

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.

FOCUS ON CRYOGENICS

Cryogenic Systems for Increasing Electronics Speed

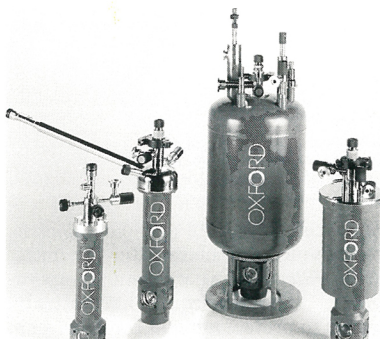
Superconductor Technologies has developed a series of free-piston, Stirling-cycle cryogenic cooling systems capable of absorbing 35 W at 220 K or 3 W at 77 K while consuming less than 200 W of input power. Each system includes the cooler, control electronics and custom packaging; it is self-contained and requires no external liquid or gas. One important application is cooling electronic devices to enhance their performance: Cooling a complementary metal oxide semiconductor microprocessor to 100 K can increase its speed by a factor of two. Other applications include scanning electron microscopy and energy-dispersive x-ray scattering. *Superconductor Technologies, 460 Ward Drive, Suite F, Santa Barbara, CA 93111-2310*

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Compact Optical Cryostats for Spectroscopy

Oxford Instruments has added the Optistat CFV and the Optistat Bath to its Optistat line of cryostats for spectroscopy. Both cryostats provide f/1 optical access and a 15-mm-diameter clear beam throughput, which allows a sample to be illuminated over a large area. Applications include condensed matter physics, chemical physics and materials science.

The Optistat CFV is a compact, continuous-flow cryostat that draws its cryogen from an external supply and maintains a vacuum around the sample. Windows are available for wavelength ranges from the near ultraviolet to the far infrared. The cryostat can maintain a base temperature from 3.8



to 500 K with a stability of 0.1 K. Good thermal contact between the sample and the heat exchanger ensures that the sample is maintained at the set temperature. For electrical measurements, one can terminate wires at pins located above the sample holder.

The Optistat Bath is a helium bath cryostat that is suited for continuous low-temperature operation because of its efficient cryogen usage. The cryostat maintains temperatures from 1.6 to 320 K with a stability of 0.1 K. The sample rod allows the user to adjust the position and orientation of the sample with accuracies of 0.5 mm and 1°, respectively. For electrical measurements, up to four wires can be terminated at connectors above the sample holder. *Oxford Instruments, Old Station Way, Eynsham, Oxford OX8 1TL, UK*

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Vacuum-Insulated, Flexible Cryogenic Transfer Hoses

The stainless steel, vacuum-insulated transfer hoses from VBS Industries are intended for the frost-free transfer of liquid nitrogen and other cryogens. The flexible hoses are small in diame-



Ability Engineering Technology, Inc.

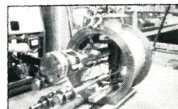
Engineering

- ▼ Chambers
- ▼ Cryogenic Shields
- ▼ Cryostat Design
- ▼ Research Equipment



Design

- ▼ Space Simulation
- ▼ High Vacuum
- ▼ Custom Welding
- ▼ Gas Process Equipment



Fabrication



Our Goal: Service the Scientific Community with design of cryogenic and vacuum equipment, specifically engineered for your needs. We are an ASME Code shop, experienced in the fabrication of cryogenic and vacuum equipment.

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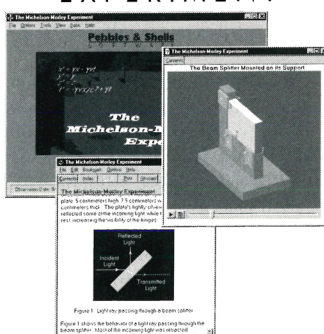
Contact: Mike Morgan
(708) 331-0025

Fax (708) 331-5090

E-Mail: ability@worldnet.att.net

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The Michelson-Morley EXPERIMENT



Requires: Windows 95 or NT 3.5, 486/33, VGA-256 clr., 13 MB free disk space.

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ter, and they are said to remain warm to the touch even when transferring very cold liquids. The vacuum insulation on the hoses results in reduced consumption of cryogen. The hoses can be used as permanent connections or for manually filling small flasks or large dewars. The hoses are available in a range of sizes and with a variety of end connections. *VBS Industries, 808 East McBlinney, Campbell, CA 95008*

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Temperature Controller for Resistive Sensors

The model 340 from Lake Shore Cryotronics is a 32-bit microprocessor-controlled cryogenic temperature controller with two independent inputs for resistive temperature sensors, including silicon and GaAlAs diodes, and Cernox and platinum, rhodium-iron, carbon-glass and germanium resistors. The controller's 24-bit analog-to-digital converter and low-noise circuit design combine to give temperature readings with resolutions as low as 0.1 mK at 4.2 K. A heater supplies up to 100 W, and a second control loop supplies up to 1 W.

The device's liquid crystal display can simultaneously show up to eight different temperature readings, including statistical functions such as the maximum, minimum and mean temperatures. Alternatively, results can be displayed as curves; an internal memory can store up to forty 200-point curves.

The device can be controlled and programmed by means of buttons on its front panel, which includes single-button initiation of functions such as autotuning and calibration algorithms. The device also includes an IEEE-488.2 interface and RS-232C and RS-485 serial interfaces, digital input and output, alarm actuators and an audible alarm. A type II personal computer card slot can be used for transferring data and instrument configurations. *Lake Shore Cryotronics, 64 East Walnut Street, Westerville, OH 43081-2399*

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Refrigerator Cools Below 4.2 K without Liquid Helium

The Coolpower 4.2GM from Leybold Cryogenics is a two-stage Gifford-McMahon cryogenic cooler that uses a neodymium regenerator to achieve

temperatures below 4.2 K. The refrigerator includes an adjustable-speed DC microstepper motor and a smoothly operating mechanical drive mechanism, which are designed to minimize noise and vibrations. Cooling is initiated by pressing a single button, and temperatures of less than 4.2 K can be achieved in less than 90 minutes. The first stage of the cooling process has a cooling power of 50 W at 50 K and the second stage's cooling power is 0.5 W at 4.2 K. The refrigerator is recommended for conductively cooling the large superconducting magnets used in magnetic resonance imaging and for cooling electronics and lab samples. *Leybold Cryogenics, 8 Sagamore Park Road, Hudson, NH 03051*

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Accelerometer Operates from 125 to 400 K

Endevco's 2256AM2 is a piezoelectric, voltage-mode accelerometer for measuring vibrations at cryogenic temperatures. The device is hermetically sealed to protect against condensation. The piezoelectric element operates in annular shear mode and is said to provide stable output over time. The accelerometer weighs 5 grams and has a sensitivity of 0.51 mV per m/s². The device is said to be suited for military, aerospace and environmental applications. It comes with all cables needed for installation. *Endevco, 30700 Rancho Viejo Road, San Juan Capistrano, California 92675-1789*

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Cryogenic System and Multitemperature Microscope Stage

Spectrolab Research Laboratories has made available a cryogenic system for doing research at temperatures from 70 to 150 K and a low-noise microscope stage for doing research at temperatures from 70 to 573 K. The cryogenic system uses no cryogenics and produces 10–40 W of cooling power using a cooling mechanism similar to that used by a household refrigerator. Applications include condensed matter physics and cooling of electronics.

The microscope stage is made of ceramic and achieves operating temperatures as low as 70 K using a low-volume nitrogen gas supply rather than a cryogen source. Temperatures are maintained within 0.05 K and can

be cycled rapidly. Because the stage operates with little noise or vibration, it is well suited to microscopy. It can also be used in ultrahigh-vacuum applications, including scanning electron and transmission electron microscopy. The device measures 7 cm × 1 cm × 4 cm. *Spectrolab Research Laboratories, P.O. Box 25, Newbury, Berkshire RG20 8BQ, UK*

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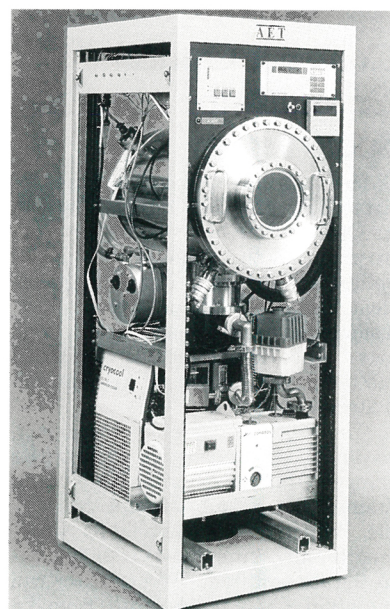
Cryogen Sensor for Electron Microscopy

Teragon's LS2 sensor is intended to detect liquid nitrogen in cold traps, dewars and other equipment. Powered by a 5 V DC supply, the probe provides a digital output that indicates whether or not the end of the probe is submerged in liquid nitrogen. The probe can be used in conjunction with liquid-nitrogen level controllers, level alarms and cryogenic dip sticks. *Teragon Research, 2518 26th Avenue, San Francisco, CA 94116*

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Programmable, High-Vacuum Cryogenic Chamber

The CEC-130 from Applied Engineering Technologies is a programmable, high-vacuum cryogenic environmental chamber that operates in the temperature range from 135 to 475 K using a mechanical refrigeration cycle, rather



than cryogenic coolants. The system's automatic turbo pumping station maintains a high-vacuum environment in the test chamber. Temperature profiles can be programmed and then executed up to 99 times in succession. The entire system mounts in a standard 19-inch control rack. Applications include condensed matter physics, materials science and chemical physics. *Applied Engineering Technologies, 155B New Boston Street, Woburn, MA 01801*
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Bimetallic Transition Joints Stable against Thermal Stress

Nuclear Metals has made available a line of bimetallic transition joints—joints formed by extruding and then joining two dissimilar metals, such as stainless steel, aluminum and titanium so that the bond between them is stronger than the parent materials. The joints are said to be unaffected by thermal or pressure cycling and have high tensile strengths (44 800 pounds per square inch in the case of one aluminum-alloy joint). They are available with outer diameters from 0.062 to 4 inches. *Nuclear Metals, 2229 Main Street, Concord, MA 01744*
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Liquid Nitrogen Monitor and Controller

Com:One's NCS-82 liquid nitrogen monitor and controller uses an Intel 80C188EB microprocessor to read the output from a capacitive liquid-nitrogen level probe. The device can be operated in two modes. In the first, the liquid crystal display continuously shows the level and consumption rate of cryogen. In the other mode, the display continually scrolls through up to 16 channels, displaying the current level and consumption rate for each. *Com:One, 1526 Elka Avenue, San Jose, CA 95129*
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On the Web

Chemical products Web site—Alfa Aesar has created a site on the World Wide Web with information about the company's line of over 20 000 chemicals and materials, as well as links to other related Web sites. The site is found at <http://www.alfa.com>. *Alfa Aesar, 30 Bond Street, Ward Hill, MA 01835-8099* ■

Accessories for rf testing

Ultra-broadband E and H field monitor • Four-channel capability. Five E-field probes available. Two standard isotropic probes cover 10 kHz to 1000 MHz or 80 MHz to 40 GHz, 1-300 V/m. Special-application probes have sensitivity down to 0.15 V/m or up to 3000 V/m. Two H-field probes provide sensitivity down to 15 mA/m from 5 to 300 MHz and down to 0.15 A/m from 300 kHz to 30 MHz, respectively.

PCB emissions scanner • Identifies frequency and location of emissions (10 MHz to 1.5 GHz) on powered-up and active printed circuit boards. Expedites correction of high-emission problems using before/after comparisons. Excellent precompliance test device for computers, wireless devices, and other products whose success depends on rapid product-to-market cycles. Helps establish minimum solutions to achieve compliance, reducing product price.

Antennas • 10 kHz to 18 GHz of coverage, includes high-gain horns, log-periodic, cavity exciting, E-field generators, and broadband transmission line.

Dual directional couplers • 13 models up to 15 kW CW, 10 kHz to 18 GHz, matched to Amplifier Research amplifiers and antennas for measuring forward and reflected power.

Broadband fiberoptic data links • Modular plug-in analog systems for acquiring and measuring interference data, simulating EUT, and displaying results, dc to 1 GHz. Used extensively in automotive susceptibility testing.

Fiberoptic CCTV systems • Watch performance of EUT under hostile EMI and/or EMP shielded-room conditions. Interference-free viewing, dc to 40 GHz, up to 200 V/m. Remote-control shielded camera. Color or b&w.

TEM cells • Half again the bandwidth of comparable-size chambers: to 750 MHz for 15-cm EUT, to 375 MHz for 30-cm EUT.

Broadband low-noise preamplifier • Increases the dynamic range and sensitivity of systems with high noise figures. 10 kHz to 1 GHz, 30 dB gain (minimum), noise figure of 3.5 dB typical.

Broadband leveling and control preamplifier • For constant-field rf susceptibility testing requiring automatic power-output control; for NMR spectroscopy requiring pulsing, blanking, rf delay and pedestal output; and for other complex rf testing applications. Provides 40 db of automatic gain control from 10 kHz to 1 GHz. Accepts monitor input voltage of any polarity (positive, negative, differential).

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