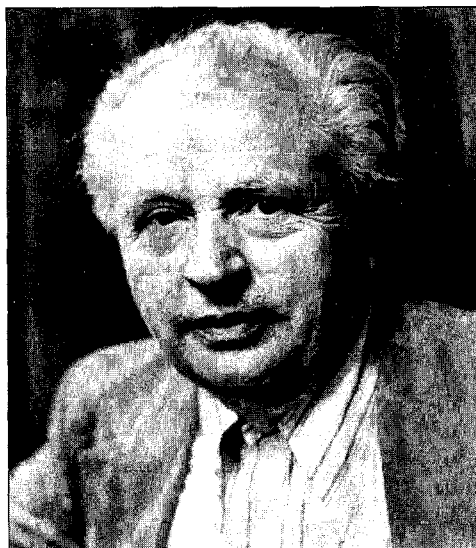


## In Memoriam

**O**skar Heil, an AES fellow, passed away on May 15 in San Mateo, CA, after a long illness. While he was best known in audio circles for the "heil air motion transformer, a mid- and high-frequency loudspeaker that enjoyed considerable commercial success through-out much of the 1970s, his other contributions to the world of science and technology are perhaps more noteworthy.

Born in 1908 in Langwieden, Germany, Oskar studied physics, chemistry, mathematics and music at the universities of Heidelberg, Berlin, Munich, and Göttingen, where he earned a Ph.D. in physics, molecular spectroscopy, in 1933. In 1935 he went to the University of Cambridge and worked on thermal neutrons in the Cavendish Laboratory under Lord Rutherford. From 1939 until 1947 he worked on microwave tubes for a number of electronics companies in England and Germany. After the war, he left Germany to work for the U.S. Government at Wright Patterson Air Force Base and at Ohio State University. In 1955 he returned to electronics, working for Eitel McCullough until 1963 when he started Heil Scientific Laboratories in Belmont, CA, working on government contracts as well as his own projects.

A few of Oskar's major contributions were the study of velocity modulation leading to the development of the klystron and traveling wave tubes (patented in 1933 and published in 1935), the field effect transistor with p and n type semiconductors (patented in 1934), a highly converging electron gun that corrects for spherical aberration with space



Oskar Heil  
1908-1994

charge fields (1947), periodic phase focusing (1960), surface explosions on solids by high density electron beams (1964), tetrahedron flow and the achromatic klystron (1965) and the air motion transformer (1972).

Prior to his death, Oskar was involved in the study of the acoustical properties of wood for musical instruments, as well as a general theory of gravitation (what it is, not what it does). It is interesting to note that by the time Bell Labs had reinvented the transistor, Oskar's original patents had nearly expired. And what led Oskar to invent the FET (he never called it an FET or transistor) was that the allies had forbidden the German citizens to have radios, and vacuum tube radios were too expensive and difficult to hide. Bell Labs, aware of Oskar's early work, falsely claimed that he could not have built such a device because materials were not yet available, a prerequisite to patentability. Oskar explained to me that his fiancée at the time helped him acquire the appropriate materials, enabling him to control electricity with a solid conductor.

Oskar was an accomplished piano player, which contributed to his love of music reproduction. In his early college days he met Hans Voigt and spent considerable time building horn loudspeakers, dome tweeters out of silk stockings, aluminum voice coils, and other devices for sound reproduction.

Oskar's lab was the proverbial inventor's paradise complete with a milling machine and lathe, welding equipment, glass blowing equipment, audio and electronics test gear, and, of course, memories. He explained to me that a prerequisite to studying physics in post World War II Germany was to become a competent tool and die maker. Oskar demonstrated this skill by making all the production tooling for the first air motion transformer.

Perhaps, one of his most admirable characteristics was his ability to take a very clear cut approach to his research and development and then to present his unique thinking in a readily understandable manner. Oskar was always very generous with his time and always took enough time to explain things with enough care to make sure that his point was completely understood. I never left a technical discussion with him without gaining new insight into what I previously thought was a complex problem. And I never ceased to be amazed at how simple and elegant he made the solution seem. Oskar will be sorely missed by the entire scientific community.

He is survived by his wife, Elisabeth, an artist, his daughter, Gertrud, and his granddaughter, Lucinda.

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