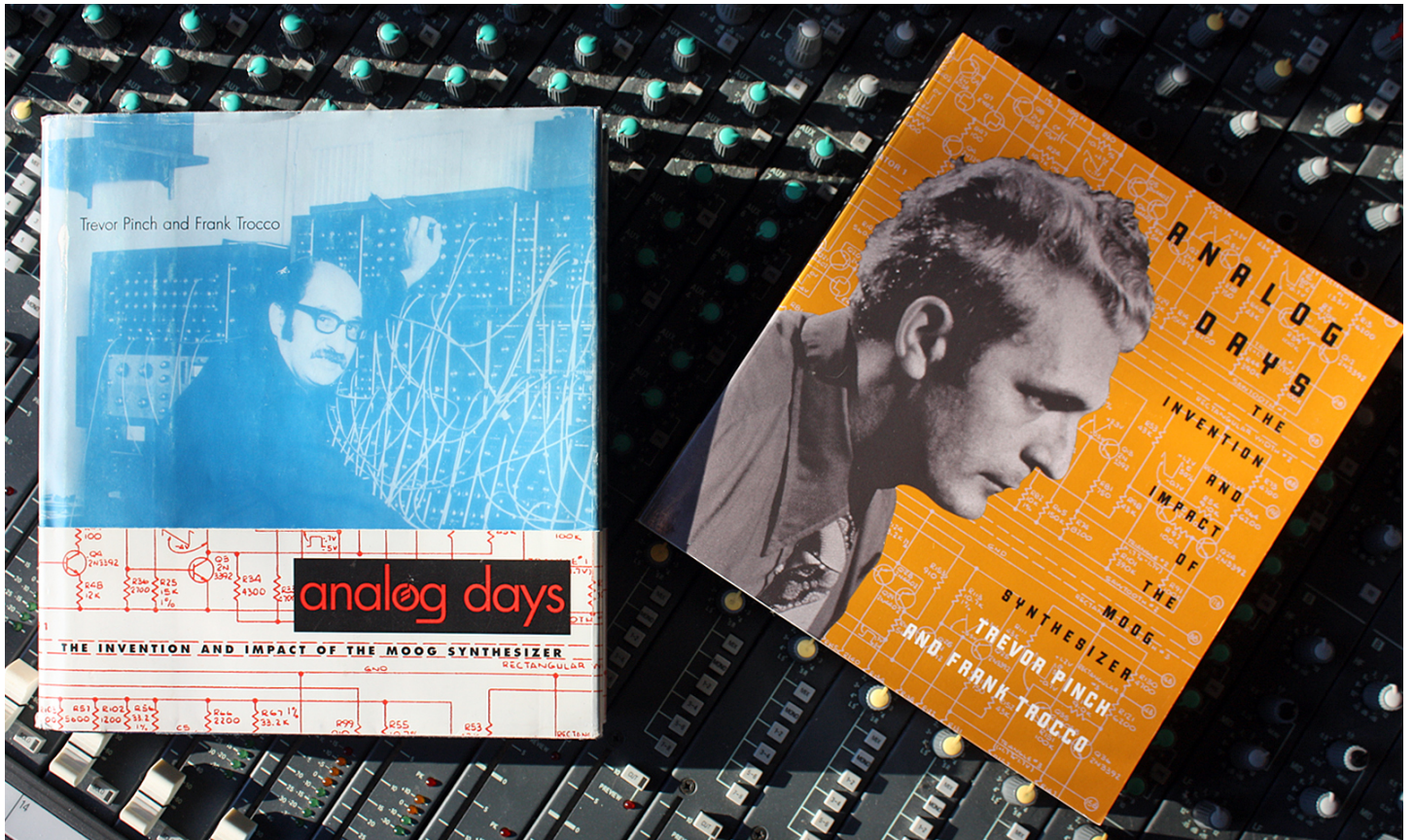


Book Recommendation: Analog Days (T. Pinch / F. Trocco)

Our headline is a bit simplified – we apologize. But even the original title **Analog Days - The Invention And Impact Of The Moog Synthesizer** seems almost too minimalist. The book illuminates the development of the (early) Moog company “in its time”, which also affects the development of other companies, such as Buchla, Oberheim, ARP, EMS and many other synthesizer manufacturer.



Analog Days by Trevor Pinch and Frank Trocco. (c) Harvard University Press. Hardcover (left) and Paperback (right).

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**Analog Days** is worth every single chapter. It informs the (possibly surprised) reader that the old Moog company sold more guitar amps than synthesizers. And it takes a closer look at the fateful meeting of several personalities that surrounded Robert Moog, like Herb Deutsch, Walter Sear, Bill Hemsath, Jimm Scott, Jon Weiss, David Van Koevering, Bill Waytena, Bernie Krause, Paul Beaver, Wendy Carlos, Keith Emerson, Malcolm Cecil and many more.

stations to listeners) could send your parents into a tail spin—"that's communist propaganda, son." As a bonus, you could also imagine you were bombing Berlin.

If your interest was in making electronic sound effects, the surplus stuff was invaluable. Synthesizer pioneer Don Buchla told us how the San Francisco Tape Center, one of the main venues on the West Coast for making electronic music in the early 1960s, used war-surplus gun sights and test equipment. Herb Deutsch, an experimental composer who had a formative influence on Bob Moog, got started with an off-the-shelf square-wave oscillator. Don Preston, who played synthesizer with Frank Zappa and the Mothers of Invention, told us, "I bought oscillators and put them all together, you know [from kits] . . . Even Stockhausen had to make a lot of stuff that he did in the early days."

**Bob's First Love: The Theremin**

One hobbyist project that captured Bob Moog's imagination was building an electronic musical instrument called the theremin.<sup>2</sup> Named after its Russian inventor, Lev Termen (Leon Theremin), this is the weirdest instrument in the history of electronic music, possibly the weirdest instrument of any sort, ever. The sound is similar to that of a ghostly, wailing human voice. And like the way we control our voices, by continuous movements of the larynx, tongue, and mouth, the sound of the theremin is controlled by continuous human movements—that of the hands or fingers moving through air. The sound always seems to be in motion. Unlike any other instrument, the theremin does not have a tangible solid controller against which you can bash your fingers—no physical resistance or feedback at all. You control the sound by waving your hands near two antennas, one for pitch and one for loudness. Without a moving hand, there is no sound. The sound is visceral, and people seem to have a primeval connection with the theremin. On seeing one for the first time, they often react by wav-

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ing their own hands near it to produce sound. It's like first learning to use your own voice: you believe that if you only worked at it a little bit harder you could get it to work for you. But it's damned hard work. The theremin is a notoriously difficult instrument to play because of the lack of any physical feedback.

Bob Moog's own connection with the theremin goes deep. He made theremins as a boy, and he still makes them today. He probably loves this instrument more than his own invention, the synthesizer. We've heard Bob joke about this, saying that his first love in life was the theremin and on the way to rediscovering his first love he invented the synthesizer: "I made my first theremin when I was fifteen in 1949. It was a hobbyist theremin. It didn't work especially well. And I just fooled and futzed with it."

Like all electronic instruments, the theremin's source of sound is electrical—two high-frequency oscillators that beat against each other to produce a lower-frequency audible sound. It is an electrical property of the hand, its capacitance, that actually controls the sound. First known as the "etherphone," the instrument was invented in Russia in the 1920s. Leon Theremin even got to demonstrate it to Lenin. After a spectacular tour of Europe, he came to New York City in 1927 to promote his instrument. It was an immediate sensation, and soon Theremin, with his Russian aristocratic roots, was the doyen of high-society

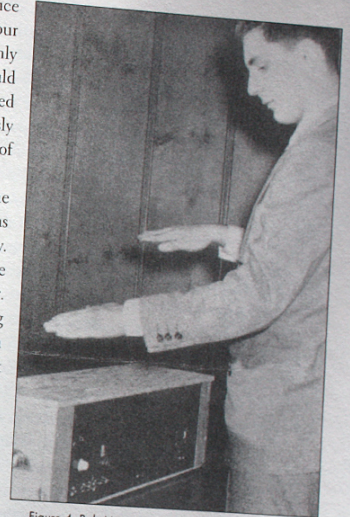


Figure 4. Bob Moog, age 17, playing theremin at Bronx High School of Science, New York City

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**4**  
**The Funky Factory in Trumansburg**

To come here was like funk city, you know, you opened the door, and you stepped in and the floor creaked.  
DAVID BORDEN

LOCATED ON THREE FLOORS ON Trumansburg's main street, next door to Kostруб's luncheonette and down the street from Camel's Bar, the former furniture store looked like any other Trumansburg business—rundown. The atmosphere of Bob's shop was described to us by several people as "funky." Bob Moog was an unorthodox businessman and liked to "make do." This was no high-tech operation with a slick sales force; it was Bob Moog and a few workers sitting in a storefront. Reynold Weidenaar, who worked there from 1965 until 1968, captures what it was like: "You had this old building that hadn't been remodeled, it was not very impressive. You had just a lot of tables. You had simple overhead lighting and people were working with their soldering pencils, and that was it—it didn't really look anything high tech at all. It looked like a lot of small-town women sitting there fussing, like they could be sewing, until you got close enough to see what they were doing." According to Weidenaar, solder splatters covered the wooden floors and benches; an ac-



Figure 11. Assembly at Moog's Trumansburg factory

desk, a secretary, a battered filing cabinet and a postage meter—was first located in the basement and then later on the second floor. On entering the front door you walked straight into the assembly area—several large tables in the middle of the room. Benches ran along both sides, where Moog and other engineers designed, aligned, and tested new modules. Later on, engineering moved upstairs to the second floor. There was a machine shop toward the rear of the building. The famous studio, like everything else, had the back of the ground floor. But the studio, like everything else, had a make-do feel. Weidenaar: "It was very undependable because whenever I couldn't make a deadline there would be a hole where there used to be a module, and he would ship it out." It seems that Bob Moog discovered in-time production long before it became a favorite Japanese management philosophy.

The makeshift nature of the facility can be gauged from Jim Scott,

THE FUNKY FACTORY IN TRUMANSBURG

The period between 1964 and 1969 is particularly exciting, when Moog (Trumansburg, New York State) on the one hand and Buchla (San Francisco, California) on the other led to early different approaches / musical orientations in the field of synthesizers / music electronics, known as East-Coast versus West-Coast sound.

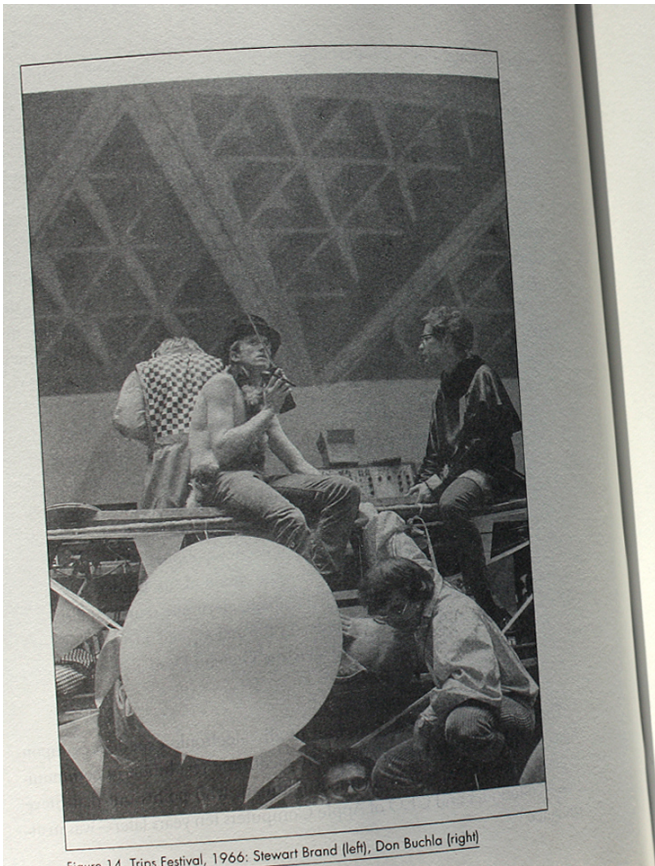


Figure 14. Trips Festival, 1966: Stewart Brand (left), Don Buchla (right)

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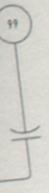


Figure 15. Buchla's Music Box in use at the Trips Festival

Acid Test Graduation

The last acid test of all, before Kesey served his jail term, was billed as the "Graduation." The Buchla Box was again present (played by the Anonymous Artists of America—a group who inherited all of Kesey's sound equipment). Tom Wolfe, in inimitable style, describes this final acid test where Kesey handed out the graduation certificates: "They're dancing clean out

HAIGHT-ASHBURY'S PSYCHEDELIC SOUND



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ble oscillators) . . . I do not want to make claims that I can't substantiate. But . . . I had it on TONTO . . . that was one of the first things that I discovered technically on the instrument.

They found that ARP would sell them individual modules, and this gave Malcolm the impetus to build his own modular accessories, for instance a voltage-controlled envelope generator (which Bob Moog didn't have) so they would be able to vary attack time with pitch. They soon got their hands on another Moog III at salvage prices whose case was burned in a Chicago dance hall fire, and they added two ARP 2600s, a ribbon controller, and two Moog drums. Eventually TONTO contained modules from Moog, EMS, Oberheim, Serge, and ARP, with Malcolm figuring out (pre-MIDI) how to get them all to "talk to each other."

Their Moog was now seriously gaining in dimensions, as Bob explains: "Our synthesizer was a whole bunch of little synthesizers. We had five or six filters, low pass and high pass. We had twelve, sixteen envelope generators, four keyboards. So we could play a lot of sounds at the same time." It was about nine feet long and they had to tow "the keyboard along on a little tea trolley to try to go from one end of the instrument to the other!"

Malcolm didn't see the keyboard as a constraint to musical innovation. He didn't think he had to play traditional twelve-note melodic music: "I particularly saw it as a freeing instrument, something [on which] we could be innovative rather than imitative." Malcolm wanted to leave behind polyphonic harmony and the twelve-note scale: "I was of the belief that this was the beginning of the music I'd been talking about all along, which had nothing to do with Western scales. In fact, 'River Song' is in seventeen tone . . . It was the first instrument I was able to tune to seventeen tone." Their goal was to make "timeless music"—"music that you couldn't put a period on, that could have been a thousand years ago, ten thousand years ago."

Occasionally they needed to imitate an acoustic sound—the story of

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Figure 26. Inside TONTO: Malcolm Cecil (left), Bob Margouleff (right)

their attempt to imitate the sound of a bell, which became the gong on "River Song," is a classic look at the labors and triumphs of emulative synthesis. It also illustrates the thrill of crafting recognizable sounds, even to two synthesists whose primary love was producing the unfamiliar:

We wanted this bell sound. And we figured out the envelope okay, that wasn't hard, you know, the strike and all that. But nothing sounded like a bell when we did it. So I said, "You know what, I've got this book, Helmholtz [*Sensations of Tones*], that I've been reading for years." I said, "I seem to remember . . . he analyzed the

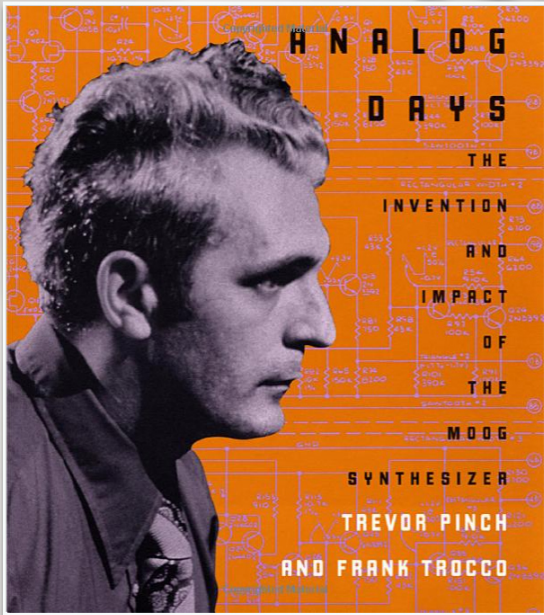
MUSIC OF MY MIND



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The influence of the *Tape Music Center* in San Francisco is also an exciting chapter. The *Tape Center* not only as birthplace of the Buchla instruments, but also as a meeting place for numerous icons of contemporary music (Steve Reich, John Cage, Terry Riley, Morton Subotnick and many more).

All in all, **Analog Days** provides a nice, supplementary overview of the social, musical and economic developments and changes that went hand in hand with the invention of the Moog Synthesizer in 1964 (then called *Electronic Music Modules*) and the invention of the Buchla Synthesizer in 1965 (then called *Music Box*).



## Analog Days:

### The Invention and Impact of the Moog Synthesizer

ISBN 0-674-01617-3

Paperback: 29.50 USD / 27.99 Euros

Hardcover: approx. 45 USD

Kindle: 17.35 USD / Euros

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### “Analog Days - The Invention And Impact Of The Moog Synthesizer” (Trevor Pinch, Frank Trocco)

First Harvard University Press  
370 pages, foreword by Robert Moog

ISBN: 0-674-00889-8 (Hardcover)

ISBN: 0-674-01617-3 (Softcover)

Amazon: [www.amazon.com/Analog-Days-Invention-Impact-Synthesizer](http://www.amazon.com/Analog-Days-Invention-Impact-Synthesizer)