Steina would you like to start?

Ussachevsky

Yeah, well I didn't hear this thing about ~~Yusachevsky~~ and Mel Powell and everything. Could you repeat that?

Somewhere around 1965 I would guess when I was a painting student at Yale I set up a small tape center in my studio. A couple of other people joined us and an informal class got underway mainly with an individual by the name of ~~Boulenta Rowell~~ Bulent Arel who was a composer teaching in the music school with Mel Powell. He was a music concrete composer and I had informal interaction with him, went over to their place. He came to ours and I started making pieces that were like music concrete, cutting up tapes and I think we had a couple of Sony decks that could do sound on sound and stuff like that. I made some tape pieces and another individual by the name of Michael Kane was also working with me doing that and finally another individual by the name of David Rumsey. The class was informal. It was a major thing. Through him I learned more about Charles Ives and about certain works that were going on at the Columbia/Princeton Center in New York. The three of us started going to army surplus places and picking up audio oscillators, notch filters, various kinds of equipment, test equipment from WWII. We got an old loft on 257 Orange Street in New Haven. It was the top of a building and began doing some installations there. Meanwhile tuning into some people in New York. For example, USCO. . . do you know who USCO was?

No.

2

USCO was US Company. They were an early psychedelic group of artists that worked out of a church in upstate New York. I'm sure you've encountered some people from that time. Anyway, they had a show at the Riverside Museum near the Hudson River.

Do you remember the date?

That must have been about '65 also. It was very psychedelic. It was installations, some sound. I can't remember an awful lot about it but we were interested in what artists were doing with wave energies and machines. We had known about certain light art in New York. There was an individual by the name of Thomas Tadlock. Do you know who he was?

Yeah, we have his patents here and a description of his Archetron.

He and Bill Crosby who was also doing some light work and we knew quite a few other artists who were doing some stuff like that. Anyway I'll just briefly describe one piece that was typical. We got a bunch of used fluorescents. We would get these in army surplus stores places too. They would be bigger than the kinds that are standard now, wider in diameter and quite long. Maybe 6 or 8 feet. We made these walls that were banks of these fluorescents. I have slides of this stuff. These were wired together in a field. We bypassed the normal ballast and ran a lead around the anodes on one end and then around the glass on the upper end and put these into a transformer and then into an audio amplifier that had a tape deck going into it. There were seven walls in this white painted space and this was a piece called "Program 3." "Program 3" made use of the two channels on a stereo tape deck. On one channel was a pulse that fired the wall. When this audio pulse when through the transformer it ignited the fluorescent tube. If it was a high frequency sound it would be a bright intense light. If it was a low frequency it would be very cloudy and murky and partial. What was happening was we were discharging or ionizing the gas by externally firing them, setting up a field

3

that ran across the whole thing. There were two sounds. There was a fairly inaudible sound which was the pulse that fired the wall. Then, with microphones we had recorded the sound of the gas ionizing and that was slightly delayed on channel two and that went into a sound system. The walls would be, let say, ten or twelve feet high, maybe twenty feet long. There were speakers associated with them as well and you would hear this discharge, poossssh, this sound that would be slightly delayed. The program began where all decks were synchronized and all walls fired together and then because the motors were non-synchronous they would go out of phase and in about 45 minutes come back into phase again and when they came back into phase that was the end of the piece. That's what that piece was and I remember you'd be more aware of the decay of the light than the attack. You would see it washing back across the white surfaces into these fluorescents and then simultaneously with that decay you would hear that sound of the gas ionizing.

This was a installation?

Yes, and there were others. We had several pieces that we would do and people would come up to the loft. We didn't realize it at the time but people from New York were coming there and a lot of people were coming to it that we didn't know who they were at the time but then later on found out about it when we were doing other pieces. So we began doing work like that and experimenting with these very simple . . . that was all that was available in those days with stuff like that. As a result of that we then got a commission to do a piece in Boston in the public garden in, I believe it was, 1966. That piece was a, let me just check this date, uh, that was an important piece. For that piece we built the hybrid-digital analog audio synthesizer . . .

Who are we? Who built it?

There were two engineers that worked with us on this as well. We came up with the idea that we

wanted a voltage-controlled hybrid digital analog sound synthesizer that also could be a programming apparatus, something that could run lights, that could do other kinds of things as well. We worked with a guy by the name of Peter Kindleman at Yale who was in the engineering department there and came up with this design. We made all our circuit boards, we printed them, drilled them, etched them. RCA, Raytheon, all these different companies gave us resistors, capacitors, transistors and stuff and we built the op-amps, multipliers, audio oscillators And/Or/Nor gate shift registers. I don't know if I've named everything. There were a lot of filters and things like that. It was totally voltage controlled. I have photographs of it.

Where does this idea of voltage control come from?

Well, that was our notion. That meant that it was an integrated system. For example, an envelope generator could shape a audio oscillator that could work as a voltage that would be driving a clock that would be operating the shift register which would be sequencing through a number of lights or speakers, lets say. We could put into the system a thermistor, lets say and the changing temperatures would do it. We could have photocells which I'll get to in a moment because we used video inputs as well where we would look out on space from a couple of different angles with very small photocells on the screen creating a gate so that a person walking by or anything like that would be an input into the system that would trigger a clock or a shift register or some other kind of sequencing. It could have Boulean (?) logic tied in with it as well so that it made it a little more complicated. I'll come back to that later on. We totally built and designed and worked on this piece for that show. Now, I want to find a date here because that's important. I'm trying to think if we did the show at Yale first or at Boston.

Was that before you met Buchla or after?

We didn't meet Buchla. In other words, I knew that Buchla had made a ring modulator. Word had filtered out that he was working on this one module but this preceded that and if you want real information on exactly that from someone other than myself Serge Tcherpin is the person to talk to.

Did you know Moog?

He was in upstate New York and we didn't know him. We had heard about it. We knew Mary Ann Amashays and we knew Mort. This was before Mort was doing certain stuff. The thing we knew about Moog synthesizers was that the oscillators were not very stable. There were certain things that were kind of a challenge for us too. We tried to, in this system, do something that pushed it to another level. Anyway, we published all our diagrams in I-Triple E spectrum. We gave that information away and a lot of people used it. For example, David Friend was a young student who was hanging out at the lab with us while we did ours and he used our circuits to build the first ARP synthesizer. That is the ARP was totally based on the system that we built.

What his name again?

David Friend.

Where did he build it? In New York?

You know the ARP synthesizer?

Oh sure we do.

6

He designed that and that was from our design. He was a student there at the time while we were building ours and we made our stuff available to him as we did printed in I–Triple E Spectrum. People like Gordon Mumma for example. You should talk to him about it. He thought it was pretty amazing at the time I think. It was useful to other people, those circuits that came out from Kindleman, Paul Fuge and the other people I mentioned as well. I should give you everybody's name later on sometime so that you know who they were but we made no distinction between the artists and the engineers and everybody was a part of that group. I think the first show we did was at the Art and Architecture School at Yale and we used the walls of light again. We made very large electro–static speakers by stretching mylar over . . . imagine a frame, a stretcher for a painting that had house screening stretched over it, then corner round moulding put on top of that and silver mylar stretched over that. They became large field speakers where, again out of an amplifier the one lead would go to the metal part of the silver mylar, the other would go to the house screening and they would produce a non–point source of sound. They would also modulate as they pushed air. They were best from mid to high frequency but as you started to put low–frequency sounds in they would short out in areas which was somewhat interesting. It was a pretty amazing installation. I have an article that I could send you. A lot of people wrote about some of these installations. Lucy Lippard, I think wrote one of the best articles for *Arts Canada* and there are other people that did as well. Anyway, we made use of speakers. We made use of strobe circuits where we fired fluorescents like strobe lights as well in that installation. Some of the people who came through at that time that interacted with the piece were the Becks, Julian Beck, the Living Theatre, those people, performances happened in this space, this installation.

Are you talking about Yale?

Then the next piece after that was in Boston. For that we used 55 channels of sound and 55 airport landing strobe lights that we made water tight and placed fifteen inches beneath the surface of the

pond, this quarter acre pond. Have you ever been in the public garden in Boston?

I don't remember.

There's a big body of water that's in the center of this park that Frederick Law Olmsted designed and it has a roughly hour-glass shape although it's very irregular. It has a bridge that goes across the center. Fifty five strobe lights under the water, and 55 polyplaner speakers which were a kind of styrofoam speaker that had a paper cone that were positioned around the edge of the pond so that the sound would bounce off the water. We did an installation there for several weeks that routed signals. We picked up the sounds of the city and we sent patterns of light and sound, some synthesized, some phonymic (?) particle generated, around this space. It was pretty remarkable installation. At that time, we met people like Doc Edgerton and we worked at MIT Center for Advanced Visual Studies and with some of the early pioneers of computer graphics and computer imaging. We started to combine computer generated signals into the piece as well. We used a punch paper tape reader and used their computers as MIT although I also hand punched a lot of, basically, tape loops. We would do a program that we be a punched paper tape loop that would drive our first computer which was a SPC-12 General Automation computer that came out of a bread factory. It was a digital computer. That combined with the hybrid digital analog audio synthesizer and banks of amplifiers and lights and sounds were, at that time, the core of the piece. We could have microphone inputs. We could bring weather conditions, the movements of people, different kinds of things like that into the environment as well. It was interesting meeting Edgerton and going up on top of the Prudential building with him and he told us that he'd convinced the city of Boston to put these strobe lights on the tops of these various buildings in terms of airplanes but he had really done it as a piece, to be seen from that vantage point and when you went up there, you noticed that were all on exactly the same plane, these strobes and it defined a shape over the city of Boston. We felt he was a precursor. We'd known his work with strobe lights at MIT but he

8

had actually done this piece that was, unbeknownst to the city, up there. Then after Boston we wanted to do an installation that people could move through. There was this golf course at Yale and that became the site for the fall and winter into the next spring where we did a series of installations with sound and light. These were large installation fields that people could move in. Their presence affected things in the program and you could tell . . . you know sound and light travel at different speeds of course and we played with that and generated some pretty sophisticated programs at that time. We were also interacting with a number of composers and musicians in New York and other places. There was a series at the Electric Circus in New York. Do you know that place?

Yeah, Subotnick put something there.

Yeah. We did something called the Electric Ear series that was Cage, Ashley and that guy who died in the airplane accident. Douglas? He was an interesting artist. Walter De Maria.

Oh, are you talking about the one who did the spiral out in . . .

No. I'm thinking of another person. Anyway, these were the Electric Ear series and we did one of those. I performed the synthesizer. The synthesizer could be played as well and for that we did 55 channels of sound and I think of light as well inside that space. It was all externally passed. I'll send you a photograph of it. It had patch cords but it was possible to set up sequences and change the patch during the performance and that was what I did.

Was that a sequencer? Did it have a sequencer per se?

Well, that's what a shift register would be but it was more sophisticated than that. It could run a shift register or if was wired in a kind of hour glass . . . let's say you got a ten stage shift register,

like a sequencer that goes one through ten and you'd have a patch down at number one and up at ten and that would mean that when the clock would hit it you could set it at a certain rate that it might go through that sequence. Imagine two wires, two rolls of patch areas with two wires running parallel. If you took the top two wires out of their top positions and shifted them around you would have a kind of X shape. That was called a Johnson Counter and that was another sequence. So there were these patterns that could be generated but they also would control speakers. They would open and close speakers or route speakers around in a configuration. So you could take a sound and you could send it through fifty-five speakers, one through fifty-five or something would happen in the program and you could send it 55 back through one. Playing with things like Doppler shift and stuff like that, envelope generators, all those kinds of things.

Tell me, who introduced you to these concepts of, let's say Boulean expressions and other mathematical conditioning for composition? What was the introduction to it?

Basically, that was the logic that was available. In other words, when we wanted to use digital logic before we had our first computer which was the General Automation computer that we got in '67 or '68, that was what there was. And it was basically And/Nor and Nor gates. So simply, when we were using inputs into the system . . . let's say we were sampling two sources and something happened in one but not the other that would be an "OR" or if it happened in both that would be an "AND" or if happened in nothing it would be a "NOR." The reason we did this and this was part of the conceptual thing we worked on was, in these environments that became increasingly interactive, where people would be moving in space, we were very aware of not wanting to set a kind of conditioning. Our model was not Skinner. We were critical of B.F. Skinner where let's say a person steps into a space and they know where a photocell is so they go and stand in front of that and make a line of lights go on. That would be conditioning their behavior. We wanted instead to have a feeling of sentience, that is, of intelligence in the space and so we employed Boulean logic,

10

digital logic at that stage to make the program more complex and not have it so causal. At the same time, you would know what was going on. You could feel it, you could sense that that was happening but it wasn't one to one and it made use of multiple events or what I would call the "Event Space." It made use of multiple events kind of superimposed.

Before you went to Yale did you already have a basic education or did it come from music. All the sort of systemic thought and the terminology and nomenclature. Were you trained in mathematics?

In high school and stuff like that but my painting at the time . . . the reason I stopped painting was that I was trying to deal with more interaction, light. I was doing systemic painting. It was the kind of thing that was there at the time. But the people I worked with as well, like Michael Kane, his background was poetry. He had worked with John Ashbery and people like that. David Rumsey was a filmmaker. He was very much into film, 24 frames a second and all that. As we started doing these pieces it came out of working with things at that level. Dealing with time, event, all those things. As we interacted with Kindleman more we learned more and built the circuits and understood more about how these things functioned. It came out of that.

Let's pick it up after Boston.

Before Boston we were going to Bell Labs, we were going to Stanford, a number of places where art and technology was going on. We were interacting with engineers and scientists in terms of what some ideas might be. By the time we did the show at the Museum of Modern Art which was the Spaces Show in 1969-70, that was a major installation where we made use of a IBM 360 as well as our control apparatus, using video as the input mechanism primarily. At that time we were working with neuro-physiologist, a guy who was a programmer and a neuro-physiologist, trying to model the brain, trying to think about how the brain worked in terms of processing signals, being very aware

of parallel processing, trying to do things that worked with parallel processing. Stuff that Marvin Minsky, who was a person we interacted with as well at that time, now calls "Connectionist Programming" but in those days the mind dealt with was kind of called parallel processing. With the IBM 360 it was possible for us to really . . . we never got total control . . . I mean I worked on that every day that that show was there and occasionally we really got some very interesting stuff happening with sound and interactivity. We also used banks of infrared heaters that made this portals or gateways that washed you with heat in certain patterns. In terms of those installations, it was really difficult because it was machine language and the programming was beyond my skills and if you know what computers were like at that time, it was really through working with people at MIT and other places that some simple programs would be possible for us to do by talking with them saying what we wanted to do. But almost everything was really done with the hybrid digital analog audio synthesizer. It's called an audio synthesizer but it was really a programming apparatus. We were interacting with people like Steve Reich and Lamont Young, Jim Tenney. We put together the first concert of those people ever. We did that at Yale and Phil Glass was a student at that time. He had just come back from Nepal with tankas I remember. That was before he began to work with Steve. We were also interacting with Karl Heinz Stockhausen and people like that. You see, Serge, who was a friend of Michael's, had been running Stockhausen's Milan studio for a couple of years before he came back to the states and Serge was a . . . (Tape flipped, text missing). . . She was a patron, she was involved with the Brooklyn Academy of Music. Anyway that was very helpful. So the Spaces Show was where we had our opportunity to really work with a powerful computer for the first time. We were attempting to do some really difficult stuff that I still think is interesting in terms of areas like artificial intelligence and interactive kind of spaces. I was on a panel a couple of years ago at the Art Institute of Chicago . . . Were you there at the "Simulations/Dissimulations" conference?

I don't recall.

Anyway, it was a panel on artificial intelligence that dealt with a lot of that . . . Cohen was on it and a lot of the early people working with interactivity and artificial intelligence. I think that one of the things that set Pulsa's work apart on a certain level was this non-direct causal kind of relationship to the way people encountered the apparatus and what the feedback was like in terms of the space. At the same time we were working with . . . Oh, here I see right now, the Electric Ear Series was organized by Mort. So that definitely was him and that was 1969.

I don't remember this MoMA show. We were in New York at that time.

It was called "Spaces" and it was 1969-1970. It was the first time that a group of contemporary artists of our ilk did anything at the Museum of Modern Art. The other people in the show were Franz Erhard Walter, the German artist, Larry Bell, Robert Morris, Dan Flavin.

Do you have a program of this?

I have one catalog of it but it's pretty rare. I could xerox something from that. After the "Spaces" show in 1969-70 we then did an installation at the Wadsworth Anthenaem. We did not do the Sao Paulo Biennal.

By this time, haven't you become Pulsa?

Yes.

When did that happen?

13

That happened in 1966 or 1967. Probably '67. Here's what my resume says, "67-'68: a continuing series of installations of programmed environments utilizing light, sound and experimental electronic apparatus in a loft at 257 Orange Street." That was Pulsa.

That means you are a founding member?

Oh, yes.

How many people were you by 1970?

We were myself, Michael Kane, David Rumsey, the main ones that initially founded it and Peter Kindleman and Paul Fuge, Bill Crosby and William Duesing.

No women? I thought Mary Ann ~~Amashay~~ Amacher was a part of that.

Mary Ann. I will come to that later on. Mary Ann lived with us and worked with us. I would say she was, although it was kind of unofficial because Mary Ann was doing her other stuff and . . . Mary Ann and I really interacted the most out of the group. We worked on the "Automation House" show with Bill Duesing.

Do you have a program of that?

Of "Automation House"?

Yes.

14

Slides. I have slides of a lot of stuff but I don't think "Automation House" produced a program.

No, no, no, that had a single sheet of paper.

They did?

Yes, we have some of it.

I don't think I have that but I have slides of some of that. What happened after that was we began working with video and did quite a few video installations.

How did that come about?

Look me look here at this. I'm on 1968 now and seeing "fluorescent light sound at the University of Rhode Island, the golf course, the Boston Public Garden, and School of Art and Architecture." I see, I'm working my way up to the top of the page. '69 was the Wadsworth Antheneum. We refused the Sao Paulo thing. We did this installation in the Louis Weiner Field in Bethany, Connecticut and we did the "Electric Ear" series with Mort. Then in '69 and '70 was the "Spaces" show at MoMA. We started doing video installations in '69-'70 and we worked with video before that on our own. We did a lot of pieces at Harmony Ranch with sending video over laser from one house to another.

What's Harmony Ranch?

Harmony Ranch was where we lived in Connecticut and that's where Mary Ann, that's where MEV (Musical Electronic and (?)) which was basically a Alvin Curran and Teitlebaum and others came

and stayed with us. It's where Steve Reich and others stayed. We did a lot of pieces there. We did private concerts and video and sound events.

Was the video then cameras or also recorders?

We were working with tape loops and working with projectors.

Half inch tape loops?

Yeah and projectors. We used them in several ways. In one way we used cameras and monitors and I can send you some slides of this, we used cameras and monitors as input devices into these installations that we did. We also used three or more large (?) Victor black and white video percatheters (?). Here's a piece in 1970 that was at the University of Kentucky/Louisville. There were two dormitories, men's and women's dormitories where we did a real time link with video projection between those two towers so that people could come up in front of the camera and communicate in these sexually segregated spaces. We did those installations with three video projectors, timed delayed images, sound and light at Yale in 1970 also and another installation at the DeCordova Museum in Lincoln, Massachusetts. Then, by 1971 there are a lot of shows that were . . . Nova Scotia College of Art and Design, Silver mine, we did "Music with Its Roots in the Ether" with Bob Ashley out at Mills, the Avant Garde Music Festival, we did a light/sound installation at Mills College besides that. We did a video installation at "Automation House" that year. We did a light and sound installation at the U. of Rhode Island. We did performances with the World Band with Alvin Lucier, Richard Teitlebaum, Mary Ann Amacher David Behrman, Anthony Braxton and others. We did a light and sound installation at the Philadelphia Museum of Modern Art that year. We did a light and sound installation at Stanford University in Palo Alto. We had a piece at the Yoko Ono show at the Iverson Museum. We did the John Cage Birthday

Performance with Nam June, Joe Jones and others at WGBH in Boston. We did multiple video projections, light and sound performance with Nam June, Serge and Simone Forte and everybody at Cal Arts. We were teaching at Cal Arts at that time as well. We did a real time video sound link between L.A. and New York which was the Armory Show, the New York Avant Garde Artist's Festival with Charlotte Moorman and Nam June Paik that year. We did a light sound installation, "Works for New Spaces" at the Walker Art Center and we did a Critics Choice for Cornell University, New York State Council of the Arts. We got one of the first CAPS grants in 1971. 1971 was a really intense year.

All these things were unique installations. They weren't repeated pieces. I remember what it was like. There were three pieces in New York, a couple in L.A., Minneapolis, it was an intense period. Then in 1972 we did a few more pieces in L.A. at Cal Arts. The first year they were in Burbank and that's where it was very experimental, working with Shuah Abbe and Nam June with the video synthesizer. And in 1972 they moved out to Valencia and . . .

Was the Shuah Abbe synthesizer working in '71?

Yeah.

How long had it been working?

That was not the first generation.

Do you know what was the first generation?

Of theirs? I would say that at least the second or third, that they had in '71 at Cal Arts. I would say probably the second or third. It was definitely working. I also had seen in New York Eric Segal's

at Howard Wise'. What date do you have on that?

1969. The Howard Wise, the show called "TV As a Creative Medium." That was colorizer. But what he calls a synthesizer came much later.

That's right. The synthesizer was later than than. I remember when he had that. That wasn't really in a show. That was in an office at Howard Wise's.

Did you know Roger Kent on the west coast?

No, I don't think so.

He built this (?) synthesizer for Cal Arts.

Well, then I knew him for sure. The name just doesn't ring a bell after all this time but it was 20 years ago.

You know Scott Bartlett the filmmaker?

Yeah, I know who you mean.

He lived next door. You might have stayed with him.

Yeah, probably.

Were you out of school or still in school?

We were out of school. I was out of school by '67.

What year were you born?

1941.

So you were an old man then. 26.

Yeah.

Did you graduate?

Yeah.

So you are a certified artist?

Yes, I guess so. The thing that made a lot of this possible was that we were so-called research associates after we graduated. We taught a seminar which was called the "Pulsa Seminar" and a lot of different people were in that seminar. It dealt with all kinds of stuff. It was in our loft and dealt with installation and video and stuff like that. Because we did that we were able to get a grant from the Graham Foundation. They were basically architects and we had a grant from them for five years that really made it possible for us to build a lot of this stuff. Also we got total donations from industry of components and by components I literally mean resistors and capacitors and stuff like that. We built our own pieces. For example, I just ran into Matt Mullican this summer and he was a student at Cal Arts when we were there and he remembered an installation that we did in Valencia where we used the hybrid digital analog audio synthesizer with about 55 channels of sound around

the balcony of this big open space and our input device into it was Doppler radar. If you were standing anywhere in this space you could move one finger and the system would respond to it. The most extreme case would be a group of people doing tai chi and according to whatever motions they made in the space, the program, the sound would drop an octave, it would change its direction, routing around the space, a number of things would come out it at that level.

Am I correct in understanding that your activity was always associated with space as large as possible, somehow laid in the field. Do you have any general pattern through which you worked? Did you have any manifesto? Any formulation . . .

We wrote about stuff. I'll try to dig up what I can. It's a shame this person by the name of Michel Warren who has done thorough research, he's talked to a lot of other artists. Again, you could talk to Ashley. I could mention a number of people that you could talk to that would give you their responses to what it was like. They were people who visited us or lived with us or that we interacted with. This guy Michel Warren, he talked to me for hours, he collected all the material. He's talked to every single one of the group. I don't know what's happening with the book or whatever it is he's working on. The last time I knew of him was about a year ago where he was teaching at UCSD in San Diego and I just lost track of him but he's compiled a huge amount of stuff. We also did interior spaces as well.

Given a choice which would you prefer?

One of the things we were interested in was the kind of thing that Lucy Lippard writes about. She writes about Pulsa in some of her books that on one level the dematerialization of the object. So we were interested in field effects. We were interested in human interaction with wave energy, with machine intelligence. I've got statements that we've written about that.

20

Would it be in the Tesla tradition?

Yeah, he was certainly someone we were very interested in. Sure. Part of this dematerialization of the object would be . . . let's say if we were doing a piece outdoors, you'd be aware of when you entered into the field but we weren't interested necessarily in climbing up to a mountaintop or a building where you could look down and see it all at once. It was more like you were a part of this field with . . . it's hard to describe because the illusion was that these sounds were flying by you and the light would move so rapidly. It was like a kind of natural phenomena. When those strobes went off underneath the water in Boston it bent the surface of the water, it made a corona discharge that was about fifteen feet or more in diameter and the water above it seemed to bend. It was very strange and they moved with incredible rapidity. You've seen lights at an airport and they usually go in a line like that. I did the installation. I drew the layout for Boston and some of the pieces and what I thought of when I did it was literally was a stone dropping into the water and the concentric rings going out and coming back over and at the nodal points where they would intersect is where I positioned the lights. When these patterns were running through it, it had a curious relationship with its edge, almost as if it were wave energy or water going back and forth if you can see what I'm saying.

It's what we call Heterodine.

Exactly. Heterodining with things we were interested in.

We experienced that with Lambnt Young and also in video.

Yeah, Lamont was a person that hung out with us. We went to his concerts. He visited us a lot.

How much energy did you usually input into these systems? It must have been large.

No, plus or minus seven volts, five volts.

What about the strobes?

There were Spellman high voltage coils in the strobe lights. We made a second generation of strobe lights after Boston that were . . . Mort still has a couple of them that he uses in his pieces. I've got a few of them.

By the way, since we are talking about the physicality, is there anybody that has collected those instruments?

This is what Serge is on my case about. This is what Stockhausen said. I remember at one that we were doing these programs and they were basically patches that I would do and they were fairly intuitive. Something may be working for a while and that patch would be noted or would just be remembered or it'd be worked with and then another piece would evolve and it would replace that one. I remember wondering about that with Stockhausen one night and I said, "We don't have any scores. Like you've got scores and stuff of all your pieces." And he said, "Your circuits are your scores." I think that's right.

Well, do you have them?

Yeah, well, we're published on one level but the device itself is in Arizona with Crosby. Serge wants to get it back. Serge thinks it should be at the Museum of Modern Art or some place. He said that he would be willing to refurbish it. His synthesizer is based on some of our stuff and Dan Sandine's

video synthesizer is based on some of our circuits as well. I don't know who else has used it but that was the general idea. Our's built on other areas as well.

So is Bill Crosby still using it?

No, he's not. We've kind of had a falling out. Am I being taped right now?

Yeah.

I'm a little leery about that.

So let's skip it until we stop the tape. Tell me, what is in Arizona? What machine? This is the synthesizer we are talking about?

Yeah, right.

Okay, any switching networks?

All that stuff is there.

And where is it? In a barn?

It should be in a house and I'll tell you later on. We can go back and talk about that but when the last time I talked to Serge about this . . . he brought it up about three years ago and he said he would be willing to go back and replace any components that needed replacing and get it in shape.

We will tell you also when we stop the tape that this is exactly what we are working on. Collecting machines and everything but let's not waste the tape on that. I think the story is sort of coming to a close because a year later you were up in Colgate as a professor. So wrap it up, man.

Okay, so what happened then was that by '72 we were doing more shows between L.A. and the east coast. As I said, '71 had been this blitz of a year. Rafe was born twenty years ago yesterday. I didn't like Valencia that much out there after what we had been doing in Burbank so I resigned and left and went back to New Haven with Flora where Rafe was born. We had been doing certain things. We had another stage that we wanted to go into with the synthesizer that involved a pure digital system and get involved in a lot of funding. Funding was getting more difficult at this point. We didn't have our grant any more from the Graham Foundation and we basically dissolved the group. Flora and I went to Mexico and Guatemala for a year where she was doing her research on pre-Columbian stuff, Mayan things and then came back and at Colgate I did a piece called "Paseo Video" which used the synthesizer again. I got the synthesizer back and that was a major piece. It involved a standing wave environment of sound. It involved a video installation and an interactive environment using the controller device, the Pulsa device.

What year?

Again, I'd like to say this off the tape.

Is there anything else to say while we have the tape running? I just want to put on the tape . . .

This is something else that relates to it but I didn't necessarily . . .

I want to know the nomenclature. What's the name of that synthesizer officially?

24

We always called it the Hybrid Digital Analog Audio Synthesizer.

Give me the nomenclature of the other associated hardware which was creative. Not the service hardware. Was there any other creative hardware associated with this project or is it all auxiliary?

There were a lot of other things in the sense of . . .

Nomenclature, give me some nomenclature.

There were a number of I/O devices. All kinds of things that went through that particular system. Such as Doppler Radar, Photo Relays, video things.

But is there nothing specific with . . .

Do you want me to list everything?

No, if you have it on some piece of paper.

I don't think it is written up.

Oh, shit. Then think about it and we can stop the tape (tape stops and resumes) Now it's recording.

It was in several configurations.

What? Give the name again please.

The hybrid digital analog audio synthesizer was in several configurations. Its earliest configuration was rack mounted. It was in an upright Bud rack type console about 5 feet high and it was a series of modules that were on cards that plugged into busses that went along went along the back with a power supply down below. One module might have two or four VCOs, that is voltage controlled oscillators on it. Another module might be a couple of envelope generators and another module might be a couple of op amps. The devices in it were a voltage controlled oscillators, op amps, multipliers, shift registers, clocks, And/Or/Nor gates, envelope generators. There were other modules as well.

How did you operate it? Was there a keyboard?

No, it was not keyboard operated at all. That was the whole idea of it. We didn't want it to be . . . even though I did use it in performances . . . the whole idea was that it was a programming device that you would set up and then modify the program according to patching it and so you would set up a sequence and get it going and then tap into that and begin building another one down here, bring that in, work back and forth on that level. It also had another Bud rack close it that had 55 to 60 pre-amps in it and the output of the first device could go into those and then out into speakers that ran by cables. It also had another rack that had a punch paper tape reader, a small General Automation SPC-12 computer and a few other devices.

Was this a collective work or was it a single individual design?

Collective. All of us, all of us' together. (Tape one ends here) A module would emerge from a discussion and Kindleman and Fuge would work on those things and we would talk together daily. Finally, the circuits were drawn up and then we applied to industry and got donations of components and then we began to literally, print, layout with a drawing, print, etch boards, drill

boards, mount and solder. It was a group collective effort putting it all together. We didn't distinguish. We were totally the opposite of the EAT. EAT matched an artist and a technician. We weren't into that. The whole idea was that as much as possible we would try to be a collective unit that didn't differentiate that much between the areas that we did.

Would you recall again the evolution of this. When did it start, this instrument building?

'66 I would say.

When would it be completed so to speak?

We had it completed before we did our first show but it certainly was completed by 1968.

How did it differ from the other synthesizers of that time?

Well, (?) were voltage controlled. By voltage controlled, understand that means that the modules are totally interactive, it also means that they can be driven by all kinds of phenomena. Any kind of varying wave energy. They could be driven by people walking by a photocell. A video camera could be looking out on the street and ten blocks away small specs of people walking by in a stream with a gate set up could be setting the clock for whatever the routing of sound or the frequency of the sound or the . . .

What was it reading on the video? A particular location or . . .

I can send you an image of this. I've got a shot from an article in Georgi Kapishes'. He did that "Visions and Values" series. I don't know if you know that. A series of books that MIT published.

27

And this was called the "Arts of the Environment." I wrote the article in there and it's loaded with Pulsa images. Imagine a monitor. At that time it was a really great industrial monitor. A Conrack. Metal cabinet or probably no cabinet. I think it was just the CRT and then on the CRT are these really small photocells, basically about a pixel, they were able to measure something and it's two of them that are wired together. They're spread apart like a Y, making a small gate, right? So there were two of these things and there was maybe a sixteenth of an inch or an eighth of an inch or a quarter of an inch between them. Then they would be able to measure a change. So if a person walked by in that area it would effect a change. Do you remember the show at the Whitney that David Behrman had a piece in that the camera looked at the clouds and there was an intelligent pixel at certain places on the monitor.

"Cloud Music."

That was exactly was this piece was like.

Did you distinguish in your synthesizer between the signal and the control or was the control and the signal identical?

See, that's what I'm saying. They could be identical. That's the first time, I'm sure, that that happened. If you called Serge he would be able to tell you about it. Gordon Mumma as well. Serge would be an ideal person because we've talked about it. He's built them. He knows the whole thing very well. He said that Buchla had made one module, one or two modules. Moog's was not voltage controlled. His was really analog. This was the first one that did that. Now, I wished I could refer you to the I-Triple E Spectrum article which I have lost where the whole system is totally described, the circuit diagrams are printed and everything is in it. I could give you the name of a person who would absolutely know and that would be Peter Kindleman at Yale University.

28

What department?

Electronic engineering department.

Good. We won't be able to get into the absolute level of detail but this is what we are doing. We are just mapping the sixties. We want to also do the pre-sixty situation from which . . . because video came in what is called synthesizer form in the '70s.

I go back earlier than that. I've got a whole talk I give of the history of video and I see it beginning with Mary Ellen Butte in the 50s.

Yeah, we got to her right now also because even earlier she was working with ~~thermo~~ Theremin. (?). After Mary Ellen Butte . . . who? How does your history continue?

You know me. I go back to other kinds of things that aren't really video. I really think that Johannes Zahn and his magic lantern in the 1600s. I use that as the first one and then I talk about that in that little essay I wrote for "Video as Attitude."

Do you know Rosebush Judson?

Just here.

We also worked with him on this. He sends us something that goes back 4000 years B.C. The whole idea of chronologies becomes crazy but . . . My question was only from your vantage point because you were in it and you were in it earlier than we were. Who were the actors in video in the late sixties?

Okay. When I first put my hands on a portable video equipment, do you know who that was? It was the Firesign Theatre. Do you know who they are? They visited Pulsa and they had a portable video camera. A typical thing we had at Harmony Ranch was up by the barn there was a telephone pole and on top of that we had mounted a video camera like a weather vane and I guess that's why I'm interested in Zahn because when I think about his piece it always seems like that. And then there was a monitor down in the kitchen and so as the wind blew the video camera it would pan the whole ranch and show that image. So we did a lot of work with closed circuit type stuff. A lot of the early stuff I did was research into video projectors because that's what we used. Do you know the IDA four? The very best color video I ever saw was Display Sciences. They were a company out of New Jersey and I think the Mafia got into it or something happened to them. But they had incredible stuff. We did our stuff with Nam June. There was a lot of interaction with him. I lived with Alison Knowles and Peter Van Riper and people like that. Peter was working with holography and I've told Woody about this a little bit but when I was at Pratt I was with a person who died very early on who really contributed a lot to the early stages of certain aspects of video, particularly with Howard Wise. He was responsible I think for white cycle even though . . . who was it?

Arthur Schneider and Frank Gillette.

Right. There was a third person.

He died?

This third person who was killed in a motorcycle accident who was a guy that I worked with at Pratt. I worked with white at Pratt as well and I can't remember his . . .

I'll tell you. His name is Dale McGee. But how could he be responsible for the white cycle. He

didn't know those guys then, did he?

He did. All I know is that he knew those guys and worked with those guys on some level. Whether or not it was white cycle . . . because white cycle really was the piece that happened when it happened . . . I know him from working with multiple images. He and I worked on some stuff with colored di-cloric lights, multiple lights creating multiple shadows of a single image in different colors and sequences. I can remember many night's conversation about what if these images could move this way or deal with it on that level. So McGee is an interesting early figure in some way. Thomas Tadlock is another interesting figure in terms of certain stuff.

He comes from light tradition. That was his origins. Was it also painting?

Yeah, I think so.

Did he make movies?

Not that I know of.

How come that Howard Wise bypassed the Pulsa?

He didn't. You see, this is the weird thing again. Is this being recorded. I don't know if I should . . .

Okay, stop the recorder. (Tape stops and resumes)

With the dematerialization of the object we were also not interested in galleries. We wanted to work

in public space. As a matter of fact, when we did the Museum of Modern Art show it was 1969 and it was the time of Vietnam and the Art Workers Coalition were doing their numbers with the spilled blood and all that and Nelson Rockefeller was on the board of the museum and he was trying to. . . he wanted to institute a five dollar admission fee to keep certain kinds of people out of the museum. So all this was being debated. And our policy with our pieces was that no one should have to pay to enter the piece because we questioned where the boundaries of the piece began itself. In other words, like we were talking before about the fields of light and sound and other kinds of things, we didn't want it to have object to it in terms of having a precise boundary so the fact that someone would have to pay was totally antithetical to the piece. One of our conditions was that people have free access to our work. It was in the sculpture garden so people were able to enter into that space from the outside I believe without having to pay. It also was the time when the Art Workers Coalition was putting a lot of pressure on and the combination of them and us got MoMA to institute their free day which was a kind of token thing. I remember having a conversation with Richard Oldenburg who is possibly still the director of MoMA today. I don't know. This is where I got my first inkling of modernism. At least, modernism from that perspective in that this whole idea of field, of boundary, of access, of the dematerialization of the object. He basically said he understood what it was about but he felt as an institution that they were dealing with other work and that there was a period of art they would continue to collect and fill out but they would not push forward into a certain kind of other work and that they were going to really deal with what was modern art. I never even thought of modern art. I thought that everything that anybody did at that time was modern just in terms of it being contemporary but I began to understand that there really was an idea about modernism that was being dealt with in that show called "Spaces."

How does it relate to Howard Wise?

So Howard Wise wanted us to join his gallery and we didn't want to do it because we didn't want

to join any gallery. It got into some strange stuff. He came up to see an installation at Yale. I don't know who he talked to. He didn't talk to me. Anyhow he came and no one was there to meet him and he got very upset about that. We had been going down there for years, going to his shows and I knew a lot of the painters that showed there before Howard Wise even started to show art technology. He offered us commissions in Europe which were big light installations, permanent installations and stuff like that but we wouldn't do it. It was part of the idealism of that time.

Was Alison Knowles his secretary at one time?

Not that I know of. I don't think so.

Didn't she organize the big conference at MoMA? Yeah, she must have been involved.

Alison Knowles?

No, that was somebody else Woody.

Alison Knowles was married to Dick Higgins.

Tell me, do you want us to talk to Serge and try to move in on this synthesizer somehow diplomatically.

Absolutely. Yeah, 'cause I'm worried that more years go by and who knows what this guy might do with it. It might end up . . .

You may stop the tape. (tape ends and resumes) You mean like you had made like a cross matrix,

a pin matrix.

Yeah.

The same kind as the English guys were using? Or did that come from ARP?

I think theirs came from ours.

Was it Cherry cross point switching that was installed in the first ARP? Remember those matrices? Was the vertical switching like a slided type of switching? Was that in the original instrument or was it included later in ARP?

I'll tell you, I didn't really see an ARP for a number of years. I saw ARP for the first time in many years was when I got to New Mexico and in Albuquerque, right across from the University when I first got there, there was a sound place that sold ARPs. I wanted to buy one but I didn't have any money at all.

I saw one about two months ago. Ralph Hawkin has one.