SCIENCE

3 October 1969
Vol. 166, No. 3901

AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE

The 11 things that may be wrong with your fume hood are the 11 things right with ours.

Fiberglass is our secret.

Because of fiberglass, and coved corners, inside and out, our fume hoods can be wiped clean quickly and easily with no joints, cracks or hard-to-reach spots to collect undesirable residue or contaminants.

Fiberglass makes them rugged and lightweight . . . easy to move around the lab.

They're corrosion-proof and chemically inert.

Double-walled fiberglass construction gives them extra strength.

Fiberglass won't peel, crack, corrode or absorb chemicals. No metal, no paint to peel, and little or no maintenance is needed. And our fiberglass is self-extinguishing.

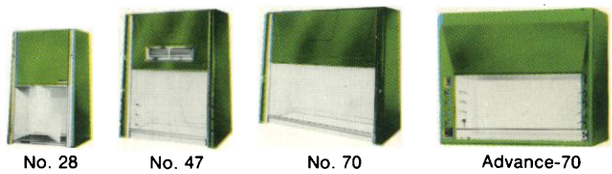
If you want to modify our fume hoods, you can do it with simple woodworking tools.

Fiberglass lets us mass produce our hoods, so you get the same high quality with each hood at a lot lower cost than old-fashioned put-together-with-bolts-and-nuts hoods.

They're handsome, too. Compliment any laboratory. And they come to you from the factory already assembled, ready to plug in and use.

We have a complete line of fiberglass fume hoods, ranging from 28″ to 47″ to 70″ face widths, with or without motors and blowers, with or without fixtures, with or without induced air. And we've got a complete line of fume hood accessories.

For a fully illustrated catalog containing all models, accessories, specifications and prices, contact your laboratory supply dealer or write to LABCONCO CORPORATION, 8805 Prospect, Kansas City, Mo. 64132.



No. 28 Fume Hood | No. 47 Fume Hood | No. 70 Fume Hood | Advance-70 Fume Hood

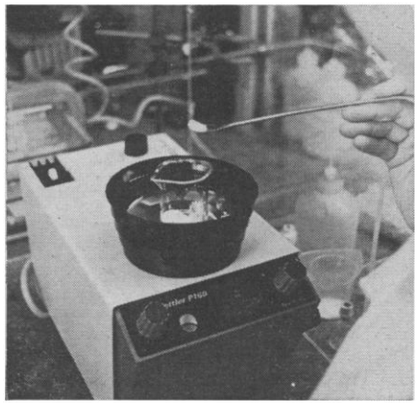
LABCONCO ***...where new ideas become better products.***

KJELDAHL and GOLDFISCH APPARATUS ■ CORROSION-PROOF LAB CARTS ■ CORROSION-PROOF BLOWERS ■ FIBERGLASS GLOVE BOXES

Circle No. 6 on Readers' Service Card

Mettler fits economy plus performance into your balance budget.

Want weighing performance, but worried about exceeding your budget? Here are 38 solutions to the balance buyer's dilemma. Mettler's 16 top-loading and 22 analytical balances.



SPEED + PRECISION = PERFORMANCE

Our top-loaders are tops when it comes to speed and weighing ease. Put the sample on the pan. Then read the weight. If you are filling a container to a target weight, Mettler's helpful filling guide shows the approximate weight on the pan throughout the filling . . . without interruptions.

Newest of the Mettler top-loaders is Model P162. It weighs up to 160 g with a precision of ±1 mg and features 10-g taring ability. Like other Mettler top-loaders, it provides digital and analog readout. Your new personnel will get the same precise results as the old hands in the department.

MANY TO CHOOSE FROM

Select the balance you need for your work from one of our top-loaders. We have one that weighs to 10 kg; another that takes arithmetic out of weight loss studies. Some automatically compensate for changes in level. All will carry out five types of weighings. Weighing unknowns. Check-weighing. Weighing-in. Batching. Weighing objects below the balance.

THE ECONOMICAL ANALYTICALS

One of the major features of all Mettler analytical balances is the impressive precision-capacity ratio. Take our low-cost Model H10. It weighs to 0.1 mg over the 0 to 160-g range. That's one part in 1,600,000.

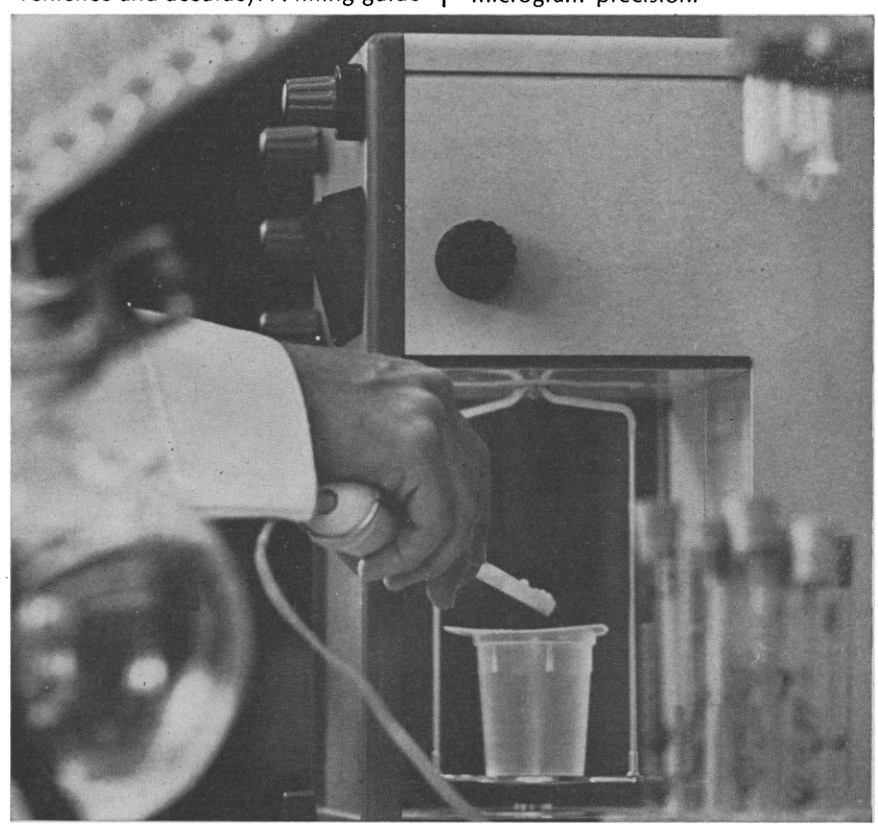
You get two balances for the price of one with our Mettler Model H20. It combines the capacity of a macro analytical with the precision of a semi-micro. Some Mettler analyticals give an instant reading of the approximate weight on the pan. We call this feature preweighing.

WEIGHT WATCHING MADE EASY

With digital readout — standard on many Mettler analyticals — you'll weigh with unsurpassed speed, convenience and accuracy. A filling guide cuts your weighing-in time by 50 percent. Optical taring allows you to compensate for container weights.

Need clearly printed records of your weighings? Check our Models H10P and H20P which print out results on adhesive-backed paper. Then there's our sophisticated H20E electronic. As it weighs, it generates an analog signal which can be fed to compatible instrumentation such as recorders. The H20E can also be interfaced with computer or other control equipment to continuously monitor and keep weight changes within predetermined limits.

There are more: from our $550 basic balance that's ideal for classroom use to our $2,550 ultra-micro with ±0.1 microgram precision.



Write Mettler Instrument Corporation, 20 Nassau Street, Princeton, New Jersey 08540

Mettler®

3 October 1969
Vol. 166, No. 3901

SCIENCE

SCIENCE is published weekly on Friday and on the fourth Tuesday in September by the American Association for the Advancement of Science, 1515 Massachusetts Ave., NW, Washington, D.C. 20005. Now combined with **The Scientific Monthly**®. Second-class postage paid at Washington, D.C. Annual subscriptions $12; foreign postage: Americas $3; overseas $5; single copies, 50¢ (back issues, $1) except **Guide to Scientific Instruments**, which is $2. School year subscriptions: 9 months, $9; 10 months, $10. Provide 4 weeks notice for change of address, giving new and old address and zip codes. Send a recent address label. SCIENCE is indexed in the **Reader's Guide to Periodical Literature**.

AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE

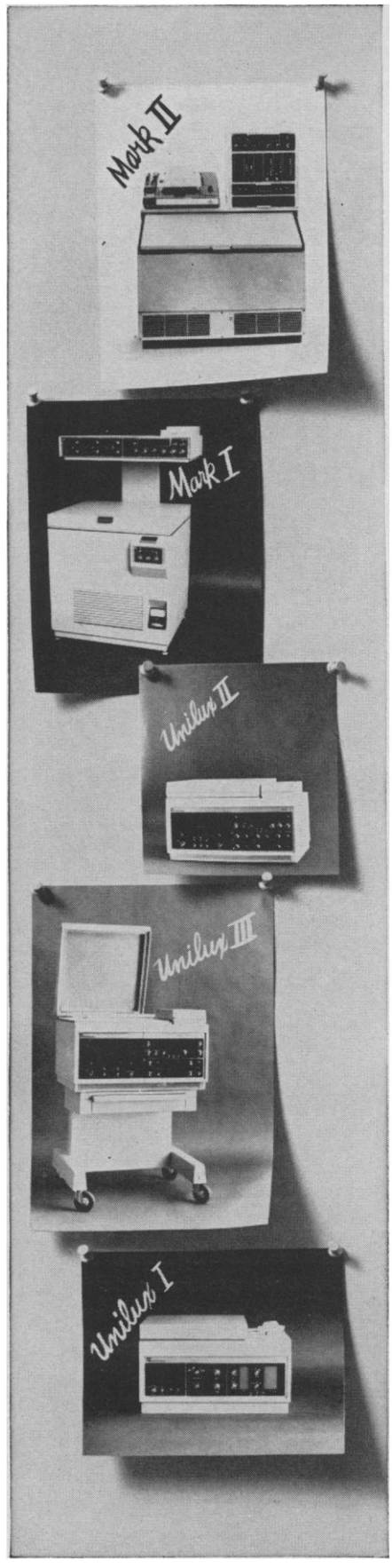
COVER

Summer view of typical northern Alaskan coast near Point Barrow showing polygonal pattern indicative of perennially frozen ground. See page 85. [Jerry Brown, U.S. Army Cold Regions Research and Engineering Laboratory, with the assistance of the Naval Arctic Research Laboratory, Barrow, Alaska]

A point of view on

YOU AND THE SYSTEM

No single liquid scintillation system can be all things to all users. When you come to us, you get only what you need.



Don't be concerned with the complexities of liquid scintillation counting. With us on your side, you *can* beat the system.

Let's say you want to start at the top. And you want to share your system with others. Your choice: one of our cooled Mark II™ Liquid Scintillation Systems. Uncompromising peak performance, super-simple operation for 300-sample counting. For you alone or for as many as 12 *different* users. Because a Mark II accommodates up to 12 different counting programs. And offers 5 standardization options, *autocalibration*, and more.

Or perhaps you seek complete *versatility* in a system. Look no further than our 150-sample, cooled Mark I™ Liquid Scintillation Computer. Performance that goes as far as you ask it to in matching your specific application. Plus computer-calculated data, high reproducibility, and a host of counting program and readout options —only *part* of the Mark I story.

Can you have the advantages of controlled-temperature cooling in a *compact* system? Of course—our Unilux® II Bench-top Liquid Scintillation System. For 100 *dual-labelled* samples. With an ultra-reproducible external standardization method. Plus a notably reliable, remarkably smooth sample changer.

And sharing many of these virtues, again in a compact bench-top system, our Unilux® III. This time designed for *ambient*-temperature counting. Also for ambient-temperature counting: our Unilux® I. The *utilitarian* bench-top system. Simple to set-up and operate. Routine counting was never better.

One of these systems is *your* system. Let us help you decide. Call your Nuclear-Chicago sales engineer or write us. 9-231

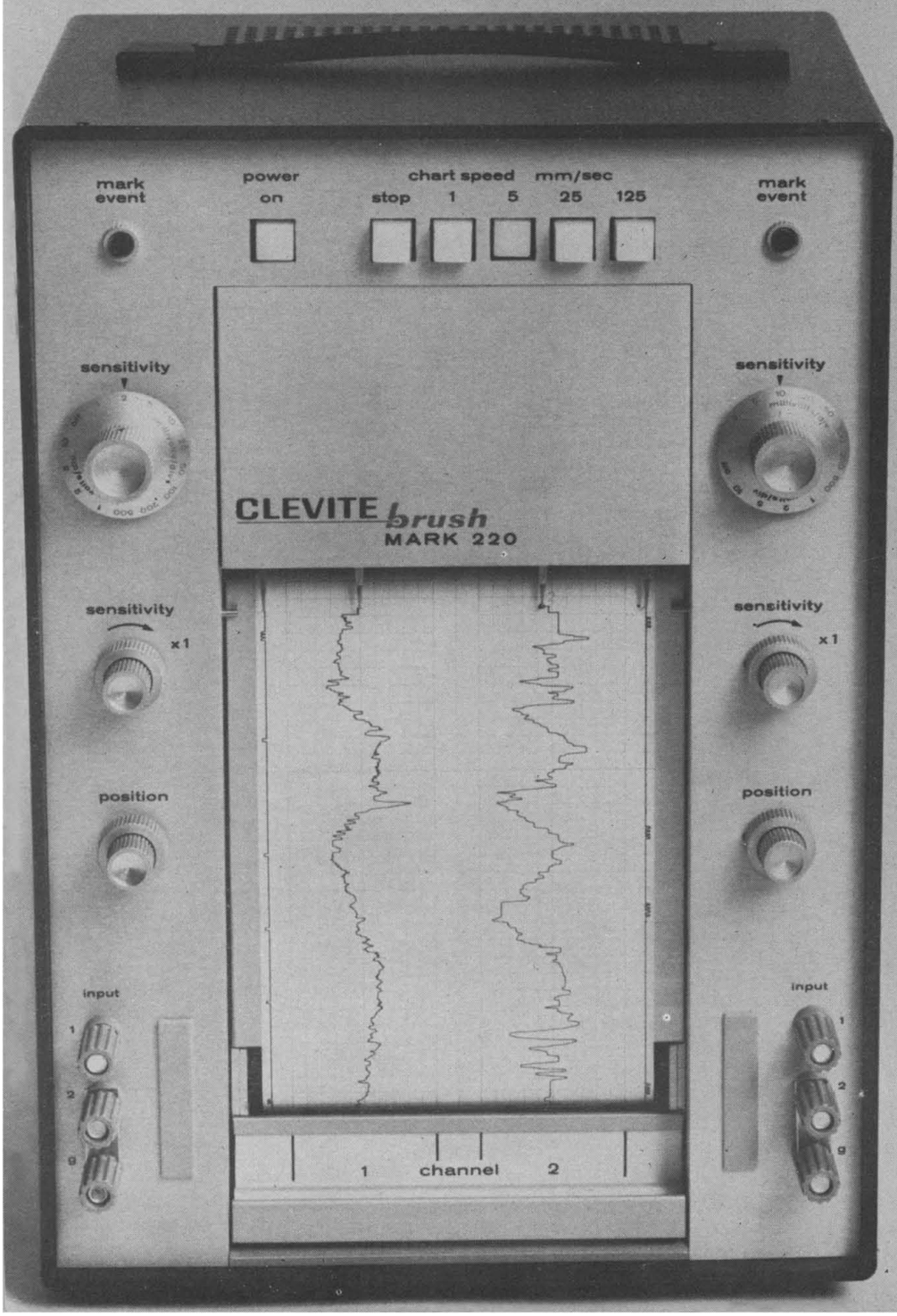
NUCLEAR-CHICAGO
A SUBSIDIARY OF G. D. SEARLE & CO.

2000 Nuclear Drive, Des Plaines, Illinois 60018, U.S.A.
Donker Curtiusstraat 7, Amsterdam W. The Netherlands
ALS-213

Circle No. 17 on Readers' Service Card

Circle No. 14 on Readers' Service Card→

This portable will record more facts in less time, at less cost than any other 2-channel recorder on the market.



We call it the Mark 220.

And once we put it through its paces for you, you'll call it the most amazing piece of recording gear around.

To begin with, we *guarantee* the Mark 220 to be 99½% accurate. Which is a good deal better than almost anything else on the market . . . regardless of size or price. The pressurized ink-writing system is the same one you'll find in our six and eight channel systems. Instead of laying the trace *on* the

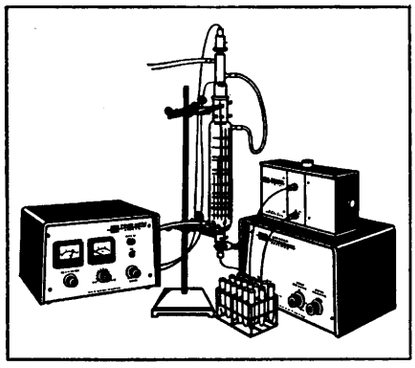
paper, it forces it *in*. Run your finger over it. There's no smear, no smudge. And trace crispness and uniformity is in a class by itself.

Built-in preamplifiers give you measurement range from 1 mV per division to 500 V full scale — and you never have to re-calibrate. Pushbutton controlled chart speeds. Two handy event markers. Ink supply is a disposable cartridge, good for a year.

Yes, for a 25 pound portable that's no bigger than a breadbox, the Mark 220 is quite a recorder. Ask your Brush representative for a demonstration. Or, write for complete details. Clevite Corporation, Brush Instruments Division, 37th and Perkins, Cleveland, Ohio 44114. We'll include our informative booklet "Elimination of Noise in Low-Level Circuits".

CLEVITE BRUSH

Ampholine Electrofocusing equipment, including Power Supply and Uvicord ultraviolet Monitor ready for protein separation.

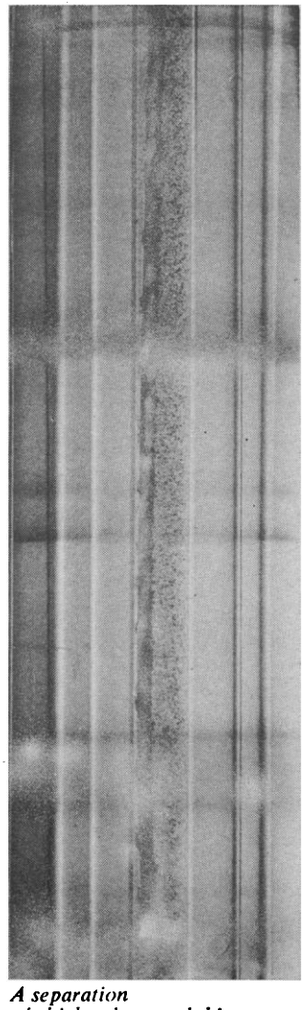


LKB IN THE SERVICE OF SCIENCE

LKB INSTRUMENTS INC. • 12221 PARKLAWN DRIVE • ROCKVILLE Md. 20852

SALES AND SERVICE THROUGHOUT THE WORLD: STOCKHOLM, THE HAGUE, COPENHAGEN, ROME, VIENNA, LONDON

PROTEIN | Separation Purification Characterization



A separation of chicken haemoglobin.

Research establishments, hospitals, and industry throughout the world have used LKB Ampholine Electrofocusing to successfully separate the following kinds of protein.

Endotoxins from bacteria (lipopolysaccharides)
Capsular polysaccharide from H. Influenza
Urine gonadotrophins of pregnancy (human)
Pituitary hormones
Amonuim Sulfate preparations of human serum
Blood coagulation proteins, namely FXII
Whole serum
Gamma globulin
Steroid binding γ-globulin
Transcortin cortisol binding β_1 globulin
γ-globulin, transferrins
Cytochrome c from beef heart
Biliverdin-protein in eel serum
Rat fetal protein from albumin
Immunoglobulins
Bovine serum
Albumin
Ovalbumin
Intact platelet mebranes
E. coli nucleases
Enzymes catalyzing sulphydryl —disulfide interchanges
Enzymes-cellulases (some proteases)
Butyrylcholinesterases from human brain
Pancreatic enzymes
Bromelain+acid phosphatase from ananas comosus
Arylsulphatases of aspergillus oryzae
Mitochondrial transaminases
D-aspartic oxidase
Glycosidases from fungal or bacterial source
Lactoperoxidase
Invertase from yeast
Ribosomal
Catalase
Acid phosphotases
DNA polymerase
Enzymes of carbohydrate metabolism
Neurospora crassa invertase
Alkaline phosphatase in eel intestinal mucosa
For myltetrahydrofolate synthetase from clostridium thermoaceticum
Haemoglobin
Isoenzymes of alcohol dehydrogenase
Soluble grape proteins
Influenza virus and adenovirus
Herpes simplex virus proteins
Renin (ovine, human)
Insulin
Glycopeptides of fibrinogen and platelets
Chondroitin sulfate glycoproteins
Myoglobin
Ferritin
Chemically modified myoglobin
Interferon samples from chicken eggs
High and low molecular weight glycosidases. Detergent-soluble glycosyltransferases (membrane bound)
Extracellular enzymes and toxins from staphylococcus aureus e.g. hyaluronate lyase

Have YOU a research problem that can be solved by LKB

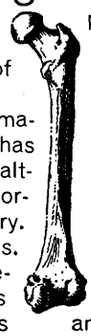
Ampholine?

Circle No. 11 on Readers' Service Card

Materials Research: advancing the development of artificial joints

A growing number of scientists doing research in prostheses use Instron test instruments to obtain precise data on mechanical properties of a variety of potential materials.

For example, in treating patients crippled by rheumatoid and osteoarthritis of the hip, a British hospital has utilized a complete hip joint replacement of cobalt-chromium-molybdenum alloy. There are several important factors in the permanence of the patient's recovery. One is the strength and durability of the materials. Instron test instruments play an important role by precisely measuring stress/strain data from specimens which are subjected to compression and tension loads for various periods of time.

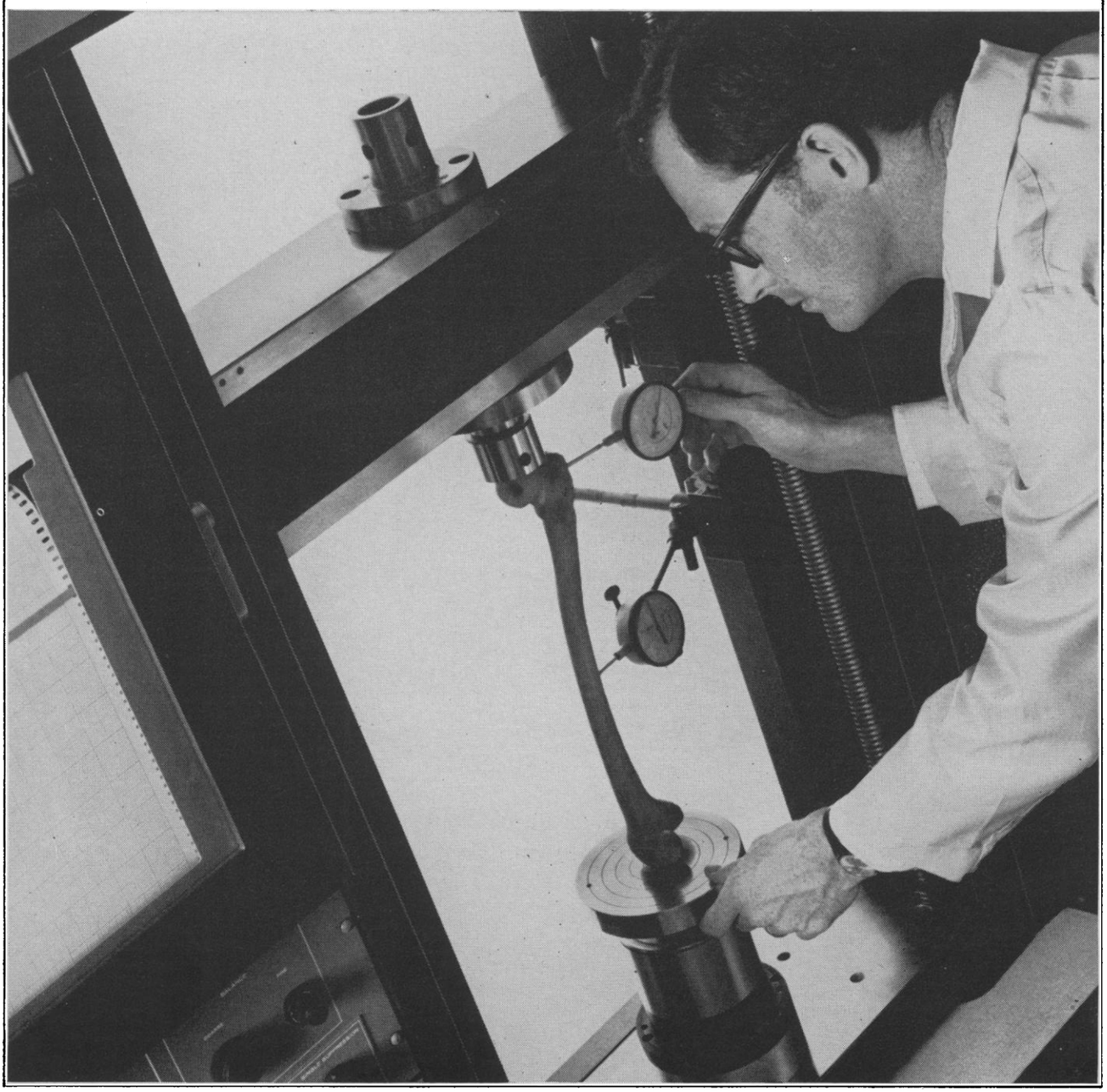


Other biophysicists are using Instron testers on development work for the knee and upper arm joints, determination of loads that will cause nerve parts to fail and exploring the biomechanics of healing wounds.

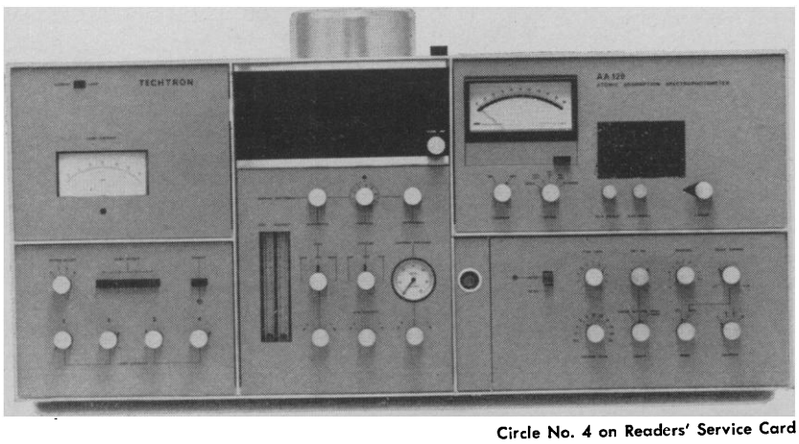
Because Instron equipment operates on exceptionally precise electronic and servomechanism principles, it is particularly suited to medical research in tensile, compressive and flow behavior as well as fatigue, resilience, stress/strain energy, hysteresis and many other physical properties. Also, Instron's modular design approach makes it economically feasible to buy only the equipment needed initially, and extend research capabilities by choosing from a complete line of fully modular accessories at any later date.

For copies of technical papers describing biological and related testing on Instron equipment together with a list of other papers of interest to scientists and engineers write today to Instron Corporation, Department S69, 2500 Washington St., Canton, Massachusetts 02021.

INSTRON



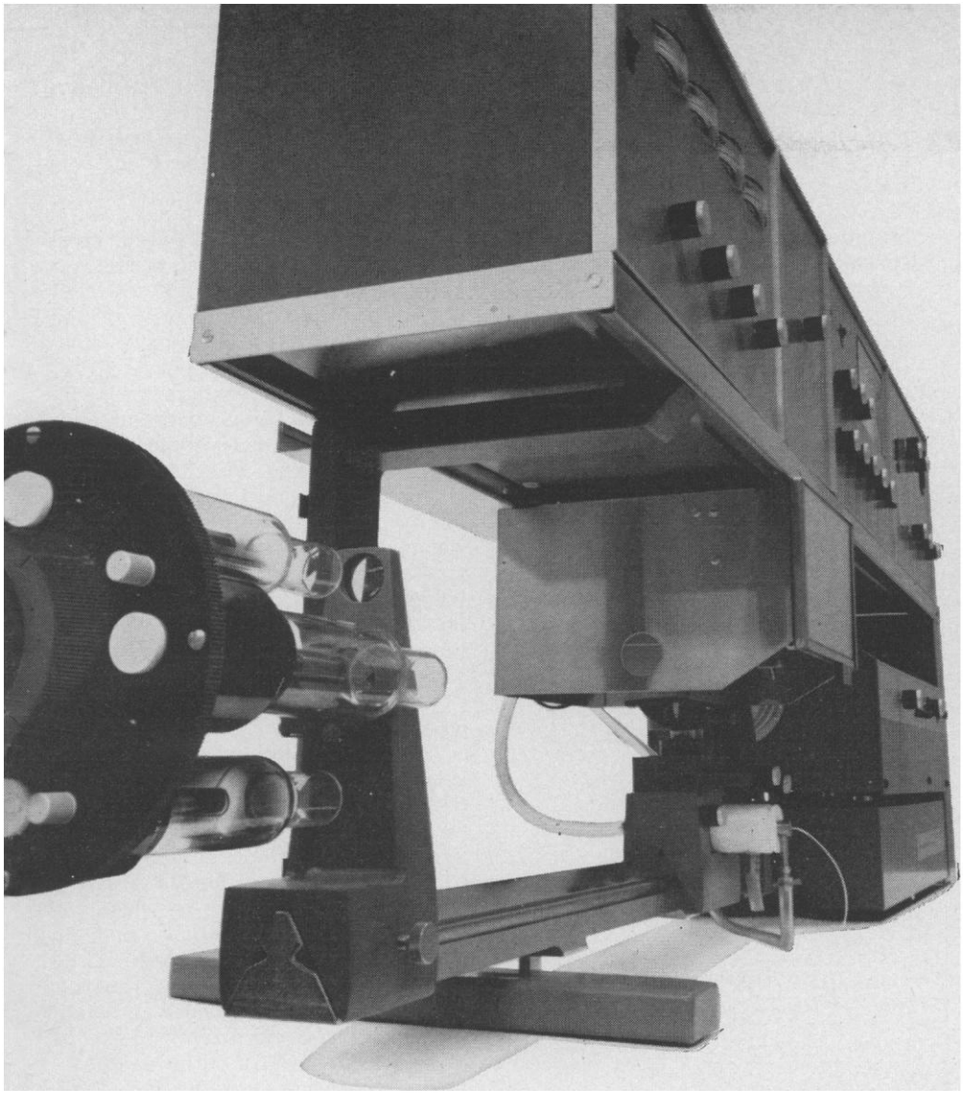
This atomic absorption spectrophotometer does everything but fly.



Circle No. 4 on Readers' Service Card

The new Varian Techtron AA-120 (left) is the finest medium-priced, all-purpose AA spectrophotometer ever built. It was designed for chemists who want the best possible performance for their money. But who don't especially plan on using the sometimes-far-out techniques being employed by today's research chemists.

The new AA-120 is completely modular in design and almost embarrassingly easy to operate and install. Its monochromator (0.25 meters, 1274 lines/mm grating) is smaller than that found on our research-oriented AA-5, but it takes a backseat to nothing in performance. The new monochromator also comes with variable slit height and slit-width adjustments; and its selectable optical filters reduce the effects of unwanted source radiation. Other AA-120 (and AA-5) features include direct concentration readout, being



This one does everything.

linear in % transmission or absorbance; variable absorbance scale expansion; zero suppression and automatic baseline correction.

Separately encased Readout, Amplifier and Power Supply modules are identical (except for some nice new convenience features) to those found on the AA-5.

The AA-120 holds four lamps in the same mounting as the AA-5 and any two may be operated in the standard instrument (or all four operated simultaneously when the supplementary power supply is included). As in the AA-5, burner adjustment has been simplified since the grooved titanium burner head may be positioned in three planes by external controls to obtain the best sensitivity.

Finally, flame emission may be used on the AA-120 when the accessory chopper (provision built-in) is activated by the flick of a switch.

OUR ULTIMATE RESEARCH WEAPON (Above)

Introduced late last year, the Varian Techtron AA-5 is the most versatile AA spectrophotometer ever made. It was designed for the research chemist who demands highest performance and the facility to let him experiment with a never-before-tried technique when he feels the urge.

The AA-5 is completely modular and electronically identical to the AA-120. And, with its optical rail, it readily adapts to emission or fluorescence studies.

COMPLETE, VERSATILE LINE

We now have the best research instrument (AA-5) and the best medium-priced, all-purpose instrument (new AA-120) in the industry.

And to complete the line, we've got the AA-100: a low-priced, not-so-fancy-looking, but good performance spectrophotometer (the only one in the group that can operate from a 12 volt battery).

To back up these instruments is a complete line of accessories, including more than 65 single and multi-element hollow cathode lamps, digital indicators, digital printers, and digital curve correctors. Just introduced, our automatic sample changer (capacity 60-200 samples) helps to automate routine analyses.

If you'd like to see and test any of the Varian Techtron AA instruments in your own lab, just ask us. We'll arrange for a free demonstration.

For a catalog which describes the Varian Techtron line in complete detail, write Cary Instruments, 2724 South Peck Road, Monrovia, California 91016. Cary is a Varian subsidiary and the United States sales and service agent for Varian Techtron Pty., Ltd., Melbourne, Australia. Ask for data file **E903-109.**

varian techtron

How EAI analog computers brought happiness to physiological data analysis

The use of digital computers to reduce experimental data in physiological investigations has proven to be no small boon. Just check with the man who used to perform the tedious, time-consuming calculations by hand.

Yet now there is a dramatic and clean-cut improvement on the improvement: EAI analog/hybrid computers. And that improvement comes in always important realms: results, time and — inevitably — money.

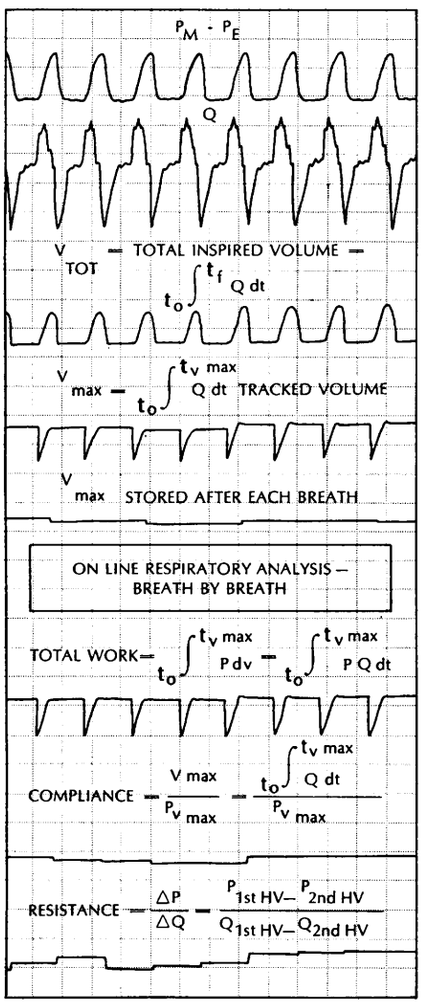


Figure 1.

Let's start with time. An analog/hybrid computer can be had for a fraction of the cost of a comparably adequate digital computer (there's money sneaking in already). That means it's feasible to tie the computer *directly* into the experiment. On-line operation, so-called. And because an analog/hybrid computer calculates essentially instantaneously, the results of the data reduction are plotted and presented to the researcher *simultaneously* with the event.

Refer now to Figure 1, which represents an analysis and display of respiratory characteristics. The two events at the top are chest pressure and volumetric flow rate through the trachea which are measured directly from the subject with appropriate transducers and presented to the analog/hybrid computer as voltage levels.

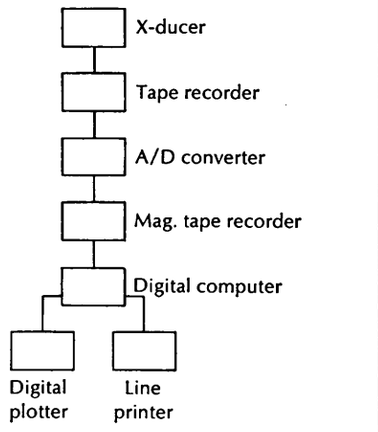


Figure 2. Digital computation. Complex, costly and cumbersome.

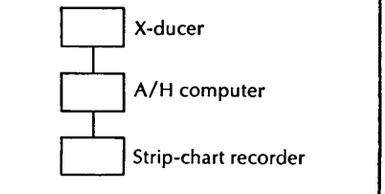


Figure 3. Analog/Hybrid computation. Short, sweet, swift and sure.

The analog computer performs the required calculations and presents the results on the stripchart recording simultaneously with the direct measurements.

Notice that, unlike most digital analytical techniques, the business of recording on magnetic tape, processing the tape through a digital computational facility, and waiting for the results is eliminated. This can mean reducing project time from months to days. Or from days to hours.

Now in terms of results. Because the experimenter can work on-line with an analog/hybrid computer, he sees what is happening *while* it's happening. Thus, he can perceive a trend, and modify or end his experiment accordingly. Moreover, because an analog/hybrid computer works directly to the recorder in voltages, the inelegant (and, not infrequently, less accurate) transformation of voltages-to-bits-to-voltages is eliminated, as shown in Figures 2 and 3. And very often in digital techniques, for economic reasons, compromise methods of calculation are used with further degradation of results.

Even if you don't want to work on-line, an analog computer is still the best way to go. You record voltages onto FM tape. Compute with voltages. Display voltages. Of course, unlike on-line, you do lose instantaneous interaction. But time and money are still saved. Results are still superior.

Equally dramatic improvements in physiological research are being attained by EAI analog computers in cardiovascular work and in the investigation of the human pupil servomechanism, membrane permeability, blood flow dynamics and pharmacokinetics to name a few. Our people can also suggest some startling uses for these remarkable machines to monitor patients in ways never before possible.

A letter or phone call will bring you helpful informed assistance complete with an actual demonstration of equipment at your facility. We're waiting to help. Electronic Associates, Inc., West Long Branch, N.J. 07764.

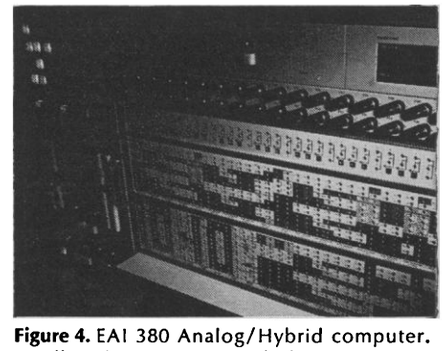


Figure 4. EAI 380 Analog/Hybrid computer. Smallest, least-expensive desktop computer available with hybrid capability.

EAI.

See us at NIH

Thelco. Still the leader fifty years later!

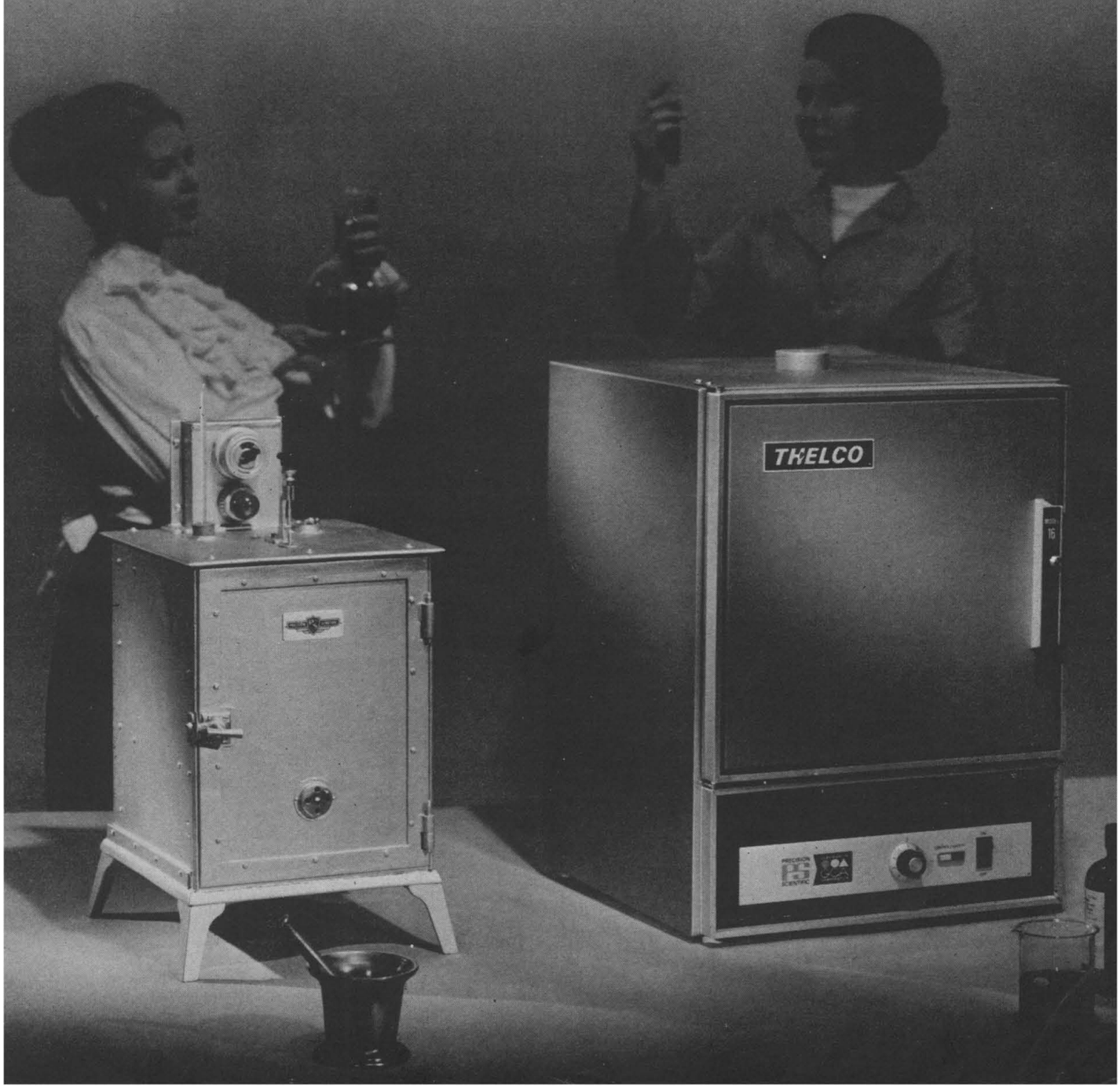
A complete new line of Thelco Ovens, Vacuum Ovens and Incubators. Great new design and appearance to compliment any laboratory. New features for convenience and performance. Traditional built-in quality and *guaranteed uniformity.* It all adds up to Thelco value . . . best for half a century and now better than ever!

You'll like the all stainless steel interiors (exclusive in this competitive price range) . . . the single-knob dual thermostat . . . the large work chambers with movable, pull-out (but no drop) shelves . . . the smooth working door release. But, most of all, you'll like the performance . . . the unequaled temperature uniformity throughout the chamber . . . and the way your new Thelco will keep on giving you trouble-free service year after year.

Thelcos cost less in the long run . . . little, if any, more to begin with . . . so why take a chance. Ask your nearby Precision Scientific Dealer or write Precision Scientific Co., 3737 W. Cortland St., Chicago, Ill. 60647. Leaders in constant temperature equipment.

PRECISION PS SCIENTIFIC

SUBSIDIARY OF GCA CORPORATION

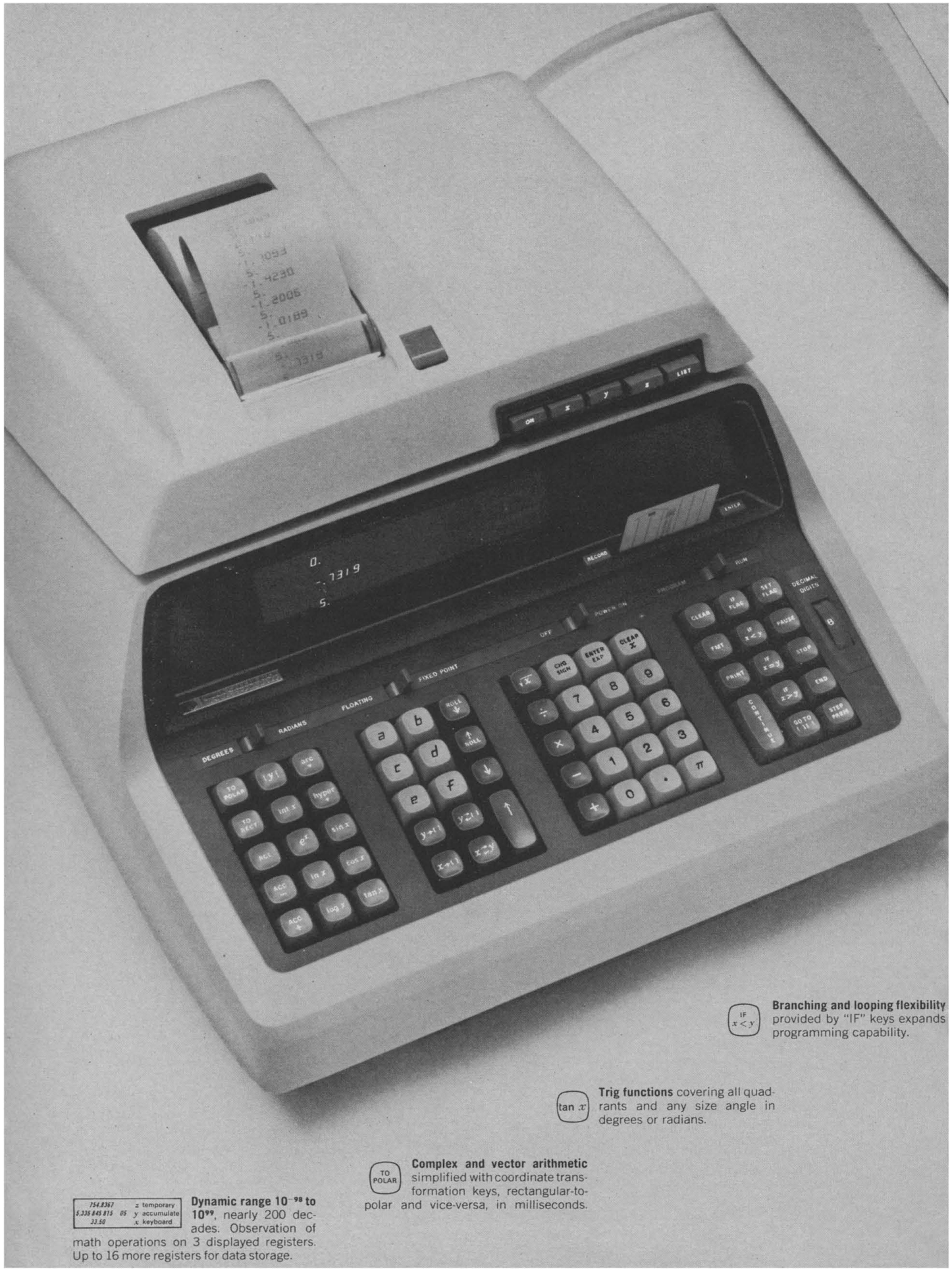


We could call ourself

Acme • Advanced Instrument • Ainsworth • Alconox • American Optical • Ames • H. Reeve Angel • BBL • Barnstead • Bausch & Lomb • Becton, Dickinson • Bioquest • Blue M • Bronwill • Browne-Morse • Buchler • Buehler • Cahn • Cambridge • Clay-Adams • Coleman • Coors • Corning • Coulter • Dade • Difco • Dillon-Lilly • Eaton-Dikeman • Edmont-Wilson • ERTCo • Falcon • Federal Pacific • Fermentation Design • Forma • Foster • Gelman • Glas-Col • Hamilton • Harleco • Hausser • Hycel • Instrumentation Laboratory • IEC • Jewett • Kimble • Labconco • Lab-Line • Lab-Tek • Lakeside • LaMotte • Leco • Lindberg • Lourdes • Magnuson • Mallinckrodt • Market Forge • Markham • Maryland Plastics • Matheson Coleman & Bell • Mettler • Nalge • Napco • Ohaus • Orion • Oxford • Pharmaseal • Photovolt • Polyscience • Precision • Revco • Rinco • Roehr • Sage • S & S • Scientific Industries • Sherwood • Sylvana • TekPro • Thermolyne • Torsion Balance • Turner • Tyler • Ultra Violet • VirTis • Voland • Wampole • Warner-Chilcott • Welch • Westinghouse • Wheaton • Wilmot Castle • Yellow Springs, Inc.

You can call us S/p for short

Our Founders called us Scientific Products. Our friends call us S/P. Our competitors call us lots of names, with good reason. We represent over 100 leading laboratory equipment manufacturers and stock over 100,000 items in 16 regional sales and distribution centers with 5,415,000 cubic feet of space and our 230-man field representative organization virtually blankets the industry and we service every item we sell and that's a mouthful nobody else can say. If you're not yet a friend, you'll find us listed under the name Scientific Products in the Yellow Pages in most major cities. Once we get to know one another, it won't take long before you're calling us S/P for short. S/P... the single source for laboratory equipment, supplies, scientific instruments. Scientific Products, a division of American Hospital Supply Corporation, 1210 Leon Place, Evanston, Illinois 60201.



Branching and looping flexibility provided by "IF" keys expands programming capability.

Trig functions covering all quadrants and any size angle in degrees or radians.

Complex and vector arithmetic simplified with coordinate transformation keys, rectangular-to-polar and vice-versa, in milliseconds.

754.8367	z temporary
5.336 845 815 05	y accumulate
33.50	x keyboard

Dynamic range 10^{-98} to 10^{99}, nearly 200 decades. Observation of math operations on 3 displayed registers. Up to 16 more registers for data storage.

Now the emancipator... computes, plots and

Prints Quietly

The HP 9100A Calculator frees you from the drudgery of complex problem solving.

The HP 9125A Plotter frees you from the tedium of hand-plotting graphs.

And now, the quiet HP 9120A Printer frees you from the manual transfer of data.

Add up these three capabilities, and what do you have?

THE ONLY TOTAL GRAPHIC COMPUTING SYSTEM AVAILABLE TODAY FOR $204 PER MONTH!

With this new electro-sensitive printer you speed up your computations by eliminating the need to record results. You get a permanent record of all inputs — a record that makes error tracing quicker and easier. And, you have printed proof of all your computations.

The 9120A printer gives you maximum flexibility in what you print. You can print all of the displayed information; a complete listing of the program instructions stored in memory; or only the information you specify. The 9120A does this printing at the rate of 3 lines per second — without the distracting noise of a mechanical printer.

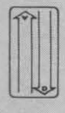
You get completely documented calculator programs that are specifically designed for use with the plotter and printer. And, you can put this system to work for you today, not sometime in the distant future.

If you want a printer that operates quietly in an office environment — if you want a low-cost system that gives you total graphic solutions — call for a quiet demonstration of the complete emancipator today.

To put this total system to work for you even faster, send your purchase order to any Hewlett-Packard Sales and Service office (located in principal cities throughout the world). For a 22-page brochure, write Hewlett-Packard, P. O. Box 301, Loveland, Colorado 80537. Europe: 1217 Meyrin-Geneva, Switzerland.

Price: HP 9100A Calculator, $4,400; HP 9120A Printer, $975; HP 9125A Plotter, $2,475. Lease/rental plans start as low as $1.50/computing hour based on average usage.

099/32



Program from the keyboard. Record and store 196-step programs on credit-card-size magnetic cards for repeated use.

Edit programs easily. Single-step through programs to check and de-bug. Address an individual step and make corrections without re-entering the entire program.

HEWLETT hp PACKARD

Circle No. 49 on Readers' Service Card

Now you don't have to wait until you can afford an expensive multiple sample automatic counter before you start liquid scintillation counting. The new β-Mate I and β-Mate II are high performance, single sample, soft-beta counting spectrophotometers that do the job for a price you can afford.

β-Mate I is ideal for teaching nuclear counting and tracer techniques, using the same procedures as if the student were using a 200-sample, automatic liquid scintillation counting system.

β-Mate II is a research instrument which offers the highest guaranteed analytical specifications available for single sample, manual, soft-beta particle counters.

Both models combine the utmost simplicity and economy with the latest counting techniques. Either way, β-Mate I or β-Mate II, it's good news for your laboratory.

The kind of news you'd expect to come from Beckman, the leader in liquid scintillation.

To receive all the specifications, write for Data File 405, Scientific Instruments Division, Beckman Instruments, Inc., 2500 Harbor Blvd., Fullerton, Calif. 92634.

Beckman
INSTRUMENTS, INC.
INTERNATIONAL SUBSIDIARIES: AMSTERDAM; CAPE TOWN; GENEVA; GLENROTHES, SCOTLAND; LONDON; MEXICO CITY; MUNICH; PARIS; STOCKHOLM; TOKYO; VIENNA

New β-Mate™. Shortcut to liquid scintillation.

Circle No. 42 on Readers' Service Card

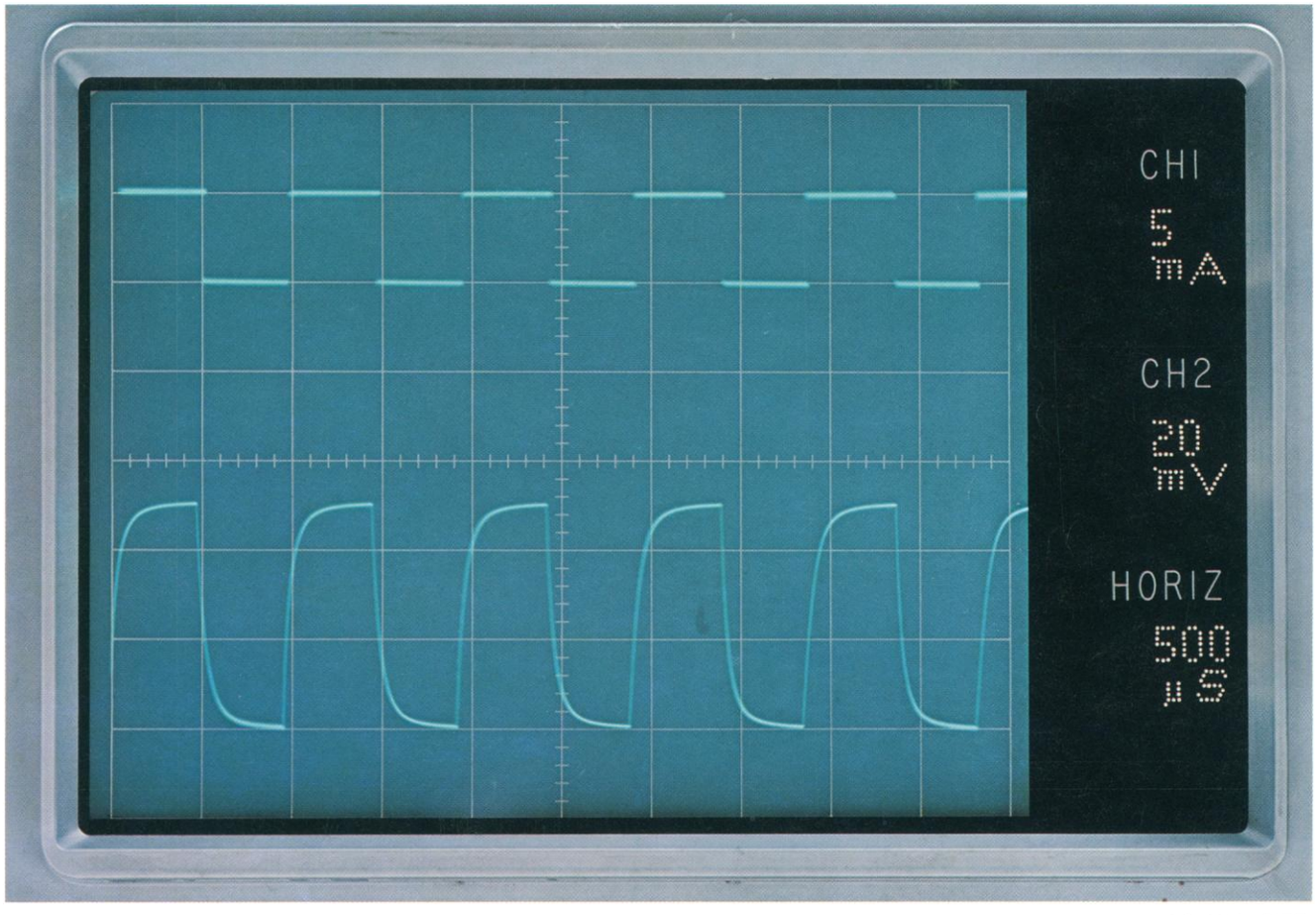
Circle No. 1 on Readers' Service Card ⟶

TEKTRONIX

product report
dual-beam

A NEW Dual-Beam Oscilloscope

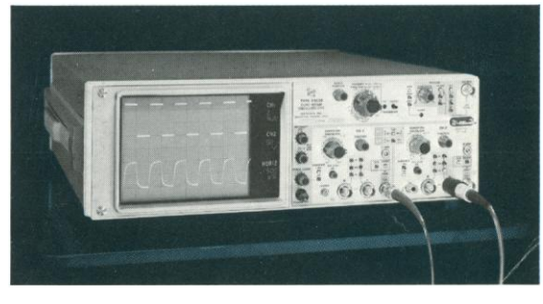
The Viewing Area



ACTUAL SIZE

Put a 6-1/2" CRT in your 5-1/4" rack . . .

. . . or on your bench!

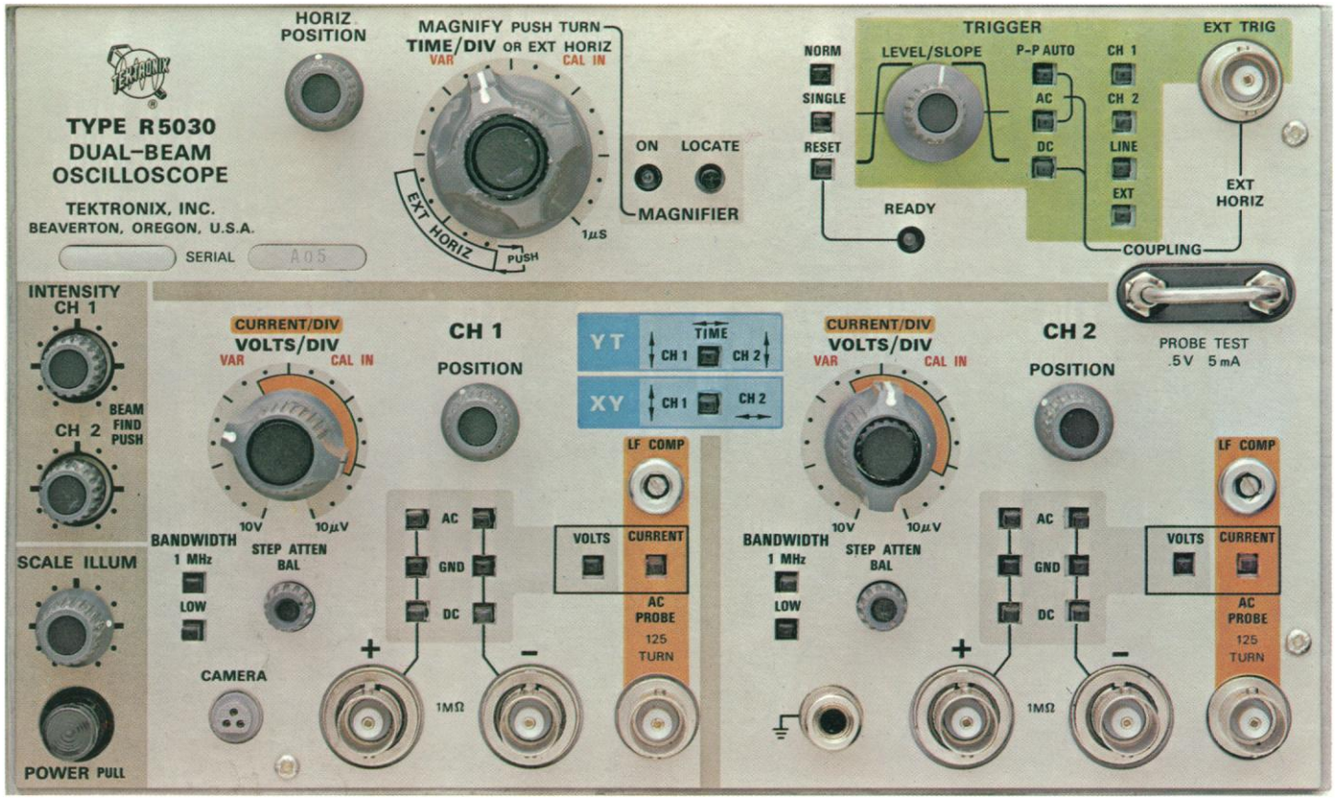


With the Type R5030, all the data required to make your measurement is where you need it . . . in the viewing area.

Scale-factors are read out immediately to the right of the 8 x 10 div CRT. Scaled in divisions equal to 1.27 cm, the CRT provides 50% more viewing area than a standard 8 x 10 cm CRT. Each beam has a full 8 x 10 div scan, separate intensity control and push-button beamfinder.

please turn page for additional information →

The Control Panel



easy to use

The complementary color scheme of the control panel of the Type R5030 aids the user in readily distinguishing various control functions.

Current probe inputs for each beam with deflection factors from 1 mA to 200 mA/div are outlined in a salmon color. The bandwidth of the current inputs is from 10 Hz to 1 MHz.

Differential or single-ended voltage inputs are provided with 19 calibrated deflection factors from 10 μV to 10 V/div. The scale-factor readouts are corrected automatically when an attenuation probe is attached to the input. Bandwidth is DC to 1 MHz at all deflection factors. However, bandwidth may be limited to $\approx$ 5 kHz to eliminate wide-band noise.

A greatly simplified trigger circuit is outlined in green. With the addition of a peak-to-peak auto mode and a combined level/slope control, the operator will find it difficult, if not impossible, to obtain a nontriggerable condition.

Mode switching has been set aside in a blue panel area where switching from a dual beam Y vs T display to an X vs Y display is as simple as pressing a button.

Rackmount, order Type R5030 ..... $1850

Low-Profile Cabinet, order Type R5030, Option 4 ..... $1850

U.S. Sales Prices, FOB Beaverton, Oregon

For a demonstration, call your local Tektronix Field Engineer or write:
Tektronix, Inc., P.O. Box 500, Beaverton, Oregon 97005

Tektronix, Inc.

committed to progress in waveform measurement

This page contains everything you need to do life sciences GC extraordinarily well.

Our Model 2100 is the best "U" column gas chromatograph ever made. It was designed specifically for life science and bio-medical applications. By people who know what they—and you—are doing.

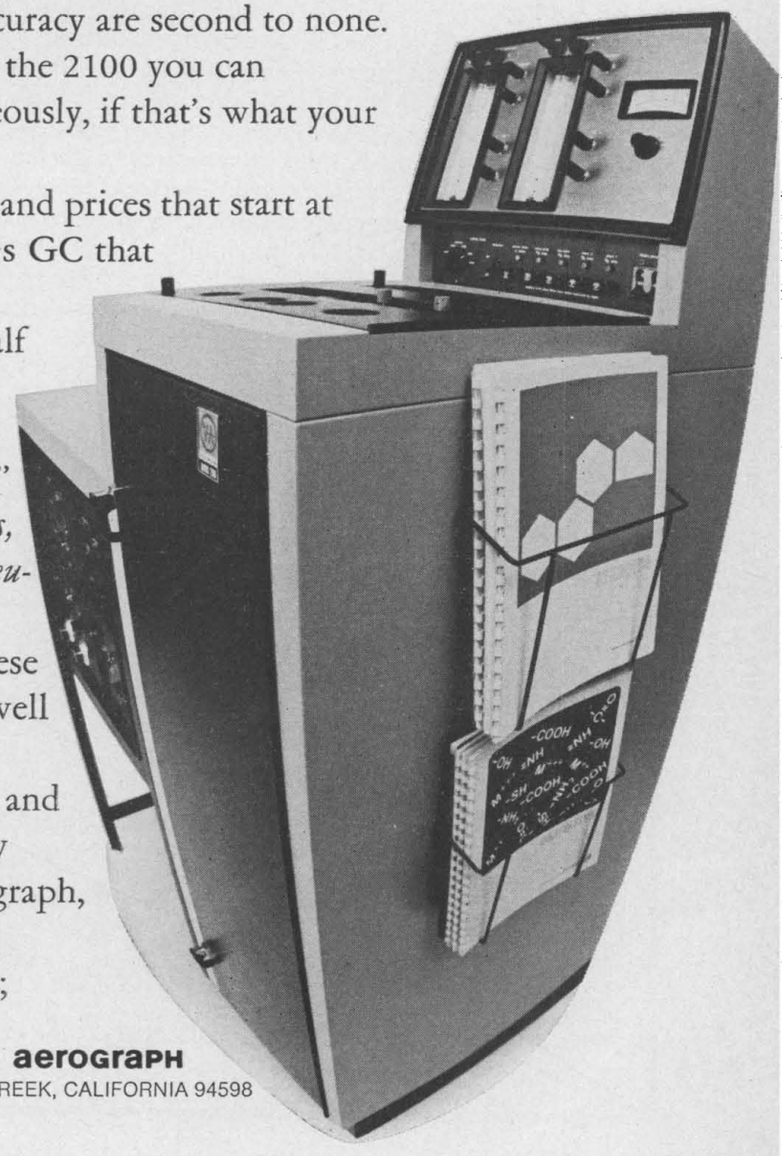
The 2100 is an all-glass system with on-column injection so that you can analyze even the most labile compounds with complete confidence. You get virtually no dead volume and precision and accuracy are second to none.

Then there's versatility. With the 2100 you can operate up to four columns simultaneously, if that's what your workload calls for.

Add fast, personalized service and prices that start at $4100.00 and you've got a life sciences GC that nobody else can touch.

But our instrument is only half the story. The other half is a series of unique life sciences GC methodology books. Each a procedural "cook book" in itself. Our titles include: *Fatty Acids, Steroids, Lipids, Carbohydrates, Pharmaceuticals & Drugs* and *Alcoholic Beverages.*

You can have any or all of these fine books with our compliments as well as a detailed product bulletin on the Model 2100. Simply write your name and the books you want on your company letterhead and mail it to Varian Aerograph, Walnut Creek, California 94598; Zug, Switzerland; Malton, Ontario, Canada; Crows Nest, N.S.W., Australia; Tokyo, Japan.

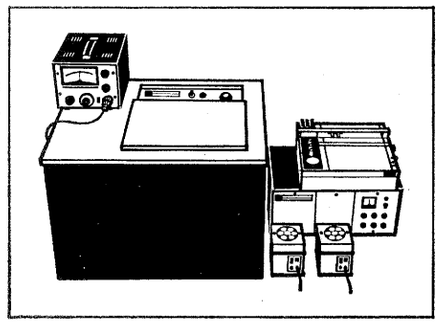


varian aerograph
WALNUT CREEK, CALIFORNIA 94598

← Circle No. 1 on Readers' Service Card

Circle No. 50 on Readers' Service Card

The LKB Microcalorimetry System:
A well-designed and compact instrument
capable of a precision
of 0.05% for large heat quantities
and better than 1% if 1.10^{-3} cal. is evolved.



LKB IN THE SERVICE OF SCIENCE

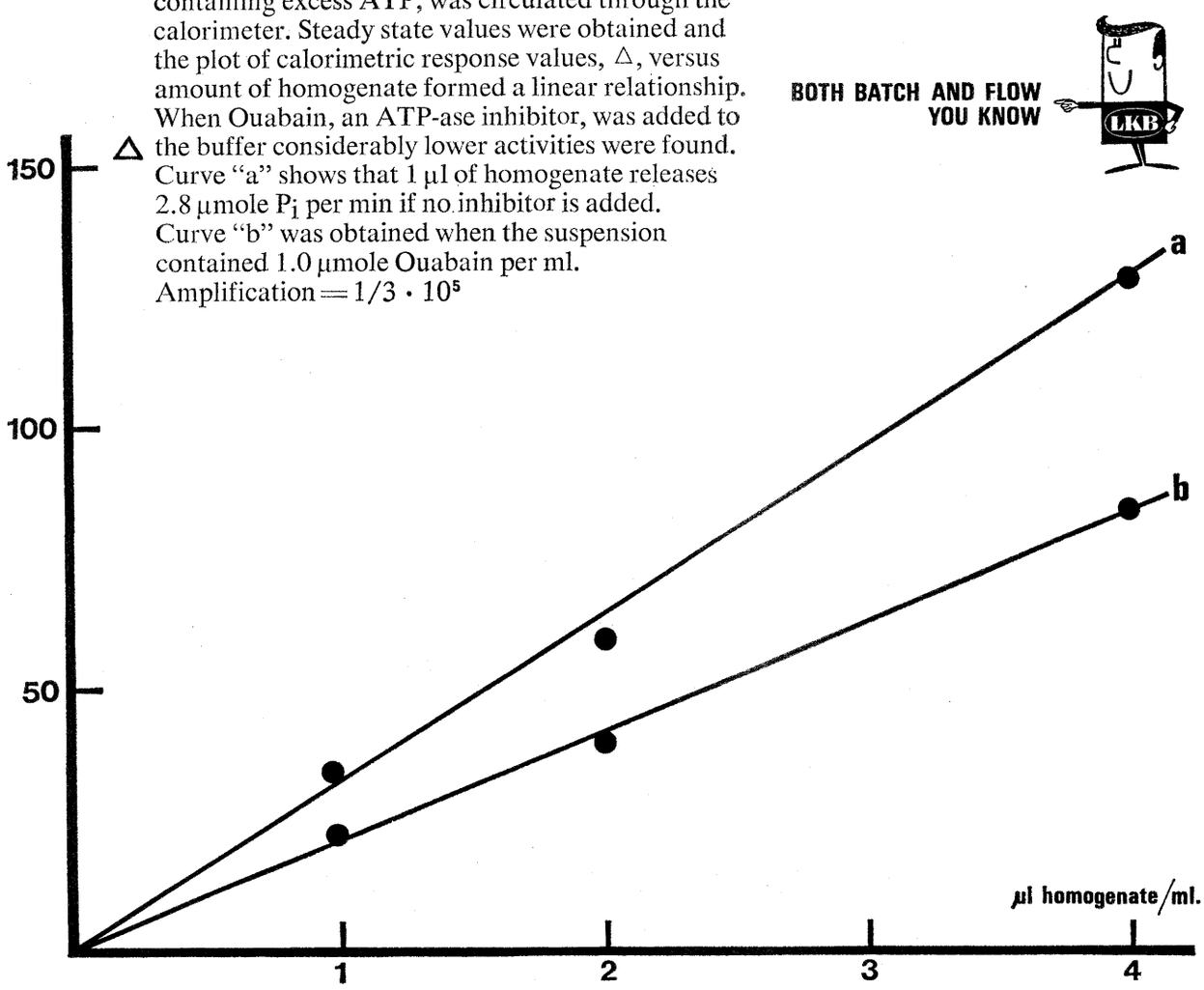
LKB INSTRUMENTS INC. • 12221 PARKLAWN DRIVE • ROCKVILLE Md. 20852

SALES AND SERVICE THROUGHOUT THE WORLD:
STOCKHOLM, THE HAGUE, COPENHAGEN, ROME, VIENNA, LONDON

Microcalorimetry for the Biochemist

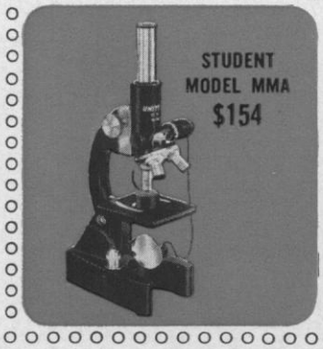
An Application that shows the unique possibilities that exist for physicists, biologists, physical chemists and biochemists to use biochemical calorimetry. Determination of ATP-ase activity in a tissue homogenate. Prepared from rat Kidney cortex, the homogenate, in suspension in an imidazole buffer containing excess ATP, was circulated through the calorimeter. Steady state values were obtained and the plot of calorimetric response values, △, versus amount of homogenate formed a linear relationship. When Ouabain, an ATP-ase inhibitor, was added to the buffer considerably lower activities were found. Curve "a" shows that 1 µl of homogenate releases 2.8 µmole P_i per min if no inhibitor is added. Curve "b" was obtained when the suspension contained 1.0 µmole Ouabain per ml. Amplification = $1/3 \cdot 10^5$

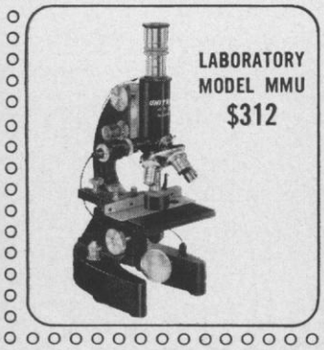
BOTH BATCH AND FLOW
YOU KNOW

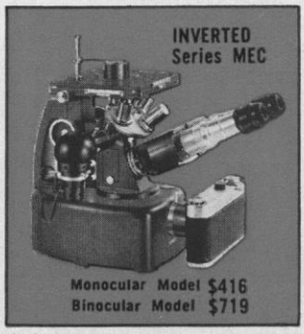


Circle No. 10 on Readers' Service Card

UNITRON... your complete source for
Microscopes with the Metallurgists' Stamp of Approval


STUDENT
MODEL MMA
$154


LABORATORY
MODEL MMU
$312


INVERTED
Series MEC
Monocular Model $416
Binocular Model $719

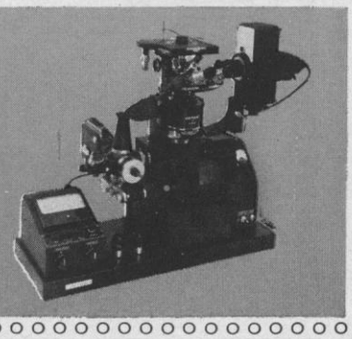

SERIES TM
UNIVERSAL
MEASURING
$1070 up


ROLLSCOPE
DMR
For large
surfaces
$415

"SERIES N" METALLOGRAPHS

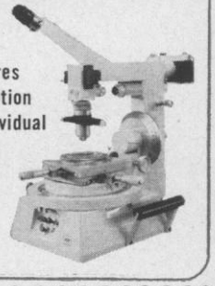
New budget-priced models with flatfield objectives, widefield eyepieces, coaxial stage controls, and many optional accessories. Models with combined xenon-tungsten or tungsten illumination available.

From
$1398 up



MICROGONIOMETER

Measures orientation of individual grains

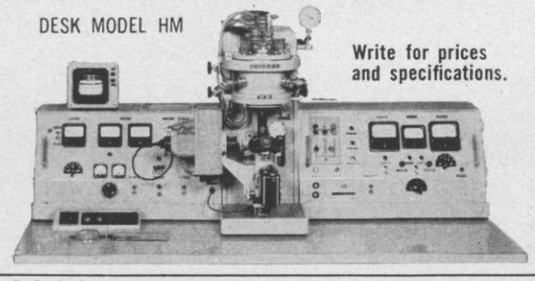



HTL HIGH TEMPERATURE
LABORATORY INSTALLATION

UNITRON'S HIGH-TEMPERATURE RESEARCH METALLOGRAPH

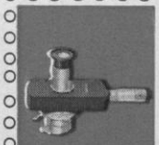
DESK MODEL HM

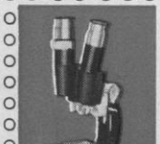
Write for prices and specifications.




HHS Vacuum Heating Stage for 1500°C. $625

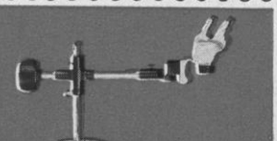

Austenite Grain Size Eyepieces:
Turret Type $76
KeloX $25


Widefield Filar Micrometer $105


Stereoscopic MSL.....$110


Stereoscopic MSF $145


Stereoscopic MSHL.....$267


PILLAR STAND FOR STEREOSCOPIC MODELS.....$75

10 DAY FREE TRIAL

A salesman's demonstration gives you only about 30 minutes to examine a microscope . . . hardly the best conditions for a critical appraisal. But UNITRON's Free 10 Day Trial allows you to evaluate the microscope in your own lab, and prove its value to you, in your own work, before you decide to purchase.

WRITE FOR OUR FREE CATALOG

The UNITRON catalog is your buying guide to a complete line of microscopes and accessories for every application. Write for your copy and see why UNITRON Microscopes have The Metallurgists' **Stamp of Approval.**

☐ Please send UNITRON's Microscope Catalog No. M-4
☐ I want a FREE, no-obligation, trial of Model . . .

NAME_____DEPT._____
COMPANY_____
ADDRESS_____
CITY_____STATE_____ZIP_____

MICROSCOPE SALES DIVISION
UNITRON INSTRUMENT COMPANY
66 NEEDHAM STREET
NEWTON HIGHLANDS
MASS. 02161

Circle No. 19 on Readers' Service Card

You can depend on Amersham/Searle...for product or service...

We weren't in business under the Amersham/Searle name when Werner Heisenberg said

$$\triangle p \cdot \triangle q \geq h,$$

declaring that the state of the object observed cannot be known for the reason that it is altered by the very act of observation.

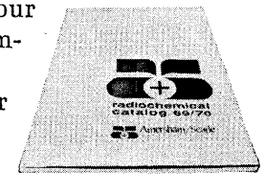
But it is a certainty that The Radiochemical Centre, which is operated by the United Kingdom Atomic Energy Authority, has made its own mark in history. And it's a certainty that G. D. Searle & Co. has earned eminence in pharmaceutical research.

If it is a labelled compound, you can be certain of the highest specific activity and the chemical and radiochemical purity.

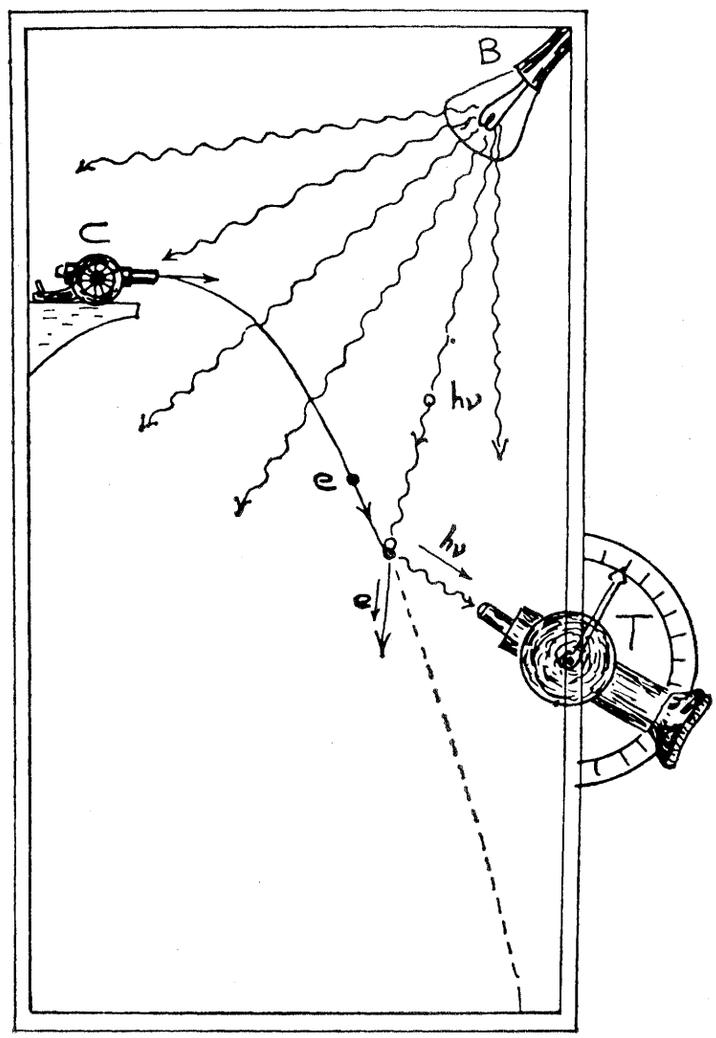
If it is a radioisotope, a solution or liquid scintillation standard, anything from our comprehensive line of nuclear laboratory supplies and accessories, it is right—exactly.

If it is information or any other service, you can count on it. Call our Customer Service Department in Des Plaines, Illinois. That's what we're here for. Find out about our labelled compounds.

Send for our first edition.



there's one thing you can be certain of, Dr. Heisenberg

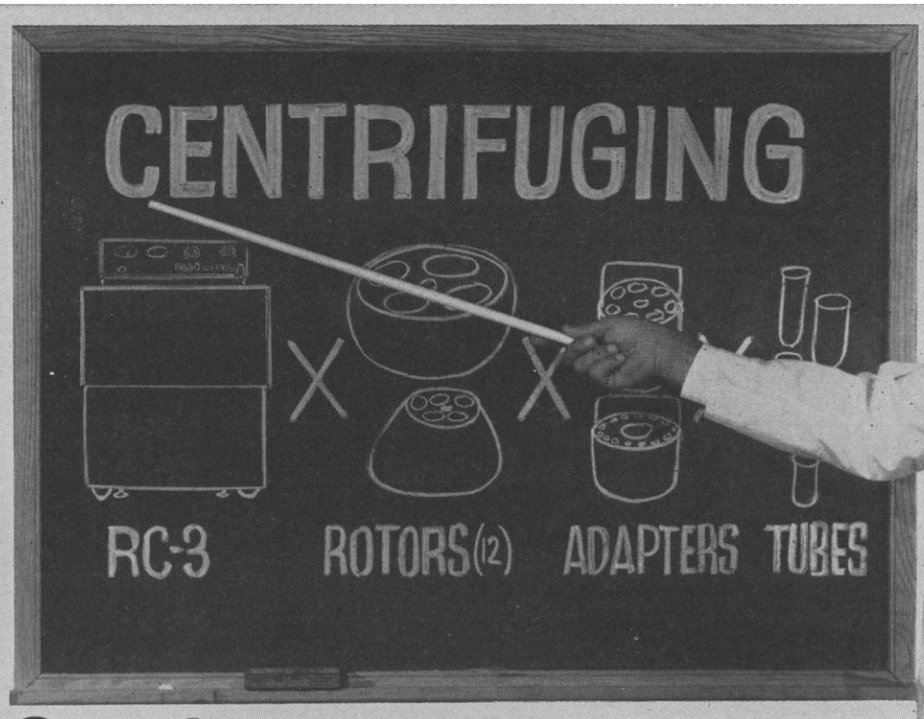


2000 NUCLEAR DRIVE, DES PLAINES, ILLINOIS 60018 TELEPHONE: (312) 296-1055

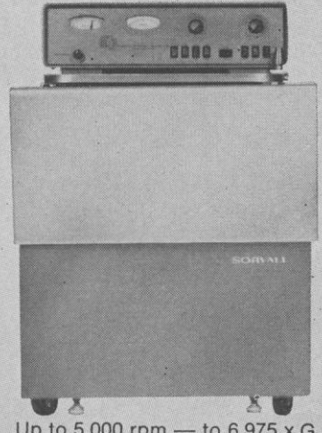
Amersham/Searle

AMERSHAM/SEARLE CORPORATION:
AN ACTIVITY OF G. D. SEARLE & CO. AND THE RADIOCHEMICAL CENTRE

"From THIRTY YEARS THAT SHOOK PHYSICS by G. Gamow, illus. by G. Gamow, copyright 1966 by Educational Services, Inc., pub. by Doubleday & Co., Inc."



Gentlemen: This Is Real Versatility

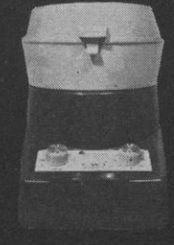


Up to 5,000 rpm — to 6,975 x G

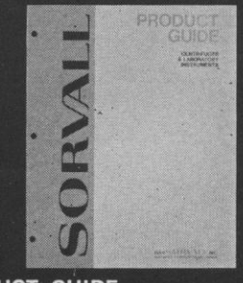
That's a fact! Twelve angle, horizontal, and special-purpose rotors; a wide variety of adapters; a huge selection of tubes — all equate to unequalled centrifuge versatility. And it is all supported by the unresuspending smoothness of SORVALL's patented Gyro-Action Direct Drive. Low-temperature precision-built advantages and automatic programming save you time. For research, clinical, routine, and blood programs, the answer is the RC-3 Automatic General-Purpose Refrigerated Centrifuge. The RC-3 can help you smoothly and reliably with almost any task. Ask for descriptive literature. Ivan Sorvall, Inc. Norwalk, Connecticut 06856.

SORVALL®

GLC-1 GENERAL LABORATORY CENTRIFUGE
RCF's to 4,950 x G. Speeds to 6,000 rpm with angle rotors/hundreds of tube combinations with horizontal rotors. Performance comparable to floor models in a foot-and-a-half of lab space, and with greater drive.



CW-1 CELL WASHING SYSTEM
Two-Speed — 3,600 and 1,200 rpm. Built-in Automatic Decanting. Automatic filling with the AF-1 Filling Device. Sets the standard in cell washing with accurate reproducibility.



PRODUCT GUIDE
Comprehensive brochure gives details and specifications of all SORVALL products.

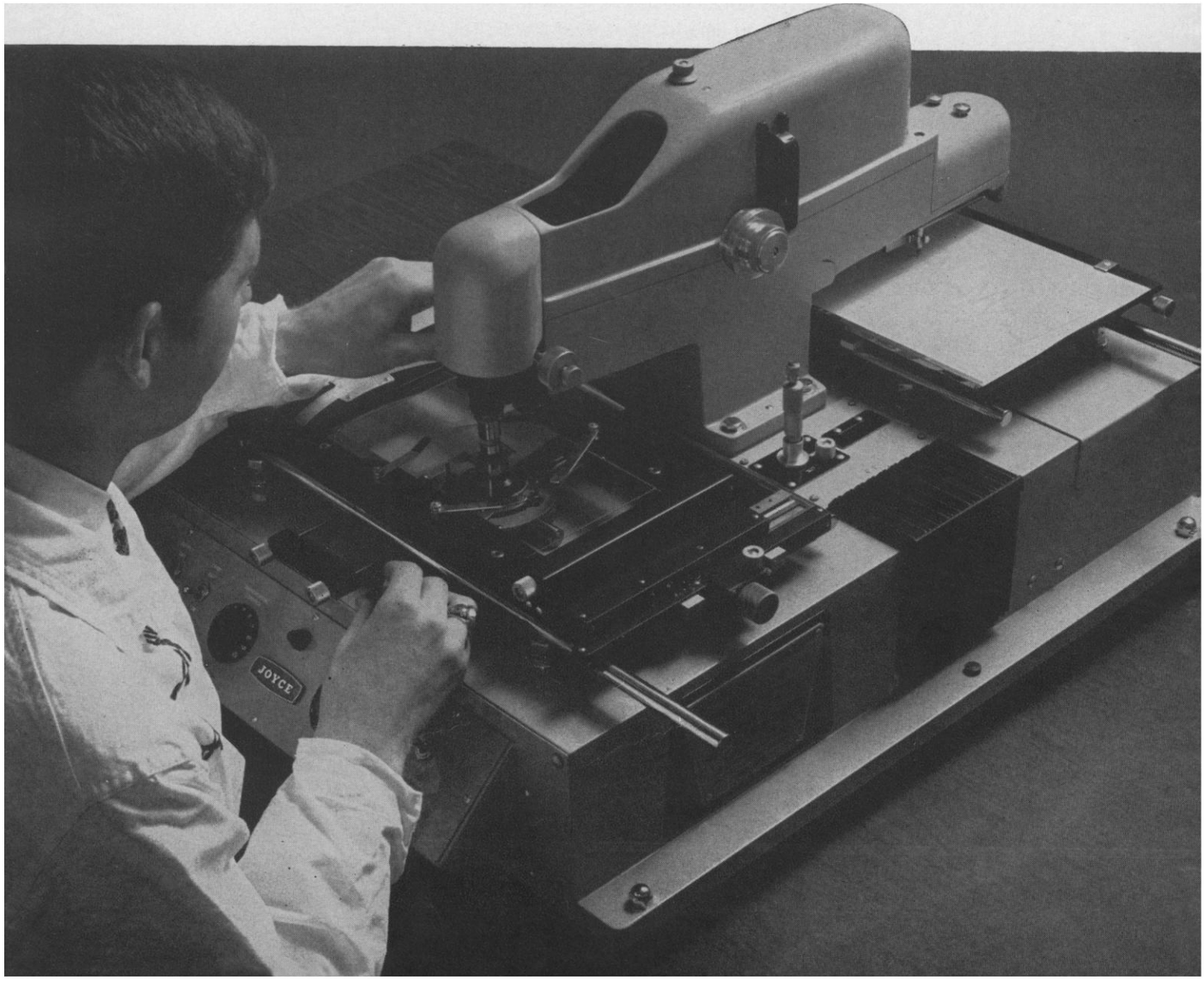
Are you using photography for recording *quantitative data?* Should you?
The Joyce, Loebl Double-Beam Automatic Recording Microdensitometer Mark IIICS provides a quick, easy, reliable way to get a lot more out of film than just a picture. Whereas your eye tells you one spot is relatively "bright", the Microdensitometer tells you exactly how bright, and how much brighter one spot is than another.
It scans a negative or positive along straight or circular lines, accurately measuring and recording optical density throughout the scan . . . prints out graphs of density vs. position on the specimen. Information about brightness, physical density, thickness, temperature, or *any* phenomena that you can record as a variation of photographic density can now be measured and recorded. The reliable double-beam, null balance design makes the Joyce, Loebl Microdensitometer unusually stable and repetitive. It is clearly established as the leading instrument of its kind, for such diverse applications as measuring mountains on the moon — radiography — cell research — high resolution mass spectrography — X-ray diffraction and U.V. absorption studies — air reconnaissance and meteorology. It's available with many helpful accessories including computer interface equipment. **Better than ever through Tech/Ops national sales and service organization.**
To find out exactly what these remarkable measuring tools can do for you, write to Joyce, Loebl & Co., Inc., an affiliate of Technical Operations, Incorporated, Department K-10, Bldg. 3, South Avenue, Burlington, Mass. 01803.

tech/ops

The Joyce, Loebl Double-Beam Microdensitometer

. . . for recording a wide range of increments of optical density in film

Circle No. 45 on Readers' Service Card



stop the biologic clock

A cryogenic refrigerator holds biologic specimens unchanged until it's time to retrieve them. Cryogenic storage is a practical way to preserve virtually anything—tissues, cells, microorganisms, or enzymes. Cultures now can be stored for extended periods without the bother and risk of subculturing.

Is cryogenic storage complicated? The answer is a simple no. A cryogenic refrigerator using liquid nitrogen as a refrigerant has no moving parts... no machinery to break down or take up space. Racking systems enable easy storage and retrieval at −196°C to −100°C. Try that with a conventional laboratory refrigerator.

Now is the time to learn what cryogenics can hold in store for your laboratory. Return the coupon and we'll send a free report on cryobiologic techniques and more information on our cryogenic refrigerators, storage and retrieval systems. Or, if you request, we'll have a representative call.

with cryogenic refrigerators

UNION CARBIDE **CRYOGENIC PRODUCTS**

Union Carbide Corporation, Linde Division, Cryogenic Products Department,
270 Park Avenue, New York, N.Y. 10017

UC 4A69

Circle No. 67 on Readers' Service Card

Union Carbide Corporation, Linde Division, Dept. JRL
270 Park Avenue, New York, N.Y. 10017
☐ Send me a copy of Cryobiology and further information on your cryogenic equipmer
☐ Have your representative call me.

SM-3

(Please Print or Type)

Name

Company

Title

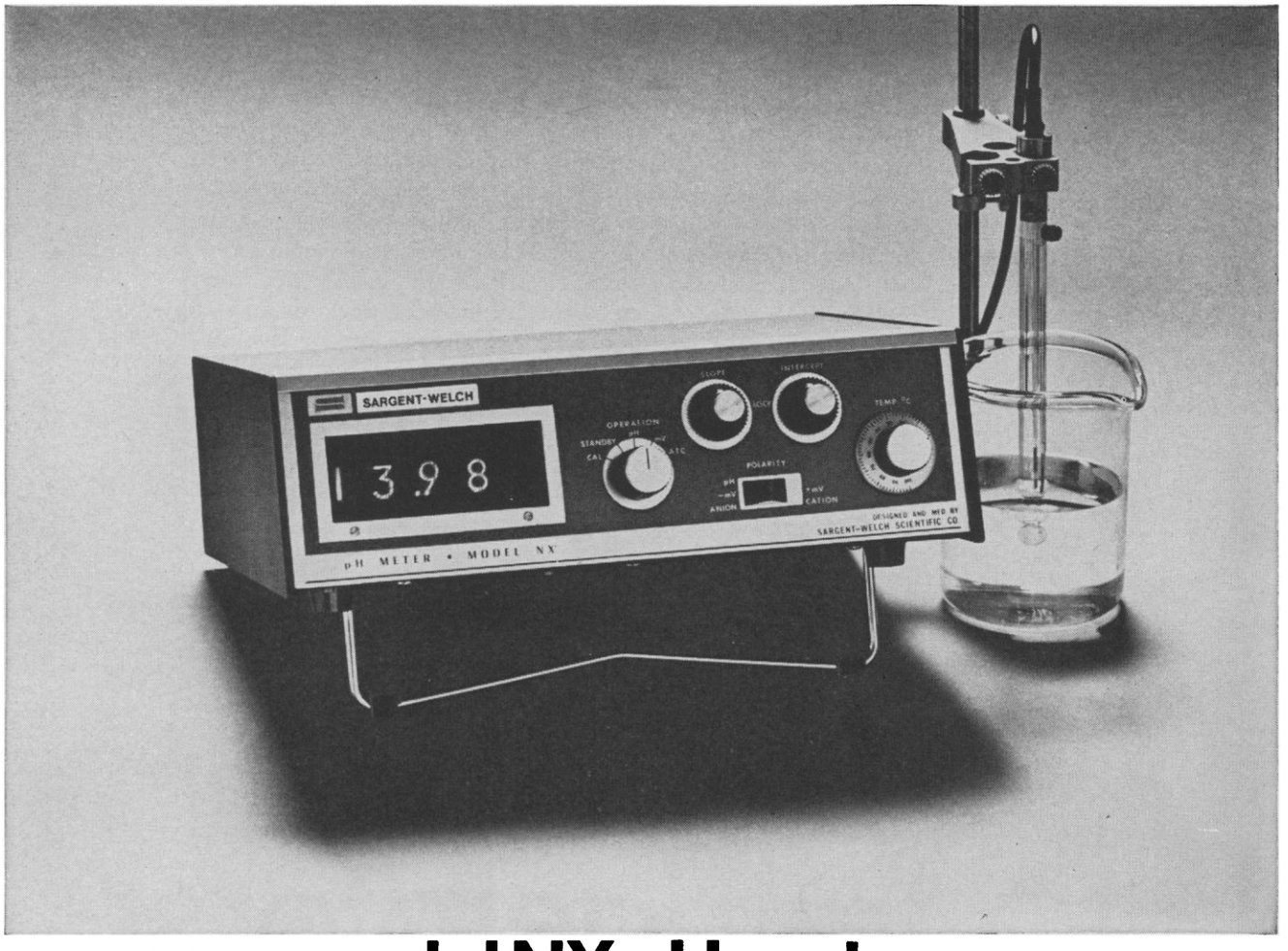
Street

City

State

Zip Co

easy-to-read. (TRUE ELECTRONIC DIGITAL DISPLAY).
easy-to-use. (SIMPLE TWO-POINT CALIBRATION, ULTRA-FAST INPUT TRACKING).
easy-to-own. ($595).



our new model NX pH meter.

We say again: The New Model NX pH Meter is a *true-electronic,* digital-indicating pH Meter—priced as low as many analog-readout, expanded-scale pH meters.

The NX's digital readout—to four significant figures—shows up, big and bright, as standard-form luminescent numerals. Visible up to 10 feet away. Even in strong ambient lighting. And the decimal point automatically pops into place where it belongs.

Use the Model NX to get millivolt readings, too. Either way, pH or mv, say good-bye to parallax, ambiguities, reading errors.

And the Model NX is an *instantaneous-tracking* instrument. Responds to rapidly changing inputs without detectable time delay. There's *no* time-constant control to adjust.

There *are* separate slope and intercept controls—and a special calibrating circuit. Which make calibration of the Model NX rapid and exact. One-cycle calibration is a lot faster than the old familiar (but time-consuming) successive approximation technique.

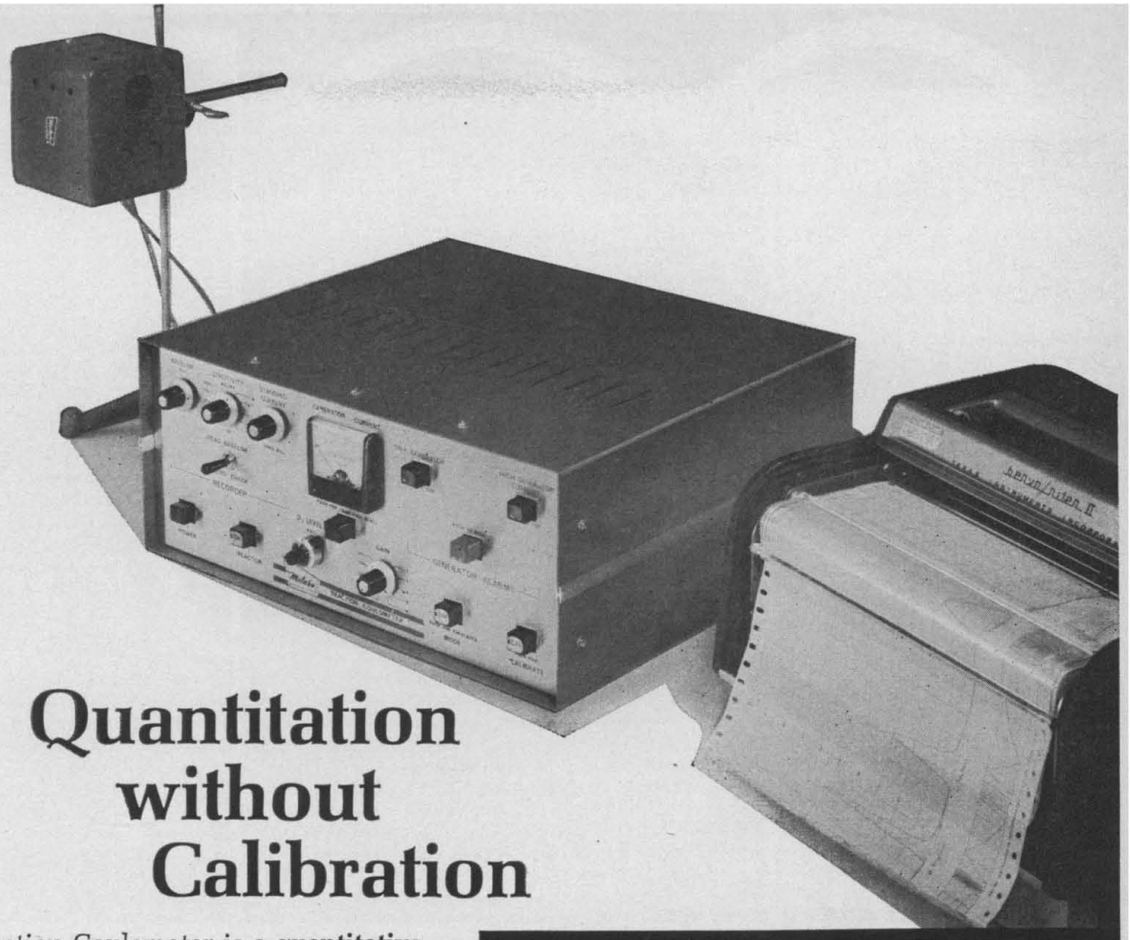
Of course, there's much more to the Model NX. Such as manual temperature compensation, with an automatic version optional. And analog recorder output. Plus optional provision for binary-coded-decimal output for digital printout or computer interfacing. Long-life cold-cathode display tubes. Solid-state circuits on plug-in printed circuit boards for convenient servicing.

The Model NX's $595 price-tag includes electrode support rod, combination electrode, and buffer solutions. Call your Sargent-Welch representative for a demonstration or write to us. 9-225

SARGENT-WELCH

Scientific instruments, apparatus, chemicals.
Sargent-Welch Scientific Company
7300 N. Linder Ave.; Skokie, Illinois 60076

Chicago/Anaheim/Birmingham/Cincinnati
Cleveland/Dallas/Denver/Detroit
Springfield, N.J./Toronto/Montreal/Vancouver



Quantitation without Calibration

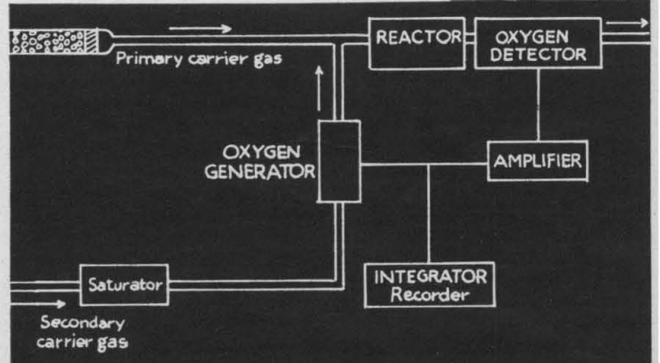
The Melabs Reaction Coulometer is a **quantitative, non-specific** detector for gas chromatography. Its primary advantages over conventional detectors:

1. Completely eliminates **calibration.** Response is absolute.
2. Response is **independent** of flow rate, temperature.
3. Because the detector is quantitative, it offers a built-in self-check of **column holdup.**
4. **Versatile**—detects most compounds combustible over platinum catalyst.
5. Provides **increased sensitivity** for detection of oxygenated compounds.
6. **Rapid response**—all key processes take place in the gas phase.

Developed by Burton, Littlewood and Wiseman[1], the Melabs Reaction Coulometer uses the proven principle of closed loop, automatic null-seeking circuitry. Key specifications: sensitivity, 10-20 ng; dynamic range, 1:10,000; absolute accuracy, better than 0.5%.

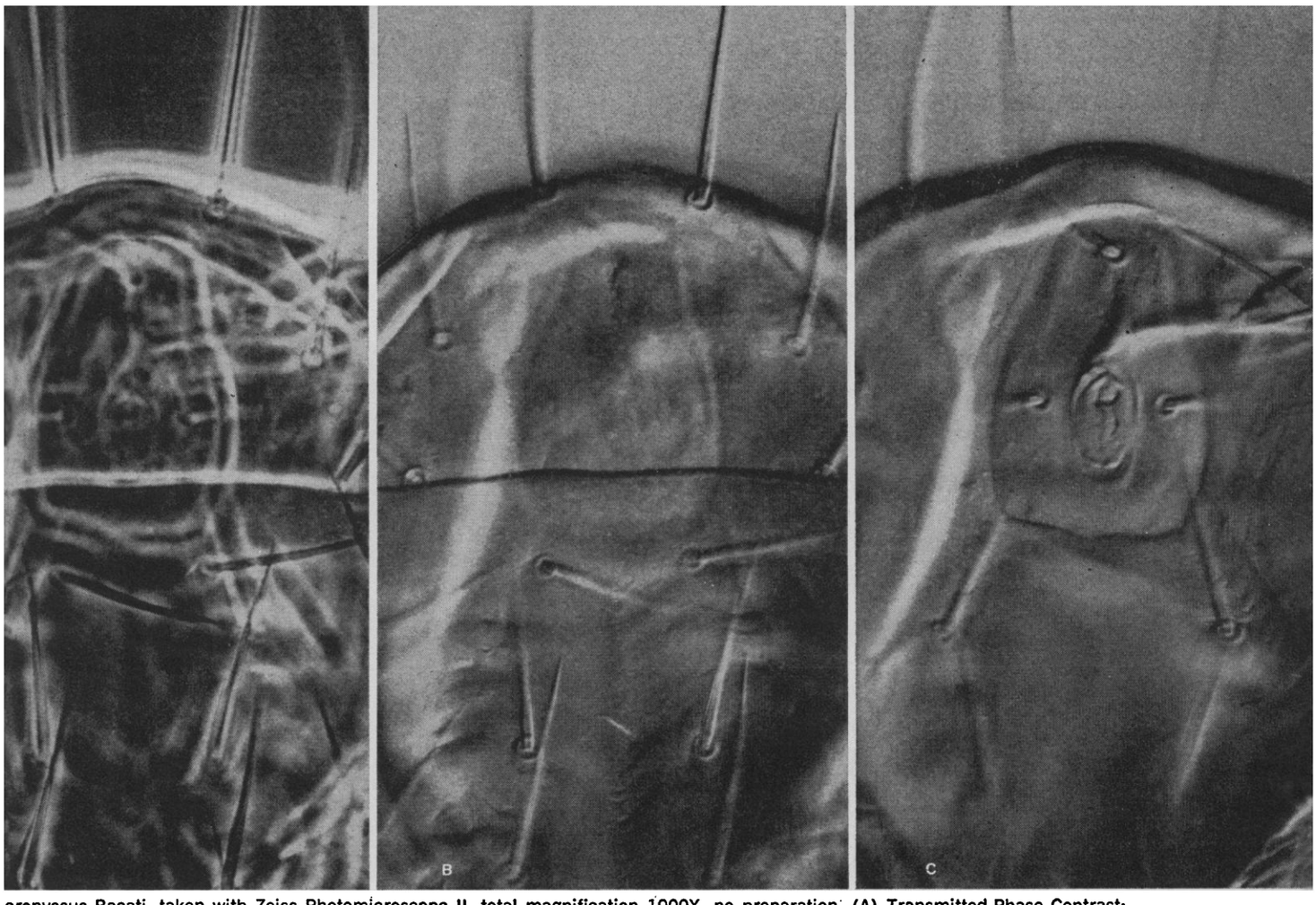
For additional details, please write to Melabs, Scientific Instruments Department, 3300 Hillview Ave., Stanford Industrial Park, Palo Alto, California 94304. Phone (415) 326-9500. In Europe, address Reaction Coulometers Ltd., Boyn Valley Rd., Maidenhead, Berks, England.

[1]Burton, G., Littlewood, A.B., and Wiseman, W. A., "A Sensitive Quantitative Detector for Gas Chromatography using Electrochemical Measurement of Oxygen." **Gas Chromatography 1966,** *Proceedings of the 6th Int'l. Symposium on Gas Chromatography and Associated Techniques,* Rome, Sept., 1966, pp 193-207, Institute of Petroleum, London, 1967, Elsevier, Amsterdam (agent).



A constant amount of oxygen from the generator is mixed with the carrier gas and passes through the reactor and oxygen detector. Essentially 100% of any combustible compound coming from the chromatographic column is burned at 1,000° C over platinum in the reactor, consuming oxygen. The oxygen detector, therefore, sees a lower oxygen level, and its signal to the servo amplifier changes. The amplifier interprets this signal change as an error signal, and provides additional current to the oxygen generator, increasing its oxygen output until the oxygen deficiency no longer exists. The recorder or integrator records the exact amount of oxygen needed to make up the deficiency caused by the burned compounds. The amount of each material present is computed directly from the peak area, without reference to calibration standards.

SCM® **MELABS, INC.**
SUBSIDIARY OF SCM CORPORATION



cronyssus Bacati, taken with Zeiss Photomicroscope II, total magnification 1000X, no preparation. (A) Transmitted Phase Contrast; &C) Nomarski Interference Contrast in two different focal planes. Notice the 3-dimensional effect.

low to make in optical slice of life.

You do it with Nomarski differential interference microscopy, a versatile phase- and amplitude-contrast system which vastly improves images both of unstained living cells and fixed and stained preparations of cells or tissues.

Like the phase-contrast and image-duplication interference microscopes, the Nomarski system generates contrast optically by interference of light waves traversing slightly different optical paths. What sets the Nomarski system apart is that differential interference produces an "optically shadow-cast" image relatively free from disturbance from out-of-focus details. Because contrast is developed only in a very thin depth of field (as little as 0.2 μm), it is possible to make "optical sections" for detailed non-destructive analysis of living material.

Easy to set up and easy to operate, Zeiss Nomarski equipment gives you a high-aperture, low-glare instrument capable of utilizing the full theoretical resolving power of the outstanding Zeiss Planachromat lenses. There is no other system like it.

Those who study stained material will find the amplitude-contrast feature of the Nomarski system very useful for bringing out weakly stained, minute details with improved resolution.

The world's best Nomarski interference equipment is available from Zeiss for Standard RA, WL and Universal Microscopes and for the camera microscopes, Photomicroscope II and Ultraphot. For complete details on Nomarski interference microscopy and equipment write Carl Zeiss, Inc., 444 Fifth Avenue, New York, N.Y. 10018.

Nationwide Service.

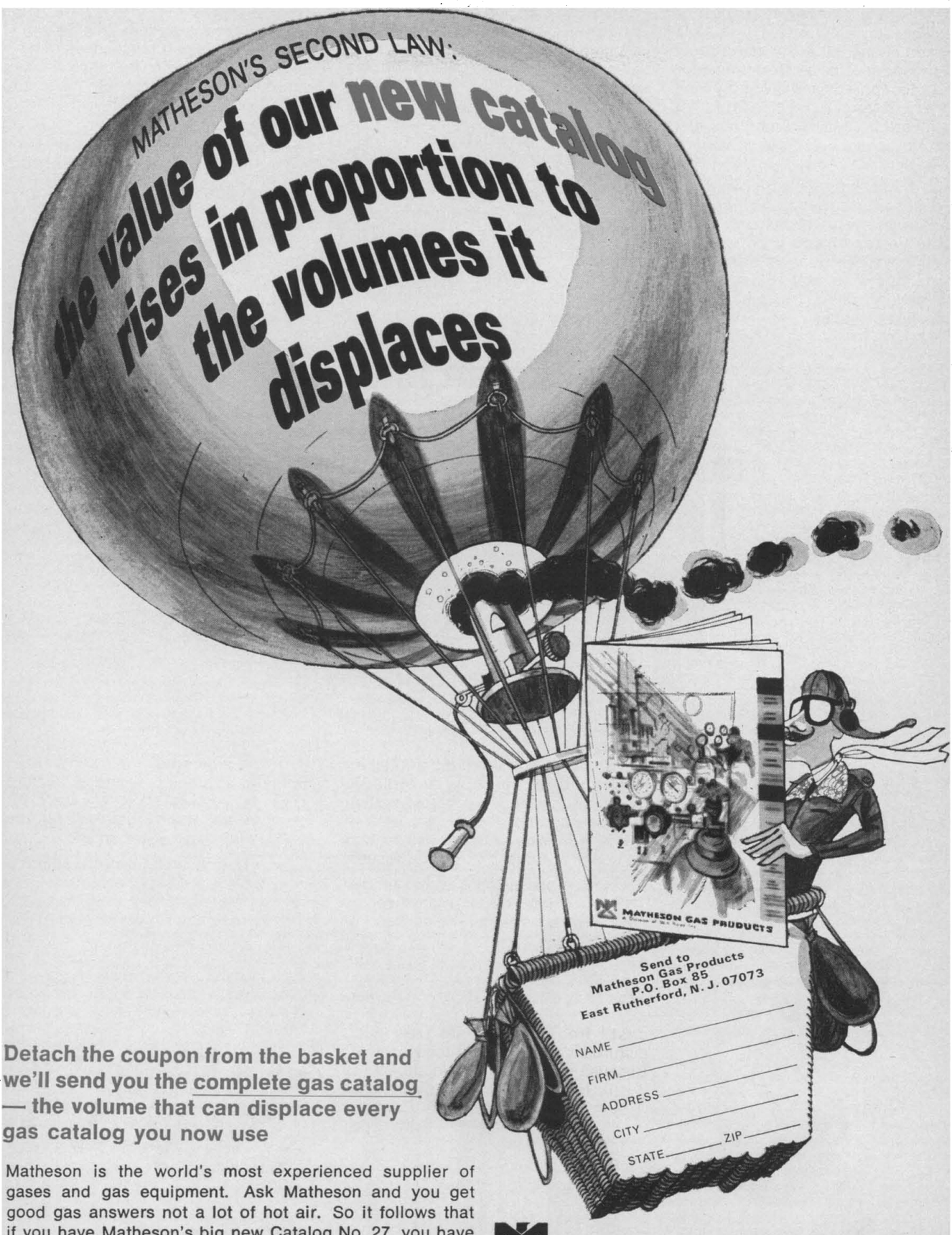
ZEISS

THE GREAT NAME IN OPTICS

CARL ZEISS WEST GERMANY

Circle No. 46 on Readers' Service Card

ATLANTA, BOSTON, CHICAGO, COLUMBUS, DENVER, HOUSTON, KANSAS CITY, LOS ANGELES, PHILADELPHIA, SAN FRANCISCO, SEATTLE, WASHINGTON D.C.



Detach the coupon from the basket and we'll send you the complete gas catalog — the volume that can displace every gas catalog you now use

Matheson is the world's most experienced supplier of gases and gas equipment. Ask Matheson and you get good gas answers not a lot of hot air. So it follows that if you have Matheson's big new Catalog No. 27, you have the last word on the subject — **the complete gas reference.** And our latest edition is bigger and better than ever . . . full of new gases, new mixtures, new equipment. It's as free as the air. Just ask for it.

MATHESON GAS PRODUCTS
A Division of Will Ross Inc.
East Rutherford, N. J.; Cucamonga, Calif.;
Gloucester, Mass.; Joliet, Ill.; LaPorte, Texas;
Morrow, Ga.; Newark, Calif.;
Matheson of Canada, Ltd., Whitby, Ont.

7-69G

Now there's a new generation of selective ion electrodes... all from Beckman and all with completely new standards of performance for the detection and monitoring of ion activity. If you've been looking for something better, Beckman has just what you need.

The 14 Beckman SelectIon™ Electrodes feature repeatability and long-term stability never before available for direct ion measurements and detection of titrations. Spanning a wide range of laboratory applications, they are available in three basic types:

Solid Ion Exchanger. Five electrodes — *water hardness, calcium, nitrate, perchlorate* and *fluoborate* — all with unbreakable plastic bodies and easy-to-replace tips guaranteed for 100 hours of operation.

Solid State Crystal. Seven electrodes — *cupric, fluoride, sulfide, bromide, chloride, iodide* and *fluoride combination* — with unbreakable plastic bodies. Sensing crystal is sealed into the body for long electrode life.

Specially Formulated Glass. Reliable, performance-proven electrodes for sodium ion and monovalent cation measurements.

Beckman second-generation SelectIon Electrodes can be used with any Beckman Century™, Digital, Expandomatic® and Research pH meters, or any pH meter with an expanded millivolt scale.

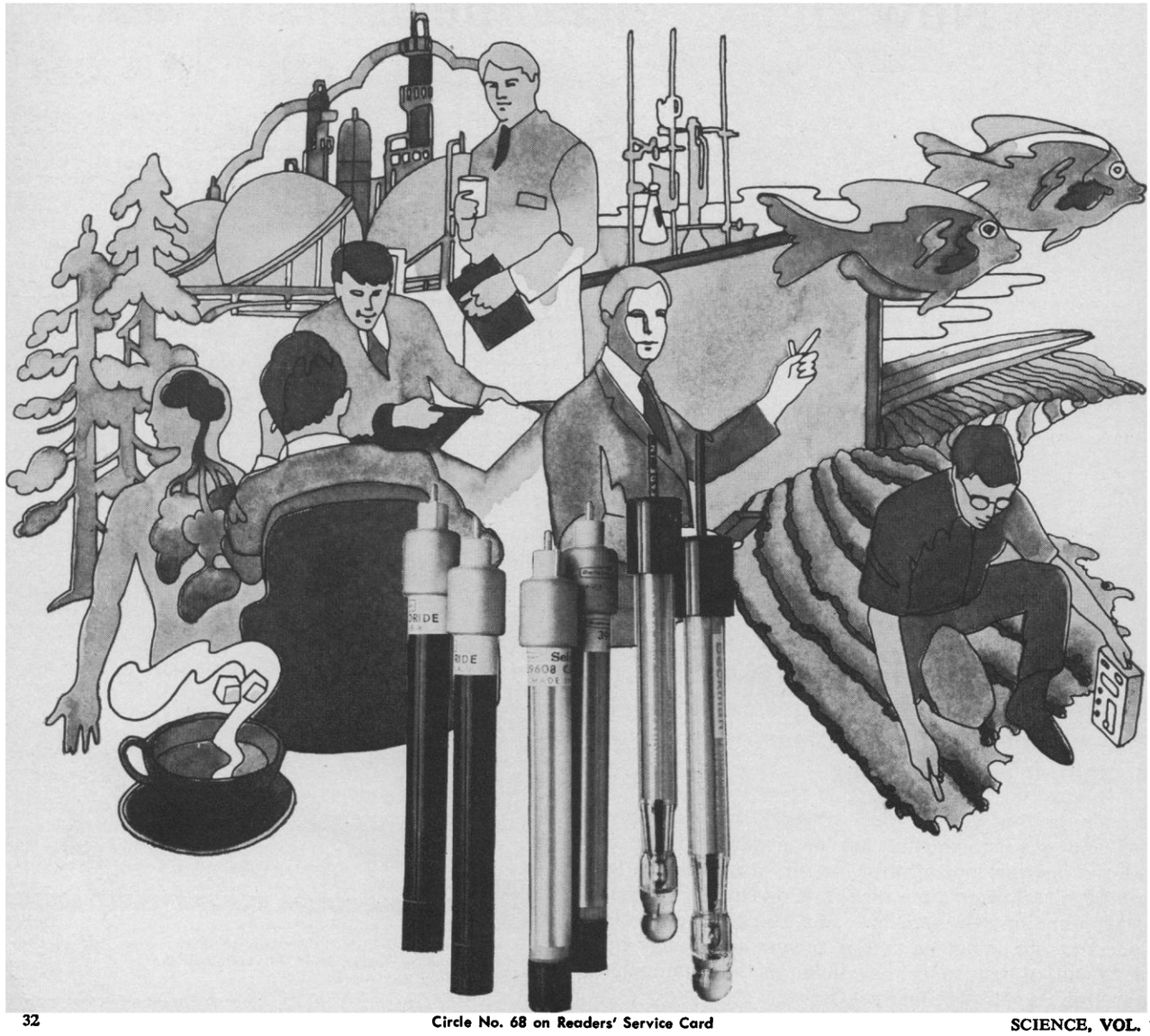
For additional information, write for Data File 1320, Scientific Instruments Division, Beckman Instruments, Inc., 2500 Harbor Boulevard, Fullerton, California 92634.

Beckman®

INSTRUMENTS, INC.

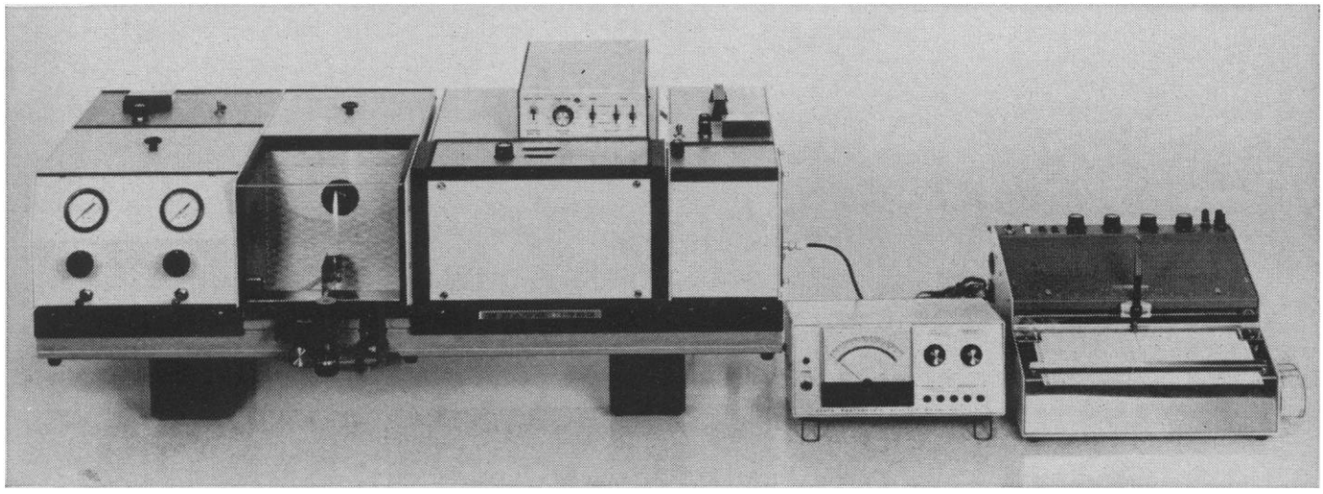
INTERNATIONAL SUBSIDIARIES: AMSTERDAM; CAPE TOWN; GENEVA; GLENROTHES, SCOTLAND; LONDON; MEXICO CITY; MUNICH; PARIS; STOCKHOLM; TOKYO; VIENNA

Beckman fills the generation gap in selective ion electrodes



atomic absorption
atomic fluorescence
atomic flame emission

$2998*



The New Heath "703" Spectrophotometer Does All Three And More At Lowest Cost

A Versatile High Performance Spectrophotometer . . . ideal for use in research in the instrumental laboratory or for routine analyses. The new Heath "703" System is a departure from classical spectrophotometer design. Each component module has many versatile features that permit easy application to new problems; the monochromator, PM and readout modules can be removed in minutes and used in many other types of spectrophotometers for research or teaching applications; the design is readily adaptable to computer control; the flame module is directly applicable for atomic absorption, flame emission and atomic fluorescence methods. All of these and many more features make the Heath EU-703 by far the best buy in AA-AE-AF spectrophotometers.

EU-700 Monochromator . . . the widely accepted Heath "700" monochromator provides the very high resolution, wavelength accuracy, low scattered light, and versatile wavelength drive that make it ideal as the wavelength isolation device for atomic absorption, emission and fluorescence spectrophotometry. The wavelength scan is by a stepper motor that is adaptable to computer control. Fixed scan rates vary from 0.05 to 20 angstroms/sec. The scan rate is also programmable by an external signal generator.

EU-703-70 Flame Module. Mounted on the front panel of the Flame Module are the needle valves, gauges & controls for the burner system and quick shutoff controls for both fuel and oxidant. A total consumption burner is standard but the large flame compartment will accommodate virtually all types of total consumption and laminar flow burners with the brackets supplied. A precision micrometer adjustment system provides accurate and repeatable X-Y, Y-Z positioning of the flame for optimum performance. Four hollow-cathode lamps can be mounted in the precision rotating turret, and other lamps easily interchange. The hollow-cathode power supply provides optical stability to 0.1% and is designed to handle all high-intensity lamps and most multi-element types. A chopper is built-in for discrimination against background radiation.

EU-701-30 PM Module. One compartment in this module contains a very stable, programmable power supply with output adjustable from 150-1500 volts. The other compartment contains a highly sensitive 1P28A PM tube and shutter assembly. Other photomultiplier tubes can be interchanged for the 1P28A because of the versatile PM tube mounting system used.

EU-703-31 Photometric Readout Module . . . a versatile new instrument applicable to all types of spectrophotometry where photomultipliers, phototubes or other photon-to-current transducers are used. Front panel pushbuttons select the output to be linear in Absorbance in 0-1, 0-2 or 1-2 spans, or 0-100% Transmittance for direct analog readout on a 6" taut-band meter. The Readout Module can be used with either chopped or unchopped input current signals and can function as a current-to-voltage interface between the PM Module and a recorder or DVM such as Heath EU-20 Series chart recorders or the EU-805A DVM. Output accuracy to recorder or DVM terminals is 0.25%.

EU-20V Multi-Speed Chart Recorder features 21 electronically-accurate, switch-selected chart speeds from 12 inches/minute to 1/2 inch/hour. Five input sensitivity ranges—10, 25, 50, 100 and 250 mV full scale, with true potentiometric null-point balance on all ranges. Accuracy better than 1%, with 0.2% or better repeatability. Response is 0.1 second per inch. An auxiliary input to the chart drive circuitry allows electronic synchronization of recorder time base with external events.

The 703-A system is less readout; the 703-B system includes the Photometric Readout Module; the 703-D system includes the Photometric Readout Module and 21-Speed Chart Recorder.

Versatile high performance spectrophotometers don't have to be expensive. Write us for a copy of the Heath Scientific Instrumentation Catalog for complete specifications.

EU-703-A System	**$2736.***
EU-703-B System	**$2998.***
EU-703-D System	**$3278.***

Discrete Modules . . .

EU-700, Monochromator	**$1195.***
EU-703-70, AA-AE-AF Flame Module	**$1145.***
EU-701-30, PM Module	**$ 350.***
EU-703-02, Base, provides accurate references for setting up the complete "703" System with precise optical alignment	**$ 190.***
EU-703-31, Photometric Readout Module	**$ 275.***
EU-20V, 21-Speed Chart Recorder	**$ 295.***

FREE Heath Scientific Instrumentation Catalog

Describes these and other precision instruments for laboratory, engineering, education and R & D applications. Send for your FREE copy now . . . just write on your school or company letterhead.

HEATH
a Schlumberger company

HEATH COMPANY, Dept. 566-19
Benton Harbor, Michigan 49022

☐ Please send FREE Heath Scientific Instrumentation Catalog

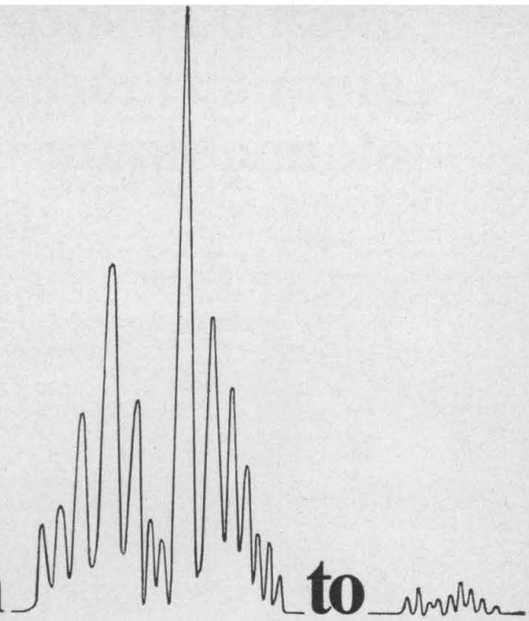
Name _____

Address _____

City _____ State _____ Zip _____

Prices and specifications subject to change without notice.
*Mail Order Prices; F.O.B. Factory

EK-277

Even if your data goes from  to you can see it all on one display.

Some of your data will barely twitch an indicator.

Some of it goes right off the scale.

No problem. The HP 7563A Voltmeter/Amplifier logarithmically compresses data with a dynamic range of 110 dB—110 dB!—and gives you a single output that includes both high and low amplitude data with constant resolution and accuracy. The 7563A accepts positive or negative signals from vibration tests, geophysical measurements, pulse height analyzers, computers and similar sources, compresses the amplitudes logarithmically and feeds the results directly to a recorder or oscilloscope. The front-panel meter gives an instant visual display in dB. And when it's not performing that job, the 7563A will double as a voltmeter (calibrated from 0.3 mV to 100 V) for system or bench use. How's that for a voltmeter/amplifier with the modest price of $695 and one of the widest dynamic ranges you can buy?

To add AC log conversion and voltmeter applications to DC, use the 7562A with its 80 dB dynamic range. It's the only converter on the market that can measure the true rms value of an AC voltage. Turn it loose on vibration studies, biochemical data, seismographic studies, audio research or similar data with large asymmetrical wave forms and it will give you the most accurate log conversion you can get in AC. Or use it as an AC/DC voltmeter, calibrated directly in volts. Price is $995.

For more information, call your local Hewlett-Packard field engineer or write Hewlett-Packard, Palo Alto, California 94304; Europe: 1217 Meyrin-Geneva, Switzerland.

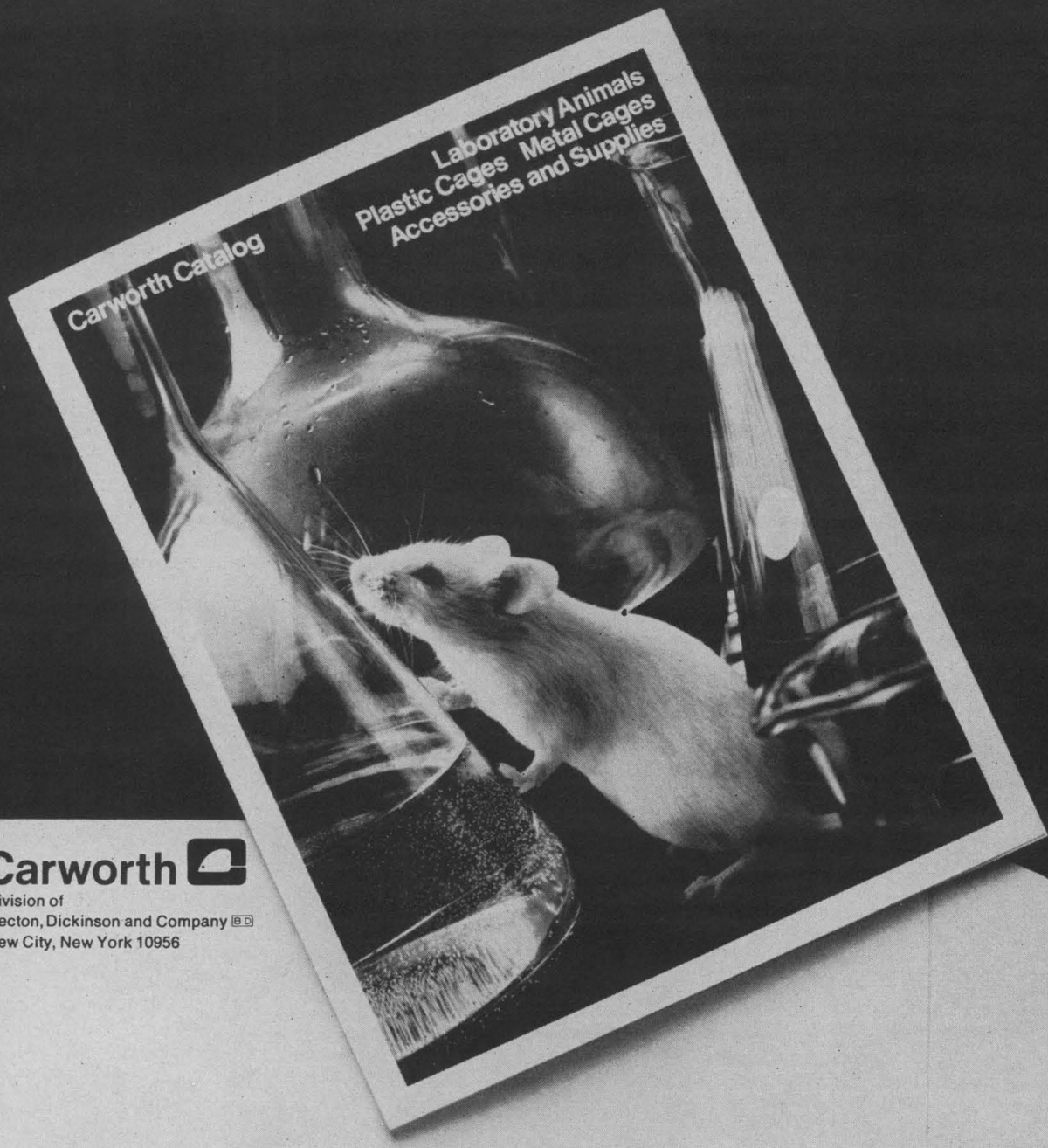
HEWLETT hp PACKARD

11907

Circle No. 41 on Readers' Service Card

Circle No. 18 on Readers' Service Card →

We saved one of these for you, but we don't know where to send it.



Carworth
Division of
Becton, Dickinson and Company
New City, New York 10956

Carworth, New City, N.Y. 10965

Please address my copy as follows:

Name_____

Title_____

Dept._____

Institution_____

Address_____

_____

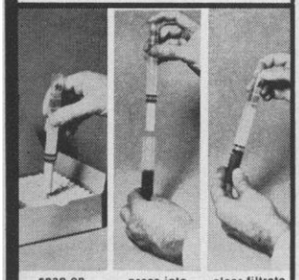
city state zip

Error Eliminators and $ Savers from L/I

1. L/I LABQUAKE™

1. L/I LABQUAKE™. A **silent, small, submersible** tube rocker and rotator for all sizes of tubes, ¼" to 1½" diameter. Occupies only 2½ x 10 x 4 inches when fully loaded with 14 tubes. LABQUAKE has 28 tube positions altogether that accommodate clips to hold tubes of varying sizes. Adjustable bracket holds LABQUAKE fully or partially submerged in water bath.

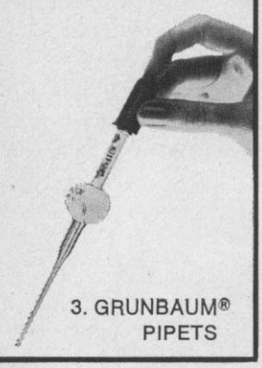
Price: LABQUAKE (patent pending), for 110-120 VAC, furnished with (14) 13 mm and (14) 16 mm clips, $59.50. Maximum capacity, 250 ml. Other clips may be substituted.



2. STAT-FILTER®

2. STAT-FILTER®. For **instant filtration** by high pressure or vacuum—in the palm of your hand. You get crystal clear filtrates within 3 seconds after precipitates form. All precipitates over 10 microns are retained with no possibility of remixing after separation. The versatile **STAT-FILTER** uses disposable polypropylene test tubes and plungers, making it suitable for **any** filtration. Inexpensive demonstration kits are available.

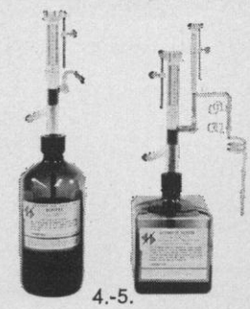
Price: complete **STAT-FILTER SYSTEM**, including 3 plungers, 100 disposable polyethylene filters and test tubes, and 25 test tube closures, $38. Demonstration **STAT-FILTER** kit with 1 plunger, 10 filters, 7 test tubes and 3 closures, $9.00.



3. GRUNBAUM® PIPETS

3. GRUNBAUM® PIPETS (The Perfect Pipet). The versatile **GRUNBAUM** micro-pipet aliquots, dilutes, transfers, and stores reagents. It's self-adjusting, self-filling, non-dripping and self-cleaning (sample B washes out sample A). Guaranteed accuracy: 5 μl, ±3%, 10 and 20 μl, ±2%; 25 μl and larger, ±1%. Guaranteed reproducibility: 0.1% at 100 μl. Sizes stocked for immediate delivery: 1, 2, 3, 4, 5, 10, 15, 20, 25, 50, 75, 100, 150, 200, 250, 300, 400, and 500 μl. Other sizes on request.

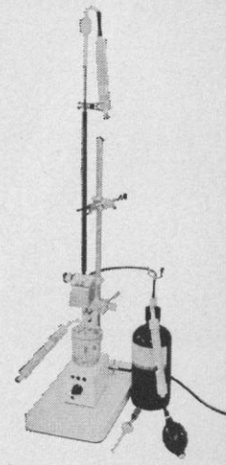
Prices: 1 through 5 and 75 μl, $7. All others $6.



4.-5. Automatic REPIPETS® and Dilutors

4.-5. Automatic REPIPETS® and Dilutors. These unique instruments pipet, dilute and dispense with a *guaranteed* accuracy of 1% and a reproducibility of 0.1%. **PYREX® L/I REPIPETS** and Dilutors are of one-piece fused glass construction with no connections—eliminating any chance for leaks. L/I's instruments fit directly on your reagent bottles, ½ ounce and larger. Any reagent can be handled. All amber instruments are supplied for your labile reagents. Use L/I **LAMBDA-DIALS®** to increase precision to 1% at 10 lambdas! L/I stocks **REPIPETS** and Dilutors in ½, 1, 5, 10, 20, and 50 ml sizes, each adjustable from zero to full capacity. Square amber liter bottles optional at N/C.

Prices: REPIPETS, $52.50; Dilutors, $99.50. Micro and Macro Teflon® tips included.



6. Aquametry Apparatus

6. Aquametry Apparatus. L/I's inexpensive Karl Fischer Aquametry Apparatus precisely determines water content of most materials in 4 minutes (1 ppm to 100% water). L/I's versatile apparatus uses the original stock K-F reagent bottle as a reservoir. The "reaction vessel" is an ordinary 4 oz., commonly available, disposable "cream" jar. It is interchangeable with a micro-reaction vessel requiring less than 2 cc total reaction volume for micro-aquametry applications.

No false end points are possible with L/I's color-coded meter indicator. A two-lambda excess of K-F reagent in a 100 ml reaction volume is detectable. The apparatus includes a 1 and 25 ml dual buret with .01 ml divisions in the micro range for high accuracy.

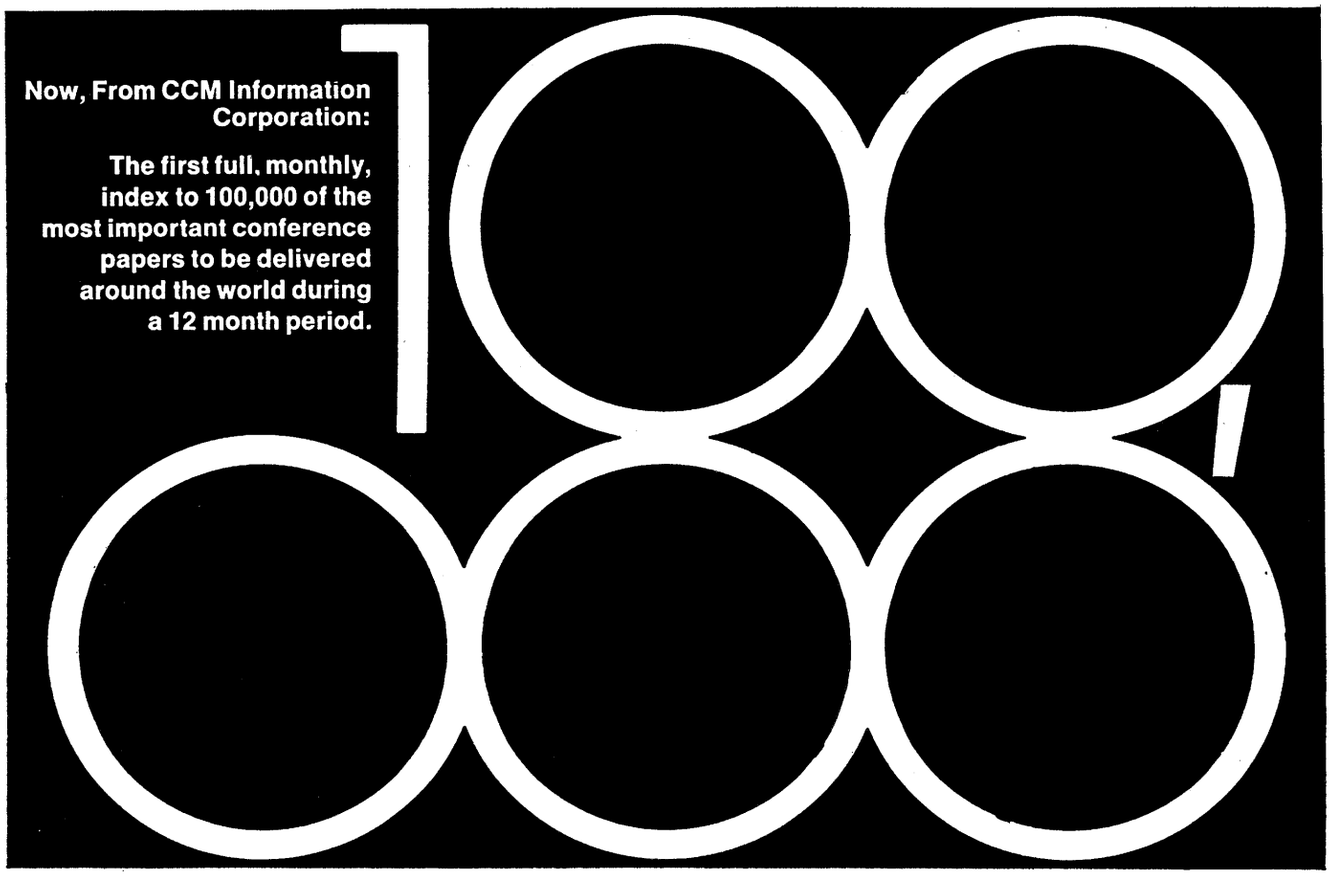
Price: $340 complete. Components available separately.

Order from Labindustries or your distributor.

LABINDUSTRIES

The Error Eliminators

1802 M Second Street · Berkeley, Calif. 94710 · Phone (415) 843-0220 · Cable: LABIND, Berkeley, Calif. (USA)



To the scientific community, the conference paper has assumed somewhat the same function as the special report in industry. It is the first public disclosure of events-in-the-making, the first report on work in progress.

Now, thanks to a unique acquisition and input procedure, and advanced computer processing capability, CCM Information Corporation is able to provide scientists and librarians with a current awareness service on new papers in chemistry, engineering and the life sciences, in many cases a month or more *before* formal presentation of the actual paper.

The three new publications are:

CURRENT INDEX TO CONFERENCE PAPERS IN CHEMISTRY

CURRENT INDEX TO CONFERENCE PAPERS IN ENGINEERING

CURRENT INDEX TO CONFERENCE PAPERS IN THE LIFE SCIENCES

Each will be published monthly and will contain three sections:

A Subject Index giving the paper's title, the author's name and his address when available.

An Author Index giving the author's name and the subject heading under which his paper appears.

A Conference Data Section containing the name of the conference, its date, location and sponsor, and ordering information of preprints, reprints, translations, abstract volumes, etc. Cumulations will be produced semiannually in printed form. The entire project is under the professional direction of the World Meetings Information Center, whose editors produce **WORLD MEETINGS** and **CALL FOR PAPERS.** To help assure the inclusion of every important scientific and technical paper, a distinguished International Advisory Board has been appointed to assist in selecting all significant conferences and meetings to be covered—some 2,000 a year.

In time—often a year or more—the vast majority of these papers will find their way into the journal literature in their fields.

But given the rate of current scientific progress, a year can be a very, very long time.

Introductory offer—save 10% on monthly issues for first 12 issues
Scheduled to begin publication in September, 1969.

CCM INFORMATION CORPORATION
A subsidiary of Crowell Collier and Macmillan
909 Third Avenue, New York, N. Y. 10022

Please enter my subscription for the following:

☐ **Current Index to Conference Papers in Chemistry** (monthly) at the pre-publication price of $67.50 (regularly $75 a year).

☐ Semi-annual cumulations (2 issues) $25 a year.

☐ **Current Index to Conference Papers in Engineering** (monthly) at the pre-publication price of $85 (regularly $95 a year).

☐ Semi-annual cumulations (2 issues) $35 a year.

☐ **Current Index to Conference Papers in Life Science** (monthly) at the pre-publication price of $81 (regularly $90 a year).

☐ Semi-annual cumulations (2 issues) $35 a year.

☐ Special combination price for all three publications (without cumulations) $235.

Name _____

Title _____

Institution _____

Address _____

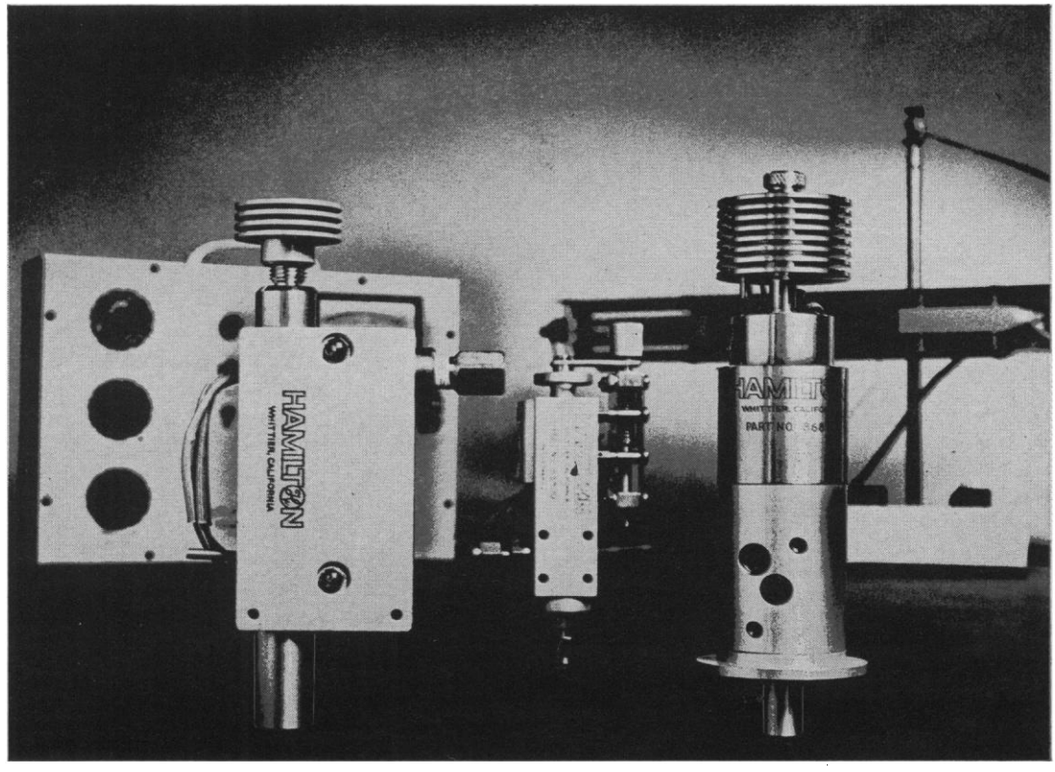
City _____ State _____

Zip _____

Two new "in" products for GC

If you want to reach new peaks in your GC work, Hamilton may have just the answer in its line of "in" products. The Standard Glass-lined Inlet resolves some of the problems of band spreading. The Multi-Purpose Sampling System provides a versatile accessory for the pyrolysis of solids. And now! for those who have wanted the sophistication of capillary or high resolution columns, Hamilton introduces: The Splitter Inlet and advanced Precolumn Inlet. The Splitter allows you to use normal-sized samples from a syringe and splits them into nanoliter range, and the Precolumn Inlet, now permits direct injection into high resolution or capillary columns of samples in the 10^{-6} gram range. Let Hamilton put you "in" chromatography. For literature on our inlet systems, write to: Hamilton Company, Post Office Box 307, Whittier, California 90608.

Repeatable Precision: Hamilton Inlets



HAMILTON

It can make your day seem a lot longer.

How many times have you wished you had more time to do things that need to be done in a day?

Waring can give you that time. Make life a little easier. And help you get more work done.

Our Commercial Blendors® were specifically designed for laboratory use. And if people like you don't buy them, nobody will.

Take our giant One-Gallon Blendor, for example. The container, blades and blending assembly are 304 stainless steel. What's more, the containers are an exclusive Waring "Cloverleaf" design hydrodynamically engineered for outstanding blending action. The 1725 watt motor is the most powerful Blendor motor available. It is virtually maintenance-free. Illustrated: CB-5 – 115 volts AC; 60 HZ; UL listed. Available in Canada. $295.00.

If you'd like to know more about the many kinds of Blendors we make and how they can help you in your work, please write us. Helping you is our job.

waring

Waring Products Division
Dynamics Corporation of America
New Hartford, Conn. 06057

Circle No. 7 on Readers' Service Card

Circle No. 47 on Readers' Service Card →

Do the Reichert Zetopan Microscope and Automatic Camera come as a set? Or can I buy and use them independently?

Yes.

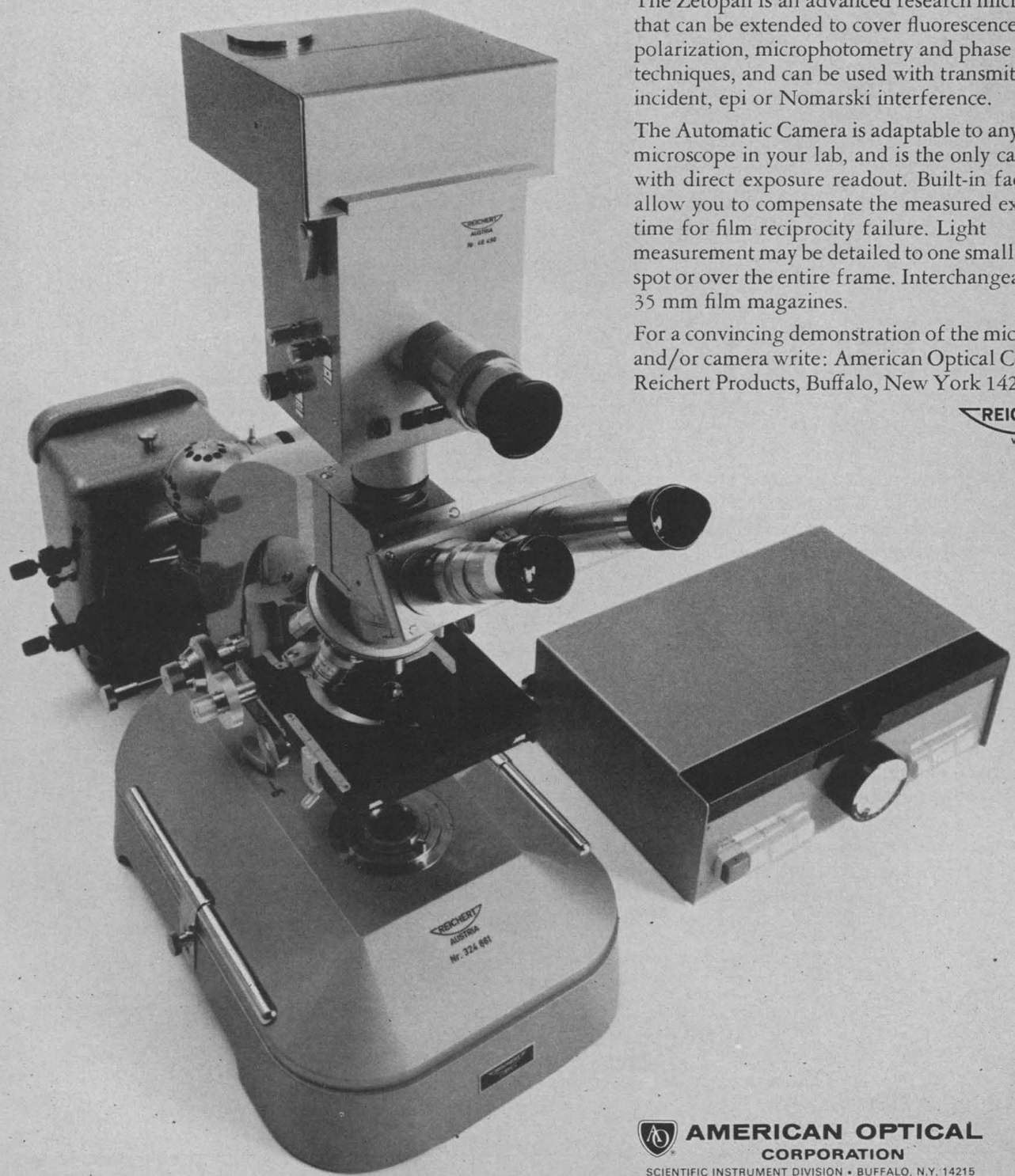
Bought separately or together, this one-twosome offers unique capability and outstanding performance.

The Zetopan is an advanced research microscope that can be extended to cover fluorescence, polarization, microphotometry and phase techniques, and can be used with transmitted, incident, epi or Nomarski interference.

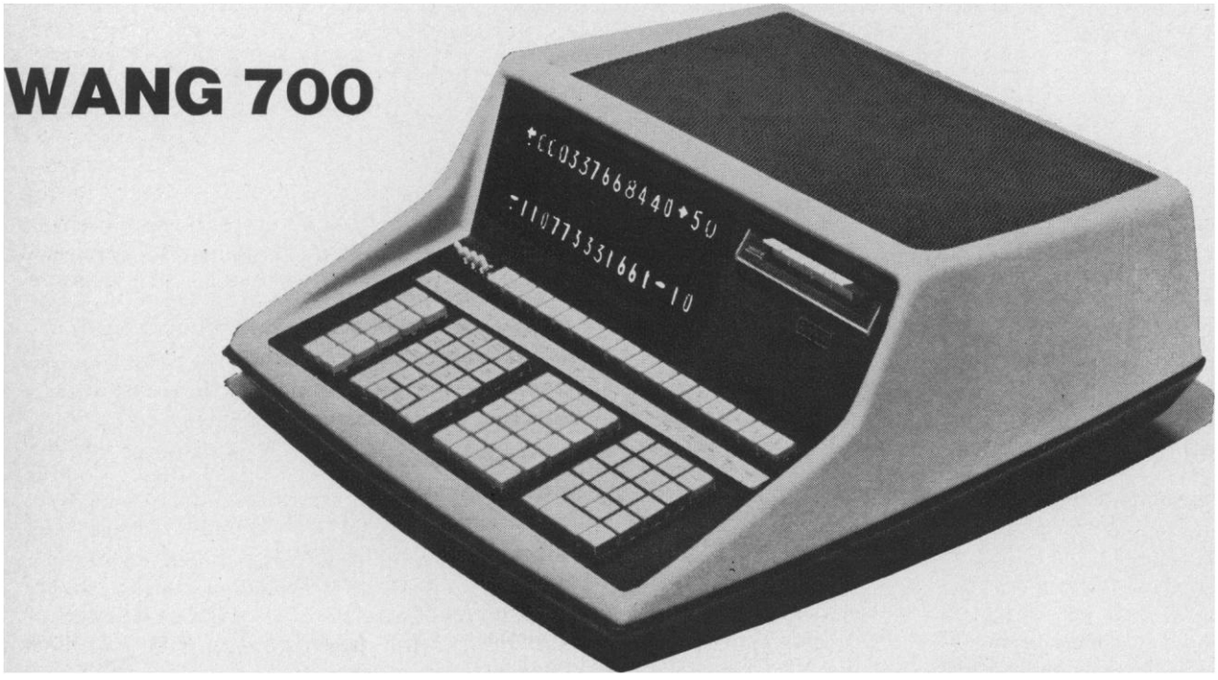
The Automatic Camera is adaptable to any microscope in your lab, and is the only camera with direct exposure readout. Built-in factor keys allow you to compensate the measured exposed time for film reciprocity failure. Light measurement may be detailed to one small spot or over the entire frame. Interchangeable 35 mm film magazines.

For a convincing demonstration of the microscope and/or camera write: American Optical Corporation, Reichert Products, Buffalo, New York 14215.

REICHERT
WIEN



AMERICAN OPTICAL
CORPORATION
SCIENTIFIC INSTRUMENT DIVISION • BUFFALO, N.Y. 14215



Calculator or computer?

Wipe out all tediousness from technical, statistical and investment computations with the Wang 360 electronic calculator. Time consuming table look-up and interpolation is a thing of the past. Wang's unique approach to data manipulation enables you to generate $\sqrt{x}$, x^2, $\text{Log}_e x$ and e^x functions by simple key strokes. Instantaneous answers are displayed in large easy-to-read numerals with ten significant digits and **self positioning decimal** (you can specify a special trig keyboard if you need $\sin\theta$, $\cos\theta$, $\sin^{-1}x$ and $\tan^{-1}x$).

A special feature of the Wang 360 is its "scratch pad" memory system. Four extra storage registers hold constants, intermediate answers, or multiple results, for recall as you need them. Wang's building block approach gives you add-on capability for **hard copy printout,** card programming, and expansion into the powerful 370 programmable computing sub-system. For greatest economy, up to 4 keyboards operate concurrently from a briefcase-size electronics package. Cost of Model 360 is then as low as $1497.50 per station and Model 320 (without extra registers) $1282.50 per station.*

Call your nearest Wang Office.

WANG LABORATORIES, INC.

SALES/SERVICE OFFICES

Alabama
(205) 881-5360
Arizona
(602) 274-2110
Arkansas
(501) 666-7115
California
(213) 776-2985
(714) 276-8464
(415) 692-0584
(805) 962-6112
Colorado
(303) 364-7361
Connecticut
(203) 288-8481
Florida
(305) 841-3691
(305) 563-8458
(813) 872-7347
Georgia
(404) 633-6327
Hawaii
(808) 536-5359
Illinois
(309) 674-8931
(312) 297-4323
Indiana
(317) 631-0909
Iowa
(515) 288-5991
Kansas
(316) 262-1388
Kentucky
(502) 426-1116
Louisiana
(504) 729-6858
Maryland
(301) 588-3711
(301) 821-8212
Massachusetts
(617) 851-7311
(617) 542-7160
Michigan
(313) 352-7112
(616) 454-4212
(517) 835-7300
Minnesota
(612) 881-5324
Mississippi
(601) 875-5588
Missouri
(816) 444-8388
(314) 727-0256
Nevada
(702) 322-4692
New Jersey
(201) 272-7160
New Mexico
(505) 265-5608
New York
(212) 682-5921
(516) 437-2500
(518) 463-8877
(716) 381-5440
(315) 463-9770
North Carolina
(919) 272-5683
Ohio
(216) 331-6525
(614) 488-9753
(216) 333-6611
(513) 531-2729
Oregon
(206) 525-2000
Oklahoma
(405) 524-4489
(918) 743-2571
Pennsylvania
(215) 642-4321
(717) 236-4782
(401) 421-0710
(412) 366-1906
Tennessee
(615) 266-5055
(615) 889-1408
(615) 524-8648
(901) 327-8241
Texas
(915) 683-3304
(512) 454-4324
(214) 361-7156
(915) 565-9927
(713) 666-2451
(214) 758-1810
Utah
(801) 487-2551
Virginia
(703) 595-6777
(703) 359-6320
Washington
(206) 525-2000
West Virginia
(304) 344-9431
Wisconsin
(608) 255-4411
(414) 442-0160
Wyoming
(303) 364-7361
Calgary
(403) 266-1804
Don Mills, Ont.
(416) 499-7890
Montreal
(514) 482-0737
Ottawa
(613) 728-4445
Vancouver
(604) 685-2835

* Price in Continental U.S.A.

Dept. 00, 836 North Street Tewksbury, Massachusetts 01876 Telephone: (617) 851-7311

microfiche. It will cut into the "grey" literature, and will make what has been available on a private basis available on a much wider basis through libraries and archives.

Among its longer-range recommendations, the publications planning committee is considering the following:

1) The pros and cons of publishing extended abstracts in the *Journal*, with the main equations and main figures, while the paper itself is available on microfiche to those who order it.

2) Investigation of new composing and printing techniques to see if they can reduce publication cost or increase publication services substantially.

3) More emphasis on the *Reviews of Geophysics* which publishes review articles covering all of the areas of interest to the members of the AGU.

S. FRED SINGER
Office of the Secretary, Department of the Interior, Washington, D.C. 20240

Plea of the Philatelist

As an avid collector of stamps and occasional author of biological papers, which even more occasionally elicit reprint requests, I deplore the trend among senders of reprints or request cards of allowing machine stamping on their envelopes instead of regular postage stamps. Surely, whether one collects stamps or not, one of the pleasures of receiving reprints or request cards, partially offsetting the tedium of reading or processing these, is the sight of exotic and colorful stamps, enlivening an otherwise humdrum heap of mail. Must we forever lose this splash of color from our working day? The price of this minor increase in efficiency is, I believe, too high.

I wish to exhort all scientists to insist on the use of postage stamps and I don't mean a never-ending tribute to Franklin D. Roosevelt or Queen Elizabeth II. Decorative commemoratives should always be at the fingertips of any competent secretary. Add some sparkle to your mail. Who knows—it may increase the impact of your publications.

A special plea to ecologists working in the Solomon Islands, Fiji, San Marino. . . .

PAUL P. FEENY
Department of Entomology, Cornell University, Ithaca, New York 14850

More about Abrus Precatorius

I wish to add more information to Gunn's letter (18 Apr.) about *Abrus precatorius*, the pretty but poisonous seed. The plant is native to India, and its seeds, known locally as *rati*, have been used here from time immemorial as weights by goldsmiths since it is presumed, though without any good reason, that the weight of all *rati* seeds is equal. Actually, each weighs about 1.75 grains troy. The seeds are extensively used as beads for necklaces. That they are poisonous has been well known from early times. The principal poisonous constituent is abrin which was formerly used as a remedy for granular eyelids, but a dangerous one, as it frequently proved. The bruised seeds have often been used as darts for criminal purposes such as poisoning cattle and even human beings. A poultice of the seeds is said to bring about abortion. Strangely enough, the boiled seeds have been used as a famine food in Egypt and India!

In addition, the roots and leaves of *A. precatorius* contain glycyrrhizin, the active ingredient in licorice which accounts for its being known as Indian licorice. The leaves taste sweet, and a decoction of the leaves and roots is widely used for coughs, colds, and colic.

R. S. CHAKRAVARTHY
Publications & Information Directorate, Council of Scientific & Industrial Research, New Delhi 12, India

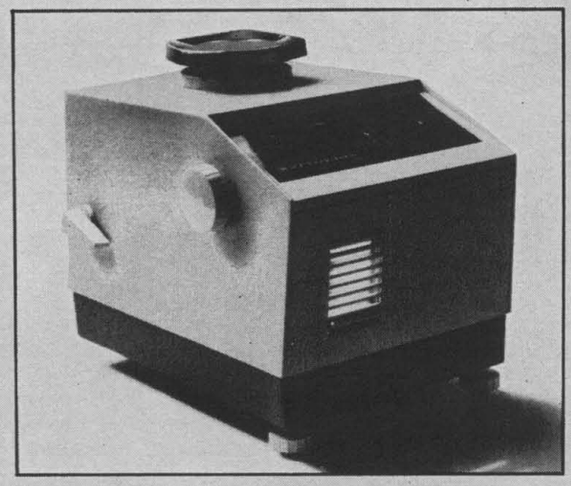
DDT: Maxwell's Demon

It appears from the letter by J. L. Fischer (15 Aug., p. 645) that DDT is well on its way to becoming a sort of reversible Maxwell's demon. If a species of wildlife *declines* in numbers, it is being poisoned by DDT; if it *increases* in numbers, this is because its natural enemy is being destroyed by DDT. Apparently, the hypothetical and unidentified predator of starfish, according to Fischer, has been eliminated by DDT, but there are no indications that DDT was present, or whether, if present, it would have killed the free-swimming and fragile larvae of the starfish themselves.

THOMAS H. JUKES
Space Sciences Laboratory, University of California, Berkeley 94720

Wouldn't it be great if someone designed a 160 g top-loader with 1 mg accuracy and all-digital readout?

Someone has. Sartorius.



There are other top-loading balances with 160 g capacity, but none is as accurate and easy to read as the new Sartorius 2255... and none is as stable.

To eliminate interpolation error with 'between the line' results, the Model 2255 provides all-digital readout to 1 mg. To further insure accuracy, there is absolutely no discernible swing—this balance stays at the indicated weight. There's no need to squint, either. Its huge new optical scale is a pleasure to read, even under the most adverse lighting conditions.

At only $725, the above features alone would make the 2255 a great buy, but there are more. The Taramatic® single knob taring system and below-balance weighing accessories are included at no extra cost.

For research, quality control, student use, or any other application requiring 1 mg weighing accuracy at loads up to 160 g, this is the simplest, yet most advanced top-loading balance available.

Sartorius all-digital top-loaders also come with higher capacities. Our 40-page catalog describes them all. For your copy, just write: Sartorius Division, Brinkmann Instruments, Cantiague Road, Westbury, N.Y. 11590.

sartorius balances

3 October 1969, Volume 166, Number 3901 **SCIENCE**

Who Will Plan the Future?

The increasing knowledge which is making it possible to plan the future to an extent quite unthinkable by any previous generation and, even more, the increasing need for long-range solutions to society's mounting problems give promise that the widening interest in future planning will continue. The establishment, in July, of a National Goals Staff in the Executive Office of the President is one of numerous signs. With much planning so strongly indicated, it is necessary to ask: Who should be responsible? The answer has two parts. In a pluralistic democracy, responsibility for initiating plans and for analyzing alternatives should be spread over all segments of society that can make useful contributions. Selection among alternatives should then be made in the public forums of legislatures and the market.

There is little current threat to the public processes of selection and decision. But there is danger that the initiating function will become unduly concentrated, for some of the institutions that should be involved are under strong attack.

Historically, some of the strongest influences on the future have resulted—although often not through deliberate planning—from private business catering to (and influencing) consumer preferences. The automobile, the elevator, the telephone, television, computers, pesticides, and the birth control pill have all had widely ramifying effects. Industry will go on innovating, but industry is under attack because pollution, noise, ecological damage, and some other effects of technology are harmful, and some extremists are attacking industry just for being *private* industry.

Universities have been the source of much of the knowledge that now makes planning more possible. But universities, despite the rarity of their acceptance of institutional responsibility for the ways in which new knowledge is used, are under attack for having any involvement with business and government, and, at the same time, are attacked for not being involved enough in local, social problems.

The private foundations have often been more farsighted than government or universities in identifying emerging problems and stimulating their study and analysis. But the House of Representatives has adopted legislation to prevent private foundations from sponsoring studies intended to influence public policy.

Each of these attacks has some justification. Industry has sometimes been callous and selfish. Universities have sometimes passively accepted conditions that should have been improved. There have been foundation abuses. These shortcomings should be corrected. But punitive restrictions on whole classes of institutions because of the shortcomings of some of their members will inevitably place more of the responsibility for planning in government hands.

Government agencies have to be involved; planning is part of their business, and some of the agencies have had substantial experience. The results have not been faultless, however, and in any event the processes of planning are too uncertain and the decisions too important to be entrusted to any one sector. No sector has a monopoly on wisdom, and participation by a variety of institutions is necessary to ensure that plans and decisions will be subject to continuous criticism, analysis, and possible revision. In deciding how faults of the past can be prevented in the future, it is therefore necessary to remember that the road marked by undue restrictions on the independence of private institutions is the road that leads toward control by government bureaucracy.

—DAEL WOLFLE

Armstrong, Aldrin, Collins they aren't.

But Almost.

Charles River Astromice® played a very vital part in the Apollo 11 program.

When our space team returned from the moon, these were the animals injected with moon dust. Without this critical test, Apollo scientists might not have been able to determine whether or not moon material contained dangerous organisms.

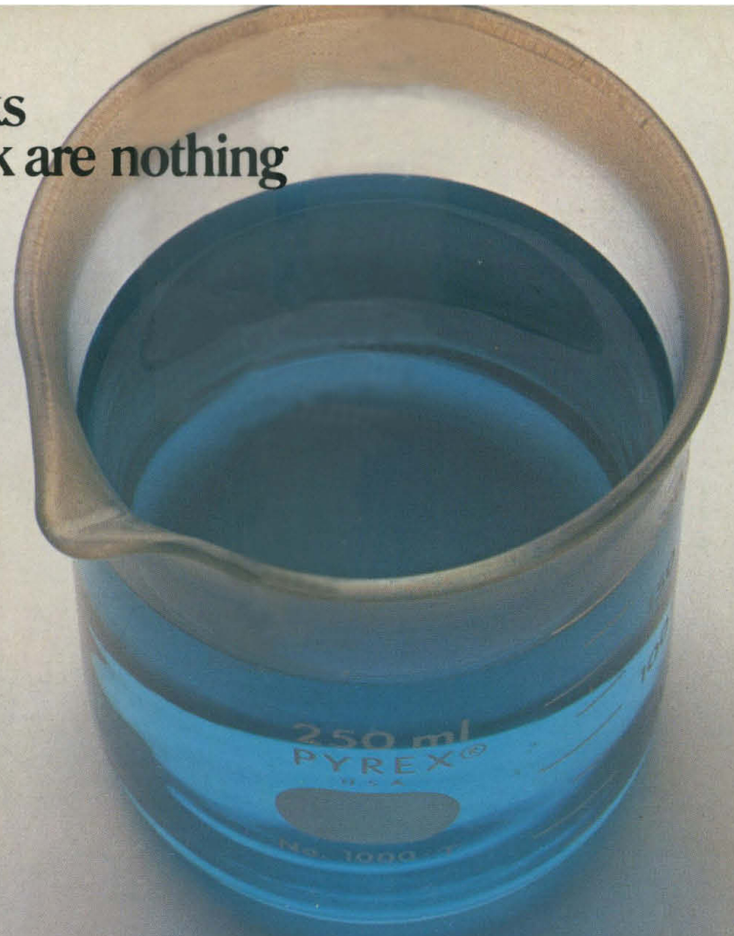
Since fall of 1967, we've supplied NASA with nearly 10,000 Astromice. Germfree: like those used in the actual lunar tests. Associated: germfree animals introduced to known members of specific bacteria. And COBS®: Caesarean-Originated, Barrier-Sustained (and our best seller). We're also supplying the prime biological models for Apollo 12.

When your scientific program requires germfree or COBS rats and mice or Lakeview hamsters of absolute quality and dependability, just tell us the number you need; when and where. We can ship anywhere but the moon within hours. For further information, write or call: Charles River Breeding Laboratories, Inc., Wilmington, Mass., USA or Charles River France in Elbeuf.

Charles River
BREEDING LABORATORIES, INC.
FROM THE HAND OF THE VETERINARIAN TO RESEARCH


SAY GOOD-BYE TO THE GOOD OLD WAYS!
TO
FROM
CENTRAL WASH
JULY
4
Lubay

This beaker thinks dribble and run-back are nothing but sports terms



Good-bye to messy pouring. Good-bye, funnels and stirring rods. Here's our new PYREX® brand Beaker with Teflon*-clad rim. It's the one and only no-drip beaker. Try some in your lab. You'll discover this is the beaker that allows you to pour contents safely, gives you drop-by-drop pourout, even lets you pull a single drop with most solutions. You'll find this is the beaker to use when you're mixing slurries. Or when you're handling HCl or H_2SO_4 or NaOH. And when you're working with materials so valuable or so hard to obtain that you just don't want to spill a drop.

Another plus: the bonded Teflon strengthens the beaker rim, lengthens beaker life. Send for a free sample and see. Use the coupon.

*Teflon is a Du Pont trademark

Portable top toppers work great, look great

Good-bye to charred, marred, chewed benchtops. You can really shield a benchtop with CORNING® Bench Protectors made of PYROCERAM® brand glass-ceramic. They're immune to acids and alkalies and solvents and gases, and to temperatures up to 500°F. We strengthen them chemically so they can withstand bangs and bumps, and they just won't dent or gouge. The glare-free white matte finish is more than handsome—it's also useful: titrations are easier to monitor. Silicone rubber feet make the protectors stable. Their light weight makes them portable. Yours in 10″ x 10″, 18″ x 24″, 23″ x 35″, and 23″ x 47″ sizes.

CORNING
BP 18 x 24

Now you can dispose completely of your pipet handling woes

Good-bye to sort, wash, autoclave, sort, convey, inventory, storage. We've got the longest throwaway line you'll find anywhere. In *glass* pipets. Clear, straight, legibly marked, non-warping, clean glass. With the "PYREX" trademark so you know they're good. Combine these with your orders for other PYREX® Labware and save as much as 28 cents on the dollar. And our disposables are throwaway priced to begin with—from just 6½¢ to 13½¢ apiece, depending on type, size and quantity. Check your dealer—he has complete stocks of PYREX brand Disposable Pipets.

pH becomes pushbutton easy–your choice of 5 digits or 4

Say good-bye to meter-scale squint and parallax error. Our new CORNING Digital 112 gives you 5-digit readout accuracy for research precision. The Digital 111 reads out to 4 digits. And their bright, clear, non-blinking display makes them easy on the eyes and the nerves. Other nice features that both offer you: slope control, and adjustable instrument zero for more accurate standardization; illuminated display of mode and function; completely adjustable for viewing angle, can even be mounted under a shelf; control panels designed for easy operation and grouped to permit an unobstructed view of the readout display. Both allow you to read the full pH range and relative or absolute potential from −1800 to +1800 mv. Try these digitals in your lab—ask to borrow one from your dealer.

Now read ion activity or concentration directly in bright, steady digits

Say good-bye to charts and graphs and tables and interpolations. Read values directly for specific ions or for pH or mv with equal ease. The new CORNING® Model 101 Digital Electrometer accepts, calibrates, and measures with all types of electrodes. So you can measure more, faster, easier. Our no-blink digital readout and adjustable instrument zero give you easier standardization and more accurate results. BCD and recorder output.

Also new is the CORNING Model 103 Three-Channel Amplifier—a system of three independent electrometer amplifiers. It can put three more inputs into your present pH meter or recorder, simultaneously or sequentially, from three different electrodes in one, two, or three samples.

Link the Model 101 and the Model 103 and you have what we call the CORNING Model 104 Four-Channel Digital Analyzer. Makes a great system.

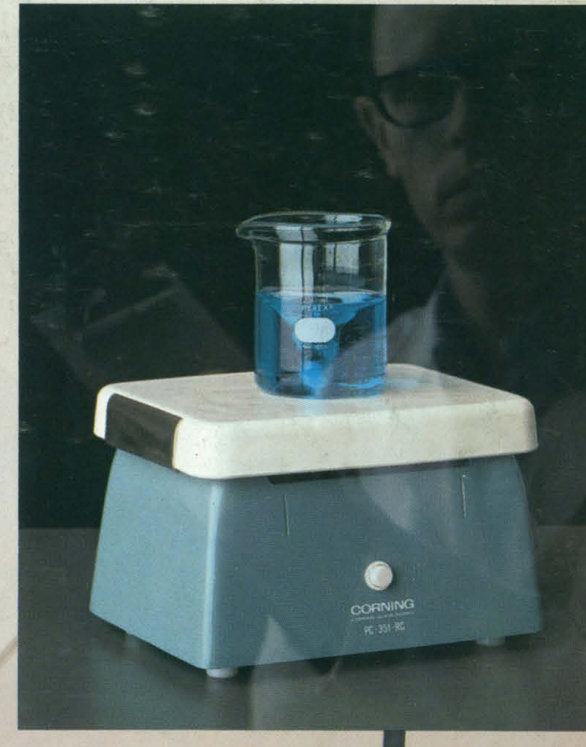
We also make great specific ion electrodes: bromide, calcium, chloride, divalent, fluoride, iodide, monovalent cation for K+ and Li+ and NH_4+, sodium capillary type as well as standard.

First totally automatic high-purity, all-glass water system

Good-bye to water-still babysitting. Start at your cold water faucet. Tie that into the CORNING® LD-2a Automatic Demineralizer with the super-effective, super-size cartridges. Tie *that* into either the CORNING Automatic 3-Liter Water Still or AG-11 all-glass water distillation unit—to get either 3 liters/hour, or 11.5 liters/hour. Tie your choice of *those* into the new CORNING Automatic Collection System. OK? Now you can forget about fussing and fretting over distilled water. Now you will have on tap from the collection system, always, up to 12 gallons of glass-distilled water—with purity equivalent to 1.7 megohm resistivity. When full, the collection system automatically shuts off the entire system—no waste production, no worry. The collection system turns everything back on again when you draw a predetermined amount from its reservoir. This is *the* answer for your lab . . . it makes pure sense because PYREX® brand components in each unit put *the* standard in chemically inert glass next to your water.

Vertical action puts a new slant on lab mixing

Good-bye to splashes and rotating seals. You're looking at the CORNING® LM-2 Mixer. It's new in principle and in versatility. Its vertical mixing action and its accessories let you work with samples from micro up to 2 liters; stir or mix without a vortex, without air entrainment; work in a closed system without a rotating seal or heat buildup; mix substances as fragile as cells without damaging them, with a completely variable speed that can gently blend as well as rigorously stir; build yourself custom paddles for unusual needs. The basic LM-2 package includes the mixer itself, a rigid rod, a flexible rod, 5 paddle assemblies, and a closed-system adapter. Get several. Today.



Remote control is what turns on this CORNING Hot Plate/Stirrer

Good-bye to spark hazards with volatiles. If you work with materials that you like to keep under a fume hood, the answer is our remote control Hot Plate/Stirrer. Your hand, temperature controller, and stirrer control all are safely remote. Beyond the controls, you'll enjoy all the usual benefits of a CORNING Hot Plate/Stirrer—its PYROCERAM® brand glass-ceramic surface ignores spills and heat shock, curves protectively over the innards, and heats up fast and cools down fast. It also looks very neat in your lab.

NOW SAY HELLO TO THE GOOD NEW WAYS

Find out how our new products can help you get more done in your lab.
Just complete and mail the coupon.
Or call your nearby Corning laboratory supplies or scientific instruments dealer for more information or for quick delivery on any or all of the good new ways.

CORNING GLASS WORKS, LABORATORY PRODUCTS DEPT., CORNING, N.Y. 14830
Please send more information on those items I have checked:

☐ Model 101 Digital Electrometer and Model 103 Amplifier ☐ Model 111 Digital pH Meter (4 digits)
☐ Model 112 Digital pH Meter (5 digits) ☐ Water purification equipment
☐ Free sample—dripless PYREX® brand beaker ☐ PYREX® brand disposable pipets
☐ Hot plate, stirrer, mixer, bench protector catalog

Name *Title* *Organization* *Dept.*

Address *City* *State* *ZIP*

CORNING
LABORATORY PRODUCTS
Makers of PYREX® Labware

Econo-Cage transparent disposable cages

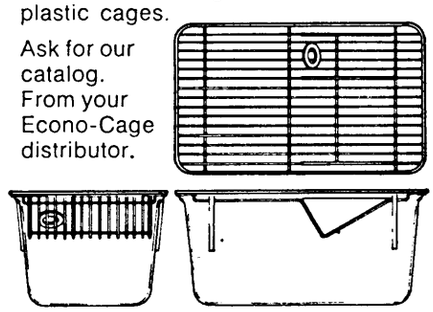
This is the most convenient, inexpensive way to house mice. Because there's no housekeeping or housecleaning. With Econo-Cage Disposable cages, you start every experiment with a new, unused cage. You use it, then you throw it away. There's no expensive maintenance and sterilizing, and no chance of residual contamination from infectious diseases, toxic chemicals or radioactive tracers. Econo-Cage Disposables incinerate to a 1-2% residue; or they can be pulped to 20% of their original volume.

Precision-molded of clear, sturdy polystyrene, the E-21 Econo-Cage Disposable cage provides full visibility. It houses up to 12 mice in an 11½" x 7½" x 5" deep space. The cage stands on its own without supports and can be fitted with our E-22, E-28 or E-29 lid and with the E-20 Filter System. It meets NIH standards and it's the lowest-cost disposable cage available. For lower laboratory animal housing bills or just plain convenience, it's worth looking into.

For more durable dwelling units, our line of permanent Econo-Cages is worth looking into. They're stronger and 20% heavier than competitive models. And they're built to take repeated sterilization cycles.

They come in the widest choice of sizes and materials — including polycarbonate, polypropylene, acrylic styrene copolmer, and polystyrene. From the leading manufacturer of plastic cages.

Ask for our catalog. From your Econo-Cage distributor.



SCIENTIFIC DIVISION
MARYLAND PLASTICS, INC.
9 East 37th Street, New York, N.Y. 10016

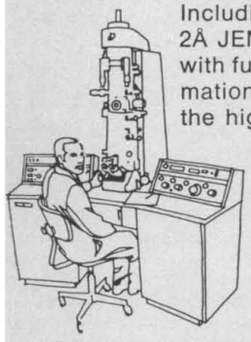
Circle No. 3 on Readers' Service Card

Jeolco's line vs. competition's. We keep adding instruments. They keep adding words.

1966. 1967. 1968. 1969.

Four years. Twenty-four new Jeolco instruments. More new instruments than all our competition combined.

All types of instruments: transmission electron microscopes, scanning scopes, and probes.

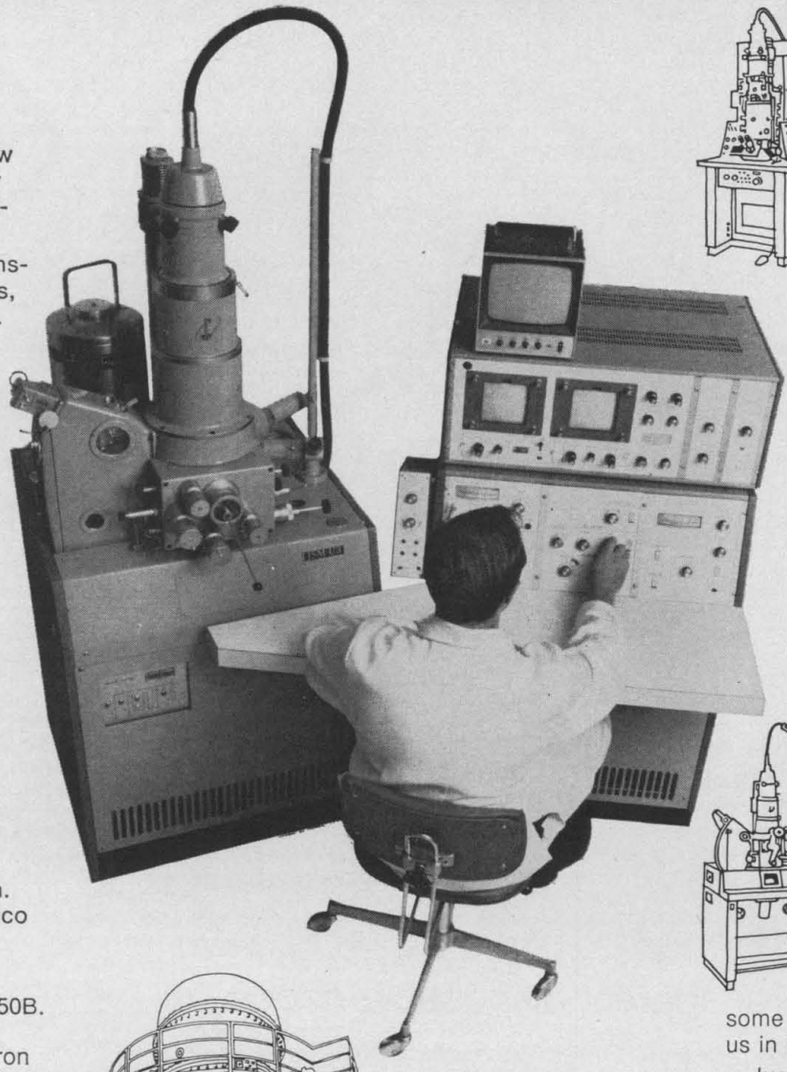


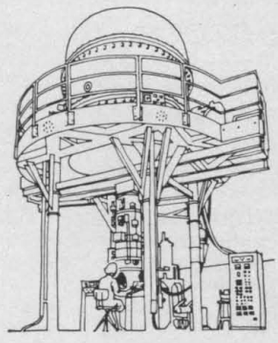
Including our 2Å JEM-100B, with full automation and the highest resolution in its class. (Our competition doesn't even come close.) And our JEM-100U, with 27 high-resolution accessories.

Including our brand-new JSM-U3. The super-compact scanning scope that shows you solid specimens in depth.

Including all the other Jeolco instruments you may or may not already know.

Like the JEM-50B. Our compact teaching electron microscope. At an unbelievably low price. It has 20 times higher resolution than an optical microscope, but it's just as easy to use.



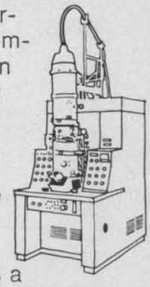


Like the JEM-1000. Our super-sensitive, super-expensive scope.

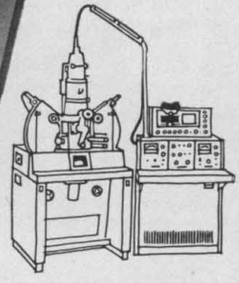
With an ultra-high transmissive power of 1 million volts. And an ultra-gentle way of handling the most delicate specimens.

Like the JEM-120. A routine replacement for any 100KV (except ours). For slightly more money, you get 20% more penetration.

Like the JEM-200. Our high-performance compact. With an accelerating voltage of 200KV and 70% higher transmissive power.



The extra power costs a little more. But then you work a little less.



Like the JXA-5. Our expert X-ray analyzer and microprobe. The only probe built that can detect beryllium.

Now that you've met some of us on paper meet all of us in person.

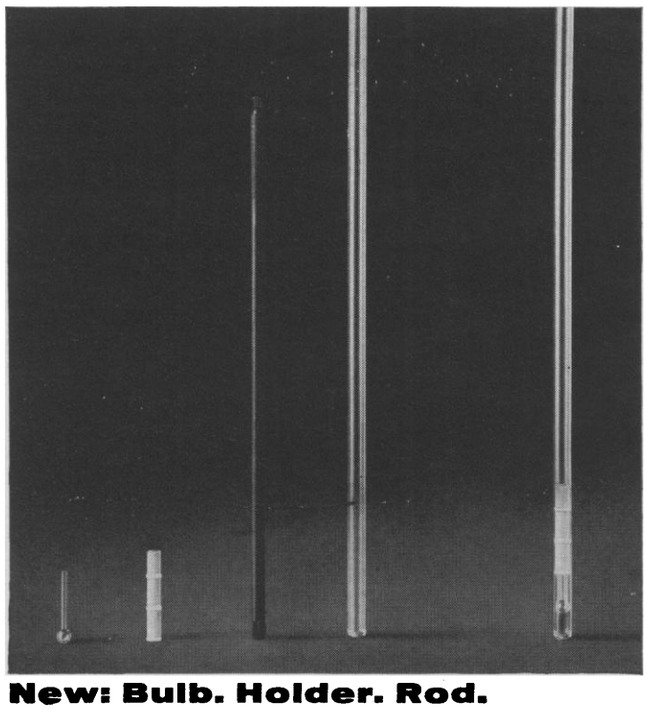
Just give us a call. Collect. (617) 396-6021.

Or see a technical consultant at one of our application centers. For a demonstration that will help you decide exactly which Jeolco instrument to buy.

jeolco

U.S.A. INC. ELECTRON OPTICS DIVISION
477 Riverside Avenue, Medford, Massachusetts 02155/Telephone (617) 396-6021

Circle No. 71 on Readers' Service Card



New: Bulb. Holder. Rod.

We just made NMR analysis easier.

We designed this unique new analytical tool to complement our extensive line of high quality NMR Tubes.

It's called a Microcell Assembly* and it's perfect for people who have only 30 μl or less for NMR Spectroscopic Analysis.

Use a standard length syringe. Put your sample in the Microcell bulb. Fit the bulb stem into the Teflon® holder. Screw on the nylon rod. Fill our special ultra precision tube with a fluid to minimize wobble. (Clearance is minimal—0.1 mm). Insert the whole assembly into the tube.

Unscrew the rod and withdraw it.

Analyze.

Our new Microcell Assembly gives you maximum resolution, fast and easily—without long, awkward syringe needles. Allowable camber: over 7.25″ of 0.002″ maximum.

And when you want your sample back just reverse the process. Reclean the bulb and store it—or throw it away. Replacement is only 69¢.

That's not all, of course. For analysis with ample samples, we've got a full line of tubes. They're all 7.25″ long. They all provide an allowable camber of 0.005″ over the full length.

They're available polished or ground—with plastic caps and in protective plastic storage cases. And most important, they all provide the consistent high quality you need and we always insist on offering.

See your local Kontes man or write direct for a detailed folder.

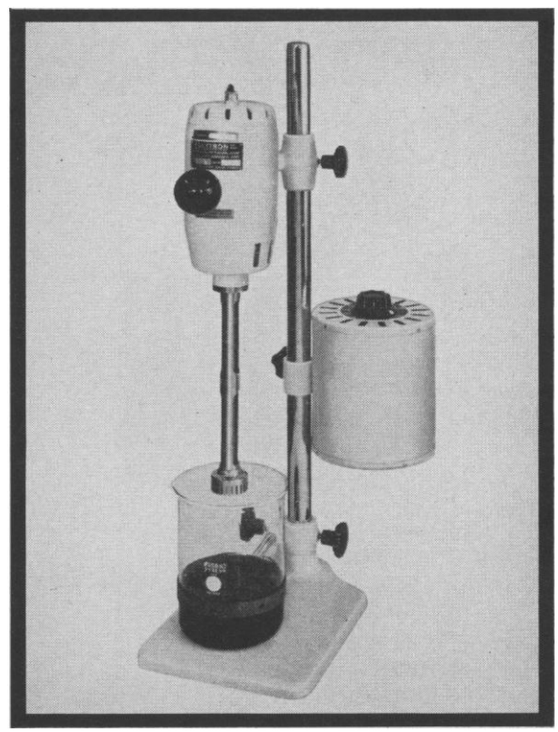
*Applied Spectroscopy, May-June, 1967, Vol. 21 #2, "Microcell for Nuclear Magnetic Resonance Analysis," R. A. Flath, N. Henderson, R. E. Lundin, and R. Teranishi.

KONTES
Vineland, N.J. 08360

Regional Distributors: KONTES OF ILL., Franklin Park, Ill. • KONTES OF CALIF., Berkeley, Calif.

Circle No. 59 on Readers' Service Card

disperser homogenizer emulsifier



.... succeeds where others fail

The Willems Polytron® instruments are based on a unique design which produces unequalled results through a kinematic high-frequency system combining sonic and ultrasonic forces. This approach is so effective in inducing chemical and physical change that it has already revolutionized numerous procedures in diverse fields of research, application and production—with materials whose consistency ranges from penicillin to bauxite, in solid, semi-solid, liquid or gas forms.

If you have such a problem, contact us and request a demonstration without obligation.

BRINKMANN INSTRUMENTS
CANTIAGUE ROAD, WESTBURY, N.Y. 11590/ED 4-7500

Circle No. 58 on Readers' Service Card

Julian H. Bigelow (Institute for Advanced Study, Princeton, New Jersey) then reviewed the Longuet-Higgins model, which is an extension of holography techniques from light to sound (phonoholograms). The essential feature brought out in this discussion was that the exact geometry of the optical hologram, for instance, is not a fundamental requirement, but rather that many methods for the storage and recovery of information about both amplitude and phase (or their counterparts) might serve in analogous situations.

Willard F. Libby (University of California at Los Angeles) opened up the discussion on possible cell and molecular levels of interaction by examining the possibility of communication between molecules, for example, between the subunits of hemoglobin. The level of understanding of hemoglobin structure and the kinetics of association of the alpha and beta subunits into hemoglobin provided the opportunity for reflections on how the heme groups "communicate" with each other, such that when one heme has acquired an oxygen, the other does not have to pay the same price in free energy for acquiring an oxygen as did the first. Possibilities suggested were that electronic shift in the proteins attending the heme due to the first oxygen attachment lowered the required association energy for other hemes, or that the charged groups just outside of the heme plates relaxed symmetrically due to heme polarization induced by oxygen attachment and thus lowered the initial entry energy barrier. William R. Carroll (National Institutes of Health) pointed out that the many subunits of glutamic acid dehydrogenase disassociate when steroid hormones are present, possibly because electronic shifts cause an entropy-based reconfiguration (steric shift). This association greatly affects the activity of the enzyme. He further pointed out that there are many such examples of "communication between molecules." However, two basic questions remained unresolved—if this kind of molecular interaction should indeed be called "communication" at all, and how such interaction could be active in information storage and transfer in the nervous system.

Melvin Klein (University of California, Berkeley) provided an added dimension to a possible molecular explanation of neuronal subsystem interactions by examining the role of liquid crystals (mesophases) as possible elements in molecular communication. The

interchangeable smectic and nematic crystalline phases can order spontaneously, orienting in electric and magnetic fields into specific three-dimensional configurations. These dynamic structures then can be modulated chemically or thermally, and respond to subsequent mechanical stresses or electrical fields. It was pointed out that many biological molecules (DNA, RNA, and protein alphahelices) exhibit similar properties and that perhaps the brain might contain information in such dynamic geometrical structures which are continually being shifted and recorrelated by neuronal impulses. The question arose, however, how this information might be stored and accurately retrieved from what is known about brain tissue structure.

Francis O. Schmitt (Massachusetts Institute of Technology), in discussing the cell and molecular level of brain structure, noted that there exists much intercellular space in brain tissue filled with hyaluronic acid fibers, ions, and proteins, all packed into approximately 150-angstrom tubes. He speculated that there might be some analogy between the behavior of these molecules confined in small spaces and paracrystalline structures. These intercellular spaces are continuous in the brain, and hydration of their hyaluronic acid, with the association of water molecules, could effect ion movement by filling or ordering intercellular space. Another potential role that molecules might play in information processing in the nervous system could be facilitated by the differential movement of metabolites and gene products along the numerous microtubules and neural filaments of brain axons. The presence of different materials at synaptic junctions, controlled by electrical activity of neurons or feedback to the genome might provide a molecular rationale for specific neuronal interactions, and the establishment of dynamically interacting neural nets. The differential activity of microtubules, coupled with what is known of differential RNA synthesis, vesicle deposition at axon endings, and the principles of allosteric molecular recognition (ab-ag, enzyme-substrate interactions) all provide some circumstantial basis for the possibility of alteration of a building stone or structural unit of synaptic membranes which could serve adequately as a "recognition factor" between neurons of the same set. For example, the successful regeneration of the fibers from the optic tectum and their proper reconnection to the optic

nerve would require such specific recognition.

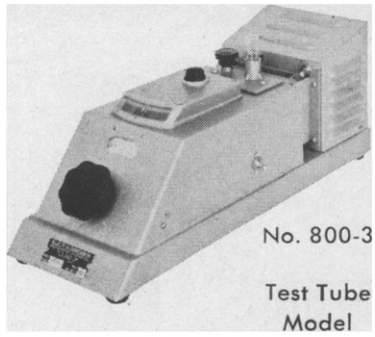
Josiah Macy, Jr. (University of Alabama), in describing the components of a large hierarchical computing complex which serves a number of research laboratories, emphasized the problem of constructing indexing techniques to find stored information in computer memory. He drew an analogy to human information processing in the central nervous system and noted that present-day computer systems are not adequate to handle the massive amounts of data that the human brain is capable of storing and retrieving.

John H. Milsum (McGill University) characterized the ocularmotor control system as an open-loop system that has been optimized by evolution. When an organism's response to some aspect of its environment requires a consistent set of neural controls for survival, then the original open-loop neural pathway becomes a closed-loop, autonomous operation. He cited what appears to be the accretion of longer, more complex control pathways in the nervous system through evolution, followed by a "streamlining" of these control modes by bypassing certain unused portions of the pathways. He then noted the interesting possibility that certain mental pathologies might be interpreted as a reopening of these discarded pathways which should be bypassed for normal, adaptive behavior.

Julian H. Bigelow (Institute for Advanced Study, Princeton, New Jersey) drew together much of what had been discussed by sketching the beginnings of a model of neuronal behavior analogous to the functional properties of holography. In his model the precise geometric constraints necessary for recovery of information with holographic optics were replaced by the concept of distributed storage of information in the nervous system, recoverable en masse by sampling with "strobing" scans using precise timing. This model provides a mechanism for erasure of information by inverse cancellation and incorporates the requirement for a conformal mapping of neuronal activity in the brain over convoluted rather than planar areas.

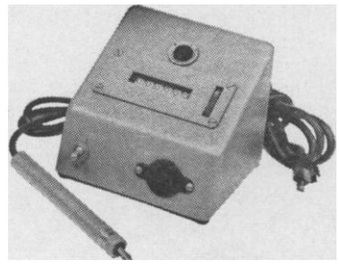
The conference, chaired by Otto H. Schmitt (University of Minnesota), was organized under the auspices of the Interdisciplinary Communications Program, formerly of the New York Academy of Sciences and now of the Smithsonian Institution (M. C. Shelesnyak, director; Frank Fremont-Smith,

Klett Summerson Photoelectric Colorimeter



KLETT COLONY MARKER and TALLY

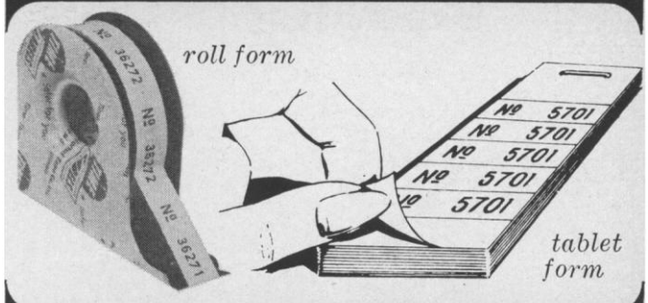
This instrument takes the drudgery and error out of the counting of bacterial colonies.



Klett MANUFACTURING CO., INC.,
179 East 87th Street, New York, 28, N.Y.

Circle No. 103 on Readers' Service Card

TIME CONSECUTIVE NUMBER LABELS



self-sticking numbers for use on test tubes, requisition forms, specimen containers.

Available in roll or tablet form, Time Consecutive Number Labels stick to any surface in temperatures ranging from —70°F to +250°F. Numbers can be repeated from 1 to 8 times in roll form, up to 10 times in tablet form. Supplied with standard "No." prefix or your choice of 5 special prefixes. Write for free literature and order instructions.

All Time Tape products are Bacteriostatic for your Safety

AVAILABLE THROUGH LABORATORY AND HOSPITAL DEALERS

PROFESSIONAL TAPE CO., INC.
365 EAST BURLINGTON ROAD
RIVERSIDE, ILLINOIS 60546

Circle No. 106 on Readers' Service Card

Generates and holds temperatures from −60°F. to 450°F. without power!

The first self-contained environment controlled shipping container.

One of the most remarkable developments in shipping, Transit-Heet® containers operate completely on their own to protect contents from extreme external environments. No ice packs. No heating coils. No cooling fluids. Transit-Heet containers need no power.

Available in a wide range of temperatures, sizes and shapes, Transit-Heet containers can maintain constant temperature levels of −60°F. to 450°F., in ambients ranging from −65°F. to 160°F. for up to five days.

Thus, they are ideal for shipping such temperature sensitive payloads as electronic instruments, biologicals, pharmaceuticals, foods and film. Containers are available in disposable and reusable models.

For more information, write or call:

AMERICAN STANDARD
Advanced Technical Products Dept.
P.O. Box 5000, Hightstown, N.J. 08520
(609) 448-9500

Circle No. 57 on Readers' Service Card

director emeritus) and was supported by funds made available by NASA. An edited transcript of the proceedings is scheduled for publication.

LENARD R. TRONCALE
Department of Biology,
Catholic University,
Washington, D.C.

DIANE M. RAMSEY-KLEE
Division of Research,
Reiss-Davis Child Study Center,
Los Angeles, California

Forthcoming Events

October

14–22. Pan-Pacific **Surgical** Assoc., 11th congr., Honolulu, Hawaii. (H. DeVault, Room 236, Alexander Young Bldg., Honolulu 96813)

16–17. Association of **Earth Science Editors**, 3rd annual conf., Houston, Tex. (W. D. Rose, Kentucky Geological Survey, Univ. of Kentucky, Lexington 40506)

16–17. National Conf. on **Fluid Power**, Chicago, Ill. (W. R. Smith, NCFP, 3300 S. Federal St., Chicago 60616)

16–17. **Rapid Excavation,** 2nd symp., Sacramento, Calif. (H. L. Hartman, Dean of Engineering, Sacramento State College, Sacramento 95819)

17–19. Society for **Social Responsibility in Science**, New Haven, Conn. (H. Bloom, SSRS. 221 Rock Hill Rd., Bala-Cynwyd, Pa. 19004)

18–23. American Acad. of **Pediatrics**, Chicago, Ill. (G. E. Hughes, Secretary for Education Affairs, 1801 Hinman Ave., Evanston, Ill. 60204)

19–22. American **Mining** Congr., San Francisco, Calif. (R. W. Van Evera, Ring Bldg., Washington, D.C. 20036)

19–25. American College of **Gastroenterology**, 34th annual, Houston, Tex. (D. Weiss, Executive Director, ACG, 33 W. 60 St., New York 10023)

20–21. **Polymer-Modified Hydraulic Cements** Symp., Philadelphia, Pa. (H. B. Wagner, Dept. of Chemistry, Drexel Inst. of Technology, Philadelphia 19104)

20–22. **George H. Hudson Symp.**, 5th annual, Plattsburgh, N.Y. (G. F. Kokoszka, Dept. of Chemistry, State Univ. College, Plattsburgh 12901)

20–22. American Assoc. of **Stratigraphic Palynologists**, University Park, Pa. (A. Traverse, Dept. of Geology and Geophysics, Pennsylvania State Univ., University Park 16802)

21–24. **Optical** Soc. of America, 54th annual, Chicago, Ill. (M. E. Warga, The Society, 2100 Pennsylvania Ave., NW, Washington, D.C. 20037)

21–25. Association of **Engineering Geologists**, 12th annual, San Francisco, Calif. (P. Vardy, AEG, P.O. Box 985, San Francisco 94101)

23–25. American **Astronautical** Soc., Las Cruces, N.M. (J. Penwarden, New Mexico State Univ., Las Cruces)

24–26. **Orton** Soc., 20th annual, New York, N.Y. (V. A. Graff, The Society, 15 Claremont Ave., New York 10027)

25–29. American Soc. of **Anesthesiol-**

ogists, San Francisco, Calif. (W. S. Marinko, 515 Busse Highway, Park Ridge, Ill. 60608)

25–31. American Assoc. of **Medical Record Librarians**, New York, N.Y. (M. Waterstraat, The Association, 211 E. Chicago Ave., Chicago, Ill. 60611)

26–30. Society for **Industrial and Applied Mathematics**, Anaheim, Calif. (R. K. Windsor, 33 S. 17 St., Philadelphia, Pa. 19103)

27–29. Interscience Conf. on **Antimicrobial Agents and Chemotherapy**, 9th, Washington, D.C. (R. W. Sarber, American Soc. for Microbiology, 1913 Eye St., NW, Washington, D.C. 20006)

25–26. International Soc. for **Homotoxicology** and **Antihomotoxicological Therapy** Symp., Baden-Baden, Germany. (F. Doerper, Bertholdstr. 7, 757 Baden-Baden)

27–30. National **Powerplant** Mtg., Cleveland, Ohio. (W. I. Marble, 2 Pennsylvania Plaza, New York 10001)

27–30. National **Safety** Congr. and Exposition, Chicago, Ill. (H. W. Champlin, The Congress, 425 N. Michigan Ave., Chicago 60611)

29–31. Symposium on **Pharmacology of Selected Drugs Used in Dermatology: Principles of Action and Uses**, New York, N.Y. (P. Merwin, New York Univ. Medical Center, 550 First Ave., New York 10016)

30–3. Association of American **Medical Colleges**, Cincinnati, Ohio. (D. E. Mattson, Div. of Educational Measurement and Research, AAMC, 2530 Ridge Ave., Evanston, Ill. 60201)

31–2. American Soc. of **Criminology**, Columbus, Ohio. (R. M. Susman, ASC, 800 Fourth St., SW, S-610, Washington, D.C. 20024)

November

2–5. **Atherosclerosis**, 2nd intern. symp., Chicago, Ill. (L. N. Katz, Chicago Heart Assoc., 22 W. Madison St., Chicago 60602)

2–7. Society of **Cosmetic Chemists**, Harriman, N.Y. (A. R. Korte, 521 W. 57 St., New York 10019)

3–4. Institute of **Navigation**, San Diego, Calif. (R. E. Freeman, Inst. of Navigation, Suite 912, 711 14th St., NW, Washington, D.C. 20005)

3–4. **Veterinarians**, 45th annual conf., Columbia, Mo. (F. McCulloch, School of Veterinary Medicine, Univ. of Missouri, Columbia 65201)

3–5. **Engineering Science in Biomedicine**, 7th annual, St. Louis, Mo. (E. Y. Rodin, Dept. of Applied Mathematics and Computer Science, Box 1176, Washington Univ., St. Louis 63130)

3–6. National Bureau of Standards, 3rd **Materials Research** Symp., Gaithersburg, Md. (R. R. Stromberg, A-307, Polymers Bldg., NBS, Washington, D.C. 20234)

3–7. American Soc. of **Parasitologists**, Washington, D.C. (D. V. Moore, Dept. of Microbiology, Univ. of Texas, Southwestern Medical School, Dallas 75235)

4–5. **Chemical Marketing Research** Assoc., Toronto, Canada. (P. E. Levesque, FMC Corp., 633 Third Ave., New York 10017)

4–6. Society of **Plastics Engineers**, Dallas, Tex. (C. C. Campbell, SPE, 656 W. Putnam Ave., Greenwich, Conn. 06830)

4–7. **Acoustical** Soc. of America, San Diego, Calif. (B. H. Goodfriend, 335 E. 45 St., New York 10017)

5–7. Pittsburgh **Diffraction** Conf., 27th, Pittsburgh, Pa. (J. H. Scott, U.S. Steel Research Center, Monroeville, Pa. 15146)

5–8. American **Chemical** Soc., southeastern regional mtg., Richmond, Va. (H. R. R. Wakeham, Philip Morris Inc., Box 3D, Richmond 23206)

5–8. Federation of Socs. for **Paint Technology**, Chicago, Ill. (R. W. Matlack, 121 S. Broad St., Philadelphia, Pa. 19107)

6–7. National Symp. on **Industrial Robots**, Chicago, Ill. (D. W. Hanify, IIT Research Inst., 10 W. 35 St., Chicago 60616)

6–8. American Soc. of **Cytology**, 17th annual scientific mtg., Chicago, Ill. (W. R. Lang, 7112 Lincoln Dr., Philadelphia, Pa. 19119)

6–8. American **Physical** Soc., Gainesville, Fla. (W. Seagondollar, Dept. of Physics, North Carolina State Univ., Raleigh 27607)

10–12. **Geological** Soc. of America, Atlantic City, N.J. (R. C. Becker, P.O. Box 1719, Boulder, Colo. 80302)

10–12. **Operations Research** Soc. of America, 36th natl., Miami, Fla. (M. E. Thomas, Dept. of Industrial and Systems Engineering, Univ. of Florida, Gainesville 32601)

10–12. **Paleontological** Soc., Atlantic City, N.J. (R. L. Langenheim, Jr., Dept. of Geology, Univ. of Illinois, Urbana 61801)

10–14. American College of **Preventive Medicine**, Philadelphia, Pa. (E. A. Piszczek, 6410 N. Leona Ave., Chicago, Ill. 60646)

10–14. American **Public Health** Assoc., 97th annual, Philadelphia, Pa. (B. F. Mattison, APHA, 1740 Broadway, New York 10019)

10–14. Technical Conf. on **Tin**, 2nd, Bangkok, Thailand. (W. Fox, Intern. Tin Council, Haymarket House, 28 Haymarket, London, S.W.1., England)

11–13. **Neurosurgical** Soc., 28th annual, Kyoto, Japan. (H. Handa, Dept. of Neurosurgery, Kyoto Univ., Kyoto)

11–14. **Neutrons in Radiobiology** Symp., Oak Ridge, Tenn. (J. A. Auxier, Oak Ridge National Lab., P.O. Box X, Oak Ridge 37830)

16–19. Association of **Military Surgeons** of the U.S., Washington, D.C. (Brig. Gen. F. E. Wilson, USAR, Executive Director, 1500 Massachusetts Ave., NW, Washington, D.C. 20005)

16–20. American Assoc. of **Blood Banks**, Houston, Tex. (L. J. James, AABB, 30 N. Michigan Ave., Chicago, Ill. 60602)

16–20. **Gulf and Caribbean Fisheries** Inst., 22nd annual, Miami Beach, Fla. (Executive Secretary, Gulf and Caribbean Fisheries Inst., 10 Rickenbacker Causeway, Miami 33149)

16–20. American Soc. of **Mechanical Engineers**, Los Angeles, Calif. (O. B. Schier, II, United Engineering Center, 345 E. 47 St., New York 10017)

17–19. National **Fire Protection** Assoc., Denver, Colo. (D. Richardson, The Association, 60 Batterymarch St., Boston, Mass. 02110)

17–21. **Electronic Industries** Assoc.,

Laser Subdivision, Paris, France. (J. Davis, EIA Subdivision, 2001 Eye St., NW, Washington, D.C. 20006)

17–21. World **Mental Health** Assembly, Washington, D.C. (P. V. Lemkau, Assembly Chairman, 615 N. Wolfe St., Baltimore, Md. 21205)

18–19. International Federation of **Surgical Colleges**, Buenos Aires, Argentina. (R. S. Johnson-Gilbert, Secretary, c/o Royal College of Surgeons of England, Lincolns Inn Fields, London, W.C.2, England)

18–21. **Magnetism and Magnetic Materials**, 15th conf., Philadelphia, Pa. (J. Blades, Franklin Inst., Research Labs., Philadelphia 19103)

19–21. Eastern **Analytical** Symp., New York, N.Y. (R. J. Knauer, Advanced Materials Div., Armco Steel Corp., P.O. Box 1697, Baltimore, Md. 21203)

20–21. Association for the Study of **Animal Behaviour**, London, England. (J. Cullen, Psychology Dept., The University, Stirling, England)

20–23. American **Anthropological** Assoc., New Orleans, La. (C. C. Reining, Suite 112, 3700 Massachusetts Ave., NW, Washington, D.C. 20016)

20–24. **Audio Engineering** Soc., 37th conv., New York, N.Y. (J. D. Colvin, Room 428, 60 E. 42 St., New York 10017)

21–22. **Clinical** Conf., 13th annual, Houston, Tex. (J. Brandenberger, M. D. Anderson Hospital & Tumor Inst., Univ. of Texas, Houston 77025)

30–3. American Acad. for **Cerebral Palsy**, Las Vegas, Nev. (G. Solomons, University Hospitals, Iowa City, Iowa 52240)

30–4. American **Nuclear** Soc., San Francisco, Calif. (O. J. Du Temple, ANS, 244 E. Ogden Ave., Hinsdale, Ill.)

December

1–4. **Entomological** Soc. of America, Chicago, Ill. (W. P. Murdoch, Executive Secretary, 4603 Calvert Rd., College Park, Md. 20740)

2–5. **Reticuloendothelial** Soc., 6th natl., San Francisco, Calif. (E. Dobson, Donner Lab., Univ. of California, Berkeley 94720)

3–5. International **Wire and Cable** Symp., Atlantic City, N.J. (J. Spergel, U.S. Army Electronics Command, Amsel-K1-EE, Fort Monmouth, N.J. 07703)

3–6. American Assoc. of **Physicists in Medicine**, Chicago, Ill. (J. G. Kereiakes, Radioisotope Lab., Cincinnati General Hospital, Cincinnati, Ohio 45229)

5–6. **Oklahoma Acad. of Science**, Edmond. (J. T. Self, 730 South Oval, Univ. of Oklahoma, Norman 73069)

5–6. **Interferon** Symp., New York, N.Y. (I. Saulpaugh, New York Heart Assoc., 2 E. 64 St., New York 10021)

5–6. American **Rheumatism** Assoc., Tucson, Ariz. (M. M. Walsh, ARA, 1212 Avenue of the Americas, New York 10036)

5–7. American Acad. of **Oral Medicine**, New York, N.Y. (B. Tuchman, 200 Central Park South, New York 10019)

5–7. American Acad. of **Psychoanalysis**, New York, N.Y. (M. Carroll, AAP, 125 E. 65 St., New York 10021)

6–11. Galaxy Conf. on **Adult Educa-**

tion, Washington, D.C. (E. Sydnor, 900 Silver Spring Ave., Silver Spring, Md. 20910)

7–9. American Soc. of **Hematology**, Cleveland, Ohio. (F. H. Gardner, Presbyterian–Univ. of Pennsylvania Medical Center, Philadelphia 19104)

7–12. American Soc. for **Testing and Materials**, Cincinnati, Ohio. (T. A. Marshall, Jr., ASTM, 1916 Race St., Philadelphia, Pa. 19103)

8–10. **Applications of Simulation**, 3rd conf., Los Angeles, Calif. (P. J. Kiviat, RAND Corp., 1700 Main St., Santa Monica, Calif. 90406)

8–10. **Circuit Theory**, intern. symp., San Francisco, Calif. (B. J. Leon, School of Electrical Engineering, Cornell Univ., Ithaca, N.Y. 14850)

8–10. National **Electronics** Conf. and Exhibition, 25th, Chicago, Ill. (R. J. Napolitan, NEC, Oakbrook Executive Plaza #2, 1211 W. 22 St., Oak Brook, Ill. 60521)

8–10. Southern **Surgical** Assoc., Hot Springs, Va. (D. C. Sabiston, Jr., Duke Univ. Medical Center, Durham, N.C. 27706)

8–11. Oak Ridge Associated Universities Symp. in **Medicine**, 12th, Oak Ridge, Tenn. (R. M. Kniseley, Medical Div., Oak Ridge Associated Universities, Oak Ridge 37830)

11–12. Conference on **Holography and the Computer**, Houston, Tex. (J. A. Jordan, Jr., IBM, Houston Scientific Center, 6900 Fannin St., Houston 77025)

12–14. American **Psychoanalytic** Assoc., New York, N.Y. (H. Fischer, 1 E. 57 St., New York 10022)

14–18. American Assoc. of **Hospital Pharmacists**, Washington, D.C. (J. A. Oddis, AAHP, 4630 Montgomery Ave., Bethesda, Md. 20014)

15–18. American **Geophysical** Union, San Francisco, Calif. (W. E. Smith, AGU, 2100 Pennsylvania Ave., NW, Washington, D.C. 20037)

17–19. Symposium on **Infections and Immunosuppression in Sub-Human Primates**, Rijswijk, Netherlands. (H. Balner, Radiobiological Institute TNO, Lange Kleiweg 151, Rijswijk Z.H., Netherlands)

18–20. International Symp. on **Computer and Information Science** (COINS-69), Miami Beach, Fla. (J. T. Lou, Univ. of Florida, Gainesville 32601)

26–30. **Sigma Delta Epsilon**, Boston, Mass. (M. Myers, 6234 Mary Lane Dr., San Diego, Calif. 92115)

26–31. American Assoc. for the **Advancement of Science**, 136th mtg., Boston, Mass. (Meetings Manager, 1515 Massachusetts Ave., NW, Washington, D.C. 20005)

26–31. **Animal Behavior** Soc., Boston, Mass. (B. Dane, Tufts Univ., Medford, Mass.)

26–31. American Soc. of **Naturalists**, Boston, Mass. (B. H. Judd, Dept. of Zoology, Univ. of Texas, Austin 78712)

26–31. Society of **Protozoologists**, Boston, Mass. (M. Hammond, Dept. of Zoology, Utah State Univ., Logan 84321)

26–31. National Assoc. of **Science Writers**, Boston, Mass. (R. Arctander, The Association, Box H, Sea Cliff, N.Y. 11579)

BOOKS RECEIVED

(*Continued from page 97*)

Biological Systems. Shelby D. Gerking. Saunders, Philadelphia, 1969. xvi + 480 pp., illus. $8.50.

Biology Laboratory Manual. A. M. Winchester. Brown, Dubuque, Iowa, ed. 4, 1969. x + 358 pp., illus. Spiral bound, $5.25.

A Biology of Higher Invertebrates. W. D. Russell-Hunter. Macmillan, New York; Collier-Macmillan, London, 1969. xiv + 226 pp., illus. Paper, $3.95. Current Concepts in Biology Series.

Computer-Aided Design of Magnetic Circuits. Alexander Kusko and Theodore Wroblewski. MIT Press, Cambridge, 1969. xiv + 114 pp., illus. $6.95.

Computerized Approximation and Synthesis of Linear Networks. Jiri Vlach. Wiley, New York, 1969. xvi + 480 pp., illus. $14.95.

The Concept of Community. Readings with Interpretations. David W. Minar and Scott Greer. Aldine, Chicago, 1969. xii + 372 pp. Cloth, $7.95; paper, $4.95.

Concepts in Physics. Robert K. Adair. Academic Press, New York, 1969. xvi + 792 pp., illus. $12.50.

Concepts of Ecology. Edward J. Kormondy. Prentice-Hall, Englewood Cliffs, N.J., 1969. xiv + 210 pp., illus. Cloth, $4.95; paper, $2.95.

Control Systems for Technicians. G. T. Bryan. Hart, New York, 1969. 328 pp., illus. $12.50.

Croissance de Composés Minéraux Monocristallins. No. 2, 1967–68. J. P. Suchet, Ed. Masson, Paris, 1969. viii + 172 pp., illus. Paper, 55 F. Séminaires de Chimie de l'Etat Solide.

Current Topics in Radiation Research. Vol. 5. Michael Ebert and Alma Howard, Eds. North-Holland, Amsterdam; Interscience (Wiley), New York, 1969. xii + 292 pp., illus. $15.50.

Darwin's South America. Robert S. Hopkins. Day, New York, 1969. 224 pp., illus. $5.95.

Diseases in Free-living Wild Animals. Proceedings of a symposium, London, 1968. A. McDiarmid, Ed. Published for the Zoological Society of London by Academic Press, New York, 1969. xxiv + 336 pp., illus. $14.50. Symposia of the Zoological Society of London, No. 24.

Distributions and Fourier Transforms. William F. Donoghue, Jr. Academic Press, New York, 1969. viii + 320 pp., illus. $16. Pure and Applied Mathematics, vol. 32.

Elementary Functions. Thomas K. Maddox and Lawrence H. Davis. Prentice-Hall, Englewood Cliffs, N.J., 1969. xii + 276 pp., illus. $8.95.

Elementary Quantum Mechanics. Morten Scharff. Translated from the Danish edition (Copenhagen, 1963). Interscience (Wiley), New York, 1969. viii + 216 pp., illus. Paper, $5.95.

Les Eléménts des Terres Rares. Jean Flahaut. Masson, Paris, 1969. xii + 168 pp., illus. Paper, 56 F. Collection de Monographies de Chimie.

Episomes. Allan M. Campbell. Harper and Row, New York, 1969. xiv + 194 pp., illus. $5.95. Modern Perspectives in Biology.

Equilibres et Réactivité des Complexes en Solution. P. Souchay and J. Lefebvre. Masson, Paris, 1969. viii + 360 pp., illus. 120 F. Collection de Chimie Physique.

Essai Critique sur les Méthodes de la Géologie. De l'Objet à la Genèse. P. Routhier. Masson, Paris, 1969. 206 pp., illus. 38 F. Collection Évolution des Sciences, No. 34.

Essentials of General, Organic and Biochemistry. Joseph I. Routh, Darrell P. Eyman, and Donald J. Burton. Saunders, Philadelphia, 1969. xii + 722 pp., illus. $9.95.

Experimental Thermodynamics. Vol. 1, Calorimetry of Non-reacting Systems. John P. McCullough and Donald W. Scott, Eds. Plenum, New York; Butterworths, London, 1969. xx + 608 pp., illus. $45.

Fatigue Design Procedures. Proceedings of the 4th Symposium of the International Committee on Aeronautical Fatigue, Munich, 1965. E. Gassner and W. Schütz, Eds. Pergamon, New York, 1969. xiv + 522 pp., illus. $27. International Series of Monographs in Aeronautics and Astronautics, Division 9: Symposia, vol. 20.

Fracture. An Advanced Treatise. Vol. 5, Fracture Design of Structures. H. Liebowitz, Ed. Academic Press, New York, 1969. xvi + 528 pp., illus. $25.

Fracture. An Advanced Treatise. Vol. 6, Fracture of Metals. H. Liebowitz, Ed. Academic Press, New York, 1969. xviii + 510 pp., illus. $26.

Fungicides. An Advanced Treatise. Vol. 2, Chemistry and Physiology. Dewayne C. Torgeson, Ed. Academic Press, New York, 1969. xvi + 744 pp., illus. $35.

Future Goals of Engineering in Biology and Medicine. Proceedings of an international conference, Washington, D.C., 1967. James F. Dickson, III and J. H. U. Brown, Eds. Academic Press, New York, 1969. xvi + 360 pp., illus. $16.

The Future of the Brain Sciences. Proceedings of a conference, New York, 1968. Samuel Bogoch, Ed. Plenum, New York, 1969. xl + 604 pp., illus. $19.50.

The Genesis of the Classical Conditioned Response. Irene Martin and A. B. Levey. Pergamon, New York, 1969. xiv + 146 pp., illus. $9. International Series of Monographs in Experimental Psychology, vol. 8.

The Genetics of Bacteria and Their Viruses. Studies in Basic Genetics and Molecular Biology. William Hayes. Wiley, New York, ed. 2, 1968. xvi + 928 pp. + plates. $13.75.

A German Source-Book in Physics. K. B. Beaton and H. C. Bolton. Oxford University Press, New York, 1969. xvi + 316 pp., illus. Cloth, $9.95; paper, $4.95.

Germ-Free Biology. Experimental and Clinical Aspects. Proceedings of an international symposium on Gnotobiology, Buffalo, N.Y., 1968. Edwin A. Mirand and Nathan Back, Eds. Plenum, New York, 1969. xii + 424 pp., illus. $22.50. Advances in Experimental Medicine and Biology, vol. 3.

Glass Microelectrodes. Marc Lavallee, Otto F. Schanne, and Normand C. Hebert, Eds. Wiley, New York, 1969. xviii + 446 pp., illus. $22.50.

Handbook of Clinical Neurology. Vol. 1, Disturbances of Nervous Function. P.

J. Vinken and G. W. Bruyn, Eds., in collaboration with R. Garcin. North-Holland, Amsterdam; Interscience (Wiley), New York, 1969. xii + 704 pp., illus. $67; by subscription, $57.

Hydraulic Servo Systems. Analysis and Design. M. Guillon. Translated from the French edition (Paris, 1961) by R. T. Griffiths. Plenum, New York; Butterworths, London, 1969. xvi + 464 pp., illus. $45.

Ideology in America. Change and Response in a City, a Suburb, and a Small Town. Everett Carll Ladd, Jr. Cornell University Press, Ithaca, N.Y., 1969. xvi + 384 pp., illus. $11.50.

Improving Office Environment. 1968 Business Equipment Manufacturers Association Management Conference. Business Press, Elmhurst, Ill., 1969 (distributor, Taplinger, New York). x + 86 pp., illus. $7.

Information Processing for Management. 1968 Business Equipment Manufacturers Association Management Conference. Business Press, Elmhurst, Ill., 1969 (distributor, Taplinger, New York). viii + 200 pp., illus. $9.25.

An Introduction to Coherent Optics and Holography. George W. Stroke. Academic Press, New York, ed. 2, 1969. xxii + 362 pp., illus. $11.50.

Introduction to Mathematics. Bruce E. Meserve and Max A. Sobel. Prentice-Hall, Englewood Cliffs, N.J., ed. 2, 1969. xii + 420 pp., illus. $7.95.

An Introduction to Nonlinear Optics. George C. Baldwin. Plenum, New York, 1969. x + 158 pp., illus. $9.50.

Introduction to Principles of Chemistry. John R. Holum. Wiley, New York, 1969. xiv + 258 pp., illus. $6.95.

Introduction to Spectral Theory in Hilbert Space. Gilbert Helmberg. North-Holland, Amsterdam; Interscience (Wiley), New York, 1969. xvi + 348 pp., illus. $19.50. North-Holland Series in Applied Mathematics and Mechanics, vol. 6.

The Invisible Giants. Atoms, Nuclei, and Radioisotopes. Vivian Grey. Little, Brown, Boston, 1969. x + 156 pp., illus. $4.50.

Jet, Rocket, Nuclear, Ion and Electric Propulsion: Theory and Design. W. H. T. Loh. Springer-Verlag, New York, 1968. xviii + 766 pp., illus. $24.80. Applied Physics and Engineering Series, vol. 7.

The Kidney. Morphology, Biochemistry, Physiology. Vol. 1. Charles Rouiller and Alex F. Muller, Eds. Academic Press, New York, 1969. xiv + 562 pp., illus. $28.05.

The La Roche Sites. J. J. Hoffman. Smithsonian Institution Rover Basin Surveys, Lincoln, Nebr., 1968. vi + 124 pp., illus. Paper. Publications in Salvage Archeology, No. 11.

Late Seventeenth Century Scientists. Donald Hutchings, Ed. Pergamon, New York, 1969. xii + 184 pp., illus. Cloth, $6; paper, $4.50. Commonwealth and International Library: Liberal Studies Division.

The Law of the Sea. International Rules and Organization for the Sea. Proceedings of the 3rd Annual Conference of the Law of the Sea Institute, Kingston, R.I., 1968. Lewis M. Alexander, Ed. University of Rhode Island, Kingston, 1969. vi + 466 pp., illus. Paper, $6.50.

Lewis and Clark. Pioneering Naturalists. Paul Russell Cutright. University of Illinois Press, Urbana, 1969. xvi + 510 pp. + plates. $12.50.

Linear Piezoelectric Plate Vibrations. Elements of the Linear Theory of Piezoelectricity and the Vibrations of Piezoelectric Plates. H. F. Tiersten. Plenum, New York, 1969. xvi + 212 pp., illus. $15.

Logical Design of Switching Circuits. Douglas Lewin. Elsevier, New York, 1969. xii + 368 pp., illus. $10.50.

The Logic of Explanation in Psychoanalysis. Michael Sherwood. Academic Press, New York, 1969. x + 278 pp. $9.50.

Mammalian Fertilization. An Atlas of Ultrastructure. Robert Hadek. Academic Press, New York, 1969. xii + 300 pp., illus. $14.50.

The Manipulation of Air-sensitive Compounds. D. F. Shriver. McGraw-Hill, New York, 1969. xvi + 304 pp., illus. $17.50.

Materials and Processes in Manufacturing. E. Paul DeGarmo. Macmillan, New York; Collier-Macmillan, London, ed. 3, 1969. viii + 952 pp., illus. $12.95.

Mathematical Methods in Kinetic Theory. Carlo Cercignani. Plenum, New York, 1969. x + 230 pp., illus. $15.

Mathematical Methods in Solid State and Superfluid Theory. Scottish Universities' Summer School in Physics, St. Andrews, 1967. R. C. Clark and G. H. Derrick, Eds. Plenum, New York, 1968. xvi + 400 pp., illus. $26.50.

Mathematics. An Introduction. Charles N. Podraza, Arlys W. Hanson, Larry L. Blevins, and Harry C. Prall. Goodyear, Pacific Palisades, Calif., 1969. xii + 260 pp., illus. $8.50.

Mathematics in Management. The Language of Sets, Statistics and Variables. P. Rosenstiehl and J. Mothes. Translated from the French edition (Paris, 1968) by A. Silvey. Interscience (Wiley), New York; North-Holland, Amsterdam, 1969. xvi + 392 pp., illus. $14.50.

Mid-Nineteenth-Century Scientists. John North, Ed. Pergamon, New York, 1969. x + 190 pp. + plates. Cloth, $6.50; paper, $4.75. Commonwealth and International Library, Liberal Studies Division: Science and Society, vol. 4.

Molecular Approaches to Ecology. Marcel Florkin and Ernest Schoffeniels. Academic Press, New York, 1969. x + 204 pp., illus. $10.

The Nature and Properties of Soils. Harry O. Buckman and Nyle C. Brady. Macmillan, New York; Collier-Macmillan, London, ed. 7, 1969. xviii + 654 pp., illus. $10.95.

Nucleic Acid Metabolism Cell Differentiation and Cancer Growth. Proceedings of the Second International Symposium for Cellular Chemistry, Ohtsu, Japan, October 1966. E. V. Cowdry and S. Seno, Eds. Pergamon, New York, 1969. xx + 484 pp., illus. $21.

Olfaction in Fishes. Herman Kleerekoper. Indiana University Press, Bloomington, 1969. viii + 224 pp., illus. $12.50.

Organic Electronic Spectral Data. Vol. 5, 1960–61. John P. Phillips, Robert E. Lyle, and Paul R. Jones, Eds. Interscience

(Wiley), New York, 1969. x + 1022 pp. $34.95.

Organisation and Administration of Agricultural Research. I. Arnon. Elsevier, New York, 1968. xii + 344 pp., illus. $12.50.

Organization and Administration of Health Care. Theory, Practice, Environment. Richard L. Durbin and W. Herbert Springall. Mosby, St. Louis, 1969. xii + 248 pp., illus. $9.85.

The Pattern of Vertebrate Evolution. L. B. Halstead. Freeman, San Francisco, 1968. xii + 210 pp., illus. $7. University Reviews in Biology, vol. 10.

Pests of Sugar Cane. J. R. Williams, J. R. Metcalfe, R. W. Mungomery, and R. Mathes, Eds. Elsevier, New York, 1969. xiv + 570 pp., illus. $32.50.

Philosophy and Ethics of Medicine. Michael Gelfand. Livingstone, Edinburgh, 1968 (U.S. distributor, Williams and Wilkins, Baltimore). viii + 176 pp. $5.50.

Physical Chemistry. An Advanced Treatise. Vol. 3, Electronic Structure of Atoms and Molecules. Douglas Henderson, Ed. Academic Press, New York, 1969. xvi + 616 pp., illus. $22.60.

Physics of Semiconductor Devices. S. M. Sze. Interscience (Wiley), New York, 1969. xvi + 814 pp., illus. $19.95.

Plant Structure and Development. A Pictorial and Physiological Approach. T. P. O'Brien and Margaret E. McCully. Macmillan, New York; Collier-Macmillan, London, 1969. x + 118 pp., illus. Cloth, $9.95; paper, $5.50.

Politics in the Altiplano. The Dynamics of Change in Rural Peru. Edward Dew. Published for the Institute of Latin American Studies by University of Texas Press, Austin, 1969. xviii + 222 pp., illus. $6.

A Practical Guide to the Study of the Productivity of Large Herbivores. Frank B. Golley and Helmut K. Buechner, Eds. Published for the International Biological Programme by Blackwell Scientific Publications, Oxford, 1968 (U.S. distributor, Davis, Philadelphia). xii + 308 pp., illus. Paper, $7. IBP Handbook No. 7.

Preparing to Teach the Disadvantaged. Approaches to Teacher Education. Bruce W. Tuckman and John L. O'Brian, Eds. Free Press, New York; Collier-Macmillan, London, 1969. xxiv + 312 pp. $7.95.

Principles of Holography. Howard M. Smith. Interscience (Wiley), New York, 1969. xiv + 242 pp., illus. $9.95.

Progress in Nuclear Magnetic Resonance Spectroscopy. Vol. 4. J. W. Emsley, J. Feeney, and L. H. Sutcliffe, Eds. Pergamon, New York, 1969. viii + 468 pp., illus. $18.

La Prospection Minière à la Batée dans le Massif Armoricain. Méthodes, Résultats, Atlas minéralogique. J. Guigues and P. Devismes. Éditions B.R.G.M., Paris, 1969. 172 pp., illus. Paper. Mémoires du B.R.G.M., No. 71.

Prospects for Mathematics in the Life Sciences. Inaugural Lecture Delivered at the University of Queensland, June 1968. L. Bass. University of Queensland Press, St. Lucia, Queensland, Australia, 1969. 16 pp. Paper, 75¢.

Psycho Physiologie. Vol. 2, Le Comportement Animal. Rémy Chauvin. Masson, Paris, 1969. viii + 420 pp., illus. 72 F. Précis de Sciences Biologiques.

Public Finance. Carl S. Shoup. Aldine, Chicago, 1969. xii + 660 pp., illus. $12.95. Aldine Treatises in Modern Economics.

Rein Control, or Unidirectional Rate Sensitivity, a Fundamental Dynamic and Organizing Function in Biology. A conference, New York, 1967. Manfred Clynes, Ed. New York Academy of Sciences, New York, 1969. Illus. Paper, $17. *Annals of the New York Academy of Sciences*, vol. 156, art. 2, pp. 627–968.

Reproduction in Domestic Animals. H. H. Cole and P. T. Cupps, Eds. Academic Press, New York, ed. 2, 1969. xviii + 662 pp., illus. $19.50.

The Ritual Process. Structure and Anti-Structure. Victor W. Turner. Aldine, Chicago, 1969. x + 214 pp., illus. $6.50. Lewis Henry Morgan Lectures, 1966.

Scheduling Handbook. James J. O'Brien. McGraw-Hill, New York, 1969. xii + 612 pp., illus. $18.50. McGraw-Hill Handbook Series.

Schizophrenia and the Need-Fear Dilemma. Donald L. Burnham, Arthur I. Gladstone, and Robert W. Gibson. International Universities Press, New York, 1969. xvi + 480 pp., illus. $12.

Science and Technology in Developing Countries. Proceedings of a conference, Beirut, Lebanon, Nov.–Dec. 1967. Claire Nader and A. B. Zahlan, Eds., with the assistance of Soraya Antonius. Cambridge University Press, New York, 1969. xx + 588 pp., illus. $16.

Seaweeds of Cape Cod and the Islands. John M. Kingsbury. Illustrated by Edward and Marcia Norman. Chatham Press, Chatham, Mass., 1969. x + 214 pp. $12.50.

A Selected and Annotated Bibliography of Korean Anthropology. Eugene I. Knez and Chang-su Swanson. National Assembly Library, Republic of Korea, 1968. Paper.

Sensory Deprivation. Fifteen Years of Research. John P. Zubek, Ed. Appleton-Century-Crofts, New York, 1969. x + 526 pp., illus. $9.50. Century Psychology Series.

Some Nineteenth Century British Scientists. R. Harré, Ed. Pergamon, New York, 1969. viii + 260 pp., illus. Cloth, $7; paper, $5.50. Commonwealth and International Library, Liberal Studies Division: Science and Society, vol. 5.

Space. Patrick Moore. Illustrated by David A. Hardy. Published for the American Museum of Natural History by Natural History Press, Garden City, N.Y., 1969. 220 pp. $12.95.

Statistical Tables. F. James Rohlf and Robert R. Sokal. Freeman, San Francisco, 1969. xiv + 258 pp. Cloth, $7.50; paper, $2.75.

Stochastic Approximation. M. T. Wasan. Cambridge University Press, New York, 1969. xii + 204 pp. $9.50. Cambridge Tracts in Mathematics and Mathematical Physics, No. 58.

Streams of Culture. Gavin de Beer. Lippincott, Philadelphia, 1969. 262 pp. $5.95.

Structure and Application of Galvanomagnetic Devices. H. Weiss. Translated from the German by H. H. Wieder and W. F. Striedieck. Pergamon, New York, 1969. xvi + 364 pp., illus. $18. Interna-

tional Series of Monographs on Semiconductors, vol. 8.

Subcellular Components. Preparation and Fractionation. A symposium, London, Nov. 1967. G. D. Birnie and Sylvia M. Fox, Eds. Plenum, New York; Butterworths, London, 1969. viii + 176 pp., illus. $12.

Symposia on Theoretical Physics and Mathematics. Vol. 9. Proceedings of the Sixth Anniversary Symposium of the Institute of Mathematical Sciences, Madras, India, Jan. 1968. Alladi Ramakrishnan, Ed. Plenum, New York, 1969. xiv + 278 pp. $15.

Technical Dictionary of High Polymers. In English, German, French, and Russian. Wladimir Dawydoff and Horst Howorka. Pergamon, New York; VEB Verlag Technik, Berlin, 1969. 960 pp. $28.

Thermal Conductivity. Proceedings of the eighth conference, West Lafayette, Ind., Oct. 1968. C. Y. Ho and R. E. Taylor, Eds. Plenum, New York, 1969. xx + 1172 pp., illus. $40.

Thermal Insulation. John F. Malloy. Van Nostrand, New York, 1969. xxiv + 552 pp., illus. $21.50. Van Nostrand Reinhold Environmental Engineering Series.

Thermal Radiation Phenomena. Rolf K. M. Landshoff and John L. Magee, Eds. IFI/Plenum, New York, 1969. Vol. 1, Radiative Properties of Air (xvi + 648 pp., illus. $28); vol. 2, Excitation and Non-Equilibrium Phenomena in Air (xvi + 290 pp., illus. $14). Vol. 1 originally issued as Defense Atomic Support Agency 1917-3 (1967); vol. 2 is slightly revised edition of DASA 1917-4 (1967).

Three Theories of Child Development. The Contributions of Erik H. Erikson, Jean Piaget, and Robert R. Sears, and Their Applications. Henry W. Maier. Harper and Row, New York, 1969. x + 342 pp., illus. $8.25. Revised version of the 1965 edition.

Topics in Atomic Collision Theory. Sydney Geltman. Academic Press, New York, 1969. viii + 248 pp., illus. $13. Pure and Applied Physics, vol. 30.

Traitement Graphique de l'Algèbre des Moments Angulaires. Edgard El-Baz, with the collaboration of J. Lafoucrière and B. Castel. Masson, Paris, 1969. 180 pp., illus. Paper, 72 F. Collection de Monographies de Physique, No. 6.

Vibration and Impact. Ralph Burton. Dover, New York, 1968. x + 310 pp., illus. Paper, $2.75. Reprint, with new Author's Preface, of the 1958 edition.

Water, Earth, and Man. A Synthesis of Hydrology, Geomorphology, and Socio-Economic Geography. Richard J. Chorley, Ed. Methuen, London, 1969 (U.S. distributor, Barnes and Noble, New York). xx + 588 pp., illus. $16.

Yearbook of the Association of Pacific Coast Geographers. Vol. 30, Eclectic Climatology. Selected Essay Written in Memory of David I. Blumenstock, 1913–1963. Arnold Court, Ed. Published for the APCG by Oregon State University Press, Corvallis, 1968. 184 pp., illus. Paper, $3.

Yearbook of the Association of Pacific Coast Geographers. Vol. 31. John F. Gaines, Ed. Published for the APCG by Oregon State University Press, Corvallis, 1969. 156 pp., illus. Paper, $3.