

## Directional Audio Coding (DirAC) demonstrations

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Directional Audio Coding (DirAC) is a method to encode and decode audio which has been recorded using a microphone array, for example using B-format microphone. It is based on analyzing the sound into diffuse and non-diffuse parts, and then reproducing them with different strategies. DirAC has been developed from Spatial impulse response rendering (SIRR) technique by Ville Pulkki and Juha Merimaa. Conceptually DirAC supports various microphone techniques and all spatial reproduction techniques. This demonstration has been implemented using B-format microphone technique and 5.0 loudspeaker setup.

This document describes the demonstration files found in [www.acoustics.hut.fi/demos/DirAC](http://www.acoustics.hut.fi/demos/DirAC).

File extensions:

**AMB.wav** Ambisonically decoded siybd with virtual hypercardioids pointing to specified directions. A potentially better Ambisonics decoding could have been achieved using the Vienna decoder, which, however was not available in the production of this demo. For simplicity, the hypercardioid virtual microphone technique is called as Ambisonics in this document.

**DirAC.wav** DirAC processed sound with loudspeakers in specified directions

**Ref.wav** The reference sound in demo 1

**Bformat.wav** The B-format file used in Ambisonics and DirAC processing

The file format is wave-format-extensible, and it should be playable with different media players.

### Demo 1: Anechoic speech with simulated B-format microphone

The reference condition is where female speaker is in direction  $30^{\circ}$  and male speaker in direction  $-30^{\circ}$ . This is realized in file AnecSpchRef.wav. The B-format microphone was simulated, resulting in a recording of anechoic speech with ideal microphone characteristics. The microphone and loudspeaker directions were [30 -30 0 N/A -110 110] in channel order L R C S/W Ls Rs. Filenames: anecSpch\*.

### Demo 2: String quartet

The B-format file has been recorded with a B-format microphone developed in Midas studios by Martin B. Kantola. There is no further information available of the microphone. A string quartet is playing in quite reverberant space. Apparently the microphone was quite near the quartet, and the sound arrived from sides to microphone. Thus the directions were [60 -60 0 N/A -110 110] in processing. Filenames: string\*.

### **Demo 3: Organ and choir**

The file has been downloaded from address <http://www.ambisonicbootlegs.net/Members/pwhodges/ambisonicfile.2006-03-24.1126831170>. It has been recorded using an omnidirectional and two figure-of-eight capsules. The directions for processing were [30 -30 0 N/A -110 110]. Filenames: lang1\* .

### **Demo 4: Applause**

Applause has been recorded with SoundField microphone system by SoundField Inc., and downloaded from <http://www.soundfield.com/downloads/b-format.php>. The directions for processing were [30 -30 0 N/A -110 110]. Filenames: Applause\* . The diffuse sound field should also in this case be wider than with Ambisonics. This sound example was included here because in some encoding-decoding techniques applause sound causes some unwanted artifacts.

When listening to demonstrations, compare the direction perceptions and room perception in large listening area.