

Obituary

Jan F. Lindberg, 1941–2020

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Jan F. Lindberg, a Fellow of the Acoustical Society of America, passed away on January 6, 2020, at the age of 78. He was born in Elyria, Ohio, on June 22, 1941. Jan was a physics graduate of Wittenberg University (Springfield, OH). He is survived by Susan (Fletcher) Lindberg, his wife of 49 years.

Jan began his career as a civil servant with the US Air Force in Ohio but soon left to join the US Navy Underwater Sound Laboratory (New London, CT) and continued with its successor the Naval Undersea Warfare Center Division Newport (Newport, RI), from which he was eventually detailed to serve as a program officer at the Office of Naval Research (ONR; Arlington VA).

Jan's first work in transduction was developing flexible-disk transducers under the mentorship of Ralph Woollett. He next began a lifelong study of flextensional transducers that use a shaped shell that offers a mechanical advantage over the normally very limited piezoelectric expansion of the ceramic stack, producing a very low resonant frequency in a small package. Much of this effort was with Class IV elliptical flextensionals, but he also initiated construction and testing of a large, 40,000-lb array of Class V circular ring-shell projectors as well as constructing a prototype Class VII dogbone-shaped flextensional. In support of this research, Jan guided the creation of several specialized software design tools. He also developed a widely accepted Figure-of-Merit (a numerical representation of the effectiveness of a device) that allowed quick comparisons of these ground-breaking designs.

Jan was particularly interested in the development of new transduction materials, which promised to greatly increase the power handling capability of sonar transducers, and developed numerous innovative transducers utilizing these new materials. In his role as an ONR Program Officer, Jan cosponsored an annual conference on transduction materials and their applications, which led to many advances in the state-of-the-art.

These interests led to one of his most creative ideas, the development of a magnetostrictive, Terfenol-D transducer driven by superconducting coil, which, with zero resistance, was free from electrical losses. This was the first demonstration of a superconducting device producing useful power while remaining in a superconducting state.

At the ONR, Jan continued pushing the state-of-the-art by mentoring others in their research. He headed up and became the technical point of contact on a large number of innovative transducer projects. Some projects included work on new materials such as a ferromagnetic-shaped memory alloy, whereas others led to new transducers such as the hybrid transducer, the leveraged cylindrical acoustic transducer, the continuous-wave transducer, the cantilever-mode transducer and, most recently, the end-driven bender transducer. Jan also supported and encouraged the use of transducer systems, such as in cloaking undersea vessels through the use of transducers.

Jan was a gifted scholar and most enjoyable person to work with or for. He almost always had a smile, which put one at ease even when dealing with difficult problems. He had a constant stream of positive suggestions for solving those difficult problems, and his legacy continues.

Selected Publications by Jan F. Lindberg

- Berliner, M. J., and Lindberg, J. F. (Eds.). (1996). *Acoustic Particle Velocity Sensors: Design, Performance, and Applications*. Acoustic Velocity Sensor Focused Workshop, American Institute of Physics Conference Proceedings, no. 368, Mystic, CT, September 12–13, 1995, American Institute of Physics Press, Woodbury, NY.
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- Ewart, L. M., Lindberg, J. F., Powers, J. M., and Butler, S. C. (2000). Materials and designs for improved high-power naval SONAR projects. *US Navy Journal of Underwater Acoustics* 50, 4-12.
- Joshi, C. H., Voccio, J. P., Lindberg, J. F., and Clark, A. E. (1993). Development of magnetostrictive sonar transducer using high-temperature superconducting coils. *The Journal of the Acoustical Society of America* 94, 1788.
- Lindberg, J. F. (1985). Parametric dual mode transducer. *The Journal of the Acoustical Society of America* 77, 774.

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