

**International Rostrum of Composers
Stockholm – 2012**



Three Studies for the Bionic Ear

by Robin Fox

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The bionic ear (or cochlear implant) is a device that allows the profoundly deaf to hear. The implant is composed of a microphone that captures an acoustic signal and sends it to a sound processor that stimulates the 30,000 auditory nerves via 22 electrodes implanted into the inner ear. For many cochlear implant recipients however, their experience of the hearing of music through this device is like hearing pianists perform while wearing boxing gloves instead of one where they hear an organised and enjoyable sound.

Three Studies for the Bionic Ear was recorded at a concert titled *Interior Design: Music for the Bionic Ear*. It was one of six compositions commissioned especially for this concert, which was devised with the support of a large number of people and organisations, many of whom assisted the composers' research and testing. The ultimate hope was that people with impaired hearing, and those using cochlear implants, would be able to enjoy a similar experience to that of people with normal hearing.

Three Studies for the Bionic Ear is designed around a unique 11.1 audio diffusion system arranged in a way that enhances aspects of the composition and the listeners' perception of it. This recording is a live stereo mix of the original multi-tracked concert performance. The composer suggests that this change might perhaps make the sound less clear for the cochlear implanted listeners (particularly in the 3rd movement), but the depth of field is maintained well for listeners without cochlear implants.

Study 1: Pulse. This study connects with the way in which the cochlear implant uses a steady pulse to regulate information sent to the 22 electrodes. Each frequency in the set of 22 is pulsed at high speed and the shape of its envelope changed regularly to produce varied sonic attacks. The spatialisation sends one set clockwise and one anti-clockwise through the speaker array.

Study 2: Rhythm/Pattern. The second of the three studies focuses on the generation of rhythmic patterns using only the frequencies that make up the 22 centre frequencies of the filters that parse audio from the air and deliver it to the cochlear implant. Various permutations are performed on the pattern including changing the wave-shape (sine, square, triangle and sawtooth) and also transpositions of the tones down from the original at various points. The transpositions are in justly intoned intervals, so fractions are used rather than equally tempered steps.

Study 3: Tone (The cochlear chord)

The third study introduces each tone of the frequency set individually. As each tone will emerge from a different channel, the room should gradually fill with the chord. My hope is that the spatial separation of the sources might increase clarity and separation of the tones for implant recipients. Extra sub bass frequencies are added to act as physical 'modulation' tones.

Robin Fox

Robin Fox was born in 1973. He has an MA in musicology and also a PhD in composition from Monash University. He has released numerous sound works on labels across Europe and Australia. His recent solo LP / Cassette, *A Handful of Automation*, is his first full length solo audio release. More recently, the Warsaw based label Bocian has released his first solo 7" *More Impossible Futures*. He has also performed with the likes of Jon Rose, Oren Ambarchi, Lasse Marhaug, Jerome Noetinger, Stephen O'Malley and Erick D'Orion among numerous other encounters. As an audio-visual performance artist his work has featured in festivals worldwide.

Three Studies for the Bionic Ear by Robin Fox. Composed in 2011. Duration: 11'20

Performed by Robin Fox

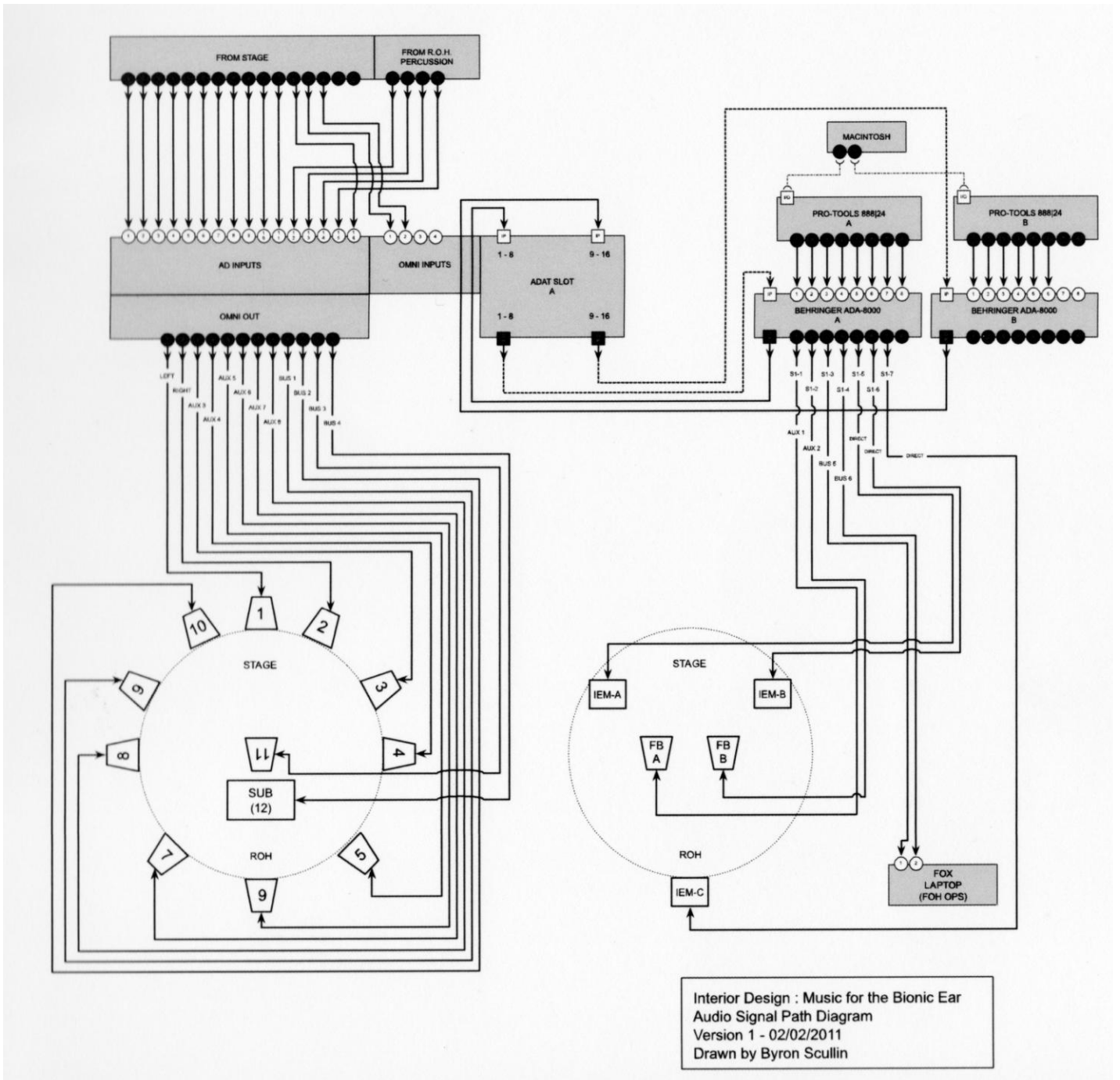
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Australian Network for Art & Technology, Australia Council for the Arts, Arts Victoria, Victorian State Government,
Arts Access Victoria, Arts Access Australia

Recording Producer: Chris Lawson; Recording Engineer: Richard Girvan.

Copies of the recording available from: Lorna Lander or Gregory Dobbs, ABC Classic FM

GPO Box 9994, Sydney 2001, Australia. Email: Lander.Lorna@abc.net.au; Dobbs.Gregory@abc.net.au

INTERIOR DESIGN: Music for the Bionic Ear Audio Signal Path Diagram



Interior Design : Music for the Bionic Ear
Audio Signal Path Diagram
Version 1 - 02/02/2011
Drawn by Byron Scullin