AUTO PHASE LOCK-IN AMPLIFIER

The Model LI-574A is an easy-to-operate low cost instrument featuring sensitivity of 10 nanovolts full scale, differential or single ended. The unit has dynamic range greater than 80 dB over a wide frequency range of 1 Hz to 100 kHz. Also included are dual phase sensitive detectors for measuring amplitude without phase compensation. Other important features are continuous frequency tracking plus simultaneous vector and analog outputs of amplitude and phase for automatic Bode and Nyquist plotting.

SYNCHRO-TRACK LOCK-IN AMPLIFIER

This precise instrument, the Model LI-575, features the heterodyne technique to eliminate harmonics, and high impedance inputs to permit low noise measurements. It features 100 dB dynamic range and 100 nanovolts full scale sensitivity over the 0.5 Hz to 200 kHz frequency range...without changing boards. The unit also provides an auto correlation mode that locks on to the input signal for synchronization, eliminating the need for a reference signal.

DIGITAL BOXCAR INTEGRATOR

The Model BX-531 is a microprocessor controlled GPIB compatible instrument offering simple, dual channel operation and high resolution over the 75 ps to 5 ms range triggered at ultra low rates. It features true digital averaging with single and multipoint signal processing as-well-as baseline sampling for minimum drift. Digital techniques eliminate duty factor limitations, while learning time problems are minimized by multiple samples/trigger.

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outstanding leadership or management of industrial research.

The department of physics at Syracuse University, Syracuse, New York, has added **Demetrios Christodoulou**, **Rafael Sorkin**, **Paul Souder** and **Peter A. Dowben** to its faculty.

Martha Krebs in the first Associate Director for Planning and Development at the Lawrence Berkeley Lab. She comes to the Lab from the staff of the House Subcommittee on Energy Development and Applications.

The American Astronautical Society has presented the John F. Kennedy Astronautics Award to **Carl Sagan**, director of the laboratory for planetary studies at Cornell. The award recognizes Sagan's contributions to public interest in the nation's space programs through his writings and the tv series "Cosmos."

Richard Soref has joined the Air Force Rome Development Center to work on electro-optical devices. He was formerly on the staff of the Sperry Research Center.

John H. Blanks has joined the Battelle Columbus Laboratories, where he will direct research on chemical-vapor deposition for industrial applications. He comes to Battelle from Alcoa.

obituaries

Joseph E. Mayer

MAYER

Joseph E. Mayer died on 15 October 1983. He was 79 years old. An internationally recognized scientist, he was one of the founders of statistical mechanics in the US. His work underlies much of our knowledge of the behavior of nonideal gases and liquids, critical phenomena, phase transitions, ionic solutions and transport processes.

He was born 4 February 1904, and attended schools in Montreal and Westmount, Canada, and Hollywood, California. He received his BS degree from the California Institute of Technology in 1924, and was awarded his PhD from the University of California, Berkeley, in 1927 under Gilbert N. Lewis. As a postdoctoral fellow (1927–28) with Lewis he wrote several papers showing how thermodynamics can be derived from Fermi–Dirac, Bose–Einstein, and Boltzmann statistics. He spent the 1929–30 academic year as an International Board Fellow (Rockefeller Foundation) in Göttingen, Germany, with James Franck. Göttingen was at that time an internationally recognized center of the new subject of quantum mechanics, and Mayer's life was affected profoundly by his experiences there. First his scientific interests broadened, which resulted in his writing a paper on the lattice energy of ionic crystals with Max Born. Second, and most important, he met Maria Goeppert (1963 Nobel laureate in physics), one of Born's students. They married in 1930, and their life together proved to be abundant in friendship and scientific achievement until her death in 1972. Their book *Statistical Mechanics*, first published in 1940, continues to be a popular introduction to the subject.

Mayer's first faculty appointment was at Johns Hopkins University. There he did his celebrated work on the virial expansion, which Born described as "a most important contribution to the development of van der Waals theory."

At the urging of Harold Urey, Mayer accepted an appointment at Columbia University in 1939. At Columbia, he produced several well-known results on the theory of distribution functions including the Mayer–Montroll integral equations, and an article, "The Statistical Mechanics of Multicomponent Systems," which he wrote with William McMillan. In the latter paper, and in one written at Chicago, he showed how to express the grand canonical partition function and potentials of mean force at one activity in terms of those at another activity. Through the use of cumulant expansions, he revealed the reciprocal nature between distribution functions at positive and zero activities. This work provided the basis for extensive research on fluid mixtures, ionic solution theory, and critical phenomena, particularly in the development of

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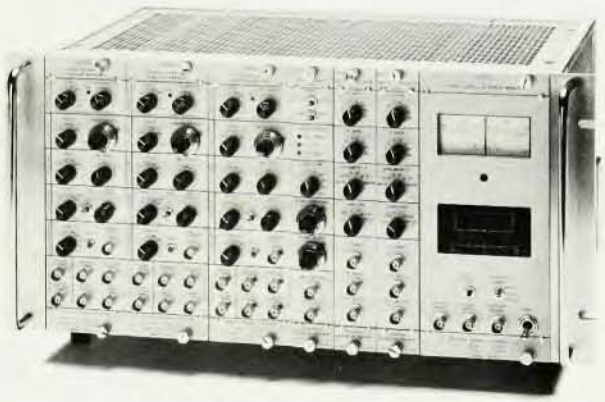
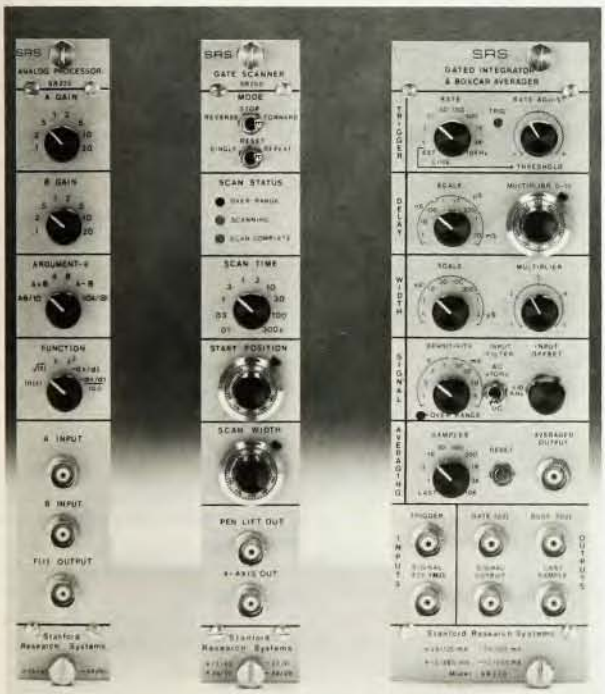


SR280 Mainframe shown with three boxcar modules, a gate scanner module and two analog processors.



SR225 SR200 SR250

SR280 Mainframe $1495

The Mainframe provides +/-12 and +/-24 VDC to its nine NIM slots. The display module has three meters: a precision analog meter, a 3½ digit voltmeter, and a 20 segment bargraph display.

SR250 Gated Integrator and Boxcar Averager $2850

Used to sample fast analog signals, this instrument overcomes many of the difficulties associated with older instruments, such as excessive drift, difficult operation, and high cost. Features include:

- Gate widths from 2 nS to 15 μS.
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- Independent gate generator for each module.
- Delay multiplier set by 10 turn dial or voltage.
- Internal rate generator, line, or external trigger.
- Fast trigger discriminator will trigger on a 5 nS pulse and can open the gate in less than 25 nS.
- Last Sample Output gives shot-by-shot data.
- Averaged Output averages over 1 to 10,000 samples.
- Averaged Output has baseline subtraction capability.
- Droop errors $<1\%$ for repetition rates >1 Hz.
- Sensitivity up to 1 volt output for 5mV input.
- Input offset drift less than 500 microvolts/hour.
- All inputs are protected to 100 VDC.
- Simple interface to laboratory computers.

SR200 Gate Scanner Module $850

Used to scan the SR250 delay multiplier in order to record entire waveforms, this module also provides pen lift and X-axis control voltages to interface to chart recorders and oscilloscopes.

SR225 Analog Processor $1250

This module is used to ratio boxcar outputs, find peaks in experimental scans, linearize exponential decay curves, compress analog signals in order to increase dynamic range, or simply to amplify a signal.

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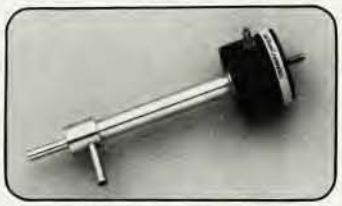

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rigorous methods of statistical mechanics, which began in the 1960s.

During World War II, Mayer served as a consultant to the Ballistics Research Laboratory, Aberdeen Proving Ground. He also began his eleven years as editor of the *Journal of Chemical Physics*. Prompted by Urey, Enrico Fermi, and Edward Teller, he accepted an appointment at the University of Chicago in 1946. He extended his work on liquids to ionic solutions, and in a landmark paper showed for the first time the real difficulties in proceeding beyond Debye–Hückel theory. Toward the end of his stay at Chicago, Mayer's interests grew in the direction of non-equilibrium phenomena and the approach of systems towards thermodynamic equilibrium. With Fermi's death and the subsequent dispersal of their friends from Chicago, the Mayers decided in 1960 to join Harold Urey and Carl Eckart at the University of California, San Diego, in La Jolla. Here, Mayer continued to work on transport theory and critical phenomena; he served as chairman of the chemistry department from 1963 to 1966, and did much to shape the character of the department in its formative years.

In 1972 Mayer retired from the University of California. His unbridled curiosity and clarity of thought continued to influence the scientific community about him. He remarried, and with his new wife, Peg Griffin, continued the Mayer traditions of warm hospitality in La Jolla. He was active on committees of the National Research Council and served as president of The American Physical Society in 1973. Among his many honors was membership in the National Academy of Sciences.

Several generations of students and colleagues will remember Joe Mayer as a compassionate scholar and friend who consistently took time to devote his full attention to their research, yet always challenged them to become better scientists. "Look beyond the mathematical formalism to the meaning of what you do," he would insist.

ELLIOTT W. MONTROLL
University of Maryland
HAROLD J. RAVECHÉ
National Bureau of Standards
JERALD A. DEVORE
California State University

Elliott Montroll died after the preparation of this obituary. An obituary of him will be published in a forthcoming issue.

Arthur C. Keller

Arthur C. Keller, retired director of the switching apparatus laboratory at Bell Laboratories, died on 25 August 1983. He was 82.

Born and raised in New York City, he obtained BS and EE degrees at Cooper Union. With a year's leave of absence from work, he acquired an MS at Yale and then went on to graduate studies in physics at Columbia.

In 1917, when Keller commenced his studies at Cooper Union, he embarked on a Bell System career of 48 years. He started at the Western Electric Engineering Department, predecessor of Bell Telephone Laboratories. At first he worked on the design and development of telephone instruments, then on sound systems. He achieved a first with his application in 1923 for his initial patent (in a total of 34) on a vented enclosure for loudspeakers to enhance low-frequency response. Through the next two decades he became deeply involved in the development of systems, apparatus and processes for disc recording and reproducing, encompassing electrical transcriptions for broadcasting and the development of the single groove stereo disc record (including the basic patent). In 1931–32, Keller and his associate, I. S. Rafuse, made the first known stereophonic and high-fidelity recordings of orchestal music (the Philadelphia Orchestra, conducted by Leopold Stokowski). The recordings were part of a Bell project aimed at improving the quality of recorded and reproduced sound to be transmitted over the telephone network.

As World War II approached, Keller was put in charge of sonar development for pro- and anti-submarine warfare. His patents on directional crystal arrays helped develop the versatile QJA sonar, which permitted the sending and receiving of pulses and sounds over various bands.

After the war, Keller turned his attention to switching apparatus. For 17 years, until his retirement in 1966, he administered the development, design and preparation for manufacture of all types of mechanical and electromechanical apparatus for telephone switching systems.

F. K. HARVEY
Bell Laboratories, retired

Erich Stefan Weibel

Erich Weibel, a foremost theoretician and international leader of the plasma-physics community, died at his home, Les Crets, in Grandvaux, Switzerland, on 16 May 1983. Founder and director of the Center for Research in Plasma Physics of the Association Euratom-Switzerland in Lausanne from 1961 through 1981, Weibel also carried out research at the forefront of plasma theory.

Born in Winterthur, Switzerland, in 1925, Weibel obtained a diploma in