The Audio Programming Book

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Preface

''But how does an oscillator really work?'' My 40-year journey to *The Audio Programming Book* began with that question. Some of the answers came from Tom Piggott (my first electronic music teacher, and the one who got me started with analog synthesizers—an EML200 and an Arp2600).

More answers came from Alan Pearlman, founder and president of the ARP Synthesizer Company, the man who commissioned my first symphony, *Three Soundscapes for Synthesizers and Orchestra*.

Still more answers came from Dexter Morrill, who offered me a Visiting Composer's Residency at Colgate University, where I made my first computer music. It took days back then, but I rendered ''Happy Birthday'' in *Music10* and played the rendered soundfile for my dad over the phone on his birthday.

And more answers came from Bruce Pennycook, who was also in residence at Colgate. (We would work through the night and end our sessions with breakfast at a local diner; I picked his brain every spare minute; he taught me how to do *stereo panning* and gave me his sub-bass oscillator instrument, *LOW*.)

I started to really answer the question in Barry Vercoe's summer workshop at the Massachusetts Institute of Technology, in which I learned *music11*. (I will never forget Barry filling whiteboard after whiteboard, and revealing, one morning, that an oscillator consisted of a phasor and a table.)

I made my way from MIT to the Center for Music Experiment at the University of California at San Diego, where I learned about *cmusic* from Dick Moore, Gareth Loy, and Mark Dolson. My first *cmusic* composition, *Two Movements in C*, featured a new trick that they taught me to do with two oscillators: FM synthesis.

Life brought me back to Boston, and Barry invited me to continue my work at MIT's new Media Lab, where I got to explore and beta-test his new language, *Csound*. By his side, I was able to further my understanding and to share some of the answers I had found along the way through *The Csound Book*.

Overlapping with my time at the Computer Audio Research Lab in San Diego and the MIT Media Lab, I got to know and work with Max V. Mathews. He invited me to work in his

studio at Bell Labs. (He would sleep in the recording booth there so that I could compose and program.) We have worked together for more than 25 years now, touring, performing, lecturing, and sometimes sailing. It was from him that I learned the programming language C. We would spend days and days going over every single line of his *Conductor* and *Improv* programs, his *Scanned Synthesis* program, his *PhaserFilters* program, and his *Music V* program. (Imagine my surprise upon discovering that an oscillator is also an envelope generator, and then the mind-bending fact that if you ''scan'' a ''mechanically modeled'' wavetable, an oscillator can ''be'' a filter.)

But still, it took John ffitch, Richard Dobson, Gabriel Maldonado, and Victor Lazzarini to teach me to actually ''program'' an oscillator—right here in *The Audio Programming Book*.

Yes, for me *The Audio Programming Book* answers my first question and many others. I think you will agree that ffitch, Dobson, Maldonado, and Lazzarini are wonderful teachers, and that the other contributors are their ''young apprentices.'' I hope the book will answer all your questions and will raise new ones too.

Richard Boulanger