Hacker & Co., Inc., Box 646, West Caldwell, N.J.)

Circle 17 on Readers' Service card

Microwave refractometer permits measurement of refractive index of gaseous media with accuracy said to be ± 1 unit and resolution 0.1 unit. Operation of the refractometer is based on the fact that resonant frequency of a microwave cavity is directly dependent upon the net dielectric constant of the gaseous medium within the cavity. Measurement is made by comparing the frequency of an exposed sampling cavity with that of a sealed reference cavity containing an inert gas. Normal readout is provided by a 13-bit analog-to-digital shaft-angle encoder. The refractometer

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operates without operator attention except for periodic verification of the instrument calibration. A calibration cavity is available. The sampling cavity can be placed up to 200 ft from the refractometer unit with the two interconnected by a standard wave guide without degradation of performance.—J.s. (Colorado Research Corp., 1550 Speer Blvd., Denver 4, Colo.)

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Hydrogen-line radiometer (model HLR) is designed for detailed investigation of radiation from neutral hydrogen atoms in space. The radiometer achieves low noise figure through use of an electron-beam parametric amplifier operating in the synchronously pumped mode. The instrument features frequency scanning of several megacycles at any rate between 1 and 40 Mcy/hr. The receiver is constructed

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Circle 19 on Readers' Service card

Arc-lamp power system is a solid-state unit for controlling the light output of compact arc lamps. A light transducer is used to sense the intensity of the arc lamp and the signal from the transducer is used to control the power to the lamps to maintain constant intensity. The transducer, a silicon phototransistor, is referred to another used as dark reference. The sensor may be as far away as required with no degradation of performance. The sensor contains temperature-compensating elements and is itself compensated to 300°F. Current regulation can be provided alternatively to intensity regulation. The high-voltage, high-current surge required immediately after ignition to heat the electrodes, is supplied from a capacitor bank charged to 100 volts by a low-power charging circuit. Operating power is supplied from silicon-controlled rectifiers driven by pulse circuitry.—J.s. (Data Sensors, Inc., 13112 Crenshaw Blvd., Gardena, Calif.)

Circle 20 on Readers' Service card

Incremental volt-milliammeter provides ten ranges of voltage measurement from 1 to 100 volts d-c and ten current ranges from 1 ma to 1 amp. Each range is again divided into ten subranges of full-scale deflection so that, for example, a full-scale deflection can be obtained for each 0.1-volt increment on the 0 to 1-volt range. Highest resolution in voltage measurement is millivolt per division, and in current measurement is 1 μ a per division. Accuracy is said to be ± 0.5 percent of the range used in the model D-3, and ± 0.1 percent in the model D-2. The instrument operates on the differential principle and uses a Zener diode reference.—J.s. (Quality Electric, 3700 South Broadway, Los Angeles 7, Calif.)

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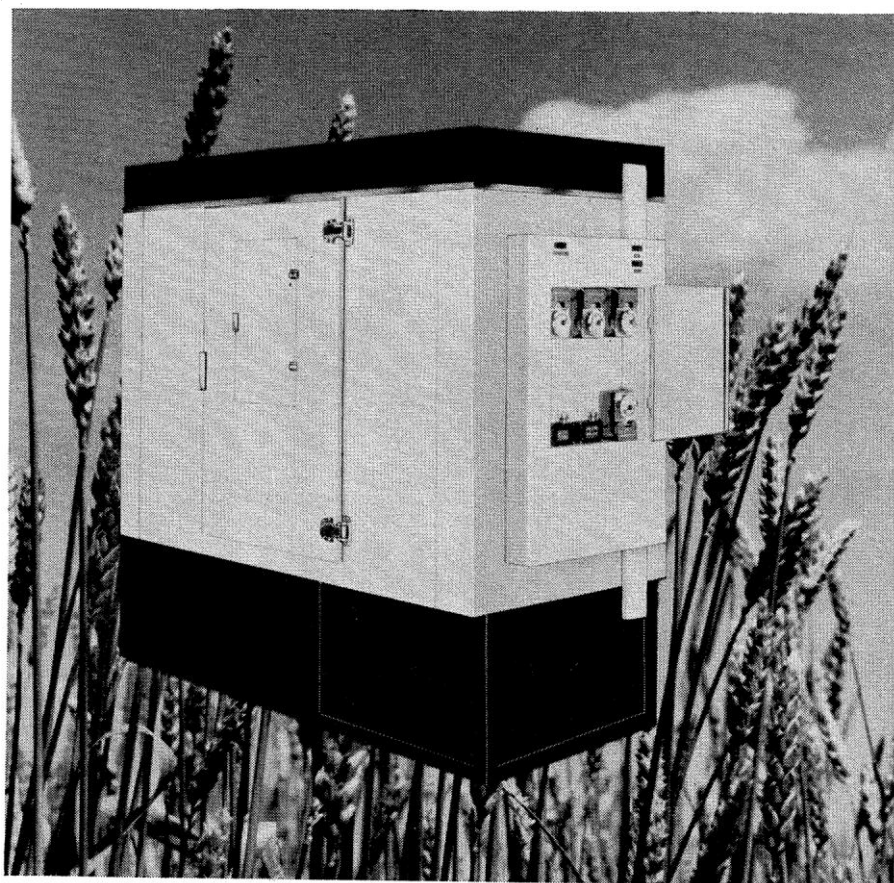
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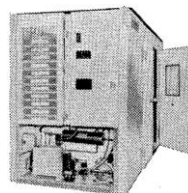
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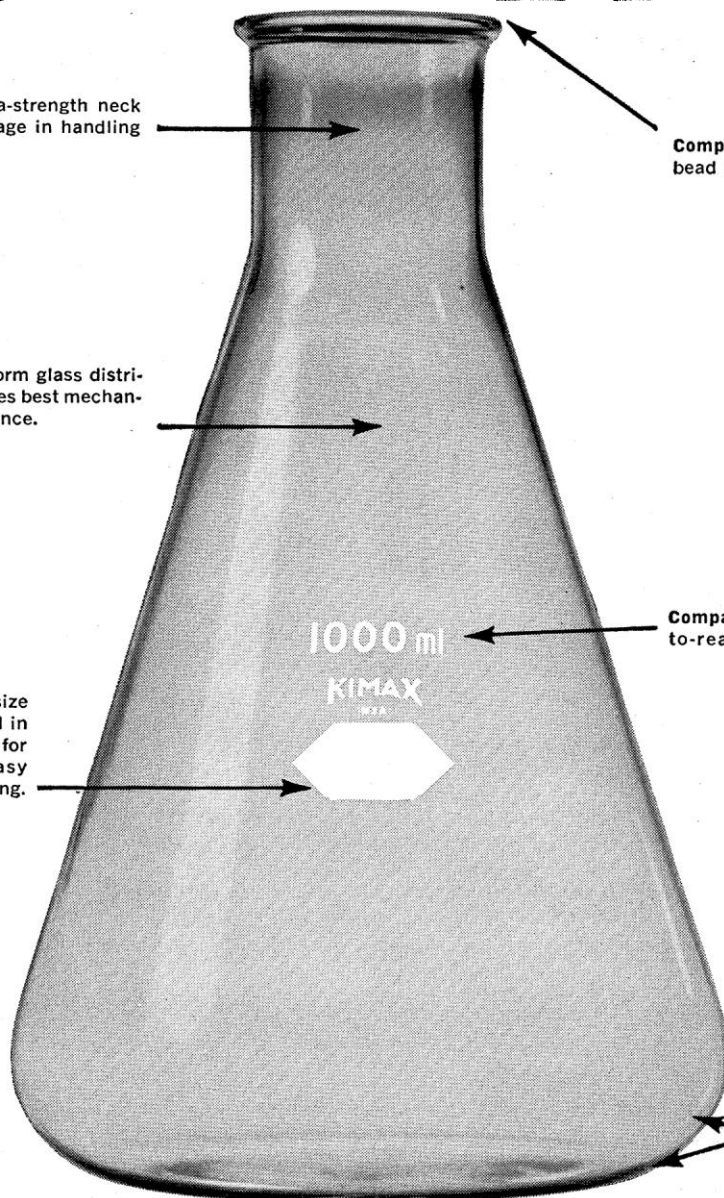
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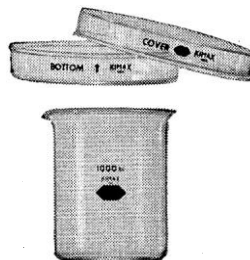


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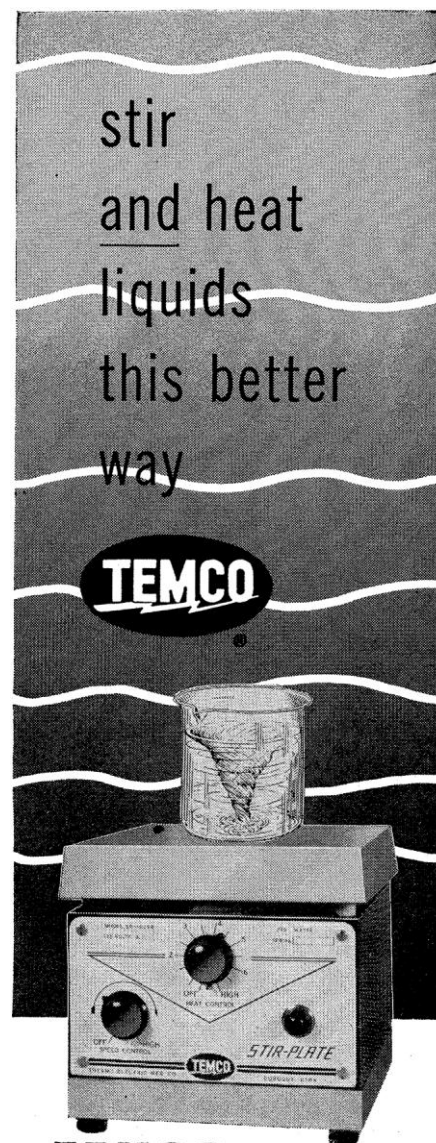
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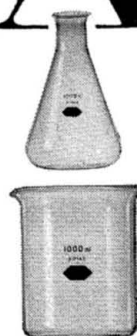
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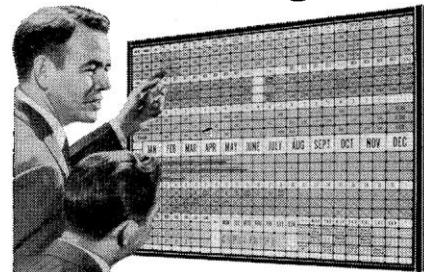
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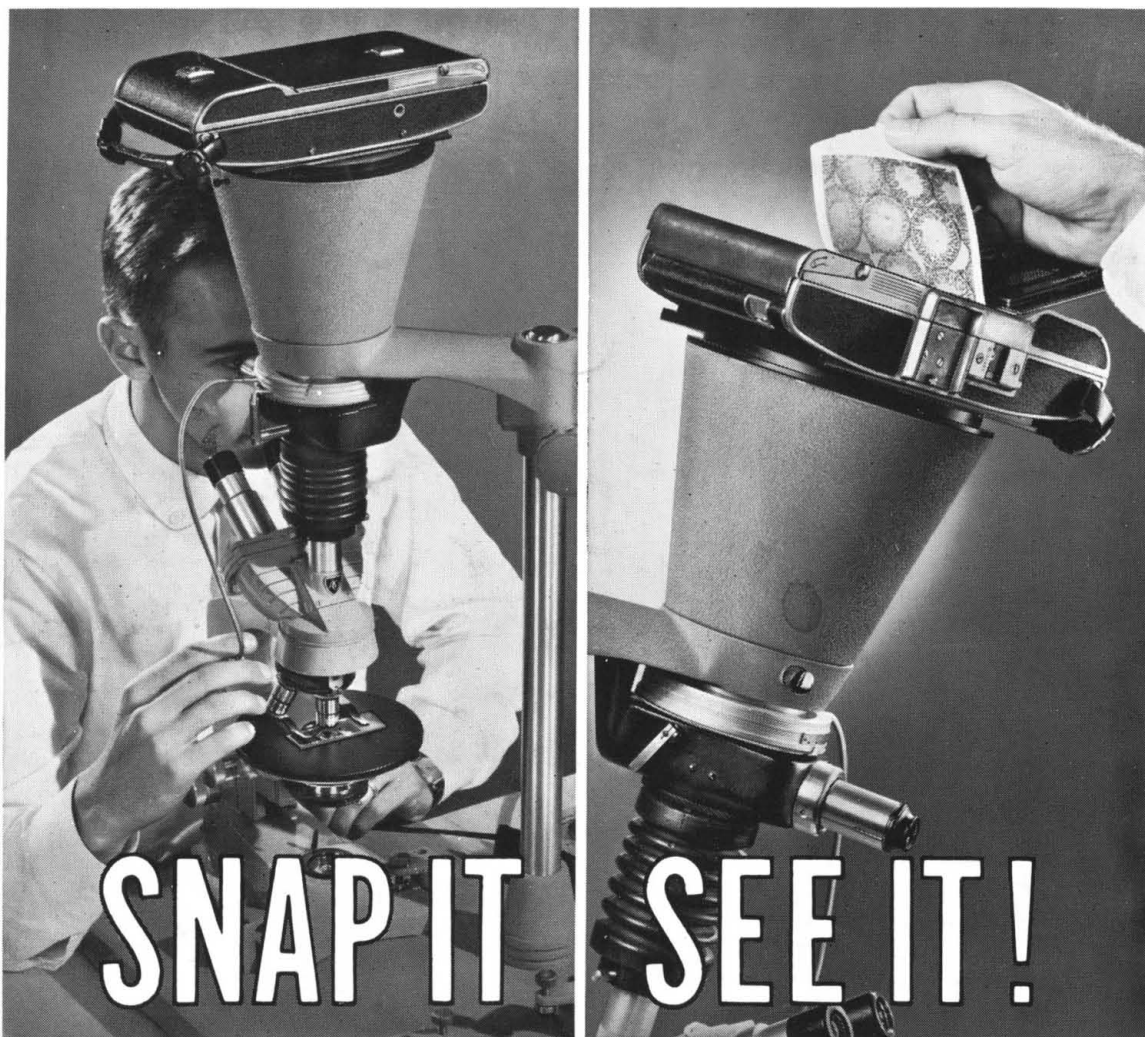
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