

WENDY CARLOS



PHOTOS BY VERNON L. SMITH

Meet the artist: Carlos in her studio, flanked by (clockwise from lower L) one-octave keyboard used to transpose Synergys, volume/tone control, two Synergys, Apple Macintosh, GDS keyboard and terminal, diagram of generalized keyboard Wendy hopes to build, Hewlett-Packard plotter, Roland SBX-80 sync box.

There are only two kinds of science—
physics and butterfly collecting.

—Sir Ernest Rutherford

DAY ONE: ENTER THE DEN OF THE butterfly collector. Even as I set down my bags, it's evident that something is different. I give the room a once-over to try to identify it. An overly spirited Wheaton terrier named Heather is happily bouncing around the room after greeting me, while three exotic-looking Siamese cats give me the curious eye... Nothing new there. A friend of Wendy's is visiting up in front, searching for something in the many walls of books. We nod hello. Continue scan. A Macintosh computer, sporting a new attached graphics tablet, occupies half of the dining room table, software manuals stacked alongside. That's new, but not it. Walk through the dining area into the studio. A few modules from the Moog system are scattered around the room. The two Synergys and GDS haven't moved, although a couple of new vocoders are in view. That's not it either. And then I figure it out: It isn't anything physical. It is in the air—the uplifting tension that comes with the excitement of new discovery. The butterfly collector has discovered a new specimen, and she can't wait to share it with the world.

Two years have come and gone since the last specimen in the Wendy Carlos collection was put on display. The culmination of a year and a half of meticulous investigation into the nature of orchestral instrument timbres and their replication using hybrid additive synthesis, *Digital Moonscapes* was the subject of *Keyboard's* Soundpage in Dec. '84. The additive techniques used in synthesizing the voices were then explained in a how-to piece in the June '85 issue. So *Keyboard* readers should need no reminder of the enormity of the task, nor of the expertise with which it was handled. Yet the general public showed little or no interest in the record. This, perhaps, was due in part to the perception (however inaccurate) that synthesizers have been able to mimic instrumental timbres with precision all along. It may also have been due to the lack of promotional support that CBS, Wendy's label for almost two decades, gave the album.

Be that as it may, it was still somewhat surprising that the next album was so long in coming. After all, we had been talking about it since the Dec. '84 Soundpage. At that time it was going to be titled *Catalyst*, and the voices were going to be hybrids of the library of orchestral timbres Carlos spent so many hours building. Two years later, *Catalyst* has been reborn as *Beauty In The Beast*, and (barring any unforeseen difficulties) it will be released in November on Audion/JEM/Passport. Wendy's final

release for CBS Records, *Secrets Of Synthesis*, is tentatively scheduled for release in April 1987.

The source of Wendy's exuberance is more than the pending release of two new albums. A barrier has been stripped away for her, exposing a new world that sorely needs exploring. That alien world is non-equal-tempered tuning. And like any explorer *cum* butterfly collector, she hopes that when she shows us what she's found, we'll be stimulated enough to join in the fun.

But there's a cynical side to the Carlos exuberance, born out of the knowledge that she has tried to lead the way before and found few people following. Of course, nobody would disagree that Wendy's 1968 LP *Switched-On Bach* (which she affectionately refers to as S.O.B.) is the single most influential synthesizer record of all time. But while there were many S.O.B. imitators, Wendy has often expressed disappointment at how few (virtually none) have managed to take that particular style beyond where she left it. And because *Digital Moonscapes* in Wendy's eyes represents a much greater accomplishment than S.O.B., and many musicians dismissed it as wasted effort in light of the advent of the sampling machine, it's no wonder that she might fear that her latest efforts could go unnoticed for years to come. Lest that sound like sour grapes, by 'unnoticed' we really mean that no one will champion the cause along with Wendy, that she will have to continue peeling back the layers of this onion virtually by herself.

Perhaps the concern that underlies all this is really for the state of today's electronic musicians. It's an unselfish worry that people are so caught up in all the new technology that they forget the point of it all—the music. Newcomers and veterans alike would do well to give *Beauty In The Beast* a listen. Not only does it successfully straddle the line between imitative and non-imitative synthesis, not only are there tunings you've never heard before, the compositions go a long way towards displaying the kind of form that's often painfully absent in works by less experienced practitioners of the art.

Secrets Of Synthesis, on the other hand, is an instructional record designed to provide some insights into Wendy's music; she narrates throughout. Much of the material will be familiar to *Keyboard* readers, but the audio examples and narration are sure to shed new light on all of her CBS records.

If you want still more information on this influential artist, you may be able to track down our Dec. '79 and Nov. '82 cover stories in your local library; both are

Defying Conventions, Discovering New Worlds

By Dominic Milano

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reprinted in *The Art Of Electronic Music* [William Morrow & Co.]. A lot has happened in Wendy's artistic development in the past four years, so it seemed to be time to catch up with her for another full-length interview. What follows are highlights of a three-day marathon conversation, condensed from the original form because Wendy speaks in paragraphs, each sentence convoluted with parenthetical asides and tangential clarifications. We collected enough material to fill an entire issue on its own if published uncut. We have tried to be true to the spirit of the dialog, which is best summarized by Carlos herself: "The greatest thing we've got going in our culture is our eccentrics. I was once embarrassed by my eccentricities, but now I value them. One of the things I've noticed in *Keyboard* lately is that very few people are willing to get on soapboxes. I'd like to see more people do that. It's the healthiest thing in the world for people to disagree, fight it out, and get to the truth of the matter. So if any of my strongly felt opinions upset any readers or potential interviewees, I hope they get upset enough to get on their soapboxes and let us know about it. Don't die and keep it a secret."

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WHAT SKILLS DO YOU THINK ARE essential for musicians working in the electronic medium?

Anyone who is not comfortable around electronic things would be best off not getting into the field. I mean, if you were pitch-deaf, you wouldn't want to be a singer. I suppose you could say you want to be a Hollywood star when you grow up, but if you have no acting skills, you're wasting your time. You should train yourself to take advantage of what skills and talents you're born with, and we're all born with something. You may not know what talents you have, or you may be lucky and find out what your talents are early on, but I've never met a pro who didn't have some special skill. It's liberating to be able to set up a home studio, work at making music of your own, honing your skills in private, and why not? But there's no way around learning some composition, arranging, performing, how timbres work, plus all the tech stuff. Anyone who expects that is kidding themselves, unless it's mainly done for fun. I'm sorry, but that's just the way I feel.

How do you feel about the idea that technology has made it easier for would-be musicians to make music?

That's a different thing. There is a democratic thing about it that's nice. I don't like elitism. That's why I apologized for my comments. I don't like people to come across to me as elitists either, unless what they're saying is simply the truth. The truth can be off-putting at times. I think

"You should take advantage of what skills and talents you're born with. . . but there's no way around learning some composition, arranging, performing, timbres, plus all the tech stuff."



Now how perfect is that perfect fifth? Carlos playing a Synergy, flanked by computer gear (clockwise from center): two Synergys, Apple Macintosh, Hewlett-Packard computer, Mac keyboard and numeric keypad, graphics tablet, Hewlett-Packard plotter, Roland SBX-80 sync box.

that manufacturers ought to be trying to democratize music as much as possible, and many of them are. That's as it should be, because music is a language. It's a tragedy that most people don't speak the language, and manufacturers who are trying to remove that stigma are doing the culture a great service. Unfortunately,

almost any positive tool can be abused. You can take a hammer and build a house with it, or you can take a hammer and kill someone with it. Clearly, the tool that allows the average people of the world to (a) find that they enjoy music, (b) learn more about it than they used to know,

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discovering new depths that they didn't know existed, and (c) finally admit they'll never be great musicians or discover they could be great musicians with a lot of work, is performing a great service. However, if the technology these manufacturers are providing takes a good pianist who can play through the usual repertoire—Chopin, Liszt, Brahms—but who has no grasp of electronic music—and gives that person the illusion that "bingo!" they now also know all about the electroacoustic arts, you're lying to them. It doesn't matter what device you buy, you can never put something into a box which will replace what should be in your head. All you can have are tools. If you know how to use tools well, you can make gorgeous things with them. If you don't know how to use them, they'll just collect dust.

Has technology advanced quickly enough for you?

Anyone who has been in the field for long enough gets to the point where they look at some of the ads and sort of smirk, "Oh sure. The only limits are your imagination." What nonsense. In fact, with a lot of the hardware out there, the limits are very much the equipment. Although you do have to take the first step before you get to the second, and I think there has been progress. It's slower than I would have imagined, but I think there's been progress. I'm not going to dump on manufacturers just because they haven't taken the tenth step yet, even though I'd like them to because that's where I'm at. I'm sure musicians more advanced than me would have liked to have seen the twentieth step by now.

There are those who think that electronic music is somehow easier to do than the so-called acoustic forms.

Yes. I'm aware that a lot of people who make movies think of electronic music as being a cheaper way of doing a score. In my experience, it's probably about even. It might even be harder to do a good electronic score than it is to do an orchestral one. Obviously, if you have an innocent sitting in front of a film improvising these marvelous inspirations on C major it's not doing anyone any good. It's cheap, and it sounds cheap. But if it's musically literate and done with professionalism and is right for the film, then it's good. It seems as though we've forgotten in the rush to be popular and successful, that there's an art behind creating good music. Let's get real.

If you are to have a long career, it's not enough to count on fooling naive clients. You can fool some of the people some of the time, as Abe said. Or maybe a film producer will be looking for a way to save money, and hire the musician only on that basis, thinking it's a shortcut. But usually it's bad news, and audiences can tell. They may not know why, but they can smell cheapness.

Those movie people act as if there's a one-to-one correlation between technological advances and artistic development.

Through the years, it's become more and more obvious that it's damn hard to do anything good, never mind great. If you think about it, we're in an age that's technologically advanced enough that we should have things better than Beethoven did. How did he manage to get so much music written in rather a short lifetime? How did Mozart do it? It's really hard to do something good. I don't think people who lust for getting into this field have any idea how hard it is. I wonder, if I had known before I started, if I'd have stuck with it. But you're really talking about growing pains here. The illusion might persist that somehow electronic music is a shortcut; with the synthesizer there's a way to get something for nothing. That's the larceny that attracts people to the field. Of course, it's b.s. In the end, truth will out. Electronic music is just another way of making music. Of course there are exciting things about it. There are breakthroughs. I just hope things don't slow down. I hope it keeps moving in the right direction, because I'd like to be alive to see the end results of some of those breakthroughs. I resent the idea of not being alive to see them. I resent it a lot. So I hope we can keep it moving in the right direction. In the '70s there was no movement in the field. I think it actually went backward. But there's some motion now. I'd just like it to move faster—we're all impatient.

Have you ever felt frustrated enough to want to leave the field?

Constantly. When we were having trouble finding a record label I started wondering if maybe playing in a different style might not earn me a living. I was wondering if I should just stop doing art things, because the world had proved to me that it didn't want art. If you can't make a living after spending years building some degree of notoriety or respect or whatever the right word is, then it's time to get out. You have to survive. I don't really think that any artist votes to be artistic and dies

doing it. Maybe there are some who will, but I think it's a little melodramatic, a little insincere, and a little neurotic. So if the wind is blowing in a direction that permits me to follow my nose and chase after art, and break as many barriers as I can, great. But I can't do it alone. I need information. I need feedback with a lot of you.

What kinds of things do you do to maintain perspective? How do you keep the music from sounding like it's performed by one person locked away in a studio?

I do a lot of drugs [laughs]. Seriously, there's no easy way to answer that. There are times when I lose it. On *Secrets Of Synthesis*, there's an example of Rachel [Elkind] coming downstairs and saying, "Wendy, what happened to you?" I lost it, yet the whole piece was done. Should I have taken the risk of starting over? We didn't have any means of storing the timbres then. It would have meant hours and hours of work, so we came up with a solution that worked all right. It was like it was held together with bubble gum.

Do you miss collaborating with Rachel?

It's good to adapt, to learn to work alone or with others. I wish I had the luxury film makers have: When they preview a film they can see the reactions of the audience and then go away and fix whatever needs to be fixed. I've always tried to be brutal in my approach. That takes a bit of courage. When the form's not working, you have to work at it until it does. I've thrown away some really good things because the form doesn't work. I've come up with new forms by asking 'what if.' And if, as you're working, it doesn't work, you throw it away even if it's brilliant. It hurts, but you do it. If something isn't working, the best thing is to leave it and go to bed. The next day, before playing it back, you just erase it. You don't give yourself a chance to chicken out. You can't give yourself a chance to rationalize that it's really okay. That's not the way art is done. That's what makes it hard to come up with masterpieces.

Do you feel people have stopped trying to expand the idiom of electronic music?

The feeling I have is that there are always people who are trying to be rather avant-garde in the best sense of the word. They're trying to break down barriers to find how far they can carry technology that leads to things that could never hope to exist before. But it's still music at its core. Now that I'm saying this, I'm fancying

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myself to have found a number of paths in much that kind of direction. There are a great many things I’m doing now, that couldn’t be done without the technology. But it’s not out of any concerted interest in looking for the “style of electronic music.” I don’t believe anyone is doing that. Certainly, lazy habits and clichés have given this illusion to the majority of music out there that uses technology. It’s given the illusion that the technology is more limited and stylistically restrictive than it is. There is a vicious circle between musicians and manufacturers who try to build equipment that appeals to the greatest number of musicians. They end up getting a certain kind of feedback that talks more and more about less and less genuine breakthrough.

Throughout your career you’ve explored a number of different styles from S.O.B. to Sonic Seasonings to “Timesteps” on the Clockwork Orange album. Do you see yourself ever going back to explore any of those styles again?

Oh sure. I know they’re perceived as being very different, but I don’t know how different they are from one another. I guess I’ve never quite repeated myself. And I guess even for bad results, that would make me a creative person. The fact that each time you see it differently leads you to never quite do anything the same way twice. If you had to do live engagements, it would make you a miserable performer. It can be a detriment to that kind of career. But for a composer, it’s a good thing. You could say I have a faulty memory. I love that line: “My plagiarism is limited only by my faulty memory.” That’s how I feel as a composer. I hear things in my head that I’ve probably heard before, but I don’t remember them quite the same way. The best music I’ve ever done has come when I didn’t try to be different. I just heard whatever I heard, even if it was a rehashing of something I thought I was vaguely remembering, but clearly I wasn’t remembering it accurately. Sometimes that leads you to feel the Imposter Syndrome, where you feel like you’re faking life. I used to feel guilty about it until I realized that’s the way it is in all the arts. We all do things that try to satisfy ourselves, even when we’re doing something we think we’ve heard before. It’s when we don’t satisfy ourselves that the audience smells it as being insincere. And you get that in all genres—classical, jazz, and even pop-rock.

Sonic Seasonings is the record that I’ve

been least comfortable with. It wasn’t promoted very well and got lost. It was a large step in a direction that no one seemed to care about or understand at that time. Now, I’d like to come back to the ideas Rachel and I explored on that record. I think it will be called *Digital Seasonings*. It will be nice to get out in the country with our Nakamichi DMP-100 and make some recordings. I’m not sure what form it will take, but that’s definitely backtracking to an earlier idea. I’m open to a lot of ways to work, to start new projects. Having worked alone now for the last six years, I’ve found my own solo work habits. And it’s long ago enough that I’d like to return to some earlier ideas when I was collaborating, and give voice to my own solo version. Much the way “Genesis” on *Digital Moonscapes* was going back to an idea I had not fully resolved in “Timesteps” [from *Clockwork Orange*]. You repeat things because they’re your personal obsessions. They’re like ghosts you can’t exorcise, so you’re forced to re-live and re-tell the ideas over and over again, but always in new ways. It’s nothing to apologize for. And as we reach the twentieth anniversary of S.O.B. I might want to do something further in that direction.

There are some who would say that using a studio to manipulate a performance is cheating. Or worse, that you’re less a musician for it. Where do you draw the line? When does technology become a crutch and not a tool?

If you can conceptualize a performance, you’re expressing a certain awareness of musicality, which hopefully your hands can perform. Conceptualizing can be of two kinds. You can hear the thing in its entirety in your mind, note-for-note. Or you can do what some people who have vague notions about writing books do. They see a final chapter and people praising them for writing a book. They’re not seeing each paragraph. They’re not being concise or compelling. If you’re conceptualizing a performance, you don’t want to be guilty of being superficial. Any of us can be superficial in fields we know nothing about. The real essence of performance is in the conceptualization and the execution, since there’s a mechanical skill involved too. In my case, I cannot perform the Bach keyboard works anywhere near the way Glenn Gould could. I’m a pathetic pianist. I never trained to be one, although I’m not a klutz at it either. I have a composer’s pianistic skill—pick up anything in any key, sight-read, all those chops. But I can’t make it sound smooth unless I take

a long time to sound only okay. Lately I’m playing more in real time. I’m learning how to breathe and phrase the way a woodwind or a string player might. I’m taking on skills that a mere pianist or organist would never need, so I’m willing to go tit for tat with any pianist who would challenge those skills. I suspect that the main reason I haven’t heard many records that come close to S.O.B. is that it’s hard work. The secret formula was always like in any magic: hard work. Whenever people ask ‘what my trick is’, they get angry when I tell them there is no trick. It’s *time, effort and patience*. Care enough. And they don’t want to hear that. Forget about shortcuts! I find that you waste more time looking for shortcuts than you would spend just doing what you were trying to avoid.

Anyone who says that using technology to make music is cheating is either being trivial, or they have some other axe to grind. Making good music of any kind is using technology. The human voice is technology. It’s an organic technology that you have to train in order to use it. People ask if I compose at the piano, which I do, as if being able to compose away from the piano somehow makes you a better composer. I use the piano to check that I’m in the right key. I don’t have perfect pitch, so I may have drifted a note or two. In any case, you’re sharpening your composing skill by having the immediate feedback of using this neutral tone of the piano. If they want to call that using a crutch, I think it’s a good crutch.

Do you think you’ll ever get into MIDI sequencing?

Yeah. That’s one of the reasons we just picked up a second Macintosh. I felt sequencing in its current form would be a good substitute for a great deal of multi-tracking. It would provide a chance to get into passages that have been nearly perfectly played but had only one or two little mistakes. I’m very interested in Performer from Mark of the Unicorn, although I complain about Professional Composer [Mark of the Unicorn’s notation program] being more like amateur composer because it has some irks and bugs. But they’re small things. With enough feedback, I think they’ll clean them up. The two together should be a powerful combination. All the things that are becoming available now, the speed and convenience that’s available to musicians at an affordable price, makes this a very exciting time. It’s one of the benefits of the democratization of music. Sequencers have become far more than they were.

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“These toys, these tools, do refresh the brain cells and get rid of some of the stagnant juices that might be forming sediment up there.”

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You used to be very anti-sequencer.

When they were effectively bad drum machines I was against them. The term has come to mean a lot more than what the old Moog 960 analog sequencer did. Now we're talking about an alternative to multi-track recording. I hope Performer will run on a Mac that's been modified with a faster processor, which is something I hope to add to my Mac in time. But they have yet to add two things that I think are essential to Performer—changing meters and changing tempos. But they know that. It's only a matter of time.

Will you be using sequencing as a supplement to tape?

Yeah, and possibly as an adjunct to composing when doing things that are impossible to notate. If a piece can't be notated conventionally, you'll at least be able to store it, and there may be ways to work up a program that bridges the notation gap so you can get something you can perform from paper later. It's these kinds of steps that have been going on from time immemorial. When you look back at Gregorian chant and see the way clefs and note heads were handled, you can see an evolution. Notation is an invention that keeps getting polished. I don't know if people of those times would write letters to the editor complaining that their conventions were being changed, as people do in *Keyboard* these days [laughs]. I mean, I'm sure harpsichord players complained when the piano took over. Tracker organ players probably complained when pneumatic actions came in. Isn't that the case in all fields? Isn't this how it always happens in human activity? Has anyone singled out music in order to dump this awful holocaust of technological change on it? I don't think so. I think some people might feel that their own expertise is being obsoleted by the new technology, overlooking the musical side of things, which kind of gets us back to your first question. There are many people who have a good grasp on the new technology. They know what the latest bells and whistles do, but they're not too aware musically. I do worry that some of them become spokespeople for us, but of course they have that right. If you attract enough attention, people want to know what you think, and you have a right to comment on things. The danger is that young players will be fooled into thinking that it's okay to be musically illiterate. How disrespectful! You need to have the chops to play a fast diminished sev-

enth. You need to be professional. You wouldn't want an unprofessional surgeon operating on you, and likewise, you don't want unprofessional musicians. I expect a lot from musicians.

How do you feel about what must be the cliché of the age—the assertion that electronics are putting people out of work?

When my first records came out, I certainly went through my share of hassles. I think the local union was going to fasten me to a cross and set me on fire. I was going to be the example. “Beware. Do not tread on these hallowed grounds.” Sure, I think that anyone who has a job at stake has a right to be a bit frightened by some of the new equipment. I think there are a lot of people who've put more musicians out of work than I have. The equipment doesn't really replace people. You can get a preset string voice going, but in order to really imitate an orchestra, it takes a lot of work. Unfortunately, in the economic battlefield we call free enterprise, it's all up for grabs out there, and when somebody can find a way to do something cheaper, people are going to jump on it. I think by and large, acoustic musicians have priced themselves perhaps too high. *Anything* performed by an orchestra is so costly. Yet fine artists deserve good lives. It's conflicting, a hundred years ago, I would have had better performances because it would have been possible to afford two or three nights of rehearsal instead of one night now. I think the people who feel threatened are the ones who haven't thought of going out and getting some new training in order to keep up with the changes. We have a neighbor who's a fabulous drummer. He plays great acoustic drums. What's he doing now? He's becoming a top drum machine programmer. I respect him a lot for that. He's out there leading the way.

Do you foresee a time when you'll forsake tape?

I hope so. Certainly with digital storage—I'm not talking about MIDI data, I mean storing real waveforms. You need something like 16-bit resolution and something like 45 kilosamples per second per channel. With that, you get into a pretty bulky storage thing. I see no reason why we should lock ourselves into tape. It's just that the technology hasn't quite gotten to the point where for any modest amount of money one can do this job with any real facility. Certainly the convenience of editing tapes is a habit of long standing, and I've been able to do things with editing

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“This is the best time to be a composer in the last 100 years.”

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that I never would have believed possible. Glenn Gould is a good example of what one can do with tape editing. Some of the new digital editing machines are quite good, though. They're so user-friendly that producers are editing things without the help of an engineer. They think nothing of spinning the dial, finding the points they want to join up, and pushing a button. They become whiz-bang editors. You don't need the manual dexterity anymore, and that's kind of good. If it's not disturbing the musical content, I can't see where an artistically performed edit is any better or worse for having been done without cutting tape.

MIDI data storage and some things we can't talk about now, because they haven't been thought of, will grow out of sequencers and digital storage random access retrieval systems. Those are what Fairlights and Synclaviers are. That's probably going to replace other methods of storage in the next fifty years. Then, I suspect, we'll get into solid state crystal things. There won't be battery backup, or at least you won't have to worry about it. There will be so many gigabytes on a very small cube that you'll be able to stick it in a machine that can scan it in three dimensions. With tape, you have one dimension. Disks are two-dimensional. If you can store one bit per molecule, you could put an awful lot of memory on one cube the size of an ice cube. Arthur Clarke likes to play these games, so I figure I'll take a stab at it too. I think we'll see more generalized digital storage take over from tape in our lifetime. But let's not forget what a massive job that is to tackle. When you get into doing 20, 30, or 40 tracks of one hour of information, and you want to increase the sampling rate in order to decrease the strain on your filters, you're talking about some serious number crunching. You may want to increase the sample rate to 88.2k and get up to 18 or 20 bits instead of 16, which I don't think is quite enough.

Do you see any of this technology having an effect on the way you structure pieces?

I guess the tools that you use as a composer do effect the kind of music you make. If I'm writing a piece for orchestra I still revert back to certain things that I've learned work very well. My ear immediately adapts to thinking, "Okay, let's hear sounds internally that are orchestra sounds." Well, maybe they're avant-garde orchestral sounds. Whereas with electronic music, you begin thinking in other timbres and now other tuning possibilities.

As the technology makes other means of making music available, you'd be pretty thick-headed and stubborn if your music didn't take on properties that it didn't have and lose properties that it did. It has to adapt to changes. That's good, because as a composer you get trapped into little habits. You start turning out pieces that are of the same type. I'm not talking about commercial pieces where you might simply be pragmatic, I'm talking about doing the same thing for artistic reasons. I don't think you want to do that. As an artist you need to grow. If you stop, you die. A little bit of you dies. If you have ever had the excitement of having a new piece of equipment come into the studio and suddenly *bam!* Your whole room is lit up. You see it in a perspective you never had before. You go off and write a really good piece of music. You know that these toys, these tools, do refresh the brain cells and get rid of some of the stagnant juices that might be forming sediment up there. Yeah, we need all the help we can get. I'm all in favor of good crutches when they aren't really crutches. They're stimuli.

What other things stimulate you to grow as a composer?

As you sharpen your ears, there's very little you hear outdoors—nature sounds, street noises, people talking, equipment—that doesn't have some music in it. Obviously, I'm not going to make it sound mystical when I say that I extract inspiration for the world in that simple-minded *musique concrète* sense. But there are influences. When you have these things floating around, it frees your mind to go back into alpha rhythm and that stuff which lets the creative juices start turning things out. When that happens, you'd better grab a piece of paper or a sequencer or something to start putting it down because it'll be gone if you don't. It's hard to remember all these things. Mozart had a phenomenal memory to be able to put all his pieces together in his brain, remember them, make revisions, and then write it all out. I'm not nearly so lucky. My memory is appalling. Stravinsky stated he didn't compose until he had paper and pencil before him. What he really meant was that that forces the discipline to confront things in cold reality. You realize that the idea might not be as good as it seemed when you were lying there thinking that it would be wonderful. That seems necessary to composing. Mozart is one of the few composers who has been able to avoid the way we all tend to work.

Inspiration comes in many strange guises. Certainly, listening to other people's music, especially good music of any kind, can be an inspiration. Even if you

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write something that has no relation to the inspiration that anyone can see. Then again, you may be almost plagiarizing, but it may just be the spirit or the mood, which if it gets filtered through you will take on your personality. Which I think is fair play.

You used to think that these were the worst times to be a composer. Have you re-evaluated that thought?

I feel like there should be a fanfare of trumpets. This is the best time to be a composer in the last 100 years. I don't think there's been much movement since people like Stravinsky defined the twentieth-century orchestra. What we need is more stimulation, and here are some things to stimulate us. I'm not trying to preach my own thing. I dislike missionaries, but I feel like I'm lucky enough to have stumbled across something so basic and primitive that it's important for everybody. I feel like championing a cause in order to eventually get a lot of people into it. The DX7 now has something available for it that gives you access to the tuning tables [Gray Matter Responses' El is being upgraded to give you total access to the tuning tables within a DX7, TF1, or TX7 module]. It's too bad they didn't include any of the important timbral algorithms on the DX7 the first time out. But that's the way you learn. You make mistakes and you grow. There will just have to be another generation of

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musician band. I don't think there is anything inherently good about that. Music needs the interaction between audience and performer. The insights you gain are invaluable to a composer. I'd apologize for the one-person band weakness of my records right now, but there's no way around it yet.

You've been talking about doing a live performance ensemble for years now. Do you think you're any closer to doing that?

Well we're already talking to our new label about staging some kind of event. We'll do it if we can pull together a few good people with the necessary skills.

Have you changed your approach to synthesis any since our June '85 how-to piece?

Not really. I'm still using complex additive. Which brings up a refinement I'd like to see improve with such new tools as perhaps Digidesign's Softsynth program for the Mac, which is purely additive. It's too time-consuming for someone to make a pass at giving every tiny description of a sound. You want to be able to control a lot—certainly more than we were able to in the past with analog—but you have to draw the line somewhere. You'll die after doing ten sounds if you don't—a decade for each sound. Very often, I'm guided by what I hear. I find that I move much more quickly in synthesis trusting my ear. You keep

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machines that will have the sophistication of sound and wisdom of timbre adjustment and open-endedness that the Synergy/GDS has with the accessibility and economy of the DX7 so these can be proliferated to a wide audience.

It's all so close now. You just want to get up and say, “Let's move the thing along now, guys!” Let's refine it into something subtle. We have access to technology that's fast, user-friendly, and open-ended. We could have a really complete system up and running in the next few years—a grand system that will cover not only iconoclasts like me, but all the other people working in different styles. It could sweep music into the twenty-first century. I'd like to light a fire under the entire industry right now. I want people to give me feedback. I don't want people to be so complacent about this. We're really lying back and being satisfied with trivial stuff like sampling machines. Not that they're bad. They're a great tool, and I hope they're going to be polished into something we'll

all be able to use. But it's *musique concrète* done in a new way. It's back to the '40s and '50s. That's all it is. There's nothing wrong with that, but it's not a breakthrough. It's a refinement. Perhaps too many of us are so taken with the glitter of these new toys that we may be overlooking the really exciting developments.

There has always been this infatuation with the concept of one person as orchestra. I think part of the excitement over sampling devices is that they make that goal easier to attain.

Yes, they do. I had forgotten that. Isn't it ironic that the weakness in electronic music, at least as it's done by people like me, is exactly that—the one-person band. It's not the way to make music. It's a liability. You can apply some of the same esthetics that you would to a painting, but wouldn't it be nice if these things could be used on stage with live musicians again? It's strange that I should agree with those who think the one-person band is not a good thing, but I don't want to be a one-

“Isn't it funny that the weakness in electronic music, at least as it's done by people like me, is exactly that—the one-person band.”

asking yourself pertinent questions and trying lots of things. It's like Edison. He tried everything imaginable before he finally stumbled upon the right material to make a light-bulb filament. And that's the way I work. The xylophone is the perfect case. I thought the xylophone was an instrument that would take many years before we could synthesize it. I knew that it had something really strange going on in the initial attack. I found it through a series of guided accidents. The same thing happened when I learned about the detuned partials of a timpani. The gamelan sounds on “Poem For Bali” were all tough that same way, because you can't assume they have a normal harmonic structure. So it wasn't possible to use that initial starting point that you begin with when you do strings and brass from a western orchestra. You're left with one less crutch to stand on.

I wish I could give people the kind of tutorial that Bo Tomlyn did on the DX7 in the June '85 issue, because I'm aware that people, myself included, really enjoy that kind of thing. And also important is some type of philosophic overview, because you

lose sight without it. It's too easy to lose sight of the forest because you're too close to the trees. Unfortunately, it makes for something that's grayer and less sharply outlined than that type of nuts and bolts talk.

We touched on the one-person orchestra ideal and its connection with the sampling machine, but how do you feel about people who buy pre-programmed patches instead of doing their own programming?

It's almost the same mind-set, isn't it? The weakest element of a one-person band is rigid drum machines. 100% quantization sounds so inhuman. Do we really desire music that sounds like bad piano rolls made before they learned how to record them by having a real pianist play? Or like bad music boxes? The really good music box makers used to move the pins in order to make little rubati. The same thing with piano rolls. The accelerandos and ritardandos make it more alive. Music that's rigid to the millisecond replaces intuitive human feelings with robotics. After Bob Easton kindly carried the first Linn drum machine to our studio—he travelled 3000

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That's true, but you've said that a new piece of gear can inspire you and stimulate you to write new music.

Yeah. I wonder what they did in the old days. I guess you'd find a new piece of music to get inspired by. The music is what should be the inspiration even now. For composers it's a little more vague, but it's true. A new piece of gear can stimulate you. I hope we reach a stage where that doesn't happen anymore, because there will still be plenty of stimuli to get your creative juices going. I'd like to see the focus brought back to music, because the damn technology is not it! Consider those pretend do-it-yourselfers who just collect together complete home woodshops with lathes and drill presses and even computer-controlled tools. And what do they do with it all? Nothing. They probably can't even hammer a nail in straight. My brain screams, "This is b.s.! The focus is all wrong." But this is a new field. You have to go through these growing pains.

Your music has had less hocketing in the orchestrations than it did when you were using the Moog system. Is there a connection?

The truth is that even though hocketing is one of the hallmarks of my older stuff, I've been thinking more orchestrally. Less chamber music, which is where the hocketing worked best. But the most important reason is that I don't need to do it as much with the digital voices. Although there is a lot of hocketing on "Poem For Bali." I find that if I do too much of it, it ruins the quality of the voices. I think the reason I used it so much before was that the analog voices didn't have enough complexity in them, whereas the digital voices are complex enough that you want to hear them on their own. I'm doing more macro hocketing now in that there are lots of color changes in the orchestration—many more than you could get away with with a real orchestra. So the impulse to keep changing colors is still with me.

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DAY THREE: USING ALTERNATIVE tunings. On this final day, we get into the nuts and bolts of the tunings used on *Beauty In The Beast*, and put together the Soundpage in the process. The finer details of the tunings are discussed on page 64. However, Wendy had a little more to say about their ramifications. And she was also quick to point out that she did not magically discover non-equal tempered tunings. She has simply borrowed from many others who have come before her. Two people she mentions in particular are Harry Partch and Easley Blackwood [see *Keyboard*, May '82]. Although Carlos didn't find a copy of Blackwood's book,

The Structure Of Recognizable Diatonic Tunings [Princeton University Press], until she was finished with *Beauty In The Beast*, she recommends it to anyone interested in investigating these tunings further. But be forewarned—it's not for the casual reader. Hermann Helmholtz' landmark study *On The Sensations Of Tone* [Dover] is also highly recommended.

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Did you come across any revelations when you started experimenting with exotic tunings?

The main one is probably that tempo is tied to tuning, and timbre is tied to tuning. So the three T's are related. And I speculate on some solid ground here that the tempo of modern music has picked up since equal temperament came in. And it hasn't been able to slow down yet, because it doesn't sound as in-tune at slower tempos. Only a very few instruments produce an equal-tempered scale well. Violins do Pythagorean tuning, which is perfect fifths and sharp major thirds. Horns are sort of geared toward just intonation with the natural third and flat seventh. Harps and pianos have to be stretch-tuned because of their harmonics. This seems like a lot of trivia, but these are the meat and potatoes of the field. What I've been noticing is that the whole texture of modern harmony is tied up in the way that we make our instrumental timbres sound.

What kinds of ramifications do tunings have for non-traditional, more avant-garde types of music?

The one example that comes immediately to mind is the effect perfect intonation has on cluster compositions. Ligeti-like clusters take on a whole new feeling in perfect intonation, because of the fact that the clusters take on an almost tonal quality due to the phenomenon that makes you perceive the sub-octave fundamental when you hold down a bunch of notes. The "Chroma" movement of "Just Imaginings" is a Ligeti-style piece with floating clusters. I had always wondered whether non-equal-tempered cluster music could be done. Simple bitonal clusters work very well. You tune one of the Synergys to F# and play a nice tall chord. You tune the other Synergy to Eb and float a similar chord on top of the first. Because they are a third apart, they aren't quite together, but the harmonics are close enough that they will beat. But it's a controlled beating. You can hear the consonance of the two elements, the sub-harmonic fundamentals, underneath.

People should listen to the Soundpage to get an idea of what these tunings are like, because they are more or less exactly what meets the ear. Some of them strike you as being not very different. Others are just the opposite. They affect you profoundly. And when you're working with

like, because they are more or less exactly what meets the ear. Some of them strike you as being not very different. Others are just the opposite. They affect you profoundly. And when you're working with them, you always have to check what they really sound like by playing the keyboard. Beethoven would have had a hard time doing what he did if he were using the harmonic scale with 144 notes per octave. Exotic tunings are a cause I really feel like championing. I hope other people feel the same way after they've had a chance to experience them. I find them extremely inspirational. But it's hard to know if inspiration is ever enough in anything you do. And it's impossible to know if your work will have any value years from now. ■

WENDY CARLOS A SELECTED DISCOGRAPHY

Switched-On Bach, Columbia, MS7194.
Switched-On Bach II, Columbia, KM 32659.
The Well-Tempered Synthesizer, Columbia, MS 7286.
By Request, Columbia, M 32988.
Clockwork Orange, Columbia, KC 31480.
Sonic Seasonings, Columbia, PG 31234.
Tron, CBS, SM 37782.
Digital Moonscapes, CBS, M 39340.
Secrets Of Synthesis, CBS, TBA.
Beauty In The Beast, Audion/JEM, SYN 200.

Note: These albums have been remastered to CD. Check <wendycarlos.com/discs> for further details.

WENDY CARLOS FOR FURTHER READING

Cover stories on Wendy Carlos have appeared twice in *Keyboard* (Dec. '79 and Nov. '82). The second story focused on her soundtrack to the Disney film *Tron*. Our Dec. '84 Soundpage featured two excerpts from *Digital Moonscapes*, and a June '85 how-to piece by Wendy herself explained some of her hybrid additive synthesis techniques. *Keyboard Reports on the Synergy and Synergy II+/GDS system* appeared in Oct. '82 and Nov. '84, respectively. Books that Carlos found helpful in replicating acoustic sounds include *Fundamentals Of Musical Acoustics* by Arthur H. Benade [Oxford University Press, 1976], *The Science Of Musical Sound*, by John Pierce [Scientific American Books, 1983], and *Sonic Design, The Nature Of Sound & Music* by Cogan and Escot [Prentice Hall, 1976]. Two books of interest in the tuning domain are *The Music Of Bali* by Colin McPhee [Da Capo Press] and *The Structure Of Recognizable Diatonic Tunings* by Easley Blackwood [Princeton University Press].