

### Abstract

Part 1 -- Problems with Stereo Reproduction and How to Fix Them

Part 2 -- Installing 2-Speaker, 4-Speaker, and 6-Speaker Ambiophonic Systems

## Understanding and Installing an Ambiophonic System

by Les Leventhal, University of Manitoba and Ralph Glasgal, Ambiophonics Institute

### Abstract

Recordings of music and film soundtracks contain cues used by the ear/brain to localize sound. Home or studio reproduction using conventional stereo, 5.1, 7.1, or 10.2 distorts these cues and creates false ones. The result is localization distortion, which degrades horizontal and depth imaging of direct and ambient sound, degrades clarity of instruments, colors the sound, and greatly reduces size and depth of the sonic stage. Localization distortion can be reduced to very low levels by a technology called Ambiophonics. Ambiophonics, at its simplest, consists of crosstalk-cancelled playback by two closely-spaced, front speakers. The result is that one can now hear at home what the recording microphones hear—and what the microphones hear is greatly improved horizontal and depth localization; solid, clear, three-dimensional imaging; less colored sound; improved clarity and tonality; improved transient response; and a sonic stage that is very deep and very wide—150-180 degrees—compared to the 60-degree wide stage of the stereo equilateral triangle. Ambiophonics does not artificially increase the width and depth of the stage. Instead, it reduces localization distortion to such low levels that one can hear the width and depth that was actually recorded on the disc. Details are discussed for setting up an Ambiophonic system with 2, 4, or 6 speakers.

First there was mono and then there was stereo. Using just one speaker, monophonic reproduction sounds like all instruments are located at the speaker. Using two widely-spaced speakers, stereophonic reproduction sounds like different instruments have different locations—with the locations stretching from one speaker to the other. Having different locations for different instruments is so highly valued that stereophonic reproduction—now almost 80 years old—and offshoots such as 5.1 and 7.1 have become standard in the home reproduction of music and movies. But stereo and its offshoots do far from a perfect job of localizing sound and their imperfections limit the quality, the believability, and the realism of the reproduction. A new technology—called *Ambiophonics*—fixes most of the problems with stereophonic reproduction. Ambiophonics is based on almost a century of psychoacoustics research on how the ear/brain localizes sound. This historical research, combined with current research, tells us how conventional stereo destroys good sound localization and how to fix the problem. Ambiophonics fixes most of stereo's problems by using crosstalk reduction with two *closely-spaced* front speakers—separated only 20 to 30 degrees. Yet the sonic stage created can be 150-180-degrees wide! Just how this can happen is a wonderful tale of how laboratory findings can produce unexpected and beautiful results.

In Part 1, we explain how stereo reproduction distorts the sound field and how Ambiophonics restores it. In Part 2, we explain how to maximize the performance of an Ambiophonics system. Those already familiar with the problems of stereo and the advantages of Ambiophonics might skip to Part 2.

<sup>1</sup> Les Leventhal, MA, PhD, is a professor of psychology at the University of Manitoba in Winnipeg, Canada. He is a member of AES and the American Psychological Association.

<sup>2</sup> Ralph Glasgal, BEP, MSEE, is the founder of the nonprofit Ambiophonics Institute. He is a member of AES and IEEE.