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

Steve: Bill Video was an artist-in-residence at NET'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. We'd been working 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 the upper 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 other factors on it. We were sort of convinced that something could be done to make it better. And I had been fiddling 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 could 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 tear almost grabbed it but didn't quite and when 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. I'd been involved in audio a lot but no video. So he showed me how the thing worked and basically 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?) used audio oscillators for this and other funny stuff. And you rescanned it. It seemed like a neat toy and it made neat pictures. Bill wanted me to work on the thing. He came up and said, "Yes, 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 wouldn't sell it back. Since they've not bought a much newer one and they really don't give 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 how 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 shapeness.

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 last 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 parameters whereas this one didn't. So if you're (inaudible) you could compensate and this one didn't really have ability to scan, the scan was very non-linear. It was good for producing similar patterns but it wasn't good for doing logos.
Just: It all have a video input? An external video input.
Steve: Yeah, they all had external video inputs.
Just: Did it have dual trace?
Steve: No, we didn't figure out 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. Suddenly turning that
up to vertical we found that you could put two different
waveforms into two different halves of the image. At the
point which I realized that people were doing that, because
Other people were working with 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
switches in, you didn't need anything as fancy as multipliers,
and that was 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 auxiliary plug-in board, it hadn't become an integral
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 these are at the Ontario College of Art?
Steve: No, they hadn't have the last tail of the thing. That
I think was the last machine I built.

As a price but we noticed the one in the Ontario,
we noticed if you're building
in the office and doing it for your own,
we can take it up in volume. I think I wish that
we would adjust the price or something
that one could afford it. 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 didn't have 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 couple 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
would have
where it should do that. So the Ontario one 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 on. That one went to
The Art Institute of Chicago. That was I think the last dual trace one we built, and then
and that was the end of the creative market for the thing.
why we couldn't afford it, and 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. We eventually stopped
building them. It was just too much of a hassle.

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: Um-hum. 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 one of the generators never worked right. I shouldn't
evaporate if it never worked right, it never did all the things we knew
sort of
could do. In the early models, it was OK, because it was this
careless stage and nothing worked right back in those
days. We used to have a standard procedure that if something
didn't work that way it was supposed to be,

wondering was making 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
Jon: So that they were electronically identical.

Steve: Yeah, electronically identical. 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 two Darlington regulators. We had an integrated circuit, I mean npn/pnp 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 modules we pulled that off because it wasn't worth the hassle.

Jon: I see, but the original complement of modules as provided to ACT 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 Vasulka 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 with a module. And then we had a bunch of diodes in it that was good for something: it mainly plugged the extra hole.
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 joystick. It's an X,Y,Z control for anything you want to use it for. It was originally designed, Extra thought it would be used as an additional thing, and he may in fact have used it for that. That I've used it for had been simply how to control any three parameters 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 something with your other hand, so you've always got one hand available and that gives you control over that. You can zoom something out, you can flip 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: So you came to this particular approach to doing this cool, nanosecond jumps processor.

Steve: Total.

Steve: total.

Steve: total.

Jon: I 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 Pail machine.
Steve: ...such an addiction ...modification. The
machine we did from the Nam June machine, well, we did two
modules to the Nam June machine. One thing was the Nam June
machine was built out of sort of surplus parts, whatever was
available, he stuck in. He started doing something.
Instead of sticking with what we started from scratch and built it, we
were a little more refined, and all plugged together and it
looked prettier. Another thing is we DC coupled everything.
It had been AC coupled. That was the main thing. I'd like 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. We couldn't
take something and slowly flip it upside down, etc., and leave it there. That was the main thing.
They were just all refinements. You know, it was like resolution;
that's why you sharpen the picture. So we went to a higher voltage
from the CRT.

John: What made the machine a completely voltage controlled?
Steve: Nam June's was sort of was. The voltage control care
pretty much from analog computers. Most of the modules we used
were things that had been analog computer concepts such as
multipliers, summing amplifiers, dividers, log functions, etc.
Now, John didn't really have all that much voltage...
She could have. He actually could have bought it off the shelf, in those days you could still buy analog computers. In fact Vasulka had an analog computer for a while, if he had.

Jon: I see, but three 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, was just sort of listening and building it and Bill was one of the people that I was listening to a lot. And he was saying, "Well, it really needs a device to zoom to allow the Paul/Abe to zoom."

Steve: And that was the PC zooming. That was THAT. That was the first unit we build did that. That's an interesting point, simply the fact that was the main difference between the two which was that we had the control which the other one didn't have. Paul/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 flips 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 are 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
Reefly, the one we built for Australia which was an outstanding thing, because we built a completely new CRT unit for it. Prior to that, one of which was at NET now, but 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 NET and the second one we built is at Venezuela. But the nine inch tube didn't particularly do anything better than 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.

Jon: What about that resolution out of the small tubes? And you were involved.

Steve: I've always been in electronics.

Jon: I see, a childhood fascination.

Steve: Weird kid. No, 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.
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with a lot of SR 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
who had been working on this for years, and that was Sid
Washer. I don't know what he's doing now, but he had been
working on building synthesizers synthesizing 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 Butt/Extra?

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

Jon: So who were the collaborators?

Steve: The first 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 anymore anybody.

Jon: In video. I was looking for somebody to wire mainframes,
not 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. And that was the one
SHURT. And then Greg Leopold started working with us and he
Jon: Do you recall the very early use of the early units of the early units, did some wiring. And that was about it.

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

Steve: And Leopold.

Jon: Who is Leopold?

Steve: Leopold used to work for Rectilinear loudspeakers. He didn't collaborate in what the device 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 there 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: Max. Is he in New York City?

Steve: Yeah, he's still around.

(Short break)

Jon: Is 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?

Well, alright, let's take an area, then.

I'll tell you what we had to build our own deflection amps. The first unit we 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 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 I 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 circuits. Part of the problem with deflection is that you have 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. Eight million 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 you only need them in pretty low bandwidth and all that stuff had to be pretty high bandwidth.

"But in some sense, the parameters of all your circuits were in the public domain?"

Steve: *Actually, the books that we built from were mostly the Motorola book and a little bit of the National book. We had this big Motorola book from which we discovered the multipliers that we used and other stuff. Pretty much put everything together from there. 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, in how to raise its speed. None of which 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. Originally for our multipliers we were using a multiplier that was an entire multiplier in a chip. But it was noisy and noise in multipliers was wobbling on the lines. So then we switched over to a Motorola multiplier-chip that wasn't a complete unit. It had a bunch of discrete stuff hanging out all over it, which took more parts but it was a much better item. Also, for a while we bought multipliers from a company which shall remain unnamed 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.

**Did you arrive at the design of your oscillators?**

Stand: *Well* they use the standard Intersil93 oscillator that the rest of the world used back then. And I basically just designed the thing one night from Intersil literature. They didn't have provisions for triggering the thing so we had to add a circuit to do that. It wasn't a question of synchronizing. (??? You can't synchronize an oscillator unless it's a multiple of the frequency where 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 Intersil 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 first floor of my 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 it was 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 everything 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
Pilt:...:fnr tri^erin-

...ever, P.

Control

the little

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 which is a multiplier, and you see that little thin one which is the

in the old ones and they're big fat ones in some of the new ones.

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 control on TV sets have height and width. Oscilloscopes have position so we had position. Mainly because whatever was around. Intensity,

immediately discovered as being necessary. The first time we zoomed the thing down to a dot. The one at MIT does not have
Density control. Basically it has your TV set brightness control. We hadn’t voltage controlled it. So the first one we built didn’t have the ability to do zooms too well. The later models had not only the intensity control but also compensation. We did a height times width times depth multiplication.

In horizontal center, we discovered,—this is an interesting thing—we spent a lot of time working on it because it’s an oscillator board that shifts the phase of the synthesizer in relation to the phase of the video. And so it could do like a theater marquee effect. You can roll the video image through it. That we just dreamed up. It was quite a trick to build it because you had to blank the image so that it didn’t come back on the other side and that was tricky.

Why did you feel the necessity of building this function?

Steve: We tried 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...
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 demand to come to you and say "I want it to do this."

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

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

Steve: People would have problems with them. The problems they would have are that the tubes would get burned, it was that kind of thing. So we made devices to solve that problem. Other 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, 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: A_ 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 rectifying it, charges a capacitor... actually doesn't change 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 variable 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 micro 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 the 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. I've 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?"
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 commercial 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 what it was. But I wouldn't call myself a creative artist even though I create stuff I do it with it. I'm just 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. Because 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 cement blocks at the Metropolitan Museum of Art constitute art. I have a pile of cement blocks in the back which I'm considering also selling for $10,000 but nobody wanted to buy them yet. I also
I 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, 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?

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

Jon: to be used with projectors?

Steve: Yeah. (brings the front panel) I'm calling this one that because they would buy it and if we called it a colorizer they wouldn't.

Jon: Siegel called it that also.

Steve: A lot of people call anything a video synthesizer. We sort of felt that our device was and we decided to sell it to the administration and we called this one that because they would buy it and if we called it a colorizer they wouldn't.

(break while we discuss the device)

123: Jon: But the quantizing functions, why did you take this particular approach?
Steve: The quantizer? Oh, because you have control over it as opposed to I and O. 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 other 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 compress 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 editing.

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 broadcast. 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
something over here. And they'd come back and they'd say, "That was 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." And you explain that you had no idea how you animated the thing two weeks ago and you were asleep 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 were trying 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 because 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 something 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, first
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 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 color 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 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 didn't 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 with 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 build a colorizer, quantizer, keyer...

Steve: Which is still a good device.

Jon: That model 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're not priced into that market.

For what we sell this thing for, you can get more hardware from Lernn. Probably after you put it into a 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 Lernn because it does more.

Jon: What were the reasons for those discussions between 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 impression 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: He 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 feasibility stuff?

Steve: No.

Jon: I see, as both he and Bill tell it, your discussions were the genesis of the Videolab, in a sense, because he 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 field. 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.

Ratt 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 what 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 problems with this thing. If somebody else tried to build it using those chips, and I use that particular chip in everything I build 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 goes like a ton in a little package. You just have to feed it right.

Jon: I see, but your discussions with Rahn 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 that by that time.

Jon: Have you been in discussion, 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 veered 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 that the 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 straightforward. I had used the circuitry that ended up in this thing originally as a keyer when we first put the 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 there tend to use the same digital chips to vary the phase of the subcarrier, which is a 74121 252k chip and is the recommended one there. And it's pretty much straightforward stuff. There's nothing innovative in it.

The only thing innovative was our marketing, I think. We found this market that other people didn't 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. Most of 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 could pick up a bunch of orders and run a whole bunch of ten.
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, simplified, 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 that we weren't going to continue in that direction.

Jon: Have you ever thought about language 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. Nothing intelligent, just explaining how it's done.

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

Steve: Yeah, what it does. (short break here) There'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 Elect. had put some of the MB 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 published, 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 taken the attitude that we've built something and don't let it out. People might have gotten that idea sometimes because we built things and wouldn't give them schematics, but that's because 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 proto-board. 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 why they did it. Hence 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 Australian 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 make 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 with PAL?

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

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

Steve: Yeah, just to get the thing to work. I don't know if we used that chip again, either. It was the same 1445. I still have one of those cards around. We built extra cards, and this unit hat's out inn the coast right now was built with those. You could switch it between PAL and NTSC by varying some of the 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 in, because 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.
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