## **Dave Rossum Interview**

## (by Jay Lee in Polyphony Magazine November/December 1981)

This month's interview is with Dave Rossum of E-mu Systems Inc. Jay sent the following introductory comments along with the interview.

"My first encounter with Dave Rossum was over the telephone some nine years ago, when he prevented me from purchasing sight unseen thousands of dollars of E-mu equipment. Dave instead encouraged me to purchase a few submodules and test them out. I did and I was hooked. Dave is an original. His first E-mu modular system has set the standard by which all other modular systems will be judged. Brilliant and witty, Dave is a new breed of electronic music pioneer whose contribution to the design of equipment for other manufacturers may have shaped the nature of the synthesizer as much as did Robert Moog's original thinking.

Jay Lee: Isn't it true that your formal training was as a biologist?

Dave Rossum: Yes, that's pretty much true. I did my undergraduate work at Cal Tech in Pasadena starting out as a chemist, then changed to physics, and then (about the end of my sophomore year) changed again to biology because it seemed that the neatest people were in biology. In the end it didn't really matter what I studied; I guess my career shows that. I graduated in 1970 with a Bachelor of Science in biology, and went to University of California at Santa Cruz for graduate school.

JL: Who, or what, changed the direction of your career? DR: At U. C. Santa Cruz I worked on the biochemistry of ribosomes, and my adviser was a man named Harry Holier. One day I came into the lab and he asked, "Have you ever seen a Moog synthesizer?" and I said no. He mentioned that they were unpacking a Moog 12 (predecessor of the Moog 15) over at the music department, and would probably need some help. As people there started playing it, I realized that I intuitively knew as much about it as anybody else in the room...it just seemed natural to me. I helped one of the professors there, Eric Regener, in teaching students how to use the instrument as well as encouraging them to experiment with the synthesizer. When people ask me how biology relates to electronic music, I simply reply that the whole word is negative feedback.

JL: Your modular E-mu system is considered by many to be the Rolls Royce of analog/digital music equipment. How would you describe your system, or modular systems in general?

DR: Well, in fact you're wrong...many people say that Rolls Royce is the E-mu of the automotive industry (laughs). When we decided to design the modular system, we had to make a decision concerning the level of the instrument...would we make a cheap one, a fine one, or what. We decided to make the best we could possibly make; any time we found a component, a design, or anything that would make it better, we put it in unless it was just totally cost-prohibitive. And this attitude kind of shows.

When we go around to demonstrate modular systems, we take prototype #l - most people simply won't believe that the instrument is 10 years old. We clean the dirt off and wash it up before we show it, but that's about all we do. The reason we can do this is because we use such parts as expensive controls and

knobs. We pay maybe \$1.50 a piece for the knobs on the synthesizer, because we want them to last. That kind of caring attitude comes through particularly with the panel components; we want everything to last 10 or 20 years, down to the 1/8 inch panels that won't bend when you push on them. In terms of design, I've looked at a lot of other circuit designs, and I think that our approach is substantially more sophisticated than anyone else's.

But the perfectionist attitude also has some drawbacks; We often get criticized because we update our circuitry, and someone will buy an E-mu system only to have us come up with a replacement submodule a year later that performs better than the original. We usually keep it pin-for-pin compatible to allow for upgrading, but very often people do get upset because our instruments are constantly evolving and improving. I don't know what to do about that problem - if we find a better way to do something, then that's the way it has to be done. Even our decisions as to what products to build show this influence. We built modular systems first because with a big enough modular system, you can do anything. We have a huge variety of modules - if we think of something that can't be done with our system, we'll add the modules necessary to do it. For example, we have five different kinds of filters.

JL: How did your partnership with Scott Wedge get started, and who does what in your company?

DR: After Harry Holier and Eric Regener introduced me to synthesizers, I got together with a group of Cal Tech people and we spent the summer of 1971 building a synthesizer. Towards the end of that summer, Scott Wedge showed up at our door in Santa Cruz - we had a sign out front that said "Starships and Synthesizers, since 1984. I'd known Scott since junior high school, although after I Went away to college, we didn't see each other that much. Scott had hurt his back jumping out of airplanes and didn't have anything to do, so he came over to see what I was up to. Just as in my case, he became intrigued with synthesizers.

After that summer, all the Cal Tech folks went back to various places, but Scott, myself, and my girlfriend at the time, Paula Butler, continued working in our spare time building a synthesizer. We called it the E-mu-25 (named after our favorite drug), and spent much time improving it and learning more about the best way to do things. Eventually we sold that first unit, and used the money we got from it to build a second one. We sold the second one, and used that money to start designing a modular system. By now it was November 1972, and we decided to form a real company. We became a general partnership, filed our papers, opened our bank accounts, and E-mu systems was formed. Back when it started, Scott worked full-time at E-mu.

I worked at a little company called Santa Clara Systems as an engineer(which enabled me to earn enough money to buy parts), and would then spend another eight hours working at E-mu. Paula provided life support and cheerful company for us all; she also had a nine-to-five job, so it was just the three of us working at first and supporting ourselves with other jobs. We bounced ideas off of each other, and nobody wore a single hat back then. When E-mu became incorporated in 1979, we tossed a coin and Scott lost, so he became president and I got to be vice president and chief engineer. Since that time he's been taking over the financial and management end of things, but also attends to a number of engineering functions- he's great at digital and software stuff, and can hold his own in analog. I help out with management too sometimes, so we still share tasks, but Scott's less involved in the engineering than I am now.

JL: Your company started out humbly, coupled with a friendly philosophy. Has that changed over the last eight years, and if so, why?

DR; Well, I think we're all a little less humble than when we started; I don't think we're any less friendly, although changes in our lifestyles may make it appear that way to some people. I've sort of become a bit of a recluse. It's hard to get to talk to me, I don't come out and meet everybody that comes in the door anymore, and that's a change in my own lifestyle. In the beginning synthesizers were my life: I'd spend16 hours a day on them, and also, my time was less structured. So, if somebody walked in the door, I'd chew the fat with them for an hour or two; now it matters whether or not something gets done by next week, so I don't have that freedom anymore. I also have more hobbies now that also take time. I mountain climb and teach scuba diving, and my life is real full so I can't allow myself so much time to relax with people. That doesn't mean I'm any less friendly, all it means is that you have to come scuba diving with me rather than talk synthesizers.

As far as the company philosophy goes, we very definitely hold an attitude that is lacking in other companies, namely, even if you don't want to buy something from us we'll tell you about what we do and try to help you out. It's not so much a selfless attitude as the fact that when we do people a favor, they'll talk to their friends or when they are ready to buy, they'll come back because they have a good feeling about us. We're still a small company, and I hope it stays that way. All of our employees are friends; we do other, things than electronic music together. That's real important to me - I want to keep the company so there isn't any "elite" management department or so that engineering doesn't hide from the production people and so on. Internally, that's important to me...more important than the size of the company.

JL: You were involved in the design of the first electronic music chips (SSM). To what extent were you involved in this?

DR: The story goes something like this. Back in 1975, Ron Dow dropped by E-mu and had this idea for a VCA design on a custom chip. He wanted us to kick in the \$1000 or so it took to integrate it, because he didn't have the money. It sounded interesting, but then he said the power supplies couldn't be any higher than +12V. Since the E-mu system was based on +15 and I didn't want to change the whole system standards for one IC, the idea no longer made sense to me. So we turned Ron down and he then got connected with SSM, and they were the ones to integrate and start selling the SSM2000.

About a year later I ran into Ron again, and he mentioned an improved VCA they were working on with+15V supplies. With my major objection gone, I became interested again. I contributed some ideas to the SSM2010 (low distortion VCA), then Ron started frequenting E-mu and used our lab to develop the chips - first the 2020 voltage controlled amplifier, then the 2030 voltage controlled oscillator (which was a very hard project and took about a year), the 2040 voltage controlled filter which went pretty quickly as did the 2050 transient generator, and we've kept up the collaboration since then. My involvement varies from chip to chip; with the 2020 I helped Ron design the control stage, while he did the VGA cell entirely by himself. The oscillator was definitely a joint -effort, while the 2040 and 2050 were largely my designs. All of the SSM chips vary like that. We've pretty well decided that we're codesigners on what we do, because you just can't separate where an idea came from. Ron might suggest something to me for a filter design, but I'll end up using the idea with something like a transient generator instead.

JL: Your influence in the design of both the Prophet 5 and the equipment of Oberheim Electronics have been grossly overlooked. Would you care to comment on what you've done for both companies?

DR: Let me talk first about Tom Oberheim, whom I met at an AES convention in the spring of 1974. We both liked each other immediately and started talking about ideas. He was talking about his phase

shifter, and said something to the effect that he knew it could be done with a 3080 transconductance amp, but didn't know exactly how to do it. So I scribbled out a circuit and said here's how you do it. He said "I bet that's patentable", and I said "I'm sure it is". He asked how would I feel about patenting it and sharing the rights under the patent? I thought it was a great Idea, and that was the beginning of our association. Incidentally, I don't think he ever used that design in anything he built. Towards the fall of that same year he visited E-mu to see our prototype polyphonic keyboard, and decided that he liked that design too .He felt that it too was patentable, and wanted to use it in a product. So we worked out an arrangement whereby he'd pay us royalties, and could use the circuit, and we would share in them benefits of the patent. The arrangement worked well in the sense that it was profitable for E-mu, we were essentially putting an investment into Tom's company with our work, and the payments (in the form of royalties) came later. I know Tom was happy with the arrangement too.

The involvement with the Prophet 5 was very similar. Dave Smith had come to us for design help with other projects, when he decided to get into a synthesizer, he came over and basically started picking our brains from the beginning, which was an intelligent thing to do. We did some specific circuit designs for the Prophet 5, reviewed virtually everything in it, and gave him access to lots of E-mu documentation. Again, we had a royalty arrangement, the product went over well, and we made a lot of money...but of course had the Prophet not gone over, we wouldn't have gotten anything for our time so essentially, we again invested in the company. Still, royalties are not a trouble-free way to conduct business. One reason why we have a bit of trouble right now in our relationship with Oberheim and Sequential Circuit\* - I can't say I'm close friends with, or see a lot of, either company - is because of this arrangement where they're still paying us royalties for things we did a long time ago. Sometimes, people forget how much they appreciated you a long time ago. So we've learned that royalties aren't always best, not so much because they're not financially lucrative, but because they destroy friendships - and as far I'm concerned, friendships are probably more important than the money itself.

## JL: Who or what was your greatest influence in designing electronic music equipment?

DR: I can't say there was one greatest influence, but here are a few. While we were designing E-mu's Universal Active Filter for the modular system, we'd scrape around and see what other people were doing - I'm not proud, I'll steal anybody's idea whenever they've got a good one (laughs) - and came across the ARP multi-mode filter spec sheet. The specifications were pretty amazing, I worked and worked and worked to get a circuit that would meet those specifications, analyzed the thing, and found out all kinds of obscure information about parts. For example, the final design had to be re-designed because of the capacitance from one trace to another on the circuit board, which affected the performance of the whole thing. I was just totally beat designing that thing...I'd dream about it every night.

When I finally got my hands on an ARP multi-mode resonant filter, it didn't come anywhere near to the specs they had listed on the spec sheet. Sometimes believing that it's possible to do something can inspire you to exceed what really is possible. Another great influence on me was Joe Parmalee, for whom I worked at Santa Clara Systems. Joe was an absolute perfectionist, if there was any conceivable way to improve a circuit, he'd make me do it. That was real good training, as it taught me to be very thorough and do my best work. Other influences exist all around us. We call up a lot of people and ask them what they think, and remain open to what they say. So, anybody can influence us and they won't even know when they've done it. I don't always like an idea when I hear it, but after it sets for a few days I may decide that it's all right after all.

JL: Voltage control is an important aspect of the modular system. What is its future, if any, with the

advent of digital synthesis?

DR: Well, I think there is a lot of misunderstanding about digital synthesis - what it really means and what it's all about. I can remember Scott coming in once and pointing out an ad to me that said in capital letters, "Digital is Better". Scott says this is what people think, but we both know it's BS. A lousy digital synthesizer is a hell of a lot worse than a good analog synthesizer, but somehow people got this brainwashed idea that digital is better. Actually, digital is different, not necessarily better. But let's look first at analogies between digital and analog systems - and there always are analogies, since both technologies are trying to accomplish the same goal. Voltage control is considered a big thing, but as most circuit designers know it's really current control.

There's nothing magic about voltage control; what's magic is that you can take a handful of modules and because any output can control any input, the number of different patches - the number of ways of making sounds - goes up exponentially with the number Of inputs and outputs. So with a relatively small number of identical modules, absolutely incredible things can be done...and that's what's so neat about voltage control. Look at the little pre-patched synthesizers, sure they're voltage controlled inside, but who cares? They don't make much use of the voltage control. A modular system does a lot more. Looking at digital systems, the analogy to the patch is the algorithm - the way that you push numbers around inside the computer. For example, Fourier synthesis is one algorithm, FM synthesis is another algorithm, a digital filter is yet another algorithm, and you can combine algorithms just like you would combine patches. Hence, voltage control would be analogous to a variable algorithm digital synthesizer, where it didn't just compute in one way, but you could actually go in there and write the microprograms and get the thing to compute the sound in whatever way you wanted. The problem with that approach is you have to be an incredible computer jock D writing microcode is hard stuff D and second, you have to find a general purpose microcoded computer that's fast enough to generate sound in real time. That's a total bitch; it just can't be done economically right now. So, I would say that the analogy of voltage control is still a goal in digital synthesis, and it's not here yet.

When you look around at digital synthesizers, you hear some pretty incredible sounds, but they're still really limited. When we get into that multiple algorithm instrument, you'll really have some power. On the other hand, I don't think the analog instruments are ever going to be outdated or obsolete; they do what they do, and what they do is pretty neat. I think that eventually we will translate the concept of voltage into variable algorithm in the digital machines, but that's in the future.

JL: E-mu's Emulator (Ed. note a keyboard instrument that reproduces, rather than synthesizes, the sounds of other instruments and sounds - similar to the idea of a solid-state Mellotron) is a radical departure from your other work. What prompted you to take this direction?

DR: In the sense of the product concept, I guess it is a pretty radical departure. But in the sense of the inside design, it's amazingly similar to what we've done before. At a certain point our financial picture made it clear to us that we needed to get into some higher volume work if we were going to stay alive. Scott and I were getting tired of starving to death and not having any extra money to play with, when we could have worked in a silicon gulch industry and made at least five times what we're earning right now. So to some extent, it was a financial decision that made us go in the direction of a high volume instrument.

The actual idea came from the fact that I was kind of amazed that something like the Fairlight could sell for \$35,000 D or whatever it is - since I knew that it could be done a lot cheaper with a proper design. I think I've been quoted before as saying that anybody can design digital, and I kind of put my

money where my mouth was and designed the thing. I think it's a really neat instrument. It does something the electronic music community wants, and it does it well and simply. The hardware in there is exceptionally flexible, so despite the instrument's apparent simplicity, it's pretty incredible what it can do. I could spend an entire interview talking about the Emulator...but that's not really what we're supposed to be doing here, so let's continue.

JL: What do you see in the future for electronic music, and are you working towards that end?

DR: I see a lot of different things in the future of electronic music. You can look at the Casio machines, and that's one future of electronic music - getting it into every home, making it cheaper, and kind of throwing away the fact that it wants to be high fidelity. That's one future of electronic music, but I don't really feel I'm working towards that end so much. In another sense, I see making the existing concepts D programmable synthesizers - more affordable. We're also working towards more utility for a given amount of money, which shows in an instrument like the Emulator. In the future you're going to see more and more digital instruments, not because digital is inherently better but because digital technology is going to be getting cheaper and cheaper, which will make it more cost-competitive with the analog stuff. We're definitely working towards that.

I think that E-mu will always be at the forefront of research, too, I'm a curious person and I've got some pretty off-the-wall ideas that I'm working on right now. But I don't think you'll see E-mu come out with any more real expensive dream machines, that's more for beginning companies. When you're first starting out in electronic music you're kind of idealistic and willing to work for nothing, and that's when you can go work for an artist or people who want special gadgets. You work for little money, spending lots of their money, to make incredible machines. As you go on in life you tend to think more of your own needs and want to produce more volume items...and end up making Emulators and things like that. Again, fine instruments, but more for the masses.

JL: Besides doing design work for Oberheim and Sequential, have you done design work for others?

DR: Yes, I have done design work for a lot of different people some of them not in the electronic music community. I'm still closely associated with SSM, and consult on almost all of their designs. I've done consulting for my previous employer, Santa Clara Systems, as well as some digital memory testers and Vice's for National Semiconductor, some synthesizer design for a company called GEM which makes electronic organs, Lyricon, Octave Electronics, and I'm also doing some work with a few other companies whose names unfortunately can't mention due to marketing considerations. E-mu is actually two companies; there's E-mu Systems Incorporated which makes the modulars and Emulators and so on, and E-mu Design which is the consulting and designing service. There we do virtually anything anybody wants us to do as consultants. And yes, we are available.

JL: Would you care to share your secret of accomplishing so much work...does it have something to do with your style of work? You're certainly not a nine-to-fiver, but more of a marathon type. How does this help you work?

DR; Well, I think that the thing I can share with people is a concept called intention. Basically, when you have an intention to do something, you direct your entire attention all of your consciousness is just focused - on what you want to do. You have to have really clear goals, go one step at a time, and keep a truly open mind - don't bang your head against the wall trying to get through, be aware enough to realize that you can often walk around the wall. I'm kind of a tornado around work, I leave little piles of mess behind me. My intention is more to get the job done than clean up after myself, and the people

that work with me realize that. The other thing that's real important to me is being completely wherever I am. When I'm at work, I'm completely here, I don't think at all of what I'm going to do tonight, or what I'm going to do tomorrow; I think about exactly what it is I'm trying to accomplish. On the other hand when I go away, like when I spent last week getting certified as a scuba diving instructor, I didn't think about E-mu for a second. That intensity is what helps me to do as much as I do. Well, I can see we're running out of time so that should just about do it for the interview. Thanks for the chance to say some things, and for the good questions.