SCIENCE

11 July 1969
Vol. 165, No. 3889

AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE

Until now Raman Spectrophotometers have been huge conglomerates of non-standard equipment, difficult to operate and far too expensive for most labs to buy.

Now, that's changed. Spectra-Physics' Model 700 Raman Spectrophotometer puts it all on a 40 x 23 inch bench top and makes it push-button easy . . . at half the price of previous units.

To accomplish this Raman revolution, Model 700 was designed as an integral unit, with all components engineered and packaged to obtain the best possible spectra at the lowest possible cost.

For example, by designing a fast new double monochromator especially for the 700, it was possible to use the casting as the backbone of the instrument. Then, advanced detector circuitry, all-solid-state electronics, sample chambers, xy recorder, ITT FW-130 photocathode, and Spectra-Physics Model 124 laser were all matched to obtain the design goal.

The result is a compact, high performance Raman Spectrophotometer that even a child can operate. Put it on the lab bench, plug it in, push three buttons and the spectra records . . . accurately and rapidly.

Digital controlled scanning permits the 700 to run a full spectrum, 4000 wavenumbers, in 2 minutes, or in 80 minutes, or in any one of four speeds in between. The data can be recorded in six different scales and is presented in easy to use and store form with direct wavenumber readout on the 11 x 17 xy plotter.

Designed to accommodate samples in liquid, powder or solid form, Model 700 contains provision for rotation of the laser beam and for analyzing either polarization to allow depolarization measurements.

With a scanning range of 23,500 to 11,300 wavenumbers, Model 700 can be used with the entire range of laser sources. Thermoelectric cooling of the selected S-20 photomultiplier can also be added for the ultimate in sensitivity.

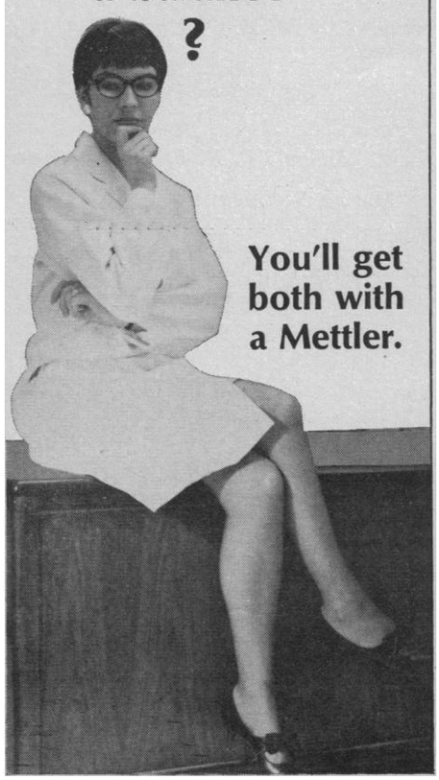
The price, installed in your laboratory, is $24,900.* For complete specifications and applications information contact: Spectra-Physics, 1250 West Middlefield Road, Mountain View, California 94040 (415) 961-2550.

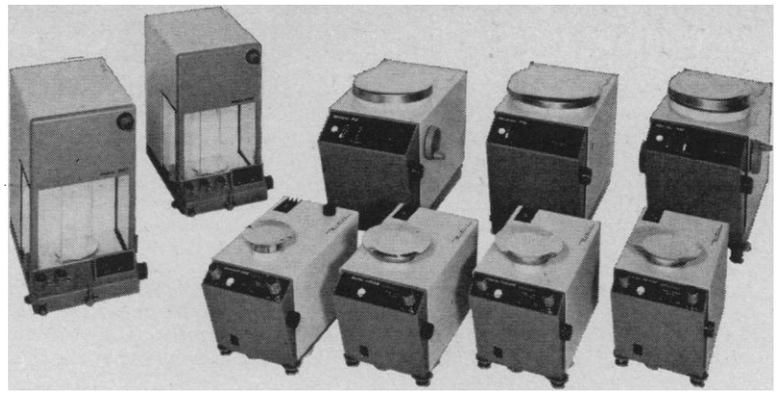
A simple Raman spectrophotometer that doesn't take up the whole bloomin' room . . . and budget

*Prices slightly higher outside the U.S.A.

Circle No. 1 on Readers' Service Card on page 110A

Why choose between economy and performance when you buy a balance ?





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.

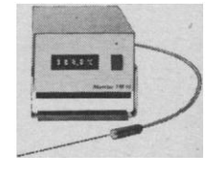
WEIGHT WATCHING MADE EASY

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.

When is a Mettler NOT a balance?



When it's our TM 15 digital platinum resistance thermometer. Portable and precise, it provides absolute accuracies up to ±0.15°C over the −20 to +300°C range. The sensors may be changed without recalibration and provide a linear output to other instruments.

For information or a demonstration of a Mettler balance or the new TM 15, write Mettler Instrument Corporation, 20 Nassau St., Princeton, N.J. 08540.

Mettler®

Circle No. 16 on Readers' Service Card on page 110A

11 July 1969
Vol. 165, Number 3889

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

Adult female monkey (*Cebus capucinus*) sitting in and feeding on *Gustavia superba*. See page 187. [J. R. Oppenheimer, Johns Hopkins University]

The Mark 260 delivers more of them...with less fuss, bother and cost...than any other oscillograph you can buy.

Facts start with accuracy.

And the Mark 260 is about as accurate as you can get. We *guarantee* 99½%. So when you're looking at the chart of a Mark 260, what you see, is fact. We owe it all to a fool-proof position feedback system that enforces pen position all the way across the chart. There are no springs, no strings. Or any of the other tricky mechanisms that you'll suffer with in other recorders.

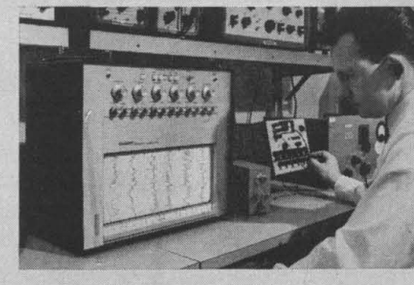
Those traces you see are a lot more than just accurate. They're crisp and clear and reliable from one edge of the chart to the other. They won't smudge or smear. (And you can chalk *that* up to a patented pressurized ink-writing system that puts the trace into the paper and not just on it.)

You can forget about recalibration problems, too. We took care of that little nuisance at the factory. So change those settings to your heart's delight. The Mark 260 will keep right up with you. And save you piles of time and piles of chart paper in the bargain.

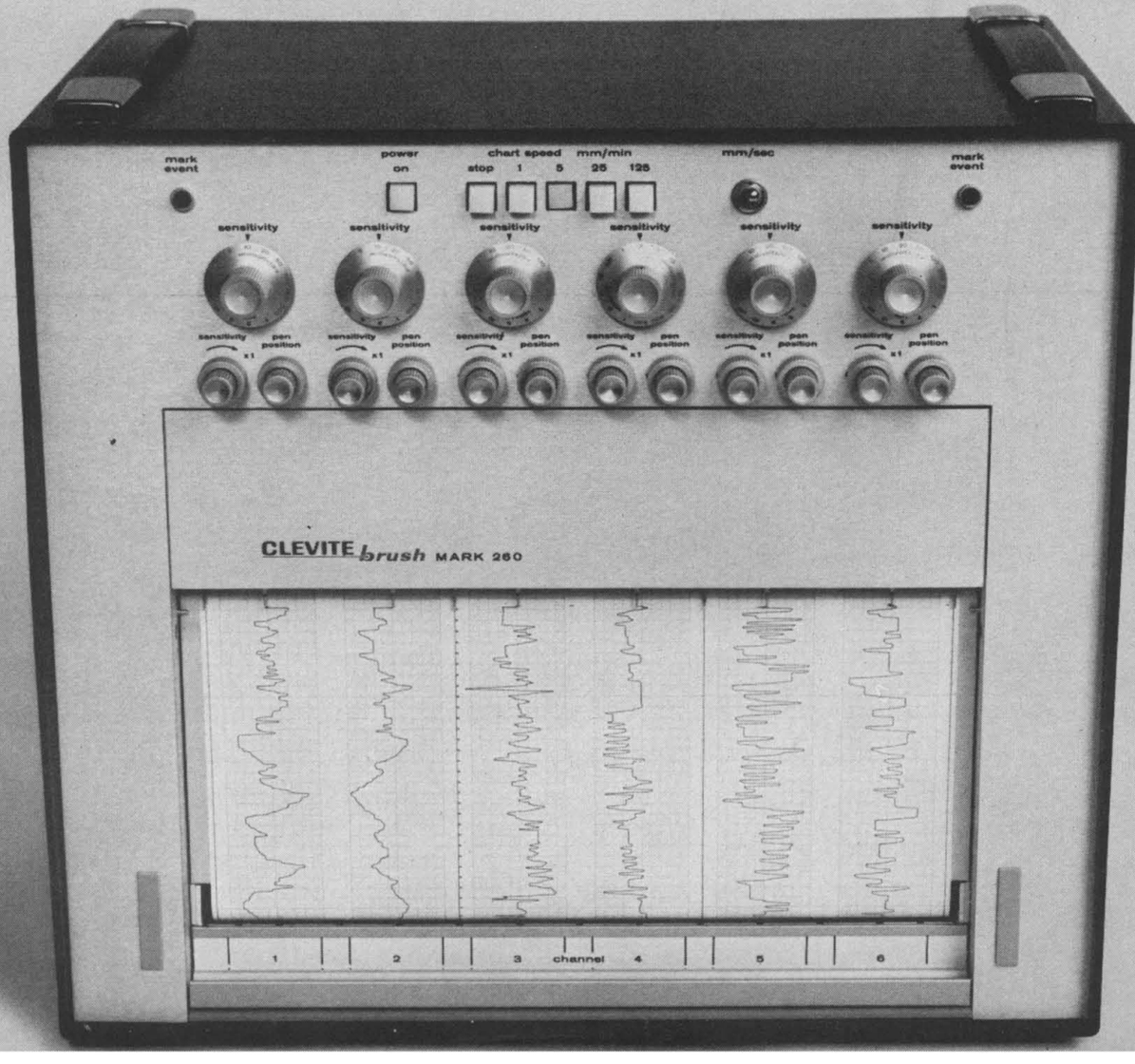
That's what you get with a Mark 260. It's the go-anywhere, do-anything 6-channel recorder by Brush. At a price per channel that will surprise you.

More facts. Less fuss, bother and cost.

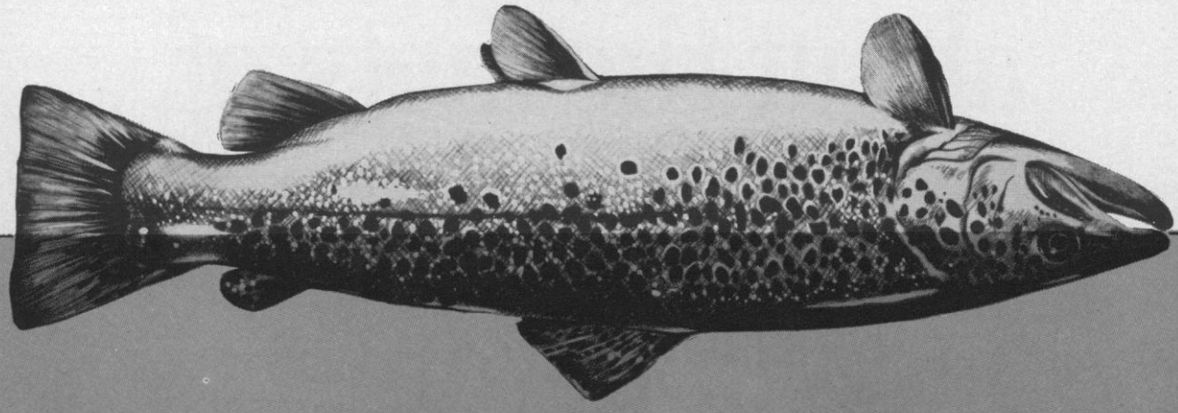
Ask your Brush representative for a demonstration. Or write for Mark 260 Bulletin 942-2: Clevite Corporation, Brush Instruments Division, 37th and Perkins, Cleveland, Ohio 44114. We'll include one of the most comprehensive handbooks on signal conditioning you'll ever find.



CLEVITE **BRUSH**



Today the Fish. Tomorrow...

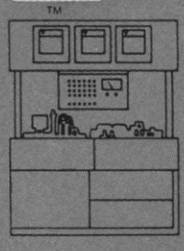


That tomorrow need never come with the Technicon® AutoAnalyzer® system, specially designed to analyze water quality in rivers, lakes, drinking water, and water-treatment plants. A mobile system set up on site will analyze, simultaneously, six pollution parameters selected by the user. Because the system is fully automated, it will operate with virtually no human attention for periods up to one week. Continuous analyses may be performed for a period of hours, several days, or a week. A CSM® 6 Laboratory Model will analyze individual samples in the lab.

The automated analysis techniques employed in the CSM 6, based on "Standard Methods for Water and Wastewater," are of known specificity and selectivity. The system is capable of detecting pollutants over a wide sensitivity range. Analyses can be made in terms as small as parts per billion.

Before you get in too deep, contact Technicon for a solution to your pollution problems.

Department 65,
Technicon Corporation,
Environmental Science Division,
Tarrytown, New York 10591.



Are you being misled about the facts of Linear Absorbance Spectrophotometry?

"Similar" does not mean *the same;* nor is "equivalent" necessarily *equal.*

In spectrophotometers, for example, several manufacturers may use certain components of similar design such as the prism system or photomultiplier. Yet, *only one* has the essential elements that make the difference between ordinary and extraordinary results.

If you are considering the purchase of a spectrophotometer — whether a basic, general purpose system or a system for enzyme analysis — the following questions deserve your careful consideration.

Is the system linear with absorbance, or with % Transmittance?

Gilford Instrument Laboratories pioneered the application of a unique, patented photometer to standard UV-VIS spectrophotometry. The results were — and are — extraordinary.

The Gilford Photometer provides an accurate, linearized output *directly in absorbance* throughout the measuring range of 0.000 to 3.000 *A*.

The specifications of photometric accuracy, linearity and repeatability apply throughout the entire linear absorbance measuring range; they are not limited to a single point as are those of % Transmittance photometers. Gilford photometric accuracy is specified as 0.5 *A* throughout the entire range, not as a % *T* value at zero only.

Can absorbance be read easily and clearly?

In the Gilford system, the usual needle type meter is replaced by a clearly readable four-digit scale which responds to the photometer output. Single sample measurements are registered *directly in absorbance,* and are readable to 0.001 *A* throughout the complete 0.000 to 3.000 *A* range.

This digital readout is *standard,* at no additional cost, in all Gilford systems.

Are recording sensitivity and response stable or variable?

The linear absorbance output of the Gilford Photometer is applied directly to a linear strip chart recorder which can be calibrated to 0.1 *A* full scale, throughout any portion of the 0.0 to 3.0 *A* range. Recording sensitivity and response are constant, directly in absorbance.

The photometer signal is linear with absorbance, extremely stable, and has an inherently low noise level. There is no need for damping circuitry which impedes recorder sensitivity and response, and distorts input data.

Circle No. 22 on Readers' Service Card on page 110A

In % Transmittance systems, the inherent short term variations of photometer output (noise) are heightened in the conversion from % *T* to absorbance. Damping must be employed to minimize this effect.

Is the sample positioner suitable for enzyme studies in the automatic mode?

Gilford Instrument Laboratories originated the Automatic Cuvette Positioner, a device which replaces the usual manual positioner and permits absorbance changes in more than one sample to be registered sequentially on the same chart as a function of time. Four positions were deliberately chosen, instead of more, so that 4 plot points could be registered for each sample every 15 seconds — 16 points for every sample every 4 minutes. Time lapse between complete cycles is minimal, in contrast with certain cuvette positioning devices which require almost a one minute time lapse before a second cycle can begin.

The Gilford Automatic Cuvette Positioner thus provides a detailed record of enzyme catalyzed reaction rates that fully meets the requirements of the majority of enzyme kinetics procedures. Positioning accuracy and repeatability are so precise that micro cuvettes as well as semimicro and standard cuvettes can be used.

Other capabilities are temperature control and measurement, simplified manual operation, the use of flow through cuvettes, and an exclusive offset feature.

Is the system single-purpose, or is it multiple-purpose?

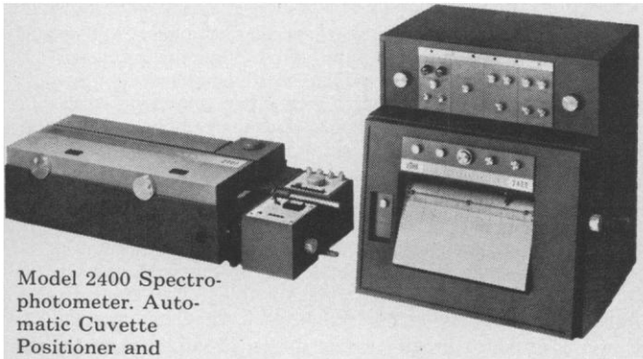
While widely acknowledged as a leading tool for enzyme kinetics, Gilford systems have demonstrated unique versatility as general purpose UV-VIS spectrophotometers. Electrophoregram scanning, density gradients, column chromatography, DNA thermal denaturation, wavelength scanning, and the rapid sampling of single sample determinations are among the proven capabilities of present Gilford systems.

Flexibility to meet your growing needs!

Based upon the inherent advantages of the Gilford Linear Absorbance Photometer, many refinements and improvements, the usefulness of Gilford Spectrophotometric Systems continues to grow. Gilford engineering and research are geared to the continuous development of innovations to meet your growing needs as spectrophotometric techniques continue to expand. The Gilford "building block" philosophy assures the compatibility of new Gilford attachments and accessories with your present Gilford system.

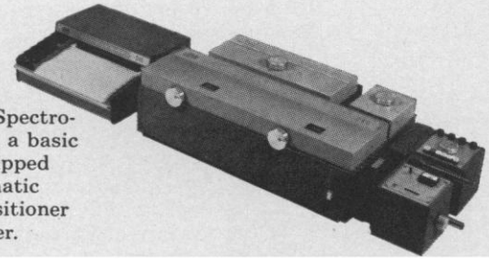
Before purchasing any spectrophotometer, insure your investment against obsolescence by talking with your Gilford representative.

Call 216/774-1041, or write, today.



Model 2400 Spectrophotometer. Automatic Cuvette Positioner and Recorder are standard, as are many auxiliary functions.

gilford®



Model 240 Spectrophotometer, a basic system equipped with Automatic Cuvette Positioner and Recorder.

GILFORD INSTRUMENT LABORATORIES INC. • OBERLIN, OHIO 44074 • 216/774-1041

A microscope in the field is worth two in the lab

...for some applications

There are many situations—away from the lab—where the opportunity for on-the-spot use of a microscope can be most valuable, even essential.

The veterinarian determining the sperm virility of a prize bull would certainly find this more practical than taking either the animal or the specimen to his laboratory. The public health man working on pest control or water pollution, can pack a prodigious amount of work into his field trips by simply screening and classifying samples on-the-spot; pre-selecting those warranting final study in the lab.

The Nikon H hand or field microscope was designed for just such applications. Notwithstanding its diminutive size (it's no larger than a 35mm camera) the Nikon H is a sophisticated, precision instrument. It is equipped with a 10X screw-in, wide-field eyepiece and a rotating nosepiece which accepts any three of the following parfocal, achromatic objectives: 4X, 10X, 40X and oil immersion 100X. The Nikon H also has a built-in Abbe double-lens condenser with iris diaphragm.

Illumination is provided by either daylight, or a built-in incandescent lamp powered by two self-contained penlight batteries. All controls for fine focusing, nosepiece rotation and slide manipulation are conveniently located, yet recessed to prevent accidental disturbance.

Among the most obvious applications for the Nikon H microscope is its use as an educational tool. There are others, equally self-evident. For the benefits to be derived from the capabilities of this unique little instrument are manifold. The Nikon H is supplied complete with oil applicator, carrying case and shoulder strap.

For details and specifications, write: Nikon Inc. Instrument Division, Subsidiary of Ehrenreich Photo-Optical Industries, Inc., Garden City, N.Y. 11533.

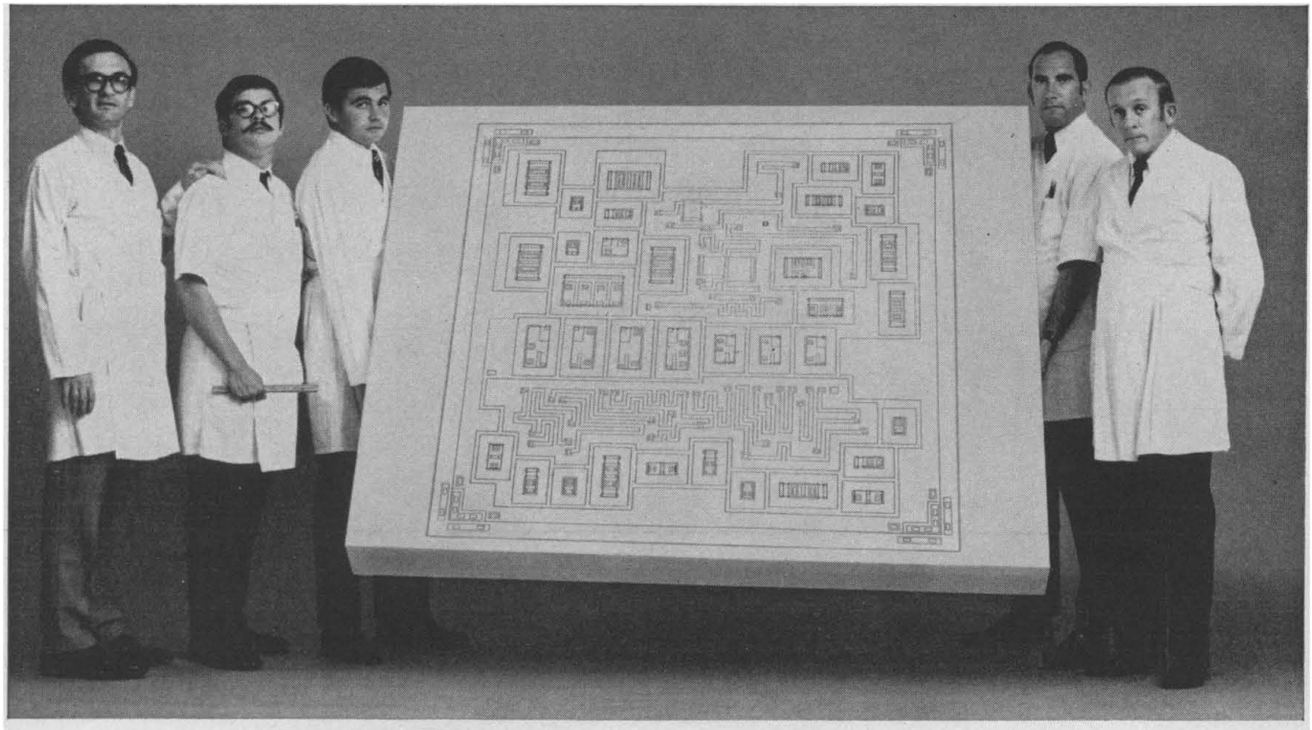
Circle No. 21 on Readers' Service Card on page 110A

Revised edition of Catalog N includes many new lower prices. Addendum with new C^{14} & H^3 compounds. Radionuclides 1969. Fluors. That's the new N-Larged Catalog N-1. Let us know if your copy hasn't arrived.

N-Larged

NEN
New England Nuclear
575 Albany Street
Boston, Mass. 02118
Tel. (617) 426-7311
Telex: 094-6582

Circle No. 15 on Readers' Service Card on page 110A



CalComp presents the 6 foot microchip.

If a 6 foot microchip sounds crazy to you, don't tell us.

Tell Texas Instruments.

They're the people who draw it, using our immense CalComp 718 Flatbed Plotter. And they say it works great.

With instructions from Texas Instruments' circuit-design computer, the CalComp 718 quickly and automatically draws a perfect design of each new chip 300 to 500 times the actual size.

With a resolution of one thousandth of an inch, these giant microchip drawings provide important visual verification of design accuracy before production.

All right, why use a CalComp 718? Consider these features.

An unmatched plot area four and a half by six feet.

Four separate pens. For automatic colors or line widths.

Automatic intermix of incremental step size.

Ability to plot on any receptive surface. (Texas Instruments draws on Mylar.)

Vacuum hold-down over the entire plotting area.

And with CalComp's exclusive Zip Mode®, timesaving speeds up to 4.6 inches a second.

CalComp is the leader in computer graphics.

With sales, service and software in 34 cities throughout the world.

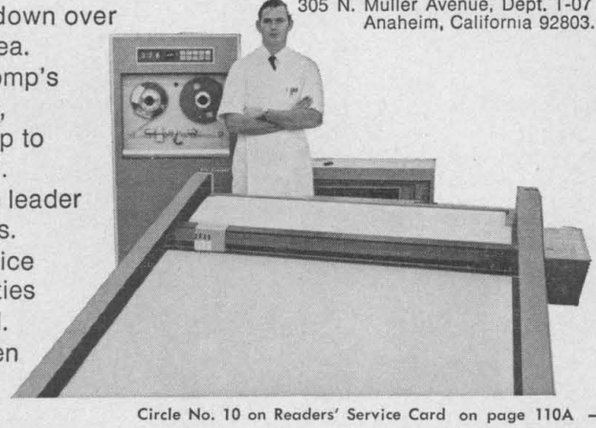
So if you happen to have a small graphics problem, call your nearest CalComp man today.

With CalComp 718, he can give you the big picture.

CALCOMP

TEACH YOUR COMPUTER TO DRAW.

California Computer Products, Inc.
305 N. Muller Avenue, Dept. T-07
Anaheim, California 92803.



Circle No. 25 on Readers' Service Card on page 110A

Circle No. 10 on Readers' Service Card on page 110A →

New solutions for old problems

New from Precision Scientific—a complete line of air quality instrumentation for sampling and evaluation. Designed to give you fast, detailed and accurate data of the source, type and distribution of pollutants.

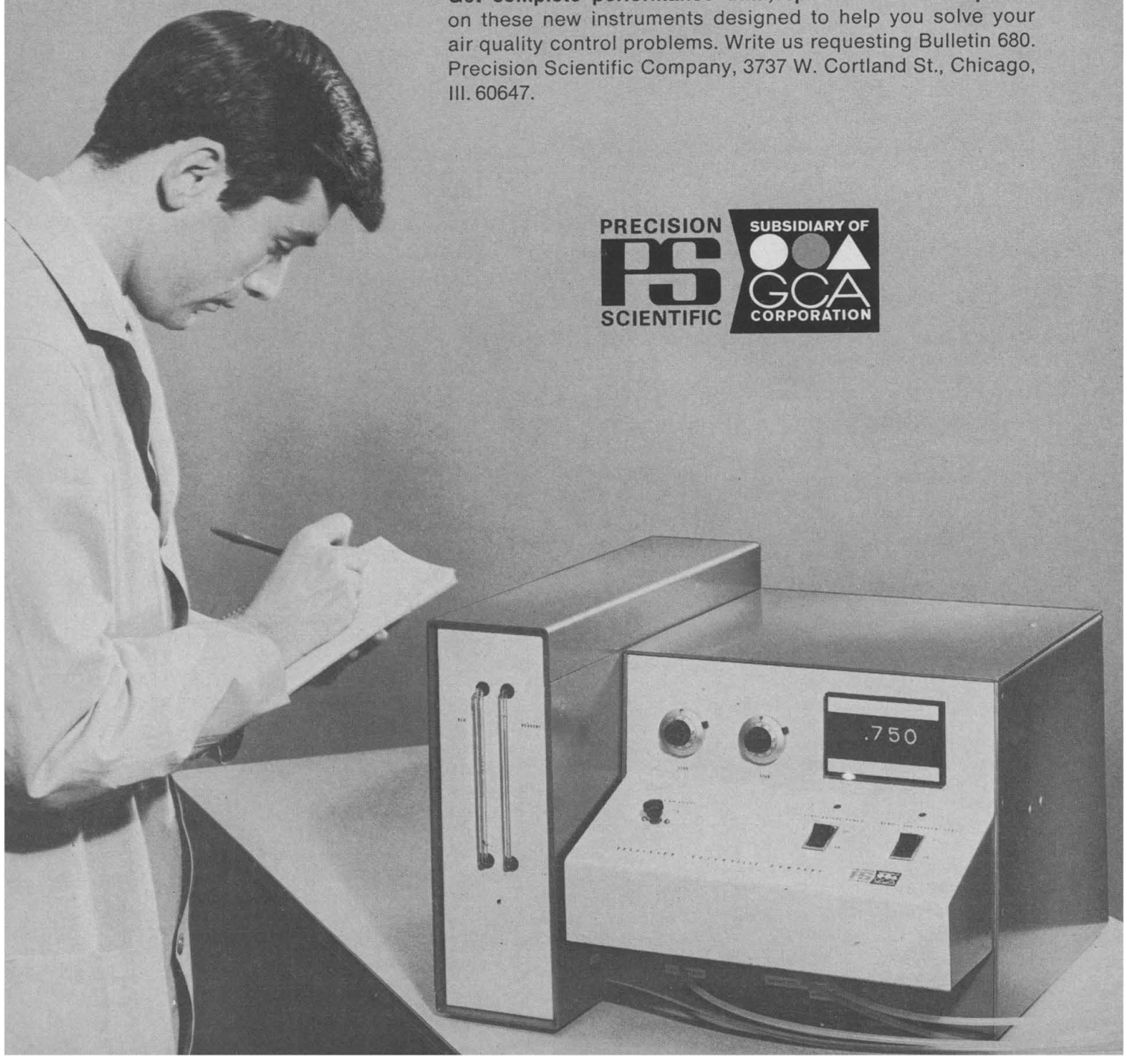
Precision's new line of Air Quality Instruments includes: Continuous NO_2 Monitor, Automatic Tape Sampler/Recorder, Sequential Sampler, High-Volume Air Sampler, SO_2/Dust-fall Monitoring Stations and Sulphation Plates. All are designed for convenience, accuracy, trouble-free service.

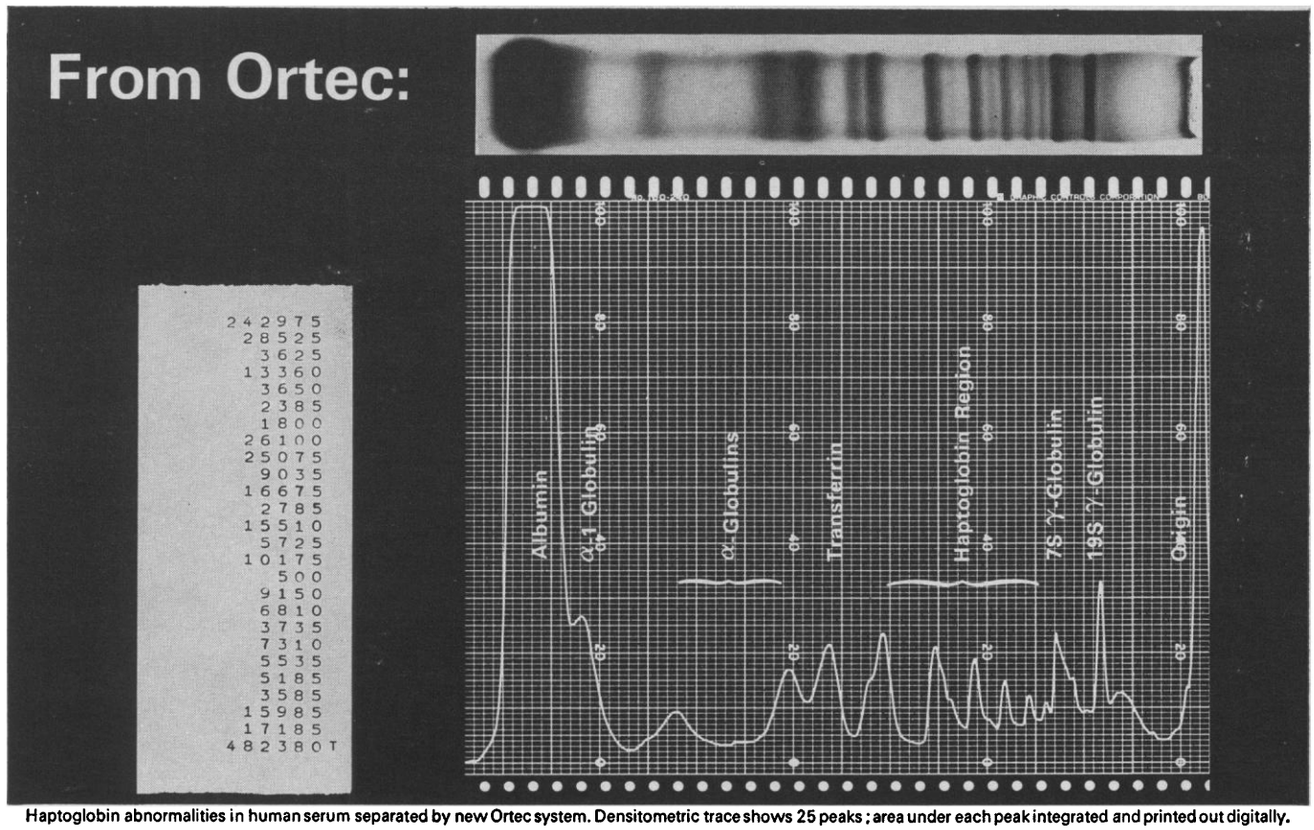
The Continuous NO_2 Monitor (shown below) provides continuous monitoring of NO_2 (or NO) in the atmosphere and indicates the concentration on a panel-mounted digital display. Range is 0 to 2 ppm full scale, and sensitivity is 0.02 ppm or better. Other Precision instruments in this great new line are equally effective—and convenient—in performing their specific tasks in sampling and evaluation.

Get complete performance data, specifications and prices on these new instruments designed to help you solve your air quality control problems. Write us requesting Bulletin 680. Precision Scientific Company, 3737 W. Cortland St., Chicago, Ill. 60647.

PRECISION PS SCIENTIFIC

SUBSIDIARY OF GCA CORPORATION





Haptoglobin abnormalities in human serum separated by new Ortec system. Densitometric trace shows 25 peaks; area under each peak integrated and printed out digitally.

News of a major development in electrophoresis

- **marked improvement in acrylamide-gel resolution**
- **pulsed regulated power, reducing joule heating and permitting higher voltage gradients for faster separations**
- **the first digital densitometric readout**
- **protein and isoenzyme separated simultaneously in the same gel slab**

To the already familiar advantages of polyacrylamide-gel electrophoresis, Ortec brings advances in equipment and electrochemistry that result in significantly sharpened resolution.

Pulsed constant power. The complete new Ortec system, shown for the first time at the 1969 FASEB Conference, owes a great deal of its effectiveness to a new principle of power supply. Rather than rely only on regulated current or voltage, Ortec went to the heart of joule heating, which has been a major drawback to improved electrophoretic resolution: Low-duty-cycle *pulsed constant power**, provided by the new Model 4100 Power Supply, permits very high voltage gradients free of the damaging heating effects that until now have prevented rapid enzyme separations.

Conductivity shift plus moving ion boundary. With the new high-resolution Ortec system, a wide differential in ionic strength (conductivity shift) between buffered sample and gel allows the rapid formation of very thin starting zones. Pulsed constant power is then increased, and a boundary or envelope of fast- and slow-moving ions moves down, further sharpening the zones sequentially. Separations of proteins and isoenzymes are completed in one-half to three-quarters the time required in previous techniques. As many as thirty clearly defined component bands now appear where only about twenty could be resolved before.

Continuous pH. The new Ortec method utilizes the same pH in both the gel and the electrode-buffer tanks. No pre-electrophoresis of the gel is necessary, nor is a spacer gel required.

Tank and Cell Assembly (Model 4200). Hard glass or quartz cells permit use of vertical flat-slab gels on which up to twelve samples per gel may be separated side-by-side. The tank accommodates two cells completely immersed in pre-cooled buffer; thus, even labile enzymes can be separated in 40 to 50 minutes without external cooling. Single samples (up to 25 mg of protein per cell) may be placed across the entire cell width for preparative separations.

Precision Densitometer System. To let you make the fullest use of quantitative data available with pulsed-power electrophoresis, Ortec offers a new integrating microdensitometer (Model 4300) which detects, records, and integrates bands as small as 35 microns in width having optical densities as low as 0.01 unit. Peak areas are digitally printed out at the rate of one peak per second, integrated at count rates up to 200,000 cps.

Send for a recent technical article† describing this important new system. We also invite you to phone our Technical Information Center (615-482-1006) to talk with our applications-laboratory biochemists. Incidentally, Ortec is a leading supplier of instrumentation to the nuclear-structure physics community. Write Ortec Incorporated, 133 Midland Road, Oak Ridge, Tenn. 37830. In Europe: Ortec GmbH, 8 München 13, Frankfurter Ring 81.

*Patent pending

†Allen, R. C., Moore, D. J., and Dilworth, R. H., "A New Rapid Electrophoresis Procedure Employing Pulsed Power in Gradient Gels at a Continuous pH: The Effect of Various Discontinuous Buffer Systems on Esterase Zymograms," *Abstract, 20th Histochem. and Cytochem. Meetg.*, Atlantic City, N.J., April 1969.

ORTEC®
AN EG&G COMPANY

4376

Circle No. 3 on Readers' Service Card on page 110A

BAUSCH & LOMB
ANALYTICAL SYSTEMS DIVISION

spectrophotometry ...simplified

Spectronic® 100

Sophisticated instrumentation . . . but automation makes it simple. Set wavelength anywhere from 325-925nm—an automatic system drives the grating, interchanges phototubes, stray light and second order filters. Select one of three readout modes—000.0% to 100.0% T, 0.000A to 2.000A, 0000 to 2000 in concentration with selectable positioning of the decimal point. Four place readout gives instant answers.

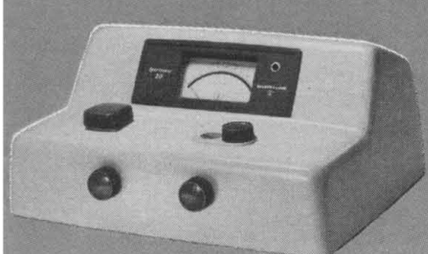
An entirely new optical design combines fine accuracy and mechanical stability with easy operation. Multiple sampling options include single, multiple and micro flow-thru cell compartments (permitting rapid sampling and minimal, 0.5ml, sample volume)—which accept test tubes, standard rectangular or cylindrical cells, or micro flow-thru cells.

Optical bandpass (resolution) is 8.0nm. A 40-pin connector for BCD output quickly accepts a variety of recording and printout devices—analog or digital. A unique calibration system is built-in. Write for Catalog 33-6031 or request a demonstration.

Spectronic® 70

So easy to use—just set wavelength, adjust for 100% T or 0.0A with reference, introduce sample and read.

The wide 325-925nm wavelength range is continuous; phototubes and filters are automatically interchanged. All solid state electronics with the latest in integrated circuit technology to assure high stability, reliability, and exceptional precision. Unprecedented sampling flexibility permits use of cylindrical cells up to 50 mm path length and rectangular cells—either semi-micro, short path or constant temperature cells. An accessory outlet allows instant attachment of a variety of readouts. Write for Catalog 33-6030 or a demonstration.

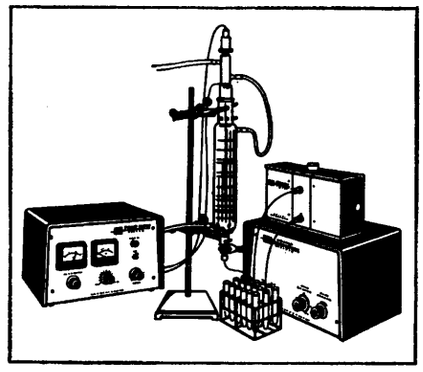


Spectronic® 20

The world's most widely used spectrophotometer. Extremely easy operation, wide 340-950nm range, remarkable stability, low stray light, high sensitivity. Its versatility is further extended by a variety of accessories, including the Concentration Computer for *direct* concentration readings. Over 60,000 in use in laboratories all over the world. Ask for brochure 33-266.

Analytical Systems Division, Bausch & Lomb, 85619 Linden Avenue, Rochester, New York 14625.

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

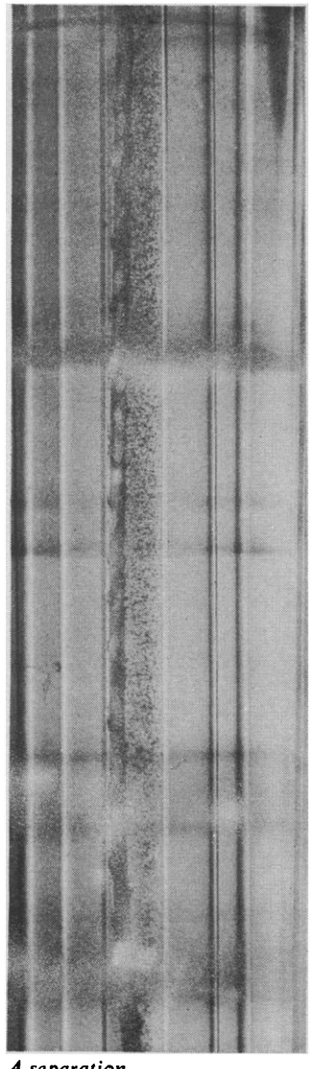


LKB IN THE SERVICE OF SCIENCE

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



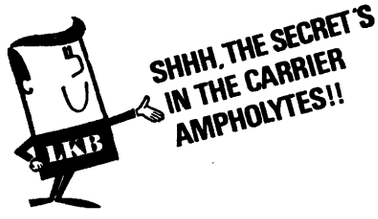
A separation of chicken haemoglobin.

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. 9 on Readers' Service Card on page 110A
Circle No. 45 on Readers' Service Card on page 110A →

Save $500.-

plus pick your purchase plan

That's right, the outstanding acceptance of the HP 9100A computing calculator now allows us to reduce the price $500—from $4900 to the new price of $4400.

Plus you now have a choice of purchase plans. Buy, rent, or lease—you pick the purchase plan that best meets your needs.

How is HP able to do all this? Volume production. In fact, we're adding a new plant to produce more calculators.

Which brings up another important point. Volume production means you don't have to wait in line 6 weeks or 6 months to put this calculator to work for you. Call any of the 135 world-wide HP Sales and Service Offices today. You'll have a 9100A computing calculator on your desk faster than you thought possible.

So, if you have been sitting on the fence—now is the time to jump.

Lease/rental plans start as low as $1.50/computing hour based on average usage. Pick your purchase plan and save money by ordering the HP 9100A computing calculator today.

For additional information, contact Hewlett-Packard, Box 301, Loveland, Colorado 80537. (303) 667-5000.
Europe: 1217 Meyrin-Geneva, Switzerland.

754.8367 z temporary
5.336 945 815 06 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.

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

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

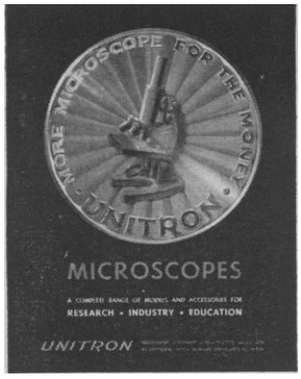
IF $x < y$ **Branching and looping flexibility** provided by "IF" keys expands programming capability.

STEP PRGM **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.

Designed for expansion. Printer and plotter are available.

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

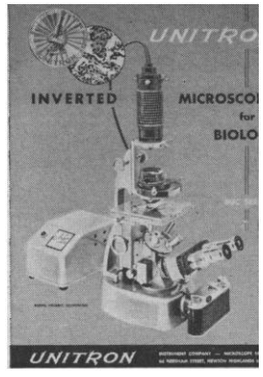
HEWLETT hp PACKARD

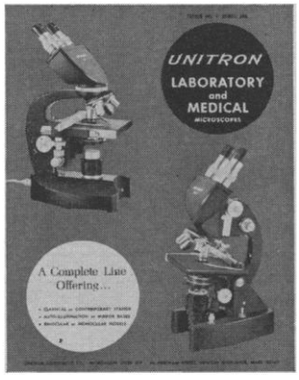


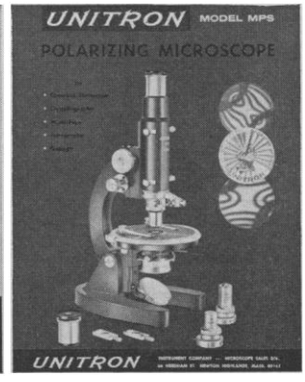
FREE MICROSCOPE BUYING GUIDE

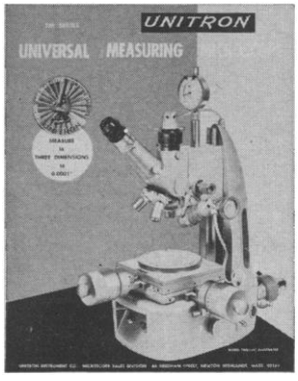
Shown here in miniature are just some of the informative brochures which comprise the UNITRON Catalog . . . your buying guide to quality microscopes at prices within your budget. Whether your application is routine laboratory analysis, advanced biological research, or industrial quality control, you will find the instrument you need in UNITRON's complete line.

A UNITRON MICROSCOPE CATALOG is Yours for the Asking.





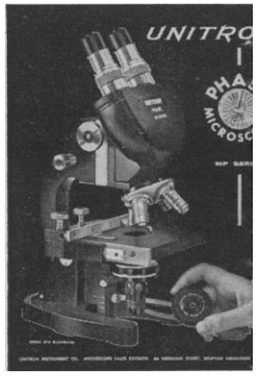


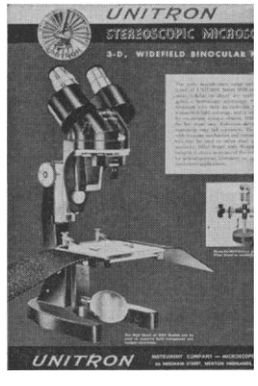


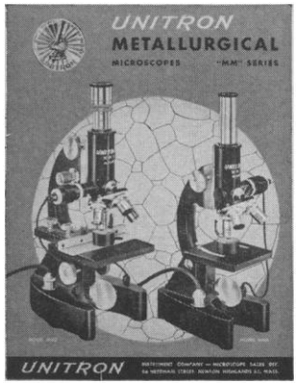
TRY ANY UNITRON MICROSCOPE FREE FOR 10 DAYS

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 gives you the opportunity to evaluate any model in your own laboratory and prove its value in your own application before you decide to purchase. See for yourself, as have thousands of other buyers, why . . .

UNITRON Means More Microscope for the Money.







Please send UNITRON's Microscope Catalog No. J-4

Name _____

Company _____

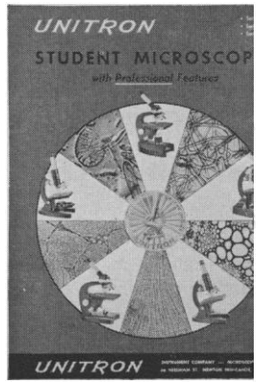
Address _____

City _____ State _____ Zip _____

Circle No. 17 on Readers' Service Card on page 110A

UNITRON
INSTRUMENT COMPANY

MICROSCOPE SALES DIVISION
66 NEEDHAM STREET
NEWTON HIGHLANDS
MASSACHUSETTS 02161



The new NAPCO CO_2 Incubator is so miserly it uses only a little gas in a long, long time.

It's perfectly true that the new NAPCO CO_2 Incubator is miserly with the gas that's fed to it . . . and with good reason; too, because the injection system is tuned to your *individual* incubator!

This means elimination of a separate air source and possible contamination from a "house" air source. Tank life is extended at least *three times* that of conventional incubators. Tank-changing inconvenience is reduced to *only three or four times a year.* What's more, the new unit boasts a CO_2 recovery timer that guards work already in the chamber.

The new NAPCO CO_2 Incubator has other advantages, too. Its all-aluminum interior cuts cleaning effort and reduces carbonic acid corrosion. There's also a significant improvement in temperature gradient . . . and unique sliding shelves make loading a cinch.

All in all, it's easier to work with the new NAPCO CO_2 Incubator . . . and it's less expensive to buy, as well!

National®

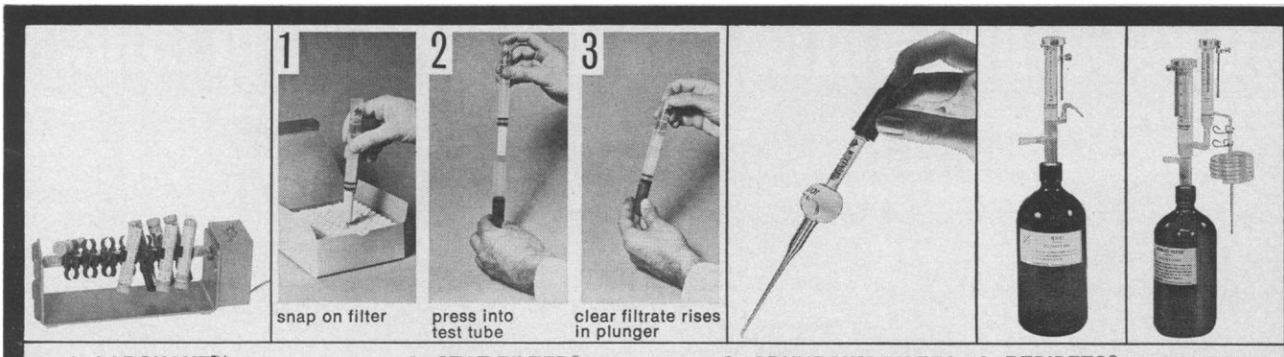
NATIONAL APPLIANCE COMPANY

SALES OFFICES: Philadelphia/Atlanta/Chicago/Portland/Los Angeles • **FACTORY: 10855 S.W. Greenburg Road, Portland, Oregon 97223**

Circle No. 46 on Readers' Service Card on page 110A

5 versatile L/I instruments for the research laboratory:

1. An amphibious tube rocker and roller. 2. An instant centrifuge. 3. The perfect pipet. 4-5. Automatic Repipets® and Dilutors.



1. LABQUAKE™ 2. STAT-FILTER® 3. GRUNBAUM PIPETS 4. REPIPETS® 5. DILUTORS

1. L/I LABQUAKE™. A silent, small, submersible tube rocker and rotator for all sizes of tubes, ¼" to 1½" diameter. Occupies only 3½ x 8 x 4½ 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. Use for thorough mixing of blood without cell damage (holds Vacutainers®); agitating during tissue, bacteria growth; preparing homogeneous dispersions of particulates for Coulter® and other particle monitors; cell trypsinization in tissue culture; enzymatic hydrolysis of steroids, and many other applications.

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®. 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 polypropylene plungers and disposable polyethylene filters, making it suitable for **any** filtration. Inexpensive demonstration kits are available.

Price: Complete STAT-FILTER SYSTEM, including 3 plungers, 100 disposable polypropylene 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 (The Perfect Pipet). The versatile GRUNBAUM micro-pipet aliquots, dilutes, transfers, and stores reagents. It's the only pipet that can handle ether, alcohol, acetone, etc. 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.

Price: $6.

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, including concentrated acids, concentrated alkalies, and chlorinated hydrocarbons. All amber instruments are supplied for your labile reagents. L/I stocks REPIPETS and Dilutors in ½, 1, 5, 10, 20 and 50 ml sizes, adjustable from zero to full scale.

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

SPECIAL NOTICE. Effective immediately, telephone orders for 10 ml L/I REPIPETS and Dilutors will be shipped within 72 hours. Mail orders 1-2 weeks.

Order from Labindustries or your distributor.

LABINDUSTRIES

The Error Eliminators

1802M Second Street • Berkeley, California 94710

Phone (415) 843-0220 • Cable: LABIND, Berkeley, Ca. (USA)

Here are the analyzer features you want, built in. Why pay more for them later?

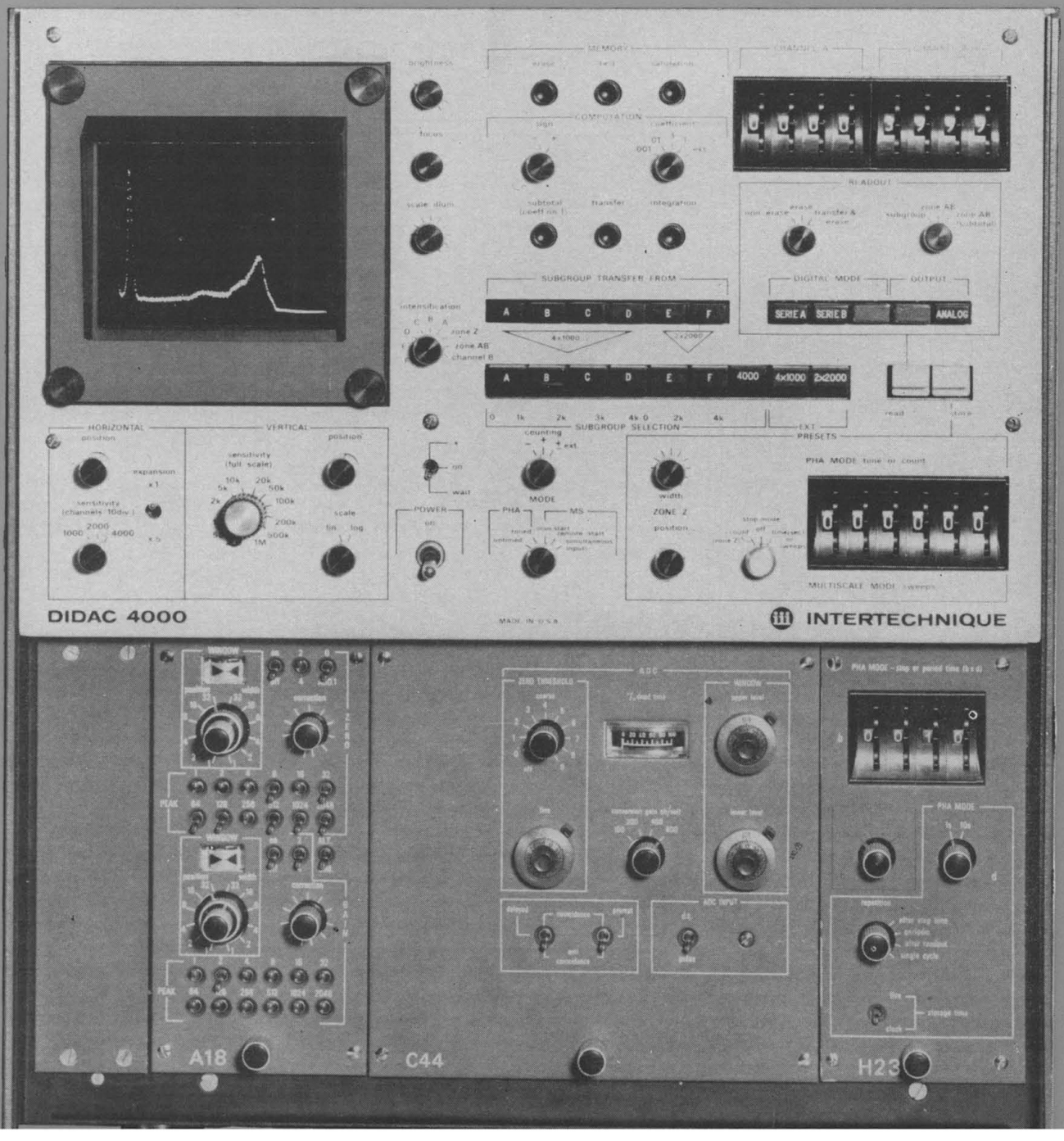
That's why our DIDAC 4000 is your best buy in a high resolution analyzer. We've anticipated your needs by including the features required to fulfill them. Consider:

- ▲ 5 microsecond memory cycle time
- ▲ 4000 channel memory, 10^6-1 capacity
- ▲ Digital baseline
- ▲ 8000 channel resolution ADC
- ▲ 100 MHz digitizing rate
- ▲ Thumbwheel selection of zone of interest
- ▲ Built-in integration, differentiation and selective readout within preselected zone of interest
- ▲ Bi-directional transfer
- ▲ Preset time or count
- ▲ Automatic recycling
- ▲ Linear or logarithmic display

And more. Get complete information by writing Intertechnique Instruments Inc., Randolph Industrial Park, Dover, New Jersey 07801. Or call (201) 361-5550.

Circle No. 24 on Readers' Service Card on page 110A

INTERTECHNIQUE
DOVER, NEW JERSEY



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

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

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

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.

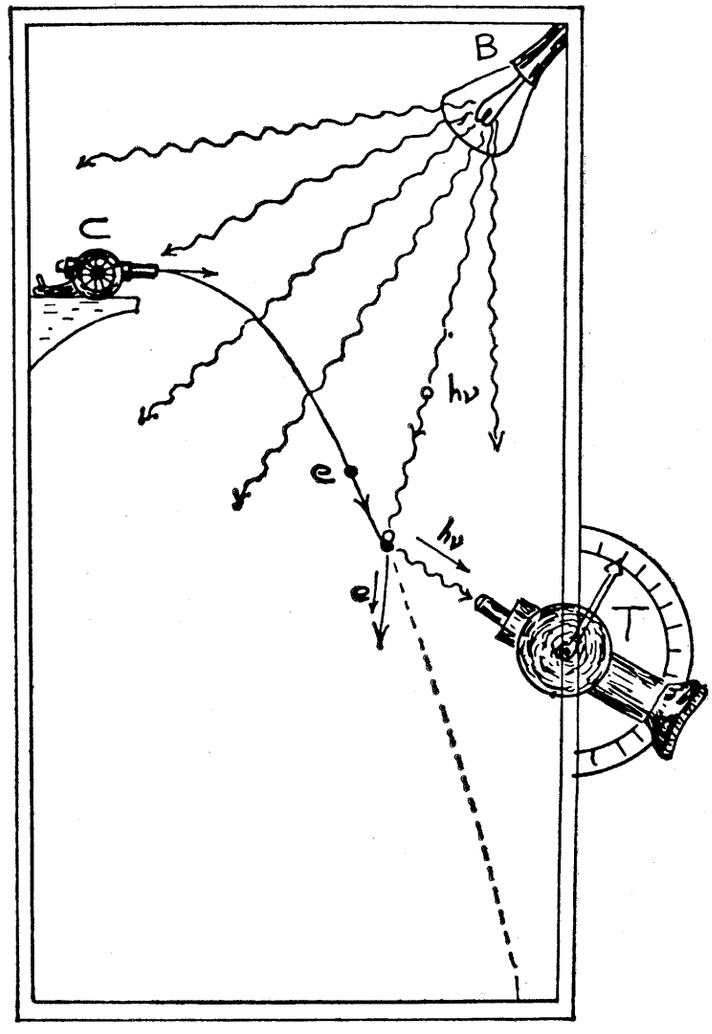
If it is a labelled compound, you can be certain of the highest specific activity and the chemical and radiochemical purity.

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."

Circle No. 13 on Readers' Service Card on page 110A

Circle No. 14 on Readers' Service Card on page 110A ⟶

Move up to zonals with the greatest of ease.

IEC's systems approach makes it easy to move up to zonals.

Because our system stresses interchangeability. You start with the most complete choice of zonal rotors. All completely interchangeable. Plus a complete, interchangeable effluent and feed seal, seal cap, glassware kit, tool kit, and spare parts kit. So you're always sure you have what you need.

Next, you can get zonal capability in a choice of centrifuges that includes low and high speed refrigerated models, and ultra centrifuges. All capable of handling a variety of zonal, fixed-angle, or swinging-bucket rotors. So your centrifuge investment is always protected. And units in the field can quickly be modified right in your lab.

Finally you get all the help you need from our staff of experts and our fully-equipped applications lab.

To find out how easy it is to take advantage of zonals for research or for routine preparative works, write us at 300 Second Ave., Needham Heights, Mass. 02194. Ask for our free 20-page, full-color zonal brochure. Or call Tom Mulvihill at (617) 444-6700, collect.

INTERNATIONAL EQUIPMENT CO.
A DIVISION OF DAMON

Turn on with the reliable ones

Either of these SORVALL Table-Top Superspeed Centrifuges can give you years of research-quality centrifugation combined with rotor, tube, and adapter versatility. The SS-3 is automatic; the SS-4 is manually controlled. Both incorporate Gyro-Action Direct Drive (patented), control accuracy, full-access rotor chambers, and a rugged motor that gives you power in reserve even at maximum speeds. Safety is a major factor. The SS-3 is a "set it and forget it" instrument; the control panel of the SS-4 snaps out for remote operation. For fully descriptive literature and price list, write Ivan Sorvall, Inc. Norwalk, Connecticut 06856.

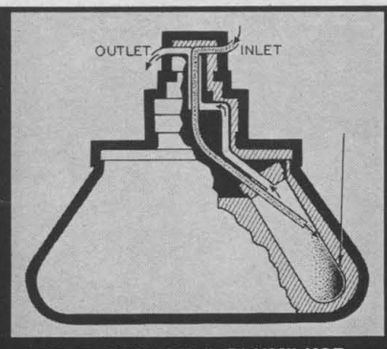
SORVALL®

SS-4 Manual Superspeed Centrifuge RCF's to 34,800 x g — Speeds to 17,000 rpm

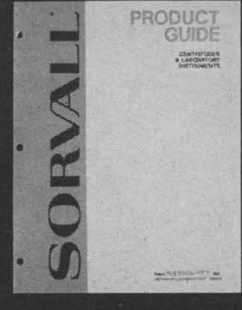
SS-3 Automatic Superspeed Centrifuge RCF's to 34,800 x g — Speeds to 17,000 rpm

Write for Bulletin SC-7SS-3/4

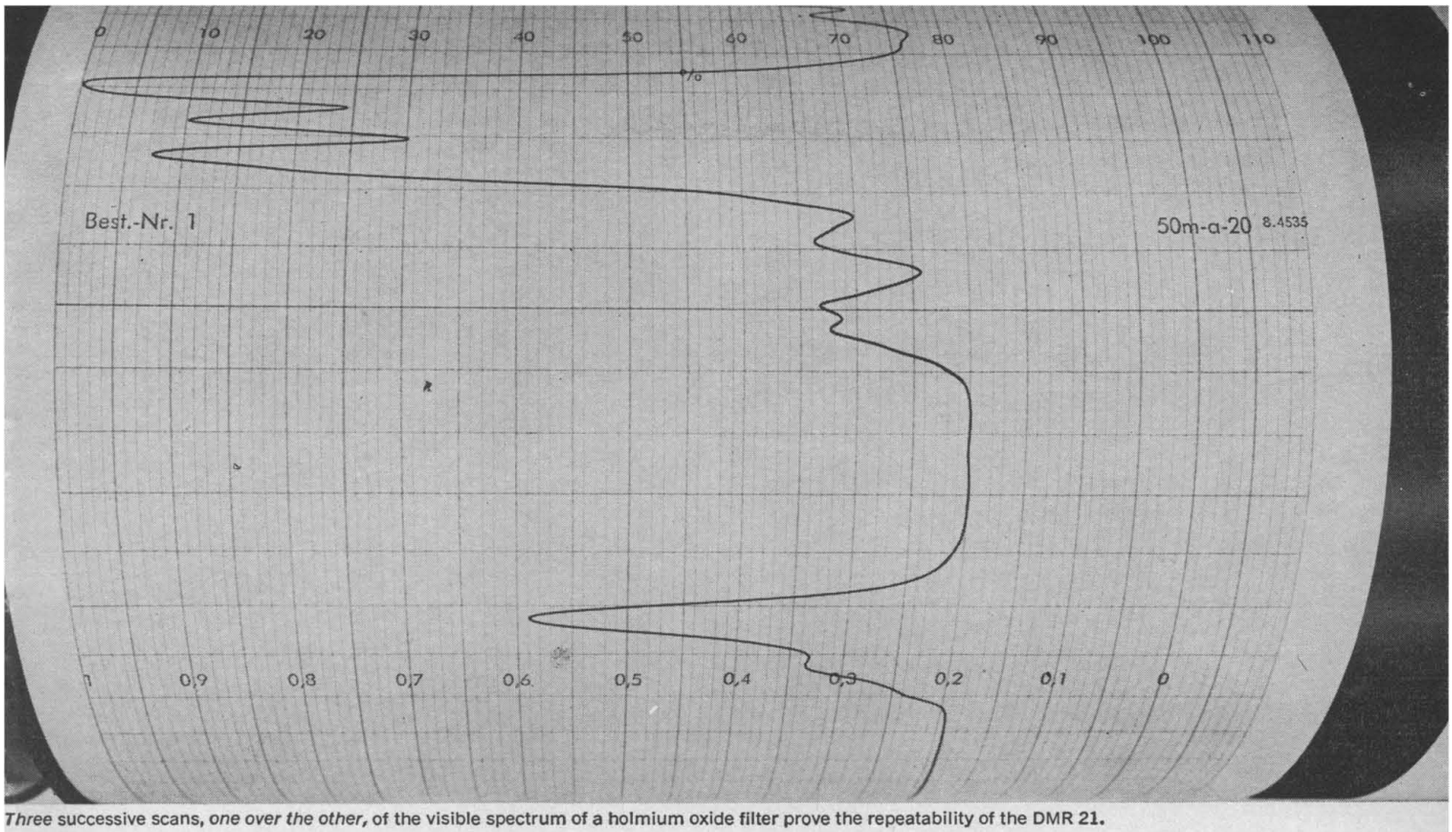
SS-1 SUPERSPEED ANGLE CENTRIFUGE
RCF's to 31,000 x G — Speeds to 16,000 RPM. The original "workhorse" of the modern laboratory and still going strong. Adaptable to Continuous Flow Collection.



"SZENT-GYORGYI & BLUM" KSB TUBE-TYPE CONTINUOUS FLOW SYSTEM
Collection in 8, 4, or 2 tubes — up to 48,200 x G may be applied. For use with SORVALL SS-1, SS-3, SS-4, and RC2-B Centrifuges.



PRODUCT GUIDE
A guide to all SORVALL centrifuges and laboratory instruments. Sent with comprehensive 28-page Price List.



Three successive scans, *one over the other,* of the visible spectrum of a holmium oxide filter prove the repeatability of the DMR 21.

One thing about the accuracy of our DMR 21 Recording Spectrophotometer:

It bears repeating

For dependable accuracy and long-term stability, the double-beam DMR-21 is unmatched. Over a 185-2500 nm range, it gives you wavelength accuracies of 0.05 at 200 nm. and 0.3 at 400 nm., with a repeatability of 0.01 and 0.1 respectively. That's because the prism and scale are mounted on one unit with no movable connection. But that's only *one* thing.

There are a number of other features that make the DMR 21 unique in its field. Here are a few:

A specially-designed drum recorder with a 500 mm recording length, repetitive scanning with unsurpassed repeatability and easy operation.

A three-point control that varies pen response down to one-half second. Half the time of other instruments.

Fully thermostated cell compartment and cell holders, standard equipment only with Zeiss. Widest variety of cells.

Maximum versatility for analytical or life science procedures, including pushbutton selection of 10 chart speeds and 8 wavelength presentations.

In fact, the DMR 21 has more features than we can detail here. Features that make it a complete system that will do a lot of things for you. And, just as important, will keep on doing them—over and over and over again. For more details, write: Carl Zeiss Inc., 444 Fifth Avenue, New York, N.Y. 10018.

Nationwide service.

ZEISS

THE GREAT NAME IN OPTICS

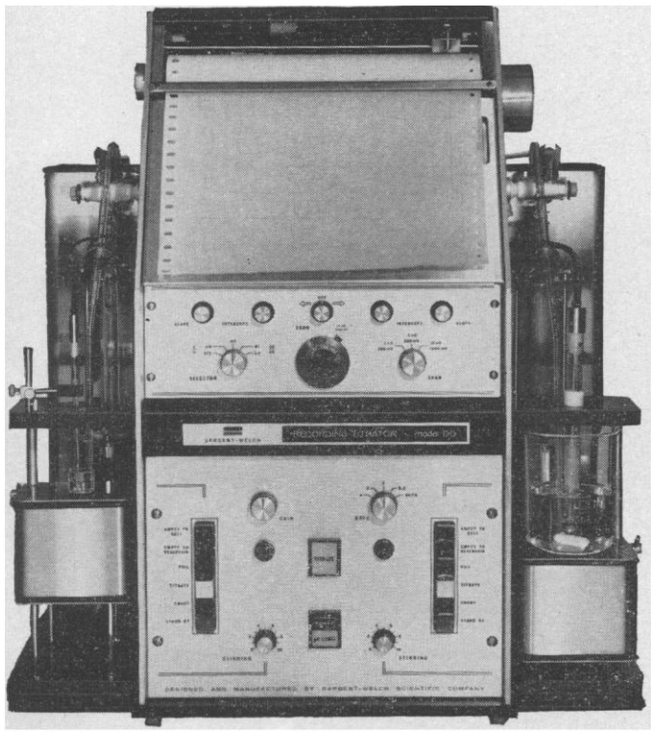
CARL ZEISS WEST GERMANY

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

Circle No. 8 on Readers' Service Card on page 110A

Just because

it's hard to titrate, write, watch, and prepare samples, all at the same time:



We give you

the Sargent-Welch Model DG Automatic Recording Titrator.

We give you, in fact, our *second-generation* automatic recording titrator. For dual pH or other potentiometric titrations. For plots of pH or e.m.f. vs. volume of titrant (and for first derivatives of such plots). Consider the DG's many advantages.

Consider first the time-saving value of the Model DG's *dual* titrating stations. While one station is in use, the second can be readied for following titrations. Using different reagents or concentrations. Virtually continuous, serial titrations of a large volume of samples. Pushbutton operation. Four fixed delivery rates *and* a variable rate controlled by curve slope for the best combination of speed in non-critical regions and accuracy at inflection points.

And burettes are quickly replaced *as a unit* for titrant changes. Burette stopcocks work automatically, too (no more forgotten, open settings). Stepper motor drives burettes and chart for precise, *electronic* synchronism without awkward mechanical linkages.

Next to be considered are the recording functions of the DG. Separate inputs for each titration station, with asymmetry and electrode-response adjustments for each input. Spans of 2, 5, and 10 pH (200, 500, and 1000 mv), with accuracy of 0.25% of full scale. Ten-turn zero adjustment *calibrated* to 0.01 pH or 1 mv. Pen response of 2 seconds (1.5 sec. *faster* than the DG's predecessor).

Also to be mentioned: An adjustable cam-and-microswitch that permits either (1) stopping the titration at predetermined endpoint or (2) operating the Model DG as a pH-stat. And optional automatic temperature compensation.

Finally, a look inside the DG. All solid-state circuitry. Standard 115/230-volt, 50-60 Hz operation.

The Model DG Automatic Recording Titrator—$3100. More details from your Sargent-Welch representative. Or write. 9-214

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

Circle No. 4 on Readers' Service Card on page 110A

Believe it or not, it's an electron microscope.

Our JEM-50B. Easy to learn on. Easy to teach from.

With 100A resolution (20 times better than any optical scope). And up to 30,000X magnification photographically.

With an air-locked specimen holder. Electromagnetic lenses. A built-in 35mm camera.

And optional anti-contamination and electron diffraction accessories.

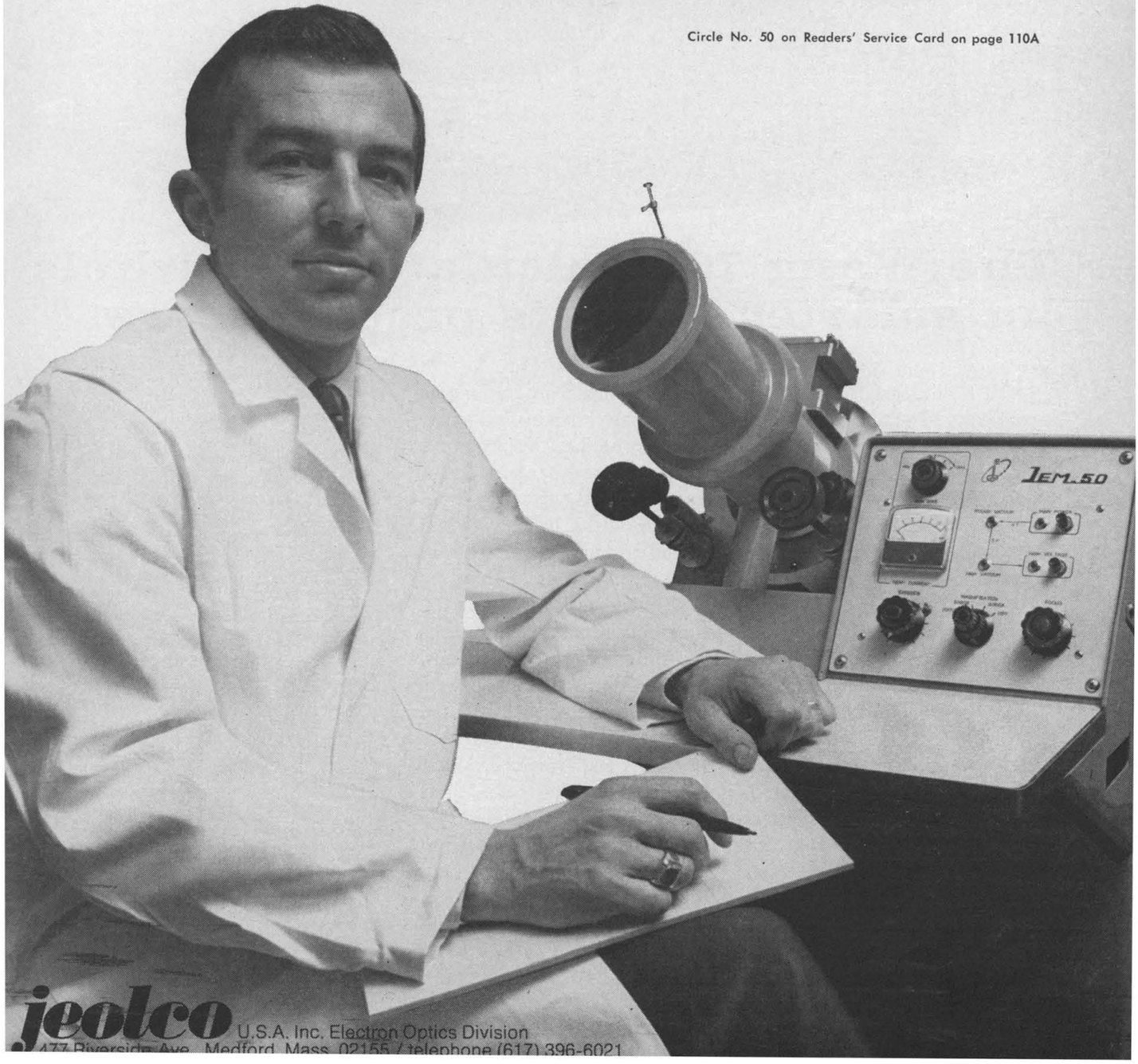
All of which come in a compact, single-cabinet package that runs on ordinary 110V house current, and requires no cooling water.

Just plug it in and watch it go to work.

There's only one thing our JEM-50B won't magnify. Its $8760 duty-free price.

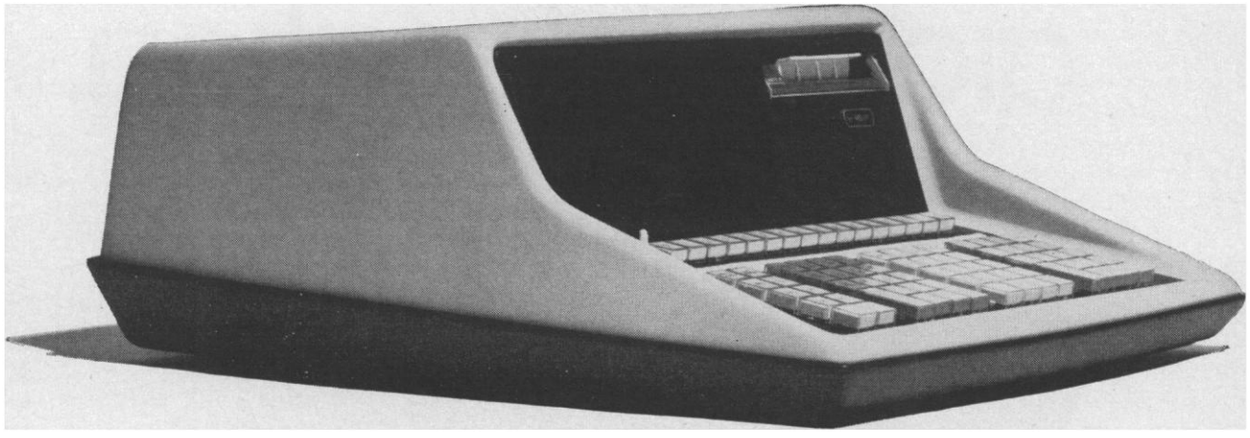
Our $8760 aid to education.

Circle No. 50 on Readers' Service Card on page 110A



jeolco U.S.A. Inc. Electron Optics Division
477 Riverside Ave., Medford, Mass. 02155 / telephone (617) 396-6021

Generation Gap



The Wang 700 calculator is a whole lot smarter than its predecessors.

It's the first of a new breed, a third generation programmable calculator. The difference is more revolutionary than evolutionary. It's ten times faster and more powerful than the best of the 2nd generation machines. It handles far longer programs (learns on a built-in 8192-bit core and stores permanently up to 10 blocks of 960 steps each on snap-in magnetic tape cassettes), has many more data storage registers (up to 120), and provides more hardware operations (like logs to base e and base 10, π, e^x, 10^x, etc.), than any existing calculator or so-called desk-top computer. Execution speeds for various functions range from 300 μsec for $+$ and $-$ to 250 msec for trig functions. A dual Nixie-type display produces 12 digit answers plus 2-digit (-98 to $+99$) exponents each register. The Wang 700 has commands for loops, branches and subroutines, unmatched power for matrix and array operations. Exclusive integrated circuit design concentrates all these capabilities into a self-contained, convenient desk-top package. It's the logical heir to Wang leadership in high performance problem-solving.

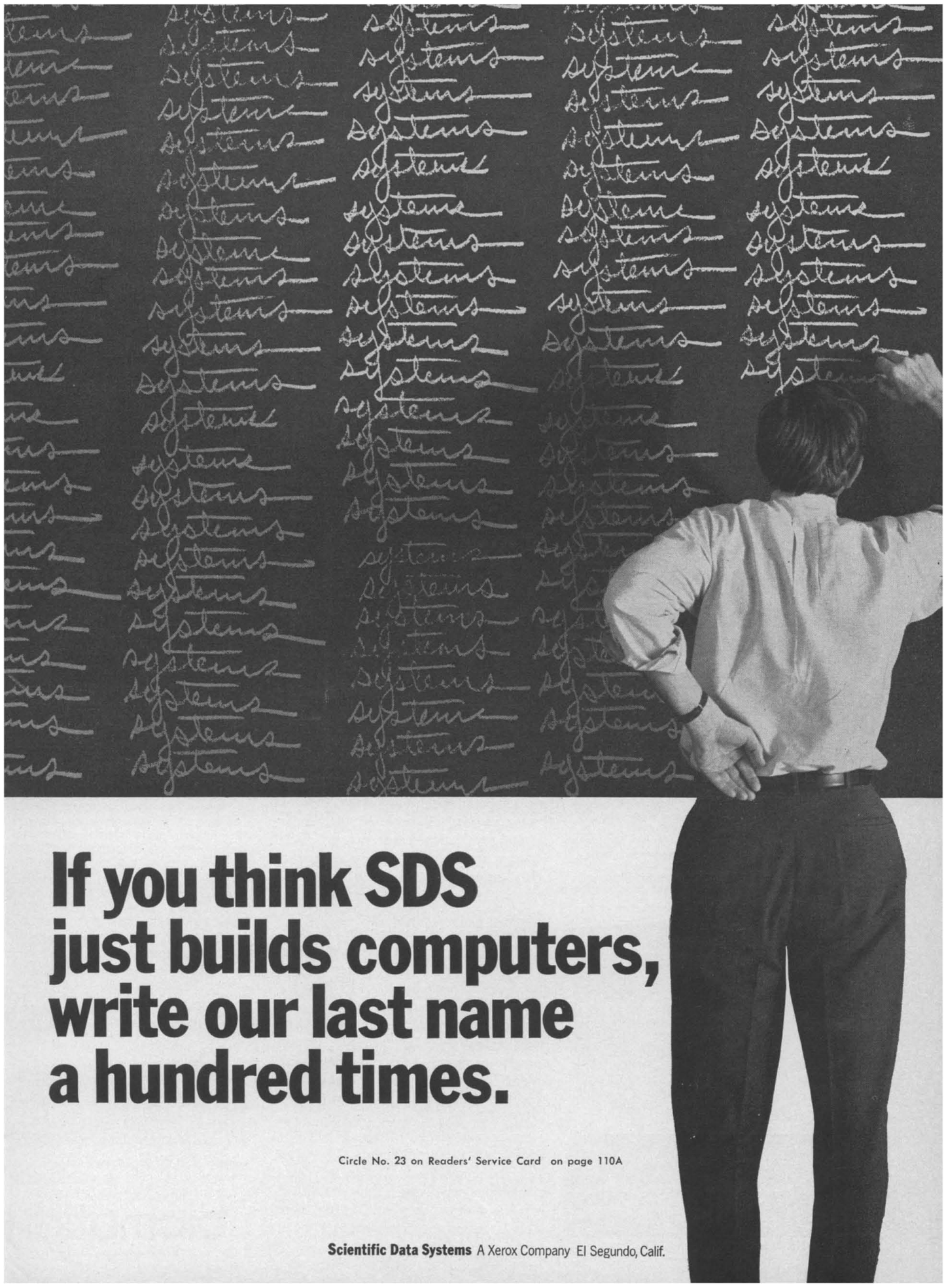
SALES/SERVICE OFFICES

Alabama (205) 881-5360
Arizona (602) 274-2110
California (213) 776-2985 (714) 234-5651 (415) 692-0584 (805) 962-6112
Colorado (303) 364-7361
Connecticut (203) 288-8481
Delaware (215) 642-4321
District of Columbia (301) 588-3711
Florida (305) 841-3691 (305) 563-8458 (813) 877-6590
Georgia (404) 633-6327
Hawaii (808) 536-5359
Illinois (309) 674-8931 (312) 297-4323
Indiana (317) 631-0909
Iowa (515) 288-5991
Idaho (303) 364-7361
Kansas (816) 444-8388
Kentucky (502) 426-1116
Louisiana (504) 729-6858
Maryland (301) 588-3711 (301) 821-8212
Massachusetts (617) 851-7311 (617) 542-7160
Michigan (313) 352-2144 (616) 454-4212 (517) 835-7300
Minnesota (612) 881-5324
Mississippi (601) 982-1721
Missouri (816) 444-8388 (314) 727-0256
Nebraska (515) 288-5991
Nevada (702) 322-4692
New Jersey (201) 272-7160
New Mexico (505) 255-5775
New York (212) 682-5921 (516) 437-2500 (518) 463-8877 (716) 381-5440 (315) 463-9770
North Carolina (919) 272-5683
Ohio (614) 488-9753 (216) 333-6611 (513) 531-2729
Oklahoma (918) 747-0018
Oregon (206) 525-2000
Pennsylvania (215) 642-4321 (717) 236-4782 (412) 366-1906
Tennessee (615) 266-5055 (615) 524-8648 (615) 889-1408
Texas (512) 454-4324 (214) 361-7156 (713) 666-2451 (817) 834-1433
Utah (801) 487-2551
Virginia (703) 595-6777 (703) 359-6320
Washington (206) 525-2000
West Virginia (304) 344-9431
Wisconsin (608) 244-9261 (414) 442-0160
Wyoming (303) 364-7361
Calgary (403) 266-1804
Montreal (514) 482-0737
Ottawa (613) 728-4445
Toronto (416) 364-0327
Vancouver (604) 685-2835

WANG
LABORATORIES, INC.

Dept. 7Q, 836 North St., Tewksbury, Massachusetts 01876 • Tel. 617 851-7311

Circle No. 6 on Readers' Service Card on page 110A



If you think SDS just builds computers, write our last name a hundred times.

Circle No. 23 on Readers' Service Card on page 110A

Scientific Data Systems A Xerox Company El Segundo, Calif.

ences of nonclinic populations. Let me remind these readers (and Weissman as well) that I did not claim that all persons have optimum access to family planning. I simply questioned the need for and appropriateness of massive, class-oriented, government intervention at the clinical level—especially since there are still unexplored and unexploited resources in the private sector.

The possible "side effects" discussed in the article (such as charges of genocide and of encouraging sexual activity by teenage girls) are smoldering public issues (not personal objections, as suggested by Frank and Reynolds). When these are combined with the possibility of physiological side effects from birth control drugs, the potential explosiveness of the mixture cannot be entirely ignored. However, I do not argue that the government should hesitate to act because of a threat of this sort—if the issue is one clearly involving national welfare and requiring its resources and authority. I have argued, rather, that no one has demonstrated convincingly that family planning "deprivation" in the United States today is such an issue.

JUDITH BLAKE

Department of Demography,
University of California,
Berkeley 94720

Social Science in the Marketplace

Willeke's letter (16 May) discusses the problem of plans developed by technical experts and subsequently "rejected by the people." He urges a better understanding of such resistance to social changes and suggests that the services of social scientists be used to implement proposals that might otherwise be rejected.

Thompson's original article (14 Mar., p. 1180) reported the defeat of a conservation plan. Willeke refers to controversies surrounding the fluoridation of municipal water supplies and the planning of freeways in urban areas. Using social scientists to help secure the adoption of proposals of these types raises important ethical issues. Should the scientist (whether "social" or "physical") make his services available to all who request it? Can social scientists adopt such a "morally neutral" position? Ten years ago I was active in several campaigns involving fluoridation of municipal water supplies. Shortly thereafter I refused to participate in a social-

sychological study of the reasons why cientists refuse to participate in research n chemical and biological warfare. Ten ears ago I might well have offered my ervices to groups seeking to overcome bjections to major freeway proposals. oday I would not participate in such a roject. How often are such questions liscussed in graduate psychology or so-iology training programs or at the an-ual meetings of the relevant profes-ional associations?

College students are increasingly in-quiring about our society's utilization of ts highly sophisticated technical skills nd knowledge. Protests against war-re-ated research have occurred on numer-us campuses. Is the scientist similar to he oft-described worker on the Detroit ssembly line who is concerned only bout the particular operation which is is responsibility? Should he not be con-erned about the end-product which re-ults from his efforts?

Social scientists often can contribute o the understanding of complex group nd individual behavior. Clearly, how-ver, the caveats that increasingly are eing raised about the uses (and misuses) f science in general apply equally to he behavioral sciences.

THOMAS F. A. PLAUT
502 Western Avenue,
Chevy Chase, Maryland 20015

ysine Enrichment: Do We Need It?

Paul B. Hamilton's letter (16 May) egarding the value of fortification of wheat with lysine was sharply critical of he Food and Drug Administration and ther governmental agencies for failing o expedite a formal lysine fortification rogram. Hamilton failed to mention everal key facets of the problem—cets which bear strongly on the wis-om of decisions on public policy in ealing with both domestic and inter-ational nutritional problems.

As a general principle, two broad types f data can justify serious consideration f enriching basic food commodities in ttempting to control malnutrition. One f these consists of thorough and reliable urvey data showing widespread defi-iency of the nutrient in question among he population. With the B-vitamins, itamins A and D, iron and iodine, such ata were available for the United tates prior to our enrichment and ortification programs for wheat, corn, nd salt. Absolutely no such data indi-

cating widespread lysine deficiency have appeared, however.

The second type of data justifying fortification consists of field demonstrations that fortification of the type proposed yields a significant public health response among the population groups in question. The advocates of lysine fortification also have not produced data of this type. They do have voluminous data showing that lysine enrichment of wheat protein is beneficial to the rat under rigidly controlled dietary conditions and very limited data on infants, again under rigid metabolic ward conditions and restricted diets, showing a lysine response. There are, however, no field demonstrations of a significant lysine response on the part of either adults or children. The equivocal data resulting from such a study in which I participated [*American Journal of Clinical Nutrition* **12**, 36 (1963)] are typical.

Those of us who hesitate to recommend lysine fortification of cereals do so because data indicating potentially significant public health benefits to be derived from such a program are lacking. Until positive results of this kind are available, it seems to us to be poor public policy to launch a program at home or abroad on the basis that lysine fortification might, rather than would, contribute to alleviation of the world food deficit.

KENDELL W. KING
Research Corporation,
405 Lexington Avenue
New York 10017

Reprint Clearinghouse

Potter's proposal (Letters, 7 Mar.) that "reprints should be paid for by the laboratory that requests them and not by the laboratory that generates them" indicates the widespread feeling of scientists that responsibility for dissemination of results does not extend beyond publication of an article. A practical solution would be for publishers to sell and distribute reprints through one central clearinghouse operated jointly on a prepaid basis by cooperating publishers of all scientific journals. If reprints cost less than making a copy (perhaps 3 cents per page with a 20-cent handling and mailing charge) and were mailed rapidly with a guarantee that all orders would be filled, the volume would be very high, yielding a substantial return even though per item profit would be low (the reverse of some existing and proposed systems).

Scientists would buy 10-cent coupons in advance and send them with a marksense form-card giving a single order number (taken from the published article) identifying the document and the number of coupons required. Order cards would be automatically processed with payments credited to cooperating publishers. The cards would then be sorted by order number to match the arrangement of articles on the shelves. Clerks could pull several thousand articles from shelves in one sequential pass, fold each article to reveal a preprinted postage-paid authorization on the blank back page, turn the request form over to show a return address, attach it to the reprint, and mail it at low bulk rates. Total clerical time should be less than one minute per reprint mailed.

This system has potential advantages to all. Authors would no longer need to process reprint requests or pay related postage costs, but instead would be required to pay the publisher a standard amount similar to current payments for reprints as a subsidy for printing and supplying reprints to the central office. The payment is a simple and inexpensive way to discharge an important, often overlooked, responsibility to society of dissemination of results.

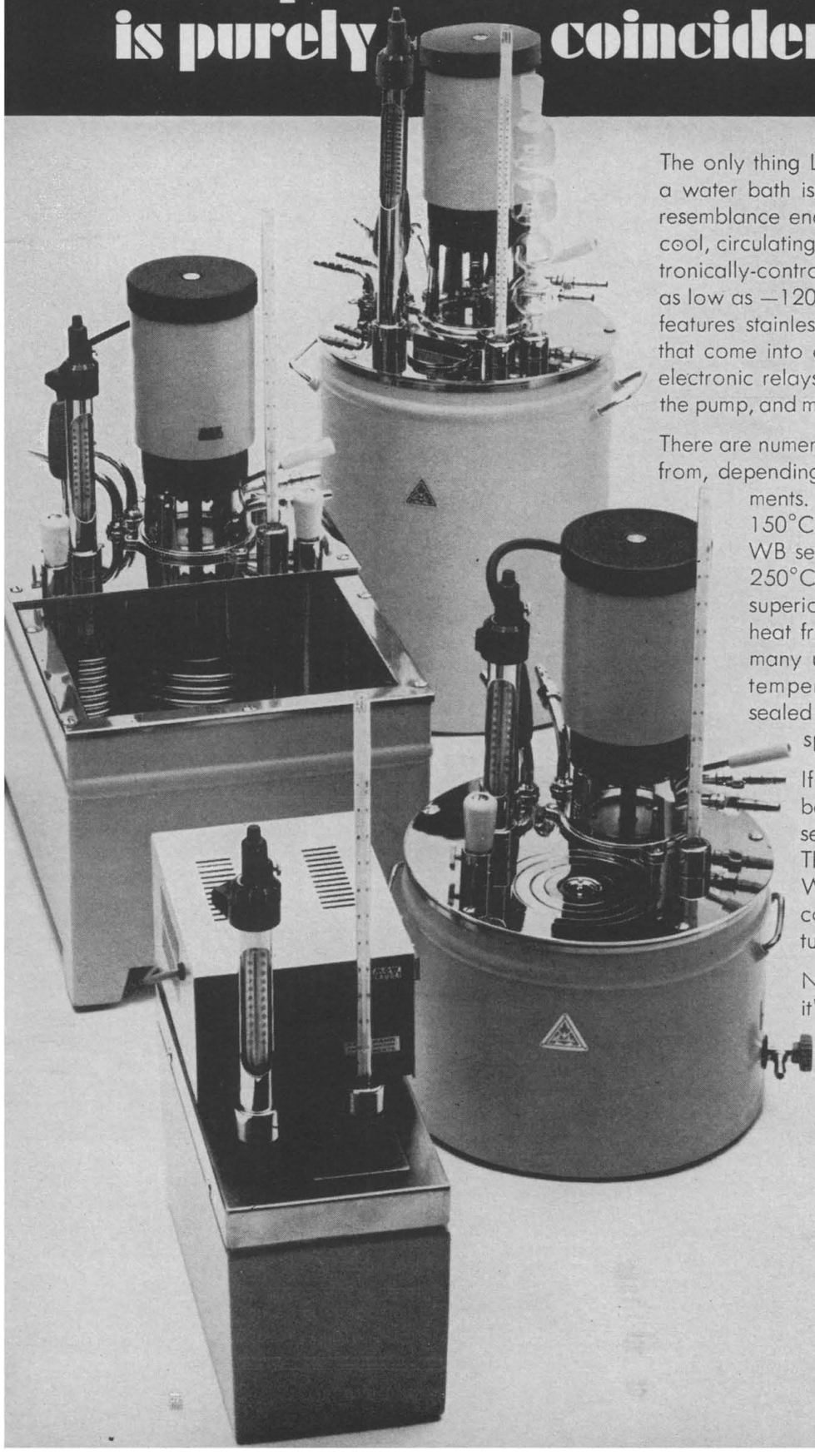
Publishers, with a centralized mailing operation, use of standardized prepaid coupons, automated processing of fiscal information, and a small subsidy from authors, should realize about 1.5 cents profit per page distributed out of the 3 cents charged. For 250 orders of twenty 7-page articles in one issue of a monthly journal, 1.5 cents profit per page would be equivalent (assuming a 50 percent profit) to income from 420 subscriptions to a journal costing $30 per year.

Librarians and administrators could reduce the expense and staffing of sizable copying operations. These are widespread because there is no alternative cheap method of obtaining single copies of papers. (The average number of reprints obtained by each of 108 active research scientists at the M.D. or Ph.D. level in a recent survey I made was 17 per month or 204 per year.)

Serious users of reprints would benefit most from this proposed system, since they would be assured of receiving in a matter of days reprints at less than total copying cost. A more complete description is available on request.

JOHN H. SCHNEIDER
3411 Fessenden Street, NW,
Washington, D.C. 20008

The Lauda all-stainless steel constant-temperature circulators. Any resemblance to a water bath is purely coincidental.



The only thing Lauda Circulators have in common with a water bath is the water they use. Beyond that, any resemblance ends. A Lauda not only heats, it can also cool, circulating water or other liquids at constant, electronically-controlled temperatures as high as 330°C. or as low as —120°C. In addition, every Lauda Circulator features stainless steel construction of all components that come into contact with the bath liquid, solid-state electronic relays, automatic excess load protection for the pump, and manual drainage and flow control valves.

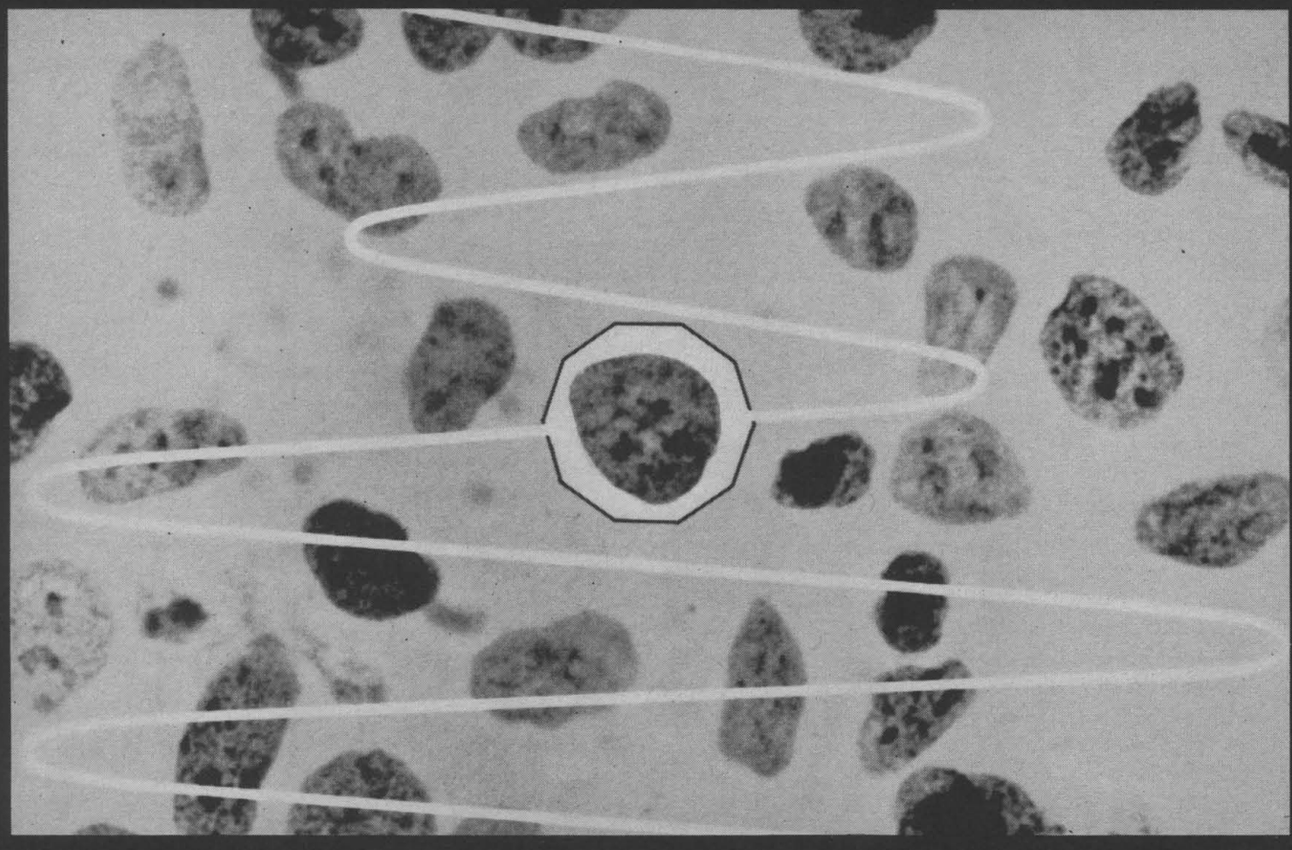
There are numerous Lauda Circulator models to choose from, depending on your specific temperature requirements. For example, the K-2 series heats to 150°C. and can cool to — 20°C., while the WB series is best for immersion heating up to 250°C. The N-HT has been engineered for superior high-temperature performance. It will heat from 50°C. to 330°C. and incorporates many unique features, including special high-temperature glass thermo-regulators, fully-sealed housing, water-cooled cover plate and special insulation.

If you do low-temperature work, you may be interested in the Lauda Ultra-Kryostat series that cools from ambient to —120°C. There is also a refrigerated version of the WB-20 that is specially recommended for controlled spectrophotometric temperature measurements.

Now that we've begun to convince you it's a mistake to call a Lauda Circulator a water bath, let our free catalog drive the point home. For your copy, just write: Lauda Circulators, Division of Brinkmann Instruments, Cantiague Rd., Westbury, New York 11590.

A DIVISION OF BRINKMANN

LAUDA Circulators



Our microscope photometer doesn't keep you in the dark about what's going on outside the measuring diaphragm.

The Leitz MPV microscope photometer. With it, you can see the adjustable measuring diaphragm *plus* the entire field of view, which simplifies exact coordination of the measuring field with the object to be measured.

The MPV is an accessory for most Leitz research microscopes. Together with the appropriate transmitted or incident light systems, the MPV can be used in many areas of microbiology, histology and cytology. Microspectrophotometry, microfluorometry and silver grain count in autoradiography are just a few applications. And a variety of attachments make the MPV the most versatile microphotometer on the market. For example, many different photomultiplier tubes and stabilized light sources are available for use with it.

For more information about the MPV, including advice on which attachments and equipment are best suited for your particular research problems, write:

Leitz

E. Leitz, Inc.
468 Park Avenue South, N.Y., N.Y. 10016

73069

11 July 1969, Volume 165, Number 3889 **SCIENCE**

Activism and the Rejection of History*

We are a society bemused in its purposes and yet secretly homesick for a lost world of inward tranquility. The thirst for illimitable knowledge now conflicts directly with the search for a serenity obtainable nowhere upon earth. Knowledge, or at least what the twentieth century acclaims as knowledge, has not led to happiness.

Ours is the most time-conscious generation that has ever lived. Our cameras, our television, our archaeological probings, our C^{14} datings, pollen counts, underwater researches, magnetometer readings, have resurrected lost cities, placing them accurately in stratigraphic succession. Each Christmas season the art of Ice Age Lascaux is placed beside that of Rembrandt on our coffee tables. Views of Pompeii share honors with Chichen Itza upon the television screen in the living room. We unearth obscure ancestral primates and, in the motion picture "2001," watch a struck fragment of bone fly into the air and become a space ship drifting among the stars, thus telescoping in an instant the whole technological history of man. We expect the average onlooker to comprehend the symbolism; such a civilization, one must assume, should show a deep veneration for the past.

Strangely, the results are quite otherwise. We appear to exist, instead, amidst a meaningless mosaic of fragments. From ape skull to Mayan temple we contemplate the miscellaneous debris of time like sightseers to whom these mighty fragments, fallen gateways, and sunken galleys convey no present instruction.

In our streets and on our campuses riots an extremist minority dedicated to the now, to the moment, however absurd, degrading, or irrelevant the moment may be. It is an activism that deliberately rejects the past and is determined to start life anew—indeed to reject the very institutions that feed, clothe, and sustain our swarming millions.

A yearning for a life of noble savagery without the accumulated burdens of history seems in danger of engulfing a whole generation, as it did the French *philosophes* and their 18th-century followers. Those individuals who persist in pursuing the mind-destroying drug of constant action have not alone confined themselves to an increasingly chaotic present—they are also, by the deliberate abandonment of their past, destroying the conceptual tools and values that are the means of introducing the rational into the oncoming future.

Their world, therefore, becomes increasingly the violent, unpredictable world of the first men simply because, in losing faith in the past, one is inevitably forsaking all that enables man to be a planning animal. For man's story, in brief, is essentially that of a creature who has abandoned instinct and replaced it with cultural tradition and the hard-won increments of contemplative thought. The lessons of the past have been found to be a reasonably secure instruction for proceeding against the unknown future. To hurl oneself recklessly, without method, upon a future that we ourselves have complicated is a sheer nihilistic rejection of all that history, including the classical world, can teach us.

—LOREN EISELEY, *Benjamin Franklin Professor of Anthropology and the History of Science, University of Pennsylvania, Philadelphia*

* This is an excerpt from *The Unexpected Universe*, which will be published in October by Harcourt, Brace & World.

← Circle No. 2 on Readers' Service Card on page 110A

Choosing a Signal Processor

by DR. E.U. COHLER, *President*
Computer Signal Processors, Inc.

Signal processing systems fall into three general categories. It is important to appreciate the differences in order to make a sensible selection.

Function-Specific

Function-specific processors are usually designed to perform a single version of a complete processing function. These systems, when developed and debugged, very often maximize performance per dollar. Unfortunately, they often result from the observation: "It's simple; we just throw together a few integrated circuits and . . .". Sadly, the result is usually functionally rigid, obsolescent, and has cost a great deal to engineer.

Algorithm-Specific

Algorithm-specific processors are designed to perform individual algorithms of general usefulness, such as Fast Fourier Transforms. This category really consists of partial systems, since these processors must be combined with either a function-specific processor or a computer. Thus it is clear that the algorithm-specific processor, like the function-specific processor, is an inherently rigid approach.

General-Purpose

General-purpose processors are systems whose functions are programmed rather than wired. The most flexible of the three, they combine the advantage of standard hardware with a multiple function capability. Such a system may be used for any algorithm: Fourier transforms, digital filtering, correlations, convolutions, cepstra, amplitude histograms, signal averaging, spectral densities, or statistical analyses. It can also accomplish the many odd jobs peculiar to a non-specific environment: comparison, peripherals handling, display, threshold sets, adaptation, and decision-making.

Each category has its place and its most useful applications. Since you know your own requirements better than anyone else, it is practical to do your own evaluating. After each category has been considered against the application, selection will be nearly automatic.

single allelic disparity caused observable differences in the sibling data; quantitative disparity increased when two allelic differences were compared with one. Kinetic measurements indicated a minimal "responding unit" of 1 per 300 cells, a "dividing unit" of 1 per 200 cells, and a cell generation time of 18 hours. Reasons for high frequency of "responding units" in cellular immune reactions and the mechanism for recognition were discussed.

The second speaker, Eli Sercarz (University of California, Los Angeles) elaborated on in vitro experiments that were directed toward substantiating his previously formulated X-Y-Z scheme of maturation of immunocompetent cells. Briefly, this scheme involves an X cell or antigen-sensitive lymphocytic cell which, upon antigen stimulation, is converted to a Y or "memory" cell; the latter, triggered by antigen, divides and matures irreversibly to a Z or terminal cell that is a mature, antibody-producing plasma cell. Using a constant in vivo dose of 10 mg of bovine serum albumin per rabbit and exposing spleen tissue in vitro to varying levels of antigen, different levels of unresponsiveness were obtained. While the data established the existence of a reversible state of in vitro paralysis, the cell stage at which paralysis occurs remains unknown. The time for establishment of memory in the primary response was less than 1 day. During this time, no cell division was required, but during the first day of the secondary response progenitor cells divided. It was concluded that it may be possible to study directly the antigen-binding activity of memory cells by sensitive techniques of micromanipulation, specific enzyme-binding antibody, and fluorimetry.

Robert Good (University of Minnesota, Minneapolis) chaired the session on "Cell Population Qualities and Kinetics in the Immune Response." Edward Boyse (Sloan-Kettering Institute for Cancer Research) spoke on "Antigenic Differentiation of Lymphoid Cells" and primarily about his own investigations. This work deals with normally occurring surface antigens, involving genetic differences among cells of the same type (for example, thymocytes) from different individuals, or phenotypic differences among the cells of a single individual. Whereas the genetic differences are of practical significance in homotransplantation, the phenotypic differences are of special interest because they are presumably relevant to the organization of interdependent cell populations within an individual. Six antigen systems have been defined for mouse thymocytes, using cytotoxic antisera in an in vitro test. The cell surfaces have been mapped on the principle that when antibody is absorbed by one of two cell antigens of different specificity, both situated in close proximity on the cell surface, the subsequent absorption of antibody by the other antigen is impeded. All the antigens studied occur on both thymocytes and lymphocytes with the exception of one set, TL, that is present only on thymocytes. Normally the antigens are stronger on thymocytes than on lymphocytes except H-2 which has four times as much on lymphocytes as on thymocytes. The genes for H-2 and TL are linked; the others are independent in inheritance. The TL genes (*Tla*) are unexpressed in TL− mice, but may be activated during leukemogenesis. Leukemia cells taken from immunized animals do not express TL antigen, but the cells regain the antigen upon passage in nonimmunized syngeneic hosts, a phenomenon termed

antigenic modulation. The features of antigenic modulation were amplified. It is assumed, but not established, that the cluster pattern of the antigens is a basic repetitive unit on the cell membrane.

Takashi Makinodan (Oak Ridge National Laboratories) spoke about "Kinetics of Cell Populations" and described various models of cell multiplication that might account for the exponential increase in numbers of antibody-forming cells. The experimental system of this investigator involves spleen tissue from mice stimulated with sheep red blood cells. Although the rate of cell increase is actually dependent upon antigen dose and factors such as cell migration, death, and possibly dedifferentiation, the models were simple and did not involve the latter parameters. The models differed with respect to number of recruitments (single or multiple); manner of recruitment (random or non-random); and proliferative capacity of the recruited cells (no division; synchronous or asynchronous division). The data from Perkins and other collaborators at Oak Ridge were most compatible with the model characterized as non-random, multiple recruitment, proliferating synchronously. Recruitment of cells capable of dividing would characterize a highly efficient differentiation process in which only a limited number of programmed cells need be stored at any one time.

The concluding session on "Regulation of the Immune Response" was chaired by Edwin Lennox (Salk Institute, San Diego). Coinvestigators Donald Rowley and Frank Fitch (University of Chicago) spoke on "Feedback Regulation." Model systems where regulation has been achieved were presented and factors involved were discussed from the findings. One model makes use of renal allografts in rats, and was studied for the effect of administering donor lymphoid cells from spleen or kidney (antigen) and/or antibody intravenously at various times with respect to time of the surgery. When both antigen and antibody were administered one day prior to surgery, the grafted kidneys function optimally, over very prolonged periods. Despite kidney survival, the treatment of the host had no effect on survival of skin grafts. Some circulating antibody against donor antigen was detected, even while the kidney grafts were fully functional. Since circulating antibody had not been totally suppressed, the

inhibition of response had been primarily in the delayed hypersensitivity system. When the established kidney was removed, without further treatment of the host, a successful second renal allograft could be achieved. Thus, it appeared that treatment with antigen and antibody had modified host rather than effecting a change in graft. From a second in vivo model involving Sprague-Dawley rats sensitized with sheep red blood cells and Freund's adjuvant specific antibody reduced the delayed hypersensitivity response when antigen was given 9 days later. It was postulated that delayed hypersensitivity involves two interactions between cells of limited number and that one of these (non-macrophage) had been suppressed by antibody. It had been shown previously by an in vitro model (plaque assay) that Sprague-Dawley rats, treated with specific antibody prior to sensitization with 10^8 sheep red blood cells, had a greatly reduced number of plaques in the spleen. The number represented a negligible response compared to well characterized responses to sheep red blood cells over a wide dosage range. It was suggested that, because of the importance of giving antibody before antigen, antibody acts by combining with antigen (at the level of specific antigenic determinants) and its effect is independent of adjuvant effect. Cell interaction appears to be important in both in vivo and in vitro reactions, as evidenced by the fact that the "rocking" of dispersed cells in cultures produced an increased number of plaques. The mechanism for feedback regulation by antibody was suggested as prevention of cell interaction through combination with antigen.

Eugene Lance (Cornell University) gave the concluding speech on "Immunosuppression." Nonspecific immunosuppressive agents (those whose action is not unique to the immune system or to particular antibody responses) include x-irradiation, radiomimetric drugs, steroids, and antimetabolites (all acting on processes of cell division, cell viability, and components of the DNA-RNA-protein sequence). Some uncertain miscellaneous phenomena such as hypnotism, reticuloendothelial blockade and treatment of grafts with RNA were also noted. Specific suppression by antigen and by antilymphocyte serum (ALS) were taken up in some detail. ALS, serum obtained by injecting lymphocytes of one animal into another species (or the antibody fraction eluted after absorption of such

serum to lymphocytes), alters immune reactions profoundly. Some points in describing the scope of the effect of ALS on humoral response were: importance of giving ALS before antigen (optimal effect when given intravenously 3 days before antigen), effectiveness on primary response which is suppressed but not abolished, and noneffectiveness against the secondary response. In order to prolong skin graft survival indefinitely, ALS must be given continuously. The serum caused no change in the thymus but produced selective damage in the paracortical area of thymus-dependent lymphoid tissue (spleen and bone marrow). The fate of labeled ALS-eluted antibody was studied. Because of rapid blood clearance it was assumed to exert a rapid effect. Radioautography of various tissues indicated only a small percentage uptake into lymphoid tissues. Because of large uptake in liver, a model was presented that indicated interaction of recirculating lymphocytes with circulating ALS and clearance of these cells by the liver. Lance expressed concern about the tendency of immunosuppressive drugs and ALS to increase the background of neoplastic cells that might give rise to lymphomas. However, he was optimistic about deriving experimental models using skin grafts and limited amounts of ALS plus other immunosuppressive agents that would lead to avoiding untoward clinical reactions to grafts.

The conference was supported in part by Ames Laboratories, Elkhart, Indiana; the Office of Naval Research, Biochemistry Branch, Washington, D.C.; and Hyland Laboratories, Los Angeles, California. This is contribution No. 3828.

JUSTINE S. GARVEY
Division of Chemistry and Chemical Engineering, California Institute of Technology, Pasadena 91109

National Meetings

August

3–6. National **Heat Transfer** Conf., 11th, Minneapolis, Minn. (D. C. Kelly, American Inst. of Chemical Engineers, 345 E. 47 St., New York 10017)

3–7. Society for **Cryobiology**, 6th annual, Buffalo, N.Y. (R. E. Greco, 3175 Staley Rd., Grand Island, N.Y. 14072)

4–5. **Aerospace Structures Design** Conf., Seattle, Wash. (J. R. Fuller, Boeing Co., P.O. Box 707, Orgn. 6-8650, M/S 77-89, Renton, Wash. 98055)

4–5. American Soc. of **Safety Engineers**, College Park, Md. (W. C. Christensen, ASSE, 850 Busse Highway, Park Ridge, Ill. 60068)

4–6. **Deterioration and Preservation of Library Materials**, 34th annual conf., Chicago, Ill. (H. W. Winger, Graduate Library School, Univ. of Chicago, 1116 E. 59 St., Chicago 60637)

4–8. **Molecular Biology and Pathology**, 2nd conf., Saratoga Springs, N.Y. (K. T. Lee, Dept. of Pathology, Albany Medical College, Albany, N.Y. 12208)

5–8. World Conf. on **Records**, Salt Lake City, Utah. (S. E. Beesley, 1030 S. Orchard Dr., Bountiful, Utah 84010)

6–8. Applications of **X-Ray Analysis** Conf., Denver, Colo. (B. L. Henke, Div. of Metallurgy, Denver Research Inst., Denver 80210)

10–13. **Soil Conservation** Soc. of America, Fort Collins, Colo. (H. W. Pritichard, 7515 NE Ankeny Rd., Ankeny, Iowa 50021)

11–13. Symposium on **Crystal Growth**, Washington, D.C. (H. S. Peiser, Room B316, Bldg. 223, National Bureau of Standards, Washington, D.C. 20234)

11–14. Society of **Photo-Optical Instrumentation Engineers**, 14th annual technical symp., San Francisco, Calif. (H. L. Kasnitz, SPIE Symposium, P.O. Box 288, Redondo Beach, Calif. 90277)

12. American **Astronomical** Soc., Albany, N.Y. (G. C. McVittie, Univ. of Illinois Observatory, Urbana 61801)

13–24. Frontier Topics in **Crystallography**, Stony Brook, L.I., N.Y. (E. H. Kone, American Inst. of Physics, 335 E. 45 St., New York 10017)

17–22. **Animal Behavior** Soc., Burlington, Vt. (B. Dane, Tufts Univ., Medford, Mass.)

17–22. American Inst. of **Biological Science**, Burlington, Vt. (J. R. Olive, 3900 Wisconsin Ave., NW, Washington, D.C. 20016)

17–22. American Soc. of **Zoologists**, Burlington, Vt. (J. R. Shaver, Dept. of Zoology, Michigan State Univ., East Lansing 48823)

18–20. **Genetics** Soc. of America, Madison, Wis. (B. Wallace, Dept. of Genetics, Cornell Univ., Ithaca, N.Y. 14850)

18–21. American **Hospital** Assoc., Chicago, Ill. (E. L. Crosby, 840 N. Lake Shore Dr., Chicago 60611)

18–22. New England Assoc. of **Chemistry Teachers**, 31st summer conf., Plymouth, N.H. (M. P. Olmsted, Publicity Chairman, NEACT, 9 Brookmont Dr., Wilbraham, Mass. 01095)

18–22. American Soc. of **Pharmacognosy**, 10th annual, Corvallis, Ore., with **Marine Biomed'cinals** Symp. (P. Catalfomo, School of Pharmacy, Oregon State Univ., Corvallis 97331)

18–22. American **Phytopathological** Soc., Spokane, Wash. (J. P. Fulton, Dept. of Plant Pathology, Univ. of Arkansas, Fayetteville 72701)

18–22. National Goals in **Water Pollution Control**, Santa Barbara, Calif. (F. A. Butrico, Coordinator of Environmental Sciences Programs, Battelle Memorial Inst., Columbus Laboratories, Washington, D.C.)

19. **Biometric** Soc., western North American regional, Pullman, Wash. (J. S. Williams, Statistical Lab., Colorado State Univ., Fort Collins)

19–21. **Birch Symp.**, Durham, N.H.

Circle No. 86 on Readers' Service Card on page 110A →

(R. R. Weyrick, Dept. of Forest Resources, Univ. of New Hampshire, Durham 03824)

19–22. **Biometric** Soc., eastern North American regional, New York, N.Y. (D. G. Gosslee, P.O. Box 713, Oak Ridge, Tenn. 37830)

19–22. American Assoc. of **Clinical Chemists**, 21st natl. mtg., Denver, Colo. (J. Preston, P.O. Box 18323, Capitol Hill Station, Denver 80218)

19–22. Western **Electronic** Show and Convention, San Francisco, Calif. (D. W. Martin, WESCON, 3600 Wilshire Blvd., Los Angeles, Calif. 90005)

19–22. American Soc. for **Horticultural Science**, 44th annual, Pullman, Wash. (C. Blackwell, The Society, 615 Elm St., St. Joseph, Mich. 49085)

19–22. **Phytochemical Soc. of North America**, Banff, Alberta, Canada. (J. W. Watkin, Prairie Regional Lab., Saskatoon, Sask., Canada)

19–22. American **Statistical** Assoc., 129th, New York, N.Y. (D. C. Riley, The Association, 810 18th St., NW, Washington, D.C. 20006)

19–23. American **Fern** Soc., Seattle, Wash. (A. M. Evans, Dept. of Botany, Univ. of Tennessee, Knoxville 37916)

20–22. American Soc. of **Civil Engineers**, Hydraulics Conf., Logan, Utah. (ASCE Hydraulics Conf., % Utah Water Research Lab., Utah State Univ., Logan 84321)

21–23. American **Nature Study** Soc., Pullman, Wash. (J. Geisler, Milewood Rd., Verbank, N.Y. 12585)

24–25. **Programming Languages Definition**, San Francisco, Calif. (J. A. Painter, IBM Corp., Research Lab., Dept. 978, Bldg. 025, Monterey and Cottle Rds., San Jose, Calif. 95114)

24–27. **Alaska Div., AAAS**, College. (V. Fisher, Inst. of Social, Economic and Government Research, Univ. of Alaska, College 99701)

24–27. **Defects in Electronic Materials for Devices**, Boston, Mass. (D. P. Seraphim, IBM Components Div., Bldg. 300, Hopewell Junction, N.Y. 12533)

24–27. Conference on **Food-Drugs from the Sea**, Kingston, R.I. (G. F. Greene, Jr., % Professional Services, Abbott Labs., North Chicago, Ill. 60064)

24–29. **Gerontological** Soc., Washington, D.C. (E. Kaskowitz, The Society, 660 S. Euclid St., St. Louis, Mo. 63110)

24–2. **Botanical** Soc. of America, Seattle, Wash. (R. C. Starr, Dept. of Botany, Indiana Univ., Bloomington 47401)

25–27. **Applied Mechanics** Western Conf., Albuquerque, N.M. (A. B. Conlin, Jr., Technical Depts., 345 E. 47 St., New York 10017)

25–27. **Mathematical** Assoc. of America, Eugene, Ore. (A. B. Willcox, The Association, 1225 Connecticut Ave., NW, Washington, D.C. 20036)

25–28. **Chromosphere-Corona Transition**, Boulder, Colo. (J. W. Evans, Sacramento Peak Observatory, Sunspot, N.M. 88349)

25–29. American **Physiological** Soc., Davis, Calif. (G. Hamilton, APS, 9650 Rockville Pike, Bethesda, Md. 20014)

26–28. Engineering Applications of **Electronic Phenomena** Conf., Ithaca,

N.Y. (H. J. Carlin, School of Electrical Engineering, Cornell Univ., Ithaca 14850)

26–29. **Electron Microscope** Soc. of America, St. Paul, Minn. (G. G. Cocks, Olin Hall, Cornell Univ., Ithaca, N.Y. 14850)

28–1. Society of **Petroleum Engineers,** Denver, Colo. (J. B. Alford, 6200 N. Central Expressway, Dallas, Tex. 75206)

31–4. American **Psychological** Assoc., Washington, D.C. (K. Goodall, The Society, 1200 17th St., NW, Washington, D.C. 20036)

31–4. **Psychometric** Soc., Washington, D.C. (W. B. Schrader, Educational Testing Service, Princeton, N.J. 08540)

31–6. **Quantum Solids: Hydrogen and Helium,** Aspen, Colo. (J. C. Raich, Colorado State Univ., Fort Collins 80521)

September

2–4. **Comparative Virology,** intern. conf., Montreal, Canada. (K. Maramorosch, Boyce Thompson Inst. for Plant Research, Yonkers, N.Y. 10701)

2–6. **Molecular Structure and Spectroscopy,** 24th annual symp., Columbus, Ohio. (K. N. Rao, Physics Dept., Ohio State Univ., Columbus 43210)

2–6. **Tuberculosis,** intern. conf., New York, N.Y. (J. E. Perkins, Natl. Tuberculosis Assoc., 1790 Broadway, New York 10019)

3–5. **Weather Forecasting and Analysis,** 3rd, Virginia Beach, Va. (E. C. Kindle, Navy Weather Research Facility, Bldg. R 48, Naval Air Station, Norfolk, Va. 23511)

3–6. Conference on **Biogenic Amines as Physiological Regulators,** Woods Hole, Mass. (B. A. Curtis, Tufts Univ. School of Medicine, 136 Harrison Ave., Boston, Mass. 02111)

3–6. American **Political Science** Assoc., New York, N.Y. (E. M. Kirkpatrick, APSA, 1527 New Hampshire Ave., NW, Washington, D.C. 20036)

4–6. American Assoc. of **Obstetricians and Gynecologists,** Hot Springs, Va. (R. B. Wilson, 200 First St., SW, Rochester, Minn. 55901)

4–6. **Parapsychological** Assoc., 12th intern. conv., New York, N.Y. (J. G. Pratt, Box 152, Univ. of Virginia Medical School, Charlottesville 22901)

5–7. Society for the Study of **Amphibians and Reptiles,** 12th annual, Carbondale, Ill. (J. T. Collins, Museum of Natural History, Univ. of Kansas, Lawrence 66044)

7–12. American **Chemical** Soc., 158th natl., New York, N.Y. (Manager, Natl. Meeting and Divisional Activities, 1155 16th St., NW, Washington, D.C. 20036)

7–12. **Experimental Medicine and Surgery in Primates,** 2nd conf., New York, N.Y. (J. Moor-Jankowski, New York Univ. Medical Center, 550 First Ave., New York 10016)

8–9. Symposium on **Turbulence Measurements in Liquids,** Rolla, Mo. (G. K. Patterson, Dept. of Chemical Engineering, Univ. of Missouri, Rolla 65401)

8–10. **Agriculture Meteorology** Conf., 9th, Seattle, Wash. (R. J. Hanks, Dept. of Soils and Meteorology, Utah State Univ., Logan 84321)

8–10. **Metallurgy and Materials Science,**

intern. conf., Philadelphia, Pa. (G. R. Belton, School of Metallurgy and Materials Sciences, Univ. of Pennsylvania, Philadelphia 19104)

8–10. **Standards Engineers** Soc., 18th annual, Washington, D.C. (J. M. Ward, 11208 Long Pine Trail, Potomac, Md. 20857)

8–11. **Electrical Insulation** Conf., 9th, Boston, Mass. (H. P. Walker, Code 6158D, Naval Ship Engineering Center, Washington, D.C. 20360)

8–12. **Dietetics**, 5th intern. congr. (American Dietetic Assoc., 52nd annual), Washington, D.C. (Public Relations, The Association, 620 N. Michigan Ave., Chicago, Ill. 60611)

8–12. American Soc. of **Limnology and Oceanography**, La Jolla, Calif. (G. H. Lauff, W. K. Kellogg Biological Station, Michigan State Univ., Hickory Corners, 49060).

8–13. **High Energy Physics and Nuclear Structure**, intern. conf., New York, N.Y. (S. Devons, Dept. of Physics, Columbia Univ., New York 10027)

9–10. Society of **Logistics Engineers**, 4th annual, Cape Canaveral, Fla. (G. Dill, Aerospace Services Div., Pan American World Airways, Inc., Patrick AFB, Fla. 32925)

11–12. Symposium on **Sulphur in Nutrition**, Corvallis, Ore. (J. E. Oldfield, Dept. of Animal Science, Oregon State Univ., Corvallis 77331)

14–17. Association of **Medical Illustrators**, Washington, D.C. (B. J. Melloni, AMI, Georgetown Univ., Washington, D.C. 20007)

14–20. College of American **Pathologists** and American Soc. of **Clinical Pathologists**, joint annual mtg., Chicago, Ill. (O. Neibel, CAP, 230 N. Michigan Ave., Chicago 60601)

15–17. **Woodhandling**, 2nd symp., Ottawa, Ont., Canada. (Technical Section, Canadian Pulp and Paper Assoc., 2280 Sun Life Bldg., Montreal 110, P.Q.)

17–19. American **Science Film** Assoc., Washington, D.C. (B. J. Melloni, ASFA, Georgetown Univ., Washington, D.C. 20007)

17–19. **Blood and Tissue Antigens**, intern. symp., Ann Arbor, Mich. (D. Aminoff, Simpson Memorial Inst., Univ. of Michigan, Ann Arbor 48104)

17–19. **Industrial Research**, 5th natl. conf., Chicago, Ill. (V. J. Danilov, Industrial Research Bldg., Beverly Shores, Ind. 46301)

18–20. **Chemical Marketing Research Assoc.**, Lake Placid, N.Y. (P. E. Levesque, FMC Corp., 633 Third Ave., New York 10017)

18–20. Symposium on **Coniferous Forests of the Northern Rocky Mountains**, Missoula, Mont. (Center for Natural Resources, Univ. of Montana, Missoula 59801)

21–24. American Assoc. of **Medical Clinics**, New York, N.Y. (E. M. Wurzel, Executive Director, The Association, 421 King St., Alexandria, Va. 22314)

21–24. **Petroleum Mechanical Engineering Conf.**, Tulsa, Okla. (H. E. Broadbent, Atlantic Richfield Co., P.O. Box 8138, Philadelphia, Pa. 19101)

21–25. **Comparative Leukemia Research**, 4th intern. symp., Cherry Hill, N.J. (R. M. Dutcher, School of Veteri-

nary Medicine, Univ. of Pennsylvania, New Bolton Center, Kennett Square 19348)

22–24. National Conf. on **Packaging Wastes**, San Francisco, Calif. (M. Li, Food Protection and Toxicology Center, Univ. of California, Davis 95616)

22–26. International **Simulation and Training** Conf., Montreal, Canada. (W. I. Marble, SAE Hq., Meetings Manager, 2 Pennsylvania Plaza, New York 10001)

23–25. **Physics and Nondestructive Testing**, 9th annual, Chicago, Ill. (W. J. McGonnagle, Symp. Coordinator, P.O. Box 554, Elmhurst, Ill. 60126)

24–26. IEEE **Ultrasonics** Symp., St. Louis, Mo. (D. I. Bolef, Inst. of Electrical and Electronics Engineers, Ultrasonics Symp., Dept. of Physics, Washington Univ., St. Louis 63130)

26–3. American Acad. of **General Practice**, Philadelphia, Pa. (M. F. Cahal, The Academy, Volker Blvd. at Brookside, Kansas City, Mo. 64112)

28–1. Society of **Petroleum Engineers of AIME**, 44th annual, Denver, Colo. (J. R. Dempsey, Northern Natural Gas Co., P.O. Box 308, Omaha, Neb. 68102)

29–1. International Conf. on **Bioelectrical Impedance**, New York, N.Y. (S. E. Marovich, The Conference, 1150 NW 14th St., Miami, Fla. 33136)

29–3. American Soc. of **Photogrammetry**, Portland, Ore. (L. P. Jacobs, 105 N. Virginia Ave., Falls Church, Va. 22046)

Foreign Meetings

September

1–4. International Soc. of **Geographical Pathology** Conf., Jerusalem, Israel. (I. S. Levij, Dept. of Pathology, Hebrew Univ., Hadassah Medical School, P.O. Box 1172, Jerusalem)

1–5. British **Pharmaceutical** Conf., Belfast, Northern Ireland. (Secretary, The Conference, 17 Bloomsbury Sq., London, W.C.1, England)

1–5. International Soc. of **Neurochemistry**, 2nd, Milan, Italy. (R. Paoletti, Scientific Secretary, Inst. of Pharmacology, Univ. of Milan, via Andrea del Sarto 21, 20129 Milan)

1–5. **Phenomena in Ionized Gases**, 9th intern. conf., Bucharest, Rumania. (E. Badareu, Inst. of Physics, Acad. of Science, Bucharest, Rumania)

1–10. **Non-Linear Continuum Theories in Mechanics and Physics and Their Applications**, Padua, Italy. (D. H. Rivlin, Scientific Director, Center of Applied Mathematics, Lehigh Univ., Bethlehem, Pa. 18015)

1–12. International Assoc. of **Geomagnetism and Aeronomy**, Madrid, Spain. (P. A. Romana, Observatoire del Ebro, Apdo 9, Taratosa, Spain)

1–19. **Geophysical Fluid Dynamics**, Bangor, N. Wales. (G. E. R. Deacon, Natl. Inst. of Oceanography, Wormley, Godalming Surrey, United Kingdom)

2–4. **Hyperbaric Medicine**, 4th intern. congr., Sapporo, Japan. (T. Iwa, Dept. of Thoracic and Cardiovascular Surgery, Sapporo Medical College and Hospital, So. 1. West 16, Sapporo 060)

3–11. International Assoc. of **Statistics in Physical Sciences**, London, England.

(J. Neyman, Dept. of Statistics, Univ. of California, Berkeley 94720)

4–9. **Ferroelectricity**, 2nd intern. conf., Tokyo, Japan. (H. Takahashi, Faculty of Science, Univ. of Tokyo, 7 Hongo, Bunkyo-ku Tokyo, Japan)

5–10. International **Clay** Conf., Tokyo, Japan. (S. Iwao, Secretary General, Organizing Committee, The Conference, Science Council of Japan, Ueno Park, Tokyo 110)

7–12. Conference on **Atomic Collision Phenomena in Solids**, Brighton, England. (Meetings Office, Inst. of Physics and the Physical Soc., 47 Belgrave Sq., London, S.W.1, England)

7–12. **Pharmaceutical Sciences**, 29th intern. congr., London, England. (J. C. Bloomfield, Pharmaceutical Soc. of Great Britain, 17 Bloomsbury Sq., London, W.C.1)

7–14. International Symp. on **Unproven Methods of Cancer Diagnosis and Treatment**, São Paulo, Brazil. (A. C. C. Junqueira, % Hospital A.C. Camargo, P.O. Box 5217, São Paulo)

8–12. **Congenital Malformations**, 3rd intern. conf., The Hague, Netherlands. (Local Secretary, % Holland Organizing Centre, 16, Lange Voorhout, The Hague)

8–12. **Fiscal Assoc.**, 23rd intern. congr., Rotterdam, Netherlands. (Local Secretary, Holland Organizing Centre, 16, Lange Voorhout, The Hague, Netherlands)

8–12. Symposium on **In Vitro Procedures with Radioisotopes in Clinical Medicine and Research**, Vienna, Austria. (J. H. Kane, Div. of Technical Information, U.S. Atomic Energy Commission, Washington, D.C. 20545)

8–12. International Symp. on **Man-Machine Systems**, Cambridge, England. (L. R. Young, Room 37-155, Massachusetts Inst. of Technology, Cambridge 02139)

8–12. International Assoc. of **Seismology and Physics of the Earth's Interior**, Madrid, Spain. (J. P. Rothe, General Secretary, The Association, 38 Boulevard d'Anvers, 67 Strasbourg, France)

8–13. **Electrosleep and Electroanaesthesia**, 2nd intern. symp., Graz, Austria. (F. M. Wageneder, Secretary, ISEE, Chirurgisch Universitatsklinik Graz, 8036 Graz)

9–12. International Symp. on **Conformational Analysis**, Brussels, Belgium. (R. C. Smekens, Executive Secretary, ISCA, 49, Square Marie-Louise, Brussels 4)

11–12. Symposium on **Earthquake Mechanics**, Madrid, Spain. (L. R. Alldredge, Inst. for Earth Science, ESSA, Boulder, Colo. 80302)

11–13. **History of Science**, intern. congr., Cordoba, Argentina. (A. Marsal, Casilla Postal 130, Cordoba, Argentina)

14–19. International Soc. for **Rehabilitation of the Disabled**, 11th world congr., Dublin, Ireland. (C. J. Sweeney, National Rehabilitation Board, 18, Merrion Rd., Dublin 4)

15–18. **Internal Medicine**, 10th intern. congr., Warszawa, Poland. (M. Tulczynski, ul. Lekarska 11, Warszawa 22)

15–20. International Symp. on **Design and Application of Logical Systems**, Brussels, Belgium. (J. Florine, Laboratoire d'Electronique Industrielle, Université Libre de Bruxelles, 50, Avenue F. D. Roosevelt, Bruxelles, 5, Belgium)

BOOKS RECEIVED

(Continued from page 168)

Collier-Macmillan, London, 1969. xii + 252 pp., illus. Paper, $4.95.

Mathematical Papers. William Kingdon Clifford. Robert Tucker, Ed. Chelsea, New York, 1968. lxxii + 658 pp., illus. $15. Reprint of the 1882 edition.

Mechanical Engineering for Professional Engineers' Examinations. Including Questions and Answers for Engineer-in-Training Review. John D. Constance. McGraw-Hill, New York, ed. 2, 1969. xx + 492 pp., illus. $11.50.

Mechanisms of Molecular Migrations. Vol. 2. B. S. Thyagarajan, Ed. Interscience (Wiley), New York, 1969. x + 470 pp., illus. $22.50.

Medical Thermography. Proceedings of a Boerhaave Course for Postgraduate Medical Education Given in Collaboration with the Netherlands' Society of Radiology, Leiden, 1968. S. F. C. Heerma van Voss and P. Thomas, Eds. Karger, Basel, 1969 (U.S. distributor, Phiebig, White Plains, N.Y.). viii + 224 pp., illus. Paper, $15.60. Bibliotheca Radiologica, No. 5.

Methoden der Organischen Chemie. Vol. 7, Part 4. Sauerstoffverbindungen II, Part 4. Eugen Müller, O. Bayer, H. Meerwein, and K. Ziegler, Eds. Thieme Verlag, Stuttgart, ed. 4, 1968 (U.S. distributor, Intercontinental Medical Books, New York). xxx + 508 pp., illus. DM 178.

The Mutants of Maize. A pictorial survey in color of the usable mutant genes in maize with gene symbols and linkage map positions. Arranged by chromosome location. M. G. Neuffer, Loring Jones, and Marcus S. Zuber. Crop Science Society of America, Madison, Wis., 1968. vi + 74 pp., illus. Cloth, $6; paper, $5.

Orbitals and Chemical Bonding. P. F. Lynch. Mifflin, Boston, 1968. viii + 56 pp., illus. Paper, $1.75. Concepts in Chemistry.

The Organic Compounds of Lead. Hymin Shapiro and F. W. Frey. Interscience (Wiley), New York, 1969. xiv + 498 pp., illus. $18. Chemistry of Organometallic Compounds.

Origin and Distribution of the Elements. An international symposium, Paris, 1967. L. H. Ahrens, Ed. Pergamon, New York, 1968. xviii + 1178 pp., illus. + 2 plates. $48. International Series of Monographs in Earth Sciences, vol. 30.

The Origins of Intellect: Piaget's Theory. John L. Phillips, Jr. Freeman, San Francisco, 1969. xviii + 150 pp., illus. Paper, $2.75. Psychology Series.

Palladium Alloys. E. M. Savitskii, V. P. Polyakova, and M. A. Tylkina. Translated from the Russian edition (Moscow, 1967) by R. E. Hammond. Primary Sources, New York, 1969. x + 214 pp., illus. $24.50.

Plant Cell Organelles. Proceedings of the Phytochemical Group Symposium, London, 1967. J. B. Pridham, Ed. Academic Press, New York, 1968. xiv + 264 pp., illus. $9.50.

The Prairie World. David F. Costello. Crowell, New York, 1969. xiv + 242 pp., illus. $7.95.

Principles of Zoophysiology. In two volumes. B. Rybak. Vol. 1. Translated from the French edition (Paris, 1962). Pergamon, New York, 1968. viii + 600 pp., illus. $25. International Series of Monographs in Pure and Applied Biology: Zoology, vol. 39.

Psycholinguistics. Experiments in Spontaneous Speech. F. Goldman Eisler. Academic Press, New York, 1968. viii + 172 pp., illus. $8.50.

The Radio Amateur's Handbook. Headquarters Staff, American Radio Relay League. Doug DeMaw, Ed. American Radio Relay League, Newington, Conn., ed. 46, 1969. 702 pp., illus. Cloth, $6.50; paper, $4. Radio Amateur's Library, Publication No. 6.

Reality and Dream. Psychotherapy of a Plains Indian. George Devereux. Psychological tests edited and interpreted by Robert R. Holt. Anchor (Doubleday), Garden City, N.Y., 1969. 1 + 622 pp. + 8 plates. Paper, $3.95. Revised version of the 1951 edition.

Reforming American Education. The Innovative Approach to Improving Our Schools and Colleges. Alvin C. Eurich. Harper and Row, New York, 1969. xviii + 270 pp. $6.50.

Rock and Mineral Analysis. John A. Maxwell. Interscience (Wiley), New York, 1968. xviii + 590 pp., illus. $24.50. Chemical Analysis, vol. 27.

Spectral Properties of Disordered Chains and Lattices. J. Hori. Pergamon, New York, 1968. xii + 232 pp., illus. $10. International Series of Monographs in Natural Philosophy, vol. 16.

Spiders, Scorpions, Centipedes and Mites. J. L. Cloudsley-Thompson. Pergamon, New York, 1968. xvi + 280 pp., illus. + 18 plates. Cloth, $6.50; paper, $4.50. Commonwealth and International Library: Biology Division. Reprint, with additions, of the 1958 edition.

The Starch Industry. J. W. Knight. Pergamon, New York, 1969. xiv + 190 pp., illus. + 16 plates. Cloth, $5.50; paper, $4. Commonwealth and International Library: Chemical Industry.

Statistical Mechanics of Chain Molecules. Paul J. Flory. Interscience (Wiley), New York, 1969. xx + 432 pp., illus. $17.50.

Stochastic Integrals. H. P. McKean, Jr. Academic Press, New York, 1969. xvi + 144 pp. $9. Probability and Mathematical Statistics, vol. 5.

Theory of Finite Groups. A symposium, Cambridge, Mass., 1968. Richard Brauer and Chih-Han Sah, Eds. Benjamin, New York, 1969. xiv + 270 pp. $12.50.

Theory of Matrices. Peter Lancaster. Academic Press, New York, 1969. xii + 316 pp. $11.

Tobacco and Your Health: The Smoking Controversy. Harold S. Diehl. McGraw-Hill, New York, 1969. xvi + 272 pp., illus. $4.95.

The Transmission of Schizophrenia. Proceedings of the Second Research Conference of the Foundations' Fund for Research in Psychiatry, Dorado, Puerto Rico, 1967. David Rosenthal and Seymour S. Kety, Eds. Pergamon, New York, 1968. xii + 436 pp., illus. $15.

The Transport of Plant Hormones. Proceedings of the NATO/EGE University Summer Institute, Izmir, Turkey, 1967. Y. Vardar, Ed. North-Holland, Amsterdam, 1968. viii + 460 pp., illus. $20.