

Edgar M. Villchur 1917-2011



Audio pioneer Edgar Villchur died last October 17, age 94, in Woodstock, New York, where he lived most of his adult life. He and his company, Acoustic Research, brought into being today's consumer audio industry, domesticating it from a hobbyist pursuit involving oversize, inelegant equipment to something of a scale that nonhobbyists, and their wives, could welcome. The system components Villchur conceived and developed were of such high quality, and so simple to use, that word spread rapidly by press report and word of mouth alike.

Later on, Villchur's research into hearing led to inventions that became directly responsible for today's advanced-technology hearing aids. These principles are virtually the standard approach throughout that industry.

Edgar Marion Villchur was born New York City on May 28, 1917, son of Mark and Miriam (Vinograd) Villchur. He married Rosemary Mackay Shafer on November 28, 1945; the couple had two children, daughter Miriam Villchur Berg and son Mark.

Villchur grew up on a farm in Lebanon, Connecticut, and as a teenager began tinkering with early radio and phonograph equipment out of an interest "that was primarily musical; I took relatively little pleasure in the technical side." He attended City College of New York, graduating in 1938 with a degree in art history, followed by a master's in education. He shared an apartment in Greenwich Village and worked in the theater, with plans to become a scene designer and teacher. Nine months before the Pearl Harbor attack he was drafted in the lottery and inducted into the Army Air Corps. Villchur served as communications officer in a fighter group, maintaining electronics equipment in fighter planes, and attained the rank of captain, heading maintenance personnel as group communications officer.

After the war Villchur opened a shop in the Village where he repaired radios and built custom home hi-fi sets. He continued to educate himself in audio engineering, taking courses in mathematics and engineering at NYU. After submitting an article to *Audio Engineering* (later renamed *Audio*), he was asked to write a regular column. From 1951 to 1956 he taught a course at NYU on the reproduction of sound. Materials from these lectures were published in a series of *Audio* articles and later in two influential books; Villchur always prided himself on being a lucid, precise writer and editor. During the early 1950s, Villchur pondered the problem of woofer distortion, tinkering with suspension elements in attempts to make them more linear. Finally, after the solution pre-

sented itself, in late 1953 he altered a conventional 12" speaker by cutting away most of the spider and all of the outer surround. Rosemary Villchur, who had been a draftsman during the war, laid out a pattern for the first half-roll surround on a sheet of mattress ticking. This was cut out and glued to the cone and the speaker basket flange. The resonance frequency was reduced to about 10 Hz. A sturdy, well-braced cabinet of 1.7 ft³ in volume raised the resonance to 45 Hz, the calculated optimal frequency, which provided full response to below 40 Hz. Its performance was all that had been predicted: powerful, audibly pure bass that astonished listeners. Villchur applied for a patent in March 1954, which was granted in December 1956. (It was eventually overturned, erroneously.)

It seemed an important enough breakthrough to warrant the attention of established loudspeaker companies, and Villchur approached two he thought most likely to be receptive. An executive at one explained that the company had a big and experienced engineering staff, and if any system had been worth developing, the staff would have done it. The other company's representative told him flatly, "What you describe is impossible."

One night after class, Villchur was approached by student Henry Kloss. Kloss's interest in the new device he'd just heard about persuaded Villchur to demonstrate the prototype. The two men drove up to Woodstock to listen. Villchur went into it more deeply on the ride, and reported, "Being so smart, Henry got it right away." Upon hearing E. Power Biggs playing organ music, Kloss immediately grasped the invention's importance: "That's it!" he remembered. Forty years later, at an AES section dinner honoring Villchur, Kloss stood during the Q&A session after Villchur's presentation to pay tribute: "The intellectual experience of hearing Ed summarize the principle in just three sentences was the high point of my life—a real thrill for me."

The two pooled resources, found a few small investors, and incorporated Acoustic Research with operating capital of \$6000. Kloss did the production engineering of the woofer; Villchur selected the midrange/tweeter (a Western Electric 8" unit that had full-range application), designed the crossover, and determined the AR-1's system resonance and Q_{tc} . Its pricing and size were simply astounding for a system that could, as the first of many rave reviews pointed out, produce more output at 25 Hz and below than the huge and hugely expensive Klipschorn.

On rare occasions a device is conceived that is perfectly suited to the times and then

is produced by the right kind of company. Edgar Villchur's acoustic suspension loudspeaker system was such a device and his Acoustic Research was such a company. It was a simple solution to a big problem, but as with many other simple ideas, no one before the inventor had thought of it in a practical sense nor realized the scope of important benefits such a system provided. Stereo was still new and exciting, but not many listeners were willing to put two large, bulky boxes in a living room. The time had come for small systems capable of full-range high-fidelity sound, taking advantage of recording media that were improving in faithfulness to sources.

Personal differences in policy arose between the co-founders. With his own backers, Kloss founded loudspeaker company KLH, employing acoustic suspension under a license from the Villchur patent. Villchur now began working diligently on design of improved mid- and high-frequency units to replace the weakest link, the AR-1 tweeter. His efforts bore fruit with the introduction of the dome speakers in the AR-3 system, shaped as sections of rigid spheres 2" and 1-3/8" in diameter, driven by a voice coil at the outer edge in each case. Most serious loudspeakers now being made use a dome speaker at least as the HF unit. AR-3s were shipped to dealers in the first half of 1959. Sales soon exceeded those of the AR-1, and it is no exaggeration to say that AR-3s became the quality standard for many years. An AR-3 is on permanent exhibition at the Smithsonian.

From the beginning, AR had an unwavering policy of treating consumers with complete support. Letters were answered promptly and fully. Problems were fixed at no cost (shipping both ways included) and with the goal of complete satisfaction of any request, even nearly unreasonable ones. In fact, AR implemented a full five-year (and beyond) warranty long before the term became commonplace.

Employee satisfaction was another policy. Promotions were made from within, and nondiscrimination was firmly implemented. The company instituted profit-sharing that was beyond generous, in addition to wages above area averages, and tuition reimbursement. It was a very good company to work for, with unsurpassed employee loyalty and very low turnover. "I'm just an old socialist at heart," Villchur once described himself.

It had always been Villchur's intention for AR to offer a complete system, and as soon as the AR-3 was launched, he turned his attention to a turntable design done in-house. Again he reduced the problem to basic prin-

ciples. It was obvious upon reflection that relative motion between tonearm spindle and turntable platter had to be minimized to prevent rumble. Solution: mount both arm and platter spindle on a rigid bearing plate isolated from the base. Stability and isolation were accomplished by using a three-point damped springmount system for the bearing plate with a very low resonance frequency and the springs located at equal load points. Isolation from the drive motor was to be accomplished by a rubber belt between drive pulley and platter. The pickup arm had to be lightweight, with a damped descent, an offset and overhung head for minimum tracking-angle error, and balanced completely except for an adjustment to achieve proper stylus force. It also needed geometry that placed the stylus in the same horizontal plane as the arm's vertical pivot, to minimize warp-wow.

It was far easier to state these requirements than to implement them. But after much trial and error and headache, the first turntables shipped to dealers in 1961, and the design quickly gained profitability despite its low price (below \$60 at the start, \$90 over a decade later). It sold in the hundreds of thousands.

In the years following, AR produced three series of live-vs-recorded concerts, in which the performers had been recorded in the large lawn in front of Villchur's hillside home and the recordings, played through a pair of AR-3s, were compared directly with the live performers. Beginning at Carnegie Recital Hall, demonstrations took place in venues throughout the country and at high-fidelity shows. Reviewers and the public were invited and, according to their own reports, the vast majority were unable to tell the difference. The company also set up two music listening rooms, one on the balcony above Grand Central Station and the other in Cambridge, Mass. They were open to all comers free of charge, who could listen to various AR loudspeakers with no sales pitch and no products for sale.

These customer-friendly policies, the superb products at bargain prices, the innovative promotions, the low-keyed, fact-based, genuinely persuasive ads, the uniformly and unprecedentedly strong product reviews, and the many published articles and papers all produced phenomenal growth for Acoustic Research. In 1967 sales were more than \$7.5 million. Market share in 1960 was 16%; by 1966, it had risen steadily to 32%, its maximum value ever and higher than any other company ever achieved. In keeping with Villchur's socialist spirit, the AR marketing philosophy was notably less push than pull—let the customer decide, there being little

need to sell him or her—and that, along with distribution that included nationally advertised discounters, did not please retail dealers. (Indeed, by the later 1960s it was easy for a salesperson in the latter type of establishment to get fired for recommending low-margin AR loudspeakers in same breath as competing higher-margin KLH and Advent models.)

Edgar Villchur left AR in 1967, when the company was sold to Teledyne. He had wished to make his next project at AR an investigation into speech processing toward better hearing aids, but he met with resistance from his management team. By consensus, it was decided to pursue the Teledyne offer. Typically, majority stockholder Villchur insisted the deal could not go through unless Teledyne agreed to give all first- and second-echelon employees five-year contracts with the same salaries and bonus provisions. All management personnel stayed.

Villchur repaired to Woodstock and established his Foundation for Hearing Aid Research, funded entirely by himself. In the years following, he developed an improved version of the standard audiometer earphone that gave better consistency in measurements than the existing model. Then he proceeded with his accustomed attack at a problem, to analyze why conventional approaches to improving intelligibility for the hearing-impaired had not worked well, and what could be done. Using dual-channel compression followed by equalization, both tailored to the client's needs, he achieved substantial improvement over existing methods. Instead of patenting his method, he simply published several papers describing the innovation, thereby granting to the world the freedom to exploit it without royalties. The great majority of current hearing aids now use some version of this processing system.

Given a career founded upon tough-minded empiricism informing a most inventive imagination, Edgar Villchur had no sympathy for audio's penchant for untested subjectivism. He once concluded an Acoustical Society of America talk by pointing out that, "Scientific method allows investigators to form hypotheses in any way they please: out of a cold assembly of facts, intuition, or a drunken stupor. Once a hypothesis is proposed, however, it must be demonstrated rigorously. The audio discipline needs to be brought back to the world of reason."

Roy Allison

(with contributions from Tom Tyson, Mead Killion, David Moran, and Paul Milner.)

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