

Bob

This is an early *extended*  
BobH  
and  
I did  
from  
winter  
'88  
JP.

BL: Let me ask you, your name is mentioned in the context of LINK. I'm sure your name could be mentioned in a lot of other contexts. Ron Smart suggested asking you under the module section to talk about something called thick film IC's, which is something I don't know anything about.

TS: That's right. So that's a whole other chapter. You're going to edit this so -- Do you want to try thick films?

BL: Try thick films.

TS: Thick films, Ken Olsen, the end of it, the bottom line was we folded up the shop and it disappeared as if you'd taken your hand out of a bucket full of water. But Ken said at the time and later, well, we learned that you shouldn't get into that business three years before all the other companies who busily got into business and wasted themselves millions of bucks. So that's why you don't know anything about it or haven't heard of it. However, the notion was, this is about somewhere around '64 or '65. Maybe we could figure out just when. And there was a big buzz, and I guess Dupont put it out, they said the way to package up -- this was before IC's had really been invented... the whole packaging job had been done, you could get discreet transistors and diodes and

things on die, as later they would all be packaged by the zillion in IC's. But there was no way to put lots of active elements together yet because the integrated circuit stuff hadn't come along. So I guess it was Dupont that was pushing it, they said what you do is you take a ceramic substrate about the size of a postage stamp and you put on Dupont's finest conductive goop, <sup>"eg loop"</sup> which were basically glass threads, the glass melts when you fire it in an oven. And when it refreezes it's a resistor or a conductor or whatever. And you pick up, in our case we started with diodes because the circuitry at that time was what they called the diode transistor logic, R something. I'll call it the diode transistor... and IBM was doing it and all. So the notion was to take little individual discreet diodes, which you could just barely see, stick them on these substrates in the wet ink that you had silkscreened on, and fire them in an oven and put on a protective coating on the top and plug it in. Ken labelled the gadgets flip chips, and we called the modules that were going to be made with the flip chips in them, flip chips, even after we got out of the flip chip business and used more normal... well, by that time developing normal IC's. So flip chip will mean something to some people.

BL: That's the term I've seen.

TS: So what we did is we set up a production line on the top of building 4 which had a bunch of ovens, and we got 30 production people in the end, and a fellow named John Viscalosi who is still around, he ended up in Marlboro building PDP 10's last I saw him, though maybe he's retired... he'd be close to retirement in any case. And we put in a whole bunch of test gear, and it was the first time at Digital that we had ever dealt with stuff you couldn't serialize, you couldn't count every one and number every... it was the first time we got into statistical things. At the end of the line you didn't know which batch necessarily the stuff had come from and you were depending on the statistics of thousands of fried connections to make it work. And so that was kind of fun. And there was a fellow named Bob Brown, who was a bit of a con artist, he actually built diodes, right here in Building 3. He had boron and diffusion furnaces and stuff. And he taught DEC something which they sort of keep relearning, but it was the higher the volume the higher the quality, which we didn't believe. We would have told you that the more volume the less the quality. But it doesn't work that way. And it's the whole issue of yields which is now beginning to sort of permeate everything, or I guess it's long since permeated everything. So OK, then we actually started producing them, and --

BL: These were the flip chips based on the new technology or the flip chips based on the thick film?

TS: Always thick... this whole conversation is only about thick film. When the flip... when the product line called flip chips actually came out it just had one true flip chip component in it. It was a 4 diode voltage regulator string. Because we had not been able to get the costs down below 10 cents each for these things, and it didn't pay till they got down below eight cents.

BL: Why were these things considered pretty cool at the time?

TS: Well at the time the choice was between little diodes that you could buy for one cent from people, or make them yourself maybe for one cent, and stick them in this goo, and stick a group of them in the goo and tie them all together and make a little diode capacitor logic circuit, or buying discreet diodes for four cents. And it would take maybe say five of those discreet diodes, so there's 20 cents. And then it would take a capacitor or two, or you could get capacitors that would stick in this same goo. And the question was whether you could get the production costs down of putting the one cent diodes together and not add so much extra in the silk screening and goo and all that stuff. So that the final thing

which looked a lot like a today's IC, actually today's ZIP, they mount it on their head, if you didn't add more back in to the cost that you saved in the cost of the parts after you got done encapsulating and testing and all the rest of it, and paying for the capital cost of the ovens. And we actually did get below the cost of the part, but then now you have to run it on the board. So it came close, very, very close. And after about two years or so of trying Pete Kaufman taught me a marvelous lesson, and it was that -- here's one of these marvelous one-liners, and we've used it many times since. If you can kill your own project, you're a hero. If your boss kills it, you're a failure. But either way, all levels of management above the boss can't tell the difference. So the moral is kill your own projects and be a hero, assuming that of course they should be killed. And don't sit there and fight and fight and fight. That's a lesson that people have to learn over and over and over. And we don't learn it very much. So it's hard. It's human nature, you fall in love with things and you're not about to kill your own project. But --

BL: So the reason for killing this project was that you never could get quite the cost savings that?

TS: That's right. Well, you know, at the time we were saying to ourselves, well if you could just get the

volume double then we could knock another 20 percent off the cost and it would make it. Well, of course the things you're competing with come down slowly in cost. It's like core memories. For the longest time everybody predicted core memories would die tomorrow, in favor of silicon memories. And it was very clear they would someday, but as the volumes of core memories went up, because they were mature, their costs still kept coming down. So it took ten years for the transition. It was the same sort of thing.

BL: By the time the end of this curve arrived they had already been replaced by...

TS: You could see that they were never going to -- it was never going to quite hit this receding target. But as I said, the thing that was neat was that Ken was really pretty good. It was my first lesson in what you might call creative failure. One of these seminars I went to, the guy at the seminar was... you know, these standard management three day things that you learn something, the guy said, how do you reward your failures? Those people who fail are the ones you should reward, because they are the ones who are making the profit. And you know, it's a really tough question, because some failures you shouldn't reward, you should kick them out. But and of course, this company, to get on a current

soapbox, this company is now all full of people who are not risk-takers. They're just so risk-adverse you wouldn't believe it. And that's why we've got a lot of the problems we've got. How do you reward those who fail, because those are the only ones who are doing something for you. And they did a very good job in rewarding me who failed in this one, you see.

BL: But do you think the environment for risk-taking is the same as it was in the '60s?

TS: Oh, nowhere near.

BL: So it may not be people so much as just the industry or...

TS: Oh, no, no, no. There are plenty of small companies that are just... in fact, when I moved out to Albuquerque it just reverted right back to 20 years prior, and it's within the company. It has nothing to do with global environment or anything like that. Yes, the U.S. is generally getting more risk-adverse for sure, but it's the nature of great crowds of human beings...

[BACKGROUND DISCUSSION]

BL: What are you involved in now in Albuquerque?

TS: Well, that's a very interesting question, it's very interesting you should ask that right at the moment. Because what I have done over five or six cycles at Digital is started a group, got it up to about 20 people, which is about my level of incompetence, and then given it away to somebody else. And I just got through giving away a group to somebody else. And the group is advanced development for monitors and display systems and stuff like that. And our last four to five years worth of effort has been to get images, meaning continuous tone images, x-rays, motion images and so on, in windows on terminals and sure enough the marketeers now are pulling it instead of us technical types pushing it. And saying see, see, this nice little mousetrap. So in another year or two they'll be out. But I'm done growing the group that's going to do it and I've given it away. And in fact, a group that didn't was this hybrid circuit one we were just talking about. But another one that grew that did was the communications group. And another one that grew that did actually ended up in the group, the DSG group we've got now. It was the terminal business that started in 1971 and I grew that one up to about 20 people before, and we produced the VT-52. And then the VT-52 went through the standard product introduction cycle of one year after you have sort of brought it out it doesn't sell, if it's new. Because people have to learn how to

use it. Well, it was new because it had some features...

[BACKGROUND DISCUSSION]

TS: So they disbanded my group for me that time. And the next year they sold 80,000 of them. Well, that is... I was just devastated. But after reading "The Soul of the New Machine," I discovered that that's absolutely normal in our business and you'd better not --

BL: Talk a little bit about that.

TS: You better not be in the R & D business if you don't expect to get absolutely smashed everytime you do something. Some of those times it pays off hugely a little later. Sometimes of course it does not. But if you can't stand that one you just better not be in the R & D business.

BL: What were you trying to do when you started the Group 2 that ultimately created the VT-52, and what were you aiming for?

*Russ Doane  
was project mgr.*

TS: DEC didn't have any terminals at the time except a thing called the VT-05. And it was really expensive compared to the competition. And it looked pretty good and all that.

BL: Did people buy DEC set-ups and put other companies video terminals on it?

TS: Oh sure. So the idea was to get into the terminal business. And we did. And in the process, it's very interesting. I went back and I read a memo that was written in December of '71. And it had a terminal type A and a terminal type B and a terminal type C. And the terminal type C had a PDP 8 in the bottom of it. If we had done that that would have been the first PC four years before PC's actually did come out. And the reason we didn't is just overload. By the time we waded through A, which was a real simple one, and B which was sort of a block mode terminal, we just... there was only six of us and we never got around to see. Even though the plastic castings had the room for these old green box, and you could have plugged a PDP 8 in it.

BL: Was the use of that projected system something that approximated what people used PC's for?

TS: Oh yeah, sure. Well, to the extent that a PDP 8 even at that time was what you'd called sort of a PC scaled back to the expectations of the moment, it made a... we didn't look at it as anything really dramatic. Just to say, well, you've got this PDP 8 here, let's make

a terminal with a little more room in it. And then we can imagine how you could sort of squish a PDP-8, repackage it a little bit to get it in there. It wasn't what you might think of as a vast concept. But then nothing ever is. When they first get started they're just sort of fragile little ideas that look as if they might be useful and that's all they ever are when they start.

BL: I think part of the trick is seeing...

TS: No, the trick is I would say just to keep chipping away. And what happens in our environment, like what's happening right now, they're cutting back everything because we're not selling high end computers. So all kinds of stuff that's in the same embryonic stage right now will fail, is failing and we will be two years from now without stuff. And you have no idea what it is that you're cutting.

BL: What's going to be good and what's going to be --

TS: Right now, this particular week is a bad week. I'm ultimately pissed off because I was up at Merrimack. At 9:00 people are still drifting into work. And I know from previous experience that at 3:00 on Fridays the place is empty. And I called people this week many times

and they call forwards and call forwards and call forwards. And it gets to somebody who's in a completely different building has no idea what the hell is going on. So you fail in your interconnections and don't get me started. Because the place is sick. And it's sicker than it's ever been. And the correct solution which they tell me you can't do, but I've fired five people, is to fire about half the people that work in this company. And the thing that really got me frosted is, I'll show it to you after we turn the tape off just because it's -- I'll mention it so it's on the tape, but if you want to see it, it's a questionnaire, called a quality assurance questionnaire that was put out by an overhead group that supports an overhead group that supports an overhead group. And it's to find out whether or not the time cards are any good. And what it really is for, but they don't tell you, is to get you used to the idea of having direct payable deductions for the whole company which is a bad idea. But the way the form is made up you can't answer. They say, would you like this? Would you like this? And your answer maybe is yes, yes, yes, but the right answer is only if it doesn't cost any more. But there's no place for that answer in the form. So they run it through there and the form is all specially made up. They paid \$100,000, you could see that, for making the form. I could hire two engineers for that \$100,000 and get the work done. And they could have produced the

same results with a hundred phone calls plus perhaps 25 or 30 interviews to check the details at 1/1,000 of the cost. And that's just a sample. That's why I'm going to go see George Chamberlain and the next session is to give that to him. It just... this place... I'm sorry.

JP: Well, Tom, try not to \_\_\_\_\_ the historical collection program to George...

TS: No, we'll get back to that...

JP: No, I didn't mean to change the subject.

TS: No, it's off the subject, but I just can't wait to get back to the \_\_\_\_\_. Everytime I \_\_\_\_\_. It's plain to see what's wrong with the thing, but I don't know how it's ever going to get fixed. Because people will not fire people.

JP: We met before. I used to work at the Computer Museum.

TS: Yeah, I sort of remember you.

JP: I was Jamie Parker then. Also I didn't have a stomach. Gordon hired me to work with him on the Computer Museum in '79 and I did that until '83.

TS: Where Gwen now?

JP: Gwen's at the Computer Museum in Boston.

TS: Oh, she is? Where's Gordon?

JP: He's at... Adcorp???

BL: In California.

TS: So they're split up?

JP: No, they're still married. It's just that he works on the West Coast, she works on the East Coast, and they have commuting, they have apartments on both coasts and one in the middle.

TS: So they just alternate or something. They have different lives.

JP: They're doing fine as far as I know. Gwen is, we've been using a lot of the Computer Museum resources and working together on this stuff, some of it. So...

BL: Well, anyway, back to... Well, we've got through the thrilling story of thick film IC's. The one other thing

I wanted to ask you about was... I sent this thing to you about length... Somebody suggested that the real significance of this LINK tape, DEC tape stuff is it was like primordial disks or it was the origin of a floppy disk, and I was intrigued by that.

TS: At the time we really screwed up. Because -- I have a wonderful story about that, but let me first say again... try and say the punchline first. The... if we had told the salesmen this was a long skinny disk and that... not so much the salesmen but the system programmers they would have programmed it correctly. As it was they thought of it as a tape, and they programmed it incorrectly. And so it -- didn't take... it didn't take off anywhere near as fast as it could have. Then we made another error which was, and it was the first of many, many similar errors that DEC has made. We decided to keep it closed. The argument of the salesman was, well, if we give it away and make it a public domain type thing then what will our salesmen sell that's different than the competition. OK, and things that we that open like Ethernet have just been superb. And things that we've had closed like BI just sort of failed. And we never seem to learn the lesson. And it just keeps going. Right now I'm working on a gigonet, gigabit speed interconnection between computers. And I've been told absolutely it will not be DEC-supported, and it's not a

good idea. But it is and so we're doing it anyway out in the desert, which is the advantage of being able to be out there with Los Alamos, and hopefully in a year or two DEC will be able to connect all the supercomputers together. And that's worth doing. But it can't be doing except with an open channel because you see the supercomputers with everything -- it's like Ethernet. But the people up at Mac say no way. In 1994 maybe we'll need something like that, thank you very much.

BL: Well, they're market-driven versus...

TS: Well, it's Grant. Grant can't make any money on business unless it's protected.

BL: So what was it about DEC-tape that made it more like disks than tape?

TS: Well, the disk is pre-sectored. It's got a track on it that divides it all up and it's preaddressed. So as it spins around and you find whatever address you want you insert something or take it out, or insert a block of stuff and take it out. And that's the way DECTape is. It's long and skinny, but it still has mark track all the way down the whole length of it. And it's got whatever it has, I don't know, a thousand or three thousand blocks. And when you want to write stuff on it you write

a block anywhere you want. It overwrites whatever is already there just like a disk. Whereas a tape, see the original tapes were really punch cards. That is you went chika chika chika chika and you stuck this whole blast of punch cards on... just copied it right on the tape without any processing at all. They were all little tiny punch card images. So when you wanted a computer payroll you had to basically add always to the end. A tape you can't start in the middle. You have to add on the end. There's no way that you can find where you are in the middle and get it accurate. So the typical process was to take off some stuff from a pair of tapes, sort it and then merge it onto a new tape, which you start from scratch and it ends up a new long tape the way you want it. And you may have to go through that process several times. Well, when they got DECTape the first programs all were like that. They packed it on the end. And later...

BL: So that got more use.

TS: Yeah, sure. It's a tape. I mean this is what you do. I didn't know enough about systems programming to know enough to avoid the trap.

BL: But did disks even exist at that point? I mean there was really no --

*Random Access -  
Changed computing style -  
made possible -  
fast interactive computing,  
like Down, but with  
a whole lot of storage*

TS: Disks didn't but drums did. Drums had been around for a long time.

BL: And that had the same kind of packet?

TS: Yeah, a drum, the typical drum in those days had maybe 100 heads on it, and one block was one revolution of the drum. So you would turn on the head and go zip and write that and turn on another one. So the concept was there alright. Plus as a matter of fact, I think disks were around now that I'm sitting here thinking about it. They were all fixed head disks though. Now they're all moveable heads. So there was plenty of precedent. It just took us several years after we got it to see that. And if we had said, it's a long skinny head disk which happens to be able to go back and forth, instead of always rotating in the same direction, people would have...

BL: That's sort of a --

TS: Or another way to say which we did say, but it didn't quite click, we did say that this is a random access tape. See that's the same point. But that was not quite enough to say...

BL: That didn't overcome the barrier...

TS: Oh yes, that means it's like a disk, see, if we had gone that one step further. It did come out. We're talking about a transition period, you see, the DECTape lasted for a very long time. Things at DEC are supposed to have a three year life, but they don't. They either have a one year life or a seven year life. It's just that the average is three. So that's what you talk about. But the things that work well have seven or eight or ten year life. The things that don't work well you don't see them. But it is not proper planning to plan on a three year life. You either plan on one or the other and then see how it develops, which plan is the right sort of first order thing. But we still don't do that.

BL: You took a look at this LINK discussion. Is there anything that you wanted to --

TS: Yeah, let me just refresh memories... Yeah, Clark and Molnar... Molnar and I used to have these violent arguments. Because he insisted that you wanted to get the tension on the tape from the drag in the gears on the little motors that we brought. And I insisted that you should have no gears in the motor and you should get the drag by putting the 30 volt AC signal on the reverse motor. Well, they won because they had been in it

longer, and I was just a young engineer. And they got me to do some of the...

JP: They were not in the company were they, per se?

TS: They were not in this company, never in DEC, no. But when I got here then, I got my chance to do it my way, by God. As a matter of fact when they first hired me they said, you'll never have to do anymore mag tapes again. I said I'm sick of mag tapes. I don't want to do anything... I've spent five years at Lincoln Lab doing various mag tapes. The -- where this Linktape came from was something that I did before Lincoln at Lincoln. And it looked just the same but the reels were 18 inches in diameter and they had a mile and  $2/5$ ths of tape on it, and they read the tape at something like 4,000 inches per second. And when the leading reel was going 1800 rpm and near the end of the tape the trailing reel was going 5000 rpm, and it sounded like a buzzsaw. And the notion was to have a huge, huge, huge internal storage. And the way Clark put it when he asked me to do it which was several years before Link, he said, I want so much storage that there's only input, no output. So no I/O. It's just an infinite sink for bits. Well, of course that's a poetic way to put it. But you can imagine that of course a programmer will instantaneously fill up all memory. But it was a nice way to put it. And that one did have

motors just like ended up with Digital. But then Charlie came along and did the mechanical design. And Charlie and I at some certain funny level we still hate each other. Even though when I see him which is every once in a while at Washington University we hug each other and all that, there is still sort of this little edge.

BL: Something as important as that never really goes away.

TS: Now on the other hand there is one residual. Which is somehow Clark and Molnar as they went out -- they stayed in academia. And they somehow got the idea that we at Digital made money on DECTape and it was evil, big business, stealing from the poor academic community, a standard liberal way of looking at that. And they applied it broadly, they took that fact and sort of extended it out and to them, not so much \_\_\_\_\_ but Molnar, it still... he feels really evil. And I found out when we were prosecuting the patent how bad it was. Because I read some of the depositions that he gave, of their side. And they accused us of fraud, all kinds -- there was no fraud. It was sort of bumbled, but there was certainly no fraud. A lot of people were doing dumb things. Well, for instance the patent was filed, you have 365 days to file the patent from the time the first thing is -- We filed it on the 367th day, but it was all

right, because the 366th was a Saturday, and the next one was a Sunday and you do get until Monday under those circumstances. But that's how it was, see. Well, then sure enough they discovered many years later that something that they had based that time on had actually been published three days sooner. Well, you can't hardly call that fraud. And yet, lawyers, they were stupid, you just don't use up all your time. You give yourself some margin and slack. But they said, see, see, that's a fraudulent patent. It was all kinds of icky. But it certainly wasn't -- it was just people screwing up by the numbers. What's new.

JP: Typical.

TS: Well, that's all, that's just side stories. Now let's see, oh my God, time's getting on. I told him that I'm supposed to be over at George Chamberlain's in an hour, 12:45 which is coming up. But that George might not see me, because she said, well you just sit there for a while. So what we could do is just keep talking, keep moving, get over there, and just keep talking over there, in Building 23 in the Mill. Just get on the shuttle. But my point is we should get on the shuttle in a few minutes. But anyway... OK, so Clark came around to me and said, why don't you design a little one instead of a big one. But what the little one was for still had

nothing to do with this Link. This was still before the Link project ever got started. It was what was called a snapshot tape. And it was supposed to be just enough to store all the entire contents of what was then the hugest memory in existence, which was 256,000 words. Now we talk about megawords, right, of storage on TH0. So the size linktape is is the size it is because that's enough to store the -- to dump the memory. Which you should do -- when the machine fails every 20 minutes you should dump the memory every five minutes, see. And so that's how it all got to be the size it is. Then along came Molnar and Clark, whose main interest of course was the Link Computer. But since Clark had been part of the predecessor, Clark cooked up the idea of the serial track, the serial registered track. But then I did the work of figuring out the codes at Digital. He figured them out... you see at Digital you wanted a 36 bit word, or something, an 18 bit word. For Link you only needed 12 so it was a different whole code structure. So I did that here. Anyway Clark knew all about it. So he just sort of said, well, we'll take this snapshot tape and stick it in the Link as this I/O device. So that's how the whole thing came about. And Charlie got to redesign the mechanics of it. I hate \_\_\_\_\_, but he did it quickly. It only took him a few weeks. And he did a good job. Yeah, this is fine. Otherwise, I don't have a whole lot to add.

BL: So there's no mistakes, errors, inaccuracies.

TS: No. So what's the next subject.

JP: PDP 11's.

TS: Well, I don't know anything about PDP 11. See, as I was telling him before you came in, my job at Digital is spend a few years starting a group up and then give it away to somebody just about the time it's grown to my level of incompetence. And I just got through doing it last Wednesday with my current group. So now I'm back to having two people work for me. And so when I -- Linktape wasn't starting a group, that was as a project engineer. But then they dragged me away from that to do this hybrid circuits thing. And that lasted a couple of years. Now in that case there was no subsequent group because there was no subsequent thing. Then the next thing after that I did a stint in what they call process engineering. And that of course has grown to be... it's the machineries of production. And so build ones of a kind and that's lots of fun. And that group stayed on after I left because when I left to do that one I started another group called "Communications," which eventually grew to be what's now up in Littleton though back then it was how do you hook a computer to a telephone wire so they can beep (?) back

and forth. And building all those --

JP: Was that early networking sorts of things?

TS: Well, no, wait a minute. Networking, yes, but all we did was plug stuff into the telephone line. Now the telephone network is worldwide, but no, not networking in the sense of how you do elaborate protocols and switching and all that sort of stuff.

BL: But it would link...

TS: ... Expand into...

BL: Was it like designing modems for Digital systems?

TS: Well, designing Digital things that would plug into a PDP 11 on the one side and plug into a modem on the other and run it. And then doing the programming for it. And then building, well, I did the first UARS, that means... nowadays a UART is a little \$4 IC. But in those days it was a whole module. So what I did was spend an eighth of a million dollars with TI who was going to bring out a version of the UART so that we would get our specs in. And Ken Olsen just bawled me out from one side to another. Never again will you give away all our engineering to an outside company. But what it did was

drop the price of UARTs from \$22 to \$7, because they did sell to our competition for sure. Well, that cycle and problem occurs over and over and over. When should you go and put something out so that you get the cost way down because you're beyond it in some sense, and when should you definitely keep it so as to keep the proprietary advantage? That's a tough question. I believe that on average we don't give it away nearly as much as we should. For sure. But of course there's plenty of times when you should definitely not give it away. That's a hard question. That's one of the things that's a \_\_\_\_\_ left-over. It's giving away and selling chips and so on. So anyway that was a thing. So anyway, that's the communication group. Then they dragged me away from the communication group to the 11 world, but not to the 11... I was certainly all part of Andy Knolls and Marcus' group alright, but I had really nothing to do with 11's per se. What I was doing was building displays for the 11's for sure, to make them better. And the VT-52 was the first result of that. Then the VT-61. Then they took my group apart, another one of those cycles because the VT-52 wasn't selling right then. And Ken got up and said how bad the product was and how awful it looked and stuff. It got a design award the next year. But he said that to 150 salesmen. And I happened to be at the meeting, and \_\_\_\_\_. Because if the boss says it's no good, well, gee, he must know. But

I got sort of belated \_\_\_\_\_. But that's what made me decide I can't take this place anymore. So I moved off to the desert and started up another group, this time to do color displays which we didn't have at the time. And what has slowly evolved into images in Windows and stuff. Which you haven't quite seen it yet in product form. But now it's time for me to get off and try the next thing while the group itself goes on and actually starts producing \_\_\_\_\_.

BL: Is there any connection between anything like Linktape and monitors and communications?

TS: Yeah, they're all I/O. And my background is electro-mechanical. I tried for a dual degree, mechanical engineering and electrical. Couldn't cut enough courses in mechanical to make room for all the courses that I had to take simultaneously, so I ended up with a mechanical, but sort of heavy on the electronics compared to the usual mechanical. So see a tape drive is electro-mechanical. And while a display is less mechanical, still you see it, it sort of has that flavor. It's all I/O. It's travelling things.

JP: We'll probably call on you again because the second phase of this exhibit which is in planning after this one opens in June on the second floor is going to do a bigger

story on terminals and printers. So we'll need a --

TS: Well, my choice when I went out there was to run the advanced development of both terminals and printers together because even then they were saying the same thing they're saying today, the two ought to be more like each other. Deep inside, WYSIWYG is the current word. And I said no, I'll take the other job which was offered, which was support engineering out at the plant, because it's a way to get away. Then I told Ken, well, I'm really not going to stay doing supporting, though it turned out to be fun. But I'll start up a little group to do \_\_\_\_\_. And he said, don't bring back paper, bring back product. Well, that's right. Nobody believes paper.

JP: That's what he said to us on this project. Just go out and do it.

TS: Nobody believes paper. They've seen so much paper that's crazy or didn't work out or in spite of how good it looked it wasn't... So that's, you know, it's solid.

JP: I had looked at the DECWorld's 10th anniversary of the PDP 11 or something like that, that special edition, and your picture's on there.

TS: Well, we all got together...

JP: Yeah, it was a party.

TS: And Chuck Blazy and I handed up --

JP: The way we have the exhibit organized it's sort of standards that are in each section, each machine section. One of them is this kind of overall quotation from a Digital employee --

TS: We can keep talking.

JP: Well, we were hoping that you might give us that, for 11's. But I thought you were really involved.

TS: The overall view? No, I really can't. I'm not the person to do that.

JP: Who do we go after?

TS: Oh boy. Well, the first person would be Julius Marcus, wherever he is. I understand he's out of Encore now, and I don't know where he ended up, but I bet you he'd do it.

BL: We're sort of sticking to people who are still with

the company, at least for this go around.

TS: Well, he's the one who knows. Every once in a while I drop by and see Andy at his house. You could do that.

BL: How about the 8's? Could you give us any kind of broad overwinging statement about the PDP 8's?

TS: The PDP 8, well, that's a lovely machine. That's a RISC machine. It only had six instructions. In fact... well, it's true. That's true. In fact Titan that they were cooking up out in California, Forrest Basket and so on, and he finally left? When you would go out and see his machine he would say, this is a RISC machine. It is nothing more than a very fast PDP 8. And it had an ISE instruction and a jump instruction and an Add and a Load and a Store and an I/O instruction. And that was it. And I had done lots and lots of programming with it, and it was certainly for I/O work it was the fastest machine around. So we can keep going. You should say that. It certainly is a RISC machine, no question about it. When everybody gets all over this RISC flap, and we're all losing because the "mega instructions per second." But the instructions don't do anything. But we've somehow not figured out how to sell more power instructions and we're always on the defensive saying, yes, but, but, ours do more, and you know, that doesn't sound very good.

We've got to figure an aggressive way to say the power here is -- we have all this power, you know. And I don't know how to do it. But if I did know I'd be a marketeer, I guess. So go ahead.

BL: I think actually that's the end of my --

TS: Oh well, then you can just put me on the shuttle.

JP: I don't think I have anything else either.

[END OF INTERVIEW]

[THIS IS AN INTERVIEW WITH TOM STOCKEBRAND IN ALBUQUERQUE,  
NEW MEXICO].

TS: Engineers, bad managers collude and they collude in the following way, the engineer says, the project that I'm about to, the set up is that the engineer knows that they're going to have to produce something by the next cycle that's we will say, 25 percent better, whatever that means, so, he goes to the manager and says, - I'm going to make something that's 25 percent better and it's going to cost this and it's going to take this long. And the manager always says, - oh, god, that's way too high a price and that's way too long. So he says, - no. So now what happens? Well, the engineer thinks about it and he goes back to the drafting board and he tries a project on for size that's 10 percent or 15 percent better but he knows in his heart that it's going to take long enough to do that, that 15 percent better isn't good enough, by the time you get to the end of it. So, what he does is, he goes to the manager and he says, - I'm going to do a project which is 15 percent better and it's going to cost less but he sets out and does a project which is going to cost more and take longer and be 25 percent better. He knows how it's going to really work out, which is, the 15 percent won't do and you take the 25, the project of course is a little longer

and more expensive but it's only a little longer so you make it. Now, the manager says yes to this project that's 15 percent and one year instead of a year and a half. Everybody, by the way, knows this whole game, that's the point. Now, what happens is, a year goes by. And now the guy, since he did the 25 percent project, now he's behind the goals have snuck up. They have appeared to sneak up but they were there all along and here comes the budget review and unfortunately the annual part of it, screwed it all up, 'cause that makes it so it has to synchronize. Normally, the way this collusion would work out is it would be a year into the project, never mind when the annual review was or it would be nine months or it would be fourteen months, it would be the right point in the project for this collusion to all work out as well as it does. But because annual budgets came along, that screwed this all up because now, those come when they come and not at a right place in a project for the review of the project but they're forced anyway, but that's a side line. Then what happens is, - a year goes by, we'll say and the manager gets all upset and everybody is dragging their tail. They have this big review. But now you see there's a difference, they're partly into it, 60 percent or some other number, they know what the specs really now can be and from now looking forward, there is much less risk. So

now the manager can say, - okay. Before, you see, he's so risk adverse and he couldn't stand up in front of his peers and say - well, I let this crazy guy go off and do this thing. But now the project is, - well if we put another million or two million or half a million or six months, we're pretty close and there are some risks sure, but now it's reduce, the manager's side of it is reduced to, what managers do, that about that much risk for about this much gain and the engineer wins because it does come out 25 percent better and a slightly longer project and the company wins but the problem is, the stress that goes on through on through that process is awful. And every once in a while you get a loony manager like Dick Clayton was, who used to brag that he would give two people only 60 percent of enough money to get the project done and then when he got to the point we're talking about, well, but then, he wouldn't merger, - see what you should do at that point is merger because now you got two bunches of people all psyched up, you got. You got full knowledge that if you got them together and really gave it your all, but now the risk is low so you can put a lot of people in it, he wouldn't do that, he would fire, well, not fire but just rip out the failing group and then he would only give the succeeding group 100 percent but since he had shorted them before, he should be giving them 120 percent, it feels to

them like 120 percent. A lot of managers, I believe, understand this whole collusion thing and how well it works - in their hearts but a lot of them don't quite know how to make it work as a conceptual thing. One last comment - I have heard that the Japanese go through this same cycle but the difference between what the Japanese do is that the review that is held at that two-thirds point or 45 percent point, there can only be two outcomes: cancel the whole thing or full speed ahead, no other outcomes allowed. Well, at DEC what would happen? It's, at that point they'd open the whole damn thing up for review again and start all over. What would usually precipitate it is that the marketeers would finally read the specs that they should have read a year ago. And some salesman would come running and say, - hey, my customer can't take this thing that we now are beginning to hear the buzz because this specification won't agree with this one particular customer. So the marketeer finally reads the specs and says, - oh my God, this won't work and that won't work and instead of taking an integrated approach and saying, - okay, now we have to make it specific for certain markets and we'll have to leave that aside until the second round of this thing, do something creative in other words, they would just ream the poor old engineer out who didn't have the marketing input in the first place. The point is,

broadly it's terrific, mismanaged it's terrible. And there was a lot of mismanagement, of course there was a lot of good stuff too happening, after all we were successful.

BL: Primary example of that was PDP-11, before the specs were changed the Venus Project, 9000, most work station projects. I think there was something like 44 work station projects going on at the same time in the PDP-283.

TS: See that's when the whole thing got out of control because I claim that the average manager didn't understand both the broad scenario I just gave you and then what to do to actually manage your way through that one. I think there's nothing wrong with this collusion but it ought to be admitted that everybody is colluding and it ought to be managed so that when that inevitable point comes, you don't tear people apart or groups apart and do crazy things. You just make the yes or no decision and get on with it because if you had, instead of having 42 work stations, you'd only have 20 because half of them wouldn't have gotten off. And it would have been in private. And that switches me to another issue - the private point - which is, we're forever dissolving groups and that's okay but over and over and over the actual announcement that this group is gone or earlier, it would be, this project is shut down. They drop

one shoe but not the other one and they'd say, this project is shut down and they might say, - that individual is now going to go there but they would not cover the needs of everybody in the group at the original announcement. When that happens, think about it, each individual returns to their child, they're back down to two and a half years-old and at that level, all you can say to a two year-old is, - coat, hat, out. That's it. That's the end of what you can say. So, put that mental hat on and you go into a meeting and you say, - you go there, you are there, you three run that one, those four are reassigned and you four are fired and whatever. It doesn't make any difference but you have got to have thought about it ahead of time. What is the single statement that you can make it, - now, sometimes I suppose like in the fire case, might have to be done in private but you better all do it within 15 minutes - zip, zip, zip in the office because it's all going to get known at the other end of it, 20 minutes later. Let me interrupt myself, story about secrecy, so you remind me to talk about secrets at DEC. So, partly I'm bragging because when it came time for me to move myself out of the head of my group and give it to a guy who I had been, I guess you'd call it - grooming - for a few years, this was a couple of years ago, actually I had him call a meeting and he put on the board the new reorganized group under him and how this

project was going to move over there, and I stood outside in my office, kind of worrying, hoping that he would handle this whole thing right. He had one \_\_\_ graph and he listed everybody. The meeting lasted a half and hour and everybody came out and nobody said anything. And I, - oh, shit, we somehow traumatized them so I went around and talked to them and they said, - oh, there was no surprises, we knew that all was going to happen. And I thought, - shoooh, I have to tell you the secret story. Even though the original story going in which was true is that people are forever wiping groups out psychologically for six months or even three months because it takes that long before they get the little pieces which they should have all done in secret before and announced it, that was the original story. Yet this story I just told about me really is the punch line for a different story. So let me switch over to the secrecy. I don't managers thinking they could keep a secret but there are so many that, - they say one thing to one person and something different to the other, even if it's as little as leaking out something they told that guy. Don't they know those people talk five seconds later, for God's sake. But I see it over and over and over. So the only right thing to do is tell the hard news along with the good news every day as it comes along. So some manager talked to me about rumor proofing, what you do

is, you just repeat every rumor. Now, at first that's bad management because the boss isn't supposed to spreading rumors but what you do is, what you find out is if you really repeat them accurately after about, - pick a number, six months, everybody is rumor proof because they've heard everything. They've hear this wild story and that wild story so they say, ho-hum and get back to work. An advanced development on that is you start the rumors yourself. You sit in with your group on your staff meeting and say, and you get points, the fact of the rumor comes back to us and the more it is identical of what we said in this room and not switched. You guys have done a better job of rumor mongering'. But that's just rumor proofing, it's not evil, it's just what you do, it seems to me. And then people also get power that way, they feel empowered, is the right way to say that because the rumors are just \_\_\_\_\_ at that point. The secrecy thing is, the manager will say, we're going to have to split this group up. Ninety seconds later everybody has heard it one way or another. So, you just say it. Ken used to do it. I'm interrupting my own stories but, anyway. Ken used to do the following; he would get an idea in the morning and if it was an ordinary idea, he would tell it to one or two folks during the course of the day. Now if it was something he really wanted the corporation to do, he'd make

sure it came up once in each meeting he had all day. But if he was really excited, he'd actually get out of his office and wander around and the first sixteen people he saw, he'd just say this idea and he had no idea how it would actually get implemented or who to see really for it but the statistical process of getting it into either a few or a few more or a great many people according to the severity that he thought would get it out into the network and he would get the answer back or it would happen or something. Sometimes the answer is the world's dumbest idea, which is another thing, never say yes to Ken, - hold that one. Now, I've got to give you my full-blown chaos theory of management which incorporates a lot of this stuff and it goes like this - back in the old days, the Harvard Business School types used to send sweet, young MBAs out to Digital and how wonderful Digital and the success story and blah, blah, blah and the only one I ever heard who hit it on the head was the one that said, - well these guys just invented what they liked for themselves and as long as the engineers were selling to people who were like themselves that strategy works. It doesn't work later on. And that's all there was to the beginning, the first ten years of the company, in my opinion. But what these guys would do, see, they couldn't really quite say that. They would say, - well, let's see how is this company managed? And they

invented a word which was widely used in the business industry and we either took it wrong or those guys wrote it wrong or something, it's called - matrix management. Now matrix management has been done for hundreds of years, it's not new, in the way it was meant. The way it's meant is there is line managers and then there is cross-function managers like sales and there is a matrix and at the corner is where you were worry about how to interact. That's all. There is nothing new about that. That's been going on for thousands of years. But somehow, we took it differently. We've got this whole mushy theory about how much matrix management means and how you have to always report to bosses. That's not two bosses, the original, that's just where the communication crossed. While there might occasionally be somebody reporting to two bosses at the intersection, that's not at all intrinsic to the idea of matrix. We went on and on for years about how we were matrix managed, all because some of these MBAs would come in and they would write these papers and they couldn't say, the following, which is the title of this little speech which is, - DEC is run by chaos management. But chaos management is a very clear and well defined thing as follows - it started because Ken used to run around and make sure that the battles between individual people were being conducted approximately evenly, that is, if somebody

is always winning the battles, give him more work to do. If somebody is always losing battles, give him less work to do or narrow him down or get him in a place where he can start winning. So, it's kind of like a pot bubbling away. And the idea is not bad. I tried this whole idea out on him and he said, - well, yeah, I guess so. I said, - well can I at least tell the story? Yeah, alright. And he says, - but we never planned, we always work by plans Tom, we always have and we always will. Yeah, but this is a flow or a process. Anyway, so we would make all these things go on approximately evenly. Now the good side, and he used to say it, is that if you're having a lot of different battles in different directions about the same subject, eventually the truth comes out and it rises to the surface. And old Shein and some of those guys used to talk about how that happened. I was never present in their board of director's meeting but they used to rip each other to shreds. That's an extreme example of this. So, that's the scheme and it was named wrongly, matrix management. It made it so that what you could do is inject ideas into the system by the rumor method and you could depend that people knew enough, crisscross around it, messages would get through. However, there are always a few bad apples and there are people who have power in mind instead of progress, so in this chaos, how could you actually manage

the chaos and prevent it from turning into anarchy, at least locally, at least wherever the bad apples were. Well, now comes the other half which is the way you prevent it and this was absolutely a guideline. It is a job requirement that you communicate fully, both the words and the music, meaning, both the reasons, emotions, whatever, hunches and the conclusions of the factual results. You got to do both. That's a sub-set of a point I should have made first which is, the answer is, - open communication allows the chaos to act as if it were organized after all by the method of the rumor thing. Okay, now having said that, on to this point about the words and the music. An example, - this happened to me once - if I'm sitting around a table and there is a whole bunch of people and they're trying to decide how their next project should run and I'm sitting at the head of the table and they know I'm an old timer and so I say something, - we're going to do it this way. They're all liable to wake up out of their seats and say, - yeah, let's do that because they know that I'm an old \_\_\_\_\_. However, if I say, that lady there, that engineer is no good and oh, by the way, I hate female engineers. Now, of course, I won't say that in the same sentence. I will be known by this theory to be prejudiced against. Now what happens? The whole table wakes up and a meeting is not good for anything except vetoes plus the

following it is good for and juries prove it all the time. You can separate the truth from wisdom. Every time you listen to an ad on TV, you're separating the hype from the truth. There's usually very little truth or very little factual stuff but a group of people is very, very good and a jury is an example, figuring out which little grains of truth in there are the ones you should be listening to, if there are any. And if there are a lot, whether they're even relevant or whether it's all because the spirit, they hype, the way we ought to be going, etc.. Groups are very good at that. So here you are sitting at the table and saying, - something should happen. And if you don't look out, they'll do it and you'll be wrong and they'll do it your way. That's just a negative way of putting it but that only works if the words and the music are both well known to everybody and it isn't that the music comes out right at the table. It's just that the milieu makes it so everybody knows what everybody else's prejudices are. Well, there's no problem if you factor prejudices in. Groups are good for doing that but groups are terrible for almost everything else. So, don't get the groups together except when you give them this kind of an assignment, directly or indirectly. Then get them together, lock the door and tell them to make the decision and get on with it. That includes everybody and does all the right thing. Just

to end this sort of extended speech, I was around when Nick Mazaries got a letter from a guy, and I think his name was Peters but I could be wrong, he had been hired, he was president of a small company out there somewhere and he got hired to be group leader of one of our groups. His ambitions were that he soon would be president of the company. But he had this problem which was that he would hold his cards close to the vest. You know a lot of people have that, somehow they're afraid that if they put their cards on the table somebody will laugh at them or the options they have are weak or their strong option will get shot down. Some have a feeling that if they keep their high cards in their hands, they have more power. One one level of course they do because you're unsure. At another level, I think they don't put them down because they're in some sense afraid, not to take that too heavy. What they don't understand, the easiest thing in the world to get the card off the table and back in your hand. You just say, - I screwed up. Boom, card jumps right back in your hand. I used to have teaching this to young engineers and they'd say, - well, I screwed up. I'd say, - so what? They'd say, - well, everybody will hate me. I said, listen, try this game; next time you're a meeting, put your hand up and say, - I made a mistake. Of course it has to be genuine, you have to really make one. But that's easy, everybody

makes them all the time. They say, - well, I can't do that. Well, I bet you a case of beer that if you do that, nothing will happen in the meeting. Oh, no, no, no, couldn't be. They'll come down on me and my career will be ruined. But about one time in three I could talk them into speaking up. And I'd come back and say, - what happened. Say, well here's your case of beer. Nothing happened. Right. Nothing. They said, - Tom, you don't understand. Nothing. There wasn't any comment at all. I said, - right. Now, what I don't understand, to be honest with you, is quite why that is psychologically. And I've got a bunch of theories that I've tried on people. Some psychiatrist probably does know or psychologist. But one theory is they say, - he admitted it, now I've got a little piece of the action, I don't have to admit it. I went along with him earlier see, so I don't have to admit. He's the scape-goat goat. But the last thing I'm going to do is beat on him because next thing you know, it will come back to me. That's one theory. Another theory is, - the one I like best is, - well, he's admitted it, good. Now we can go and get him to fix it. Another one is, maybe a little more altruistic but maybe a little solid, which is, - gee, the problem is out. The guy who's there really says it. Now we know that's a problem. Now, let's all go work on it. Or anybody, whoever should work on it but at least

we're not groping around with a vague idea there might be something wrong. But for whatever reason when you admit error, nothing happens. Ken used to have one that said, - no one will fail in this company who raises their hand and says they screwed up. The only ones who fail are the ones who keep it a secret. He used to say that. And mostly people didn't believe it but it's this same thing and it's roughly true. Now, in the current corporation, it's not so true. In the current corporation, you find somebody who has made mistakes, that's one of the reasons I'm out I think, and they admit them, they say, - ah ha, now here's a place we can cut some deadwood. I listened to one of these consultants at one of these little three-day, - Improve Yourself As A Manager seminars - said, - how do you reward your failures? And that stopped everybody because nobody ever thought about it in those terms but the people who succeed are also the people who fail.

BL: You also once said, if you can kill off your own project, you come out looking good.

TS: Well, let's take it one level up. Say, I'm the manager and some of my people have a project that's not getting anywhere. If I can stop it and somehow keep those

people happy and switch them to something else, good managing. Then, my boss thinks I'm terrific.

[END OF SIDE 1].

TS: Okay, now let's say I don't do that and my boss finds out and has to stop it. Now, I am bad because I didn't do my management job, everybody is in bad shape. However, one further up, my boss' boss, the consequences are identical either way. He doesn't really care whether his subordinate or the one below that fixed it, so you might as well fix it and get the brownie points as letting your boss fix it. A, he gets the brownie points and B, everything screws up more. But more importantly, your boss now trusts you in the future to give you jobs because he knows. It's like the person you trust much more who asks the questions and acts dumb in class because, you say to yourself, - well, they know their own limit and if you know your limit, well, hell, then there's no limit because I know my limit, I go find the guy who can do it or answer the question. But everybody knows that. They just don't translate it when they get in a bind. They're in a potential place to really win if they cut the project.]

BL: You talk about how to really win and what's good with you but then how do you reward your failures? I think you just said the answer, the boss trusts you more to give you new projects.

TS: It hasn't been verbalized. The stuff I'm telling you about, I always found myself being the first guy to tell the story and yet everybody would agree and say, yeah, yeah. All of this is just Management 1A. It's not very.

BL: Digital Management 1A.

TS: Well, yeah.

BL: If you thought of that, you could figure it out.

TS: That's right. That's my point. It's not management with a great big capital M. Everybody ought to know all these things. But either they know them or don't act on them. I think the first thing you have to do is say, - I screw up all the time. Everybody else screws up all the time. Now, let's agree on that and get going. People can't do that very well. People have been told by their parents or somebody in the system that that's somehow weak. But to me it's just obvious.

BL: I want to tie that back into the killing projects.  
It's all wonderfully consistent.

TS: I don't know about wonderful but it is consistent.

BL: I think it goes under the title of - chaos management model. I see at first things, say maybe up to the mid seventies, things were it seems project oriented. Engineers were on projects. As you were working on one project you knew there were danger areas where it might stop but if it kept going it would slowly fade away. You networked to other projects so that you would be in with the network and you could count on getting new jobs that way. It seemed that changed into a group orientation, maybe somewhere in the mid seventies an engineering.

TS: At that time I would have been in the PDP-11 mode. Go on, keep talking.

BL: Wherein, people seemed to be more part of a group than a project and the difference is that if you were in a winning project, you could really make a change. [TALKING TOGETHER - OBSCURES DIALOG].

TS: Like what's just happened to you. The whole group goes out, the people [TALKING TOGETHER].

BL: Then with group orientation, it's more stable and you can build people longer.

TS: I like that. I like that. I'm going to let it digest in the back of my head over the next five minutes. Let me tell you an up-to-date story that may turn out to contain the seeds of the answer whether I really like it or, whether, yeah, sure, it sounds good to me. I'm going to jump to a story which I've been resolving to tell people and started practicing. Since I left the company, it goes like this. The bottom of it is, - if you're a fish in the water, you don't know the water exists. As long as you stay in the water, then that's just your environment and you don't know about water, it's just what it is. But I got out of the environment so then I could take a look just as the fish out on land would say, - oh, gee there's water. It's the same kind of thought. I didn't realize that the problem that I will end with here in a second was going on all the time and really inhibited a lot of the work that I was doing. But it goes like this, and Joan of course, she said, - well, idiot, I knew that all along. She said, - I've been telling you that for years and she had been.

It's just that it wasn't sinking in, it wasn't communicating. Here's the story. I got out and I set up a small business and it's just a little nothing, it's just a little challenge, it's incorporated and all but it's just a way to pay for your hobby. Sure I would like and hope and believe that once I get through the transition years, make some income. First thing I did was go and hire myself out as a consultant and I worked about a half a day a week. I did a few jobs for people and they paid me some money and then I did some more jobs, little ones. I thought, well, this is neat. And I asked them I said, - aren't you worried that maybe this bit of engineering I did for you is not good? The conversation I'm about to say is an apocryphal story. It did happen but it was in little comments here and there. So the next transaction never exactly happened the way I'm saying but it makes it a quick story. They basically said, - well, if it screws up, you'll make it good. You'll rework it, whatever and we know you're not going to charge us for anything because the deal was, we paid you this money for that engineering. Okay? Which is all normal. Only then did I see that at Digital anyway in the last ten years, it's not like that at all. We would do projects and we would produce a proposal, a bread board, a prototype, six of these, whatever and it would work. Some didn't but let's say it did. And we'd go

to our bosses, not just the bosses, the bosses with a small b, anybody around that would support you and we'd say, - here, we did this thing and now we'd like to do the next step because we've shown that the idea is good or this gives a clue on that or whatever. And they would say, - gee, let's think about it. And to make a long story short, you never would get any yes out of them.

BL: This was the phase review \_\_\_\_?

TS: Well, I escaped phase reviews because I got out of Back East in 1976 just as they were starting to be formal. I escaped phase reviews. But I do believe that this is phase review mentality, I do believe it. So the answer is yes. Even though I can't, since I never went through the horror, I can't \_\_\_\_\_. Now to make the bottom line, I'll probably will have to back up and fill in on one line. At Digital, and I suspect it's true everywhere, GM, every other big place, it's more like, - if I let Stocky do that and give him his 50k or quarter mill, whatever it is and he fails, I may lose my job. Therefore, I'm going to say no or at least drag my feet. Certainly not going to say yes. So, instead of what they say on the outside which is, - if Stocky fails, depending on your personality, it's either, - he'll fix it or we'll just chuck it, feed it to the fire.

It's not my problem. Then, therefore, they can say, yes. People were making decisions based on a fear that failure by the other guy would affect them: their career, their review, their whatever. And if you are in that mode, boy, you won't say yes. The extreme case is, when you decide in your career and everybody ought to decide this, you're going to get fired. So what? There's lots worse things than getting fired and one of them is staying, working for DEC.

BL: Nobody working at DEC thinks that way, quite the opposite, the worst thing in the world would be to get fired.

TS: That's exactly true and I don't think it's just DEC. But, as soon as you can get to the point, in the old days you felt you could un-wedge it yourself, just go and scream and holler and beat on a few people. Now, it's perfectly clear you can't un-wedge it yourself and so that's the frustration. So end of that. So back to this.

BL: The fear of the other guy affects you. I wonder maybe that part of the change in Digital's product set, if you have a stand alone produce, then, okay, let him fail, not my problem. I really won't be affected. As things got

more and more system related and all of a sudden, any product you made, ... cross dependency.

TS: No, I hear you and you're very rational and logical and correct but the way you solve that problem is the way we've always been solving it which is, - until it's working, you don't put the result into the bigger picture. [TALKING TOGETHER - OBSCURING DIALOG] If you tell me, you're working for me and you tell me, the product is going to take six months. I certainly tell my boss nine or fifteen and if I have to tell him the whole truth, I'd say, - well, he says six months but I know some other people are going to be involved and that's going to add three months, any way to get around it. So, that's how you solve that problem. [INTERRUPTION AGAIN OBSCURES DIALOG]. Now this is fear of peers. The bottom line is that our managers, as you go up the chain, it's a truism that each level loses 25 percent of the battle. So that when you're four levels up, the guy doesn't know anything. That doesn't compute even because before 25 percent, there's still 10 percent. [INTERRUPTION]. It doesn't go to zero. In DEC it's again, it's as if the next manager knows only 5 percent and the one beyond that now is the one who doesn't know anything. But that means that the guy who is one up from me is deciding to say no or not yes anyway, based on the idea

that his boss who knows nothing, will judge him on some very superficial thing. And if your boss is going to judge you on superficial things but if you're going to lose your job because of it, who care? So you make sure that those superficial things come out right. So we say no to Stocky because one of the superficial things is - well, you said, yes to two or three projects that didn't work. And instead of saying, - you said to some projects and Stocky didn't make them work, it's, - you said, yes and it's your fault, which is this whole business on how do you reward your failures. The point is, you get known for some very deep, powerful reasons. I forget, there was another little thing buried in here but the bottom of it all is, - I was spending and I didn't see this, 65 percent of my management time was spent selling within the company, mostly unsuccessfully and now that I'm outside I spend essentially 1 percent of my time selling and the other 64 percent now you can be getting the work done successfully or not. I remember what the little loose end was, it's that, once you've decided that, yep, they're going to fire you, they're going to fire. So, you're going to get fired. All of a sudden, you start making good decisions because you're free from the fear that the security issues cause. So therefore, if you can somehow, get yourself or get your people to be free from that, a funny, odd thing happens.

Now, all of a sudden, your decisions are all good ones so the problem then doesn't occur because you are successful and you don't get fired. But it can't happen as long as there is the present wedged situation around Digital. And that's why you're right. If you just fire the whole group and get it over with, that releases, unlocks all kinds of circular stuff that's going on which cuts the efficiency to 2 or 3 percent, I'm sure at many groups at Digital. I got stuck in it even though my groups pretty good. By the way, - subject is changing now a little, and then we'll try maybe to link this back to your point about whether, switch from project oriented to something else, whether this has any relevance on it. When we did disband the group, the first day, - shock and disbelief and the second day was - resume, let's get the funny colored paper, have you got a good printer program that makes resumes? The third day was indignation. How could they do this to us? I don't know which day it was but I started getting a network going and making sure that everybody I knew in the company and out of the company knew that there was 24 people here. So, pretty soon, about the fourth day, we were starting to get calls of people who wanted to interview the people. I did that mostly on purpose to get them cheered back up. A lot of folks, personnel types, called up that very first session and then never followed it up. So what good are they?

They could have had some really good deal. Bottom line was, about a third of the group left the corporation. Which third do you suppose it was?

BL: The best.

TS: Of course, because [UNINTELLIGIBLE] ... and get the jobs and all that. So, to just knock off a group does that. Of course you want it to do that in the scenario that you talked about where you are planning ahead of time to hire back the consultants. That's just a nice slick piece of the normal process that you can take to your advantage. But in this case, there is one exception of two, Joel \_\_\_\_\_, the first thing Joel did two years ago, where I told you we had the meeting that nothing much happened, the first thing he did was kick me out, he said, - I'm only going to invite you to the monthly meeting. You can't harangue everybody for an hour each week at the weekly meeting because, first of all, we're not going to have weekly meetings 'cause meetings suck. Second of all [INTERRUPTION] ... but they'll be much smaller, a little sub-set to the group and I, Joel, will go and attend those different meetings. And I'm the only one whose time is wasted. He did end up back working for Tavernetti, who's my boss. By that time it was Brian Fitzgerald but the

tenure was fairly short, that is, Tavernetti was the guy who called me up and said, - Bye Bye group. And he did it on Brian's behalf because I had only worked for Brian for a while. So strictly my boss was Brian but Tavernetti is the guy I dealt with for the previous five years and all but the last. Anyway, Tavernetti got Joel and Tavernetti said, he's the best manager he ever got in terms of training and stuff. You might have fun, not so much on a formal, big deal interview, but you might have fun going and spending a little time with Joel to corroborate anything that goes on here because what I would like to find out, I'd like to get something out of this too, except it's fun and it boosts your ego naturally, but what I would like to find out is, whether Joel figures I taught him anything. That is, all of this stuff and lots more that we talked about in our group and I would like to believe that people extracted from this and it went to their advantage but only Joel, that I know of, ended up in management world. So he's the one that counts for this kind of stuff. We haven't been talking about the technical side of things; the patents and all that bullshit. Don't go out of your way but I'd like a little bit of feedback. First of all, does Joel think along these lines as he does his day to day managing and second of all, did he learn anything from his years and association from me? And he's a very quiet, clammy type

and he'll say things like, - oh yeah, right, terrific, sure I did. There almost has to be a third party doing the talking to get an honest answer. I think he did. The question is, - would he have done it anyway? That's more like it. Here's Ken's philosophy and I think I've got it, he, Ken is actually a pretty good manager, though there's plenty of people who would argue about that but he's a pretty good manager. So he thinks that anybody can manage and all they have to is - common sense, when it comes time to manage. Now what he forgets is, the agreed that it takes 15 years for an engineer to get to be really good in some area. He's got to have a lot of experience and make a bunch of failures and stuff like that. When you try to tell him though that it also takes 15 years to get a new manager, same guy, same process, he's right at the bottom, this is common sense. It's like an engineer, once you got you're degree, well, you just crank them out, assuming you've got the interest and all of that, he'll be a good engineer and equally, I agree with him, you turn the crank for 15 years in a management role and you'll be a good one. He wouldn't acknowledge that second half. So, what happens is, you've heard the dilemma millions of times that engineers turn into shitty managers. No, it's just that they need the 15 years because the local situation for an engineer is, you're only going to have six projects for

your whole life, small number. So it behooves you, no matter how late they are, how over budget, that they be successful because you're only going to get measured a few times.

BL: That's a great ethic.

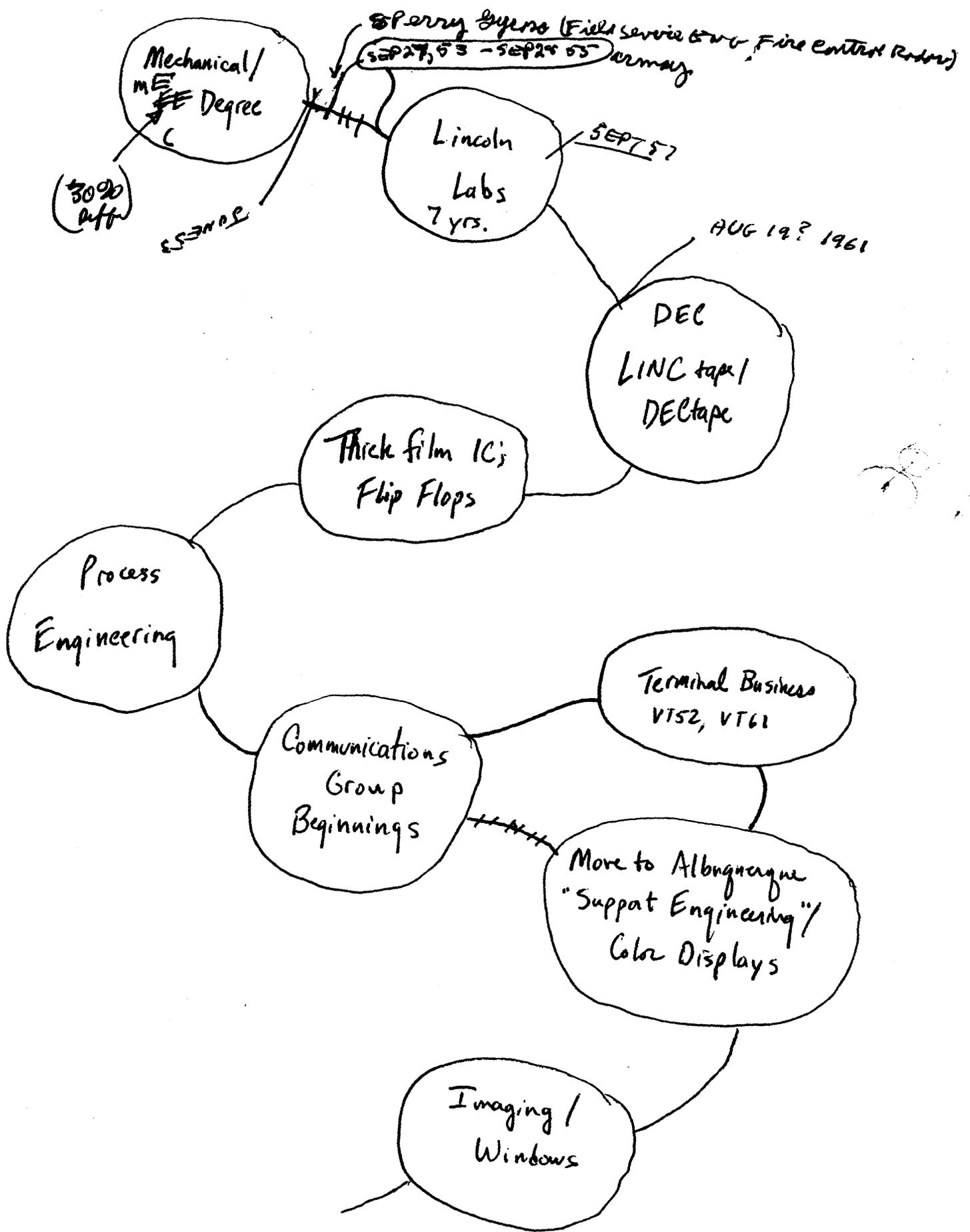
TS: Well, that's the way it is, not ethic. So, it doesn't make any difference how late it is, just make sure it's right. And it doesn't take you very much experience before you find out the wrong part, the part that screws up, that 90 percent of it, somewhere in that last 10 percent is the thing that's going to blow it. So, in the engineering case, you slow down and you worry about that last 10 percent excessively knowing a \_\_\_\_\_ is going to come. So you're late and your over budget but it doesn't matter fundamentally to your career. What only matters is whether they look back on it a year later or a month or two years and say, - that was a good one. Okay, now let's look at management, same one liner for management. I learned this one from Pete \_\_\_\_\_. Pete tells the story which is the Mississippi River theory of management and it's beautiful. I use it over and over. And he says, you know it's really very easy to turn the Mississippi right, just keep throwing stones in on the left bank, just keep throwing them in,

throwing them in, throwing them in. Now, he says, - if you throw one in the middle, it will get washed downstream, some could go in the middle, it will be alright. And if you thrown them in on the right bank, they're wasted and counterproductive but you can do that too. But, for God sake, about two and a half years later when the river finally starts to turn right, you don't want to say, - shit, that was the direction that I threw. And that's the Mississippi River theory of management. Now look at that and compare that to the engineering case. No decision makes any difference. And you better not wait until the river does anything in particular, you better be ahead of it. But, just keep throwing in the stones. So, what do you do every day if you're a manager? You make millions of little decisions so there's momentum and so people feel that left is the way and the extract whatever they want to from it and you don't hesitate to decide because if you, what will happen is, everything will slow down to inertia, to a crawl. And in engineering you can get away with that. No decisions at all if possible. Yeah, sure on specifications and stuff but as far as going along because the longer you can put it off the more that 10 percent will show up and we'd be reduced to 5 percent. But you see in management that strategy just is wrong. You've got to keep plugging away and you have to make these decisions,

Mississippi decisions with about 1 percent good data or 3 percent. In engineering you can wait until it's 30 or 40 percent assurance before you make the decision and you add another, your own judgment, and now it's okay. But management, you can't wait till you know anything. You have to have an image of what way you're going and just keep hacking away. It takes 15 years to get this to be the way you deal every day, this kind of a philosophy, just as it takes 15 years for the engineer to decide that this is the way. See, the point is, Ken is right. It is easy, in a sense, to be a manager, common sense but you have to work the problems just as much either way and so you can't take somebody and just them into management even though you can and expect \_\_\_\_\_ any more than you, nobody would argue you can't do that ... engineering. Or, a football player, you pass phhhh. Ken never understood that. I'm sure he understands it now but for a very critical first ten years of the company he trained up no managers except those that happened by accident. And we suffered for the second ten years. And now, they're all sitting, successful, with options and money and no incentive and they're this middle wedged bunch. What I'm hoping is that if somebody made the decision to farm all your group out, I don't know who that was, but whoever it is, it means there are some good folks high enough up that they can just arbitrarily do it. But,

to be just a little cynical about it, there's also some folks high enough up who could arbitrarily do it, who are arbitrarily doing stupid things too - oh yes. And that flows from this other point which is, - we didn't do management development because I believe Ken didn't think we could do it(?). So what. Anybody could do that. He \_\_\_\_\_ some pretty good ones. The other [TAPE CUT].

[END OF SIDE 2].



Tom Stockebrand Life History Flow Chart

*Ted Johnson called me up late at night  
a few months ago,*

TS: <sup>^</sup> ... and he actually said, - son, I should be president of the company. And this is four years after he's out. Didn't they know that I was a leader of men - and that's a quote. I don't think I really want this to get back into Ted's ear of course. But I was just amazed at how long it took. But if you say that six years is not atypical, then I guess I'll have to say that he was not atypical and I thought he was. But he either didn't see the handwriting on the wall and it was a shock or he did and did not want to admit it or what but, boy, what a trauma that guy went through. And then, - hey, Jack. I'd go visit him when I would go back. You get uncomfortable in his presence because pretty soon, within a very short time, the subject always got around to how he was mistreated - poor him.

BL: In cases like that, it's just like you said, you should say they're two and a half years old and say, go do this.

TS: Well, I did and all his friends did, as far as I know, just said, - hey, look, true or not, you aren't president. True or not, you're out now. Coat, hat, - go get drunk. Or, if you're so rich you don't need a job then retire to a happy existence doing what you wanted to do anyway. And I'm sort of halfway between. When I first retired or got

retired, of course I had been planning to do it in another few years anyway, so it wasn't much of a transient and I got a good package of course. I got out at a perfect time. Only a few people got a better package, the year prior bunch. But the package helped. I thought it would pay the mortgage off, it didn't quite. So, I'm in a position that I don't have to work. I guess most of the folks that I've talked to in my group, we're going to have a big party here the 21st of September, which is the first anniversary of the announcement of the device(?). So I invited all 30 people and I don't think too many of them show up from far away. But the one or two that I've talked to, well, Weisman is in Illinois and he said, he'd send pictures. Jeff Lew is in Austin. He said, - oh, shit, we're coming to the balloon festival which is in October, so we can't come twice. The people back East of course in the current morose state of affairs, usually if you have a long warning and I gave him six months warning, you can arrange it so that a trip, without stretching things, you can arrange it so the trip will get you to places but I don't think [INAUDIBLE].

BL: So the three or four that are in Maynard, you probably won't see.

TS: But most everybody [INAUDIBLE].

BL: Let me see if I'm close.

TS: Where did you get all this? I think about this when I sometimes get \_\_\_\_\_ (?). Yeah, right. I mean there are some other details I might throw in but that's exactly right. Where did you get it?

BL: From talking.

TS: Just pick it up? When you talk about one person do you get some other little threads on other people? There's one \_\_\_\_\_ in here that's kind of interesting. The first project before Linc Tape(?), see the assured me when they hired me from Lincoln Lab, I'd never have anything else to do with 98 tape. They were going to hire me for my brains and I was sick of tapes.

BL: You were doing that for years.

TS: This is seven years, this was, well, I can put the dates on some of these if you want. This transition was June of '53, there was a two-year stint in the army in between here. June of '53, okay, then there's six months

at Sperry Gyroscope, they called it then, and it was field service engineer and this level of detail is important as you'll see in just a second, field service engineer for fire control radar computers, for the army, which Sperry made and it was \_\_\_\_\_ and cans and DC motors and pots and signs and co-signs and stuff like that.

BL: The link between the mechanical and EE.

TS: As it turned out but actually I tried to get a double degree but at Cal Tech you can't, you have to decide which course to cut, they don't. They've got you absolutely scheduled solid. So you can't, unless you were more of a genius than I was, you have to cut half the courses to get the other half and I couldn't do that and make it. But anyway, but the point is, this was an ME degree and the EE was, the courses were 40 percent different and I took 30 percent of those 40, sort of a shot. Anyway, this was electromechanical computing, cams and servals(?) and stuff. And that was for six months. Then September 28th, 1953 I was in the army, September 27th I got drafted.

BL: That's pretty close to the day you got laid off.

TS: That's right, many, many years later. So, September 27th '53 to September 28th, '55 was the army, two years.

BL: End of September seems to be very important for you.

TS: It does, doesn't it. My birthday is November 2nd, so maybe it has to do with the conjunction of the planets. So that was the army. Then that was exactly contiguous with Lincoln Labs [INAUDIBLE].

BL: How did you fall into Lincoln Lab?

TS: That's a good story too. My boss said, I mean my father said, - there's a good Freudian slip for you - he said, - you should get a Masters' degree. Deep in my heart I was sick of school but here's dad and he was going to pay for it. So I went up to MIT and applied and they said, - no. Even though as an undergraduate I had applied and they said yes and even gave me a scholarship, it's just that Cal Tech gave me a better one so I went there. They said, - no. And I said, - well, what happened? They said, - well, you weren't in the top third of your class. I said, - well, I was in the top, which I was, just 80 in a class of 160. And it was Cal Tech, a nice school. Later, many years later, I discovered that they had so many applicants

that they were just arbitrarily hacking away in any way. They said, - however, what you can do is go over to Lincoln Lab and go to work and then take courses here and if you do well, get a few B's and an A, then we'll take you on. So I did. I went over to Lincoln Lab and I fell in love with the place instantly. So I was working 80 hours a week and sleeping there and a lot of the Stockebrand stories come from there. And I just loved work so much better than school that, while I did take a course or two, it was pointless. I might as well say, my heart wasn't in it. So that's how I got to Lincoln Lab. And then ...

BL: Did you do much IO?

TS: If you want to talk about my engineering career, it has been electromechanical, input, output equipment for the whole life of the career even though down here, there's not a whole lot of mechanical. But the reason that I got off to this is - well, let's continue here for just another second. In 1957 - when did DEC start?

BL: 7.

TS: '57, September, but anyway DEC starts in 57 and Ken and Holland and Gurley, Ben Gurley - was he there? Who was

there? Anyway, they all said, - you stay at Lincoln Lab young man, pat, pat, and we'll hire you on in another year or two and you'll be up with the technology. Now, I've never ever figured out whether that meant, you know, - sorry about that, really, or whether they were absolutely straight, which I think they were or what. But in the interim, between September of '57 and when I did go to work for DEC which was in August 19, I'm going to say August 19, question mark, - 1961, about that. I would get on my bicycle evenings and ride over to Digital and go see my buddies. One of the Stockebrand stories comes from the fact that what I would do is, at night it was all locked but the mill in those days was so full of holes, it was unbelievable. There were broken windows and doors you could push aside and elevator shafts you could climb up and it was just paradise. I would climb in and I would show up and shoot the bull for a while. And, what's his face, - one of the engineers, Lauren Premise(?) who was their mechanical engineer guy, built cabinets and all that. At that time, everybody had tucked under their wings a few administrative things because there was only a few of them, what he had tucked under his wing was security. So he would get so pissed off and the next time I would go try whatever route I had used to get in, he would have sealed it up, fixed the window or put the padlock on the door. So

it got to be fun to figure out how to get in the place. And then I would brag on him. So that's one of the Stockebrand stories, it gets meshed with others. That's the truth, what I just said. And mostly when I hear that one it comes out about the way I said it but some of the other ones come out really weird.

BL: It sounds like you had an extraordinary understanding of the physical plant of the mill and [INTERRUPTION OBSCURES DIALOG].

TS: Well, yes but, anybody, if you had the idea that you were going to have some fun and break in, no not extraordinary, you know, you start poking around and you find the holes.

BL: Did you ever get up in the cupola?

TS: Never did, I have since but at that time never. No, didn't know it existed. Oh, you can get up there any time. I'll tell you who will let you in. There's a guy who had an office up there and he worked for Jim, - who's the Chinese guy? I want to say Jim Luang, - Jim, ah, let me let that sink into the back of my head, it will occur to me, but he was doing Ethernet on a microwave length and he

had to get his antenna up high so he stuck it up in the cupola. As I get older I get CRS disease, you know what that is, - can't remember shit. Well, okay, this whole little tirade because I want to say something about just before Linc Tape, the first three months, my actual job was, to, we were making display scopes and they were what were called, XY display scopes. The computer gave you the X and the Y and you put a little dot there, then you get another X and another Y and put a dot there, and so on, very tedious. But all those dots added up to some kind of picture depending on what you would do. Well, what I was supposed to do was make it so that the X counter, the horizontal counter was a counter instead of just a register. Now, what you could do is you could go YYYYYYYYYY, it was twice as fast and just increment the X every time so that if what you wanted to do is draw the line, it was a lot faster. And the point of it all is, see I ended up back in displays, way at the other end of displays and all through this period, thick films and process engineering I kept wondering and to this day I'm not sure why, but it happened again, you see, I kept wondering why the people who were doing those XY displays, that I had this little dip in, never made it at DEC. We were way ahead in displays of all other companies at this time and we slowly pissed it away and the engineers who

were working on it, were second class engineers. And I always wanted to get in there and shake that end of it up. And what I decided is that, the company is a computer company and it thinks it's a computer company and that's what it is and while it has to deal with a few odd things on the side like this and maybe some displays that the thrust of it is, as Ken used to say, it's tough enough doing whatever your main job is, not to go by other companies and get in their business. So the people who were doing this, which I was kind of watching, sort of wanting to get in with that group and stuff, suffered from that problem and maybe didn't know it, at least I didn't know it. And it's true to the present day. Even the display group at Digital as a whole, I mean Cabonetti does nothing but cry all the time about he's neglected and underfunded. Even though I make, says he, a lot higher percentage profit than most of the others and he does. Still, if we ship 500 thousand terminals a year, if you add them all up, if you add everything up and yet nobody even knows we exist. Cry, cry, cry, cry. It's still true.

BL: I'm wondering if there is also a certain sense of computing that's different from the imaging, when the first MAC displays were starting to be invented, it's strange because TXs were very interactive, [UNINTELLIGIBLE] ...

screens and that just sort of piddled away or else into sort of fell unused and became a character mode, serial way of computing as opposed to a visual interactive [INTERRUPTION OBSCURES DIALOG].

TS: I know the technical reason.

BL: \_\_\_\_\_ to expand, nobody in their right mind would buy it. [INAUDIBLE].

TS: Another thing pops into mind. I don't know where you want to go with this discussion but.

BL: I sort of wanted to follow this. I do want to stand back and say - what does this all mean?

TS: Oh, shit, I don't know. People used to say to me, - you mean you don't plan your career? And it's all these young guys and I guess they've been told in college, if you don't plan your ...

BL: I'm starting to hear that too.

TS: You just do what's fun. My big speech to young folk is, -only do what's fun because it's simple. Whatever

you're going to be an expert at some day is going to take 80 hour weeks today. Now, a lot of people think, they look at TV and they think things are automatic but they're not. So, if you're going to spend 80 hour weeks, you won't spend them unless you're doing something that for you is fun. So, if your ma wants you to be a lawyer and that's no fun and you want to be a teacher which doesn't make any money but it's fun, be the teacher because you can put the 80 hour weeks in that it takes to get to be a good teacher and you'll be a lot happier than if you had been a poorer lawyer. Very simple. So what do you do at any point in your career? You just do what looks like the most fun.

BL: Why did it look like the most fun to jump into Digital at that point?

TS: Two things: in Lincoln Lab the big problem with any government lab and Ken was very, very clear about this, he told me what I'm about to tell you but when he said it I said, - oh, yeah, right, it's true. In any government lab you get so frustrated because your work never gets out. So you want all these people that are coming through and looking, you want them to steal your stuff and go make a thousand of them and sell them or a hundred or five thousand. So what it is about going to a place like DEC at

this point is you got all this stuff you can do and you've written papers and nobody has read the papers and you've presented them at conferences and you got a nice trip out of it but you're not actually doing anything for the world. So DEC or any manufacturing company, gives you the opportunity to put some in production. I remember when we first were trying to decide how many DEC tape units to divide the engineering costs over. He said, well, maybe a thousand units. So we divided the engineering costs by a thousand and loaded up each unit with that number and we sold 145 thousand units. Now, to be fair, they were redesigned somewhere along. So it's only the first group, that story only applies to however many were made before the redesign. But I remember that real clearly. Anyway, that's how you get to a place like that. And I knew everybody it was easy. So one day, Dick Best said to me, - why aren't you working here? I said, - well you never asked. Says, - oh. Next day I get this phone call, to be honest with you, I forget whether it was him or Ben Grealey but I think maybe it was him. Anyway, he says, - we wish to formally raise your salary from nine thousand a year to fourteen thousand a year, which I thought of course, was, - wow, never, ever in my whole life made more than ten thousand a year, I would have made it, when I was in college. So here it is, only seven years out of college

and I make fourteen thousand a year, God. So I was in ecstasy at both levels. I hadn't even thought about the salary part. Well, in a general way I knew you got more out of business, sure. But it certainly was no part of any plan. So here, I not only get to do something that will benefit mankind but also get paid for it. The same thing had happened in Lincoln, when I first got out of the army and got in Lincoln Lab, wow, my God, I should be paying them for the privilege of doing this stuff. And the first project there was a paper tape reader that didn't work. I think if people are in their calling, that's a very common thing. Well, okay.

BL: You jumped into DEC did anyone suggest you do anything?

TS: [TALKING TOGETHER] ... display project but I was into display, oh sure, because offices were just another corner, a cubbyhole that is, no doors for many years on offices. It was one of the rules. And later, when you did get doors they had to have a window, always had.

BL: Why is that?

TS: Oh, you never imagine what is going on in those secret places. Oh and let's jump way back to Ken's, two or three things that bothered Ken but not very much does and he can't bear a grudge. The end of that, - not bear a grudge story, is he'd ball you out purple with rage, you'd be absolutely wiped out. And you'd go back to him six weeks or two months or whatever later and you'd bring up the subject, tentatively, say, - it was roughly, - do you still hate me? He'd say, - about what? And you'd say, - well, about that. Oh, that, yeah, well. And then he'd either say, - I was right wasn't I? Or, I was wrong, wasn't I? Or, whatever the concluding remark was and that would be the end of it. And people here are so terrified of, you'd tell them the story and they would be just all bemused. They'd hope it was true, see. But it is true. And that's one of the great things about him. But he had a couple of things that were sinful, one was, - driving a car drunk, especially a DEC car or rental car. That was instant firing. Of course, that would be mostly salesmen. And another one was stealing company property. Of course that's a sin, but it's way out of proportion in his head. And all of us old guys have had the following experience, one way or another - get a call from personnel, let's say, - we're setting up a fake meeting for Joe Blow to keep him out of his office for two and a half hours, you're supposed

to go down and go through every paper in his office, make sure that the 10 percent or so that belongs to us, we got. And the meeting would be over and the guy would come back to his office, that 10 percent would be missing or 3 percent and it would turn out that the guy had been stealing disks and selling them on the side, whatever the sin was. Everybody has had that experience. I guess that's common to in other companies. And then of course the last one is, hanky-panky in the office behind the closed door. But for my time it was no doors in anybody's office. So, no problem. And I don't remember how I happened to hit displays except that I had been fascinated with displays all along and through TX-2 - zero and all that. So I think I just said, - how about doing that? Or, what have you got going? Well, we need this thing designed. I don't think it was complicated. But I did get him to promise never to do any more tapes because I was sick of it. Here's how I got into DEC tape, about three months into it, they had assigned an engineer, his name was Jim somebody, and I called him - the galoot, the big gallot, very friendly, helpful, eager, brave, clean, reverent, cheerful - dumb engineer. And he kept coming, his assignment was to do in Digital what I had done in Lincoln Lab which was, - make this little, what was called Linc tape. He kept coming to me and he'd say, - well, now

what do you do? So finally, Ken was walking the aisle one day and I said, - Jesus, this is old, you want a new \_\_\_\_\_. Darn. Oh, \_\_\_\_\_. It all happened. I didn't even know it, young engineer, open your mouth, open my mouth. And he did it very smoothly, it wasn't quite as abrupt as what I just said but it did all happen in 30 seconds. And there I was doing Linc tape. So I started doing it quite differently than it was being done at Lincoln because of course once you've done a thing, you know what to report. I got the Linc tape, the people who were still back at Lincoln, Charlie Molnar, who is now at Washington University, at St. Louis, who is still miffed because it wasn't the real thing. We did something different and he thought \_\_\_\_\_. See that whole bunch, including Wes Clark and all the rest of them, Wes has gotten mellow. I've seen him off and on, he's alright. They all had the liberal view of business which is that business is out to screw everybody except themselves and they were going to get all the patents and all the money and us poor people who stay in academia have no benefit but we're the ones that give them all the ideas and all of that, see. And they had that disease just something awful. I really wish that they had gotten into some business to see that there's a lot more to it than that. I have fired people, not fired, moved them swiftly to one side who felt that they were being paid for

their ideas. And that may be true in universities but it's certainly not true in industry. It's just what the man said, - it takes 90 percent perspiration and that's what you get paid for, perspiration. There's enough idea, always, the janitor has enough idea. Now, sure it takes some, - call it talent, to figure out which of the millions and millions and millions of ideas that are around that you should grab this time to work on. So, at that level, and when you grab them then you get the credit for the idea but it was already there. Every engineer that I know has gone through this formula, it happened to me about age 34, which is, - what will happen to me when they find out I'm a fraud? And there must be something equivalent to this in your world, the writing world. Because you say to yourself, here they are telling me that I invent things. I didn't invent anything. I can tell you where every idea that I ever got, who told it to me. One of these days, they're going to find out I'm a fraud and I'm going to have to go back to school and learn to be an engineer again and on and on and on and on. You get this terrible feeling that ...

[END OF SIDE 3].

TS: ... I'm being paid for other people's ideas. Well of course the answer is, - it's not the ideas, they are already there. It's grabbing that one at this time and this other one and sticking them in place and turning it into something that somebody can use. And for that, you should get paid. But they don't say it that way. They say, - you're very creative. Well, it's more like, the harder you work, the luckier you get. And that's true for everybody. I'm sure that's true in your world. Just for fun, there must be a story like that in the publishing world, where everybody somehow ...

BL: Everybody turns into a manic-depressive. Just like engineer, again, it's a project related thing. If you live along projects, you get so high when things work, get done or when you know you can finish them. But up until that point, you have lows, how in the world am I going to make this thing work?

TS: No, that's different. I hear that and that's right but that's different from what I'm getting at. This is a matter of fundamental self worth because everything you're being rewarded for, or at least what they say, is stuff you know you didn't do. It's a little different. Back a sentence or so because that reminded me of something that

was back in manager's thing, - you said highs and lows and projects, it will come back.

BL: What then was the concept in terms of changing \_\_\_\_  
\_\_\_\_?

TS: Well, it will sound funny but the Linc tape had a little motor in it and some gears and the gears turned this wheel. The tension on the tape was produced by the fact that when this motor drove, those gears were dragging. In any mechanism the gears are both the expense at the beginning and the source of the wear. So when I say, - the motors are going to simply be slow speed motors, 900 rpm instead of 1800 and we're going to just put the shafts, the motors right on the shaft. Well now if you do that, you can't get the tape tension because if you're running along and you stop this front motor, it will put a bunch of tape on the counter. So what we did we fired up this motor(?), it was 3-phase, AC motor, anyway we fired it up backwards, [UNINTELLIGIBLE] .... and then of course that didn't work because motors have cogs in them. So we had to get non-cogging motors. But that's all there was to it. Somehow it wasn't the real thing. So then we did DEC tape.

BL: Which created the potential for a new style of computing.

TS: That's right because see, now a days, there's floppy disks.

BL: You had to put everything in the end of a batch file.

TS: That's right. The game on DEC tape, it's hard to sell anything that's new, the salesman doesn't know what to tell the customer and the customer doesn't know quite what to do about it, even though you've thought about it, it's why your job is so important. You have to get the idea out where people can mull it over and look at it from different angles and get used to it before they're going to buy it. So, about two years later they say, - if you had just told us that this was a disk, we could have sold it. But, as a tape, everybody knows you had tape \_\_\_ on the end so they didn't know how to deal with it but it's a disk, a sector track.

BL: Well, there weren't disks then there was just drums right?

TS: That's true. Well, no, there were disks. They were fixed bit disks. No, no, there were lots of disks. Drums were out by that time. It is true back here. But not at this point. We had plenty of disks. Not Winchesters with moving heads, but fixed head disks. And of course in a disk you read a sector and a track and an addressing mark, and now you're just putting stuff in. But it does require completely different \_\_\_\_\_ techniques to work with that, than it does to just sort, merge and stick stuff on the end of a tape. But nevermind. And then many years later we got in a big patent brawl. They said that we were illegally involved in patenting, and fraudulent and everything else. Of course, one of the problems is you've got a year from the time you publish to file. Well, there was some doubt always, you know, if you publish an internal memo that doesn't count. Now if the internal memo gets out now does that count, and on and on and on. And so the lawyers made a mistake which is they waited until they had decided when what it was would be the symbol for publishing. And they, would you believe they filed on the 366th day from that time. Because, well it was a gyp because it turned out the 365th day was a Sunday. And they do allow you to file on a Monday. Well, of course, they found something 20 days prior or 30 days prior, so you see you were fraudulent. No, just inept. A bunch of lawyers.

And they said some other thing, it was an awful... it got \_\_\_\_\_, and then, well, nevermind all of that. But I want to get to a point. Where is the point? Oh, the point isn't until way up here. So forget the point for now. You talk. What do you want to do now?

BL: Well, let me guess. After that, the project was successful, and then...

TS: And I gave it to John Shenaga.

BL: You gave the group away, which you tend to always do.

TS: Always. I didn't understand what was going on for a couple of cycles. But over time if you switch to the management side of things, you start up a group. And that's great because you can pick the people, and you don't have to worry about the deadwood problem and all that. And you get up and go on, and get the group going and get the thing going. And you're not free until you've elected your successor and got the hell out of there. So you do that, and then you go start another one. And that's just what happens throughout the entire process. And I was lucky that I could get away with it. There are a lot of people that felt they couldn't. But you see, that's another one

of these questions. As I began to understand this, the first job, the very first day that you reported to work, you should define who your successor is. Now, of course, I don't mean that literally, but I mean it roughly very early on. And you pick a young person who wants to grow and for whom it's not an onerous idea that they're going to -- oh, you know, I'm going to take over this second-hand toy. So you do that. And until you've done that you're not free. But I could never understand out here \_\_\_\_\_ his idea was that you were only successful if you had more and more people working for you. And as somebody else told me one time, it's a good thing, your limit is 25 people. Now each time we did this, the limits got a little bigger. Because you do grow. But let's say there's 5 people at some point and then you get rid of the group. Then the next group you can grow it up to 7 or so before you're at your level of incompetence. But you can't grow fast enough to keep up with the normal growth of any successful group. You can't grow that fast. But you can try again and hit a higher one somewhat later. Well, at one of these cycles I was feeling all depressed. I think it was \_\_\_\_\_ and he said, well, don't worry, your limit is 24 people, but your boss's limit is 75 and he's trying to run 150. But yeah, that's right. So I've been just extremely lucky. But it didn't actually happen that way. In fact, I would

set myself up so that it could happen after I figured it out. But the way it actually -- in every case it was the same. Somebody would come around and say, we need you for this other thing more than we need you for what you're doing. That's how the actual transitions happened. That is, I forget now who it was that came down. And I remember the scene, sort of. I was sitting down, over in the corner, and I had \_\_\_\_\_ without knowing it at this point. And he was doing all the real follow onward. So I'm a good founder, but not a very good manager. But I think I still know more about good managing than most managers at DEC really, without being too modest about it. Nevertheless what I would do is invent things. If it takes a few people to help you invent them that's the idea see.

BL: I think you're an inventor.

TS: Yeah, and I don't want to -- if they're more complicated you can't do it yourself. You've got to have friends. So you've got to be able to do some managing. But it's just a tool in your kit that you just need as you go along. And I used to have no patience at all with young engineers who would come to me and say, I don't have to work with drafting, I'm an engineer. That's not the right example, but something like that. And I'd say, oh, and I

don't have to work with personnel. And what is this business about me having to give a review to my technicians. And I'd say to them, look, it's projects. The outcome of life is projects, at least in this local role. And he can't run a project, then if you want him to sit at your desk and do the engineering part of it only that's all right, but you're only worth half to me what you would be if you were able to get a project. So I can forget about it and get the damn thing done. But some engineers just couldn't understand that. See, in my head I've got this punchline and the story I just told you doesn't lead to the punchline I've got in my head. So let me try again. I'll give you the punchline, and then we'll see if we can invent the problem. The engineers would come to me after they had been working for DEC for 18 months. And they'd say, Tom, you know, just about the time you learn to play a tune on this piano, here, somebody comes along and retunes it. But you see, I forgot the story that comes ahead of that. But nevermind, that's just a one-liner for you.

BL: I love it.

TS: Russ Doane was all involved \_\_\_\_\_ still. I love the guy but he's turned religious.

BL: He's turned religious also in, his new thing is trying to get rid of meetings. Which is good, exploring ways of finding when meetings are effective, which you have already described, when it is, and how you could otherwise take care of --

TS: That's another thing that I never could figure out, and I think I'm wrong in this case. There are a lot of people who really feel that they cannot avoid -- if somebody calls them to a meeting they have to go. And you know, I ask them. And they say, well, something might happen that would affect me. And I say, yeah, but your friends will tell you. Well, there's somebody that will get up and shoot down the project that I've been working on for years. And you know how it is around here and he's right. Some random guy can crop up from nowhere, and then it sets it all back to zero. And I say, that's true. But what's the chances of it happening in this meeting? But there are people -- I saw Bob Puffer one time walking down the hall toward the end of the week in a daze, just a real daze. Oh, one of my assignments under Pete Kaufman was in this period, was to break in Bob Puffer. And that's a weird thing, to have a VP level person come in and work for a PM for a while to get the word. Now it turns out he

learned very fast, and it was about six weeks is all as long as it lasted, but that was kind of fun. Because you teach them the ropes. But he got way ahead of me. Anyway, he was walking down the aisle one day -- when he was my boss -- I'll interrupt a story with a story. He was my boss at the time that I actually decided to come out here, well, actually he was my boss's boss. My boss was Ed Karola (?)

BL: [INAUDIBLE]

TS: Well, he, yeah, he ended up, we were in this company called Jupiter up in New Hampshire. Heavy-duty consulting for a company called Jupiter. No, he wasn't a \_\_\_\_\_ guy. He was a printer (?). He came from what's that company just over the line in New Hampshire in Route 3?

BL: Sanders.

TS: Sanders. Anyway -- geez, I'm interrupting myself too much. Carell who taught me another lesson about management, which I want to get back to, we'll call it brutality. That would be good enough, psychology brutality. Oh, kinship, that's his little speech on

kinship that I got. Now I can go back. So Puffer is standing there in the aisle and I'm saying, you assigned me to go to Phoenix, but I'm going to go to Albuquerque instead. And you shouldn't care because there's support engineering in both places. And he says, well, I do care because Phoenix is where it is all at, it's the crossroads of the universe, and Albuquerque is just a little hicktown. And I said, yeah, that's why I want to live there. I said, what difference does it make to you. I've got to get in an airplane and commute everyday, every week, every couple of weeks and go back and forth. And anyway, a long story. He said, no, no, no, no. So I just drove to Albuquerque, literally. Just ignored him. So that's one advantage of being an old-timer. But on the other hand, anybody could have done that because once it was a fait accompli who would ever change it. As long as you're doing your job. And then of course, about six weeks after I got here I promoted the guy in Phoenix, no, it was more like six months, Joe Beal. I promoted the guy in Phoenix to report to my boss, up to my level, see. Now I didn't have to go to Phoenix anymore.

BL: You replaced yourself again.

TS: Yeah. And I always thought later that was a real coup. And my boss didn't seem to notice it. I mean he noticed the physical fact of it, but it didn't seem to sink in on him. And then I was all along. I had an empty room here, and nobody working for me. And at the time I had gone to some meeting where there was some government type, and I was telling him how pleased I was that nobody was working for me. They said, do you know what would happen in the government if you did that? You'd lose your job.

[TAPE CUT]

TS: Let me just say two words about these other \_\_\_\_\_. Dick Carol (?) Ken came down or somebody and said, stop doing Linctape, let the \_\_\_\_\_, finish it up, but he's better at it anyway. And put us in the thick film (?) business. Which after 18 or 20 months of building production lines and all that, we found out it's too expensive. And my boss at the time was Pete Kaufman. I learned more about management from him. And basically you just couldn't make them as cheap as you wanted to. So he got me to set down my own group. That was the first time that I had been pushed through that exercise and that's when I learned to \_\_\_\_\_. But I discovered that some time afterward Ken came around and he said, you know,

I don't want you to feel bad about that group having come and gone because we're way ahead of our competition because of that. Because they're all doing six things (?) now. He said, if you can get a global enough perspective a lot of things aren't the way you think from your poor little ego-driven insides. So that's all I wanted to say about that.

BL: Which led you into process engineering.

TS: Now process engineering just means building the machineries of production. It doesn't quite mean what it means today with --

BL: Just the machinery.

TS: So we built that kind of wiring, machines and stuff. And that, in fact, was our big success. The notion that it was to build production machinery that allows people to do what people can do best and computers to do what computers can do best, and for example, the best example, the back (?) kind of wiring machine had a... it was for a PDP 8, and you moved the panel and you felt up and down. So it was just an x, y, z (?) really. And it was driven by a PDP 8. And it would go and point to the pin you were supposed to wire. And then we just took a wire \_\_\_\_\_ and it was

all sorted so that all of the same size wires would come at once. So you took a handful of those wires and cha-ka, cha-ka. And you had a little foot pedal and everytime you hit it you'd go to the next chip. Well, see, the problem at that time you could spend a quarter of a million dollars and buy an automatic wire-wrapping machine. And it would wire 700 an hour, where people can only wire 250 an hour. But the 700 an hour ones, \_\_\_\_\_ couldn't \_\_\_\_\_ . But people had no trouble at all, with hand-eye coordination to even know it fit. They'd hit it. That's what you do, hit the pin, right. On the other hand, people are terrible at doing the clerical work of getting \_\_\_\_\_ .

BL: Right.

TS: But the machine did that job for us. And you did that part, and ours cost \$25,000 bucks. And that gave you \$600 \_\_\_\_\_. So in point, capital is transferred up, and \_\_\_\_\_. That was when I fired my first guy \_\_\_\_\_. They get 90 percent of the way through a project and then they stop working on it. As if they're scared that if it comes to an end, what will I do. Or, in this case, it was more subtle. If I ever finish this up, people will find out the bad

things that are in there, that I designed. It was more subtle. Well, I fired him, and I remember the incident very well. He said, why didn't you fire me a year ago? I said, you worked at the problem for a year. [INAUDIBLE] So that's where I got some of my prejudices about people on projects [INAUDIBLE]. OK, now the communications group.

BL: At that time there was no communications group. There was at best some controllers.

TS: TS: I claim that that started at the time that I was in the hospital recovering from a hemorrhoid operation. And just before that, Kaufman had assigned me, he said, we just started up a plant in Puerto Rico, and I want to communicate with Puerto Rico now. Teletype. So I want you to install the Teletype link between here and there and I want to hook it to computers, because at that time computers had just begun to be able to be -- they were using a Teletype \_\_\_\_\_, so somebody had said, well, why not use a real Teletype. You know, current loop \_\_\_\_\_ . So I went to, I guess it was IT and negotiated for a \_\_\_\_\_ and I'll swear that the wire down in Puerto Rico went down on the top wire of the barbed wire fence and came back on the bottom wire, and everytime a cow came along it broke the connection. And I talked to Alan

Kotok about how to do the software and stuff. Anyway he came in on assignment just before the hemorrhoid operation. And while I was in the hospital I amused myself, because it was boring, calling up IC and stuff. And eventually I got down there and I saw how it really worked. If you first sent it to Puerto Rico and then reversed it and came back it took two seconds to get down there and back.

[INAUDIBLE] I had no idea it was so fast. But that's where it all got started. So we put the loop in. And Alan was happy because he could just put a message in his \_\_\_\_\_ and eventually he got it down \_\_\_\_\_ and it eventually got down there all right.

BL: So it was actually an interface card.

TS: Yeah. And so we build something and that began...

BL: 20 <sup>milliamp</sup> ~~million~~ currently.

TS: 20 <sup>milliamps</sup> ~~million~~ currently was already around. (??)

Because that's how everybody ran. The interface was more of a software. It was making the \_\_\_\_\_ put in ASCII \_\_\_\_\_ and come out with \_\_\_\_\_ Teletype code, including end of message and beginning of message and all the other garbage, and coped with and watched our timers and

\_\_\_\_\_. It was more of a systems  
\_\_\_\_\_. And I remember now, I said to  
\_\_\_\_\_. But it was a big success and it  
set the PDP 8 up. So then that slowly grew into a group,  
and my successor there that I found was Vince Battiano, who  
ended up in Tokyo. And I actually \_\_\_\_ designed a PN-11.  
Somewhere in here we built an interface to the front of an  
IBM channel. What I can't quite remember is how we got  
from communications meetings, switching the telephone and  
\_\_\_\_\_ and stuff like that. The reason it's  
significant though is because that ended up back in Los  
Alamos. That knowledge was... mostly it's not knowledge.  
It's just being not afraid to do something because you each  
know a little something about it. Instead of being afraid  
to do anything. That's mostly the difference.

BL: I think it's a different view of computing as a  
communications tool. All of a sudden --

TS: Oh, wait a minute. I take it back. We \_\_\_\_\_ on DEC.  
The first PDP-1 was sold to Eastern Airlines to do  
reservations. And that's where we got first into  
communications. So \_\_\_\_\_ anything. I've  
forgotten know how the connection happened between... the  
point is there was a body of knowledge in DEC because of

that. And some how or another that body of knowledge, either some guy showed up or something, but we got a kickstart, and it wasn't unfamiliar to \_\_\_\_\_, even though the actual project was the one I \_\_\_\_\_. Then with that working, somehow I got a fellow named John McNamara who you may have spoken with. (?) He finally wrote a book on communications. And he was with the communications group for Whole Life (?). And I designed, somewhere in here, the PDP-11 people came along, Ken Noale. But after 2/3rds of the way through the life of that group, they said, now do the communications for PDP-11 and that's when I did the last actual design. I designed and put into production a BN-11, which was an automatic dialer, a telephone dialer. So that the computer could dial the telephone. And this was an 8-line version of that. But anyways, to summarize, the communications group did what at that time seemed like the ultimate area \_\_\_\_\_ computer to have... for I/O just to deal with. Oh, modems were invented about that time. The PL3 modem, so you had to build an interface for them. So we did. PL3 is not right, it's the L... whatever that first one was.

BL: But the model then was to use telephone lines instead of \_\_\_\_\_.

TS: That's right. [INAUDIBLE] So now what did you have to do? You had to deal with all that, dial a telephone, you had to do some elementary reswitching, and as soon as you do this with one line then you had to get 8-lines to do a cross-dial. So from our point of view \_\_\_\_\_.

So then the other folks came along, and they wanted it. And now then they knew about it. So pretty soon Andy Knowle came along and he said, stop doing this and go in with Russ Doane who had been doing the VT-05. Now, Russ Doane is an engineer's engineer. And he has -- he's just a marvelous guy. He's got a full set of \_\_\_\_\_.

His weakness is that you ask him a question and you get 500 answers, all neatly written. And then you say, well, which one? And he says, well, I arranged them in order of priority. And persistent with he's a unique guy. But \_\_\_\_\_, cooked up, and I'm not quite sure what he'd actually told me \_\_\_\_\_.

But this is where I'm going to go back to kinship. So we're switching over to a couple of stories about kinship. I learned about it, this first time was by accident like everything else. I didn't learn anything. Only later did I learn what I learned. So it was a primary time, and I always think this to myself. Russ Doane knows far more about \_\_\_\_\_.

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[END OF SIDE 4]

TS: The question was why did Andy pick me to go run this proof, instead of Russ, this is the first time I have given it any thought, except as a thought, but the answer is that he saw me as an engineering manager and he saw Russ as a super-engineer and he needed an engineer manager. I guess that's what it was, he never said so. [TAPE IS WOBBLY] So I sitting in the group and here's Russ who knows much more about everything than everything and about six or eight weeks in the group I remember clearly his coming to me and saying well, should we do it this way or that way, and I would prefer this way and I said no, that way. Just all straightforward and he said to me why, and I said because I say so. And not heavy, almost as casual as we are talking now and I remember being astounded that he took it, he didn't say anything and he went off and did it that way. It was fine, it was a small part, it was more than that but less than anything cosmic. And for some reason that stuck in my head. And now that we've jumped many years ahead to when I got the lesson reinforced in a different way then I'll jump even further ahead to the local story as I tell it today. Ed Krehl (?) who I worked for in the, well at the end of the VT's, Julius Marcus I worked for, he was the best boss I every worked for and there is another story there about two kinds of managers. So, we had just invented the VT-52 and this little nugget does end up at

Kingship is another good paragraph. I had learned and didn't know that I had learned it what the book called, the soul of the new machine. The bottom line of that book was that everybody works really hard and gets the job done then they all get fired. Now I didn't realize until I read that book that it was normal. But I went through a cycle or two to the part towards the ends of these things that I was comfortable knowing that it's time to get fired. Because that's how it is, but Ed hooked up the VT-52 and Ken Olsen himself got up in front of a bunch of salesmen and I happened to be in the audience. He told them how awful the VT-52 was and how it was big and square and ugly and the reason it was big and square and ugly is we were planning to put in something we had just got in. We would have made a killing. Which was the printer. We made room for our PDP-8 and if we had, with Julius, we said we are going to make an A, a B and a C. And a C would have been a minicomputer. But things got bogged down and we never got to C. But there was enough space and it was the right side. It did depend on developing the next pass at the PDP-8 which would have been smaller yet. But the space was there and just the right size for the green box and Julius later one said if we had just, we missed by about six months. Ahead of the whole thing. He dug up the memo and said you had it right there. But, you can't cry about that

stuff. So it didn't sell. The reason didn't have anything to do with the beauty of it, one year later it got an award for beauty, it had to do with the fact that we made a decision to use X-on X-off as the signal we release, in band signal, up to that time if you wanted to start or stop something you had to have an extra wire to it saying stop. Now start, and extra wires out of band, you had to provide it either physically or logically extra wire. all we did was borrow the teletype x-on x-off which had been around for a hundred years, they call it float control, and make sure it was in the terminal. We around talking to Peter Christy who said no way will be change our programming in our PDP-6's because it would cost \$50,000 and here is how hard you have to change. The stuff is pouring into the buffer and the buffer is getting full. And you have to send a signal before it's completely full and that signal has to be buried in whatever your normal output stream which was going along anyway was. That means the guy at the far end has to look and look for that one or two signals, ahead of time, he can't let it go into his buffer. It will be buried in there waiting and the whole thing will lock up and similarly at this end when that guy says I got to stop you, you have to look specially at every character to see if it is one of these two or three control characters. They wouldn't do that. I said, but look, if

you do that you no longer have to put endless null in to make up for the fact that some of those machines have to do a carriage return which takes a long time and other ones are terminals and they take the character return is instantaneous and you have to put in all these nulls to make up for the possibility that it might be a teletype or, sure, you could figure out in the code how to figure out whether it's a teletype or a display out there. But that's impossible because people haven't gotten around to putting symbols that identify themselves as a certain generic fake. So, I said, your the boss and I gave up and I shouldn't have, he said later it was all my fault because I gave up, and I said wait a minute, you were in charge of all software for PDP-6. Well they put x-on-x on their the reason it didn't sell is nobody knew what to do with it. Same thing in \_\_\_\_\_ though in that case it was so new that you knew people would have lots of trouble. In this case it was just one difference. I said, I don't have to worry anymore about whether it's a twenty four line screen or a thirty or a sixty, isn't that worth something, to have it just do the flow control right in the hardware-software comp-- yeah but it will cost us \$50,000. That's nothing but at the time... So our group got disbanded just like the soul within the machine and Ed Krehl disbanded it and he thought he was doing the right thing, and it's \_\_\_\_\_

and we had just at that time we were off to build some hardware that would put vectors on the screen it was the precursor to Bitman and he could generate the vectors on the fly so fast, that you could generate the full set of vectors in a line by line, with 256 of them anywhere on the screen and it would sit there, it was a highspeed triple hardware of sort and it worked. But we had to suspend it an whatever was excipient at that point was lost. But you can't tell people that this excipient stuff isn't going to be any good because most of it isn't going to be any good. But something in there probably is. You have to go on faith and there isn't any anymore. They don't trust that Stocke will fix it.

INT: That must have been hard because it was an attempt to get in the terminal business. The VT-05 worked, but it wasn't a big seller. DEC wasn't really in the terminal...

TS: Now later on the VT-52 sold like hotcakes. But the group was long gone by then.

INT: Yeah, it sold 150,000.

TS: Oh, it was 120 or something. In fact, I remember it hit exactly the marketing targets that we cooked up in the first place.

INT: I'm sure they understood how to use --

TS: But there was this short period of about nine months when they didn't sell and it looked like... So at any rate, we got disbanded, and so... and the way it was done was Ken or Ted Crowe (?) exercised kinship in the most brutal way. He came -- I went away for a two day trip and I came back and found my office totally empty. Everything moved out. One of the things you know about people is that they're territorial. Never ever do that to anybody. That just cut off... that was the blow. And I said, well, what did you do that for? There's no real input, that's the point. I mean we were going to move somewhere. And he said, well, I just got my secretary to tell the boys to clean it all out. And I just started to understand if you want to wipe people out. OK, now hold that one for just a second. The end of the kingship story comes, and I'm not quite sure in this telling what triggered it, but here comes the standards for the kingship story. Everybody needs kingship to be supplied to them. And it solves a huge problem, which is fear of the unknown. If the boss says, because I say so.

Or don't worry about it, all's well with the world. I'm the king, the person saying it relaxes and says, great. Because they see the whole world just all full of spooks, you do, I do, everyone does. And all kinds of terrifying things lurking out there in the wilderness. And some of it's going to get you but it's all right because there's this king. Now of course the king needs a king or a queen as the case may be. So what do they do, they invoke the same thing the next layer up. So pretty Ken Olsen is going to have take care of it. Well, what does Ken do? End of story, this is why man invented God. Absolutely. See God was invented in the likeness of man, not man invented in the likeness of God, to solve a very real straightforward perfectly reasonable thing. Which is, you've got to have a place to throw 95 percent of the shit over the wall in order to -- and so every boss owes it to their new people to do some kingship thing. You know as soon as you have an idea in your head you don't actually have to do anything about it. The opportunity always crops up, I've noticed. And I guess because that's because people make the opportunity crop up. Down in their hearts they want to check this one out. That's my theory. Because I've never ever consciously set out to do the kingship thing, like Ben Carell did. And he's an asshole for it. So that's the whole complete kingship story. And I've tried it out of

course. You've tried it out. Lots of people... and I'm sure it's true.

BL: It works. I'm sure it's true.

TS: I'm sure it's true. But there again, it's like a lot of things I find myself telling other people that story and it's the new idea for them, which is astounding.

BL: If you just look at it in that light.

TS: As we were saying before, sure, there's a thousand variants in the psychological literature on this story and I'm sure it's been done. But you don't \_\_\_\_\_ life as not growing up middle managers, or whatever. A lot of this stuff just isn't known, or at least not known at the level of action by anybody. By anybody... oh, a lot of people when you tell them, who've had some experience say, oh yeah... but that's what was wrong with the place I claim, and that's the root of it.

BL: Why do the kings have to use what you call the psychological brutality?

TS: Oh, they don't. Oh, oh, subpart of the story, never, ever use psychological brutality. It's just that I think that some folks haven't articulated it this well. Ed was one. He knew that you had to be decisive or something. I think it comes out in macho. I think it comes out in decisiveness and some images about what bosses are supposed to be and people believe that shit and stuff like that. No, no, no, no. I only give -- now that I've gone all this far through it, I guess I'm not even sure that his exercise of what I'm calling kingship, I guess it isn't even relevant. It was just an example of how... you see, there I did it again. Wrong punchline, different story.

BL: It's certainly an old kind of God example.

[BACKGROUND CONVERSATION]

TS: Management is very -- and this is what engineers need to know to make the switch. There's only five or six genes, glands, I call them, inside you. And one is territoriality. And one is something like insecurity. Another one is need for love, though I suppose that's just insecurity. I'll think of them in a couple of moments. But there's only a few. So when you're dealing with people, which is what scares the shit out of you, now we're

not talking about management in the planning and the global sense. We're talking about wiping people's noses and what do you do about that guy. I'm long since used to men coming in and closing the door and crying. And then you just listen to them for a while and don't do anything, and then they walk out and say, you're the first person that's ever listened to me. You understand me and nobody else does. And you say, you know, you didn't do anything. But anyway, that's what scares off junior engineers who talk about whether they're going to get into management. So you tell them this story and you say, the problem is that a given symptom, you can't always tell which gland it comes from. And that's the problem. But be assured there's only a few possibilities. And a lot of times you don't even have to know in the end. If you take this model of people. But the point is you don't have to model people as the complex organism-mechanism that you as an engineer project on a bunch of neurons or something. See, you only have to model them as... damn, I'm having trouble thinking of the other couple of glands. But they just have a few primitive drives. Again, the practical problem is, you don't know when this guy's crying which gland was the thing that generated the problem for him. So you do have to do some work. But if you look at it that way, it becomes a problem that's tractable. See, and you just say, well, OK, what's

bothering this one. And I may know an hour later, or something, but let's work the problem. And of course, with some experience, a lot of things sort of hook together, and again, if you look at it this way everyday you see people in action, so you get some clues as to which gland they're going to use. Anyway, that's the end of that. Your turn.

BL: Let's see, I wanted to go into, in the terminals group this \_\_\_\_\_ was saying that that was really a first attempt to get into the business. And while it was a success it laid the groundwork for a phenomenal success, the VT-100.

TS: Right. That was after our group was disbanded.

BL: Right. But it was this learning, he was saying that was necessary to...

TS: That's right. It made it so, I put it more cynically. It made it so that the managers didn't feel that the risk level was so high and they could say yes later. I'm always in the situation of doing stuff which is too high a risk level for the managers around me. And then as the managers get \_\_\_\_\_ and \_\_\_\_\_, I get finally scooted (?) out. And I'm happy about that, because it all worked out well in my

career. On the other hand I think it's too bad, because of course I'm not the only one who's come into contact with that. But maybe it's inevitable. But a bunch of managers interacting with each other can become wedged. I think it's just human nature.

BL: So after terminals got blown out, you came to Albuquerque.

TS: Right. The choice was very simple. Carell sent me down, and he had got this message from Puffer, which was his boss. And he's the guy I said a little later I had this funny experience. And he said, I'm going to give you two choices. You can either take our entire support and demand group of 25 people here and become their manager and move them all to Phoenix, or you can assume the stewardship of a new group which will be the advanced development for simultaneously printers and terminals. Because at that point everybody knew, and by the way they still do, that there's something wrong when printers and terminals are separate. Because there's so much common even though there's some uncommon. And it took me 30 seconds. I didn't tell him for an hour, but I took 30 seconds to decide that I was going to do the support group. And only one or two of my friends understood. And one of them, I

remember we had this discussion was Chuck Glazen (?) was that the reason was to escape \_\_\_\_\_. If I hadn't escaped then I'm sure I wouldn't have been working for Digital a whole hell of a lot longer. Also I knew I would be incompetent to do this... see, I knew I was up to 25 people or whatever. And I couldn't possibly manage 150 or whatever that other one was. So that's true too. That the other alternative wasn't one that I felt I could do. However, I came out of that meeting so happy. So then I learned another management lesson or maybe I'd already learned it, which is that you can't push on a string. You can only pull it. So I moved out here first. And then the other people when they were going through the same traumas, and went oh God, here I am, thousands of miles away from nowhere, should I really make this move, what will my wife say? I can say, well, I've been through all that over the last month.

BL: And you can pull them down and pull them through.

TS: Would you believe we got 23 out of the 25 to come. Now I think that's pretty good. Just like I feel good about, it was a non-event when we completely reorganized the group. That's the way these changes should be, they should be non-events. And it's not hard. Just think about

two year olds. And you only have to settle that first question. See, then people cope. They say, well, I'm fired. OK, I've got a new job. OK. I'm going to work with this asshole. OK. Whatever it is. But they don't say, what is going to happen to me. They start thinking about the end of the world in whatever terms they make it. And it's so obvious. That's another thing, see, over my years at DEC I only got about six reviews, in spite of all this business about you will get a review every year, it's all bullshit. And if my experience is similar, no wonder..

BL: I only had one in eight years, in nine years.

TS: Now the troops lately do get reviews because it's all locked into the system. But people in the middle, well, you cannot... my reviews got so much better when I moved here, and the rigor of the local personnel... Oh...

BL: So, that was...

TS: -- And then also \_\_\_\_\_ have been saying, let's get out of this cold New England and stuff, and that helped. And she's not as tightly coupled to her family as some people are, and that helped. And I wasn't at all, because my family was in Chicago and Canada (?) and I was in

Boston. So those things all kind of get together. Then I got out here, then I promoted as I said, Joe Bidow, to take over my role in the work out there. And then, the plant manager here whose name was Dick Esten, because see, people did say to me, what do you want to be in support engineering for when your real forte is product design? Well, what I discovered in the year or two that I had it is that support engineering is tough. Because see in product design you've got it easy. If you change something you can change everything else to make it all still work. In production design if you change something you don't have the freedom to change the rest of the design. You've got to change only that which will make you work. And it ain't working because that guy fucked it up. Because he didn't think about some one percent case, you see. So it's much tougher. Much more of a challenge. And I loved it, absolutely loved it. And I had lots of respect for production. That would probably make sense, the same thing for -- well, production engineers and product support engineers they have a tough life. But the happy side is that it's tough and it's challenging. And if you're into challenges, boy, that's where it's at.

BL: What kind of challenges did the group have to take on out here?

TS: The support group?

BL: Yeah.

TS: Well, basically there was a bunch of printers being built in Phoenix. And they flipped. The displays were going to get built and did for the first six or nine weeks and I was here then, come to this plant, the VT... 52's? The 50? No, no, it was the 52, because we skipped through the 50 because it only have 12 lines and our marketeer suddenly realized my God, with less than 24 lines you're dead. So it was to support the production line here, but then they decided to make the displays over there after all. So they managed to move it all back. But here's the basic job. As a thing goes from a hundred units a month or a year or something to a thousand or ten thousand, each time around, each doubling, you can cover a whole new set of design problems because at the higher volume levels, stuff that didn't matter, then you can go sort of just fix it. Because it was only occurring one percent of the time, that's only one per day. Well you can fix it. Now when it's ten times the production that's ten a day. Now ten times production again it's a hundred a day. This is why it stops the production line. So it's like peeling layers

on an onion. The design is never finished. So support engineering is to... Oh, another thing that happens is that the vendor forgets how to make the part. Or conversely he goes out of business. So now you realize the design wasn't flexible enough to stand the other vendors part that you thought would be a good second source. It's a little different. And his parts are never completely spec'd anyway. So now you have to change the design a little bit to accommodate this new part and that's very common. Then the other one is a straight design change. It won't sell on the marketplace if, unless, because the competition came out with something. So those are just pure redesigns. So those are the kind of three things that happen. And those are... I think we had 700 engineering changes in the two years of life. But meanwhile, I got myself back to nobody working for me in a big empty room down here. And set out to build up what I had set up in the first place, which was I was going to set a group up that had in the long run, as it developed it would have what you would call R & D. That's the question, is what should we do? That's what you'd call advanced development. And the question is now that we know what we should do, what works? And then the production engineering which is do it. And then support engineering which is maintain it. And it was all going to be done here. And Dick Clayton

stopped it dead in its tracks, because as soon as we had, or a couple of years after we'd gotten -- we had support already, the end of it. And then we had R & D. And R & D doesn't threaten anybody. Advanced development doesn't either really, until people start to notice. But we hired a guy named Joe Demarinis from Sylvania in Octavia, New York, to start a whole group back there to do the production engineering of the terminals. (??) And Joe was a disaster, but it didn't become clear until a year or two after he had done it. It was too late, because now we were told specifically you will do no architecting. We'll do all the architecting, you will do nothing. And looking way back in hindsight, that was the time I should have gone out. Not true, because I had great fun for the next ten years. But as far as being helpful to DEC and an engineer needs to be responsible for about 100 times his salary in product. And from that point on it just slowly wedged up to the point where I wasn't having any fun (?) and I got fired. Gracefully and nicely, but you know, you're still not needed. So we let you go because you wouldn't let somebody go that was needed. So Clayton hired Joe Dimarias. And I worked for Joe for six weeks. He came down here, and he said, now I'm going to make you a success because you're not -- no, that was later. By the way he finally got -- I don't think he's left the company. He's

just one of those bigwigs that's down in the \_\_\_\_\_. That would be another question. Does Joe Dimarinis still work for DEC? You might be able to find that out. Demarias [SPELLS OUT]. He came down here and he said, I'm going to countersign every single thing you sign. And I said, wait a minute, you're back east and I'm up there. All this --

[END OF SIDE 5 -- BEGIN SIDE 6]

BL: Oh, that's all right, he said, we'll just FAX it.

TS: We'll just FAX it, no problem. And then I'll sign it up there, and then the occasional time you really need the hard copy, you know, you can get it a little bit later, because you'll know whether I signed it. And I said, Joe, is this how you worked at Sylvania? Oh, he said, yes. I said, why? And he said, well, I had three guys working for me that were turkeys, or that were sneaky or something. And I said, well what about the other ten. And he said, oh they were fine. And I said, well, wasn't this very inhibiting for them, at least psychologically? And he says, oh, well, no. And I said, why didn't you just fire the three and forget this shit? Well, he had no answer, you know. But it was clear we were going nowhere. And that to this... I've got it blocked out or something. But

for some reason I can't quite remember but I did end up not reporting to Joe. And I'll say maybe I reported to Carell, one up. But it didn't have anything to do with rank or status, it just had to do with I had to report to somebody. And it wasn't going to be Joe. So it's just another one of these stories, you know. Well, he built up the group and built up the group and failed and failed. And finally the VT-201 came out. And he called up frantically and he said, nothing works, will you design it? And we designed the entire VT-201 down here with the exception of the video amplifier, and nobody knows it. But we said, well, you know, just because we hate the guy, we still have to help the company. We did the whole thing in about 90 days, \_\_\_\_\_, put the whole group on it, particularly a fellow named Russ Baker. You might see him back here now. Nobody knows it. But see, that's another one of those little things that gets you more and more isolated. Because Joe wasn't about to tell anybody that somebody else did it, especially this bunch down there. So that's, and so it went.

BL: Then you started working on color displays?

TS: Oh yeah, well, when we moved out here one of the very first things we did was lined up 15 displays and got people

to look at them, different colors. We went all through everything that \_\_\_\_\_, they're still having these roaring battles over stuff like, how fast does flicker, and whether yellow is better than green is better than blue. And you know, all these... And oh yeah, if it flickers it's because it beats with the fluorescent lights. Well, we put some BC (?) on the fluorescent light. It still flickers. But you still hear it. And we just tried to learn what, you need to know at least 25 percent as much as you should know before you start doing anything. And sure enough, color in there too. And that was one place where we could do it without threatening anybody because there wasn't any color being done by anybody back east. So we made quite a little run at the color. And oh, then I remember another one. Along in this period I had a boss, I remember now who my boss was, it was Bob... ah... useless kind of guy. Friendly, liked the \_\_\_\_\_, just friendly. If you ever wanted him not to talk about a subject, if he called you up and you said you didn't want to talk about it, all you had to say was, there are some emotional overtones with some people over there, chooooo... gone. Never again did that subject come up. He was just scared of people. And he, \_\_\_\_\_ anyway, I had a no good guy, and I knew it. But on the other hand he had cooked up this 63 kilohertz horizontal scan display, which

four years later was all the rage, but at the time everybody said, you can't do it. Because the gun will heat up and I said, well, let's try it. It worked fine. But the guy I had doing it, and we were going to give something to \_\_\_\_\_ was an engineer, there was a wonderful story about him, but since we're short of time I'll just compress it to the end, what he did was, he would read four or five books on the subject. And of course a book that tells you how to design such and such a coil, using this formula, in the next book, how to design that same coil there would be a different formula because the boss made the guy use different assumptions. And they don't always state the assumptions. But that's nada. So by the time you read the fourth book and it's got a different one yet, what you do is you slow down and you try and figure out which assumptions because either they're all the same, and the guy did make a mistake, but you've got to know. My guy averaged the results of all four, and came up of course with the wrong answer and put it in. Well, the evil thing is that my boss who begins with an H that I hope will pop up here, knew that the design review we were going to have down here was going to fail. And he was going to send two people down, did send two people down to the designer whose job was to make sure it failed. And he didn't tell me in advance. And this was part of the evil

side of it. And eventually it came -- I blamed Dick Clayton who was the boss through this whole thing. I've got a bunch of Dick Clayton stories too, but you know, you could spend another whole day or an hour on the telephone or whatever you want, or you could forget it, I don't care. But Dick Clayton didn't understand the meaning of the word love, is the bottom line of that. Anyway, so they sandbagged this guy. And then when I found out about it after they went back and they gave this miserable design review. And the guy did fail the review. No question about it. I know, Papas who failed the review was working for a guy who worked for me. And so of course, in a certain sense it's his fault too.

[BACKGROUND DISCUSSION]

TS: So I called him up and I said, well, why did you sandbag us? Well, he said, I wanted to teach you a lesson. I went, what lesson? Well, that you're supposed to do a better job of managing this guy. I said, well look, if you knew ahead of time, because you see, on some issue they did MR \_\_\_\_\_ what they got us, don't you owe me the statement that it's not going to work, and let me solve the management problem? And if I'm a little stupid, which I was, just why don't you make me aware of the problem or

something? Why do this? Well, of course the real reason was the head of the group up there, whose idea was not to let us do anything that would leave (?) production. I guess I was threatening to them. Because they had these 50 people up there. Besides we might actually succeed because we'd probably do something. Well, here comes the punchline, the project, I fired Pappas, shortly thereafter. Hired a guy, got him in, got the project done on time anyway. So there. But nobody knows. So I felt good in the end, even though, but you see what was happening, just more and more. Now then, it's not Bob Heffner (?). Hey, Joe, what was Bob's name... he was my boss for about a year and a half, two years, it began with H?

[BACKGROUND DISCUSSION]

TS: Sandy haired guy, slight, he could only talk about pleasantries or nothing. And it was after I had been with him for a year I got in this terrible depression and got all, it was the first time in my life I got out of control, psychologically, you know, with myself, everything's wrong. And ever since then I've been much more sympathetic to people who have lost their grip for a while. Because before that I couldn't conceive of anybody losing their grip, especially me. You know, me, lose my grip, come on.

But it all happened for a very simple reason, he just never ever gave me any feedback anyway.

[BACKGROUND DISCUSSION]

TS: Huettner. Bob Huettner. And I remember I was 44 at the time. And I said, how can a person who's 44 and been relatively successful be in this state. I was completely unglued. I didn't know which way to go, I didn't know what to do. I lost all my bearings about life, career, I was just a vegetable, a pillow, a marshmallow, just nothing. But since then, and I know it was only because he never gave me any connectivity, or feedback. Because after this one brutal one, which happened fairly early and he just listened to Puffer telling him what to do or something, he never said a word. He wasn't going to make that mistake again. And I just whew... came apart. It was really something.

BL: Now was that before you worked with Cathy Leroy?

TS: Yeah. While I've been down here I have had 14 bosses. Now Huettner was a long one, everyone else was four months, six months. Glorioso, Leroy, and that's another part of it. Only Cathy... oh, I had a guy who... well, only Cathy

felt that a boss's job -- which is what I feel -- the boss's job is to do for the troops what it's harder for the troops, they could do it for themselves, but it's harder for them to do it because they don't have the rank. And she was the only boss, I call that boss principle number one. I learned it when I was in the army from a captain who had that. And he gave that specific speech, because I didn't realize I was learning management. But he said, my only job is to do for you things that you could do for yourself, but they're a lot easier for me to do because I've got rank. So therefore I should only attend to those things. And it's you that I'm working for. And she felt that way. And she also had a sense of humor, unlike most of the rest of them. But one day we came down for, I don't know, six monthly reviews, and she put on a black gown and a judge's hat. And everybody had to parade in front of her. Give their little slides and stuff. And we gave nobody any warning. They didn't know what to think. That was terrific. And then she took us all out. So she in that whole period was the only good boss I had. Now, of course, she's got her set of hang-ups too, especially with \_\_\_\_\_, but there you are. It was good. So you see the thing was Stocke can take care of himself. He's got a proven track record. He's down there, he's not bothering anybody. What he's doing probably is going to work out and

be good, so we don't have to defend it to anybody. So, yeah, I'll be his boss. Now in a way I should take that as a compliment.

BL: Absolutely.

TS: But when your real desire is to make billions for the corporation, that's no good. Because you've got to get connected in. You've got to have somebody back there doing the footwork. Well, finally Henry Crouse says to me, you'll get around to interviewing him. Spend a whole day with that guy. He won't get so much into himself, but he has had so much experience from ground one on. He will corroborate and interact, just really don't do it at work, take him out on a cruise somewhere, or he'll suggest something. And wait as long as you reasonably can before you talk to him. And then you'll have a list of 100 things to check. And he's not very good at putting himself forward. He doesn't do what I do. He just sort of sits calmly and listens. But he'll be excellent at giving the other aspect. You know what was really going on was... or he thinks it's that, but here's the true scoop. Or he doesn't realize that... or something like that. And he knows everybody and everything and he's been everywhere. He and I owned an airplane for a while together. He used

to -- he was purchasing manager way back when. And he used to arrange to run out of stuff at the end of the month so we'd have to jump in an airplane and go off and get it the last day of the month. That's why I know he's OK. Cause piracy is the only way you win in this world. And so when you get to Henry have with you as your homework, more than just the sketch of Henry but just run through the high points of all the other things we've talked about, because he'll tie a lot of things together, I'm sure. Anyway, Henry said, you're going to fail out there unless you yourself get back here and take one trip a month. And I said, that's ridiculous. You might be right, but I don't want to. Who wants to do that? Well, he said, in his way, with a smile of course, well, it's your choice. You might be able to make it once every two months. And I said, well, could I maybe get somebody working for me back there, on my payroll back there. Yeah, he says, that would work too, but of course, it's hard to arrange that. And I got all good lip service when I go back there. He thinks we're doing fine. We get good reports. And I said, oh gee, you've got to do more of that. Nothing would ever actually \_\_\_\_\_ . And sure enough, I'm sure that Henry's right. If we had been back pumping around for one week out of four, or one month out of -- I

don't know what the right formula would have been. And people do that. Galbatts does that. He goes --

BL: Constantly.

TS: He's out there, almost, well, it was one day a week or two days a week. But anyway... so to be honest with you, I sort of understood about three years that the end was coming one way or another. And you know, it's all my fault. Fault, wrong word. I truly believe that everything that happens to you is what you created to make it happen. You don't always know you're doing it. But there's no -- you can't sit around and cry about that kind of stuff. Like Teddy's (?) doing. You just make the best of where you're at, and you realize there's an awful lot of wisdom in you and in everyone else that's not going to be used. And you've learned all this stuff, but now how are you going to apply it. And just to end it up, in the last year, I've busily been trying to shed all I know about management. I mean that's not right, but just not think about it. And learn all kinds of stuff I knew 35 years ago. How to program, I'm programming in machine language. Of course, there's a number of things that I have learned. One is never promise anything that you haven't already done. And all engineers learn that before very long. That

doesn't mean you have to have it totally perfect. But you've got to have gone through it and have done it in quotes. So of course there's lots of stuff like that. And I'm taking a course in \_\_\_\_\_. You've got to do it, otherwise... I bought Peachtree III which is an accounting program, and I bought it because my CPA said that's the one to use if you're ever going to do any manufacturing, because it's got inventory. Well, then I go read the book. And wait a minute, accounts receivable is a plus, but cash is a minus when it's really a plus. Now wait a minute. Debits... let's see, a debit is really a credit that gets on the... Oh..... And I know there's something down in there that's all rational, but...

BL: You've got to learn how to do it.

TS: And then if I'm ever going to get serious and really want some money they're going to want balance sheets and stuff like that.

BL: I've watched people go through the agony of the accounting course and it's always been worthwhile.

TS: Yes, it does seem already to be, even though I've only had a couple of weeks of it.

BL: But it's an agony while they're in it. It always has been.

TS: Actually this was not an agony because they're teaching it kind of slow. But then of course I've got nothing to do but the homework before the next day. I've already got at least one kid in the class pissed off because I did some homework ahead. And they said, well, you never do anything except what the instructor tells you to do.

BL: Is this a night...?

TS: No, it's a day course, but it's the local community college.

BL: I'm thinking that may be more of an educational ethic in the student of the '90s.

TS: Oh you think so?

BL: Maybe. But after people have finished accounting then I've watched them devouring balance sheets of other companies and sending away for annual reports.

TS: I can already see that's going to happen.

BL: I've got five quick questions. Did you ever throw a machine out the window into the pond?

TS: No.

BL: Did you ever take kayaks and canoes...?

TS: In a minute I'll give you a summary, just run through all five.

BL: Have you ever founded meetings underneath tables?

TS: Yes, and on top of filing cabinets.

BL: Have you ever worn tuxedos and sneakers to major events?

TS: Not sneakers, tuxedos.

BL: And where did you get your back problem?

TS: OK, they all couple together so I'll just give you a quick one. When I was at Lincoln Lab, they assigned me for a month to work at IBM in Poughkeepsie, New York, because we had to learn very rapidly about how to maintain some tape drives, and they didn't have the manuals and stuff. So they put me to work on the production floor. Bringing up a system is a very good way to find out about how it works, so there \_\_\_\_\_ today, right there. Toward the end of the time I was dating a girl, who I was trying to get dating and I had taken a tux with me. So toward the end of the time I -- oh, mixed story. I'll finish that one. I finally got the date and she said, gee, you're a good dancer, why didn't I go out with you a month sooner. I said, you dumb broad. OK, so I'm sitting at IBM. I had the tux at home. And there's a guy on the floor and he says, I notice that some days you wear good clothes and some days you wear bad clothes. I was wearing my Navy fatigues, you know. And the truth was I wanted to find out whether it was true, this story that you have to dress up at IBM. That's true. But I told him that some days I feel proud of myself and I wear good clothes and some days I feel shitty and I wear bad clothes. But he was kind of a dumb young kid, frankly. And he said, oh, is that so. And then I did it to myself, and I said, some days I feel so proud that I wear a tux. Well, his eyes got as big as

saucers, and I was suckered. So I did, I wore a tux to work, to IBM though. Well, the furor calmed down by 10:00 in the morning. And there I am working away with my tux all day, and you know, technicians work on the final assembly line. 3:30 in the afternoon there shows up in the distance, this entourage of my section leader and his group chairman and his, the floor leader and stuff. And the head of it, his name was Brown, and he's the head of IBM, Poughkeepsie, New York. And they come up and they sit in front of me, and they don't say a word, but they offered me a job at IBM. Now to this day, they ignored the tux, absolutely never said a word. It's like when the little dog shits on the floor in the party and the maid comes along and cleans it up and nobody says anything, you know, at the cocktail party. Nobody said a thing. To this day I don't know whether it's figure out an excuse to go see this crazy or... I had made a good reputation because by that time I had written a whole manual for how to check this thing out. So they knew I was all right, you see. So maybe it was a normal thing. They happened to hit the wrong day. I have no idea. Anyway, that's the truth see. So now I went back to Lincoln Lab, and I wore a tux the first day back, and my speech was going to be, I got couth at IBM. Nobody paid any attention. It failed totally as a joke. Because at Lincoln Lab everybody runs around

barefoot or whatever. You know, I got a few chuckles, but nothing exciting. So that's the truth. OK, so now then, hold that for a second. The next thing is, I do have a bad back, and it's cured, see those two heels, see how much thicker this one is than that one is? Well, in the early days I didn't know that that's all it would take to cure it. And I'm still a little, let's say weak. That is if I don't do that for a few days or whatever it starts to really act up. So I get in the position I'm in now a lot. And then it was pretty much intolerable. I had to lie down. So I would lie down on the floor, on the table, anywhere. And as soon as the little local group understood nobody paid any attention. But of course any outsider coming in, and Ken has a story about hearing this voice coming over the top. But it was very, very commonly stretched out. So there's just a million little tiny incidents. The next one is, Pete Kaufman -- you'll like this one -- John Allen Jones was one of the VP's. And he came up to me one day and he said, would you teach me how to do white water canoeing, which was my sport. Oh no, first step is Ken said to me one day, he said, I know you do white water canoeing. He said, I go up on the same \_\_\_\_\_, and every once in a while I get caught in a rapid, and would you take me out and just teach me the elements of getting through rapids. And I said, sure. So we did.

Well, he turned out to like it. So we did a little more of it. And so, kind of every fourth weekend, maybe three times a winter, a couple of winters we would go down to the Assabet and just kind of do something. And actually I just got him to get up where he should have gone in the first place, which is a little learning session. But he's so proud that he didn't -- he's all into image. Which is good for \_\_\_\_\_. So a side story one day we're going around through Maynard in the back and we're coming around about to go underneath the bridge from behind the cleaners there, and he starts kind of adjusting his collar, and getting himself hunched in the right place, and I said, what are you doing that for? There's a rock coming. Well, he says, there's going to be people on that bridge, this is Saturday morning. People on that bridge that know I'm the president and I've got to look good. And I said, all right, that's fair enough. Well, we did hit the rock. OK, so now John Allen comes up, and dumb me, I didn't pay any attention to him, and he says, you know, would you take me out white water canoeing, and I said, sure. So we did, and the next thing you know, McMasters... I still didn't figure it out. Nick Masareese comes around, another VP. Would you take me canoeing. Oh sure, let's all go together. Well, we did. And then there was one more. Well, about this time I figured it out. If the boss is going to go white water

canoeing us VP's should maybe change from golf to white water canoeing or something. But I just laughed. What the hell. If they want to play the game, I like to canoe. But Pete Kaufman came along, but he was different. He really wanted to canoe. So that guy, we quit going on the local river. We went up north and went with the Appalachian Mountain Club with all our stuff. He got to be a class four canoeist and everything. Well, that's the set up. Here's the story. One day a friend of mine who makes canoes said, I'll make you a fiberglass canoe, which I didn't show you but it's out there. A competition canoe, the kind you could roll over in and have a little thing to sit in and all that. It's like a kayak but you kneel in it instead of sitting in it. And would you like one Pete. He said, oh yeah, sure. So along about December I said now the guy wants his money. Because he's doing it in his basement, and he makes them in the winter. And he wants this money ahead of time so that in the spring you get this canoe. And he backed out. So I said to myself, you asshole, you know. So the guy made me my canoe. So in the spring I took my canoe out and I stuck it on his desk. Now a canoe is 13 feet long. And in an office, it was the same office that Jack Smith had for a long time, in Building [LENGTHY DISCUSSION ABOUT WHAT BUILDING]. Well, it fills the whole office, because 13 feet that's the diagonal of an

office. So I hauled the canoe in and everybody laughed. They didn't know exactly what I was doing but they watched me carry the canoe in and dump it on his desk. I said, there, that serves you right, bastard for not... now you figure out what to do with this. So that's another piece. Well, now let's see what else. I built an electric car and I got permission to plug it in during the day to charge it up. I took Ken for a ride in it. And they filled it full of garbage, the shop people. But they were good buddies. But that's not relevant to this series. Run through the quick five again.

BL: The kayaks and some machine in the window. Throwing a machine out a window?

TS: I don't know where that one comes from except that I did talk about that it would be great... Oh, oh, I remember the --

[END OF INTERVIEW]