

Leonard S. Cutler



1928-2006

IN MEMORIAM

DR. LEN CUTLER

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Many people in this audience knew Len Cutler. Len passed away in September of this year at the age of 78. His professional career spanned almost 50 years, during which time he led the development of numerous technologies and instruments which affect the way we keep time to this day. His inventions were not limited to time and frequency, however, as he made, for example, contributions to magnetic recording technology in his early career and to precision distance and position measurement technology later in his career.

Len was a key architect and designer of the first solid-state atomic frequency standard, released by Hewlett Packard as the 5060 in 1964. It was only 3 years later that the SI interval of time was redefined as the ground state hyperfine transition in cesium. Over the course of Len's career, three more cesium beam instruments would emerge from HP, culminating in the 5071A in 1991. Most of us realize that such instruments have several critical elements; in the case of the 5071A, these elements are the cesium-beam tube, the electronics, and the operational algorithms. Len was a master of all of these disciplines, as both scientist and engineer.

Len went to work at HP in May 1957 at the age of 29 when he was still in school at Stanford. Len went on to receive his BS, MS, and PhD degrees from Stanford while working at HP.

A review of Len's numerous publications and patents provides insight into his work; I provide a selection of what I might call key words or phrases to include the following:

atomic beams	time comparison using GPS
optical pumping	superconducting resonators
coherent population trapping	clock synchronization
high thermal gain oven	

Len accomplishments were recognized many times during his career:

- elected to IEEE Fellow (1978) for “contributions to the design of atomic frequency standards and to the theory and measurement of frequency stability”
- awarded IEEE Morris Leeds award (1984)
- elected to National Academy of Engineering (1987)
- awarded the IEEE Rabi Award (1989) for “for consistent technical and managerial contributions to the development of atomic cesium, rubidium and mercury ion frequency standards”
- designated an Agilent Distinguished Contributor (1989)
- elected to Fellow of the American Physical Society (1997).
- awarded the PTTI Distinguished Service Award (1999).
- designated an Agilent Distinguished Fellow (2004); the first and only one to receive this honor.

Len made valuable contributions to the time and frequency community: he worked on standards committees and taught tutorials at symposia.

As I have talked to people who worked directly with Len, several perspectives come forth:

Len was uncompromising on the integrity of the science.

When a question was posed to Len, he would respond only after careful reflection. You came to learn that when he spoke, his thoughts had been carefully organized.

There is an amusing story about Len which tells us that he could be a demanding task master. The story is attributed to Robin Giffard who worked with Len at HP. A novice engineer had trouble getting a design element to work exactly as Len wanted it to. So often did Len send the design back for additional work, that Robin moved to console the young engineer, a recent immigrant from Poland. "Don't worry. It's nothing," the weary young engineer replied. "Before this, I worked under Communists."

One of my personal favorite memories of Len comes from an article in the *Wall Street Journal*, March 19, 1997. This article appeared the day after HP announced Len's election as a fellow of the American Physical Society. Len's portrait, in the trademark pen and ink portrait style of the *Wall Street Journal*, appears at the beginning of the article. Len's work, as described in this article, symbolizes, to me, his role as both a scientist and as one who industrialized complex technology.

There were aspects of Len that most of us never knew: he was an accomplished musician, retaining an ability, even late in life, to play Beethoven from memory. He played piano in the 1945 movie *Anchors Aweigh*. He owned a Porsche which he raced in weekend timed road rallies.

Len's passing was perhaps best described by Darlene Soloman, CTO and VP of Agilent Labs:

"We have lost a great man, a brilliant researcher, a wise leader, and a good friend."