

## Roy F. Allison Interview

By Steve Mowry | Wednesday, 22 December 2010 10:49

Roy Allison is a legend in the hi-fi loudspeaker industry, having been chief engineer at Acoustic Research when that company developed the world's first dome midrange and first dome tweeter. He then went on to found Allison Acoustics. At 84, he's still active in audio, acting as a consultant for a number of famous US loudspeaker manufacturers. Steve Mowry caught up with him at his home in Belmont, New Hampshire...

Roy Allison. Hi-Fi Industry Legend.

**Steve Mowry:** Do you consider yourself to be a loudspeaker pioneer?

**Roy Allison:** Well, I've been active in the industry since 1951, first in audio editorial work and then, beginning in 1959 with Acoustic Research, in the design and production of commercial speakers and electronics. There were others before me.

**SM:** Did you invent the dome tweeter?

**RA:** No. Edgar Villchur developed the edge-driven dome midrange unit and tweeter.

**SM:** Where do you see the loudspeaker industry in the next 5 to 10 years?

**RA:** In home applications, loudspeakers will be considered to be primarily an adjunct to television and personal computers. Aside from that, I'd expect to see much more emphasis on wireless signal transmission, especially to surround and rear speakers. In commercial applications, they will be much the same as now.

**SM:** What do you consider to be the greatest achievement in your career?

**RA:** Learning and then teaching how rooms affect loudspeaker performance and how to use that information to design much better loudspeaker systems. Only a few designers have taken advantage of these simple rules. Of course, the appropriate comment to make here is: 'There are none so blind as those who will not see.'

**SM:** The transducers used in the Allison One looked proprietary. What were the design criteria for the dome tweeter, dome midrange and woofers?

**RA:** The midrange and tweeter units are not really domes in the usual sense. They are convex radiators, but each is driven by a voice coil at approximately half the distance from the centre to the suspension edge. Neither has a spider. The cone part of the tweeter, although convex overall, is curved inward and the outer edge is clamped through a very thin ring of latex foam to the mounting plate. Thus the radius of curvature of the cone changes as the voice coil moves, simulating a pulsating hemisphere that puts large amounts of high-frequency energy into the reverberant field all the way up to 20kHz. The midrange unit has a straight-sided cone with a flexible polyethylene edge suspension. It has extremely wide and uniform dispersion over its operating range... as does the tweeter. Neither is proprietary inasmuch as they're not protected by patents, but they are difficult and time-consuming to make properly, and they do project relatively far out from the front cabinet panel, which complicates the grille design. They have not been imitated, probably for those reasons.

The woofers themselves are simple, very good basic designs. What makes their performance exceptional is their placement in the enclosures. Villchur said it: the woofer and the cabinet are one system. I extended the bass system to include the room boundaries.

**SM:** Can you see any parallels between your focus and view on loudspeakers and acoustics, and those of Dr Amar Bose?

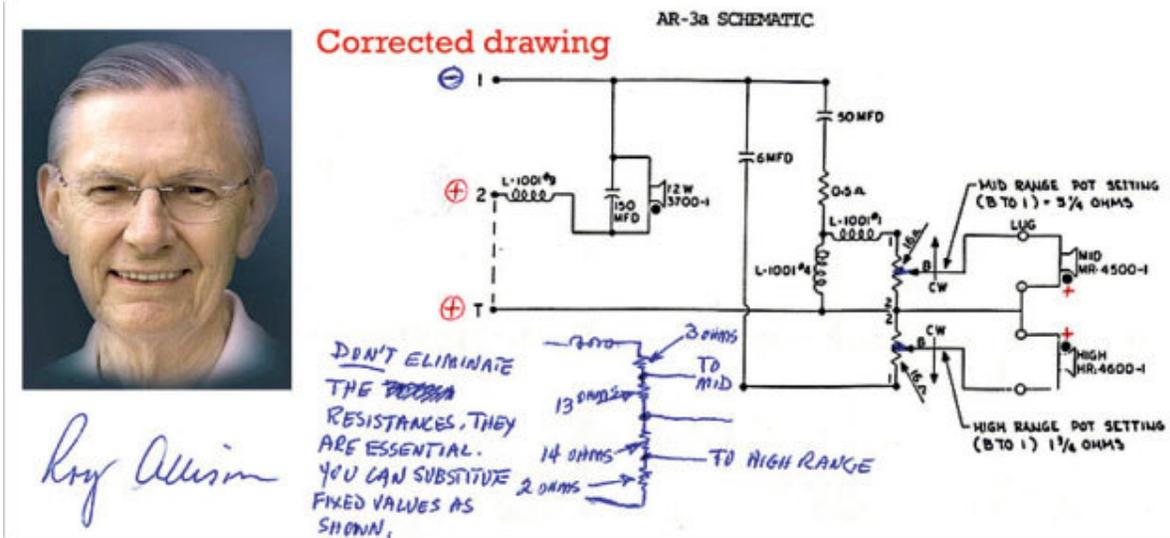
**RA:** I can't speak for Dr Bose, but my designs always aim for a flat power response. After all, it's the power vs frequency response in the reverberant field of the room that we perceive as frequency response, no matter how flat the on-axis response may be. Put simply, in a normal listening room, direct and reflected energy during the first 30-milliseconds or so are what we perceive as 'frequency balance'. As for loudspeaker design, there are some vague similarities with some Bose products... but very few.

**SM:** Well, few of us can speak for Dr Bose; however, I worked in transducer R&D at Bose Corp. from 1995-98, when US loudspeaker companies in the Boston area were still conducting serious R&D and power response was considered to be everything then and there. Systems were evaluated, both listening and computer data acquisition tests, in what was called the 'golden room' that was considered typical. A small to mid-sized room complete with furniture and a bit of draperies with ten microphone positions marked with tape on the carpeted floor. Room boundaries were considered in all system designs and the trademark term 'Direct Reflecting' was Bose's way of expressing that to the market. Were the Allison loudspeakers evaluated in a particular room and could you comment on anechoic measurements and loudspeaker evaluation?

**RA:** The first thing we did when we moved into our factory on Tech Circle in Natick, MA, was build a semi-anechoic chamber. By that I mean a test chamber with three mutually intersecting surfaces (ceiling and two intersecting walls) covered with 50Hz anechoic wedges. The three opposing room boundaries were very rigid, smooth and bare. In that room, with multiple microphone positions to sample the total output around a test speaker system, I could calculate the power vs frequency that the test speaker system would produce when placed typically in a real room, taking account of the reflected impedance from the nearby boundaries when the speaker system was positioned as recommended (or at any arbitrary position, for that matter.)

My first speaker systems were still in the development stages, and that chamber proved to be invaluable at every step of the way. It was also equipped with a microphone on a swivel arm, operable from outside the chamber, which could be moved in an arc always facing a test speaker on a removable baffle board flush with the inside surface of the bare chamber wall. Every individual speaker we made was tested in that facility before being approved for assembly into a system cabinet.

Speaker systems designed with the use of that chamber were compared with others not so designed, and were shown to provide the flat low-frequency power response in real rooms predicted by theory (1).



The original AR-3 used the first commercial edge-driven direct radiator midrange and tweeter domes. Pictured above is the original schematic for the AR-3a, a second-generation model that used fixed resistors in place of potentiometers.

**SM:** Other than yourself, whom have you considered to be key contributors to the development of loudspeakers since 1950?  
**RA:** Since 1950, Edgar Villchur, Arthur Janszen, Henry Kloss, Mark Davis, Neville Thiele, Richard Small, and Floyd Toole. To any I have missed, my apologies. But before 1950 there were the giants upon whose shoulders we've all stood, including Chester Rice and Edward Kellogg, Albert Thuras, Harry Olson, and Leo Beranek.

**SM:** What do you consider to be the most important design criteria for a loudspeaker?  
**RA:** Flatness of power response over the widest possible frequency range, and uniform dispersion of that power into the solid angle of radiation. Low distortion at available radiated power. Efficiency adequate for the intended use. Convenience of placement in the domestic environment.

**SM:** Does it seem to you that loudspeaker technology is not keeping up with advances in other industries?  
**RA:** The knowledge and the capability to make loudspeakers audibly indistinguishable from live sources in the same environment exist today. It isn't loudspeakers that impose limits to life-like reproduction, it's recording techniques and the playback environment. There can be, and should be, more convenient ways to set up surround systems. High-quality wireless signal transmission to the surround speakers at a reasonable price should be pursued vigorously, and I believe that this development would not be difficult.

**SM:** I believe that you have experience with moving manufacturing of products from the USA to Asia. Can you comment on the migration of loudspeaker industries to Asia and especially to China?  
**RA:** Actually I have no such experience. When I was involved with manufacturing at Allison and RDL loudspeakers we bought some metal parts, in particular forgings, from Korea. We also bought some tweeters and midrange units from Italy and Korea for use in low-cost systems... but nothing from China. It seems to me that the practice of buying complete loudspeaker systems from China is good for consumers, but bad for loudspeaker company employees and the towns in which they were employed. That's what free trade does.

**SM:** What words of wisdom do you have for junior engineers and technicians?  
**RA:** Part of your education should be assisting in a prototype lab, actually assembling speaker parts under experienced mentors. Before assuming design responsibility, learn what tests are both reliable and valid—which ones correspond with what people actually hear in a listening-room environment, and which ones are without much value.



Acoustic Research AR3a

**SM:** There is a story going around that you helped Andy Kotsatos start Boston Acoustics when he was a competitor. Is it true and if so, can you tell us about it?

**RA:** Yes, it is true. We were up and running, and had been at it long enough to have achieved smooth production operations, when Andy and Frank Reed decided to start Boston Acoustics. Andy is a friend. He was welcome to visit, to see what we were doing and to ask questions... which we answered willingly. I am certain that Boston Acoustics would have been successful without any help from us, but if we made it a little easier for them to get started I have no regrets.

**SM:** How long have you been working in the industry?

**RA:** If you include writing and editing audio publications, 57 years. If you don't: 49.

**SM:** What is different about your loudspeaker design philosophy?

**RA:** I design systems that take maximum advantage of beneficial room boundary effects with minimum or no bad effects. Serendipitously, that places them close to room surfaces where they occupy a minimum of living space. In addition, I strive to get maximum and equal dispersion from the lowest to the highest audible frequencies.

**SM:** Do you agree that your products epitomised the 'East Coast' or 'New England' sound, as some people claim?

**RA:** I prefer to think that they attempted to simulate live acoustic concert sound as closely as is possible. Many of the East Coast loudspeaker companies were founded by former employees of the first major Cambridge loudspeaker designer/manufacturers, Acoustic Research and KLH, which would account for the similar sound balance between all of them.

**SM:** The AR-3a is exhibited in the Smithsonian Institute. Is the AR-3a the greatest loudspeaker of all time or is it some other system?

**RA:** It may be the most famous, and it remained a standard for comparison for many years. However, its predecessor, the AR-3, is the model on permanent exhibition in the Smithsonian. The AR-3 was chosen because it contained the first commercial midrange and tweeter edge-driven direct-radiator domes. It was entirely Edgar Villchur's design.

#### **ABOUT THE AUTHOR:**

Steve Mowry has BS and MS degrees in Electrical Engineering from the University of Rhode Island. He began his professional career in the R&D (Transducer) division at Bose Corp before leaving to become Chief Engineer at TC Sounds, a transducer manufacturer in San Diego. He migrated to Asia as Manager of R&D for Eastec, where he supported transducer design and development for Philips, RCA/Thompson, Polk Audio and JBL before joining the A-TON Acoustics Group as Director of Engineering. He now owns S. M. Audio Engineering. In addition to his loudspeaker design and consultancy work, he writes for Voice Coil, MultiMedia Manufacturing and the Loudspeaker Industry Sourcebook