Amar Gopal Bose FREE

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Amar Gopal Bose

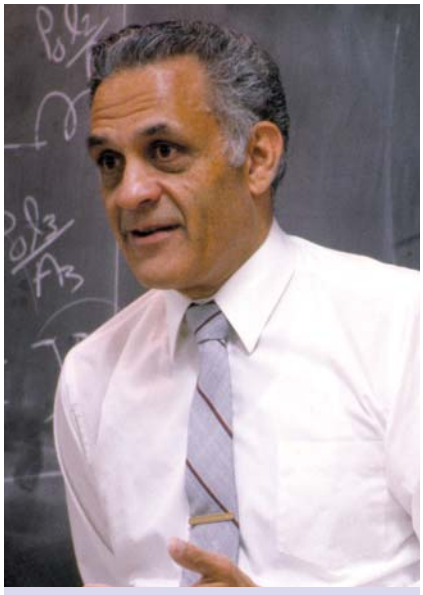
Acoustical researcher Amar Gopal Bose died on 12 July 2013 at his home in Wayland, Massachusetts. Bose was an innovative teacher of electrical engineering and acoustics at MIT, the founder of Bose Corp, and collaborator on the company's successful applications of electroacoustic technology.

Bose was born in Philadelphia on 2 November 1929. His Bengali father had immigrated to the US from India in 1920 because of harassment for his involvement with the Indian freedom movement. He settled in the Philadelphia area, where he married Bose's mother, a schoolteacher. During World War II, while Bose was in high school, he helped support his family by repairing radios.

Entering MIT in 1947, Bose was admitted to the cooperative course in electrical engineering; for alternate semesters, he worked for Philco Corp in Philadelphia in engineering and color television research. He received his SBEE and SMEE degrees in 1952. Following his return to MIT from a summer job in the Netherlands in 1953, Bose was assigned a new thesis topic by Jerome Wiesner and Henry Zimmerman, director and assistant director, respectively, of the Research Laboratory of Electronics, where Bose had a research assistantship; he was to work on a problem by mathematician Norbert Wiener.

Bose could not understand Wiener's work, and his adviser, Yuk Wing Lee, was not able to help him. That six-month period was the most important learning experience in his life, and two weeks before he had to make his presentation, it "all came together." Bose's thesis in the statistical theory of communication earned him an ScD degree in 1956. He then joined MIT as an assistant professor.

While a doctoral student, Bose purchased the stereo system with the best specifications because he thought that would result in lifelike sound. But that was not the case. Having played the violin as a child, he bought some violin recordings and was shocked at how the system that measured so well reproduced the violin so poorly.



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That revelation started Bose on an investigation that led him to work many nights in MIT's anechoic chamber and later take measurements at the Tanglewood music venue. The result: In 1964 he formed Bose Corp as a private company. He then made his first patented invention—the 2201 loudspeaker system with two cabinets, each designed in the shape of an eighth of a sphere, placed at opposite corners of a room to radiate sound and simulate what is heard from an ideal spherical surface. That was followed by his development of the Bose 901 direct and reflecting loudspeaker system.

One day Bose was listening to music reproduced by an audio power amplifier and noticed the heat from it. He recognized that a two-state amplifier with switching transistors that dissipated little heat could reproduce sound much more efficiently. Bose Corp's first research contract was based on the two-state technology, and the first products were loudspeaker systems. Bose received several patents for nonlinear, two-state modulated class-D power processing; he was awarded 84 patents during his lifetime.

Bose's research led to a number of innovative products, in addition to the 901 loudspeaker system. For example, the company's automotive sound systems, which are installed in millions of vehicles, represent years of innovative design work incorporating noise compensation, advanced bass response, and spatial characteristics that established new standards in vehicle sound. Noise-reducing headphones came about after Bose listened to an aviation headset producing sounds obscured by the cabin noise on a flight from Asia; he then did a preliminary design that used active noise control to reduce unwanted sounds.

At MIT, Bose taught basic courses in electrical engineering and acoustics through a creative approach in which students were not taught how to solve engineering problems but were given basic principles that they used to work through unique design situations. He eventually shifted to teaching only acoustics courses. His commitment to teaching resulted in MIT establishing the Bose Award for Excellence in Teaching. He taught at MIT until 2001.

With Kenneth Stevens, Bose coauthored the book *Introductory Network Theory* (Harper & Row, 1965), which exemplified Bose's approach to teaching. Among his other publications was the two-part article "Sound recording and reproduction," published in 1973 in *Technology Review*; it explained the synthesis of all Bose acoustical systems in terms a layperson could understand.

Throughout his career Bose had remarkable personal achievements, such as teaching statistical communication theory at the National Physical Laboratory of India in 1956–57. He also received numerous awards, including the IEEE/Royal Society of Edinburgh Wolfson James Clerk Maxwell Award in 2010.

Not only did Bose accomplish much personally, but his students, particularly those fortunate enough to have worked on their degrees with him, have advanced the world of acoustics and electrical engineering. He supervised at least 47 doctoral students. His success was due to his knowledge, close working relationships, and an extraordinary ability at collaboration.

Bose has done much to inspire countless individuals to pursue the enjoyment of acoustics personally and professionally. His research and his students provide the means for MIT, Bose Corp, and many others to contribute to the growth of technology and learning in the acoustical community and in our society.

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