



## IN MEMORIAM

Henry John Orchard  
Professor of Electrical Engineering, Emeritus  
Los Angeles  
1922–2004

H. J. (John) Orchard, professor emeritus at the Henry Samueli School of Engineering and Applied Science and a pioneer of modern filter theory, passed away on June 23, 2004 at the age of 82. A native of England, he was educated at the University of London. Following a stint (1942-1947) as lecturer at the Central Training School of the British Post Office Engineering Department, he took a position in their Research Division. He moved to the United States of America in 1961 and was a senior staff engineer at Lenkurt Electric Co. until joining UCLA in 1970, where he taught until 1991. He continued to be active in research until his death.

Orchard's early work dealt with mathematically difficult but practically important topics in the areas of passive and linear- active circuit design and approximation theory. His publications solved design- oriented problems of significance to filter specialists, such as equalizer and phase- shifter design, predistortion and computationally efficient methods for solving the approximation problem.

In a monumental breakthrough publication (Electronics Letters, 1966), he explained the "secret" behind the low passband sensitivity of doubly- loaded reactance two- ports and showed how to design active two- ports that retain this key attribute. Among Professor Orchard's key contributions was the development of a systematic process for the computer- aided design of filters. During the early years of computer- aided filter design, when the synthesis of a single circuit required several days of multiple- precision computation, his method had an important beneficial effect. He was instrumental in introducing into switched- capacitor filter design the bilinear  $s$ -  $z$  mapping, previously used solely in digital filter design, and in developing a methodology that allowed the use of arbitrary active- RC models for switched- capacitor filter syntheses.

The key attribute of Professor Orchard's contributions was a deep understanding of the underlying physics and theory, combined with a great respect for the practical aspects of circuit analysis and design. He would not publish a theoretically elegant but practically useless result, nor a useful but trivial one. He could instantly extract the essence of a problem and attack it on its most fundamental level.

John's last published paper appeared in the March, 2003 issue of the IEEE Transactions on Circuits and Systems. Another journal publication concerning the rather esoteric mathematical topic of "resultants," was accepted for publication in the journal Linear Algebra and its Applications only a few days after his death. It will appear in early 2005 in a special LLA issue dedicated to the great matrix and determinant theorist, Thomas Muir.

John's talents were recognized by the IEEE Millennium Medal in 2000 as well as the IEEE Circuits and Systems Society's 2003 Technical Achievement Award for "a sustained record of seminal publications in the field of filter design for more than half a century that have contributed theoretical breakthroughs, new design techniques and practical advancements." He was also chosen as the recipient of the UCLA Engineering Alumni Association's "Lifetime Contribution Award" (posthumously awarded to him and accepted by his wife Marietta and son Richard in October, 2004).

Despite his quiet and introverted nature (he never attended meetings and preferred to interact even with friends by way of letters and, later, e-mail rather than in person), John's deep understanding of both theory and practice and his commitment to clarity in thought and expression made him not only a wonderful research collaborator but an outstanding teacher. He taught a sequence of graduate courses at UCLA in a style that achieved a perfection and flawlessness rarely found today, all without ever having gotten a Ph.D. himself!

John would put many hours of preparation into his lectures, and he also went to great lengths to craft fiendishly searching exam problems. He believed that an examination, instead of being a test of routine problem-solving, should be a learning experience, albeit a very different one than the lecture. The student learns under pressure; but the revelations, if they arrive, are more durable. At first sight his problems looked very difficult, seemingly necessitating lengthy numerical calculations that could not possibly be completed in time. Yet with insight and the strategically supplied hint, the problem would dissolve into simple round number solutions readily found by manual calculation, very effectively testing the particular point being examined.

For many years, John garnered the highest numerical ratings in the student evaluations of any faculty member of the UCLA Electrical Engineering Department — perhaps in the entire School or Engineering! His teaching style was close to perfection. Using chalk on blackboard and drawing circuit diagrams with great care, he could convey profoundly deep insights into electrical networks and filters that, in many cases, only he possessed. It's hard to think of an electrical engineering professor today with the talent, dedication and panache to achieve John's level of artistry in the classroom. He also served the Electrical Engineering Department as vice chair of Graduate Affairs for nearly a decade, insuring that its graduate program was the best run of any department in the School of Engineering.

Orchard was known to all of us as a great researcher, a rare and extraordinary teacher, a modest gentleman with a wry sense of humor and a quiet charm. It is indicative of his personality that he would likely be as pleased to be remembered for his precision in language as for his precision in math. In his honor, we request that readers watch their use of the apostrophe and pronounce kilometer correctly — it should rhyme with centimeter, NOT thermometer (his pet peeve).

Asad Abidi  
Yahya Rahmat- Samii  
Gabor C. Temes  
Chand R. Viswanathan  
Alan N. Willson, Jr.