Jon: First, it would be good to go into the circumstances surrounding the development of the Butt/Etra.

Steve: Bill Etra was an artist-in-residenceat MIT's Lab. This is going back an incredible amount of time, back before we moved to New York, so that would be about six years ago. He was working as an artist-in-residence at the Lab. He'd beenworking with the Paik machine and discovered some of the limitations it had which were to a great degree because it was AC coupled, which is to say you couldn't take the image and put it in theupper right hand corner and leave it there. You could only sort of modulate it into the upper right hand corner and it would come right back.And toher factors on it. He was sort of convinced that something could be done to make it better. And I had been foöling around with these strobe lights that I was building and looking to see if they could be used for video. We were using them for other things. Huge tremendous strobe lights that put out an average of 3,000 watts.

Jon: You were building these for personal purposes or for commercial?

Steve: Commercial. We were using them to inspect things like cold rolled sheet steel while it was on a mill and all kinds of funny stuff like that. I was interested in seeing what it could do in video. So I borrowed Bill's half-inch machine and I was noticing that it would slow things down. It wouldn't slow things down because you could sync it up to vertical and you could examine something a frame at a time. If you wanted to

see why your milk carton bottling line was jamming up you could put this thing on it and then when it jammed up you could go back and inspect it and you'd get these very clear pictures and you could see that what actually happened was that this gear almost grabbed it but didnt quite and whnn it didn't grab it it fell over there and that thing slammed into it and . . . So, Bill was looking at that and he wanted to play with the strobe with some color stuff so we brought the strobe down to the Lab. And while I was down there he was explained to me this Nam June thing and I'd never seen one before.

Jon: You had not been involved in video previously?

Steve: No, I'd not been involved previously. Even vaguely. A I'd been involved in audio a lot but no video. So he showed me how the thing worked and baically it was a TV set with various systems to add external forces to the deflection by either injecting it into the already existing deflection circuitry and also through additional coils that were put on the thing. They (I?) ~~xxxxxxxx~~ used audio oscillators for this and other funny stuff. And you rescanned it. It seemed like a neat toyx and it made neat pictures. Bill watned me to work on the thing. He came up and So I said, "Yeah, OK, maybe some day."/Got me a grant of $3,000 to develop this device and we set out to do it and thirteen thousand dollars later we finished it. At that point I was committed to this industry, if for nothing else to get my ten thousand dollars back.

Jon: The grant was from the TV Lab?

Steve: Yeah, from the TV Lab. It was actually an artist-in-residence, because they didn't have any hardware money available. Anyway, they got a good deal and we built this synthesizer and gave it to them. The one that's still there. And I tried to buy it back from them and they won't sell it back. Since they've not bought a much newer one ~~xxxxxxxx~~ so they really don't have a lot of use for the old one.

So, that was the first unit, and we really didn't know what we were doing back then. We built it, and we modified a TV set the same as Tom June did, only we were a little more sophisticated on it. The next generation we built from scratch.

Jon: Well let's stop for a second. The features this first machine had? How does it differ from the production models?

Steve: Mostly in sharpness.

Jon: Because of the tube? You had not found the Panasonic?

Steve: Well, more than the tube, the new units in fact uses a smaller tube, but it's in the circuitry that's running the thing. For example, the new one's have the ability to control the intensity of the display at any instant. In other words, with the same speed that you can control all the other paramters whereas this one didn't. So if you're (inaudible) _____ you could compensate and this one didn't really have ~~xxxx~~ ability to scan, the scan was very non-linear. It was good for producing ~~xxxxx~~ patterns but it wasn't good for doing logos.

Jon: It did have a video input? An external video input.

Steve: Yeah, they all had external video inputs.

Jon: Did it have dual trace?

Steve: No, we ~~didnt~~ hadn't figured that one out yet. Dual trace actually came as the result of playing with that one. We had multipliers in it and one of the things people started doing very quickly was taking a multiplier,— actually two multipliers since there were two available— feeding a square wave into them through a couple of diodes so that one of the multipliers would see a positive voltage and then it would see nothing and the other sees just the opposite. ~~Xxxxx~~ Syncing that up to vertical we found that you could put two different waveforms into two different halves of the ~~xxxx~~ image. At the point which I realized that people were doing that, because at this point I hadn't actually started using my machine (my motto back in the old days was "I just build ~~xxxxx~~ 'em, I dont fly em," and in fact I didn't start using them until I stopped building them. Other people were workingwith the things,John Godfrey and whoever else was around the Lab, and they discovered this: all that is is a dual trace oscilloscope. It's been around for years. All you have to do is put in a couple of swtiches in, you didn't need anything as fancy as multipliers, and that was ~~wx~~ it.

There were three models that weren't dual trace that were built before we switched over. In fact that, over there in the corner, is the first dual trace unit ever built, and that had an auxilliary plug-in board, it hadn't becoome an integral 090

system
part of the unit yet. That was the last pre-production run and then we made a run of them, a whole bunch of them, identical.

Jon: So those are at the Ontario College of Art?

Steve: No, they have the last tail of the thing. That I think was the last machine I built. What we did over the years was raise the price add improve the quality, we mostly raised the price but we never made money on it in the old days and we figured . . . it's the old story, if you're building it for five dollars and selling it for four dollars, you can make it up in volume. So what we decided we had to do was raise our price. So we doubled the price or something and nobody could afford it any more. So we built this stripped-down version and we sold one to Ontario. It's an interesting device because it had all . . . it had a lot of the controls similar to the older units but it didnt ahve the dual trace. But it had the picture sharpness of the new ones and it had the intensity control of the new ones and it had a few . . . Later on we discovered a couble of circuits that were usable to . . . One of the problems is burning the tubes, we have several circuits that((something like "tried to)) compensate for intensity were like crowbar circuits that just crashed off when it got where it should do that. So the Ontario one would have has/that and it had a few other things. But that was very recent. I'm trying to think of the details on that one. I think there were new boards made up for that one too.

The one before that had dual trace in. Thatone went to

the Art Institute of Chicago. That was I think the last dual trace one we built, and then we pushed the price way up and that was the end of the creative market for the thing. They just couldn't afford it. Had we got more orders from industrial people we could have built them at a lower price, but for the most part building them one at a time we couldn't afford to do it at those prices. And we eventually stopped building them, it was just too much of a hassel.

Jon: What control modules did the original models have?

Steve: The one at NET didn;t have modules, that was before we discovered modules.

Jon: It's simply a solid front panel?

Steve: Mhmmhx Yeah. The early ones had about the same ones as the later ones. One of the things that hasn't changed is the modules, which has become sort of a joke for one thing because this waveform generator never worked right. I shouldn't say it never worked right, it never did all the things we knew it could do. In the early models it was sort of OK, because it was this early stage state and nothing worked right back in those days. We used to have a standard procedure that if something didn't work kak that was the way it was supposed to be. Andif no one else was making it it wasn't a problem and it all worked better than what had been here before. But we never changed any of this stuff. Never changed the modules at all. The only thing we ever did was put power supplies on the modules--each one--so that you could line them up and plug them into the

machine.

Jon: So that they were electronically identical.

Steve: Yeah, electronically identical. We then found out the power supplies were the weakest link and they used to blow out all the time. This is before you could buy three-terminal regulators. We had an integrated circuit, I mean two Darlington transistors on some of the bigger ones, just regular NPN-PNP pairs on the smaller ones to make the plus or minus 15 volts that they run on. And we found that the power supplies blew out certainly 10 times more than anything else blew out. If you had ten module failures, nine of them were power supplies. So, the later models we pulled that off because it wasn't worth the hassle.

Jon: I see, but the original complement of modules as provided to NET were . . .

Steve: It's almost the same as what's on that machine. Always two waveform generators, some people have bought more. At least one summing amp. At least one ramp generator, except that Wasulka and the Art Institute and Australia got the ramp programmers so you could do more than one move. We should have built more of those things and rammed them down people's throats, because people didn't want to pay extra for them but it was really limiting when you didn't have this stupid thing. So we had that. That's got a joystick on it ((referring to the machine in the room)) which we built for a few but that wasn't a standard module. And then we had a/bunch of diodes in a module with a in it that was good for something: it mainly plugged the extra hold hole in 152

that was in the unit up. When you had two waveform generators, a summing ramp and a ramp generator there was an extra slot.

Jon: What is that module, the joystick?

Steve: That's just a joytick. It's an X,Y,Z control for anyting you want to use it for. It was originally designed, Ktra thought it would be used as an additional thing, and he may in fact have used it for that. What I've used it for had been simply how to control any three paramters with one hand.

Jon: It's a manual interface.

Steve: Yeah, it's a good device because it's incredible how much control . . . you always need to do someting with your other hand, so you've always got one hand available and that gives you cojtrol over that. You can zoom something out, you can flipp it upside down, you can blow it apart and any of those three any time you want with very good control. We put integrators on the output so that if you move it fast it makes a nice smooth move.

Jon: How was it that you came to this particular approach to designing this tool, the scan processor.

Steve: Oh the Paik unit (???) totall, /we just expanded on that. But we didn:t in fact know where it was going to go when we started. We didn't understand that you could do this much with it.

Jon: So you had sought to make, in essence, a modification or an addition to the Paik machine.

Steve: It wasn't so much an addition as a modification. The main thing we did from the Nam June machine, well we did two things to the Nam June machine. One thing was the Nam June machine was built out ms of sort of surplus parts, whatever appeared to be available he snuck in. % If we wnated something that did something, we started from scratch and built it. So it was a little more refined and all plugged together and I it looked prettier. The other thing is we DC coupled everything which had been AC coupled. That was the main thing. If I had to point to one change I did in the Nam June machine, it was the DC coupling because without that, you couldn't get positional movement, you could only get waveform distortion. You couldn't actually take something and slowly flip it upside down. Or flip it someplace and leave it there. That was the main thing. They were just all refinements. You know, it was like resolution: how do you sharpen the picture. So we went to a higher voltage on the CRT . . .

Jon: And the fact that the machine was completely voltage controlled?

Steve: Well, Nam June's sort of was. The voltage control came pretty much from analog computers. Most of the modules we used were things that had been analog computer concepts such as multiplier, summing amplifiers, dividers, log functions~~xxxxx~~ ~~xxxxxxxxxx~~ (some of the units have log generators to compensate for intensity and other things). Pretty much just analog computer circuitry. Nam June didn't really have all that much in it, but

he could have. He actually could have bought it off the shelf because back in those days you could still buy analog computers. In fact Vasulka had an analog computer for a while, if he ever got ~~xxx~~ it working. Some weird old analog computer. The design came from that pretty much.

Jon: I see, butthree was a specific demand, in a sense. An image perhaps or a kind of programmatic material that you and Bill wanted to make?

Steve: That Bill wanted to make mostly. I was just sort of listening to what people wanted and building it and Bill was one of the people that I was listening to a lot. And he was saying, "Well what it really needs is a device to . . ."

Jon: To allow the Paik/Abe to zoom.

Steve: Yeah, that was the DC coupling. That was THAT. That was the first unit we build did that. That;s an interesting point. simply the fact Thatwas the main difference between the two which was/that we had the control which the other one didn;t have. The Paik/Abe can zoom but it can only zoom for about a sixtieth of a second and then it comes back, which makes an interesting pattern. But it couldn't zoom completely and it can't make smooth flipp and it can't make a square into a pyramid exactly. It can do a lot of the other things that we can do with our machine. But those a re the facts. And then as new people wanted them, in the early stages somebody wanted this and somebody wanted that, we built modules. That was the module idea. We were constantly trying to get the image sharper. We built a couple of units with

bigger CRTs. Actually, the one we built for Australia which was really an outstanding ~~thing~~ thing, because we built a completely new CRT unit for it. The two previous to that, one of which is at NLT now, were in their day pretty good but however, now we've managed to get about that resolution out of the small tubes. And probably the one up in Canada is just as sharp.

Jon: You were using a nine inch tube?

Steve: Two of them had nine inch tubes, the first one we built at NLT and the second one we built is at Venezuela. But the nine inch tube didn't particularly do anything better that this one.

Jon: How did you get involved with Etra?

Steve: I've known him for years. He and I sort of go back a long way, before he was in video as a matter of fact. _____ back then, but that was a long time back.

Jon: And you were involved in electronics?

Steve: I've always been in electronics.

Jon: I see, a childhood fascination.

Steve: Weird kid. No, Bill was in still photography then, before he got into video. I know he had a good line once, which was that he went into film for a while, he said, "the problem with film was that by the time you got it back from the lab he forgot why he shot it" That was his excuse for getting into video. He was also sort of the first kid on his block with portable video equipment back when it was brand new. And that got him going and got him interested in it. He was experimenting

with a lot of xx oscillators and things. You know, colors and lots of crazy projects. So by the time I got tied up with him on this stuff, he already had a pretty good knowledge of what was going on. And we got working with somebody else too who ha' been working on this for years, nd that was Sid Washer. I don;t know what he's doing now, but he had been working on building synthesizing xtype stuff for quite some time and had also figured out the DC coupling thing but hadn't quite gotten it into practice. He and Bill and myself and Greg Leopold were the original bunch of nuts.

Jon: So you were speaking with Washer while you were designing the Rutt/Etra?

Steve: Well, he was working for us, helping to design and building and everything else.

Jon: So who were the collaborators?

Steve: The fist unit was built by me, Bill and Sid and a woman who I don;t remember her name now, who worked for the telephone company wired it.

Jon: Liz Phillips?

Steve: No, it wasn;t anybody whose around. It wasn;t anybody whose in video. I was looking for somebody to wire mainframes, it was like hundreds and hundreds of feet of wire with nothing longer than eight inches. Anyway, she came in and wired this thing up and she met a guy here and split. Add that was the one at NET. And then Greg Leopold started working w-th us and he

managed at the factory. Tom Zafian worked with us on some of the early units, did some wiring. And that was about it.

Jon: So, aside from you and Bill and Sid Asher nobody else were collaborators.

Steve: and Leopold.

Jon: Who is Leopold?

Steve: Greg Leopold used to work for Rectilinear loudspeakers. We didn't collaborate in what the dev ice should do as much as packaging and how the device should do its stuff. In other words, our problem was that we're going to add this unit over here which seems to be connected up this way which involves so much power which involves so much cooling which involves so much space. And he worked with us on packaging this stuff and getting it all together.

Jon: Is he in New York City?

Steve: Yeah, he's still around

(short break)

Jon: I s there anything more you can tell me about the development of the Rutt/Etra?

Steve: Well, there wasn't that much involved unfortunately. We spent a tremendous amount of time doing it, but looking back it's hard to see what we really did.

Jon: There must have been an immense number of problems, like the deflection amplifiers, for instance?

Steve: Well, alright, I'll take an area, then. We had to build our own deflection amps. The first unit w built we used a Dynaco Stereo 120 deflection amp, and . . . it's really funny because all my friends have those things in hi-fi

sets and every once in a while one breaks and because of my experiences there I now know of every single resistor in the device. We used to blow the ~~fix~~ thing out about once every fifteen minutes.

(interruption)

Jon: So you were talking about problems with the deflection amps.

Steve: So we used to blow the Dynaco Stereo 120s out all the time. And then we started wiring them up ourselves with op amps. Actually, I think the first one MIT got may not have had a Dynaco. I think we already built . . . Part of the Dynaco was that it was AC coupled so we couldn:t do enough with them. You could zoom with them but you couldn't take the image and move it over to the left. Because it goes back to zero again with the AC coupling. So we started building it with an op amp and Darlington output transistors and eventually/went to higher voltage cifcuits. Part of the problem with deflection is that you hae to have a lot of voltage and a lot of current at the same time from the same amplifier, which is a problem. Because something that can deliver 30 or forty volts and can also deliver like eight amps starts to look like a lot of power. And when it's delivering 8 amps, thirty volts are being dropped across the transistors. That's something like 50 watts cooking off there plus other losses. That was not even one of our bigger amps. Some of the bigger ones were 500 watts. So we started building them and that was like one major project.

Jon: Were there any influences or sources that would contain this information?

Steve: Oh yes. Right zillion servo circuits in books. DC servo amplifiers that only needed to be run up in frequency. So we went through them to see what we could do to raise the bandwidth on the thing, because servo circuits xxx only generally they take in pretty low bandwidth and all that stuff had to be pretty high bandwidth.

Jon: But in some sense, the parameters of all your circuits were in the public domaine?

Steve: Well, actually, the books that we built from were mostly the Motorola book and a little bit of the National book. I had this big Motorola book from which we discovered the multipliers that we used and other stuff. Pretty much put everything together from there. So the circuitry was around. You'd look up an op amp and it would have eighteen different circuits on how to use it, how to raise its power, xx how to raise its speed. None of hich worked, of course, Half the stuff in the book was always screwed up. You know, you built it and then you de-bugged it. We went that round. Or-ginally for our multipliers we were using a multiplier that was an entire multiplier in a chip. But it as woisy and noise in multipliers was wobbling on the lines. So then we switched over to a Motorola multiplier chip that wasnt a complete unit. It had a bunch of discrete stuff handing out all over it, which took more parts but it was a much better item. Also, forw a while we bought multipliers from a company which shall remain unnamed. I would say terrible things about them.

They were supposed to be very high precision and low noise and everything. They were ~~totally~~ a total disaster. We built one unit with them and everything was non-linear. We couldn't get a square. We put a grid on the screen and you couldn't tell that it was supposed to be that.

Jon: How did you arrive at the design of your oscillators?

~~Steve~~ Steve: They use the standard Intersil8038 ~~oscillator~~ chip that the rest of theworld used back then. And I basically just designed the thing one night from Intersil literature. They didnt ahve provisions for triggering the thing so we had to add a circuit to do that. It wasn't a question of sychronizeing. (???) You cant synchronize an oscillator unless it's a multiple of te frequency where as these things will lock up at any frequency. You get that by triggering them and we had to build a little circuit that made the Inersil chip think that it had hit one or the other side of its oscillations that it would always start off from the same direction of this reset pulse. (skip a little elaboration here) So we designed it one night sitting on the ~~flat~~ floor of mh living room and we breadboarded it. Sid did the breadboard on it. And we debugged it and then we put it on a card and ~~we~~ always said we were really going to do a number on it someday, and we never did. And that was the oscillator. And what it does is, it basically does evetything really well.In a free running mode it's not very stable. Probably could be more stable but we don't recommend using it for that. Even myself, I have an old vacuum tube audio oscillator which I use when I want to

synchronize something. It's pretty solid. But for triggering the thing it worked very well, because you can trigger it on vertical and horizontal and it locks on there for ever. And the multiplier on it. Because the voltage control output is the same multiplier we used in the earlier units it was the little one in the can, the complete unit which was also an Intersil, the 8013. In the later units it was the Motorola. It's all modular construction like the rest of te thing. There is this one card that's an oscillator and then there are four cards that are summing amplifiers. We made this one summing amplifier card and use it everywhere. And then there's one card ~~xxx~~ which is a multiplier, and you see that little thin one ~~xhichxxxistxthe xldxxxxxxxdx~~ in the old ones and theyre big fat ones in some of the new ones.

Jon: To change the subject slightly, I'm curious how you came up with . . . how you envisioned the capabilities of this machine and so derived this particular set of modules which are in some sense standard to you, like diodes, summing amps, two oscillators, ramp generator and so on. As well as how you arrived at the basic parameters of control.

Steve: OK, that was pretty much obvious. That's really all it was. Bill had always wanted to zoom so we had a depth eontrolon it. TV sets have height and width. ~~Axxx~~ Oscilloscopes have position so we had position. ~~Maxx~~ Minly becuase _____ _____ whatever was around. Intensity, we immediately discovered as being necessary. The fisrt time we zoomed the thing down to a dot. The one at BRT does not have

intensity control. Basically it has your TV set birgtness control. We hadn't voltage controlled it. So the first one we built didn:t abve the ability to do zooms too well. The later models had not only on the intensity control but also compensation. We did a height times width times depth multip-. lication.

The horizontal center, we discovered,--this is an intersting thing--we vpent a lot of time working on it because it's a xhmxciruuit boardx that shifts the phase of the synthesizer in relation to the phase ofthe video. And so it could do like a theater marquee effect. You can roll the video image through it. Thatwe just dreamed up. It was quite a trick to build it because you had to blank the image so thatit didn't come back on the other side and that was tricky.

Jon: Why did you feel the necessity of building this function?

Steve: We tridd to do theater marquee type things where you could roll an image through and we did it by moving the graphic but that was never satisfactory. It's the same with rotation. We developed a little bit of rotation stuff. But in that case it's easier to move the graphic, put it on a turntable . . .

END, SIDE 1

Jon: Just to get this down on tape, you were the prime designer of all of these systems?

Steve: Yes.

Jon: Were you in some sense the specifier of the functions of these machines?

Steve: In some sense. But in a lot of sense other people specified what they wanted to do.

Jon: So that there was a/commercial certain demand to come to you and say "I want it to do this."

Steve: It was not necessarily commerical, it's as much creative. Remember, I wasn't using the machine myself at that point, so I didnt really know what the thing did. It was q-ite a while after I stopped building them that I became proficient in using them.

Jon: When a creative person came to you, did do you remember some of the dialogs you had about this or some of the issues that came up.

Steve: If people would have problems with them. The roblems they would have are that the tubes would get burned, it was that kind of thing. So we made devices to solve that problem. Oter than that I think it was very vague. People would say that they hooked up their toaster to the thing and it did that and could we build a module to do that, so we built them a toaster module to do that. That's about the level the thing was at. We built the audio interface that way. People were modulating things with audio.

Jon: I've never seen that, by the way.

Steve: All it is is an envelope generator like from an audio synthesizer. It just takes a signal in and you can vary the attack and the decay times. It rectifies the signal, amplifies it and rectifies it, charges a capacitor. . . actally doesnt charge a capacitor it was an integrator with a variable discharge rate on the thing. And you can set it . . . It had a cute thing that we came up with. Around the integrator, if you want to vary the time of integrating a varuable capacitor, all you vary is the input voltage. Since we were both charging and discharging the thing. . . you know how an op amp works, you've got your input and your feedback resistor so if your input resistor is 10K and your feedback resistor is 10K and you had a 1 mike capacitor across the thing, you'd have a certain response time. If your input resistor was 100K and your feedback was 100K your response time would now be 10 times longer, it would be 10 times more damped. Now what we did was we used a ganged pot to vary those two in he same ratio so you could vary the attack and decay time of the thing without affecting any other parameters on it, which were like its gain, etc. That was a good module, we did a lot of stuff with that. Ive used it a lot, in fact, here . . . (indistinct)

Jon: Do you make tapes?

Steve: Yes.

Jon: I've never seen them.

Steve: You probably have, did you ever watch "The Edge of Night?"

038

We did the opening.

Jon: Do you make tapes not for commercial work but for your own purposes?

Steve: A little bit. I'll put up one tape, I'll show you a tape that I did. I haven't done a lot and I haven't done anything with other people.

Jon: And so when you began this there was no question of art involvement in any sense. It was all electronics and commerical functions.

Steve: Oh yeah, there's still no question of art involvement. I'm certainly not an artist, under any stretch of the imagination by professionally accepted standards, I guess. I mean I create with the thing because I know how it works electronically. And I'm able to create stuff that I've passed off as art. Some of it for considerable amounts of money considering whta it was. But I wouldn't call myself a creative artist ewen though I creat stuff with it./ I do it more like a technician knowing what the machine can do and knowing what somebody wants done. And a lot of the stuff that has been created with this stuff that people call art I'd also put into the same category as the stuff I do as a technician. Becuase I don't think somebody walking over to his TV set and turning the horizontal hold off and photographing the screen constitutes art. But neither does a pile of cmeent blocks at the Metropolitan Museum of Art consititute art. I have a pile of cement blocks inthe back which I'm considering also selling for $10,000 but nobody wanted to buy them yet. I also

have a pile of plasterboard which I'm going to put out as soon as the cement blocks are sold. By the modern standards of art I'm sure I'm an artist. By other standards I'm sure I'm not, ~~xxiiix~~ including my own. But I'm a damned good technician and I can crank out pretty images but video art is a pretty vague field.

Jon: What are the total products of Rutt Electrophysics?

Steve: Right now we're doing TV production, which is one of the products.

Jon: You're no longer making?

~~r~~Steve: Oh yes, we're making stuff. Well, we still do custom tu~~ff~~. For example we've been building colorizers for discotheques.

Jon: to beused ~~fax~~ with projectors?

Steve: Yeah. ~~xixhaax thrigax~~(brings the front panel) I have o ~~d~~confess there's some bit of commercialism there. We call the thing, instead of a colorizer, a video synthesizer which helps it sell.

Jon: Siegel called it tat also.

Steve: A lot of people call anyting a video synthesizer. We sort of felt that our device was and we decided to sell out to the administration and we called this one that because they would buy it and if we called it a colorizer they wouldnt.

(break while we discuss the device)
, most no relevant to immediate concerns--commercial device--except for following)

123: Jon: But the quantizing functions, why did you take this particular approach?

Steve: The quantizer? Oh, because you hae control over it as opposed to I and Q. Because you don:t have the optimum control over it. In other words, someone says "I want that shade of gray to be that shade of purple." You can't do it, everything affects everything else. You take these four levels and you adjust one and nothing happens on the oter levels. Totally rock solid.

(short break)

Jon: Other products?

Steve: Well, the repositioner is a thing that takes an already recorded image and moves it anywhere on the screen. For example, if you had a mortise shot on the lower left and you wanted to move it to the upper right this device would do it very easily.

Jon: Will it compress the image?

Steve: No, it won't compress the image. For seven thousand dollars you get a device that moves it. For another seventy thousand dollars we'll tell you where you can buy one to compres it or we'll go out and buy one for you.

Jon: Have you sold these?

Steve: Yeah, they've been in production for a while. There my design, I took out a patent on it.

Jon: Is it digital?

Steve: It's all digital, but it doesn't store though. What it does is that it digitally moves the sync a cycle subcarrier at a time horizontally and a line at a time vertically. And then it takes the video coming out of the VTR or film chain or camera or

frame store unit, as a matter of fact, it's in use with a frame store unit at CBS--and reinserts sync at the proper place and blanks the sync off in the wrong place. In New York here, who has it? There's CBS, Dolphin and EUE Screen Gems. There's a few others floating around and we have a bunch on order. Once we get this place together here we'll be manufacturing them.

There are a few other things on the drawing board when they come closer to reality I'll tell you about. They'll come closer to reality by the time you're progressing along further, so check back with me. I don;t want to say what I'm doing until I get it at least stuck together. Before the year's out, I'll have one more product out which is directed towards low-end video users. People that don't have time base correctors and don;t have complex switchers, who just simply use dditing.

Jon: Would you care to be more specific?

Steve: Not at this point. We're moving our market. The Repositioner is geared totally toward high-end braodcast. You can't use it unless you have at least two tape machines, three tape machines, two of which are either quads or have time base correctors. And there aren't too many facilities around to do that.

Jon: How do you decide what you're going to design and produce?

Steve: Well, the Repositioner came from synthesizerland. We always had this problem . . . I started first using the machine and at EUE . . . we always had the problem of animating something in the wrong place or they wanted to move it or can you do 176

something over here. And they'd come back and they'd say, "Thatwas really good and now we want to do it again but down in the lower third because we have this title we want to put in in the bottom." Andyou explain that you had no idea how you animated the thing two weeks ago and vou were sleep and you don;t know what your patch was and it took five hours and you're going to have to do it all again from scratch. and they said "just to move it?" So we used to do kines on an optical bench and we discovered that was ridiculous. And people weretrying to fudge with the servos of VTRs which is a horror to try to get them to move. And we just came up with the idea of doing it and built a breadboard.

Jon: So it came from the demand of trying to work.

Steve: And the need of doing something. And when we had the prototype we showed it around. One of those we showed it to was CBS, not becuase we were showing it but because I needed it. At that point. At that point I wasn't tied in that tightly to EUE. I needed a place to screw around with the quad machines.

(continues to 201, not necessary to transcribe this stuff)

Jon: Could you say someting about the commercial aspects of the colorizer?

Steve: The first thing is that we never designed the thing for the video market, past the first units. The first units were designed for the video market. This thing that you're looking at here was designed for discotheques. However, it's probably better than most of the video ones around. It's soft edge, fistt

of all, so you don't get any of that tearing and noise on the edges. And it's quite straightforward. You adjust the controls, they do exactly what it says. It's like taking a quadruple re-entry switcher and keying on all four busses ~~which~~ with the ability to fade video in. And that gives you total control. I can, for example, feed a picture in there and make the gray one color add the black another colro and white another color and still have a color left over for something else. Then they'd be very defined. Then if somebody said, "make that outside frame a little more blue," I could just adjust it and ~~ak~~ make it a little more blue.

Jon: You were familiar with the Hearn machine?

Steve: Yeah, Hearn does more stuff than this. Well, the Hearn is the more sophisticated version of our colorizer.

Jon: As I understand what Bill and Bill say, you had been with Etra in contact with Hearn in specifying colorizer, matrix switcher, and so forth.

Steve: This was something in the early stages. It was a voltage control on how the stuff works. Yeah we worked together but Hearn pretty much did that thing on his own. It wasn't a joint effort like the Rutt/Etra Synthesizer. I'm sure he got some ideas from us, but HEarn . . . you know, what the device had to do . . . but in terms of how he did it I know he did it on his own. I know he doesn't use the same chips I use. He uses these balanced modulators, I can't think of the number. He got off on those things.

Jon: What was the reason that you called him?

Steve: Well we didnt really call him to build it, we just knew

him. He was always building stuff. I don't think we were in any way responsible for him doing it although maybe we were responsible for him doing it in certain ways, but certainly not for the original idea.

Jon: As I understand it, correct me if I'm wrong, you called him to open discussions ~~for~~ on him constructing a box with collaborative specifications coming from both you and him. And you had presumably known his colorizer?

Steve: He had already built stuff.

Jon: Yeah, he had to Model 200 colorizer, quantizer, keyer . . .

Steve: Which is still a good device.

Jon: Thatmodel had some problems.

Steve: Yeah, but compared to what else is around. It's really the only thing available in the video market, since we're not aimed to that market and we'ere not priced into that market. For what we sell this thing for, ~~we~~ you can get more hardware from Hearn. Probably after you put it into a ~~disc~~ discotheque, drop it down the stairs a few times, smash the shit out of it and set it on top of a two kilowatt loudspeaker box, our would probably stand up a little better. We've spent a lot of money in packaging the thing. If I had to go out and buy one for my studio I'd probably buy a Hearn because it does more.

Jon: What were the reasons for those discussions beteween you and Bill and Bill.

Steve: I don't remember specifically what the reasons were.

Probably mostly from Bill and Bill, with Etra getting back to me on stuff. But I think mostly general feel of what's going on discussions.

Jon: I see, I got the impressions that you had a need for a device that you thought he could build, and had in fact a use for it and wanted to commission this device?

Steve: We may have talked to him about building stuff at one point. He did some consulting for us at one point on a couple of things. Some feasibility stuff, colorizer stuff. But I think that was back when we still doing synthesizers and planned to get into it.

Jon: You were never in any kind of contractual arrangement with him, other than the consultant stuff?

Steve: No.

Jon: I see, as both he and Bill tell it, your discussions were the genesis of the Videolab, in a sense, becuase te requests for complete voltage control, which he was hesitant to do. The fact that Bill did not request oscillators, because he had so many, these kinds of things. The voltage actuated matrix patch feld. That was Bill's specification.

Steve: OK, that was something that we put _____ _____ to save us, and we had used plus or minus 10 volts on everything. Audio stuff used plus or minus five or zero to plus five.

Rutt now distinguished his machine from Hearn's in voltage levels, not necessary to transcribe

Steve: I got the impression that everything he did he did pretty much on his own. I know he used different circuitry than we had originally worked out. I tried to get him to do stuff with some of the circuits we had so there might be some more areas we looked into. We flopped around. But he'd already gone down his own road and it's very difficult to change your philosophy. Obviously we had the same kind of problem with this thing. If somebody else tried to build it using those chips, and I use that particular chip in everything I cuild I never have any problems with the stupid thing. And these guys, it just drove them up the wall. It's a touchy chip but it does like a ton in one little package. You just have to feed it right.

Jon: I see, but your discussions with Barn were towards whatever the fruition of designing some device that either Rutt in his productions . . .

Steve: My discussions never got that far. It was probably mostly Bill. The idea of marketing the Videolab and all that was strictly between the two Bills. I was not involved in that. I was pretty much out of t-at by that time.

Jon: Have you been indiscussion, either formal or informal, with other designers or artists on the specifications of these things.

Steve: Not since stopping the synthesizers. We really sort of oved out of that field because we certainly weren't making enough money at it to warrant hanging in and we had been doing other electronic stuff all that time to supplement it. We decided thatthe thing wasn't going any place but that we would

continue doing the other electronic stuff. On an ongoing basis, I talked to people about my synthesizers but I haven't gotten into any other heavy projects. The colorizer was not a heavy project. The colorizer was a good afternoon. Very straightforwardy.I had used the circuitry that ended up in this thing origiaally as a keyer when we first put t-e studio together. And a chroma key unit, you know, a chroma key switch . . . we just assembled the package. The circuitry to make the color is almost off the shelf. Most of the switchers out ~~the~~ tend to use the same . s digital chips to vary the phase of the subcarrier, which is a 74121 ~~7521~~ chip and is the recommended one there. And it's pretty much straightforward stuff. Thre's nothing innovative in it. The only thing innovative was our marketing, I think. We found this market that other people didnt know existed, which is a discotheque thing, and managed to exploit it. _____ _____ but only one unit we built ended up in the video art field. The rest of them are all in discos.

Jon: What other products has Rutt Electrophysics come out with that we haven't discussed? The RE-21.

Steve: ~~That was~~ I don't know if we ever really made one of. That was that whole same package. We just built a colorizer out of that. Mostof that package never got built. It was just on the paper. There was that and there was an RE-3 synthesizer that never got built.

Jon: a scan processor?

Steve: A scan processor, yeah. We were looking to see if we coul pick up a bunch of orders and run a ~~mix~~ whole bunch of tem.

Definitely and only directed towards schools and such. It had a set of patch boards, a matrix, a pin matrix. It was a Selectro-board is what it was. It was stripped down a little bit, simplied, not quite as snappy and we were going to sell it for about three or four thousand. We didn;t get enough orders for them. We never built it. That and that other thing were sort of the last stages of deciding taht we weren;t going to continue in that direction.

Jon: Have you ever thought about lanugage to describe the effects or functions of these machines?

Steve: Well, we thought about it but didn;t come up with anything. Nothing intelligent, just explaining how it's done.

Jon: And so when you lable a module, a you label it in standard . . . like bias and level and so forth?

Steve: Yeah. What it does. (short break here) Thre's really never been an operating thing that I know of. _____

I should have one because even right here I have a problem showing people how to use the thing. And that book only covers certain areas. It was written mainly not even as an operating tool but as something to allow people to understand what the device is. A prospectus.

(break here, discuss NET computer and that R Elect. had put some of the boards together and not much of it worked)

(I ask for materials and black diagrams, her offers them. . .

Jon: This would be for publication.

Steve: Yeah, well this is just stuff I copied out of the Motorola book, so you're welcome to publish it. If anybody wants to build a synthesizer out of them, move power to them. And the same holds true for the colorizer. The device we use at the chart of the colorizer is described in the Motorola book as a "high speed video switch" and anybody could build something with it. The only thing we consider proprietary is the Repositioner and we don't even consider it proprietary. The circuits are puclihsed, we just happen to ave a patent on it and if anybody would like to build it and pay us a royalty, we'd be glad to sit down and talk. I've never thaken the attitude that we've built something and don't let it out. People might have gotten that idea sometimes becuase we built things and wouldn't give them schematics, but that's becauee the schematics didn't exist. A lot of stuff we built I just built. We even shipped a few things with proto-boards in them, including the colorizer as a matter of fact. (tells short story about protoboard. Mentions Joe Paul Ferrara who worked with Siegel on Proc Amp.)

476: Steve: Oh, Siegel worked on the original thing, I forgot that. He and Joe Paul came in and helped put this first version together (tape ends)

Side 3

Steve: They didn;t use the concept of the Siegel but the balance quantizing thing. I remember why Eric got involved in it. I had to build a PAL one for Australia, and they knew PAL better than I did. That was shy they did it. Sonce that's been done, Joe

Paul's been in and out a couple of times on other projects with us.

Jon: They only helped you put together the one for Australain TV?

Steve: Yeah, they didn't put it together, they just did the design on it. We just did the packaging at that point. At that point we were pretty heavy into packaging. For us to take a circuit and nalle edge circuit cards and cases and that sort of thing was a snap back then.

Jon: So there function was only to change the design inasmuch as it would interface wth PAL?

Steve: Well, changing the design to interface with PAL is not an easy project. ~~Exxzakkz~~ Yeah, there were major changes.

Jon: But in no sense did they alter the ~~functionakx~~ major functions and controls?

Steve: Yeah, just to get the thing to work. I dont know if we used that chip again, either. It was the same 1445. I still ahve ome ofsthose cards around. We built extra cards, and this unit hat's out ion the coarst right now was built with those. You could switch it between PAL and NTSC by varving some of the ~~fixit~~ filter parameters and the burst flipping circuit which we simply took out of . . . And we never built a proc amp for it: we never put them ~~nnxcardsx~~ in hard, becuase the Australian one used a switcher and later on we used a Proto-board. Finally we made some cards up on actual breadboards. But the first NTSC one literally a Prototype board: all it did was add burst, because it filtered it off coming in and added it coming out. 023

And we didn't strip sync because we didn't see any advantage to doing that. It was just one more thing to go wrong.

END OF TAPE