

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.

The following new products are some of those that will be exhibited from 25 to 27 March at the New York Meeting of The American Physical Society.

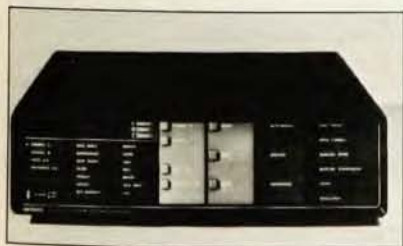
Ion gun

The beam diameter of 3M's Mini Beam II ion gun is less than 35 microns, with a pressure differential from ion source to analysis chamber of 10 000:1, when used with an optional 110 liter/sec turbomolecular pump. Since the source pressures are typically 10^{-4} to 10^{-5} Torr, the analysis chamber pressures can reach absolute pressures of 10^{-9} during sputtering. The device has three (switch-selectable) pre-aligned beam diameters: 35, 450 and 1000 microns. 35 microns is claimed to be considerably smaller than beam diameters available in competing ion guns. The beam is moved across the plane by a double-deflection beam scanning system, which facilitates wide-area imaging over thousands of beam diameters. *Analytical Systems/3M, 53-3 3M Center, St. Paul, Minnesota 55101*

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Electrometer

Keithley's model-619 dual-channel electrometer/multimeter is claimed to offer electrometer sensitivity together with the convenience of a digital multimeter. The



fully programmable device measures currents from 10^{-13} to 2 amps with a sensitivity of 10^{-14} amps. As a voltmeter it provides 10^{13} -ohm input impedance to measure potentials from 10 to 200 volts, with a sensitivity of one microvolt. Each

of the two electrometer channels is isolated and independently programmable through the IEEE 488 bus. Function, range and all front-panel controls (except ratio and difference) are programmable. Depending on user's requirements, the 619 offers up to 5 1/2-digit resolution. The device also measures resistance, from 0.1 to 2×10^{12} ohms. The price is \$2995. *Keithley Instruments, 28775 Aurora Road, Cleveland, Ohio 44139*

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Electro-optic devices

Lasermetrics will be exhibiting four new electro-optics devices at the March APS Meeting. The Series-3126 (models A and B) electro-optic phase-frequency modulators are described as high-sensitivity, wide-bandwidth modulators, utilizing single and dual LiTaO₃ crystals in a travelling-wave configuration. Both models have half-millimeter apertures and offer rather large Doppler shifts per unit drive voltage—10.2 MHz microns/volt. The useful spectral range goes from 0.5 to 4 microns. For the model A the useful drive frequency (3dB) range is 960 MHz, with a nominal phase shift of 2.6×10^{-2} rad-microns/volt, at a price of \$2450. The model B (\$2950) has half the drive-frequency range and twice the phase shift.

The model 8006 high-voltage generator is intended for use with Pockels-cell-type electro-optic light modulators. Q-switched high-power optical pulses can be generated at repetition rates up to 1000 pps when the 8006 drives a Q-switching light modulator in the optical cavity of a pulsed laser. One can get peak power densities of 750 MW/cm² with a typical 20–25 ns-wide Q-switched pulse. The generator can switch from +7 kV through ground to a preset negative level, adjustable to –500 V. This capability is used to



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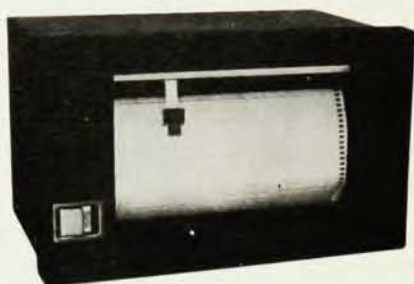
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new products

ensure that the voltage transition passes through zero, thus removing residual effects in the Pockels-cell crystals and forcing the cell to become more transmissive.

The model 5025 mode-locked laser-pulse extraction system is designed to gate light pulses selectively for mode-locked lasers operating in the range 0.34 to 1.315 microns. It is suitable for evaluation of pulse-dispersion and attenuation measurements of fiber-optics cables. Pulse extraction is accomplished with an external trigger, synchronized to the mode-locked train by a photodetector and high-speed processing circuit. The system accepts mode-locked rates up to 200 MHz. The self-contained 5025 system includes a travelling-wave light modulator, polarizer, high-speed photodiode and processing electronics. *Lasermetrics, 111 Galway Place, Teaneck, New Jersey 07666*

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Spectroscopy amplifier

Canberra's model 2020 is described as a high-performance spectroscopy amplifier. It is claimed that the 2020 conveniently provides, in a two-NIM-width module, electronic features that one generally finds in four-width units. The amplifier offers 12 shaping time constants, a pile-up rejector/live time corrector, and an asymmetrical or symmetrical base-line restorer, for optimal performance with different semiconductor detectors. High throughput at high counting rates is made possible by the 2020's automatic baseline restoration of threshold and rate with a tucked-in tail pulse. Canberra's near-Gaussian filter shaping has been refined in the model 2020 to improve pulse symmetry, to minimize sensitivity to detector rise time, and to maximize the signal-to-noise ratio. *Canberra Industries, 45 Gracey Avenue, Meriden, Conn 06450*

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Time analyzers

Canberra is also exhibiting two new time-to-amplitude converters at the March APS Meeting, models 2043 and 2044. Both time analyzers generate a rectangular output pulse whose peak amplitude is proportional to the time interval between start and stop input signals. One can use this time-to-amplitude conversion for time-of-flight measurements, nuclear lifetime measurements, pulse-pair timing in position-sensitive detector systems, and pulse-shape analysis in particle studies.

Both models provide 15 timing ranges,

from 20 nanosecs to 1 millisecc, with resolution better than 0.01% + 5 picosecs in any range. The coincidence/anticoincidence gating feature permits early gating of a stop/start pulse pair, to minimize conversion time on unwanted pulses. The two-NIM-width model 2043 also has a built-in single-channel analyzer and linear gate, producing a logic output whenever the converter's peak output falls within a specified timing window. This logic signal may be used to gate the converter output. *Canberra Industries, 45 Gracey Avenue, Meriden, Conn 06450*

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Vacuum gauge

MKS's type-227 vacuum process gauge joins their 220 series of MKS Baratron capacitance manometers. The 227 is intended for the low pressures encountered in such semiconductor vacuum processes as sputtering, plasma etching and deposition, chemical-vapor deposition, diffusion and metallization. The device is based on the single-sided manometer principle. It provides true total-pressure measurements, independent of the dielectric or gas composition. The only gauge surface exposed to the process is made of Inconel, so it can be used with wet



or corrosive gases. MKS claims exceptional stability in the lower pressure ranges, because the sensor employs proportional temperature control. The accuracy of the 227 is stated to be 0.15% of reading, with a resolution of 0.01% of full scale. The scales provided are 1, 10, 100 and 1000 Torr, full scale. A set-point switch is provided for process control or alarm. Output is 0 to 10 volts dc, with an input power of 15 volts dc at 300 ma. *MKS Instruments, 222 Third Avenue, Burlington, Mass. 01803*

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Diagnostic vacuum gauge

The Kearns Group's Anavac-2 is a diagnostic vacuum gauge that can detect leaks and analyze residual gases by measuring partial pressures of component gases as well as total pressure. The detector head

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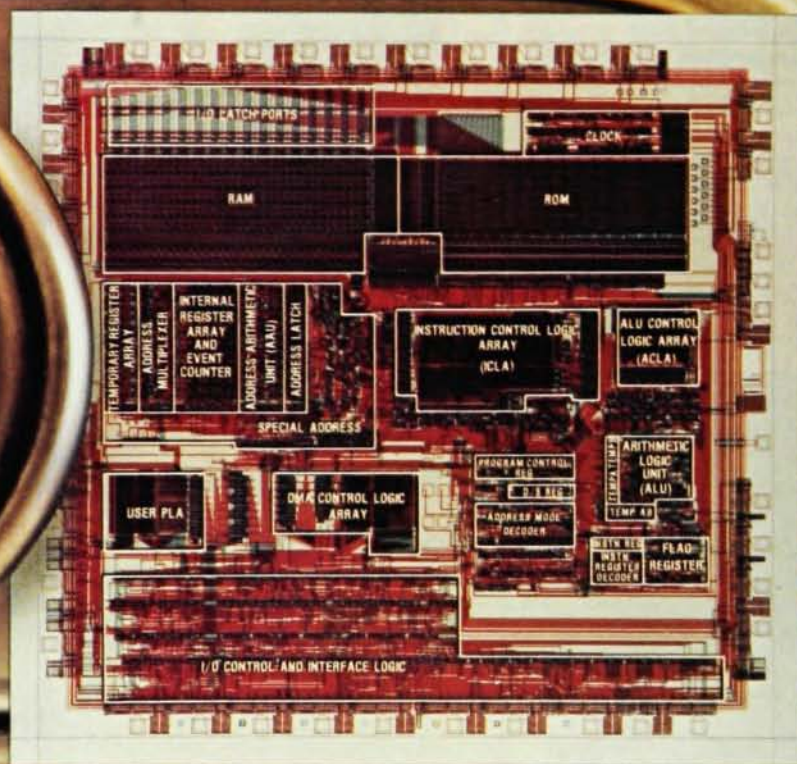
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ITHACO

The one-chip computer: offspring of the transistor



The MAC-4 one-chip computer, developed for a variety of telecommunications applications, is compared to a standard-sized paper clip. The chip's numerous functional areas are labeled.

One of the transistor's latest descendants is the Bell System's 30,000-element MAC-4 "computer-on-a-chip." It's another in a long line of microelectronic developments that have come from Bell Laboratories.

The MAC-4 is so efficient that a program written on it takes 25 percent less storage space than that required by most other microcomputers. Its assembler language, C, also developed at Bell Labs, has features that make MAC-4 easier to program, debug and maintain. And the MAC-4 can handle anything from nibbles to bytes to words with its 4-, 8-, 12-, and 16-bit operations capacity.

Like other one-chip computers, the MAC-4 has sufficient memory to support its varied tasks—3000 nibbles of read-only memory and 200 nibbles of random access memory coupled to 34 input/output ports.

Fabricated with the latest CMOS technology, the MAC-4 needs little power. Thus it is well matched to a variety of telecommunications applications.

It started with the transistor

MAC-4 is just one current example of the many microelectronic devices to come from Bell Labs since we started the

solid-state revolution with the invention of the transistor in 1947.

Over the past three decades, our advances in materials, processing, and devices have been vital to solid-state technology. These include:

- The Junction Transistor
- Crystal Pulling
- Zone Refining
- Field-Effect Transistor
- Diffusion
- Solar Cell
- Oxide Masking
- Thermocompression Bonding
- Photolithography
- Epitaxial Film Process
- Magnetic Bubble Memory
- Charge-Coupled Device
- Semiconductor Heterostructure
- Laser Used in Lightwave Communications
- Electron-Beam Exposure System

Today and tomorrow

Today, we continue to make important contributions to solid-state technology. For example, we've developed a rugged 65,536-bit RAM that can tolerate processing faults. Corrections can be made on the chip itself, so we can get more usable chips out of each manufacturing batch—and thus lower unit costs.

In materials processing, we've

developed a technique for precisely controlling the growth of successive atomic layers of single crystal materials. This "molecular beam epitaxy" process is finding increasing use within Bell Labs and elsewhere in the electronics industry. We've used it to fabricate a device that permits us to double the speed of electrons by channeling them into crystal layers where they meet less resistance.

Other advances, in X-ray lithography and new resist materials, for example, promise to help place more elements on microelectronic devices and thus enhance their ability to perform important tasks.

As the solid-state revolution continues, these and other developments from Bell Labs will play an important part in it. What's important to us is the promise these advances offer for new telecommunications products and services. Like the transistor, MAC-4 and its solid-state relatives will find more and more applications in the nationwide telecommunications network.

For information about employment, write: Bell Laboratories, Room 3C-303, 600 Mountain Avenue, Murray Hill, N.J. 07974. Please include a résumé.

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new products

is a quadrupole mass analyzer, so that one can rapidly measure the concentration of any selected mass number, from 2 (hydrogen) to 60. The measured output can be displayed on an integral meter or recorded on a separate chart recorder as concentration against time. For a complete analysis of residual gases in a vacuum system, the Anavac-2 can scan the entire mass range electronically. The instrument can measure total pressures down to 5×10^{-12} millibar. Its sensitivity is credited to a new multipass electron-bombardment ionizer. Its Faraday-plate collector is claimed to be immune to vacuum contamination and high-pressure operation. *The Kearns Group, 58 Buckingham Drive, Stamford, Conn. 06902*

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Multichannel analyzer

Nuclear Data describe their model ND66 as a "firmware-controlled, microprocessor-based multichannel analyzer system that can function both as a stand-alone analyzer and as a remote computer ter-



terminal." It can support simultaneous pulse-height analysis, multichannel scaling or list-mode acquisition from four independent interfaces. The basic 24-bit storage memory is 4K, expandable to 32K. The ND66 terminal offers full ASCII keyboard and 9-inch diagonal screen with raster-scan TV display, in a four-NIM-width enclosure. As a remote terminal, it displays twenty 80-character lines, with transmission rates from 110 to 38.4K baud. As an analyzer, the ND66 provides linear or logarithmic spectral data display, area and background calculation, and automatic energy calibration. *Nuclear Data, Golf and Meacham Roads, Schaumburg, Illinois 60196*

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Gated rf amplifier

Matec's model 515A is a high-power, gated rf amplifier. It is intended for use with a mainframe gated modulator and a

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separate continuous-wave source in nuclear magnetic resonance studies, ultrasonics and other research applications. The amplifier produces sequences of co-



herent, high-power rf pulses when used, for example, with Matec's model 5100 gating modulator and a cw source. It operates over the frequency range 0.5 to 25 megahertz, with rms output power typically exceeding 1.5 kW.

The 515A accepts cw input levels from below 10 to above 100 millivolts. Pulse width and separation can be varied continuously or in steps with respect to the source. The amplifier will also accept externally generated rf pulses, for example, a multiple rf pulse program for nmr applications, or a single pulse from a low-level pulsed oscillator for ultrasonics. The model 515A costs \$3595. *Matec, 60 Montebello Road, Warwick, Rhode Island 02886*

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Photoelectron spectroscopy

Vactronic is exhibiting a new line of bakable, high-vacuum ultraviolet lamps, monochrometers and accessories intended for angle-resolved photoelectron spectroscopy. Model UV-75B is an ultraviolet discharge lamp. It is claimed that by employing light-channeling techniques this lamp puts out an order of magnitude more total light than its competitors. A bellows-sealed tripod adjuster permits axial alignment with respect to the sample. Optional discharge capillaries and a polarized version of the lamp are available.

The model UVM-23 ultraviolet monochromator consists of a vacuum-tight housing with a precision, bellows-sealed mechanism for positioning the light-channeling optics. The optical transmission exceeds 15%, and the resolution of 20 Å allows easy separation of argon, neon and helium lines within a spectral range of 10 to 15 eV. *Vactronic Laboratory Equipment, 65 Brightside Avenue, East Northport, New York 11731* □

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