



# ROBERT MOOG

## Moog Modular Audio Synthesizer, 1964

**THE OMNIPRESENT** Richard Lowenberg brought us right to the beast. "The Moog" was a series of black closets with intimidating front panels, crisscrossed with tens of patchcords.

It must have been somewhere on Fifth or Park, a Mid-town place that was elegant and pleasant. The music-man operating the Moog fit the interior (although we somehow had the impression that neither the interior nor the instrument belonged to him). Gino Pisserchio was his name and we later learned he was an early Andy Warhol star.

We brought a tape, a movement/dance improvisation, and patched the video into the Moog. The resultant success was the work of the patch: peaks of video triggering the sequencer steps. Later we went through another adventure in interactivity with Lowenberg. We hired a dancer by the name of Kei Takei and wired her up for muscle monitoring. —W.V.

**ROBERT** Arthur Moog was born in Flushing New York in 1934. He took degrees in physics from Queens College, New York, in electrical engineering from Columbia University, and received a Ph.D. in engineering physics from Cornell University in 1965. In the mid-50s he founded the R. A. Moog Co. for the manufacture of theremins; the company began making electronic music synthesizers in 1965 which became its primary concern. Moog's first synthesizers were designed in collaboration with the composers Herbert A. Deutsch, and Walter Carlos; other composers who have since worked with Moog include John Cage, David Tudor, Gordon Mumma, Richard Teitelbaum, Chris Swanson, and David Borden. With the success of Walter Carlos' Switched On Bach recording released in 1969 which uses a Moog synthesizer, Moog's name and equipment have become widely identified with electronic synthesizers. Moog is currently active in music research and in the development of new instruments, with particular interest in evolving more sophisticated control devices and more complex ways of applying control signals to add aural interest to sounds.

**ROBERT MOOG IS WELL ALONG** the way to joining those men whose last names have become common nouns in the language. Although the Moog Synthesizer is only one of several manufactured synthesizers, increasingly these days, a "Moog" means a music synthesizer.

Moog lives and works in Trumansburg, NY. You can get there by taking route 96 north out of Ithaca, up the west side of Cayuga Lake. The R.A. Moog Corporation is located in a white, two-story main street building, next to the local drug store, and across the street from a service station, on the right as you come into town from the south.

Inside and up a long flight of stairs you meet a receptionist, who will wind you through two drafting rooms and into a large room scattered with drawings, tape recorders, synthesizer components and drafting tables. Moog's desk is the far one on the right, next to the window, with the computer print-out of Snoopy hanging above.

Bob Moog does not look like you'd expect him to. That is to say he is not a weirdo long-hair electronic freak who looks like he has just grabbed a capacitor. His build is slender, and he might be described as looking "straight." He is reserved, but cordial.

Before sitting down to talk, we toured the plant, looking at the assembly room and cabinet shop downstairs. Since the permanently installed synthesizer downstairs was being used, we returned to his "office" for a demonstration on a smaller portable model. After looking at a tape deck built by Magnetic Recording, for which Moog's company is designing





Robert A. Moog at conference on Electronic Art Tools, at SUNY, Buffalo, 1977



MOOG Modular Audio Synthesizer, 1968-69

*electronics, we sat down again, rolled our tape recorder, and began.*

*J.R.: How did you get into this?*

MOOG: Out of interest. I began working with an electronic music composer and we developed some of the first ideas and then it just grew from there.

*About when was this?*

Well, we began in '63.

*Had you been tied in with any of RCA's synthesizer work in the middle '50s?*

No, I was independent. Remember that Victor never made anything commercially. It was just an experiment.

*Do you perform yourself?*

No! We sponsored a concert in New York, but I am not a performing musician. I'm purely a designer.

*Is each unit custom built today?*

A lot of them are standard synthesizer systems now. Most of our synthesizers are built out of standard modules, but we do some custom work. The module is the component of the synthesizer.

*Is it all built here?*

Yeah. The cabinets are built here and the modules are all assembled here.

*The unusual quality about this whole thing, I guess, is the fact that it's been so long since a new major musical instrument has come out.*

Well, it's too early to tell if this is going to be accepted in the long run. For instance, in 1929 and 1930 there was a huge flurry of excitement about the theremin. Today a lot of people don't even know what a theremin is. No one plays it.

*Do you think a lot of people, like rock bands, are buying these because it is like a sophisticated organ, just another keyboard accessory, and aren't utilizing it?*

It's true. It's years before you really know basically what a synthesizer is musically.

*It seems like many of the people in the pop field haven't really gotten into it.*

It will be years. Dick Hyman is learning, but he is learning slowly. The trouble is that guys like him and Peter Nero and George Harrison are successful pop musicians who have made a shithouse full of money, you know, with traditional instruments and they are not psychologically prepared to bust their hump to really do a job in a new medium because they are making so much money in the old one. So they skim a little cream off the top. Publicity value, and that's it. But Hyman is doing things, he's working.



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*You just don't hear that much good stuff.*

No, there isn't that much around. That's the shortage.

*Does it take a special type of mentality to work with a Moog?*

I suppose it does, but we can't characterize it. It takes a guy who's a good musician, and likes to work alone, and has a rational mind.

*Why don't you try to explain to me how a Moog synthesizer differs from an electronic organ in the way it develops or duplicates sound.*

An organ is a device on which you can play as many notes as you want. There are a great many note generators or oscillators in it. And that's about all there are. If you play one note the note, has a simple tone color, a tone color that cannot be varied or shaped by the musician as it is being played. You put your finger on a key, the note starts, you lift your finger from the key, the note stops. That sort of tone, a tone that does not vary as it goes on, is only one of a great many types of musical tones.

Just about all other musical tones vary a great deal as they go on. When a violinist plays he is constantly moving his hands, changing the amount of pressure with the bow. And these things result in variations in pitch, tone color and loudness. These greatly affect the expressive content of the sounding of the music that is made up from sounds.

What the synthesizer is all about is giving this sort of control over the sounds to the musician. Once the musician sets up a sound he can then impart as many variations as he wants into the various properties of the sounds, either directly with his hands, or by mechanical means, program means.

That's the difference between a synthesizer and an organ. The same difference exists between a trumpet and an organ. The synthesizer plays one note at a time, and at the most two or three, but those can be shaped very carefully.

We would also allow for its speed to build up with a characteristic time. All these things I mention correspond to a simple electronic mode of operation that you establish with one or two patch cords, and one or two dial settings. What the musician gets used to is thinking in terms of these operations, which have direct musical meaning . . .

*Actually, since you are controlling with, for example,*

*a keyboard, could you use your keyboard to not only change your oscillator, but control other functions too?*

Yes. We can use the keyboard to change anything that is changeable at all.

*But it isn't necessary to have a keyboard to control the instrument?*

Right. There is usually a keyboard, but the keyboard is only one way of controlling the instrument, of playing it.

*If you want to make a "replica" of a sound . . . like reproduce a trumpet or violin, how do you . . . ?*

Musicians don't usually think of making replicas. It is sort of a futile exercise. The synthesizer works according to a certain pattern of logic and by using this pattern of logic you can construct a great many sounds, some of which are trumpet-like, some of which are violin-like, and some of which you never heard before. But if you think in terms of starting with something that makes sense with acoustical instruments and trying to force the synthesizer to do that, you'll generally fail. You think more in terms of following the logic of the synthesizer, of the sort of things it can do well, to get the sort of tone color as close to the sort of tone color you want.

*Could you elaborate on that? Where does it excel?*

Let's assume we want to build a violin-like sound, as an example. We are never going to make a sound that is completely violin-like, because a synthesizer doesn't function like a violin.

We can do the following things: First we can pick a wave-form that's close to the wave-form of a vibrating string that's being bowed. Right? Then we can pick a filter that has the same resonant characteristics as the body of a violin. Okay, so far so good. Now, we can shape the loudness, causing it to build up in the same way as a violinist does when he puts the bow down on the string. The loudness builds with a certain characteristic time. So when a violinist plays, when he starts a note, he'll put the bow down on the string and he'll gradually, with his left hand on the finger board, build up a vibrato, both in speed and intensity. He'll start off very slowly, and then build up faster. This is for a long violin tone.

Suppose you want to do the same thing on a synthesizer. Well, what we could do is use another periodic generator, or oscillator, to produce a slow variation that would correspond to the vibrato, a

variation of six cycles per second. We would arrange for that to build up with a certain characteristic time, just the same way as we allowed for the sound itself to build up with a characteristic time.

*How else would you do it?*

A computer program. Other control devices, manual control devices like a ribbon controller. Sequential control which allows you to set up automatic patterns. The simplest way is, of course, just turning the dials on the instruments themselves. And there is what we might call analogue programming . . . using other modular instruments to produce the contours of the variations.

*What type of work is being done with computer programming into the control circuits?*

The most interesting work is being done at Bell Labs. They set up a fairly elaborate program to enable assembly of sound sequences and edit them. The most interesting part is the array of input points. They have a couple of keyboards and a joy stick-like affair and pots, a panel full of pots. They have a great big cathode ray tube.

The output of this program, the output of the computer I should say, contains 14 signals, control signals, and they go off to the oscillators and amplifiers and so on and produce the variations. Well, these 14 signals are plotted on the cathode ray tube at the same time, and so you have 14 little squiggly lines. And a vertical line goes across the screen and tells you where you are in time, as time progresses.

Then you can stop it, you can stop the parameters and you can vary any of the 14 parameters, move it up or down and then go right on. I think it is a light pen that they use. You know, without touching tape, without even getting involved with tape you can edit the whole thing. Really beautiful.

*Is any of this available on record?*

There's no music on it, it's just experimental work.

*Are you involved much with the creating of special new sounds, like the human voice?*

Not really. Carlos did a little of that in Well-Tempered Synthesizer, but we're not really into that. It is something the computer people are very interested in, as a method of giving the computer a voice.

*Where is your primary design effort going?*

Two or three areas. It's in improving the circuitry of

what we have now. And in opening up two new markets. One of them is a small, light portable unit that rock groups might use . . . keyboard accessories. And the other is teaching equipment for high schools that are interested in electronic music.

*Is your biggest market now with the classical people or the rock bands?*

What does classical mean?

*Well, serious music.*

Half go to serious composers and universities, and half go to recording people . . . recording studios and independent commercial producers.

*Somehow I'd gotten the idea that some of the serious music composers consider the Moog a late comer that is not totally welcome. Like progress stopped with the synthesizer built by RCA.*

That's one extreme point of view, I'd say. The fact is the RCA sound synthesizer has been used by eight or 10 people in the world, ever, in any music hall. It costs nearly \$200,000. Our customers number in the hundreds, and I think as far as they are concerned, our equipment is welcome.

*What is the Buchla?*

Well, it is a synthesizer developed independently from ours. It uses some of the same ideas, and some are different. The differences are in the way it is organized. The Buchla is organized toward making automatic sequences of sound. Any sound is rather simple. Ours is not organized to make automatic sequences like the Buchla; it's organized to playing the sounds, but where the sounds can be very complex.

*What's the effect of the new quadrasonic stereo?*

Well, some electronic music composers have been doing that for years. Now the Columbia-Princeton people never did anything else except four channel sound. How important it will be commercially I can't say.

*Where do you get your ideas from?*

It's a combination. Many come from musicians and some come from our engineering people here. It is very much of an interrelated thing.

—Judson Rosebush, 1972