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Woody: How would you summarize the tools of video that you have contributed to or created. Do you have any list of them?

Bill: List of them?

Woody:Could you just go chronologically. Recall something that you have built, ~~ax~~ dnd then applied, or have built and given to other people or you have conceptualized and other peoole have built. Anything that you think that is a creative contribution of the tools which does not exist as a commercial.

BILL: Well, I didn;t know what I was doing when I started. I probably still don;t know what I:m doing, but I have some vague thoughts along those lines now. I started out doing documentary, you know that.

Woody: A camera basic thing.

Bill: ~~Basicallyxinportapaksxandxcamerax~~ Basically in portapak and camera.

Woody: That's the commerical part, you could buy it.

Bill: Right, so then I started to do feedback.

Woody: OK, that's fair. Did you find any special thing in feedback.

Bi-l: Everybody finds special things in feedback. I was playing with the feedback and I began to play with mirrors. I began to play with lasers.

Woody: Isee, I recall.

Bill: I played with lasers and feedback and then lasers on mercury which was something which ~~should have~~ Shridhar Bapat told me about ~~which~~ that they had done at MIT where they put a multi-vibrator in a mercury pool and vibrated to music and reflected the laser off the pool but they all poisoned themselves with mercury poison. So I sealed the mercury in a gas, in $CO_2$ or oxygen. Should have been in $CO_2$ but it was probably not perfect. And I used it as a

short circuit ina magnetic field, which was better than multi-vibrators. Moredirect electronically. And I started to play with that for deflection. You remember that. You dont really need a lens on your camera for that cause the laxer light stays focused. You can do it on the surface of the vidicon.That's what I started to do.

Woody: it was a kind of conceptual contribution.. .

Bill: It's a deflection of the beam, you know

Woody: Modulated by something . . .(inaudible) . . . by music or by oscillators

Bill: By oscillators, not music. This is a deflection. S- this is hwat I started to do when I got into the video end of it. And then I got lots of world war II oscillators, surplus tube oscillators, hundreds of them.

Woody: Do you recall compositions? Did you make compositions.

Bill: Yeah, there was the Laser Quantumelle (sp?) which I did at the TV Lab when it first started, which is a laser composition. Then Andy Mann and I together did a laser to music thing.

Woody: Did it have a name?

Bill: Downstairs the half inch tape says "Etra-Mann, Laser I." And I did several short things with lasers. And I did a show at the Kitchen, actually, with live laser and video and matrix of monitors and live oscillators directly into video, into keyer and switcher, you know the small S-ny switcher they had there and I did it live and it was the night of one of the moon landings. Do you remember. It was one of the lunam landings, I don;t remember which one, and I kept waiting for them to land and for some reason they were delayed and I kept waiting for the image of the man landing on the moon to come

up, which was going to be my last grand image. The oscillators were actually not properly balanced and were burning themselves out one by one. I had them incorrectly summed. And finally the last oscillator burnt out. I had a TV monitoring the channels and somebody put on a simulation of a lunar landing and I went to that.

Woody: You had some keyer then, didn't you?

Bill: The little Sony swithcer.

Woody: But that doesn't have a keyer?

Bill: Yeah, it does, sort of.

Woody: Just negative-positive?

Bill: Yeah, negative positive. It didn't have a keyer, so I had your keyer. The Shintron keyer. And that was called (inaudible) Mars and Optic Aspect with Oscillators and Pulse Generators." And that one was called, what was it called? I really rescanned, that had to be rescanned because there was no video to it, it was just raw pulses. That one was called "Space Flight in the Negative Dimension" or something.

Woddy: I see, is "Mars and Optic Aspect" also rescanned?

Bill: Yeah, sure, because there's nothing putting it into the video sync signal. All the oscillators are raw into the back of the monitor summed together. They burnt out. I had more. That's what got me to get Rutt to make it more logical.

Woody: Is that the sequence? Oscillators into the monitor, then rescanned?

Bill: Yeah.

Woody: What was the next step?

Bill: Th next step was I was at the TV Lab for a while, so I built one of Nam June-type machines. The one Barbara Buckner used.

Woody: That was from her? Did you get the schematics from ~~her~~ first?

Bill: No, it was from looking at the picture and from looking at the TV Lab's machine. I built it with the 11" trinitron which was a slightly better monitor, and a bigger yoke and different amplifiers, but I mean ~~it~~ there was no schematic, this is the way it works. Louise remembers.

Woody: What was the year?

Bill: I don't know, we lived in Brooklyn then. it was the first year we lived in Brooklym, it was the year after we were married.

Louise: 71.

Woody: When I met you you already lived in Brooklyn?

Louise,: No, we lived on Sullivan Street.

Woody: Have I ever seen your home?

Bill: On Sullivan Street, I don't know, I don:t think so. I went to visit you becuase George Stoney . . . I'd been doing feedback apes and George Stoney said there was someone who had something that would turn this into color. Brought my feedback tape to you, Mr. Vasulka. You're going to be embarrased now, a little. And you colorized it and it was a feedback piece I'd done to Chopin and you said you can just waste your time doing these pretty little things for ever and walked away. So you insulted me. I was . . .

Woody: Oh, I was probably honest.

Louise: Bill was shattered.

Bill: I was angry, no I was angry for a long time I was angry.

Louise: that was the same year that article came out that Chloe Aaron wrote.

Woody: Did you have any other tools? When was Aspect made? The same year.

Louise: That was in Brooklyn.

Bill: It was the same year probably, we had moved.

Woody: After this, the prototype of the Scan Processor. How did you get together with Steve?

Bill: I knew Steve for a long time. Steve was a high school friend of other friends, Paul Gore and other people I knew. He'd been in the same crowd. I knew Steve three or four years already.

Woody: As what?

Bill and Louise: Just a friend.

Woody: You didn't caere what he was doing? What was he doing?

Bill: He was making strobes lights and relay switches.

Woody: Why would he do it? Was he educated or was he predestined?

Bill: His family was in electronics. His uncle had owned Sprague Electronic Sale Division and his father was the sole distributor for Sprague and his other uncle owned Amperite, which was the factory in which Steve had a shop. In his uncle's factory in Jersey. Steve knew electronics, he just knew electronics. He had not finis-hed college but he knew electronics and had been brought up with electronics.

Woody: You approached him and said "let's make art" or what?

Bi-l: I said I wanted help doing this and Steve said he wanted money and eventually I convinced NET to give him the right amount of

money I could make a Nam June synthesizer that zoomed and panned. Because his synthesizer only wobbled, the image won't reduce its size or zoom or pan.

Woody: Did you get sponsored for this?

Bill: Yeah, that got sponsored for $3,500, which is what they paid for the first Rutt/Etra. Steve and I added about $10,000 of our own money we borrowed from our families for it and built the fist machine. It cost us ~~$13,300 and they~~ $13,000 and they got it for $3,500.

Woody: That was the first time you got sponsored to build anything?

Bill: Yeah

Louise: That was in 73.

Woody: How did it develop from this idea of building it?

Bill: It would probably not have happened had access been available to a Dolphin computer. But it wasn't and there was a big computer; we couldn't possible think about buying it.

Woody: Did you go there?

Bill: I had seen it. I didn't actually see it until we were already working on ours, but I knew Walter's, I'd seen Walter's things.

Woody: You'd seen Walters tapes?

Louise : And Ed had been working there.

Bill: And Ed had been working there. I'd seen Ed Emshwiller's stuff. That wasn't Scapemates, it was the one before Scapemates. The people twisting in space.

Woody: Where did you actually pin-point what we call the control modes? The controls.

Bill: I didn't. Their controls are different. It worked out like this. Since I knew almost nothing when I started. I knew you had to sum the waveforms. That was obvious from the oscillators. I knew you had to attenuate them, which is multiplication. Steve knew more, Steve knew about diodes, resistance networks, etc. I wanted locked oscillators for ever, becuase I wanted to stop them moving. Mars and Optic Aspect rolls continuously partially becuase you can't. Sometime in there we made Video Wallpaper using the Nam June Encoder. Nam June's colorizer is really an enocder with three shifted positions. So it's R_G_B_Y_M_C_Y encoder with a shifter on thegeneral phase.

Louise: That was also in 73 and that was the first time I worked with Bill at the Lab.

Woody: Did you have any special tool before, like a colorizer.

Louise: We had the Eric Siegel colorizer.

Woody: You owned one?

Louise: Yes.

Bill: I bought one from Eric eventually. I had George Brown's befor that.

Woddy: Let's see. After the oscillators you bought from Leeds or whatever, you actually purchased a CT Lui colorizer, so to speak, and then after that Eric Siegel's. You didn't purchase any other special tools.

Bill: No, but I did have Eric Siegel make his voltage controlled 1045

Woody: Was it a pain, was it easy?

Bill: He was screeming and yelling "why?"

Woody: Did it work well?

Louisa: About so-so.

Woody: But you had a scope by that time, didn't you. You were the first guy from that crowd who would have a scope?

Bill: Probably. And the other thing I had. I had played also with Eric's synthesizer. He had let me borrow it in Brooklyn.

Woody: You brought it home, from him directly?

Bill: Well he had it, it came from him.

Louisa: And his big color monitor.

Bill: And his 25" . . .

Louise: Don:t you remember Andy Mann brought it up the steps.

Woody:

Bill: He stored it with you before he went to India?

Bill: Right.

Woody: And how long did it stay at your place?

Bill: A long time, but it wasn't really usable. It was usable for him, he had built it, but it had parts that didn't work and shape generation that . . . I never made a tape with it, I never felt comfortable with it.

Woody: It stoped working at a certain point?

Bill: No. It always worked but I never felt comfortable enough with it to make a tape with it.

Woody: You have no tapes of that time?

Bill: I have a couple of hours of tape of my playing withit, zooming shapes in and out, but I never made a tape I showed withit.

Louise: Well, Laser Quantebelle was madexwithxix at the TV Lab with Rhys Chatham who did the music on it.

Bill: But that's separatex. It doesn't use Eric's synthesizer. So I had seen his synthesizer also, so I had an idea of what I liked and what I didn:t like. I didn't like his patch system.

Woody: So let's trace that down. Did you ever produce anything you picture, like the camera taping you working with Eric Siegel. You don't have any "how-to" from that time.

Bill: No, I don't have any from this time. The only thing I have is how the Rutt/Etra works, but only when I'm forced into it. Explanation is not my forte.

Woody: What you learned from Eric is the problems of patching.

Bill: This was one of t-e major things. The other was that hsi machine had switches on the boards and hidden and when I finally saw it, so did the Computer Imae machine. You'd pull open panels and switch it to do dfferent things. And this was really repulsive to me.

Woody: It was a system? If it was systemic in any way it must have influenced you somehow.

Bill: Sure, all systems have an influence. Rutt and I worked in this way, you know,"What can you do with it", and I'd have to try to figure it out or he would eliminate it.

Woody: So how did it work? Which was his idea and what was your idea?

Bill: It's very . . . Rutt wanted to make cimmercial units, so there is a slightly different drive. I wanted to make art

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units, it's a slightly different drive.

Woody: How did you negotiate these two extremes?

Bill: Well, it was easy, I was selling them all and seleling them to people like Jose Nascio, who's an artist, who wnated it for more art . . . It went for a while. In fact up until he sold the machine to Australia, which was probably the first really commerical machine, at which point I left the factory because it was no longer of interest . . . But the dialog with Rutt was, "What if we take this off, what'll it do? When you need this, you don't need this" and it was one of these, "what's functional" dialogs.

Th first machine we built was really deflection on a regular oscilloscope, in fact I have the oscilloscope downstairs. We used huge pots, to actually change the deflection voltages on the yoke, to zoom and rotate. Thatone did rotation in the center e asily.

Woody: Who did you think this would be sold to, since you represented the selling part of the company?

Bill: I thought it was sold to . . . I thought it was going to cost under $5,000 and be sold to artists and schools. I never liked the . . . I still dont like ~~the~~ broadcast companies particularly.

Woody: Why do you think this never really happened?

Bill: That's a question I dont want to address myself to. I think it was personality problems and other things. It got too expensive, among ~~Xmasdxxx~~ other things. The price went up, it was tried to be sold

for broadcast where the engineers couldn't use it anyway. They didn't have the initiateive to use that sort of ~~thing~~ complex equipment. And the Rutt/Etra turns out to be an analog computer.

Woody: So, besides that, was that at the same time you were negotiating with Bill Hearn. How did you ever encounter Hearn.

Bill: I stopped with the Rutt Etra sometime around the time Steve moved into New York. I started to stop with that. It's about the time the Mercer Arts Center collapsed.

Louise: that would be in 73.

Bill: I guess I was teadhing at NYU.

Louise: Yes.

Bill: And I was looking for colorizers. I mean I was looking for a machine more like Steve Beck's. I didnt like . . . well, I wasn't going to build an image processor. I liked Dan't machine a lot, but I didn't like the way it worked as a system. I still don't like his patch cords. ~~X~~ Also, the boxes were too big. After building the Rutt/Etra Dan's boxes seemed to much work to do it that way. Partially because I'd gone through all this learning on the Rutt/Etra for two or three years. And I was looking to buy it, becuase it didn't seem to me to be worth the time to build it. And it was $2,000 in parts to build it, it's probably gone up to 3,000 or 3,500. And i heard about Hearn.

Louise: Through Skip Sweeney becuase he had a colorizer.

Bill: Right. And I called him up and I wanted him to make a voltage controlled colorizer. He never made a voltage controlled colrizer. So with much argument and stuff, I wanted him to make his colorizer voltage controlled. And I got one that worked, sometimes. I blew it

up at least once or twice.

Woody: Did it not have protection? (mostly inaudible here)

Bill: Oh, ithad CMOS circuits that were . . .

Woody: too sensitive.

Bill: Yeah. Which was a problem. Part of the problem with the colorizer was a lack of switching at the input. So I asked him to design a voltage controlled switch to go with the colorizer. Well out of the voltage controlled switch into the voltage controlled colorizer came the Videolab. Becuase the major parts of the Videolab are the voltage controlled switch, the switching matrix. The matrix voltage controlled switch with linear possibilities, where it's not only on/off, but where the voltage is integrated linearly. And the voltage controlled colorizer. And then there's anohter output keyer/fader, which is Bill's idea. Actually that's Howie Gutstadt's idea. Because Howie wanted A/B program dissolve. Part of the reason there are no oscillators in Bill's machine was becuase I didn't need oscillators. An error. There was always intended to be a third box with oscillators and pahse shifters for people who wanted it. I don't think Bill really realized it until . . . He came into me one day and said, "Dan Sandin/'s does something ours/doesn't" le had seen Jody Gilberman doing oscillator patters, and this was this year. And I plugged my oscillators into his machine, and I said "yours does that!" But he always know, and neither did Steve always know what the machine did.

Woody: But if you take Dan, he also is astonished.

He said once to Steina, "I didn't know that there was an internal source of image. I never meant it. But then some of my students worked with oscillators." So he himself was not conscious of it.

Bill: I knew that well, becuase that's how I started. The reason that there are vertical and horizontal locked ramps is because those are needed. Also, in the back of my mind is always that you might want to run a scan system from it. In fact, there's somebody running a scan system in Chicago from one of Dan's machines, with some help from myself, which runs a scan manipulation system. Howie Samuels xx has a rescan machine running . . . Becuase all you need is a locked vertical and horizontal ramp and multipliers and summing amplifiers into it to create the Rutt/Etra type effects. Except xxxxx the resolution on the screen is not likely to be asgood, unless you spend $5,000 or 6,000 for an electrostatic tube, and if you go to an electromagnetic, it's very hard to find, you may go as high as $10,000. The Rutt/Etra tube is really a very good high resolution monitor, the small one. There's very high resolution. You can't get one like that easily. And that was the hardest thing to get, the deflection system.

Woody: Do you hae any description? Did you ever describe how to use the Rutt/Etra?

Bill: Yeah, there's a whole booklet.

Woody: I know, I have the booklet, but . . .

Bill: I went over that with Marcia Roth, Marcia did the booklet but I sat there.

Woody: Beyond that, there isn't anything?

Bill: No, there's nothing you xxxxxxx should know about beyond that. And the LEarn machine was . . . you see I wanted him to put bias and level controls becuase xx I'm used to bias and level. He didnt want to do it becuase of panel space and expensive knobs. I think that was an error. The story, he's going to be pissed, oh what the hell. The story is that I was in New York and he s ent me the design for the front panel of the Videolab and he removed the voltage xx control from the colorizer becuase he didn't think it was necessary to voltage control the colorizer. And I flew xxxx to California and fought with him until he put it back on. So at times he says I have nothing to do with it, but if you don't have a voltage controlled colorizer you don't have a usable instrument. So

I wish it had bias and level. Bill has some plan now to build them with dual length pots with two knobs, a big and a small one, and make it bias and level. Thatshould be done. The matrix switcher is an extraordinary thing, becuase it's a 36 reentry switcher with a very minimal delay. It should have phase shifters xxxxxx based on sync or counters based on sync for oscillators. It doesn't mostly because no one else besides me ever needed it from Bill and I already had mine. The Rutt/Etra oscillators worked relatively well, and if I was going to do something else it would be digital now anyway. th next thing I do is frequency synthesis, not this. Dan has a good frequency synthesizer he has made, a digital one, 32 bit.

Woody: So, would you say that his Lab is the most comprehensive summary of video? (something inaudible ending in "scan Processing)

Bill: No, if you take Steven Beck's machine is more comprehensive, but only Steven uses it, there's only one.

Woody: I wonder how comprehensive it is?

Bill: It's hard to tell, but I can tell it's fairly comprehensive.

Woody: You can tell by looking at it, but there's no block diagram. Do you recall any block diagram?

Bill: They're individual machines. To some extent, Eric Siegel's was almost as complex as Steven's and if he had ever worked on it it was first and it was just as comprehensive, the design was there. Steven's is a personal instrument, so it becomes hard. The Videolab's gone through several generations. The Videlab will do almost anything Dan's machine will do save it doesn't have an R-G-B encoder, so it doesn't have that permutation in it, but it can come very close by voltage controlling hue, luminance and chrominance on one channel. You can get that sort of . . .

Woody: So what you are saying is that Dan's system is the most comprehensive summary of video effects, of video techniques.

Bill: Yeah, it's harder to use.

Woody: I know, but by its function there's nothing (indistinct) except scan processing?

Bill: It's hard to tell. I'd say Dan's has probably a small advantage on the Videolab. If you hae the full system.

Woody: You have the whole god damn system it's comprehensive.

Bill: But I think it's close to 3800 dollars in parts before your

effort is added in. Itdepends what you take your effort at.

Woody: But you would say as a control system it depends on the intelligence of the operator, which means that you have to learn it longer.

Bill: Well I find it totally impossible to deal with patching BNCs on the front panel. I just don:t like that. I know I lose reolution with banana plugs. I take ease of patching to be more importnat. I also know you have your Rutt/Etra with shielded cables, which probably helps. It's easier on the Rutt/Etra than it is on Dan's machine. You've seen the patch. But Dan tends to keep a patch on his machine and operate within that patch, which is the problem iwth analog machines, which is why I'm into computers.

Woody: So is there anything else. We ahve come to this original way of thinking and using a laser beam, oscillators I think is common tool. Now, you hae been instrumental

Etra: Ben Tatti used oscilàators very well.

Woody: I guess t-ere are very few people who went into the electronic image that didn't eventually come to that, like feedback. But then besides the laser you have done conceptual and practical work on scan processing and the Videolab. Is there anything more of a major kind before the digital?

END, SIDE 1

Etra: . . . the horizontal positioning control, which is not common, which actually phase shifts the system sync on the scan processor relative to the incoming video sync.

talking aobut the
Woody: You mean/the horizontal or vertical?

Bill: Horizontal. Not the position, the phorizontal phase shift. The horizontal centering.

Woody: You mean horizontal centering.

Bill: And the phase shift allows you to smoothly move the picture through the effect of the display. This is a very importnt concept becuase this is the same thing that should have probably replaced oscillators a long time ago. Phase shift changes the timing ~~xxixxixxxx~~ of your picture relative to the incoming sync.

, but . . .

Woody: It's anoter generation of decision?

Bill: Yeah, it's another generation of decision. And that's very important becuase to some extent Steve goes on and perfects it in his repositioner, which is a time shifter and I go on and use it extensively in digital circuits. And I'm very aware of it, because the shift of your sync relative to what you're mixing

with, relative to the rest of the sync, is . . .

irrelevant dialog here

Woody: By your education you are not excluseively related to electronics at all. Your back ground is generally in the humanities? Is it related to art?

Bill: Actually, I started school as a major in biophysics and that lasted one semester. I was taking a course that led in five years to a pre-med and an engineering degree. It lasted one semester, at which point I flunked. And then I went into drama and classics: english latin and ~~greek~~ literature. I spent some time in drama and then I quit school and I went to a commercial school of photography. The Germain School of Photography and studied still photography. I went back to school at Hofstra and I studied psychology and art history and graphics. Silkscreening, mosaics and thier history. And I quit school again and I went to motion picture camera school and became a professional cameraman. Then I quit that and went to NYU to study directing, which is where I met George Stoney and video and became interested in documentary. That's how I got ~~intoxfeedback~~ a portapak. And it was orobably Andy Mann showing me feedback one night in my apartment that stopped the whole thing in the documentary dimension. I was already orking with Stoney.

Woody: Before you leave, what would you think is the major . . . do you recognize yourself as team. Would you ever do anythng which you do alone, either of you? In that scale would you continue to do all that you have done alone?

Louise: I wouldn't do that much video.

Woody: Would carry on this size of work without Louise, or is it instrumentat that she is with you. What do you think? It doesn't ahve to be true.

Bill: It doesn't have to be true? It doesnt even get considered.

Woody: So you think as an individual you are totally self-contained in video as tool and craft?

Bill: I dont think I'd function very well without Lousie, as a human being.

Woody: So, this environment you both create is a conditioning, but it's not exactly a direct interchange at the craft level or conceptual level.

Bill: No, but you have to understand that Louise is the major starter of most of our work. It's true. And since it's interactive work and she can change what's happening while it's happening and see it, there's a large part of that body of work, at least half of it, is directly attributable to ~~hm~~ what Louise did while I was turning the controls. There's some where I did it myself, but part of it, if it has any character, has it through Louise.

Woody: What's your favorite technique?

Louise: I'm more excited abut the color as opposed to the scan manipulation. I think the only thing I really enjoy about the work like dcan manipulation is ~~thm~~ more on the order of a kind of ~~xinnnbinin~~ Lady of the Lake or the kind of work you and Steina have done, which is really thrilling.

Woody: Do you thikk you come from the ~~txnnbinn~~ tradition of the two dimensional . . .

Louise:

Louise: I feel that I come more out of a painterly tradition. But I think that, well, we can't really talk about that . . . the new stuff were working on (inaudible) . . . much more exciting than anything we've done so far. And the ability to do tha much real time changing is . . .

Woody: Do you think that you are . . . do you have any family style? The Etras, do they have a specific style?

Bill: Yeah.

Woody: What would that be?

Louise: One is . . .

Bill: Baroquely grotesque.

Woody: Do you have a particular technique which you are using which is kind of unlikely?

Louisa: More a conceptual syle than a technique. The style carries through in a lot of different techniques.

Bill: A lot of what we do is to use one ~~style to perfect the~~ techniuqe to perfect the style and leave it. The Lady of the Lake is one. So is Narcissicon. Maybe the style doesn't come from the teqhnique. Miz Muffet is another. They're all little horror pieces. And The Kiss. These are all . . . they're vignettes, we tend to do v ignettes, we tend to keep our tongues in our cheek.

irrelevant dialog

Woody:Let me ask you a summarizing question. What is your position? Since I have observed you for some time you seem to be having some kind of organization of things, or producing things going a few years back.

break

Bill: I'm sorry Woody, what were you saying?

Woody: I was posing this question. You are a person who has the ability to organize certain kinds of things, like tool development or pursuing such a ting from beginning to end as a proudct. Which part do you recognize as more importnat in your/work? Or, what is art to you, since I understand you are an artist. Now, what is art to you in your work? Is it the leadership, organization, do you have any ideas about it?

Bill: Whatever massages the ego well.

Woody: So you think that the ego is in fact the substance of every creation?

Bill: No, but I think there is a lot of that in it. I believe there are libraries is because everybody thinks they've found the answer, and if I wasn't sure I had the answer and I had to show everybody that I had the answer/I probably would not be torturning myself this way.

Woody: If someone would call you a humanist who is altruistic, who sacrifices his own ego to the common good of tool development . . .

Bill: I wouldn't agree with it. In fact, I get very suspicious. I think that what we design is what we want.

Louisa: We had to convince other people that they wer commerciallv viable things to do.

Bill: This is a torture to make everybody believe that this is commercially viable. Since it hasn't been true so far.

Woody: Do you truely believe that is the motive of your?

Bill: To make the money or to make the tools? To get the tools?

To alarge extent. I don't believe in altruistic motives, I'm sorry Woody. I get suspicious when somebody tells me he's doing something for the good of mankind. I'd much rather know how it's going to be good for him becuase then I can figure out if it's also good for me or not. I don't trust altruism. I get worried about missionaries who tell me they're out to save my soul for my sake.

Woody: Don't you think that every tool builder has no chance to get a full return?

Louise: Of course not. There was one day were Bill realized that certainly in his lifetime a lot of other people are going to have a lot more fun and get a lot farther on the tools he helped design. And that will continue probably.

Woody: Are you a victim of your own talent?

Bill: You know, you and I and the rest will all suffer the same fate to some extent. One, we get to be pioneers which is great and glorious, if it continues. Of course, if it ends that's something different, becuase if video had only a small part in it, then we all get washed out. But for a while we get to be pioneers. And we also get never to use the things as well as the next generation who doesn't have to deal with all the nonsense. And who grow up with digital computers and doesn't have to at thrity or fourty learn Boolean algebra. This is torture. You know it and I know it. I was teaching in Maryland, which is horrible. We had 2650s, the Sony editing decks with the automatic editor.

Louisa: That was in Amherst.

Bill: That's right, that was in Amherst, and they had the BVU there, the Broadcast Sony editing system and the students were complaining that they didn't have a super-computerized editing system, they didn't have CMX editing. Andthe fisst time I edited a piece of videotape I cut it and taped it. So, I kept my mouth shut by my reaction was "What sort of nonsense is this? They have this machine, it runs back and forth and tells them what frame it's on. I remember running the reals back and forth on the machines. The first year of our work dissappeared. You know that, it desintegrated to nothingness. Onward Christian Soldire is gone for ever. Several other pieces have disappeared because we didnt know the technology well enough, the machines weren't good enough. But I mean to sit and . . . I felt like an old man, I wnated to say "We used to fly in bi-planes with open cockpits and you complain taht the pressure's not right in your jet." And they were sitting there with a broadcast editing system, a time base corrector and vecoorscopes and they were complaining that the editing was too difficult becuase they didn't have the latest CMX system. When I started editing, which is what I started doing for George, I edited by still framing the portapak. There were no editing deck. A 5000 was the closest thing to an editing deck.

Woody: Do you think that you will always be doing the same? That you will be always pioneering and when you look back on it will always be ridiculous?

Bill: Yes. So it goes!

Woody: What interests me now, is there any material in which you would . . . I know your essays. Which one would you point out as the closest to description of composition and craft. I know you have a proposal I hae read in which you describe composition.

Louise: Right, "Computer as a Compositional Tool."

Woody: Is that representation of that time of thinking?

Bill: I probably have a better essay now. What I'm doing changes. Or what I think I'm doing changes. What I'm doing hasnt changed much but what I think I'm doing changes.

Woody: The question is, I would like to get down on paper for Burris who's going to work on it a few facts that he can pursue. I hae that essay, what other essays you would find important.

Bill: Do you have the whole booklet that I wrote.

Louise: Yeah, but that's not about this stuff.

Woody: Yeah, I need something that goes a little bit back to video only and isdescribing either tools or techniques or craft.

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Louise promises to go through file and make copies of stuff.

Etra does not have lawsuit files.

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Woody: Would you be willing to talk anything about digital, or is it all classified?

Bill: No, I'll talk something about digital.

Woody: Is it evolutionary to you or not?

Bill: As I was saying, what I'm doing changes. (sic) and you know I have this strage zen-jewish philosophy. I beieve you're on the oad and you're continually trying and you dont reach the goal but you have to stay on the raod. What I see at the end, or what I'm working towards, changes. For a long time I thought that the ultimate would be to transmit images into somebody elses mind directly. I thought this was what I really would be pleased with, or creating other realities. And then I just wrote an articule, it's not publkshed yet, for a computer magazine, in which I talk about the transporter in Star Treck. They beam them up and they beam them down. I'm not the only one to talk about this. The man who wrote the movie "The Fly" is talking about transmission of matter andLarry Niven, who is a well-known science fiction writer, talks about it in several instances. It is the theme of at least one of his books. But what you're doing . . . I called the article, which I guess will come out in Creative Computing, "please Mr. Spock, One moment before you beam me aboard." When you're doing that, you're treating living biological matter as data. And when you start to reduce everything to data, which is whta you're doing when you start to computerize . . . When I first got into the computer I thought "Ah, the computer will give me 100 fingers, I can twist all the knobs on the Rutt/Etra and the voltage controlled colorizer." Then the further I got into it, the more I saw that it was . . . that wasn't the way it could be and there was a better way possible, was to break all the data down to digital form and process it that way. That is the direction you know I'm wr

working on now. Total digital manipulation of the data, of the iage. It comes in analog and goes into digital and comes out analog again, but all the processing is not done by digital machines controlling analog machines . . . This is my first ideal and what I started to try to do, you know PDP-11-10 "Abstractions on the Bedsheet" was done that way with the computer. And that's what convinced me that computers were useful. I spend all this time learning about them. We've all paid our prices for this early interest. But I decided that what I'm doing now, even though I don't know how to build the transporter or handle biological material as data is that all the stuff we do with images is applicable as the early work in how you manipulate data. So if you duplicate an image twice it's analogous to duplicating a human being twice. If you change part of the image it's the same as storing the image and keeping the person . . . returning the old brain to the young body by storing and what I see now is that we're dealing with this processing information in time and whether we're processing information that has happened a long time ago, that's current, whether it will happen in the future, which is also po-sible to some extent by prediction. And that what we're doing is setting the rules for data processing of complex images which are two dimensional representations of people or things which are three dimensional representations and so I now tell people when they ask me what I'm working on I'm working on clonging and eternal youth and teleportation and that. Because the fact that the method doesn't exist doesn't mean that what we do now doesn't relate to

it, becuae it obviously does.

Woody: Yes, but practically, how far do you think you can read the binary matter. You would read every atom? If eventually you want to teleport a human being you would have to . . .

Etra: I didn't say I knew how to do it. I'm just saying we get closer and closer within several orders of magnitude of the t heoretical limits of the . . . IBM is experimenting with Josephson junctions, $10^{-12}$ seconds. That approaches the speed of light. Josephson Junctions are kilo-gigahertz, thousands of gigahertz, you know they operate in the pico-second range. Hundreds of gigahertz in extremely small information in bubbles which are storing millions of bytes of information, almost at the molecular level, the large molecule level, eventually at the a tomic level. So yeah, I think it eventually will get down.

Woody: So you account for every particle of living matter.

Bill: I'm saying that it's not that I know how to do it, but this is something that probably will/eventually happen, whether it's now or in a hundred years or in a thousand years doesn't matter. So I expand what I saw as my horizons by virtue of looking at it that way. I know it's a little crazy, but it is and it isn't. Lew Katz and I had a good time, we figured out that the current rate of growth of speed of computers within the next fiv- years the infomration will get to the gate before it's generated. We're r unning away with ourselves. We're going to need new technology soon, becuase we're up to the theoretical limits.

THIS IS A WASTE OF TIME, I STOP HERE ALTHOUGH HE SPEAKS MINDLESSLY FOR SOME TIME.