

new products

The descriptions of the new products listed in this section are based on information supplied to us by the manufacturers, and in some cases by independent sources. PHYSICS TODAY can assume no responsibility for their accuracy. To facilitate inquiries about a particular product, a Reader Service Card is attached inside the back cover of the magazine.

Pulsed electron beam for fast quench annealing of metals

Spire has introduced a pulsed electron-beam machine designed specifically for fast quench-annealing of metallic surfaces. Designated Spi-Pulse 300 M, this machine has been used to form metallic glass and surface alloys by pulse diffusion, and to anneal magnetic-bubble-memory films. The metal surface is pulsed with a single submicrosecond burst of energy. The brevity of the pulse limits the heating to the surface of the target, with the bulk remaining cool. Unlike laser-pulse heating, the reflectivity of the surface does not matter. Even refractory metal surfaces can be melted, resulting in smoother surface morphology. The Spi-Pulse 300M is cassette-loaded; it can process material up to 3 inches in diameter. The price \$99 500. *Spire Corporation Patriots Park, Bedford, Massachusetts 01730*

Circle number 140 on Reader Service Card

One-meter grazing-incidence vacuum spectrograph

Acton has introduced a new 1.0-meter grazing-incidence spectrograph, the model GS-541. This instrument incorporates all its major components in the same vacuum chamber, for the sake of compactness, portability and ease of operation.

The GS-541 is based on the Rowland



Circle mounting of a concave grating. It uses 35-mm film to photograph the spectral region from 10 angstroms in the x-ray regime to 2600 angstroms in the ultraviolet. Performance is dependent on the choice of gratings, which are available with groove spacings from 133 to 3600 lines/mm. Other options include angle of incidence from 82° to 88°, and the choice of single- or multiple-exposure film cassettes. The GS-541 is 19 inches long by 11 inches wide by 10 inches high and weighs approximately 60 lbs. *Acton Research Corporation, PO Box 215, Acton, Massachusetts 01720*

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4-channel, wide-range gate and delay generator

The new LeCroy model 4222 is a 4-channel, wide-range gate and delay generator designed for applications that require long, accurate time delays or precise time windows. It replaces rack-size units with a compact, remotely programmable modular instrument that is claimed to be easy to use. The model 4222 can be used in time-of-flight and mass-spectroscopy systems, particle beam studies, electronics development, particle and nuclear physics and as a standard laboratory diagnostic tool. Applications include test and measurement, simulation, precision pulse sampling and calibration.

The gate and delay generator provides four sets of outputs, independently delayed with respect to a common start input or trigger signal. Each set of outputs for the four channels includes both a positive voltage pulse output and complementary negative voltage level. The four delays are separately programmable in 1-nanosecond increments over a time range from 0.1 to 16.7 msec. The accuracy of the generated delay, we are told, is better than 200 picoseconds, with a jitter of less than 150 picoseconds.

Precision time windows may be gen-

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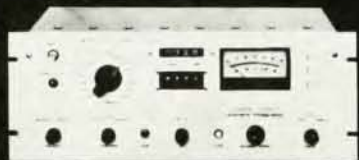
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new products

erated from the delays with the flip of a switch. The four outputs are internally paired to generate two independent time windows synchronized to the start input. The windows' leading and trailing edges are separately programmable. Several of these generators may be synchronized to an identical time base by way of a front-panel external clock input. The price is \$3850. *LeCroy Research Systems, 700 South Main Street, Spring Valley, New York 10977*

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Electronic readout for streak cameras

The Hamamatsu Temporal analyzer C1440-04 converts visual information from a streak-camera event into digital data that can be stored and handled in its frame memory. The Temporal analyzer stores data in 512x512 sixteen-bit channels.

A microcomputer in the Temporal analyzer follows user commands and puts out information to selected peripherals. Data showing intensity vs. time as a function of position can be displayed on the monitor, or transmitted to a plotter or printer. Image enhancement is provided through dark current subtraction. One can freeze frames to study the image.

A programmable feature permits one to program output format and destination, and to initiate up to 100 actions by pressing a single button. The system will soon be offered in a three-dimensional output format. *Hamamatsu Corporation, 420 South Avenue, Middlesex, New Jersey 08846*

Circle number 143 on Reader Service Card

Remote-local oscilloscope link

Two of Nicolet's latest digital oscilloscopes can now be linked together over telephone lines for automatic transfer of waveform information. The small, portable 3091 (4K points per channel) gathers signals at a remote testing site, then sends the acquired information via phone lines to the Nicolet 4094 oscilloscope. The 4094 is a powerful lab instrument (16K memory) which is capable of many waveform analysis calculations. Baud rates from 110 to 19 200 bps are available to suit varied modem and telephone-line conditions.

The 3091-4094 remote-local link is claimed to be particularly valuable in situations where field workers need to send in signal information for verification and analysis. In many cases it is a cost-effective alternative to an external

computer, since the computational abilities of the 4094 (for example, fast Fourier transforms) are extended to data gathered on the less expensive portable scopes. No programming time or effort is needed to transfer waveforms because the transfer is controlled by disk-downloaded software in the 4094. The price, with the advanced acquisition package, is \$150. *Nicolet, 5225 Verona Road, PO Box 4288, Madison, Wisconsin 53711*

Circle number 144 on Reader Service Card

Portable, hand-held gaussmeter

RFL announces the new model 902 portable, hand-held gaussmeter. The instrument uses the most advanced techniques available, we are told, to provide the widest degree of measure-



ment flexibility. The model 902 is powered by a single 9-volt battery. Standard probes are available in both axial and transverse configurations. Using the 902MP, the model 902 can be converted into a hand-held magnetometer.

The field being measured is displayed by a 3 1/2-digit lcd display; range selection is made by touch switches. In addition to conventional dc magnetic-field measurements, one can also perform incremental or expanded-scale operations without any additional adapters. Overall accuracy is claimed to be $\pm 0.5\%$ plus the probe accuracy. This includes the 0.25% internal calibration uncertainty. *RFL Industries, Powerville Road, Boonton, New Jersey 07005*

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Digital voltmeter and d/a converter

Transiac announces a pair of new complementary CAMAC modules (IEEE

standard number 583) for high-frequency measurement and analog output. The model 2032 is a high-accuracy, autoranging scanning digital



voltmeter. It offers a resolution of 1 microvolt, a programmable digital filter for 50/60 Hz noise suppression, 32 differential input channels, an onboard microprocessor, 24-bit dynamic range and self diagnostics. It is packaged in a single-width CAMAC module and sells for \$1500.

Transiac's model 3016 is a 16-channel, 16-bit digital-to-analog converter. Its performance is guaranteed to 14 bits and it has a settling time of less than 200 microseconds, we are told. It also is a single-width CAMAC module, and it sells for \$1200. *Transiac, 2375 Garcia Avenue, Mountain View, California 94043*

Circle number 146 on Reader Service Card

Digital R-G bridge for resistance measurement

Quantum Design's model 1802 is a high-resolution, multichannel digital R-G bridge designed for precision measurements of resistance and conductance on all types of ohmic sensors and experimental samples. A single unit can monitor up to four separate sensors, and corresponding analog drivers allow the user to implement a digitally filtered multichannel controller. The system is provided with a structured set of executive commands that can be controlled from a small computer through an IEEE-488 interface. Since sensor calibrations or sample parameters can be stored in the controlling

computer, the bridge remains completely independent of both sensor and calibration.

The model 1802 uses a four-terminal ac measurement technique that provides 17-bit resolution even under adverse conditions such as large thermal EMFs and 60-Hz noise. Automatic internal calibration, which periodically checks internal gains and instrument zero, maintains an overall system precision of about 0.01%, we are told.

Measurements of metallic sensors having resistances between 0 and 20 k Ω would normally use the resistance mode, while the conductance mode is more appropriate for sensors with higher resistances. Twelve separate ranges in both modes maintain system resolution for small values of either resistance or conductance. Very small power dissipation in the sensor also makes the model 1802 suitable for cryogenic applications. *Quantum Design, 11404 Sorrento Valley Road, Suite 114, San Diego, California 92121*

Circle number 147 on Reader Service Card

Computer-controlled Guinier diffractometer

Huber Diffraktionstechnik has introduced a new line of computer-controlled Guinier-type diffractometers. The standard basic model 642 consists of a mechanical scintillation-tube rotation device with stepper motor and oscillating powder-specimen holder. The detector slit width and height are variable for an optimum theta-angle resolution down to 0.02°, depending on sample conditions. Together with a stepper-motor control and a desktop computer, its graphically supported software is said to be well suited for fast profile and phase analysis or reflection intensity measurements for structure determination.

The model 644, with heatable powder capillaries capable of temperatures up to 1200 K, lets one do phase-transition studies. Another model, the 653, is suited for examination of thin-film samples. A full range of focusing monochromators for all common x-ray tube wavelengths is available.

The software makes full use of crt or matrix-printer graphics, featuring automatic search for diffraction peaks, precise refinement of angle position by a fitting procedure, smoothing of noisy scans, optimization of integration times and three-dimensional plots of diffractograms. It runs on a Hewlett-Packard 86 and controls the hardware via RS 232 C or optional IEEE 488 interface. *Huber Diffraktionstechnik, Sommerstrasse 4, D-8219 Rimsting/Chiemsee, West Germany*

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GATED INTEGRATOR



Model 4130 will function in a linear integrate-and-hold/reset mode, or, with feedback, as an exponential integrator. Minimum gating time is 30ns., and the droop is extremely low.

Special features, including multiple inputs, a fast input voltage-follower, simplify box-car adaptations for pulse and waveform analysis.

Supporting modules are available: programmable time delays, ramp generator, ratiometer, amplifiers.

EVANS ASSOCIATES

P.O. Box 5055, Berkeley, California 94705
Telephone: (415) 653-3083

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TRANSFORMER WITH DC PRIMARY (ALTERNATOR)

One of the tiniest forces known to man resides in a photon and another is the splitting of one atom. Our ac electric power industry (EPI) ultimately depends on alternately flip flopping (at 60cps) the spin of 4 unpaired electrons in atoms of mostly iron core materials around which coils of wire are wound to distribute and generate electricity. In atoms electrons always spin at $+\frac{1}{2}$ or $-\frac{1}{2}$. What about a free electron? Does it always spin but with a high rate of spin or precession of its spin axis? Probably not or an electron would have infinite energy. Above 10^{-4} cm the magnetic field of a free spinning electron with no spin is very weak.

It has been impossible for this layman to find the energy required to flip the spin of an electron. It must be vanishingly small, even less than the energy of a photon, as a tiny button magnet will lift billions of nails and not be measurably weakened. The electron spin of trillions of electrons in each nail must be aligned or flipped in a certain direction by magnetic induction before a nail is attracted and lifted.

At present the EPI uses mainly electromagnetic induction to generate electricity. Rewind the dc coils from the rotor of an ac alternator on to the stator along with the ac coils. Now all we rotate is a steel rotor with no brushes which flips the spin of electrons in the core of the ac coils every 60 degrees of rotor rotation. Just like a nail the teeth of this rotor are always attracted to a stator pole regardless of its magnetic polarity. This modified alternator is similar to a transformer with a dc primary.

In today's alternators the rotor teeth are repelled as they approach a stator pole due to Lenz's law and electromagnetic induction. In either magnetic or electromagnetic induction the rotor teeth must be pulled from the stator poles by input torque. Think flipping spin not reversing flux.

Can a device be made that is safer and simpler than a breeder reactor which makes a magnitude more fuel (energy) than its field coils and control motor uses? It might if we pay more heed as to how we flip electron spin in magnetic material and use magnetic induction.

A ferromagnetic atom weighs over 100,000 times more than its 4 unpaired electrons. Even so over a ton of these electrons are flip flopped per decade in the armature of a 10 kw permanent magnet (pm) alternator without measurably weakening the pms. From 140,000 hp/hrs of input torque 87,600 kw/hrs of electricity is produced. All this hp goes to turn pms which then flip flop electron spins. Details see page 77, June 82 Physics Today or send GASE to J.W. Ecklin, 6143K Edsall Rd., Alexandria, VA 22304 USA



HAT