

of further aggravating his depression were he to spend time with McCulloch. Accordingly, Margaret told her husband that their daughter Barbara had been taken advantage of years earlier by several of the young men in McCulloch's group.

Jerry Lettwin, one of Conway and Siegelman's informants, suggests that Margaret's accusation was a lie. Nevertheless, Wiener reacted strongly and immediately, cutting all ties with McCulloch and his group. His actions were, as the authors argue, the death knell for cybernetics as a unified field

of study. McCulloch and his team were devastated by Wiener's rejection, and they turned away from further exploration and elaboration of his ideas.

At this point, Margaret drops out of the story. It isn't clear to what extent she was an important later influence on Wiener's career. Such a lack of clarity points to a key weakness in the authors' approach: When the narrative centers on the family context, but that context later becomes unimportant, the biography loses its focus. In this case, the authors move rapidly away from furnishing an understand-

ing of Wiener the man to providing an overview of his activities in India and the Soviet Union in the late 1950s and early 1960s. Although those periods of Wiener's career are interesting, the reader is left unsure how they connect to Wiener as father and husband.

Dark Hero of the Information Age is not the easiest introduction to cybernetics, nor to Wiener. For those, one should read the man's own words or the previously mentioned biographies. The book does shed light on the links between the curious Wiener family and the evolution and fate of cybernetics at MIT in the 1950s. And for that, it is a valuable contribution to the history of the field.

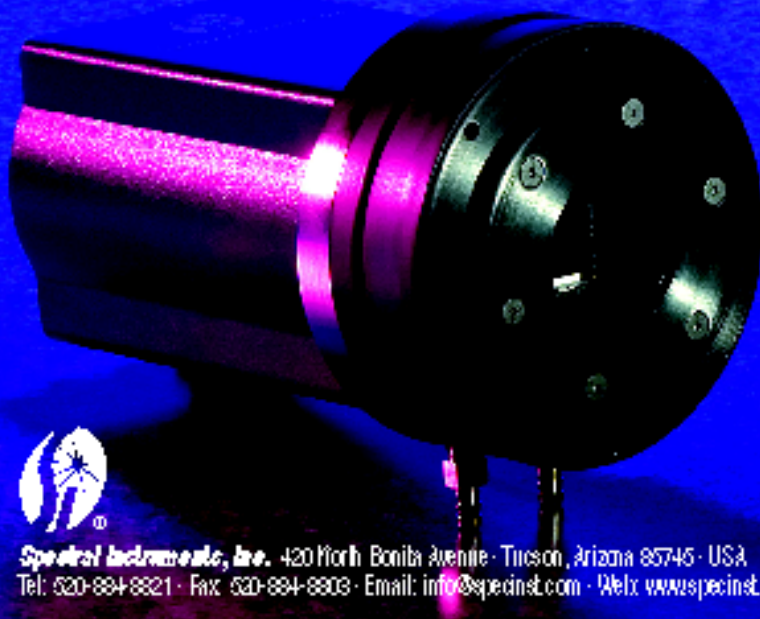
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Measurement Systems and Sensors

Waldemar Nawrocki

Artech House, Norwood, MA, 2005.

\$95.00 (325 pp.).

ISBN 1-58053-945-9

Waldemar Nawrocki's *Measurement Systems and Sensors* has a somewhat misleading title. Perhaps the title should have been *Computer-Based Measurement Systems* or *Measurement Systems and Communication Buses*. The author has devoted only about 10% of his book to sensors while reserving most of the remainder for what he describes as measurement—that is, how information is transmitted to and received by a personal computer via a variety of communications protocols, or I/O (input-output) buses. Nevertheless, his overall presentation of communication protocols as they directly relate to the art of measurement is an approach that is possibly the first of its kind.

Nawrocki, a professor of electronics at the Poznan University of Technology, Poland, describes in the first chapter the traditional method of computer-based measurement: feeding an input from a sensor or experimental sample to a digital system—composed of a signal conditioner, amplifiers, and analog-to-digital (A/D) and digital-to-analog (D/A) converters—and then to an output. The author does not get into history, but perhaps it is germane to remind read-



ers that not so long ago the output was in the form of an analog voltage or current signal directed to a display, such as a moving-coil meter, potentiometric recorder, oscillographic recorder, or oscilloscope. With the addition of the necessary output interfaces, researchers progressed to recording on punch cards, punch-paper tape, and magnetic tape. Then a significant change occurred: The microprocessor chip was introduced as a manager, or controller, of the system—an innovation that also enabled the processing, analyzing, and storing of the acquired data. To exploit the advantages of what has now become a computer-based measurement system, users must choose among the many available I/O bus systems, all of which initially faced the problem of adhering to protocols that equipment manufacturers and their customers had agreed upon.

To provide guidance for users, the author then discusses how information may be transmitted. He delineates two types of transmission systems: serial or bit-by-bit and parallel, in which the information is transmitted in the form of multibit words. Nawrocki first logically and clearly presents a wealth of information on serial systems, beginning with the RS-232C. When installed in a PC, that serial interface can lead to a simple measurement system involving one digital instrument and one computer. However, the system has a serious transmission-rate limitation, the extent of which depends on the length of the transmission line. The now-popular USB (universal serial bus) allows a significantly increased rate and a new method of attaching and accessing peripheral devices. The author then describes the RS-449 and RS-530 serial systems, with their electrical-circuit parameters defined in the RS-223A, RS-422A, and RS-485 standards.

Nawrocki then turns to parallel interfaces, beginning with the most widely used IEEE-488, which is also known under the generic name of GPIB (general purpose interface bus). It offers much higher data rates than does serial data transfer and allows an instrument to operate either in interface systems or autonomously. The VXI system is used for setting up modular systems. Its designers were challenged to find a solution to the system control problem, one that could use software developed for IEEE-488. The reader will also find material on wireless measurement systems; other crate and modular systems, such as CAMAC and PXI; and the IEEE-1284

interface for printer control. Examples of the increasingly important computer network-based measurement systems include the LAN (local area network) types, of which the Ethernet is the most widely used.

The book includes descriptions of such system components as signal conditioners, A/D and D/A converters, computer measurement boards (more commonly referred to as data-acquisition boards), and virtual instruments. While no new ground has been broken on those topics, Nawrocki's approach is constantly useful for understanding the operation of measurement systems.

Although the author's coverage of sensors is sparse, he does describe some interface circuitry necessary to match the sensors to the system input. Readers who need more information on sensors can find books with detailed treatments, including the *AIP Handbook of Modern Sensors: Physics, Designs, and Applications* (AIP, 1993) by Jacob Fraden (see my review in PHYSICS TODAY, June 1994, page 74). The topics in the main part of *Measurement Systems and Sensors* should prove valuable to those trying to properly integrate, for example, a PC with a data-acquisition system. Nawrocki is adept at untangling the nuances of that process.

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New Books

Acoustics

The Science and Applications of Acoustics. 2nd ed. D. R. Raichel. Springer-Verlag, New York, 2006 [2000]. \$89.95 (660 pp.). ISBN 0-387-26062-5

Astronomy and Astrophysics

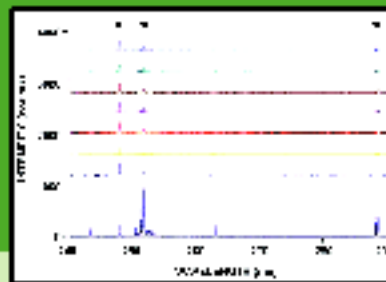
14th European Workshop on White Dwarfs. D. Koester, S. Moehler, eds. *Astronomical Society of the Pacific Conference Series 334*. Proc. wksp., Kiel, Germany, July 2004. Astronomical Society of the Pacific, San Francisco, 2005. \$77.00 (666 pp.). ISBN 1-58381-197-4

1604-2004: Supernovae as Cosmological Lighthouses. M. Turatto, S. Benetti, L. Zampieri, W. Shea, eds. *Astronomical Society of the Pacific Conference Series 342*. Proc. mtg., Padua, Italy, June 2004. Astronomical Society of the Pacific, San Francisco, 2005. \$77.00 (512 pp.). ISBN 1-58381-209-1

Advances in Astronomy: From the Big Bang to the Solar System. J. M. T. Thompson, ed. *Royal Society Series on Advances in Science 1*. Imperial College Press, London, 2005. \$118.00 (417 pp.). ISBN 1-86094-577-5

The Cool Universe: Observing Cosmic Dawn. C. Lidman, D. Alloin, eds.

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LIBS spectra of silicon surface contamination samples, taken in 2004. The LIBS spectra show a clear silicon emission line, which is enhanced in the bottom of the graph.

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