

November 1982 \$1.75 (Canadian \$2.00, UK £1.10)



KEYBOARD

WIN A
PRO-ONE
SYNTHESIZER
KEYBOARD GIVEAWAY #2

**WENDY
CARLOS**

ON HER
MUSIC FOR

TRON

BY

BOB MOOG

ALICE

COLTRANE

JOSHUA

RIFKIN

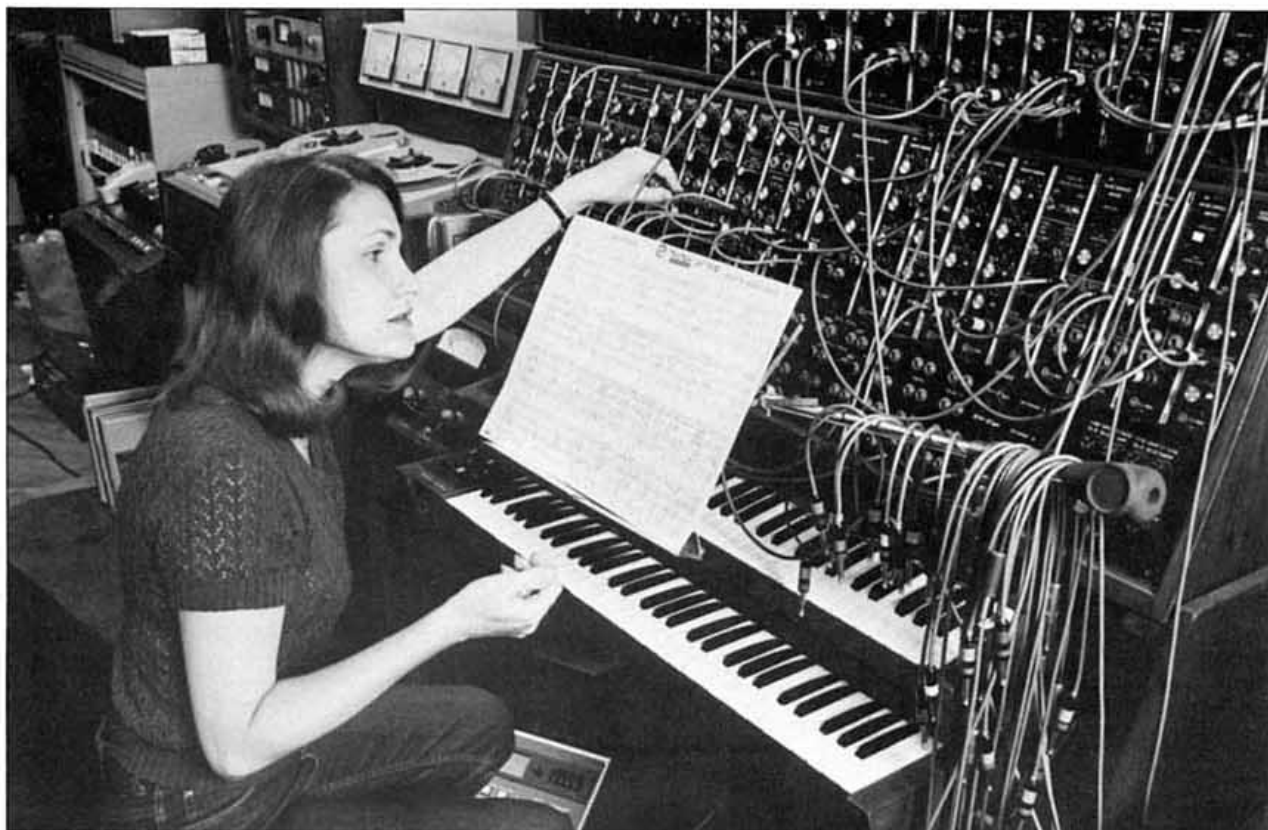
DOUG JOHNSON OF

LOVERBOY



Wendy Carlos

NEW DIRECTIONS FOR A SYNTHESIZER PIONEER



PHOTOS BY VERNON L. SMITH

Wendy Carlos studying Tron score at her modular Moog system.

By Robert Moog

LECTURING BEFORE A packed house at an Audio Engineering Society meeting in 1979, Wendy Carlos described and illustrated a number of her techniques for shaping timbres, orchestrating electronic textures, and recording complex sound material. Her remarks had to do with subtle details of technique that she had developed over the years, but which commercial electronic musicians were generally not familiar with. At the end of her talk she quoted a famous scientist as saying that there are only two kinds of science — physics and butterfly collecting. “I am a butterfly collector,” Wendy concluded. “I have just shown you some of my favorite butterflies.”

In *Keyboard's* first cover story on

Robert Moog's name has been a household word among musicians since his groundbreaking work with voltage-controlled synthesizers in the 1960s. His On Synthesizers column, which has been a regular part of Keyboard since our first issue, will return next month.

Wendy [Dec. '79], Dominic Milano thoroughly explored her pivotal role in shaping the current electronic music scene, starting with the making of *Switched-On Bach*. He also talked a great deal with Wendy about her technique, philosophies, and equipment. Like that interview, the discussion below has to do with ‘butterflies,’ with a near-fanatical concern for subtlety and delicacy of detail. Having worked for many years with electronic musicians, I am constantly impressed by how the differences between merely adequate and top-level music depend precisely on these fine details. And no musician illustrates this fact better than Wendy Carlos.

She also has some comments on the practical side of making a rewarding career of electronic music. She observes the pitfalls and risks of a profession that seems to the uninitiated to be entirely glamorous and carefree. Her remarks will be meaningful to aspiring composers in all areas of music.

From her first work on *Switched-On Bach* to the making of the music for Stanley Kubrick's film *The Shining*, Carlos collaborated closely with Rachel Elkind. But two

years ago Rachel married and left to join her husband in Europe. At about the same time, Wendy made new business connections and set out on her own. She decided to establish new headquarters in a loft in Greenwich Village, one of those long, wide open spaces that used to be used for light industrial operations (i.e., sweatshops) in the early part of the century, but which have in recent years become the favorite living and work spaces of New York artists and musicians. Much of Wendy's time has been devoted to designing and constructing the loft's interior.

The new studio is located in the center of the loft, separating the bedroom area at the rear from the living room and kitchen at the front. By setting the studio at a 45° angle to the long axis of the loft, Wendy managed to come up with a roomy, workable, comfortable, visually interesting studio room with near-optimum acoustic properties, while breaking up what would otherwise have been a long straight hall joining the two ends of the 110'-long loft. The studio design is further evidence of Wendy's consistent attention to detail, and I began by asking her about it.

* * * *

HOW WOULD YOU describe your new studio?

The room is a truncated triangle, sort of a skewed kite shape. The floor is raised about four inches over half the room. The console is right in the center of the room, at the edge of the raised floor area, looking out over the lower area. To the left of the console is the 16-track recorder, and another 16-track when we rent it. The GDS [digital synthesizer] with its terminal and auxiliary speaker form a nice little L-shaped area along the back wall. The door that you enter is to the left of and behind the console, so that the first thing you see when you come in is the console. The ceiling is covered with a triangular pattern of two-foot by three-foot fiberglass panels. They float above you, much like the clouds they used to have in Philharmonic Hall at Lincoln Center. The carpet is a rust color, but in the center of the room an octagonal oriental carpet is embedded in the rust carpet. Because the room is full of 45° angles, the octagonal carpet really looks like it belongs.

How are the speakers placed?

The four Klipsch Cornwalls are hung from the ceiling on brass chains in a 180° arc around the console. For me that gives the best quad effect, and it's also useful for mixing film scores that will be played back in Dolby Stereo.

It's certainly a visually interesting room.

An odd-looking room. Because the walls are at different angles, there is almost no slap

echo. So it's a good shape for mixing sound.

Did you actually try out the layout with the equipment, or did you work it out on paper?

I made an enlarged drawing and cardboard patterns of everything I owned. We tried many configurations, and found four or five that seemed to work. Then we looked at them all and decided which satisfied most of the requirements that I had. There is very little wasted space. From the console you can reach quite a few things, yet there's a ton of room. You don't get claustrophobic. We spent many, many hours working out the details of the acoustic design and isolation, and of equipment location. It would really be very painful if we had to set up another room that would be quite as ideal for the kind of music made here. I probably couldn't have done the *Tron* project comfortably at all in some other room.

Is the room shielded?

We took the precaution of trying to build a "Faraday cage" [of electrical shielding] in the walls and ceiling, which is something we didn't have in our previous studio. All of the sheet rock has aluminum foil backing, and the floor has aluminum screening under the carpet. The room has no RF [radio frequency interference] that we can detect. It's difficult to pick up anything on a radio or TV in this room. And because of this, all of the equipment suddenly acted as though it were brand new. I couldn't believe that we had worked for all those years at the console not knowing it was not working at its optimum. Although it was fine for most things, it was nowhere near where it could have been. Now we get incredibly good signal-to-noise ratio and low distortion. With the console wide open, the room is as quiet as a mouse.

An audio engineer came by the week after we got the studio set up. He couldn't believe the total absence of noise. You walk around the studio and there's nothing coming out of the speakers.

In other words, cutting out the RF not only eliminated the recognizable signals from radio and TV stations, it got rid of the background white noise too?

Yes. It turns out that most equipment noise, at least equipment operating in city environments, is a hash that is actually partially detected RF over a wide band — radio, VHF, UHF, and other bands as well. The old frequency shifter that you built for us, which used to have barely acceptable signal-to-noise, is like a new machine now.

I never thought that background RF could be so incoherent that it could be mistaken for equipment noise.

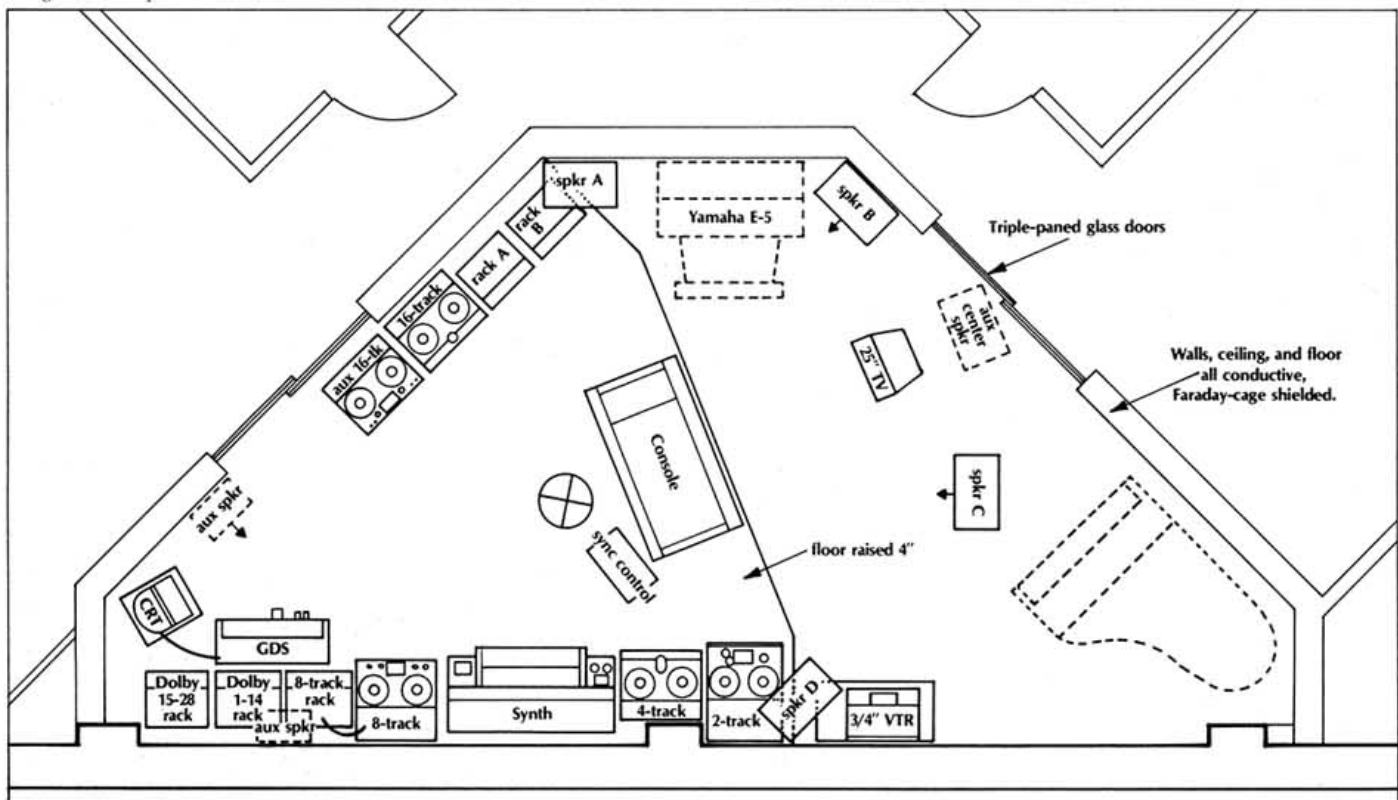
The RF spectrum is so rich in New York that it does sound like white noise. I remember years ago when Bulent Arel at the Columbia-Princeton Electronic Music Center made his own white noise tape. He didn't have a source of white noise, so he recorded layer upon layer of square waves at different frequencies. The result sounds almost exactly the same as white noise, especially when you filter out the lower frequencies.

You've had most of your equipment for ten years or more now. Do you plan to make any substitutions or changes?

The studio works very well and exceeds all my quality, if not quantity, requirements. I'd be scared to death to change anything, because there is no compelling reason to, and we might be asking for new problems that would take a long time to iron out. Really, these things ought to last a lifetime.

Continued on page 58

Design for Wendy Carlos's studio.



like a piano. In the case of electronic music equipment, some of the machines that we got years ago are dated now in certain ways. But then there is all the propaganda advanced by engineers and producers who think that new is best. Most modern equipment has gone way past the point where you can just walk in and pretend to know what's going on by looking at it. At newer studios, things can appear intimidating, even though there may not be that much beneath the surface complexity. Our console no longer looks intimidating to anyone. It looks sort of quaint. When it was built, people would say, "Oh, wow, what is this?" Back then, sixteen seemed like a lot of tracks. Now we seem very conservative insisting that we want 72 mil [.072 inch] track widths, which you can't fit on two-inch 24-track machines and you certainly don't get on one-inch 16-track machines. I hear people talking about wanting to use half-inch tape with only two tracks, giving them tracks that are 200 mils wide. There's a touch of hypocrisy out there somewhere. How people can endure the lower recording quality of 40 mil wide tracks, which is what two-inch 24-track machines use, or 18 mil tracks, which is what are being used on two-inch 32-track machines, and then insist on half-inch tape for a two-track . . . well, I rest my case. For doing demos in home studios, and for less critical work, the 16-track machines that use one-inch tape are fine. They're a wonderful tool for freeing the musician from the tyranny of professional studio costs. But if you're doing something for, say, a professional film or an important record that will be around for a few years, then it would be nice to make the sound quality a little purer. There's another, very simple aspect to our attitude toward our equipment. We're not made of gold bars. This studio is a business investment. If we were not as careful with our equipment as we are, we would be wasting a lot of our capital resources.

Are you still using your original modular synthesizer?

Yes, but not as much as we used to. I've been depending more and more on the [Music Technology] GDS. The GDS looks like a very useful device until Nirvana happens, with the underlying structure and sound quality that Hal Alles thought out so well.

What features of the GDS do you like?

Although it's a rather slow and hard-to-use device, the software is brilliantly put together. To control all the time contours with a single Z-80 microprocessor — it's an amazing masterpiece of software. There's not just a single control knob; the controls are arranged all over the place, which is what I'm used to from analog machines. I mean, could you mix a whole album with just one fader, one rotary knob, and a key address pad by which you could call up any parameter to modify with the fader? I don't think so. But that's the approach that a lot of machines are taking currently — the Moog Source, the Rhodes Chroma, the Synclavier.

Those machines make sense for live per-

formance, where the player wants basically a preset machine.

That's right. They may want to tweak only one or two parameters. A different tool for a different job, I guess.

You had also been developing your own digital synthesizer.



We had been working with Harvie Branscomb, a gifted digital engineer. It's really in limbo now. We wanted to do a lot more with it before we considered it complete.

What was the philosophy underlying the design of your experimental synthesizer?

It was simply an overbuilt testing machine. It's overbuilt in every aspect. It can describe phase with 12-bit accuracy — one part in 4,000 — frequency with 22 bits — one part in 4,000,000 — and amplitude with 16 bits — one part in 65,000. Its wave tables for the sine wave are also 16 bits, as are all the hard-wired multiplications. The machine is basically 16 digital oscillators, all producing sine waves for additive synthesis, with no provision for FM. [Ed. Note: Frequency modulation, or FM, is currently the standard means by which digital synthesizers generate complex tone colors.] At the time we began the machine design, I had the arrogance to think that everyone would want to work with additive synthesis. Anyway, the synthesizer is tied to our Hewlett-Packard 9825 [computer], which we use the load the parameters into the synthesizer. We got to the point where the steady-state parameters are extremely convenient to input through the computer keyboard. You can specify waves that have the same inharmonicity [out-of-tuneness of the upper harmonics] as a piano, or any other scaling, on any curve. At high inharmonics you can accurately synthesize sounds like glockenspiel and xylophone.

Why use so many bits to specify parameters?

We wanted to build a machine that was the state of the art in digital synthesis. We had the arrogance to want something that is as close to perfect as the human ear requires. Or maybe one step closer. And then we would be able to go back and prune out the unneeded bits of control, stopping just short of audible deterioration.

How does your machine compare in sound quality to the GDS?

It's a matter of resolution. The more bits you specify a wave to, the closer to ideal it comes. It's like film. You can have 35mm or 70mm. The bigger you get, the more perfect

the image becomes. I feel that the GDS is like 35mm and our machine is like 70mm. We have the ability to generate any sound that you can describe by complete Fourier analysis, which includes every sound, theoretically. [Ed. Note: Fourier analysis is a method of describing complex sounds as the sum of simple sine waves.] The trick is parameter specification. In order to get interesting sounds, you have to supply an awful lot of information. You need software to fill in the details and absorb some of this inherent burden. That's what we're working on now.

Is it limited to just having 16 oscillators?

For the work I was doing when we began the design project, we never intended to use the machine for anything more than getting a perfect copy of a single sound, then slowly deviating until we established a completely new sound family still filled with acoustic nuance. We could go continuously from the familiar to any new sound. For this application 16 partials was fine.

You mentioned the Synclavier earlier.

I like the Synclavier. I'd love to have their sound analysis [sampling and storage of acoustic sounds] system. But since their oscillators don't allow any real control of phase or frequency, the analysis doesn't include it either. That's fine if you want a machine that sounds like a marvelous analog synthesizer, because that's what all these waveforms sound like. It's not so fine if you want the warmth and richness of an acoustic musical instrument, where individual overtones 'tumble' because they are slightly out of tune with the fundamental. The Synclavier and the GDS make their sounds in different ways. The Synclavier uses FM synthesis extensively, and changes frequency by updating a clock, whereas the GDS interpolates from different points in a wavetable, but always at the same clock rate. The Synclavier changes pitch the same way a VFO [variable frequency oscillator, used to control tape speed] does, which keeps the waveform from changing as its fundamental frequency changes. Technically this is why the machine can sound so clean, but it does limit the control you have over detuning individual partials. The Synclavier envelopes are ADSRs, whereas the GDS envelopes are 16-part linear contours with looping functions. This means that the Synclavier can easily generate interesting attacks by adding together what they call 'partial timbres,' but after the attack portions of the sound are over, the sound no longer moves, and you think you're listening to a standard analog machine. On the GDS this is not so. You can program motion into the sound that lasts far beyond the initial attack.

Can you combine additive synthesis with FM in the GDS?

I'm using a hybrid of FM and additive, which I believe is the strength of the GDS. I've come off my high horse about thinking that all of the FM synthesis described by John Chowning is bad. The reason I had that idea, I think, is that people tend to abuse the notion. Chowning himself spoke about how to avoid some of the limitations of FM, especially the spectrum with FM, and you have to fill them in. If you're aware of this, you can fill in by modulating with more than one frequency,

or modulating the modulating wave, or using additive synthesis.

Is it important for digital synthesizer users to know these technical principles?

I think people ought to know more of what's happening in the hardware, and where the tradeoffs are. This is the same old line that I've been famous for in the past. I always want to peek and see how the magic trick is done. But I think that's fair, because musicians are magicians. Our shop talk ought to be about how the illusion is produced, with no holds barred.

When Dominic interviewed you three years ago, you were about to begin work on music for Kubrick's The Shining. How did that project turn out?

At that time, Rachel and I had done about an hour of music. We had been asked to send it on to Kubrick, and were simply hopeful that something would come of it. We did that music based on our reading of the novel; there was no screenplay or input of any sort from Kubrick.

Did you know that Jack Nicholson was going to play the lead?

We knew details like that, but we didn't know anything about the pacing of the film. It turned out that the film was extraordinarily *adagio*, while the music we submitted had a more typical range of tempos. So our music didn't marry well with the picture. Anyway, at the beginning of 1980 we got the call that we should go to England and meet with Kubrick. After seeing the first ten of the thirteen reels of film as it existed then, we talked with Kubrick about his philosophy and what he

thought about the music we had done. He essentially showed us, just by needle-dropping, which is his way of working, that most of our music simply did not lay in well with any of his picture. There were a couple of things that did, and one of these eventually became part of the opening title music.

In the course of the next few months we composed about four and a half hours of music, mostly synthesizer and *musique concrète*. We were trying to do it according to cues which we notated extensively as we went, reel by reel, through the entire film with Kubrick. So we had a pretty exact set of specs, foot/frame listings and so on. It looked overwhelming, as a matter of fact. It required about an hour and forty-five minutes of music, which is a lot for a film nowadays.

However, the music that we did never quite grabbed him. I guess it was one of those things where he anticipated that we would be like a computer where we could push a button and get the same kind of thing we had done before. But Rachel's and my tastes and style had naturally shifted slightly since the days of our *Clockwork Orange* work [the first film they had collaborated on with Kubrick] ten years ago. So his fix on why he had called us in the first place was disturbed, since we were doing more theatrical, richly textured things than we had done before. They were more dramatic, and probably scary enough so they could be played in a dark room and scare people without any picture. He apparently was looking for things that were very laid back — soft, slow, not much drama. So we were on the very opposite side of the coin

from where he wished us to be. Yet he did not, perhaps could not, verbalize this. So we didn't know what he wanted. For instance, he asked for what he called "low flybys." We thought he meant low in pitch, so we had these big sonorous things that would come snarling through the room, then go off into the distance. But they were certainly dramatic. They were not like two or three cellos 150 feet away making a gentle crescendo and diminuendo, which seems to me now to be more what he wanted.

Then he asked us if we knew of any tune or theme that would be ideal for the movie, a well-known tune that already existed. The only theme I could think of was the "Dies Irae" [Latin for "Day Of Wrath"], which traces its roots back to the Gregorian chants of the Middle Ages. I mentioned the Berlioz *Symphonie Fantastique*, which uses that theme. What apparently happened after that was that Kubrick listened to the Berlioz over and over again while we were working on our music, and became fixated on Berlioz' treatment of the "Dies Irae." He could only hear it the way Berlioz did it, I think, with *no variation*. We didn't realize until much later how thoroughly he had become locked into the Berlioz. He didn't like any of the treatments we did, but he offered no constructive comments. Instead, our work was more or less put aside.

He then asked us to do something for orchestra, on a most modest budget. We wound up scoring for 36 musicians and selected instruments predominantly in the bass region. In ten days, with the help of an

orchestrator, we composed fifty minutes of music. In London, with a superb small orchestra, we recorded close to an hour of that and some textures for further processing and adding of synthesizer as the last step. All of it was based on the "Dies Irae," in many, many different ways. In addition, we recorded some nice tone color melodies, timpani solos, and other material of the sort that Kubrick had liked in previous years. We took these back to New York and began working on them.

Kubrick then told us on the phone that he didn't think the "Dies Irae" theme could be varied at all. We slowly realized that he had become obsessed, not with the original "Dies Irae," but with the Berlioz version. What he was telling us, in an awkward way that infuriated us at the time, was that he was latched onto the Berlioz and could hear nothing else at all. The orchestral score, which contained some awfully fine stuff, was all turned down for peculiar, fanciful reasons, all of which seemed to come down to the fact that it was not the Berlioz version of the "Dies Irae," but a different version!

We then tried to give him some things exactly the way he heard them. Being as professional as we could, we did literally what he asked for. If he asked for something that did exactly what Berlioz did, or if he asked for heartbeats, that's what we gave him. And some of this material made its way into the film. In the end, Kubrick scored the film by needle-dropping, just as he did when he first began making films. For us it was very disappointing that he could not get past his old

way of working, enough to allow us to contribute as we had first looked forward to doing.

We had done all this work on good faith, expecting to get a good record out of it. Only two very brief cues that were used in the movie finally made it to the record. We're not getting a cent in royalties from the record. We had used up the better part of two years on a movie score, producing something in excess of six or seven hours of music, including some of the best stuff that Rachel and I had ever done together. None of it was used, and for all our time and best efforts we earned only a couple of dollars an hour.

After two years now, I feel I don't know the man at all. For me it's a sad final ending to a project that was started with sincerity and excitement. You feel bitter and you feel used. You say to yourself, "Never again." And yet you try to be sensible enough to realize that if Kubrick or someone like him wanted to buy some record cues in the future, you'd be foolish not to sell them, but you would never again get involved in that type of situation. So to all struggling young composers, I certainly recommend not to do too much simply on good faith. You will probably get burned in the end. Also, be sure that you're dealing with somebody who really wants *music*, and that you know pretty well what kind of music. If it all has to be loud and fast, make sure you know that ahead of time. You may talk about instruments and mood and never find out that your customer wants it loud and fast. In this case, Kubrick wanted it soft and slow, and we didn't realize that until it was too late.

Perhaps if we had realized that we needed to ask these basic questions, we would have found out more about what he really wanted.

Looking back now, when should you have realized that the project was not going as it should for you?

There were very strong clues, for Rachel particularly, during that week's meeting in London. But even after that, when each conversation was getting less pleasant, less funny, and more troubled. At the end we weren't communicating and there was frustration on both ends of the phone. Looking back now, we should have bowed out at that point.

What has happened to all the music that wasn't used?

Thanks to the harsh one-sided contracts you must sign if you want to work, Warner Bros. owns all the music, all the recordings. That's seven hours of music that Rachel and I killed ourselves over, trying to do the best possible job for the film and for the people who buy our records. Rachel really had some great ideas in that music, and she wanted to do something special. None of this came to the public's eye because it wasn't used. Unless we make new recordings of this material at our own expense and release it ourselves, no one will hear any of it. And as it now stands, Warner Brothers owns the copyright on music they'll never use!

Is it possible to protect yourself from this sort of thing?

Some limited rights were established by a Composers Guild lawsuit a few years ago. The Composers Guild apparently didn't have sufficient clout to protect its members. For

people trying to work in this field, which combines art and utility, there is no strong protecting organization. The best approach is to try to protect yourself by putting safeguards in your contract. Even with that, you will have to sue if you feel that the agreement has been violated. This is an anomaly. In any other area of filmmaking, nobody would bat an eye about assuring proper compensation for time and effort. This is the aspect of unionism that makes our country a great place to live and work. One trouble is that composers are not seen within the industry as people who enhance a film, even to the point of making or breaking it. Often their artistry is as filled with nuance as, say, acting is. But producers and directors tend to look on film scores as an unimportant frosting for the cake, rather than as something that should be considered a vital part from the very beginning.

I think most of the problems can be forestalled if you develop the ability to communicate, to analyze, to try very hard to see the other person's point of view. Of course, none of this helps when you're dealing with thieves, but most people in the film industry are not in that category. They simply want to see their film born, which in some cases doesn't happen until you marry the music to it, as [director] Steven Spielberg said recently. If you can provide the music for someone like this, and not get burned financially while doing it, it can be a rewarding, creative way to make a living. You'll never make a fortune, but it can fulfill some of the early desires that got you into being a composer in the first

place. But you've got to be careful. As a profession it's a lot more treacherous than it can possibly seem from the outside.

If you practice your half art/half craft and manage so that everybody is satisfied, you get a chance to communicate, to turn on the audience, and that's the goal. I think everyone who goes into this field has to have the desire to make films, has to love movies, love the idea of moving an audience, love seeing the final product with an audience and hearing them shout out with excitement. If you don't have that desire, I think your cynicism will eventually get the better of you.

What projects are you working on now?

We're just finishing a small non-feature film project. Dolby Labs figured that, now that movie theaters have all this expensive sound equipment, they should put together a demonstration to show the audiences what a great thing a wide screen with Dolby Stereo can be. So they budgeted for a ten-minute film that will show off Dolby Stereo. They want to have a splendid big ending based on a theme from Wagner's overture to *Tannhäuser*, which is used as a *leitmotif* throughout the film. They've asked me to do a realization to that, and I'm just now coming up with something that will be faithful both to the synthesizer and to the original orchestral version.

How many tracks will there be in the final mix?

A lot. It's supposed to sound big, like a big orchestra. So it will probably be like going back to the Tchaikovsky from the *By Request* album, where I used upwards of 40 tracks. I'll

use submixes and small groupings so that nothing is further removed from the master than second generation.

How many output channels will there be?

It will be a four-track version, but it will be released in Dolby Stereo, which is two optical tracks on the film, using their new matrixing scheme, which is different from the matrixed quad that was developed for domestic use. There are left, center, and right screen speakers, and a surround channel as well. It's the way most of the big films are released as a bare minimum. *Tron* was released with six discrete channels, and also in so-called Dolby Six-Track, which is really four tracks plus two sub-bass non-Dolby tracks on 70mm film. There's also the stereo surround version, which I wanted to use on *Tron*, but was turned down. For the Wagner I'll have to check the mix through the Dolby encoder-decoder to make sure I put in the right kind of trickery to emphasize the best qualities of the matrix.

How about future albums?

I feel very strongly that I should go back and finish the double ballet score that I've been working on. Columbia [Records] would like that, and would also like to see some tie-in to a choreographed production. So many of our records have been used for ballets that it would be nice to work on this one as a ballet before the fact. But realistically, I'm not sure what the next step is. We're waiting for reactions to *Tron*, which will be another month or two in coming. We may do another film score first, or we may do the ballet album and then another film score.

Do you have a choreographer or a style of dance in mind for your ballet?

I haven't really approached anyone yet. It's still too early for that. With regard to style of dance, the music would be danced in a way that is not unlike Ravel's *Daphnis et Chloé*, or a lot of the Stravinsky ballets. It would have to have an athletic quality in places, because there is a strong rhythmic impetus in the music.

Will the music all be on tape, or will there be some live performance?

The ballet would be something that could be done by a smaller troupe, so it would be much more practical if they could play the music from quad tapes. Ultimately I'd like to do a version that had synthesizer, either on tape or live, with an orchestra. The piece would handle itself nicely that way. Besides, there is something nice about the marriage of synthesizer and orchestra that has not been exploited nearly enough. This was what went into our work on the part of the *Shining* score that was not used, and on the *Tron* score that is clearly audible on the record — that marvelous balance between "is it or isn't it" electronic or acoustic is what I'm looking for. It's treacherous and tricky to pull off properly, and therefore stimulating and challenging and all the wonderful things you expect from any notion that makes you want to write a piece of music in the first place.

A lot of people may have only a fuzzy idea how a synthesizer would fit into an orchestra. How do you see that?

How about a concerto-type piece, to begin with? A synthesizer might fill the same

role that an organ does in an organ concerto, where the organ can either play the theme while the orchestra plays a background part, or play background figures while the orchestra plays the thematic material. To that extent it can indeed be part of the orchestra, as much as the woodwind section is, say. Somehow a concerto format seems best, since people still react more strongly to synthesizer sound than to traditional orchestral timbres. Of course, as you go into the realm of good-quality digital synthesis, the timbres can be very close to those of traditional orchestral instruments. The trick is to bridge [the gap between] the two media properly, so that they are totally without seams. Then you have a continuum that you can use in any way that the materials you're working on seem to want to be used.

How do you decide what timbres to use?

For me very often the composer is like a referee. Notions come into your inner ear, and you struggle to find out what it is you're hearing. I use the piano less to improvise than to peg down what I'm hearing in my head. I almost immediately know what timbre it is, be it a clarinet or a sawtooth wave. And I mean that literally. The things that come through your inner ear have timbres on them immediately as you first hear them. You actually dissect what you hear in the same way that a musical person in the audience can strain to do as he listens to a performance. The materials are then, in a sense, steering themselves. You might say that the right hemisphere of the brain is dictating and the left hemisphere is taking it down, organizing,

and notating it. There's some kind of feedback loop. Logic and common sense will keep you from being too undisciplined and without some kind of formal plan, and instinct will prevent your concocting pseudo-music that you aren't really hearing. It's that thin line between what is planned and thought out, and what is instinctive and spontaneous, that the great music has always made use of.

Then your inner ear is very important to you.

Let me put it this way: I have a fear of becoming too practiced at what I'm doing, and thereby becoming, in my own definition, a hack. I am often in awe of the way music can come into my ear, and of how this ghost, this muse, contributes to the process. I often feel that I'm a witness, a mere participant, rather than that it's me. I'm afraid that if I have to meet deadlines too often, I'll begin to think, "Oh, gee, they're never going to hear this properly. I'd better write something to meet the deadline." If I become too professional at that, it might become a habit that I can't turn off. If I were to fall back on techniques and formulas, I would be bypassing my inner ear. I never want to lose touch with that. It's the part of me that led me into music in the first place.

In doing the music for Tron, you were under some deadline pressure.

Often I look back after finishing a project and wonder, "Where did that come from?", and start to be afraid that I'll never be able to do it again. It's a scary feeling that you probably never totally lose. But some part of it went

away after *Tron*. That was the most concentrated, tightly packed amount of work, from both a technical and an artistic viewpoint, that I had ever done in my life. I had never been this forced to plan out and produce in so little time. So I had to run more by the seat of my pants and hope that I was really as professional as people were telling me I was. And yet I didn't feel that I ever resorted to formulas or compromises. Somehow I feel that my experiences over the past twenty years have made me a composer now in a way that I never felt I was before. I'm not afraid to say that, yes, I can compose to order. I'm not afraid that I will lack inspiration, or that my output will be just plain lousy. At the same time, I feel much less that I am actually the personal author of the work. I feel that I'm part of a process. I watch from afar, as it were, and see something like the satellite phone system, where I'm not originating a transmission, but it's passing through me and I'm responsible for keeping its coherence and its intelligibility. At the same time, I know that something is part of me when it's all finished. Clearly it reflects some of the things I like to hear. These are my feelings. I'm not trying to put a value on these feelings, just to observe that they exist.

Do you think that the position of the contemporary composer is being influenced by the sudden development of all the digital music hardware that we're seeing? Do you feel it's a different ball game now?

To me there's very little need to dissect these different resources into separate compartments, either chronologically or in terms

of hardware developments. However, the fact that the hardware is becoming more musically sophisticated is changing the complexity of the medium. The sorts of things

**WENDY CARLOS:
A SELECTED DISCOGRAPHY**

- A Clockwork Orange*, Columbia, KC-31480.
- Bach's Greatest Hits Album*, Columbia, MG-31261.
- Bach's Greatest Hits, Vol. 1*, Columbia, MS-7501.
- Bach's Greatest Hits, Vol. 2*, Columbia, MS-7415.
- By Request*, Columbia, M-32088.
- Sonic Seasonings*, Columbia, PC-31234.
- Switched-On Bach, Vol. 1*, Columbia, MS-7194.
- Switched-On Bach, Vol. 2*, Columbia, M-32658.
- Switched-On Brandenburgs*, Columbia, M2X-35895.
- Switched-On Brandenburgs, Vol. 1*, Columbia, HM-35950.
- Switched-On Brandenburgs, Vol. 2*, Columbia, HM-35951.
- The Shining* (featured on one cut, "Rocky Mountains"), Warner Bros., HS-3449.
- Tron*, CBS, SM-37782.

that you and I had anticipated in the early '70s are now finally becoming available. I don't see that that changes anything particularly, except that it lets our feelings go back to the

way they were in the late '60s, when we knew what steps were needed next. As far as I'm concerned, the '70s were a waste in terms of sonic resource development. We agreed at the beginning of the decade that most of the analog synthesizers that were around were insufficient to produce really interesting timbres. And we were told that, not only were they sufficient, but that they were all you need ever have. With the new digital instruments there is, finally, an awareness of timbral complexity, so we can go back to what we started in the '60s.

All this is fine, except that, as a professional, I have lost time. Every time there is a halt in developments in your field, it means that there is a little less you can accomplish in a lifetime. The fact that, so far, there is still no practical means to work in anything other than a 12-tone equal-tempered scale represents a loss to me. I was sixteen when I first became enthused about working in a new scale. So a great many years have passed for me, and still virtually nothing has happened. On the other hand, I feel we're lucky to be here during a time when computer technology is becoming available to musicians. In a sense it might have been better if we had been born later, but maybe if we were, we would find that a lot of the good work had already been done by others. If you reflect on what your time allows you to do with developments in technology, and create art that takes advantage of those developments to produce ideas whose time has come, then of course you're going to feel that you were born in the right time. ■



Want to write the *Keyboard* columnists?

It's easy. Just send your letters to them at our address: *Keyboard Magazine*, 20605 Lazaneo, Cupertino, CA 95014. Are there column ideas you'd like them to consider? Were you unclear about last month's article? Constructive criticism is always appreciated; so are hard won pats on the back.

Naturally, these artists/columnists can't personally respond to every letter, but you can bet they'll read each and every one.

Have something to share with them? Then write them today!

Keyboard Magazine
20605 Lazaneo, Cupertino, CA 95014

Sam Ash, the
IN-STOCK
keyboard specialty store

We sell, service and stock:

SEQUENTIAL CIRCUITS
Prophet 5 & 10 Pro-1

OBERHEIM
OBXa, OBSX
OB1A, DMX
DSX

CRUMAR
Orchestrator Performer

Stratus

Trilogy
T-1C, T-2
Toccata
Roadrunner

ROLAND

Jupiter
RS-09, SA-09
SH-09, VK-09

MTI

Synergy
Auto Orchestra

KORG

ES50 Lambda
DL50 Delta
CX3, BX3
LP-10 Piano
MS10, 20
X917

HOHNER

Clavinet E7
Pianet

WURLITZER

EP200

Agents For:

Arp
Casiotone
Helpinstill
Kustom Piano
Octave-Plateau
Multivox
RMI
Emulator
Eventide
Teac-Tascam
Linn Drum
General Devel.

We're the biggest in the business, with six Sam Ash Stores in the New York area plus a huge warehouse. Our inventory also includes all instruments, amplifiers and sound reinforcement. For price quotes, information, or just plain advice, call the Sam Ash toll free Hot Line:

HOT LINE CALL TOLL FREE:
800-645-3518

IN NEW YORK STATE CALL 212-347-7757
VISA
TWX 510-222-1630 SAM ASH HEMP

Since 1924
Sam Ash
MUSIC STORES
124 Fulton Avenue
Hempstead, New York 11550