Oral History of Allan (Al) Alcorn

Interviewed by:
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Henry Lowood: Ok Al, thanks so very much for agreeing to do this oral history. I wanted to start right at the beginning and ask you to give a little background about your family, where you were born and where you grew up.

Allan (Al) Alcorn: Yeah, I was born and raised in San Francisco in 1948, just after World War II, baby boom, and lived in various places. We were kind of a lower-middle class family, moved around in San Francisco, various apartments, and I guess the most interesting thing is eventually we wound up at an apartment flat in 520 Ashbury, just a half a block from the corner of Haight-Ashbury. When I was very young I always had an interest in technical sort of things, and I wound up talking my dad [into something] -- My mother and father got divorced when I was pretty young. My father, a Merchant Marine said "Ok," and signed me up for a correspondence course under RCA on radio TV repair, electronics, and so I was in junior high school when I took this course, and it was basically a technician's kind of course; how to solder. It wasn't a whole lot of theory; it was just the practical stuff. So my father wasn't around, but across the street was a very nice man named Emmett Marrujo and he ran, and owned and operated a television shop [S&M TV Repair] down on Haight Street, down towards Divisadero, and so in junior high school I'd go down there and hang out. Remember I was in junior high, and I got to the point where I could fix things, and I actually had a tube caddy. This thing would be hard for me to carry, you know. You've got to remember, I couldn't drive a car because I was too young; I was like 14, 15. I remember that didn't deter me. I still wound up driving cars anyway, and the repair man, I mean, did this for years and I got to be very good at it, and in that business in those days it was all vacuum tubes, and when the TV, the outside guy, he'd go from the shop to the person's house, and if he couldn't fix the TV by replacing the tube, which most of the time you could, he'd take the chassis out of the whole TV and bring it to the shop. The inside guy, he had to be able to fix anything; he was like a journeyman position, you know, and I got to the point where I could do that. The other thing about this shop that was interesting is by after lunch, most of these guys got pretty drunk, and so I'd be the only sober one there, and they'd have a crap game which started about 3:00 in the back room. So I basically got to run the shop for a while so it was pretty fun. And it was really a great [experience]-- He was kind of a surrogate father to me, and it worked out well because when I went to Lowell High School in San Francisco. Great High School, I believe Bill Hewlett went to that school; a college prep kind of high school, and <inaudible> physics. Thank God I had a good education there and I was on the football team.

I was actually quite a jock. I wound up playing all-city football with OJ Simpson. I was all-state, and I had offers for a few colleges, and eventually I was not offered a scholarship at Cal, but I got into Cal based on that, and leveraged that to get in and quit the football team after a week. I decided to be an engineer or a football player. I thought my career would be better off as an engineer. So, but where it really paid off was about the first year my father paid for the tuition. It wasn't that much at Cal in those days, but then he got a heart attack and he couldn't pay anymore. Now here I was-- and this is of course in the middle of the '60s, that reading, writing, revolution time-- and I really wanted to stay there for two reasons: One, I liked the place, and secondly it was the Vietnam War, so if you didn't do that you, you, you know-- Some of my friends, you know, died in Vietnam, so you don't want to do that. So, I stayed there and I went to the college job search thing and there was an opening for a TV repair man three blocks off of campus on Telegraph Avenue at Hubbard Radio and Television Repair. It turns out Mr. Hubbard who owned the place, his son was a professor in one of my classes in electrical engineering. So, he really trusted me and it was a great deal. I worked my way through college, but I'm not pleading hardship because I actually had a key to the place, I could come any time I want, I got piece work, and I was able to comfortably pay my way through college fixing TVs, and I got <inaudible> journeyman thing. It also was a great base when the People's Park riots happened. It was right in no man's land, so I got to see both sides of the tear gas and everything.

Lowood: So there was never any doubt really that you would go into engineering given…

Alcorn: Right, and I remember I really, really liked electronics. I remember buying the first transistor [BC?] 107, you know, and playing with it and that stuff, but like most people, you know, I said well, I guess I should be an electrical engineer. There was also another very interesting-- Ah, the other telling thing was when I was in junior high school there was a program at Polytechnic High School which is nearby our home in Haight-Ashbury. My brother went there. Very, very tough bottom-end school, and they had a thing called Lux Lab that was just-- in a separate building, just next to the main building, and it was about electronics, and I wanted to be in that class because I was a bright, young kid in junior high school, and they had--it was oversubscribed, I showed up, but I couldn't get in, and it was just by luck of the draw, toss of the coin. I was very depressed. That's when my father got me the RCA correspondence course. So, I was the youngest guy to ever complete the correspondence course.

Lowood: So immediately at Berkeley you went into electrical engineering as soon as you could?

Alcorn: Not off the bat. It was electrical engineering computer science. I had decided that I liked analog electronics, this whole new field of digital electronics, and computer science didn't really interest me. It just seemed like, you know, kind of a different problem. The elegance and the artistry in an analog circuit appealed to me; amplifiers, oscillators, you know, linear stuff, non-linear stuff, those kinds of equations. I really enjoyed that, but thank God at Cal in those days they force-fed you enough. They made me take a course EE101 which was Computer Programming, so then it was Fortran on a 7090, 7094, punch cards and all that; later a 6400 Control Data. I probably would not have taken it had it not been that they forced me to, and thank God I got that exposure, and also digital circuits and stuff like that. So, I got a broader education than I wanted, but it's what I needed, you know.

Lowood: I've read you say that you like to solve analog problems using digital and so on. Did this mix that you had in your education kind of set you up to think about using different kinds of digital technology as they came online through the early 1970s and maybe applying them to the areas that previously had been areas of analog electronics?

Alcorn: The real moment it did that was when I got to my junior year at the factory a.k.a. Cal Berkeley; not a warm and fuzzy place, right? And the pressure of the war and the protesting going on, all this conflict, I got to the point where many students do. I almost dropped out. I just didn't like the whole thing; too much pressure. So I decided ah, the work-study program. There was a work-study program that was pretty well unknown at Cal at the time; there were 50 <audio gap>. Ok so I decided to participate in the work-study program, and that was a program where you would work in industry for paid for six months and then go back to school for six months. Cal was on the quarter system at the time. And I thought, oh great, I'll make a lot of money and I'll save up all this money that will help pay for everything, and I had a heck of a time getting a job. I put my resume out. I couldn't get anything- no response, not a response, and my mother worked as a secretary for an executive in an insurance company and this guy knew Mr. Roberts who was the President at Ampex and said "I'll get you a job." So I finally gave up and said "Ok Mom," and boom, I get into the interview process and I'm hired by Kurt Wallace at the Video File Group. That exposure to high resolution video technology and well-done engineering, really, really top flight crafted skill, excellent work was really a great exposure and really, you know, I now had to do things I now saw what an engineer did, which usually doesn't happen until after you've graduated, and I imagine some people do this and discover they don't really like the field they've studied for because it's not the same as going to school. It's not the same s fixing TVs. And I really enjoyed it. I enjoyed the people.

That's where I met Nolan Bushnell, Ted Dabney, Steve Mayer, Larry Emmons, those kinds of guys while there. And so when I went back to school, boy I now was focused because then I said "Gee, I want to answer these questions: How do I build a certain band pass amplifier? How do I solve this problem? How do I do these things?" And these questions were there for me so I was a much better student for the things that I knew applied.

Lowood: So something like spring, summer you were at Ampex and say fall, winter you would be back in classes. Not coterminous in any way, but you spent the full six months really working.

Alcorn: Absolutely. Lived down in Silicon Valley and did that, yeah.

Lowood: Ampex was a very hot company in the '50s and into the '60s; very underappreciated today of course because people have seen a lot of other companies come and go in Silicon Valley. Could you talk a little bit about what it was like at Ampex and what the feeling was there when you arrived?

Alcorn: Yeah, exactly. It was one of the pioneer companies in the valley. I mean there was Lockheed of course, and there was Fairchild. I don't believe National had even started then, so it was really the pioneer company that started out with an audio tape recording, and then pioneered video tape recording, and I worked in a spin-off. We were very lucky. It wasn't really a spin-off, it was a division called Video File which was a group that was headed by Charlie Steinberg, who later became the President of Ampex and Mike Felix, one of the smartest guys I ever knew and John Watney was there; very good technical people and a few of the people that were involved with the video tape stuff, so they really knew this stuff really well. The product they had was a big system. The idea was to use video tape, this two-inch wide video tape in a different format all together to store documents, to actually store, retrieve readable documents. So, it required a very high-resolution camera. It wasn't television standards, it was 15 frames a second, over 1000 scan lines; custom stuff, which was good because now you're unstuck from "Oh, this is what television is," you know, 525 line 15 kilohertz horizontal. This is all different, and so I did a lot of analog stuff. But then there was one of the things they had to do, one of the experiments they had me do was make--because people were complaining about getting epileptic seizures watching these displays at 15 hertz, even though they were long persistence phosphors. They wanted to see, maybe they could do a two-to-one interlace, or a four-to-one interlace, and so I had to build a sync generator that would do all these weird standards, and the way you built sync generators in those days was like a divide by five, divide by seven. They were very difficult, tedious things to build. I mean, a sync generator that Ampex had for the building was like a rack of electronics. So, and I having known TTL from my days at Cal, I built a sync generator with digital dividers that was easily modifiable, so with a few switches I could do all these things and make changes-- just to save me work because I'm lazy. I could just do all these different experiments and see how it would work. So that's where I started applying this stuff. And the other very similar thing for me-- What happened was that the plan was to do the six months back at Berkeley and then go back to Ampex for six months and then do enough to graduate and I'd get a job, but at Ampex-- and I'd retire with a gold watch and be happy.

By the time I'd finished-- I came back, Ampex had a problem. Now they were in trouble. They had this fundamental problem because they were doing audio tape recording, and reel-to-reel audio tape, and they were selling the stuff at retail and they were in the return business, and they had all of a sudden the first loss they ever posted, and now they couldn't hire me back. But my old boss, Kurt Wallace, who's still a friend wanted to put me on ice basically and had a company run by Johnston, an Englishman. I think he did Alto Computer, I'm not sure. But anyway, this was a company called Peripheral Technologies. He

got me a job there. It's funny, he said, "Oh, they'll be out of business in six months or so and I'll get you back, so just go there." I was basically a junior tech at that company, and they built computer output microphone machines. So this is back in the days when there were legions of people typing data into this computer system to do billing and stuff like that, and the idea was to keep the records on a microfiche as opposed to microfilm, so they had a funny camera, but they had a lot of electronics, all TTL that would take the data, and spool it from I guess mag tape they used, and spool it to microfilm. So they had a good engineer, a good analog engineer and a really good digital engineer, hardware engineer, and they shared two ends of a big table, and they worked very well together, and I really apprenticed. I wish I could remember the digital engineer's name. He was excellent, and showed me some of the conventional tricks and the tricks of the trade, how to do some of the stuff which <inaudible>.

Lowood: So this was probably 1970 maybe?

Alcorn: Yeah, this was probably-- Yeah, because I was first at Ampex in '68 so this was 1969, '70.

Lowood: You did get back to Ampex.

Alcorn: What happened was, the company got bought by Pertech, a Southern California company. Surprise, instead of going out of business they got bought, and okay, and so it's in Orange County and I wasn't on the list, being a junior engineer, of the guys that had moved down there, but was on the edge of the list. So they actually flew me down to interview, which was like, "Oh wow, this is cool," and I interviewed them and basically they hired me and paid to move me down, and rented an apartment in Laguna Beach. It was wonderful, and so at that place I learned more about digital-- pretty much doing nothing but digital electronics and the occasional power supply fix, so it was very interesting because it was a lot different than Berkeley. And just as an aside I had-- I was somewhat of an activist at Cal in that era and I was very involved with People's Park and in fact in the book People's Park you'll see three of my photographs. I'm an amateur photographer, and so they were pretty good photographs in this book. I had some of my photographs printed up as 11 x14s [that] were on exhibit. So I had these prints, and I put them up on my cubicle of the confrontation between the Blue Meanies and the students and it was pretty like, really-- they were good photojournalism. I remember one of the vice presidents of Orange County coming in huffing and puffing, looking and saying "Why don't you have pictures of kids throwing tear gas at the cops?" I go, "Hey, where do you buy tear gas? They wouldn't sell me tear gas." And I go, "Where did you find this out?" I read it in the Orange County Daily Register. But I got away with it, and it was funny, that's how I grew a beard because if you grew a beard you'd get fired. So, I wanted to see.

Lowood: And what happened?

Alcorn: I didn't get fired. And then about that time I wound up-- Ampex recovered a bit and Kurt said, "Hey, do you want your job back?" I said "Yes," and I moved back up to Redwood City and now I was full-time junior engineer at Ampex at $1,000 a month.

Lowood: I'm not sure if the timing works out, but did you know Lee Felsenstein at Berkeley at all?

Alcorn: Never knew him there at the time, no. We were around obviously, but we were throwing different rocks I guess.

Lowood: So now you've got back to Ampex. Did you go into the same group that you had been in before?

Alcorn: Yes, I went to the very same group as before minus Nolan who had spun off to do this crazy, stupid thing called Computer Space, this video game. I mean, what an idea, you know. And Nolan was always a puzzlement because he wasn't the greatest engineer, but he was-- he had actually formed a stock buying club, where you get enough guys together that can pool enough money where they actually get an account to buy stock. It wasn't as common for people to buy stock in those days, and so he was more of an entrepreneur than an engineer, but he was okay, and he was obviously very, very bright. He reported to Ted Dabney, so when Nolan left Ted was still there so I took Nolan's old place--office--but I worked for Ed De Benedetti on the camera.

Lowood: So the chronology then was that Nolan was there when you were there on the internship, and then when you left and came back, by that time he had already left.

Alcorn: That's right, and we have talked to "Hey, Nolan's quit. Wow, he quit?" I mean, this is not something you did back in those days. It was a very crazy maneuver, and he was from Salt Lake City and the whole thing.

Lowood: So were all of you guys in the Video File part of Ampex as well? Were Nolan and Ted Dabney, all the people, in the same group?

Alcorn: Yeah. In fact, Patty Ewart was the Plant Nurse back when they had plant nurses and we hired her as a secretary. She was my secretary for many years.

Lowood: There were a number of people who eventually ended up at Atari who came from Ampex. Today we might say in a way it was sort of a spin-off. This kind of thing is very common of course in the Silicon Valley.

Alcorn: Now.

Lowood: Now, but at the time what was it like?

Alcorn: Well, there were others. I mean, <inaudible> Division spun out. There were people-- and there was another group from Trans American Insurance, Trans something [Trans-American Video, Inc.], that stole the concept of Video File. Now, you know-- I mean, if you're going to steal something, then steal something that's going to make money. So they were sniping at people, and so there were people spinning out. That was going on, but it wasn't as prevalent as it is today, and indeed frankly what happened, the reason I got hired was I was recruited by a recruiter to go to work at this competition for Ampex, and they flew me up from Orange County to interview and they were like a mile down the street from the Video File Group which was in Sunnyvale, not Redwood City. And they kind of dropped the ball. Once I finished the interview, they said goodbye. I'm sitting here, you know, <inaudible> take a bus to the airport. I mean like I didn't have a car, I was-- but I just walked over to Video File and showed up and said "Hey guys." These guys say "Hi, I was going to work for them,"-- I gave them all the information that I'd learned and they said "Hey, we'll buy you lunch," and then shortly after they said "We'll hire you."

Lowood: Just to close up the Video File thing, what was the intended market for that?

Alcorn: Ah, yeah, there were like a few big customers. It was like the intended market for the computers, you know. They sold one to Southern Pacific to keep track of way bills, they sold one to the-- they tried to sell one to the Department of Motor Vehicles to keep track of all the little slips of paper, these funny sized pieces of paper, and the most endearing one to me at the time, was one for the government which was-- and these-- they would stage these big computer systems in the back room on a computer floor, you know. They were huge. I mean-- and it was first-- the sign went up NSA, because they had signs over it and they came by to do the-- the generals came by and they go "We can't say that," so it was Fort Meade. Okay, the sign went up "Fort Meade". What's this? And then you can't do that, we're telling them too much, so then it was the Department of Defense, you know. It kept changing. So, now we called it Fort Dodd. That was the project, and one of our guys-- this is back when the NSA was still a big secret, so we didn't know what they were using it for. I didn't really care, but apparently had problems with the <inaudible>. We actually take the video picture, the video rates, and then to print them out they'd put it on a hard disk, because Ampex really invented the hard disk recording for video. It came from those guys, all that technology, floating heads and all that. And they physically slowed the disk down like ten to one speed and then ran it through some kind of a funny thermal printer with a funny line CRT and the wet-back paper and made prints that way, you know. If the disk wouldn't work they had a crash and so we sent a buy back there, one of the techs, one of the engineers back there who could make the disk work but when they got there they wouldn't let him see the disk because he might have something in his eyes he could read the data off the disk, and they finally said, "Well what if we grind it up in little bitsy pieces, can you fix it then?" He said "No," and he said "Can you grind a disk like that?" "Yeah, oh yea. I got trippers and" so and we went away and he said "Every time I went to the bathroom a guy would be sitting there holding a .45 looking at you while you're going." So it was all these funny stories, so that was the market. They sold maybe five or six systems, you know, big systems and, you know, it was not really a great product, but boy with the great technology that was there and the engineering process of how to get boards built, I think that's very important.

Lowood: So, Bushnell's left now when you get back. You're working at Ampex. As we know Bushnell then went on to do Computer Space and had this connection with Nutting [Associates] and eventually he founded Syzygy +in the middle of 1972. In that chronology when did he actually come to you? What were the circumstances of him coming to you?

Alcorn: What happened was I think the technical details-- and you should check this with Nolan-- my understanding was he gave Nutting Associates a license to build Computer Space and that's why it says "Syzygy engineered" on it through Syzygy Company. Then he and Ted Dabney came on as VP of Engineering as contractors or consultants as opposed to full-time. And then as I think as Nolan said the game didn't sell that well-- and Nolan found the guy [Dave Ralston, marketing director of Nutting Associates] because my understanding was they shared the same dentist. Mr. Nutting was like this coinkydink. It's the only person who manufactured coin-op stuff west of the Mississippi, so that was convenient. His previous machine was Computer Quiz, so hence the Computer Space name, you know, and then apparently they had a US sales guy that did all the sales, they had a foreign sales guy that sold one machine to Canada, and Mr. Nutting made him the president of the company, you know, and didn't like the US sales guy because the US sales guy made more money on commissions than he did, so you fire him. Nolan's saying "This is not how I run a company," but Nutting-- and so Nolan said to him, my understanding was that he says, "Look, you give me some equity in this company, make me a partner, and <inaudible> make this a very big company," and he said "No." Nutting told him "You're' just a kid, you don't understand business <inaudible>," and I won't do it. So, ok. So Nolan said "Great, we'll spin

out," so now he's decides to leave because Computer Space had kind of run its course and he wasn't going to-- he wanted to start his own company, this bold maneuver like "Whoa, how are you going to do this?" So they had royalty money income coming from this thing and they used it to buy slot machines and they had their own route. Nolan loved operating, so we actually had a route in the area of maybe 50 machines, and that's when Nolan came to me and said "Hey, I need to hire-- I want to hire you because I want to start this company and I think it would be really great." I suspect he hired me because I was cheap. I was making $1200 a month by that time at Ampex, and he offered me $1000 a month, so it was a cut-in salary, but things started degenerating at Ampex and it was really getting a little less fun than it was. There was a lot of economic pressure. They merged another group, the-- I forgot the name of it that did training, audio training for schools and stuff, and they didn't have-- there was an engineer there that-- I won't say his name, but he wasn't very good. So it was very frustrating to have to work with the guy. In fact, I, being subversive, this guy was working on a video head read amp, and he was just incompetent and every time you have to DC couple these amps, even though you're doing it up a very high frequency you have to DC couple them because they read and then they write, and when you write there's this huge pulse, so it charges up all the capacitors in the AC coupling and it takes forever for everything to settle. If you DC couple it, it doesn't happen. And furthermore, there's a part called the 733 [mu-733] which is a differential, it's a chip. <inaudible> was meant for this purpose <inaudible> used commonly, completely unaware. So, this guy would, he'd solve one problem and another problem would crop up and he'd solve that problem and go back. He was going in a big circle and it got to be where it was just like, the good engineers were going "This idiot." So one day, one afternoon I made up the right circuit, the correct circuit and put it in his machine where he didn't know it, actually put it in, and it worked perfectly. So, yes, yes, yes, I solved the problem. Then everybody laughed and said "By the way that's not your circuit. That's what I've been telling you to do for the last three months," and it was fun for me.

Lowood: Did you know Nolan well enough from the internship that he just called you up and said "Hey Al, I'm starting a new thing."

Alcorn: Yeah, we weren't tight but we knew of each other, yeah. We didn't share an office, but yeah. And he shows up; takes me to lunch in a company car. It was his blue station wagon, Chevy or Oldsmobile Station Wagon and the concept-- I've got to tell you, the concept of a free car, like wow, what an idea, you know, and he'd rented this space on Scott Boulevard, and it seemed like such a-- I mean come on, this was the era. I mean this was I think a real key thing that's hard to communicate to people today. You had the Vietnam War going on, you had this feeling that, you know, there was a Cold War, and remember we were building fallout shelters and there was this sense that we could be dead at any minute from nuclear annihilation, and you had people coming back from Vietnam in a box, dead, and our parents all survived the depression and thought that my God you got a college education, you are set. You know, don't screw with it, but we learned not to trust the government anymore, and we were young and adventurous and crazy risk taking. I mean, I was from Berkeley. Anyone who was from Utah certainly wasn't radical at the time, but there was this feeling of let's do something because, you know, life is short, and so there was this kind of a-- and my thought about the process was that "Oh yeah, he gave me a little cut in salary, he gave me 10% of the stock in the company," which had no bearing to me at all" because I didn't know what that was going to be worth, and I thought the company would fail. I knew that most startups didn't succeed, but I knew it would be fun working with them, and the idea of working in a very small company <inaudible> do everything, whereas at Ampex, you know, there was manufacturing, you didn't mess with them, and there was all this process which is good to know about, but you've got to just focus on drawing the schematics and testing things. So I had a big expanded range and then when it failed I would go back to Ampex. And I saw people that did that and came back on a much higher spot because now-- so it's actually a way to advance. So that was my fallback. We never really thought that this idea would be a big success.

Lowood: So that moment Atari-- It was called Atari by then, right?

Alcorn: No Syzygy. My business card.

Lowood: That's right. So at that moment it was basically Nolan, Al Alcorn and Ted Dabney.

Alcorn: Nolan, Ted Dabney, then me.

Lowood: Sure, but that was basically the company at that point. The other founder was Larry Bryan?

Alcorn: Ah, yeah. Well I'm glad you brought that up. Larry was actually a part of the original forming of Syzygy, whatever that was, but by the time Nolan hired me … See, the original idea of the whole thing of Nolan originally was to use a Supernova Mini Computer running a bank of video games so you could share it among a bunch of video games in an arcade to make an economic model. In fact my understanding-- you could ask him-- his wife was the secretary or the accountant of the corporation, and he had to check out to buy a few of these computers and they were like $10,000 a piece, and she never sent the order. She thought it was so crazy, and by the time Nolan would have noticed if the chips or the computer wasn't there, he had designed out the need for the computer, because the computers were so slow at that time, you know. So there was this brilliant leap that Nolan made about how he could get rid of just a little bit of logic and could do the same thing the computer's going to do just much, much faster, so he didn't need the computers. Bryan was going to be the guy to program the computers. He was the programmer from Ampex that programmed these because we had our-- they're running this whole huge system. The video file was a little SLI or an ancient computer, not well known and it was, you know, a mini, and he knew how to program assembly language which was the thing in those days. But we didn't need them because there was no programming.

Lowood: So the equipment that was set up in Nolan's daughter's bedroom and all of that, he never actually set up a computer to run that.

Alcorn: Not to my knowledge. He never had a computer.

Lowood: Oh, interesting. And so Larry Bryan then was kind of superfluous at that point.

Alcorn: He was never in the office to my knowledge, never actually-- That somehow terminated before we actually opened the doors on Scott Boulevard.

Lowood: Okay, so it was the three of you. Is it true your title was Senior Engineer or something like that?

Alcorn: Yeah, something like that. It was never VP of Engineering. It was eventually VP of R&D or something like that.

Lowood: Was the idea that you were pretty much in charge of the R&D or the development part of it maybe more? What did you go into the company thinking your role would be?

Alcorn: I think-- Remember, both Nolan and Ted were Electrical Engineers, and I'm this junior guy, you know? I'm the low man on the totem pole, and I think the main feature is that I was cheap, right? And I'd go along with the gag, and I'm sure he would have loved to have hired the professionals back there, the real greats, but he couldn't afford them. Why would they leave, you know? So I was what he got, which I think was the best because I wasn't burdened with knowledge of how you do video. I knew how to do video from the old days, so what was your question again on that?

Lowood: What did you see your role as being?

Alcorn: So Nolan gave me this job to do Pong, a simple video game which we now know was just an exercise. So he left me alone to go do this. I mean, I suspect if it was the real game he would have been over my shoulder all the time, but because it was just this test, which I thought was the real thing, I basically had free reign to go do this, and I'd ask the question occasionally to Ted or Nolan about how to do this or that, and that's what happened. I wound up making [it], because I was lied to about it-- I thought it was a real game, so I put features in it to make it more playable, which if you think about it is an exercise. Why bother if nobody's going to play it? It's like the movie The Producers, you know? We're going to steal this idea from Magnavox, but it's a turkey so what's the problem? All of a sudden it's a success.

Lowood: So day one basically that was the assignment?

Alcorn: Absolutely, from day one Nolan-- "We got this contract from General Electric. We're going to do a home consumer video game, very, very simple, one spot," and I'm sure he got it from seeing the Magnavox. I think I must have seen an ad on television for the Magnavox.

Lowood: Of course there was that demo in Burlingame.

Alcorn: I was never there. Nolan was. Apparently Nolan went to see it, and I'm sure it gave him the idea for it, "Hey this is really, really simple," but we knew it wasn't a successful game. People didn't like playing it. It didn't sell very well. So, you know, let's just do the most simple game to save time, you know, and he had-- and Nolan had-- this is important-- a contract from Bally. He had gone and talked to Bally and he had a contract for a video game-- because <inaudible> there was Computer Space. That was the video game. So he was going to do one for Bally, and he had a pinball machine he was going to make. In fact, this is back …

Lowood: The pinball machine is not the Bally contract?

Alcorn: Yeah. Bally had three things we had to do for them: a pinball machine, a video game and I think some kind of a major arcade piece.

Lowood: There was a something I read, maybe you can correct this, that it was a racing game or something like that.

Alcorn: A video game?

Lowood: For Bally.

Alcorn: I don't think it was-- well, the video game for Bally, who knows what it was going to be. No one was busy by the way designing a two-player Computer Space. He had an agreement, the contract with Nutting to do a two-player Computer Space, and so he did it, and I couldn't help him because I could not understand his design methodology. I could not read his schematics. If you've ever seen a Computer Space schematic you'll know what I mean. So it works for him, but not for me, so he was doing that and I was doing Pong, and as it came to pass Nutting, by the time he finished this thing Pong was out. Pong was a super hit, and Nutting wanted Pong, not that.

Lowood: And just to clarify, you didn't know anything about the Bally contract.

Alcorn: Oh no. I knew about the Bally contract. Oh, I knew about the Bally contract, but there was never a mention I was doing something for General Electric, and people from Bally actually came by. In fact, Sam Klein came by one time. That was very interesting. Sam Klein was like the Treasurer of Bally, and this was in the good old days. I hesitate to say too much but he was the darker side of the coin-op industry, a <inaudible> man and very self-assured, you know what I mean. Anyway, Ted Dabney was on the way out. That was a very, very touching, tender, sad moment. This was after Pong had gotten-- Maybe I'm jumping ahead in the story but-- but Pong was beginning to be in production. They were going to put it in production, and Ted was in charge of manufacturing it, and Nolan came into my office and said "Al I'm going to have to fire Ted and I don't want to lose you," because Ted and I were good friends. I said "What?" and he said "Ted isn't cutting the weight. He's not really competent at this, doing a job beyond his abilities," and I said "No." I said "Gee, I didn't know about quitting" but I was stunned and about that time Ted walked in. They had been arguing before, and so Nolan just asked him questions about what's our manufacturing capacity, how many people, obvious questions and Ted didn't have any answers for him and I go, "Wow, you're right Nolan." So we had to let [him go]. That was a very painful thing, a very sad moment. I really loved Ted, and that's when Ted left. So we were trying to build this--I was trying to put Pong into production and Nolan tried to finish off Computer Space and he had this weird project of a pinball machine he was building up in the back, but it was relays, and we didn't know relay logic. But there was one guy Herbert, Tom Herbert at Ampex, who was one of the good engineers, the top guy, and he knew relay logic. So Nolan got him to moonlight, to come in and do this stuff, and I remember we actually had a kind of a crude functioning wide bodied playfield pinball machine, and Herbert loved it for the odd reason. It was the first time he said he ever worked on anything that his daughter could understand. "Ah, it's a pinball machine." Because he worked on this big system. That's no fun. So he really enjoyed doing it, and I don't think-- it never went to Bally.

END OF TAPE 1 / BEGINNING OF TAPE 2

Lowood: Okay, so I want to ask you a two-part question about when you're beginning the work on Pong and starting to settle into that. This is about two possible influences on what you were doing. And the first was, okay Computer Space, you said the schematics you found very difficult to read. So I just wanted first to talk about whether you looked at it, whether you looked at the circuitry and the kind of design decisions Nolan made. And secondly, whether you had any chance to see what was going on at Nutting, and how they were doing, what they were doing with Nolan Bushnell there and whether that also fit in to what you were beginning to develop with Pong.

Alcorn: Okay, yeah. Let me talk about the second one first. I was back at Ampex now, Nolan and Ted had left and they were working for Nutting Associates as I mentioned earlier. And one day there was like an invitation for the old team at Ampex, maybe four, five of us to go visit, see what's going on and have lunch, you know. So when I saw that, a couple of things struck me, the idea again of playing-- the whole idea. It's is the first time I really saw a video game on a TV set, so it's very clever using a TV set on one hand. But I knew a lot about TV sets from my day, fixing stuff, and this was the days when transistors were starting to come in. And Nolan somehow picked this vacuum tube General Electric TV set that was a dog-- I would never have-- a fire hazard as far as I was concerned, so that was one--and then the other [was the] cabinet that Nolan had chosen was really bizarre and interesting and had a lot of smell to it you know, from the fiberglass. So that struck me as odd, but the learning-- so other than that I didn't-- and other than hey there's a business here, you know, there's some play value here, it struck me as a complex game--a little hard to play. And then the other thing about learning from what Nolan had done. Nolan had filed a patent on the fundamental trick. The how to get rid of-- how to make a spot appear on a TV screen like Pong without having to do a memory map, a frame buffer, like what you would do today, because there was no memory other than flip flops. And so it was a very, very, very clever trick. And I think I perused, glanced at the patent and just verbal from Nolan you know how it was done, it was really clever. And it involved simply making a sync generator, a television sync generator which had you know, counters to count clock pulses to make a horizontal sync, and then counters to count horizontal sync to make vertical sync, and so you'd get the lines set up. If you had another sync generator and you just had it running at the same time, but not synchronous with it, just the same clock and you decided to take the second sync generator output and make a spot where horizontal and vertical sync happen the same time, that spot would appear randomly, somewhere on that screen, just by happenstance. You turn the power up, backup would be somewhere else. So now if you had that sitting there and you made the second sync generator a vertical counter, one less than the primary sync generator, that spot would appear to move up, you know, and if you made the count one more than the count, you'd appear to go down and similarly horizontal. So now, you've basically-- you're less than 20, 50-cents chips, and you now have a spot, you can put a spot anywhere. The funny part is you can't actually-- it's not easy, almost impossible to say I want this spot there. It's just there and you can make it move. I suppose you could force it to go somewhere, but that would have been a lot more circuitry, so that was just brilliant. And it all worked at-- you know, the PTL circuits are working at 20, 30 megahertz, no problem in those days. Video was five megahertz so, hey, this was all pretty standard, pretty straightforward. But it was this happy relationship between using the digital TTL circuits which are absolutely ones and zeros, to do video which in those days was absolutely analog. There were no ones and zeros. And I remember at Ampex, Watney had some weird project where he was doing digital video, it was really weird. And he had these computer printouts that reflected video, video images of bits. And the word pixel wasn't in use, that's another whole story. But you know, like wow, I mean the merging of this and somebody in the audio group was doing, playing with digital audio and this whole idea was absolutely fascinating and new. And so we were very fortunate to be right at the cusp of making this happen. It didn't seem that revolutionary at the time, but it wound up being the first digital appliance consumers ever got their hand on, high speed digital appliance.

Lowood: In Computer Space, Bushnell had this thing with using diodes for the rockets, was that something you looked at?

Alcorn: Yeah, no. I thought that was a giggle, because I remember, remember back in those days RAMs had just come out from Intel, had made the first RAM chip. There really weren't ROMs, you could get them, but they were very, very slow and very simple, very crude. And you could do it that way, but those were expensive parts, and to just put the diodes on the circuit board was kind of cool. I also did not like how Computer Space had three printed circuit boards in a cage, that was very traditional stuff and I forget where, but I had seen other people designing products where they'd just make one big circuit board

and put it all on. It's much-- saves a lot of problems, a lot of quality reliability, and that's what I did with Pong, just put it on one big board.

Lowood: And some of these things, the way you were generating the images carried on all the way through to the VCS [Atari Video Computer System], didn't it? Because there you weren't doing bitmap either.

Alcorn: Oh right. I mean that was a whole other economic issue with semiconductor companies and how things were designed, and why we did our own designs.

Lowood: There were two other projects that I know about at this time that were related. One was the Galaxy Game at Stanford with Bill Pitts. Did you know about that?

Alcorn: Yes. One of the great things that Nolan did, we did. It was great happenstance. Remember I said Nolan had a route, and he had pinball machines out there, so in the back room on Scott Boulevard we had a kind of a small warehouse with a half-a-dozen pins that we'd move around. The way you'd made money in the business was that once a machine got played out at a certain bar, you'd move it to a different location and you could renew the earnings. So I got to go play the pinball machines in the back and that was good. I really enjoyed playing Fireball, it was really therapeutic. But also in the evening on the way home I would go and collect an occasional machine, especially the Pong machines. And it was very helpful because I then understood the needs-- there are several customers when you make a product. One, the obvious customer is the guy who plays the machine, but you also have the distributor you have to sell it to, and you have the operating environment and they need to have this. So, how do you collect the coins out of the machine in these things? And we had stupidly--you had to open the back of the Pong machine up to get the coins out. Well, that means to move the machine out, you know, no coin door, which was a problem. And so I would-- but one of our first locations after Andy Capp's Tavern, was the student union at Stanford. And right next to me was Pitts with his, what did you call it, Galaxy Game. And Nolan. We looked at this thing and my goodness, there was a teletype terminal sitting behind it, and he'd be in there modifying code on this thing. There was a vector scan display, from I think Hewlett Packard or Tektronics. There was a real minicomputer in there.

Lowood: Did Nolan ever say this is what I'd thought I was going to do?

Alcorn: No. In fact Nolan said, this is what not to do, he said this guy's giving away 2 or 3 bucks with every quarter you put in. It doesn't make viable sense at all. But to me the right thing, you know, okay-- I remember talking to him. I run into him occasionally, but he'd be there all day working on this thing, and it’s probably the only place--one of the few places in America--people would play it, because you needed a physics majors to really play this thing. Meanwhile, we had this stupid Pong game sitting there, and I was scooping out fistful of quarters. The blank thing just ran forever and I said, well I'll see you later, so it was kind of an interesting-- and I've seen Bill since then and I just think it's wonderful.

Lowood: One other thing, and this just came out a couple of years ago. As kind of a random question, I didn't have it in the outline. A couple of years ago, Dean Takahashi wrote this piece. He was talking to Ted Hoff, and Ted Hoff mentioned that he had done a version of Spacewar! using the 4004 [Intel 4004] in 1972, that he had done it for sort of a demo, and he's written about that. That was not something that you knew about? Did you know Ted Hoff?

Alcorn: No.

Lowood: You have this design assignment for Pong, there's the contract. You mentioned a little bit already about the Magnavox Odyssey and Ralph Baer's patents that he had from Sanders. Where did Nolan tell you they got this idea from for doing a ping pong game?

Alcorn: No, it was just a fiat decree. I never asked.

Lowood: So you just went to work on that? What did you think the most important part of this design project was going to be?

Alcorn: The criteria then were cost, cost, cost. Because it's a consumer game, so you know, we knew enough at that point even though no one had ever done a consumer product, but this thing had to sell because the Magnavox was selling for like 100 bucks. So you knew the electronics had to be down around the $15, $20 region to do this, and you know that means with power supply and everything, you could maybe have 20 chips. And so by the time I'd finished Pong, I was up to 70 chips, so I was kind of a failure. I mean the game played well, but you know, now what? I figured I would try to go back and cost reduce this or something. So I wasn't very, I wasn't really like wow, I really did this job. It was kind of I missed the mark, I felt.

Lowood: So you had set a target in terms of cost basically and in your mind, you'd missed that target.

Alcorn: Yes, and indeed the very first Pong and that prototype I still have. It was set up to run through a little modulator that I built for channel three or four, because it was going to be a home set, and putting it in a box and the coin-op thing was a secondary thing that happened. I remember going to Christmas at my mother's home that year. I guess it had to be '72, December '72, and I brought it to Christmas. And my brother had two young kids about five years old and they loved playing it. I mean, Uncle Fred, "Ah, the lever's hell." I didn't know, he might be right, but some kids at least liked it.

Lowood: So you'd set this task for yourself, price point or however you defined it, how did you then go through what you knew about TTL and about television technology and all of these different things that you had gone through up to this point to make decisions about what the design would be? How did you pick the components?

Alcorn: Yeah. There were lots and lots of design decisions that we made that were I think very interesting to me and hopefully people listen to this. One of the big one's I mentioned earlier, I didn't like the idea of multiple cards in a slot, because you'd pull a card out, all hell breaks loose, connectors or a big failure area. The coin-op environment is terrible. Godzilla plays the machines, so it's really bad. So one of the decisions we made was getting this new production put on a single board. The other decision that was interesting was the power supply. We needed a single power supply that ran at about 1.5 amps. In those days, you could get an open, so-called open frame power supply that costs about $30, $30, $40 that would do five volts at like three amps, but they were very analog devices--linear supplies--and they had an adjustment knob to adjust the voltage on them. Even though it was from the early days, and National [National Semiconductor] had just come out with a LM307 [probably LM309] or something, which was a five volt regulator on a chip that would do one amp and I needed one-and-a-half amps. But I wanted it on the board, it was a very, I thought a very, brilliant, if I do say so, decision; I hadn't seen it

quite done before. You put this thing on the board. Wel,l let me start by saying [that with] the first 10 Pong boards we built, Howard Cantin, one of the best PC layout artists in the world, did this for us. He also did the Apple II boards. We had it there, but we couldn't get the parts, they were just so new. So the first 10 we had to get out the door to get money, so we used an external power supply, and every one of them had to come back because, remember now we were selling these things to people who were used to doing pinball machines. So they had a big screwdriver, and a file and a hammer. And when it didn't [work], when the sound wasn't loud enough, or the picture wasn't bright enough, the most visible knob was the one on the power supply, so they'd turn that and they'd blow everything out, and screw it up. So for the idea of putting this-- integrating it into the circuit board, the five-volt supply, was very helpful, but there was a trick. How did I get it to be one and a half amps? And the engineering trick was well, wait a second, this is a three terminal device, it's always associated with the load. You can't pull the card out of the load. Right? So if you do that, the volt to the current draw drops to zero, so this could never drop to zero. So why don't I just put a resistor around the three terminal device, like a 10-watt resistor that ran three quarters of an amp roughly and it made heat over there. And now the three terminals are possibly only doing three quarters of an amp and I could get away with it. It's something you shouldn't do. I remember when National said you can't do that because if the load goes somewhere, you'll put current the wrong way through the regulator, but how do you take the load away, oh the load can never go away. So now it was bulletproof. So all you had was an external transformer that costs us a few bucks, right, and that went to the board, which then had the diodes, the rectifiers and everything, it was just self contained. So that was, I thought, a clever innovation. The other one was the crystal oscillator; I'd learned this and a trick, dirty trick at Ampex, using a 7404 Hex Inverter TTL [Transistor-Transistor Logic] chip in a linear fashion to make an oscillator out of it; so that was really handy and that worked well. It's funny because, the one issue the very first Pong had-- Fairchild had a really cool TV character generator chip that would do, take a four-bit hex number, and so you'd get zero through nine and a few other characters out of it. But it was CMOS [Complementary Metal–Oxide Semiconductor], and it required minus five plus 12, but beautiful characters. And I put that in and we weren't going to production. "No, no we can't afford that." And I had to-- I don't want to-- it was very, very hard to decode all the states to get the characters, but okay I did it and got rid of that part.

Lowood: And what about the bread and butter kinds of things, like the cabinet, the television and all that?

Alcorn: Well the TV, the TV, that was important and I love it when Woz [Steve Wozniak] gives credit to Pong for really changing his whole thing because-- and I had seen Nolan do this, so the concept was-- remember back in those days you could get a TV display or monitor from Motorola. These green things that they used in airports that were always broken. And they were like $500. They were on a wire-framed chassis and there was no way. And having been a TV repairman, I just went up to Walgreens, on El Camino Real and bought a black and white TV and snip, snip, snip, turned it into a monitor with a-- it used the sound, it was very hard to adjust the sound on Pong, you had to reach around, but hell, it was free. And it cost me 75 bucks. And we just bolted this thing to the cabinet. So that was the monitor. Motorola was horrified. You know this was like an affront. "You can't do this." "Sure I can do it," and that's what we did. But that was really Nolan's idea. I just picked a better set than Nolan did. And the coin box was on the original Pong prototype. It was a bolt on, laundromat coin box. We then used a front plate thing, but it was no coin door. So it was a negative, and we had a bread pan to collect the money, which was an improvement over Computer Space which used a one-gallon kerosene can with the lid cut off so you'd cut your hand. But it would hold maybe 20 pounds of quarters if you get that many. But even this bread pan would overflow at times it made so much money. The cabinet was easy. The cabinet was Hurlbut [PS Hurlbut]. There was a [fiberglass] company, and Nolan learned not to go with the-- we toyed with some fiberglass ideas, but I went to view the place and I was going Jesus Christ, the smell, and they

could only build. You build up-- you know it was a tooling thing. So you'd take a day or two to make a cabinet and it was [limited by] the number of tools you had, so you couldn't grow. And Hurlbut was nearby this company. They had all the right equipment, and they could scale quickly, so it was designed, you know, pretty simple.

Lowood: The "Avoid missing ball for high score," the thing that was put on the cabinet plate, was that you or was that Nolan?

Alcorn: I think that was me, I think it was me. Basically it was a funny argument that we had where Nolan said before we put this out in production it has [to have instructions], because the original Pong prototype has no instructions on it at all. That was in retrospect pretty telling. I mean here you put this machine out at Andy Capp's with no instructions, a coin box, two knobs, and a TV set and it made money. I mean that's pretty impressive. But Nolan said it had to have instructions, I said nonsense. If you have to have instructions no one will play it and no one would read it. He said pinball machines have instructions. I said, "No they don't." We go in the back and look. There they are in the lower left hand corner. Like wow, I never read that, you know. So okay, in my sarcastic fashion, I picked up the three instructions: Insert quarter, ball will serve automatically, avoid missing ball for high score. Yeah I think I did that. The other thing that happened in the early days, the other thing we learned right off the back was the potentiometer to control the paddles. I just went and bought at Radio Shack or an electronic parts store, a 50 cent potentiometer. Within a week or two, it was dead. Then I did the math. I figured we knew how many coins were in the box and you'd figure there may be 20 or 30 turns of the knob for every quarter that was in there, and we did the math and like, oh my God, this thing will do a million rotations in three or four months. And so we had to go to Allen-Bradley to get a very highlight potentiometer, otherwise these things would fail all of the time. So that was kind of a happy problem.

Lowood: When you were picking out the various companies to which you would outsource these parts of the design and so on for the cabinet and the knobs and so on, by that time you already knew that you would have a product that would sell. Right?

Alcorn: Yeah, you want to talk about that whole era? Why did we decide to produce things? How do we <inaudible>? See, when we started-- I didn't say this, but we started Syzygy/ Atari, the idea wasn't to be a coin-op manufacturer. The idea was to design games, intellectual property and license them to other people like Bally, who was our goal. They were the biggest guys. [The idea was] to receive checks and not build stuff. We didn't want to soil our hands with manufacturing, and that was pretty much agreed upon. So I remember once, how we had this hit with Pong it was like all these stories about that and Nolan. Remember Nolan [promised] to give Bally a video game, right, and the word spread like wildfire that something was going on with this thing at Andy Capp's. I mean just this one machine. People started waking up because-- I've got to tell you a side story, I mean, because we had a route in this area, there were other people who had routes. And one of the reasons we never got any money from banks-- oh this is about the mob. I was never offered anything by the mob, so who knows if I would have succumbed to the forces. But they accused us of doing it anyhow. And we got resistance from operators that we were in their territory. One guy pulled a gun on me at a dinner. That's another story. So you know we <inaudible> be in this business, but this thing was a hit. The word was getting out, people were showing up to play this game that, you know, weren't drinking beer at nine in the morning. So Nolan had agreed to give them a pinball machine or a video game and now Nolan realized that this thing was too important and he wanted to build it, but that wasn't our charter. So he had two problems. One, he had to convince Bally and Williams that they didn't want the game, and he billed them something else. And he had to convince me and Ted Dabney that we wanted to be a manufacturing business. I remember sitting

at the bar at Andy Capp's, pondering that here's this prototype making money out there. Nolan says I want to be in the business, and we said no, we don't. And he basically: fiat we are. And then the trick, well I'd love to have been there, how he convinced Bally they didn't want this machine. He managed to do it, and we go off and build this machine. But how we built it, and stop me if I'm getting too much detail, but wow, how do we do this? We had, again, we're down to three people, you know, how are we going to do this thing, getting a circuit board laid out. There was a company that was kind of a scam. It was a trade school for how to be an assembler. Well I mean, what you do you as an assembler? You got hired and then they'd teach you in an hour how to put parts in a board, and these kids' mothers and fathers were paying these kids to do that, and they were helping us-- what they were doing was assembling boards for us, charging us and getting the parents to pay for the labor. It was a pretty good scam. But all of a sudden one day these guys had to [graduate]. What's going to happen when these guys graduate? They've got to get them jobs. And one day the President of the company, this little company, shows up in our facility unannounced with ten people, saying you want to hire these guys? Huh? So Nolan, Ted and I got in the back room. We thought, you know, maybe it's an idea. We had no idea how to hire anybody. So we hire these people, and two of them, I can't remember their names damn it, wonderful guys, young guys, I taught them how to be techs. Two of the brightest guys and they worked at Atari forever and still have a great career in how to debug a board, how to troubleshoot a Pong board. Because once you built the board, there will usually be one bad chip in it or a solder jumps, you had to go rework it, and I taught them how to do that. So that was our first work force, it was just really kind of weird ad hoc stuff. So we got into manufacturing business. Way after that was when Nolan realized that Ted really wasn't being successful at that part of the job. And Ted was an analog engineer, and there was no analog engineering in this thing.

Lowood: I just want to ask you, the story that I heard about the Bally/Midway side of it was that the trick there was to convince Bally that Midway wasn't interested and Midway that Bally wasn't interested, and neither one of them would then want to do something that they figured the other one would.

Alcorn: I think that's how Nolan did it. It's best to ask to Nolan, but yeah it was a masterpiece of subterfuge however he did that. And then we had to convince them that they wanted a number two game, and meanwhile Pong was making all this money and they weren't participating. They eventually knocked off and copied Pong.

Lowood: So did you take the lead then in setting up this production? I guess the production line was in some roller skating rink somewhere?

Alcorn: We first built them on Scott Boulevard. And what was happening, again the financing of the company, we had no bank loan, no one had got vendor credit through Kramer Electronics and other vendors like Hurlbut, our cabinet manufacturers. You pay them like 90 days, 60 days. So we get the parts. I remember, wow, we have a contract with Kramer to buy TTL at these great prices, 50 cents, 10 cents a chip, you know, wow this is great. And we then set the manufacturing up in that plant and we were out of capacity. We would get paid-- I think Nolan sold them for 1,200 bucks and we would basically get paid cash up front, they were so important to the operators. And we'd turn our inventory in like four weeks. So we had great retained earnings. And the other thing that's important and helped Pong's success is that it was a quarter play, and so the operators may get double their income just off of that. All games before that were 10-cent plays.

Lowood: My understanding is that the cash up front was actually not the norm for that industry.

Alcorn: Well, this industry, I mean these are all independent-- wonderful people, very colorful people. They're wheeler dealers, they're cross shipping to the other guys territories, and they have this weird thing I'm sure we'll talk about later, where in every market there's like three distribution chains, there's three dealers and you don't know where the twain shall meet. And I remember we worked very closely with Advanced Automatic in San Francisco. The guy probably had more power than he should have. I forget the guys name, the President of this, who told Nolan how to do it and gave him a list of what distributors to go with and where the good distributors were in the various cities.

Lowood: Was this Nolan's side of the business pretty much? You didn't get too involved in that?

Alcorn: I did not except that one time Nolan said I had to go to a dinner at Advanced Automatic representing Atari and I was you know, like 25 years old. My wife and I go up to this dinner in the city and we're sitting at a table with an operator, and they're using the usual happy horse shit about … We introduce ourselves and the [operator] guy says, this old coot, and he says, "Oh you're with Atari. You know you're operating machines in my territory." He reaches in his pocket and pulls out a pistol, puts it on the table, and said, "I don't like that." So I go, "Ha, ha, ha, ha, ha." I go back to work. I said, "God damn it Nolan, the guy pulled a gun on me." He's, "Oh he wasn't going to shoot you." I mean I'm not going to these anymore, I'm just not going to these anymore.

Lowood: The manufacturing part you were more involved in though. Right?

Alcorn: Well certainly for the electronic board. I had to. Here's the problem. I wound up spending a lot of time being a technician debugging Pong boards to get the production going. And I had these two kids. I wish I could remember their names. They deserve credit, working with me and they were very good, and so great. Now we had a supply of Pong boards. But now the problem was how am I going to design the next game? I'm totally immersed to getting manufacturing, at least the electronic parts of it going. And that's where the Grass Valley thing came in.

Lowood: Before we get to that, I just want to ask you one manufacturing question. This Durastress trademark, where did that come from, and was it just marketing to use that or what was the idea?

Alcorn: Nolan's bullshit. Yeah, I mean I love it, on the back of the Pong board. I still have that on my Pong machine. The Durastress process you know, and guaranteed. And you were going to ask about the MIL Standard 883 [MIL-STD-883, or Military Standard 883]. What that was, was at the time probably the most complex chip we used in the thing was a [National Semiconductor] 9316. It was basically a four-bit counter that you could jam a count into, and it was made by several companies. But the primary leader was AMD [Advanced Micro Devices], which was making this TTL part in a plastic package. And one of their claims to fame was every part they made was certified to MIL Standard 883, which is some--I don't know what the hell it was, didn't mean anything to me. The parts worked pretty good; they cost too much money. But I only needed I think four of them in the designs. So that's Nolan, who just lit off of that-- two four parts in the thing were-- you know. I don't know if it made any difference.

Lowood: Pong's out, it's making money. Were you thinking about intellectual property, were you thinking about how to guard the stuff that you'd made? What kind of measures did you put into play, if any?

Alcorn: Well Nolan had applied for a patent back at Nutting on the motion, the Bushnell motion circuit. And there is a patent out there, when you look it up you'll see the Bushnell motion circuit. And the attorney was Baylor Riddell [ph?]. And he did that when he was [at Nutting.] I think he had to pay for it out of his own pocket, not Nutting. And that was our key thing. Now Nolan's attitude at the time about patents was it was kind of a waste of time in that business because you're dealing with people that pop up and you go sue them, you know, and they'll just go out of business and pop up somewhere else. So it really wasn't an effective tool. It's not at all like it is today. So we didn't waste time doing that. Later on we got some more patents, but we made a big mistake later on when we had consumer Pong and National [National Semiconductor] was copying us. Nolan tried to assert the patent to these guys. Physically he handed them a patent at the trade show, and by this time we'd gotten pretty big. Flehr, Test [Flehr, Hohback, Test, Albritton & Herbert] was the law firm. Because Nolan was such a low guy, they gave him this guy Baylor who's a sweet man, but he had just recovered from brain surgery, so he wasn't all there. Nolan told him that Computer Space was shown at the MOA show in 1971 or something like that and Baylor asserted that that was not a publication of the invention, which is just crazy. It absolutely was and so it was filed erroneously, badly, and the patent was not enforceable at all. In fact, much to the chagrin of the law firm, once we told them, well we gave National this patent, and they looked at it and they go, "Oh we've got bad news for you Nolan. The patent's not valid, in fact, and if you assert it you could get in trouble for fraud." "Well you gave us the patent." You know, like, "Well gee, excuse us, we're sorry." So that was that part, but it was never the issue. We always wanted to stay ahead by building new stuff and keeping ahead by building stuff.

Lowood: So basically full speed ahead, design new games before anybody else, and if somebody's copying your games, they're copying the old games, you move faster than they have.

Alcorn: Exactly, but they copied right off the bat. I mean it was right off the bat. We were still on Scott Boulevard and we were sniped at. And thank God we were so profitable. We could afford this. We had a guy, forget his name, but he was like a little local crook that had a printer circuit board factory and was giving us good prices on printer circuit boards. The reason was he was making twice as many as we needed and selling them to everybody else who wanted them. And so, all the guys were just-- I have in my collection, copies of our circuit board, it was same artwork. So they were stealing parts from us and all kinds of stuff.

Lowood: I wanted to ask about the Grass Valley group, but I wanted to make sure I got it in the right part of the chronology. So after Pong, you started to think about the next game you were going to design. Was that Space Race, was that the next one?

Alcorn: I believe it was. Yeah. Either that or Gotcha. I forget which one.

Lowood: Was the Grass Valley group in place yet or did that come later?

Alcorn: I don't think so. It was fairly early on but we didn't get anything out of them for a little while.

Lowood: There's Grand Track which was '74, so somewhere in that time period. Let's talk about the next couple of games. You said you were trying to juggle balls basically in the company. You were trying to do some quality assurance kind of work with the stuff that was being done, and at the same time free up time to design the next game. So you were basically the game designer for Atari. How did you solve that problem?

Alcorn: Well in a sense that Nolan-- well how did I solve it? Yeah, I was quite busy. Again I had delegated some of the work to the technicians, so that freed up some time, but I just had to force myself - to do work at home and stuff like that. I think, again there's always this distinction. I suspect Space Race, I don't recall how it was conceived, but it was probably me and Nolan, you know together, saying what we could do with it, and so I built it out.

Lowood: This was then part of fulfilling the agreement with Bally Midway?

Alcorn: Yeah, we tried to sucker them into that one or Gotcha. I think it might have been Gotcha. An engineer came by from Bally and I gave him a head rub on how this stuff worked. But they soon realized the goal was Pong and they didn't want to have this stuff. And I think they wanted to be, they felt they wanted to be in the business and they had to acquire some engineering expertise to design this kind of game, but it took them a while.

Lowood: Were you kind of keeping them at arms length as much as you could?

Alcorn: I suppose. I mean Nolan was keeping them happy, trying to keep them happy you know, because they were sending us checks to some extent. And obviously we had become fairly important in the industry. We had something here, so they didn't want to-- so there was some, I guess some tension, but it was pretty good.

Lowood: Okay, so let's move forward a little to around 1974, There are a couple of things I wanted to ask you about there. One was the difficulties that Atari was having as a business and what was going on there with trying to sort of restart things. And then secondly the whole thing around Grass Valley and the Grand Track game and all of that.

Alcorn: All right, well let me just say that Grass Valley I think came out pretty early because Steve Mayer and Larry Emmons had left Ampex about the time Nolan did. But what they did was they decided to leave the urban environment, move up to Grass Valley and the country. They got a job at a company called Arvin Systems. It was a military type of thing. And they were trying to build a video tape recorder based on longitudinal tape without flying heads, and it just violated the laws of physics and the guy was crazy. So they quit and they started this little thing called Cyan Engineering, trying to do consulting work up there at Grass Valley in the Litton Building up on a hill, an old hospital on a hill. And I think, I'm guessing, I know within the first year of Atari we did a deal with them and gave them some stock and whatnot.

Lowood: So you were starting to talk about the Grass Valley group and how that got started in '73?

Alcorn: Yeah. So they had spun out of Ampex, they went to Arvin Systems, quit Arvin, then they had a consulting group. We realized that we had this problem, and Nolan and I agreed that we needed some way to design new stuff. We had to be physically out of the factory because it was such a beast sucking up all of our time, and we'd never get anywhere. We'd be hurt. So they helped on some simpler games, multiplayer Pong; they did a lot of variations on Pong. I know we did a World Cup soccer [game] to appease the European customers, which is a dog. So that was very helpful.

Lowood: And then Grand Track, which came out in '74, that was not so successful. What was the story with that?

Alcorn: I think, this could be a big story, because that goes into the <inaudible> and everything which is a very important phase…

Lowood: This might be a good place to stop…

Alcorn: Yeah.

END OF TAPE 2 / BEGINNING OF TAPE 3

Henry Lowood: Atari was probably was starting to hit on tough times in 1974. Can you talk about some of the things that were happening to rectify that, what Nolan Bushnell was trying to do then?

Al Alcorn: Yeah. Nolan got this idea from reading a book that you had to replace the entire management team with professionals. That the people that did the start up, were the same people that could get you to run a bigger company, grow it beyond-- in other words, we had done a million dollars in our revenue in our first year of operations which was astounding. And now we were getting up into the tens of millions of dollars and Nolan felt that he should change it out. So somehow he found a group of people. And there was John Wakefield [John C. Wakefield], who was his wife's brother-in-law. He was a psychiatrist in Los Gatos. He became the president of the company and had no corporate experience, no game [experience] or nothing like that, but he was a shrink. Mobilio and Oliver were from Hewlett Packard. They had worked at a big company at Hewlett Packard, one in finance, a financial officer, and a marketing guy. And then he got Lloyd Warman, who was a caretaker engineer, who knew how to run engineering from the Video File Division of Ampex. It was more of a caretaker role but he was very professional. He dressed well, worked very hard late, did lots of schedules, and stuff like that. And at the same time my mother was dying from lung cancer. So I used it as an occasion to kind of go on a sabbatical. When these guys took over, they're going to really launch this company well. Well, at the same time we were trying to put Grand Track into production. And Lloyd Warman, who was the V.P. of Engineering, had a much better relationship with Larry Emmons and Steve Mayer than he did with me. And didn't understand-- there is always a conflict between engineering and manufacturing, engineering and research. And engineers usually hate the research guys because they have an easy life, they don't have to do any of this stuff. And the reverse happens, too. The production guys don't understand how to do things right. So, Larry felt he could do a productization of this technology better than we could. But he had never done that before. He didn't understand any of the issues. So he basically designed a production release for the Grand Track game that was unproducible and didn't work in the field. It was a disaster. He had also designed in [a hybrid]. We tried to stop the copiers. So we designed in a hybrid-- an analog hybrid for the sound circuit for the Grand Track game through National Semiconductor sole source. Not because it was cheaper or better but because the competition couldn't [do it}. It would stop them because they were copying everything else we had done. And because our sales started waning a bit, at that time, National got wind of it and National preemptively pulled us. All of a sudden put us on C.O.D. And the single chip audio circuit morphed into three custom hybrids, the price shot up and they wouldn't sell them to us and they were sole source. So now we're kind of like shut down, we couldn't build this game at all. And I'm like, “what are we going to do?” The finances wouldn't lend Mobilio any money. The manufacturing guys didn't get this kind of weird young manufacturing line. It was just turning to garbage. And it was going to implode. It was a very sad time. What happened was, a guy named Ron

Gordon [Ronald F. Gordon], who Nolan hired on early to bail us out of our international sales fiascos-- every time Nolan shipped stuff to Japan it'd get stuck in customs. They'd penalize us, it wouldn't get out of customs, we were getting bills, it was the worst thing you can imagine. Ron Gordon was a professional marketing guy, out of Muntz from L.A., Muntz Television, Madman Muntz [Earl William “Madman” Muntz]. And he did it right, he set it up. See, he was making big money on commissions and he saw his cash cow going away. He never showed up much he did his job so well, but he came in and he counseled Nolan how to restructure the company, how to get it going again. By this time, Nolan had started Kee Games, which was a subsidiary that basically doubled our distribution, and Joe Keenan was a very professional manager. I literally remember there was a time when Nolan was in tears in an afternoon meeting. The marketing guy, Pat Karnes, the sales guy, and I took Nolan physically out of the building. We went to a restaurant across the street, because he was just-- he saw the whole thing going to go away. It was that bad. Ron Gordon said basically get Lloyd Warman out, put Al back in engineering and merge Kee Games with Atari so you had a president. And now you had people in manufacturing. And Ron personally went to the banks and got the money to get going again. So my role was to reproductize the Grand Track driving game so it was buildable. And so I literally sat down at the bench and did it myself. Then that thing was a pick hit and the merging-- remerging of Kee and Atari was a very good idea. And then I got off doing the Consumer stuff.

Henry Lowood: So Consumer was separate, obviously from the Grass Valley group? Grass Valley became sort of the R&D part of Atari?

Al Alcorn: Yes. The earliest consumer effort was really funded by a couple of things. One was my boredom and frustration with doing coin-op, because it now became a job, it was managing, it was like-- it wasn't as much fun. And Nolan had this memo, which you've seen, this crazy memo from engineering from Nolan. Where number six on the thing was doing a home [version of Pong]-- you know, simple Pong video game at home. And I thought that'd be fun. I mean, it's a hell of a lot of fun than doing it [than what I was doing]. So I gave engineering over to Steve Bristow, who came. We gave him to Kee Games. He was like my guy right behind me at Ampex, on the same track I was. And so he ran coin-op well. And we got the tank game because he had hired Lyle Rains to do the tank games. So we had that game. We shared that game. And I went off and did this idea of making Pong on a chip. I had hired earlier on a guy, what's his name? Harold Lee, who was a brilliant [engineer]. He had a Masters EE, did circuit design, and chip design which is really very unusual and very helpful. So we had him; the theory was we'd stop copiers. Harold would do their work on some of our games that understand our technology, and then, ah, let's go and design a custom chip. I was thinking like a sync generator or something we use in a lot of games that we could then put in our games that nobody else could buy, would keep them from copying, because the games were so easy to copy. Off the shelf parts you could see how to build it. And what happened was he said that wasn't going to work, our technology was changing too fast. But he said, "I think I could put the old original simple Pong game on a single chip." And I go, "Wow that sounds like fun." And so I went off and did it. Again, my attitude with Nolan was, well it's crazy, you know, this was a consumer business. I mean, we know nothing about this business. We have no friends, no contacts, this is really pretty absurd. But I get to build a custom chip which is really kind of fun. So we'll see how far we'll get.

Henry Lowood: At this point it would probably be good just to say a few words about the planning process that led to decisions like this, like let's do home Pong, for example. At some point in here you started having these corporate retreats and things that I guess initially Nolan Bushnell organized, and then that became part of the company. What were those like and what was the process? Was it a free for all or was it a very well organized kind of planning process?

Al Alcorn: It was semi-free for all, semi-organized. In the early days, the typical thing was Pajaro Dunes. We go out to Pajaro Dunes, rent a house for a few days and--a few houses--and bring a bunch of engineers, not all the engineers down. And Nolan has this list. I mean Nolan has always had a list. He'll die with these lists in his hand, and these lists of all these game ideas. And basically we'd go over these lists of ideas. A few ideas were determined by the troops. And it was pretty wide open and we'd figure out what we were going to do next, you know. I think the consumer stuff was really-- God bless Nolan because, you know, I mean, he read books. So he read a book *How to Name a Company*, that's where the Atari name came from. He read a book on management. That's how we almost killed the company by firing all the right people. But he also understood the concept, I mean--and the GE Hotpoint stuff, so the idea of doing Kee Games. And then the idea of doing a home product. He had come to the realization, since our goal was always to be as big as Bally, and Nolan always said he wanted to duplicate Disney. He wanted to make movies and all this other stuff. And once we-- after like two years, were as big as Bally, we were bigger than Bally. And, like, now what? And the freedom, this is really important because we were so young and didn't have-- I mean, why did we decide to do a home game? Now Magnavox had done a home game but it wasn't very good, but it seemed to us it was really quite simple. The best we could do is sell everybody, every coin-op distributor a video game in every arcade. That's finite. You can't get much bigger than that. But boy, if we could sell one in every home that's a much bigger market, and let's go for it, and let's do it. Nolan never believed--to this day-- and I think he's right, he doesn't believe in focus group testing or any of that stuff, especially when it's revolutionary product that they don't tell you much. And I looked at it as a chance to go build a chip, and so the three of us, Harold Lee, who got in a guy named Bob Brown [Robert Brown] to do the test program, and myself. we worked basically at home and kind of on the side in this project and put together this Pong chip. And we convinced AMD to be our first—AMI [AMI Semiconductor], excuse me, AMI to be our fab partner to fab this chip. Intel, we tried to talk to them. They wouldn't build anybody else's part, and they were kind of stunned that anybody would even ask. And one day Bob Noyce, Andy Grove and Gordon Moore came by to do a tour. It was quite fun. I was the only guy there, and I gave them the tour. At the board meeting I told them that I had given this tour. And Don Valentine went ballistic, saying, "You told them what we're doing?" He didn't trust them. And I said, "Well, I got them to sign a non-disclosure agreement. And he said, "That's like going after a tank with a flyswatter." It was funny. So anyway, yeah, doing this chip was really quite exciting. And then all of a sudden the chip-- we got the prototype back and, my God, it worked. It was really a weird moment, a really telling moment. Coin-op was doing fine on its own. But all of a sudden, we had this thing that was like the hardest part. We had probably invested 50, maybe 70 grand to get this far, and it worked. It was like a dog chasing a car. What do you do when you catch it? Where do you go from here? And, literally, we cold-called Sears Roebuck. I mean, there was no plan to go after that.

Lowood: Was the chip the only thing you had at the point when that happened? You hadn't gone much further in the design than that?

Alcorn: There was no case. There was no idea how we'd distribute it. There was no other thing to see if we could make this chip-- put Pong on a chip. And we did. Whoo! Now what? And so we scrambled. And we got lucky, extremely lucky with the Tom Quinn story.

Lowood: Why don't you talk about the New York Toy Fair and the thing with Sears?

Alcorn: What happened was, somehow, literally, Joe Keenan would know the story better, we basically cold-called [Sears]. I mean, we literally said Sears-- they've got that big building in Chicago. We cold-called and stumbled across Tom Quinn who's in sporting goods, a sporting goods buyer, who was buying

the Magnavox Odyssey game. And Magnavox would not allow Sears to sell it in the retail store because they didn't want it to hurt their sales of these big TVs that nobody wanted. They were just a good example of dying American consumer electronics thinking. So when we called Tom and said that we had this better game than the Magnavox Odyssey game, digital, on a chip, in a box, it's the real thing, Pong, he got the importance of it. He'd been--the happenstance, the luck, to find the one man in Sears that was crazy enough to do this, because it didn't really actually help his career in the end. And he came out in three or four days to see us and was kind of stunned at what he saw. You know, nobody dressed up in a suit and tie. Where he came from everybody did. You know, this whole culture thing. But he saw the picture, believed us, and he really convinced us to do this. I remember some of the telling moments because it was a question of, okay, what are you going to charge for it? It was Joe, Nolan, and me in a room, and we were kind of arguing and I forget, it was him or somebody said, "Why don't we go in the other room and talk about it? We'll be right back. Have some coffee." And Nolan and Joe were all over the map. Like what does it cost to build? Well, I think it's going to cost us maybe 50 bucks, or-- I'm not sure, you know-- I had done my calculation but I had forgot about the factory. I just left the whole factory off the calculation. So we thought we could build 100,000, I think, and we think we set a [price]. I forget the price, 75 or 80 bucks for the first ones. And Tom gave us an order for 200,000. And we're wondering where we'd get the money to do this. He said Sears' bank will finance it, which they did. But we said we did not want to be sole source to Sears. We'd heard stories about this. They're such a big retailer in those days that we wanted to have some other place to sell this thing. So we're going to take it to the New York Toy Fair in the January show and sell it. Open it up. And Tom tried to dissuade us from doing this. "Trust us. We'll treat you right. We'll pay you. You really don't know what you're getting into." So we went. And we were so naive. The Toy Fair is one of the weirdest trade shows in the world. First off, there's two Toy Fairs. The one Toy Fair, the real one, takes place in the toy buildings in downtown New York and there are suites of offices in this old, I don't know, 20-story office building that the toy companies maintain year-round and they used for one or two weeks of the year. You only see things by appointment. What's the point of having the show? I mean, you go there, you couldn't get in to see anything. And then after that's over, there's another thing semi-open to the public called the Toy Fair, which takes place in Jacob Javits Convention Hall in the basement of the Waldorf Astoria in their rooms. And that's where we went, thinking that was the toy show. But we didn't realize that pretty much all the buys had been done the previous week. So now we had just the dreck. The Mr. Magic with the magic stuff was next to us. So here we are, Atari, Nolan Bushnell, Joe Keenan, myself, and Gene Lipkin dressed up, sitting there, and next to us is National Semiconductor, who didn't know any more than we did, selling a rip-off of our stuff. By this time, after National almost killed us with cutting us off, we didn't buy anything from National. They were verboten. They absolutely-- we would not…

Lowood: What product were they showing at the Toy Fair?

Alcorn: They had knocked off Pong. They had designed this thing. Their attitude was, "Hey, if it's a semiconductor, we can do some of these things better than Atari. Why shouldn't we do this?" That's when Joe-- we said FedEx us out or mail out our patent. And we presented them with the patent and we kind of said, "Here, you bastards," you know. We wound up hiring all those guys later on, but the amazing thing was, I remember when the buyers came by, you know, from Macy's and all of these stores. You name it. They were all there, and they all saw the product, and not one of them bought a thing. I mean, it was weird. I remember every evening we had time on our hands. It was my first time in New York City. It was wonderful. My wife was along. But it was the biggest non-event you ever saw. And it was really, I think, a fascinating indictment of the toy business that, faced with a product that was clearly going to be the hit of the decade, maybe it wasn't clear at the time, but it was surely different than a magic thing that nobody would take a flyer on it. There is no risk. It is the most risk-averse kind of business you could imagine.

Lowood: So what happened then? You went back to Sears and said, "Well, maybe sole source isn't such a bad idea?"

Alcorn: Exactly. And another incident that happened was the FCC [Federal Communications Commission] was a really, really, really big deal. Oh, the plastics. Just to say that we had gotten swindled on how to make the plastic case. I way underestimated the task. Indeed, the plastic tooling for the home Pong took more time and more money and more risk than the chip was. And I thought the chip, that's high tech, we were done. Uh-uh. And so we managed to pull out of the fire the plastic case. The FCC was a real tough one because the FCC regulations in those days were so strict. They were really designed around the Magnavox Odyssey game, which is pretty much a kind of an analog game, and so it didn't emit these very high frequencies that high-speed digital electronics did. So it was very, very hard to do that. Sears was a big help in getting us to get it passed, get it approved. But I did a lot of extra engineering to make this thing meet those regulations at the time. It was very hard.

Lowood: I wanted to ask you about two machines at that time, one was yours, one was somebody else's, beginning with the Fairchild Channel F.

Alcorn: Yeah. And there was also Executive Games, which is a weird one. Executive Games was a company that spawned out of MIT on a consortium thing with industry partially funded by Sears and Roebuck. And they came out to build-- basically, they did what I was doing with the original Pong. They made a TTL-based home game, which, you know, we knew wasn't going to work. And Sears was petrified, like holey-moley, not only do we have competition, but we're funding it. But that went away eventually.

Lowood: When you were doing home Pong, was anything going on already with thinking about maybe cartridge based games?

Alcorn: No.

Lowood: It was pretty much the single game platform then?

Alcorn: No. Yeah. Yeah. I mean, the first guys to really knock us off was National, just basically copies of what we did. But, no, the cartridge game came much later. The other interesting one was Fairchild. Jerry Lawson [Gerald Anderson “Jerry” Lawson], a dear friend, was a field sales engineer for Fairchild, and he was actually coming over, helping us. That's where I got the first five-volt regulators, from him. Fairchild was making them. And then he disappeared and he winds up head of this project to do the Fairchild Channel F, which I understood was actually done with another company in mind, kind of in participation with another company. And so they were out there with really the first cartridge-based video game at that time.

Lowood: And you found that out a little bit after Pong?

Alcorn: Oh, yeah. No, it was a year or so after because-- and we saw these-- I think there was another company, the name escapes me, that had the firsr. I think it evolved into the Fairchild Channel F. And they actually had a patent on the cartridge stuff, which wound up being worth a lot of money later on to somebody.

Lowood: Maybe one last thing about home Pong. So now it's time to fulfill this contract with Sears, and set up all this manufacturing operation. Was that your bailiwick at that time or was there somebody else at Atari?

Alcorn: Well what happened, that was interesting, typical Atari, it really wasn't planned for. As you can see from that business plan, it wasn't where the money was, all the glory, and this is this weird Alcorn project, you know.

Lowood: These are home projects under R&D?

Alcorn: Yeah just this one guy out there. In typical Atari fashion there was a very interesting gentleman in manufacturing. Manufacturing by that time was being run by a gentleman named Gil Williams. And he was coin-op, he was kind of authoritarian, and he was too smart to go risk anything doing this weird home thing. But word got out we were going to do this and one day, in my office in engineering, a gentleman named Jim Tubb comes in, a big guy from the South. His brother, by the way is Ernest Tubb, the country western singer. And he said, "Mr. Alcorn, I want to introduce myself, and I understand you're doing this, and I want to take a shot at doing this." And we had the factory left over from Kee Games, abandoned. It was unused, and we were going to get rid of it, you know, stop paying the lease money whatever. Here was a facility. And he says, "I can do it, I know I can do it." And it was "Okay, you got it." I mean that's basically it, and he did it. It was kind of catch-up stuff but he did a good job. And it was really funny because Sears, you know they funded this stuff for us. We had no idea how good we had it. I remember when it started selling, then they were running ads on television on Monday night football. You would see this ad for Sears' telegame. We didn't pay for it, it was like, "Wow I'm on national TV." So we had no bad debt, they paid, they put a machine in our facility, a printer that would print shipping labels on the boxes, and we'd just put these labels on the boxes and they'd pay us within 30 or 45 days, There was never a problem, when you're in the real business, you know these people don't pay you, I mean it just goes on and on. So it was wonderful, and now once this becomes a success and the money starts rolling in, Gil basically fires Tubb and takes over and tries to take credit for it, so it was a typical…

Lowood: Before we get to the VCS, there are two quick questions I wanted to ask you about, one narrow, one broader. The narrow one is about Breakout in '76. You hired Steve Wozniak to do that?

Alcorn: No, no. Steve Jobs. I hired Steve Jobs really early on in '73 when we moved, first moved to Los Gatos, just as a tech in the lab. And it was an odd hire, fortuitous but odd. And he left. After about three months he went off to go meet his guru and it was, "Great, what if you get work," and about three months later he came back with a bad case of hepatitis apparently, but recovered, and we put him to work. And Nolan-- see, Nolan and I always had this tension. Nolan had a very short attention span and Nolan would go through the lab and he'd change games behind my back. He'd change projects without telling me, and it got very frustrating because nothing would ever get out if I did that. So I kind of clamped down on that. Then Nolan went around me and grabbed Steve who I wasn't watching, because he's not really an engineer, and [Jobs] got a commission to [make Breakout]. [Bushnell] described this game of Breakout I knew nothing about. And then what happened was Steve couldn't design it, you know, nothing. One day I came into work, and they said, "Hey Al, you've got to go see this. And I go in the lab and there is a functioning game, Breakout. I've never heard of this game, it was never talked about, it was never-- like, you know, how did this happen? None of the engineers were working on it, and Jobs couldn't do it, and Woz came in. And Woz, I guess, has a sleeping disorder or something, and he worked on it for like two or three days straight. And it was this bonus for every chip less than 50, you get a $1,000 bonus which I

didn't know about until after the fact, and it was like done on like 20 chips. It was like, whoa, but Woz gamed it. Nolan didn't say you had to be able to buy the chips, and these chips came out of Hewlett Packard, you know. So it was kind of an odd thing that couldn't be produced. And I was [thinking], what's the point here, but okay, fine. It was really a tour de force technically. And the game actually didn't get released for another year because it had to be redesigned with 100 chips, so mere mortals could build it.

Lowood: With chips he could actually process.

Alcorn: Yeah. And it was a big hit. It was also our first inkling of something wrong in Japan, because we shipped about 50 games to Japan and nothing more. That's odd, it's doing pretty well, it should-- well one of our guys happened to go to Japan and said, “hey, you know how they have Pachinko parlors in Japan?” They had Breakout parlors in Japan. It was all over the place and we only sold 50 to the country. So we confronted Mr. Nakamura, from Namc with, "What's going on here?" "I don't know." I mean like he was surprised and so something was fishy over there. They had managed to copy that game. Some bad guys copied it.

Lowood: Then the big thing was the sale to Warner in '76.

Alcorn: Well yeah, what led to that was when we got into the consumer business, especially since we were going to go into the video-- now we're looking around in '75, '76, we needed funding to get into the consumer business, especially the cartridge game business. We were no longer sole source to Sears. We had other vendors, and so now we needed a lot of capital to go build this thing. And how do you get that capital? We knew this, and that's what this business plan did, and we got Don Valentine [Donald T. Valentine]. Ah. The funny part was this process was started just when we were coming out of the doldrums. Remember the Grand Track experience, the Wakefield, Mobilio, and Oliver fiasco. So we got Don in because we need money. We're going to go out of business; we need capital. We had no capital. It was all retained earnings. And typical venture capitalist they don't take a risk, and so they just waited and waited, and we started pulling ourselves out of this thing. But the price had been set back in those days. So they agreed, and this was pretty much coin-op, there was this consumer [technology] coming up. I remember vividly the day before we were going to close this deal, Joe Keenan and a few others had realized, wait a second, we're underpriced. We're no longer in a problem, the price is way off. And so we doubled the price. We decided at the board to double the price. I mean it was the day it was going to close and we knew consciously that this was a very risky thing, that if we pissed Don off, we're not getting any money from anybody for quite a long time. But we said, oh what the hell. And so we did it, and we went to the dinner. I didn't go; It was Joe and Nolan who went to dinner with them that night. Don had the champagne in the back of the car to celebrate the closing of the deal. He's got bad news. We've just doubled the price. A week later he bought it at the doubled price, grumpily, but he did it. And, okay. So that was our capital. But then you know he was on the board. Then we needed this big infusion to get into consumer and we were going to do a public offering. I wish I kept it, I can't find it. We actually had a red herring, a prototype red herring to do a public offering and Bill White, Joe and Nolan and myself went back to Wall Street, I remember, it should be a lot of fun. By this time General Instruments was copying our chips and we went back there, talked to them, had some fun. But that didn't work. The economy tanked. And so now it was a search for a partner, a sales partner. And frankly what happened was Don Valentine. Sequoia [Sequoia Capital] was one of the largest shareholders in Warner Communications at that time. And he put together the marriage, but I remember we talked to Disney I think, we talked to Quaker Oats, and other toy companies. Finally, Warner seemed the best fit because they understood the record business and the hit business.

Lowood: So that was when Ray Kassar [Raymond E. Kassar] came to run the company?

Alcorn: That came later. That was '76. The deal was closed in like November of '76, about $30 million. And one of the amusing things was Warner was really nervous. I mean they had to fire an attorney at Warner because this guy was so convinced we were just a sham, a fraud. It was so unusual what we were doing that they couldn't believe it. We were all young. The comment with what do you do when you turn 30, they throw you in a pit somewhere? There was nobody over 30 in the company. So, yeah, that was a strange break, but it worked very well at first. It was wonderful at first.

Lowood: So did very much change then?

Alcorn: No. After when that thing came over, we had just moved into our new facility on Borregas [Borregas Avenue], and things went really quite well. And then the big event was in '77, the June Consumer Electronic Show. We introduce the VCS. And the reason we introduced the VCS at that time at that show, was a year prior—well, year-and-a-half prior--we got the letter from Magnavox saying we were violating their patent. And we said that's bullshit. The patent is invalid, is prior art and all that. We had attorneys; they had attorneys. And it was getting to be the June of '76 consumer show, Nolan was back in Chicago and he's talking to them. Our attorney said we can knock this over, we can win, great. How much would it cost? And they told us 1.5 million which we knew was the least amount. And we knew that the time that Joe and Nolan and I would have to take to go defend this would be a killer to our company. Magnavox, very, very wisely offered to settle that suit for somewhere around $300,000, a paid up license. This was a no-brainer. But the other thing they did that really helped us, was that they had a clause in there that [for] any new tech product that we introduce between the signing of that agreement, which was a week before the CES show, and for one calendar year [afterward], Magnavox would have the right to market that product. So this is the first time we kept our mouths shut about a new product, and we did not release or announce it. So it was a big surprise in June of '77: a fully formed [VCS]. We had more time now to really develop it and we'd hired away the engineering team, the good engineering team from National Semiconductor. John Ellis and a few other great guys came in and did a beautiful job of productizing this thing and making it meet the FCC rules. So at that show it was a hit. Fairchild was there, but we blew the doors off of them.

Lowood: About when had you started thinking about a cartridge-based game?

Alcorn: Yeah, the cartridge game came out of the realization that this was not sustainable. The original Pong was great, but now every new game was a new custom chip and that takes like nine months. And it's in a plastic tooling, and the game didn't succeed. And you really needed to have something you could reprogram easily. So it was pretty obvious that that's what had to happen. And then Fairchild one, came out. Now the problem with them and the reason that the VCS from an engineering standpoint--I think this is a very fundamental point about companies, that companies get successful in what they do and that's what they do. And to do something wacky, like go into a whole new market, consumer market, is very, very hard for an existing company to do. When we did the first Pong, home Pong, Bally's complaining to us, "Do you realize you're going to kill customers? They're going to go away from the arcades, they're going to play at home. You're going to hurt our business." And we're saying, "Hey, we're going here. You either get it and get with the program or go out of business." Their attitude was, "You shouldn't do this. You're rocking the boat." And, "We're going to sell a lot more units." And, "So what. We've got the customers, we'll have them, you won't guys." So what happened was all these companies got desperate and wanted to compete at our level. And what happens in consumer electronics? How did the first

transistorized television set come out? What happened was Fairchild, who's making transistors, wanted to sell them; this [television] is an obvious place. But the engineers that designed TV sets were old farts that knew vacuum tubes and didn't know how to design with transistors. So indeed Fairchild had to say, "Here, Phillips, here Magnavox, here is a circuit design, reference design using our parts, so that you can make a TV and save money." So they basically designed it for them. The same thing happened with video games. And all the companies, AMI, not Synertek, General Instruments, Fairchild, they all designed. Signetics. They all had reference designs for video games, all using lots of semiconductors to go back in to that company. They all had frame buffers, which are very-- they used like 10, 20 chips. And we said no, no, no, no. So Steve Mayer—brilliant--Steve Mayer and Joe Decuir and Ron Milner up at Grass Valley, their charter was to do this and they came up with this brilliant idea of using this one microprocessor the 6502. It was like the 6800 but twice as fast because of page zero and pipeline they'd put in. And Chuck Peddle had done this thing back at MOS Technology in Philadelphia. And we could build a custom chip that was tricky, much harder than our existing stupid video games, dedicated games. The idea was it would assemble two lines of video on the fly, and so vertical sync was in software. So there were 128 bytes of memory in the whole thing, in a 2K cartridge, originally 2K byte cartridge. And that was a Stella chip. And Jay Miner … We had the best chip designer, because we couldn't do it with art, and the word was Jay Miner is the best guy to do this stuff. He was working at Synertek. Synertek was using him to build the version of the 6502 microprocessor that I got then, and I said no, we've got to have him. We basically cut a deal where he was a Synertek employee with a Synertek badge and an Atari badge, and he came to work for us. And Synertek got the rights to build as many of theses as they wanted. So it was a great deal for everybody.

Lowood: There was another product, I don't know very much about this, called the Game Brain at Atari. It was a cartridge thing but it was never released as far as I know. Probably the Grass Valley group had something to do with that. That wasn't something that you were aware of?

Alcorn: No.

Lowood: One question about the cartridge design. Was the intention all along that the consumer would be putting the cartridges in or were you thinking more in terms of something that would happen in manufacturing?

Alcorn: No, the consumer would put the cartridge in because the plastics again were the killer, the plastic case. I mean to tool up the VCS case, a set of tools for high volume production would cost maybe a quarter-of-a-million to a half-a-million dollars, and took six to nine months to make.

Lowood: So that was the design vision all along: That this would be for the consumer.

Alcorn: Yes.

Lowood: A couple of other things on the design decisions. You mentioned the 6502, but then you used something called a 6507 in the product itself.

Alcorn: Oh yeah. 6502 was the generic name for the processor. Chuck Peddle worked on the 6800, the classic thing, bright guy. He told Motorola, "Hey, lets put in pipelining and page zero." Motorola got to the point where at some point you've got to shoot the engineer and ship the product. And they did, so he

got pissed and went to MOS Technology and got them to build this part, which was kind of a rip off for the 6800, but ran twice as fast. And so there was a lawsuit and they agreed. The 6502 I think was pin compatible for the 6800. So I think the particular part we used might have been called a 6507, but it's in the same category. And there was also a peripheral chip that had the 128 bytes of RAM and some PIA [Peripheral Interface Adapter] ports, interface ports that we bought from them.

Lowood: This was being designed under you, right?

Alcorn: The VCS? Yes, Grass Valley was reporting to me.

Lowood: Did you or they anticipate the volume of games that would come out?

Alcorn: The only guy that was that crazy was Nolan. I mean, you just built them and see what happens. And no, up to that point we'd been around for what, five years? The games lasted a year at the most, right? No one thought it would ever be-- I mean like holy shit. In fact, that's why towards the end, Nolan and Joe got in a big fight with Warner. Because we were ready to scrap it and do the next thing, and Warner wisely said they were going to stay on it. So we never thought it was going to last that long, my God no. That would be pretty presumptuous. And Nolan was the only guy crazy enough to think those kinds of thoughts.

Lowood: There are still people today designing games for the VCS believe it or not.

Alcorn: <laughs> It takes a real man to program that. None of this high-level language crap.

Lowood: Even in my classes I still ask students what they're familiar with, and I am still getting a third to a half of 20-year olds today who have played on the VCS, so the longevity of it and the popularity is interesting.

Alcorn: Yeah, it was interesting, and it's hard for me to really kind of fathom. One of the best experiences was the 1977 June Consumer Electronic show, when we released this product. Because my goodness, it was palatable in the air that this was a hit. It took the show by storm. And it's not clear why. I think the games were good. And because of this minimal design that Steve and Ron did, it wound up having legs. It wound up being better, because the other designs that were from AMI, who did the one for Mattel, got into the business, they were really bad designs because they were the classic [situation] with the engineer saying, oh this is a Sprite, this is … and constrained it. It wasn't as flexible. And it used a lot more silicon, but you could actually do more and better games on this [the VCS]. That wasn't the reason we did it. That was just happenstance that we did that. So that was luck. I mean, hey, luck, I'll go for that anytime.

Lowood: Was Nolan Bushnell still involved very much with Atari at that point, '77?

Alcorn: Oh sure.

Lowood: So when did he leave?

Alcorn: Oh he didn't leave I think until about '79, after Ray, they [Warner] got a little worried about us because we were-- see we were just this-- let's do this stuff. And Warner is a lot more old fashioned, structured, you know, let's talk about it before we do it. And so there became some tension. And immediately VCS did not [take off]. It did big the first year, but the second year didn't take off, and we said, "Okay, we expected that, let's go build something else." And Warner said no wisely.

Lowood: So the next thing I want to talk about is the 400-800 [Atari 400/800 Home Computer]. We won't have enough time on this tape for sure. Can you remember any of the projects from that time period that didn't go anywhere, that were completely wacky ideas?

Alcorn: Oh yeah. The biggest thing I think was very important was video music [Atari Video Music]. I mean video music was the big chip after Pong. Harold Lee wanted to do this, and it was basically a color work and light show hooked to your color TV set and your stereo, Hi-Fi. And it would make this light show on the TV set. That was the product that we introduced at the winter consumer show six months before the VCS. We didn't sell one of those babies. I mean it was like a product that nobody-- well, you could go to Radio Shack and buy a box with light bulbs in it that would make the same sort of thing, then why would you want to waste your color TV. And Nolan-- we had made a mistake packing it in a wood case that was very [expensive]. It cost over $100 and nobody bought it. Nolan ordered 50,000 to be built; they made like 2,000 in manufacturing. They just violated, just played-- blew them off. And thank God they did. And now you can tell it's a real Atari guy because every one of us has a Video Music in the original packing crate in our garage. Someday it will be worth something. You know I actually went to a party, one of the-- a fun old Atari party where somebody fired up the Video Music and had it working. So the point was that nobody got fired.

[audio ends abruptly]

END OF SESSION 1 / BEGINNING OF SESSION 2

Lowood: Okay. So, we've just finished talking about the VCS and we're in the period after the sale to Warner. And I wanted to go back and talk about some of the characteristics of the company just a little bit. One thing that struck me was how there's a sort of continuous trend at Atari of using technology that was kind of close to the leading edge, digital components, ICs, microprocessors and all of that. And I went back, since you gave me this documentation, the business plan. I noticed that there was this emphasis at Atari on a combination of controlling the distribution channels, which we've already talked about, and then this idea of producing innovative new products.

Alcorn: Uh-huh.

Lowood: So when I first read that, I thought, innovative means, you know, the game design and all that, but then I realized that you were probably talking about something else there. And I just wanted you to maybe talk a little bit about the importance of working with these new technologies, being on top of that and seeing places to introduce them at Atari.

Alcorn: Yeah. I think two points on that. Nolan's motto or theme or message for Atari's tag line was innovative leisure, and we really, really meant that. It meant focusing on entertainment, reason being the philosophy was people will buy, will pay lots of money for what they want but not what they need. And so

entertainment was what they want, not what they needed, so we wanted to stay there. And innovative meant, really, to us, not just minor improvements but really, really let's really apply the new technology. We felt that we understood the technology better than anybody in the entertainment business, and our success was going to be if we could apply that technology in clever ways to create new forms of entertainment. So that was really our thought. And we enjoyed it. I mean, we were real techie people and we thought we were smart, we were young. We were up on the latest stuff in technology, at the time TTL. Even the crazy idea, when you think about it, of doing a custom chip for the home Pong game. I kind of took it as a challenge, as an exercise, but I didn't know if it would succeed or not, but that was the sort of stuff we did, and it did succeed and it worked. So, yeah, we kind of focused. We felt we were that kind of a company.

Lowood: At that time in Silicon Valley, what was the environment like? How did you keep track of what was going on? Was it more through personal contacts, or was there kind of a grapevine, or were there places where you met people from other companies and found out about things?

Alcorn: Well, you're talking about from the latest technology?

Lowood: Yeah, yeah.

Alcorn: Well, again, part of the secret there was, remember, we were all under 30, so we were fresh out of school. So we were really kind of hip to the latest technology. In fact, in retrospect, Nolan had a leg up having gone to the University of Utah, which happened to be one of the preeminent places in the world doing computer graphics, right? I mean, how many people actually saw Space War back in those days, and had knowledge of the coin-op entertainment industry at the same time and saw that opportunity. So, I think that being young, you try to keep up with the technology. The truth is, we were right out of school and we were fresh with the technology. But the meetings and the business stuff was more to keep track of the business and the environment. And of course, you know, I think if you're fascinated with the technology, you want to learn about it. The example at the time: Woz [Steve Wozniak] and the Homebrew Computer Club and Lee Felsenstein were going on at the same time, which was all very exciting. So, it was a very exciting time in the valley and things were changing very fast. And of course Intel would come in and talk to us, pitch us on the microprocessor. Well, a good example was why did we pick the 6502 microprocessor? And I believe it was that famous thing at the West Coast Computer Faire where MOS Technology, who was there with Chuck Peddle and a barrel of, a bucket of microprocessors, pitching that they were cheap. And then we looked at them, and Steve Mayer and team discovered that they were really quite good for what we were doing.

Lowood: Since you mentioned the Homebrew [Computer Club], I'll ask now, can you tell the story, first of all, if it's true, and then can you tell the story if it is true about Steve Jobs and Steve Wozniak offering the Apple I to Atari? Is that a true story? And if so what happened?

Alcorn: Oh, absolutely. Absolutely. I believe it was Steve Jobs that came to me and told me about this. I mean, because we all were enthused about the technology, we loved it. And Woz was coming in helping Steve do his work for him at night and Woz was playing with the HP-35 calculator and talking about this thing, and he brought it in. I think he brought it in and I saw it. I said wow, I thought it was really, really cool, but I didn't see any real market at the time, mistake of mine. There was no software for it. Who wants a computer? You know, who needs a telephone, right? But they seriously offered, and he talked to me, Steve Jobs. So I set up a meeting with Joe Keenan, the businessman, the president of the

company, with Steve Jobs. And Steve made this pitch to Joe. And after the meeting was over, Steve looked kind of dejected and he came out kind of depressed. What happened? And he says, "Oh, he wouldn't do it." And then Joe was kind of steamed. He really did not connect with Steve Jobs's kind of lifestyle. I mean, remember, he was a bit of a hippy at the time, didn't wear shoes or anything. And Joe was a great guy, easy going, very fun guy, but there was some decorum in the office. So, I mean, he'd already decided, and I think wisely, that [with] our growth curve and our potential-- because the consumer was just coming up and was so much more important-- there was no way we should distract ourselves trying to get into the untried business. I mean, there was nobody making any money selling these things, whereas we already had more on our plate than we could handle. So we passed on it. So that is absolutely true. And then I wound up-- we wound up--helping them because they were great guys, fun guys, and they wanted to go do this thing. I actually remember introducing him to Don Valentine … and also parts. We had the attitude that we learned from Ampex; That all the engineers could take home insignificant amounts of parts because you're going to take them anyhow, so why makes thieves out of them? And then Steve said, "Can we actually buy the parts from you?" Because, again, they weren't even 21 years old, so let alone renting a car, trying to get a line of credit at a vendor wasn't easy to do. So we actually would mark our parts up by, you know, some small percentage and sell chips and stuff like that to them. Yeah, so we helped them a lot and we, you know, again, I think in the spirit of Silicon Valley, we did not see them as competitors at all. And God bless them, I didn't think it was going to work. Unfortunately, I turned down the offer of founder stock in Apple, but, oh, well.

Lowood: So when did Atari start the process of thinking about the home computer that eventually became the 400 and 800?

Alcorn: Well, it first started for a strange reason. Steve had a tiger by the tail with Apple, so he was trying to staff. And so he was stealing employees from Atari at a great pace, stealing some of my best people, and it really bothered me. It bothered all of us. And so, I called him up, tried to get him to stop. He wouldn't take my calls after a while. I remember one time calling, telling the secretary I was from the FCC-- because we all have trouble--and bingo, he's on the phone, and I yelled at him. And it didn't make any difference. So, we finally decided on a typical kind of a strategy. Joe came and said, "Look, you know, these guys are making a simple board, it's kind of like a coin-op video game board from the manufacturing stand point. We could out produce them, you know, easily." So he said, "Put a team together in coin-op engineering to knock off the Apple II." Now, I knew that our good engineers wouldn't participate in that kind of a thing. A good engineer doesn't want to-- I'm going to copy somebody else's design. But we knew the word would get back to Steve quite quickly, and he would realize the threat that we could put him out of business. And so he called two weeks later, saying, "Okay, I won't take anymore people." So that was our first foray into the personal computer, knowing it would never happen. Then, I don't recall-- that was about the time we had the troubles with Warner taking over and Ray Kassar. Nolan was being ejected. I really don't recall too much the rationale, but I guess because it was a big business and everybody was doing it. And so, we put together a team with Jay Miner and our best people to put together-- and Grass Valley participated-- to build a design. And our key in the whole thing was the fact that we knew the secret sauce of how to make a product comply with the Federal Communications rules at that time, which were ridiculously hard. Our strategy was that we could build a computer that would comply with the existing rules, knowing that the Radio Shack computer, the Apple computer, the TRS (Tandy TRS-80-)-- none of those things complied. They were terrible, and then we could be the only guy

in the whole marketplace. So that was part of our strategy. Plus, the idea with games and the graphics, we could do that very well, and that was our strategy.

Lowood: In your role at Atari, were you tracking that project or was this getting to be towards the time you were starting to think about exiting yourself?

Alcorn: Well, no. This was the time of transition. At that point I was pretty much an exec. A staff guy, so I didn't have too much-- any direct line responsibility, which was fine. John Ellis and Wade Tuma were doing an excellent job running engineering: coin-op-- I mean, excuse me, consumer engineering, , this is world class production engineering, better than anybody else out there, much highly tooled product. Our experience in high-volume manufacturing of the VCS really put us in the spot to go do this, right. So, this is about the time things were changing. In fact, once Ray Kassar really came in and Joe and Nolan were gone, that's when I started the Cosmos product. So I really wasn't thinking of leaving at all at that point in time. And there was a lot of conflict because once that product got released, Ray Kassar was in control and his marketing people, which he brought in from Proctor and Gamble and from the East Coast, really didn't understand this business. Hardly anybody really did except maybe Apple. So for three months it would be a game computer, then, no games, it's a serious business computer, and then it was a game computer. It was just ridiculous the kind of stuff that went on. I mean, engineering-wise it was a very interesting project, but at that time point, Steve Bristow was running consumer engineering, VP of engineering, consumer. So, I stayed out of it.

Lowood: Yeah, it kind of ended up being both. I remember the first two people to tell me about the Atari 400-- maybe one was an 800, I'm not sure. One wrote his dissertation on it and the other played Eastern Front. So, it was completely different.

Alcorn: Yeah.

Lowood: So, let's talk about what I think was your last project at Atari, which was Cosmos. And where did this idea come from? I mean, there's so much craziness in that machine, the Mylar cards, the holography. Where did all that come from and how did it come together?

Alcorn: Well, it came about because of my angst at what was going on at Atari. The exec. staff was not my kind of place. It was not warm and friendly at all. I couldn't even talk to Ray. You had to set an appointment days in advance and sit outside his office to even talk to him. Joe was gone, Nolan was gone, and so I had to make a decision. Was I going to quit or what was I going to do? And I personally decided that I didn't want to quit. I felt Atari was my baby. And so, what I wanted, what I thought I'd do is go back into engineering, go back to my basics, my roots, and put together a small but creative team-- which was always the way I did things-- and I got together with Roger Hector and Harry Jenkins, two of the best part designers we had at the company. I got them out of coin-op. I had to argue with Steve

Bristow for a while or with other people to get them, but I got them. And we did everything absolutely backwards. We chose holography-- well, yeah, we chose holography. We started with, let's do something with holography. The reason being, it was hard, it was fun-- it intrigued me, and we had been using holography as a lie, as a ruse for the last four or five, three or four years, claiming that that was our next project because we couldn't keep secrets, to try to throw off Bally and Williams, our competitors, to see if they'd waste money in it. So I figured for absolutely the wrong reasons, completely the wrong thing, I said, "Let's do a product with holography." Somehow in talking to the marketing people and what-not, the concept came out, because I looked at all different forms of holography at the time. There was The Multiplex Company, which was a kind of a hippy commune holographic commune up in San Francisco on Capp Street, had invented these moving holograms, cylindrical, hemispherical moving holograms. Did you ever see one?

Lowood: Yes.

Alcorn: If they rotated, you would see somebody doing something. So I talked to them. Again, all holograms at that time were originally laser-made photographs. And so that was a separate problem. We looked at all four of them just trying to figure out what could we do as a product, working with these product designers. They finally came up with the idea, let's make-- and this is how we kind of sold it to the company, unsuccessfully-- a cartridge game. I think Ray Kassar even kind of accepted it on the basis, "Well, gee, Atari VCS is very successful." Yeah. "The cartridges are a good business." Yeah. "So let's see if we can do something for half the retail sales price of the VCS." So, the cartridge in a VCS has one chip in it. So, how do you cut the price of that? Take the chip out. So that was kind of the idea. Let's make a half-price VCS, a simple game player that people could buy, and we could sell cartridges for it. So that was what came about, the genesis of the idea. But the technical challenges were fabulous, I mean, were just wonderful, and we just dived into it. Well, we had a serious technical issue. How do we make embossed, mass-produced, cheap holograms, which had never been done before. We had to solve that problem. The other interesting problem was the patent situation. There was a whole bunch of patents about holography that had gone on-- had been done in the late '60s, early '70s. Juris Upatnieks. There was a company, Holosonics, and they had degenerated into kind of a stock fraud scam thing, utilizing holography, the next great solution for medicine, cures cancer, yada, yada. And we'd taken a lot of money from people. And so that was remaining. But there were like 50 patents. There was a huge cloud of patents these guys had, and they were now owned by the People's Bank up in Seattle. A few banks owned these things. Skip Paul and I had great sport, great fun, negotiating a license for the consumer applications of holography from this portfolio. That was another whole adventure. It was a pleasure working with Skip Paul. He was very effective with negotiation. We got a license, I think, for like 300 thousand dollars for consumer applications for holography, which is a big field. And IBM, tame, negotiated a license for just using it on a bar code scanner, and they paid, like, a half a million dollars for a very narrow application. So we had that part solved. And then we had to go and invent a way to make embossed holograms. And one of my pleasures was at a company in Baltimore, Maryland, called the Defraction Company, and a gentleman named Hugh Wynd, We were making Mylar circular defraction gratings hot stamped on Mylar, and they're selling it as jewelry at the time. The circular defraction grating is of no use scientifically, but it was interesting because it would make specular colors from any angle.

So they had the manufacturing technology. It was a humble facility. They'd be twice the size of this room. And they had these homemade funny machines like a big copy machine that would take a roll of Mylar and hot stamp with a nickel master 4 x 5 inches. And I was there when the first holograms came off the press and it was just, wow, you know. We really felt we'd achieved something at least scientifically. Manufacturing-wise. Whether we had a product or not was to be seen.

Lowood: So the original claim, I guess, you said, with holography was that this technology would reduce the cost in some way. With all of this new stuff-- and we haven't even talked about the display-- with all this new stuff that you were introducing, were you actually able to do that, to hit a price point that would work?

Alcorn: Well, yeah. Oh, absolutely. I mean, again, the cartridges. I think the holograms cost us, like, I don't know, 5, 10 cents apiece for a 4 x 5 hologram. We were very good at tooling plastics because of the Atari VCS. That was really, really key. So you could spend capital, a million bucks up front to tool this thing up. So, the first one costs you two or three million; the rest of them are very cheap. So we tooled up the product, which is quite remarkable for a part they never sold anything of, you know.

Lowood: Now, you took it to the toy fair and you did get orders, right?

Alcorn: Well, we took it to the CES in Las Vegas. Yeah, we took it to the CES in Las Vegas and it was fighting everywhere. I mean, it to me was really told a lot about the end of Atari. We fought to get a booth space in the giant Atari booth at the CES, but no marketing guy would man the booth. I mean, it was me, Harry and Roger doing the sales. And I was kind of, you know, ranting in the background, you know, saying, "Look, guys, everybody was screaming to buy VCSs, you know." I meant we were, this was the greatest job. I would quip that a sales guy at Atari had the greatest job in the world. All he did was, "I'm sorry, we're sold out. I'm sorry, we're sold out." People were begging for stuff just like Nintendo today, with the Wii. And so I said, "Look, I mean, these guys could sell, we could sell millions of these things." We could sell because we had the leverage." So they wanted the VCS. "You want a VCS, buy one of these things." You know what I mean? This was perfect. They wouldn't do it. They wouldn't touch it because I believe-- maybe I'm wrong-- but my belief was that [they thought] why take on a risk when "I'm sorry, we're sold out. I'm sorry, we're sold out." Not going to go to work and we're getting these big paychecks. There was no incentive for the marketing guys to want it. There was no incentive for manufacturing to do it because they were busy doing their job on the Atari VCS. So they declined. And part-development didn't want it because it didn't come out of them, it came out of Al and this weird offshoot, you know. And so, I had to fight every organization to sell it. And we did take it to the toy-- to the CES show, and we think we had a few hundred thousand units sold. But Ray just cancelled the project one day. He had this weird secondary executive staff meeting where all the old timers would go and Ray would sit and listen to us and nothing would happen. We could say things and we'd just get shot down, and it was kind of we had fun with the meeting after a while.

Lowood: What you described was a reversal, really, of the early culture of Atari.

Alcorn: Oh, absolutely. I mean, the early culture of Atari was one where every year we risked the entire company on a new product with the attitude that we were young, let's go for it, let's have fun. The worst we could do is crash the whole company, and we go back to work somewhere. So that was the idea. And we had our failures. The Video Music, for example, no problem. And so, all of a sudden, the company had turned. Now we had 2 billion dollars a year in revenue, and they're afraid to introduce a product that if it failed, <pfff>-- big deal. And it was just stunning. I'd never seen it. I was young. I'd never seen this kind of resistance to change in a company that was really based on innovative leisure. And finally, shortly after, when Ray finally just-- because I had fought everybody. For example, manufacturing. Paul Malloy, said, "No, we can't build it. We're too busy building the VCS." I said, "Put that in writing." He did. And then I found a manufacturer in Texas that could do a better job cheaper anyhow. Then faced with that, he's, "Oh, no, no, I can do it." Because he didn't want to be embarrassed by seeing these guys could do it cheaper and better. Then they had a business plan. I think I'd mentioned this story.

Lowood: Yes.

Alcorn: You know, and I overturned that issue. So, but at the end, Ray just said no. Just flat no excuse, no reason, I'm not doing it. And I say, "Okay, I'm out of here. You don't need me." Even at that time, some of the really good engineers remaining in consumer, they said, "Al, you're wasting your time. You know, they're not going to put anything new out." And I said, "I am going to do it." You know, "I'm Al Alcorn, and I'm going to really do it. I am going to go through." I pushed it harder than anything, and they still … Indeed, the fact is that after Ray Kassar kicked in, no new products were introduced, none whatsoever. Even, there was a whole division after I left, the AtariTel division, a whole division, they never released a product. I mean, what's going on? So that was the death of the company.

Lowood: So, we're going to get you out of Atari in a second. I just wanted to ask about a couple of colleagues and people just to talk about them a little bit. And of course, I am going to start with Nolan Bushnell. What was it like to work for him and what did you take from that experience?

Alcorn: Oh, boy. Gosh, yeah. Nolan was and is one of the most creative, innovative people probably that ever lived and an entrepreneur of the first water. So it's a little tough living with that because change isn't always fun, it isn't always good. He's always, you know, being an engineer. Trying to get something out the door was always tough. I told the story about how I had to kind of restrict him from doing that in coin-op. The energy, the enthusiasm, the ideas, the bold ideas … you see something new like that, it's uncomfortable. And so there was a lot of conflict. We never really got acrimonious, but it was loud and it was heated as those memos. I think Steve Jobs saw that, and the idea that a very strong leader could drive a company. Because one of the things I've learned over the years now is that the large organizations are very rarely innovative and creative at that level. You've got to be careful how you

define innovation. As you said earlier, it's not just incremental change on making a faster, prettier, more colorful product. It's actually let's change the nature of the product. Let's change the market. Let's take big steps. And that's not often done in big companies. And to do that, I believe the only companies that succeed at doing that, I think, are ones that have very bold, strong leadership that can take a risk. When I was at Apple, I could see that Sculley [John Sculley] didn't really understand the technology enough to really feel comfortable with it. He was very nervous about taking big risks like that, as most people are. Nolan understood the technology well enough to know if he was being bullshitted or not and would come up with ideas that were possible, if bold. Like consumer, I mean, sure, you could make a custom chip to go do this, but how the hell can we do it with no money, no manufacturing capacity, never having done it before, having no particular skills in that area. So, let's do it. I mean, that was the sort of thing that happened. And we would have these meetings at Pajaro Dunes where we would just go over this. Nolan always had this endless list of ideas, and it never seemed to end. We were never short of ideas for new stuff, and a few of them were really bold, big ideas.

Lowood: You made a quick comment in there. Do you think Steve Jobs was influenced by Bushnell?

Alcorn: Absolutely. Absolutely. Again, my personal belief-- remember, Steve was an adopted child, right. And I don't think the relationship with his parents was that good, and and he was, what, 18, 19 years old? To all of a sudden see this weird relationship between Nolan and myself, how the dynamics worked and how, you know, we already were known to be a pretty innovative company. He came to us because it was clearly a fun place to work. And then to see that process and the very nature of what happened with the Breakout story, you know, that Nolan would get him to go do this thing. You heard the Breakout story. You know.

Lowood: Yes.

Alcorn: And not even tell me about it, you know, to get things done. I mean, look at how things happened with the Macintosh and things at Apple later on, the same kind of thread, just flat out not taking no for an answer. I think that Steve was affected by that [relationship with Bushnell.] Yeah.

Lowood: Okay. A couple of people, just maybe quickly, that you were involved with here and there-- well, more than here and there-- at Atari. Steve Mayer was one, if you could talk a little bit what you think his contributions were.

Alcorn: Well, I think in the early days-- very early days-- when we started Atari, we had come out of Ampex Videofile Division and Videofile, as I said before, was getting-- Ampex was getting to be a less fun place to work. They'd suffered their first financial loss and so a few people had left. And early on, Larry Emmons and Steve Mayer, two of the guys in the Videofile group, left. They wanted to go. Their future was going to be up in Grass Valley in a rural setting in a company called Arvin Associates who did military

contracting, had an idea for a videotape recorder. And so they bought homes up there and, you know, enjoyed that life. Unfortunately, Arvin didn't work out shortly after, and they left and formed a consulting company, Cyan Engineering, which was housed in the Litton Building, an old hospital up on the mountain top in Grass Valley, and basically, okay, they were there. They were running. And then shortly after Pong had come out, we had this problem as I described earlier that, we weren't equipped to be in manufacturing and engineering at the same time. So I was engineering, and I was swamped getting Pong into production and keeping Pong into production. And Nolan decided that this was kind of an opportunity, like the kids that we hired when they just walked in. Hey, these guys are here, we know they're bright. They're not in the valley, and the idea of let's hire a team that can think ahead and not be encumbered intentionally by the manufacturing crises that are going on daily [was attractive]. So Nolan cut a deal with them. And Cyan became owned, really part of Atari, but we kept the name Cyan Engineering so they could do stuff without being … Nobody knew it was part of Atari. And that was just fabulous. So that's how that came about. So it was within the first year of the founding of Atari. Now, the relationship. Again, we were young. I was young and naïve as we all were and probably still--I'm not young but probably naïve. You always have a tension between engineering and a research group, product engineering and a research group. There's always a conflict because production engineers have to suffer the daily slings and arrows, and the research guys, they're free to have fun and goof off. And vice versa. The research guys say, "Those guys at part development don't know what they're doing." You know, so there's always that. And I misinterpreted that in the early on. So there was some hostility, but Nolan eventually put me in charge of Grass Valley. And that turned things around. That was a brilliant move on Nolan's part, because it forced me to go up there every couple of weeks. And I had an airplane. It was fun to go fly up there and meet with them and actually work with them and get their stuff integrated into the product development path. That was a lot. A lot of companies have research groups--as I was at Apple-- and you couldn't get anything out of the research group because product development wouldn't take it. The kind of a weird deal was that Nolan and I--the way Nolan ran the company, I mean—would just start a new division if we had to, you know. We weren't going to take no for an answer. And so, indeed, I think the first big hit that came out of them was the driving game. The driving game, Grand Track, was inspired by an article in the old Scientific American about a paper game. And they did it and it wound up saving our company as I mentioned earlier.

Lowood: Very interesting. What about Harold Lee?

Alcorn: Oh, yes. Harold Lee, again, in I guess '73, '74 in Los Gatos, we were the place to work. And people would come in. And Harold was one of them. Master's EE that knew chip design, circuit design, testing, I mean, a broad spectrum and a very rare guy, and I hired him because in coin-op-- all we had was coin-op-- was the idea that, because of people copying our designs, if we could do a custom chip that could provide some utility functionality, even if it didn't save us any money, it was custom, it would obscure our designs. The idea was to have Harold work as a designer, architect for a few months, do a game, understand enough of the technology and then sit down and say, "Hey, what can we do that would work?" And so what happened was Harold did that and assessed that "It's not going to work in coin-op. However, I think I can put the old Pong game on a chip," and then combine that with Nolan's ranting about let's do a consumer product. Like say, "Okay, this is more fun." And I got tired of running

engineering. So I gave it to Steve Bristow, who was a year behind me in college, so when we started Atari, he was still just graduating from Berkeley. We had him operate our arcade there in Berkeley for a while. And then when he came back, we put him at Kee Games. And he got Kee Games going with Joe Keenan and then when that story where Atari had its problems, <inaudible> Steve owned coin-op engineering. And I went off with Harold and Bob Brown and decided to do this custom chip. Bob was the guy that knew how to do the test program. Harold did the chip, architecture design, and I did the wire wrapping and the analog board around it, three people. And so, Harold was a very nontraditional guy, very, you know, mountain man, Hell's Angel type, smoked and drank a lot-- since cleaned up. But he was brilliant, gifted. And so, it was a weird kind of team with Bob Brown, who was super straight, very professional, traditional, Harold, who was crazy, and then me, and we worked well together. It was a lot of fun.

Lowood: So, you left Atari in '81? Correct?

Alcorn: Yes.

Lowood: And was that a buy-out basically? Because you didn't do much the next couple of years. How did that work?

Alcorn: What happened was, when we sold Atari to Warner in 1977 for either 28 million or 31, depending how you count it, which we thought was a hell of a lot of money back then. I guess it was, but not by today's standards. They were so concerned. They were so nervous. They had to actually fire an attorney who was convinced this was all a fraud. I mean, this was so weird, this new business. We were all so young and not professional. The deal was one of the most complex deals-- three months in negotiations. And so, one of the things they were worried about was that we would take all this money, become newfound millionaires and just kill ourselves with cocaine or parties or whatever, so that, well, why should we continue to work? We were infinitely wealthy now with a million bucks. So they had a point. What they did was they established a seven-year debenture, a very weird construct. One, they worked. This is bizarre; they managed to affect the only kind of noncompete clause that's enforceable in California. In the California laws, and one of the reasons Silicon Valley is here, is because noncompete contracts are not enforceable normally in California. So when you hire somebody for contracting, you can say, "You can never work for a competitor for, you know, five years," and it's not enforceable. In other states it is. And that's one of the reasons Silicon Valley prospers so well. But they found a way to do it that was effective until '83. So we had a noncompete that expired in 1983. Hence our motto, "Free in '83." By '81, things had turned sour-- by '80-- but they kept this noncompete in. And there was also another thing they put in, a bonus pool, the executive bonus pool, not talked about much. The idea was, we're going to inspire, incent the top five executives, Nolan, Joe, me, Steve, Dennis Groth, to stay there and 15 percent would be a bonus pool with, like, a huge amount, 5, 10, 15 percent of the after-tax profits. Assuming we made a minimum of 10 or 20 million that year, [that] would go into a bonus pool divvied up among the executives. And boy, oh, boy, you know, this was great. And there was even an on-the-

beach provision, which was another thing. So they could put us on the beach. We did a bad job of negotiating. So to make a long story short, after they left, and after we all left, '81, we were now getting paid full salary to not show up. We could not compete, and we were on the on-the-beach provision, and it was kind of irritating. And of course, Nolan couldn't do that. He formed the Rust Bucket, the catalyst incubator over there. And I joined and started the company. And so, by '82, we were pretty well into this thing by '83. So that was going on. Then there were some issues about the bonus pool. I don't want to get into the legalities of it, but yeah. Then what happened was the bonus pool, all of a sudden, Atari hit, you know, a billion dollars in sales. The bonus pool became colossal. I mean, it was more money than Steve Ross and the movie studio. So it became very interesting and very, very ugly. There were some lawsuits about that.

Lowood: Did Alan Kay succeed you as head of R&D?

Alcorn: Yeah.

Lowood: He did?

Alcorn: Yeah. And that was, you know, that was really a weird thing. At that point, I never really had met Alan Kay. This was, again, more of a corporate thing. Alan Kay is indeed one of the preeminent computer scientists in the world. And the idea of Warner being, you know, a New York stock exchange company, let's hire the best for research. My title was VP of R&D, but I never really did any real R&D. The most R&D I did was the Cosmos product. Alan Kay is one of the great scientists in the world. And I found, I realized later-- we're friends-- that he really lives, he's ten years out ahead, and he really is. And that's very disconcerting to the people in the present. And so, he was great, but he didn't really do the kind of R&D that Warner, I think, expected. He was really, you know, putting science forward, with _____ programming and stuff like that that had really little impact on today's products. So, it was great that he was here at Atari, but I think there was some tension, and [he] wasn't the right kind of fit for what Atari needed. But boy, what a way to be replaced. I'm certainly not in that league, you know.

Lowood: So you left Atari in ’81, you’re on the beach. From a distance, what was your perception of what happened to the video game industry in ’83, the crash?

Alcorn: I remember my observation that Atari had stopped innovating. It stopped releasing any new products at all. I think it had this interest conflict. I saw it coming. To me, Atari was dead when I left in ’81 even though they had $2 billion in sales, I think, at that point. Just like, whoa. Because in Silicon Valley, when you’re in the technology business, if you don’t obsolete your own products, somebody else will. When they put in their management from Ray, who is an experienced professional manager from the east coast, but he came out of Burlington Industries, where you had a product, you had a certain product, a towel, whatever it was and that product lasted forever. The idea that you would spend millions of dollars

creating a new product that would live for three years, five years, and you have to obsolete it, and if you don't, you're dead. I don't think they understood that. I believe they felt they were really in the catbird seat and they had created a vast bureaucratic organization. There were buildings on Ironwood by Great America that were just huge and they were all accounts and sales and stuff like that. What had happened [was that] the communications had ceased. Ray had built this structure, an elaborate corporate structure. He had an executive dining room so they weren't soiled by the great unwashed, the engineers. They didn't understand what was going on. So even when the catastrophe came in late-'82/'83, the ET disaster, the word would not get up to Ray or Manny that the sales had stopped. No one is going to say that. I believe the rumor I heard was there was a party at Skip Paul's house where Dennis Groff realized hey, wait a second, there's a sales problem. These things aren't selling and that was the first inkling that Ray got that they had stopped, but he should have known a lot earlier.

Lowood: The new regime comes in with Nintendo and they take a different approach to the industry. Did you have any advance notice that Nintendo was interested in coming into the North American market? Did you hear anything about them?

Alcorn: Not specifically Nintendo. I think that Warner made a miscalculation. They were really, really bruised by what happened. There was a lawsuit, remember, very important lawsuit because Ray and Dennis Groth were caught selling stock right after a very positive announcement right before. They had a very positive, I believe, January of profits, and then a week later, guess what? It's all wrong and Ray was furious so they wanted out of this thing. This was a disaster for them. Some of us realized that this was not the end of the industry. The idea that video games were over, like the hula hoop, that was sort of the feeling I think. I had no inkling about Nintendo per se, although I always knew that the way the Japanese were, where there's a market, they will take their time and get into it and they indeed had been very effective at copying our coin-op stuff and became a power in their own right of designing and developing their own line of games. I found out later that Nintendo was working for a year or so looking at our architecture. The Nintendo architecture was kind of-- I'm told--based on our VCS stuff and went off of it. That was understanding where the market is, and I think Warner was so bruised, they were just happy to get out of this thing.

Lowood: For you, was your comeback basically an Atari spinoff?

Alcorn: I wouldn't call it an Atari spinoff but it was a continuation of what you should do. Cumma particularly was. Again, Nolan had the catalyst. He had all this money. He felt we were real rich. He had a Lear jet or two. So Gene Lipkin, Joe Keenan and myself were having fun plotting the future. We couldn't stop the same kind of innovation that we had when we were at Atari. We agreed we wouldn't do it, and they were paying us not to do this, but Nolan would dare them to go sue us and at this time, Nolan had bought Pizza Time Theater and Manny thought he'd sold him a lemon. I remember Manny Gerard was really impressed. He told me, "I think Nolan's the finest entrepreneur I've ever met." It's unbelievable that he would take this thing that was a dog and make a big hit out of it. They were doing that and they could

do that and then he built this catalyst thing to do all this other stuff. Allegedly, it wasn't in the video game business but the idea of Cumma was to solve a problem called the SKU [stock-keeping unit] problem, or the inventory problem of a cartridge. This was physical cartridges that stores had to buy, like in the hit record business and if they didn't sell, you were stuck with these cartridges. Don Kingsborough, who was one of our top marketing buys in Consumer had left and formed a company called SKU. SKU stands for Stock Keeping Unit. They use a totally different number on it. Basically he was a rack jobber for cartridges. We saw this and said, wait a second, let's just go to the next level. We're just selling bits. This is before Negroponte [Nicholas Negroponte] wrote his seminal book on *Being Digital*. Let's just sell the bits. Let's make a cartridge with CMOS static RAM in it, It had memory and a little battery in there and you'd pay 20 bucks for a blank cartridge and you'd put it in this vending machine, coin-op, put a $20 bill in and you could download the software. So now, there was no inventory problem. Before there was an internet, before there was any of that stuff going on, we had a way of doing that. We actually had a contract with Sears and went to the Consumer Electronics Show. We were well received but got there just in time for the crash and killed that company.

Lowood: The one that came after that was Woodcom Video Compression? Talk about your interest in video compression.

Alcorn: One of the projects that we had in the background at Atari--this was a typical Nolan/Atari thing--was a project called the Phony Project. The idea was to do a low-cost picture phone that you could have in your home using telephone voice grade lines. Back in those days, telephone voice grade lines could be pretty bad. So there were several aspects that we had to do to make this possible. One was video compression which we never really did anything about. Two was a modem, how to get stuff over a telephone line and this was in the days when you still had to buy a unit to put on the wall. You couldn't tap into a phone line but it was just changing. So we hired a small team of people in a secret area to work on an advanced modem, a 12,000 baud modem. At that time the highest baud rate was like 2800 baud so that project was going on. That project never really succeeded under my tutelage. Subsequently after I left and even at the end of Atari, the Grass Valley guys took up the project and did something using a different approach. They actually leased a product through Hitachi I think -- one of the Japanese companies, I think it was Hitachi -- and it was semi-successful, but it was always a frustration. The manufacturing guy, Jim Tubb -- wonderful guy; I told a story about how he did manufacturing for Consumer -- he wound up at this company called Widcomm. They were making a professional video teleconferencing machine that cost like $100,000, but it used a technology called discrete cosine transform and it was meant to work at 64 KB. On a high speed digital line, you could buy lease-lines and a lot of big corporations had these lease-line they weren't even using, so you could have real-time video teleconferencing between sites. They asked me if I would be the VP of Operations overseeing manufacturing and engineering at that company and it sounded like it could be very interesting. The technology was great but the company was mismanaged by Bob Widergren, who played the stock market, just manipulated it to the point where he could go to jail.

Lowood: You joined Apple as an Apple Fellow. Tell me what an Apple Fellow is.

Alcorn: I'll give a brief history. How I got in there was Steve Jobs likes to hire great people and Atari was winding down. Steve Mayer had a research group in New York who did some very interesting stuff, stuff that led to another company, Digital FX. Steve Jobs wanted to hire Steve Mayer just because he's great to have. So he actually hired him and gave him a badge, the whole nine yards, and he had to go back to New York, move back to California, close the lab up. By the time he shows up his first day at Apple under Larry Tesler, Steve had been kicked out and Larry said "Who are you?" That didn't work out. So then they said "Well, we are looking for a VP of Engineering. Would you like to be ..." Steve Mayer laughed. He's not that kind of guy. They said "Well who could you recommend," and he recommended me. So I get a cold call from Apple HR people saying they're looking for a VP of Engineering," So I went and interviewed at Apple in a process that took darned near three months of interviewing. I had figured out the politics.I was meeting very interesting people but the politics at apple were such that I would get cut up if I was the VP. I didn't want that job. I wasn't going to take that job. It was a big company VP like that, oh my god, no. But I was getting free lunches, had nothing else to do, and I was meeting all these interesting people. So I continued on until one day when Jean-Louis Gassée and I had a meeting and the HR lady says "You really don't want the job, do you?" No, I don't. Thanks guys. Thanks for the lunch, it was really a lot of fun. "Would you want to be an Apple Fellow?" I said, "what's an Apple Fellow?" They weren't sure. Wow, this sounded good. Who are the other Apple fellows? They named a bunch of names: Alan Kay, Bill Atkinson, one other guy who was a friend of mine who was one of the guys that Steve Jobs stole from Atari who was a fellow, and they didn't even name his name. So I'm thinking this is really good if a guy can be a Fellow and management isn't even aware he's working there. So I took the job. It was wonderful. The best thing was I found there was a manual in HR that described the job of an Apple Fellow. The role of a division director would be to cut costs and do big products better. Vice President should be responsible for getting bold new products introduced in the company, change the kind of product mix. A fellow should change the industry. Far out, like okay. So at first, I did very simple things. There was a product called the Trojan Horse Board, which is the idea of putting a Mac and a plug-in card in a PC. We actually made it work. I hired a great, very small team and then discovered that marketing at Apple was pretty poor and they weren't going to release it. They were afraid of the product. It was again this big corporate stuff. It was like, oh my god, this will put a Mac where the sun doesn't shine. It was weird.

Lowood: This was before project Star Trek, trying to put the Mac OS on the PC?

Alcorn: Absolutely. In fact this was really early. This is way before its time. This was in '86, and we did it very quickly with no help from product development. They refused to give us any people. It was like pulling teeth even to get a copy of the Mac OS. How are you going to do that? Mac OS was not a simple, pretty thing. It was pretty gnarly and ugly in those days. And how do you hack it to make this live in a place where it's not supposed to be? We did that. We merged the file systems and all that. Then it was killed and I was very upset and angry about that. But Larry Tesler was a great, great manager for me and let me do my thing and said let's do something else. That led to this fabulous project which led to Quick Time and MPEG.

Lowood: What was your sense of Apple and how they were doing? How would you compare Apple to Atari? What was your feeling about Apple after you got your feet on the ground there?

Alcorn: Compared to Atari -- and I think it's an interesting comparison -- compared to Atari under Ray Kassar, and you can compare it to Atari under Nolan Bushnell, and then Apple under Sculley. Apple was a big profitable company but it was much better organized than Ray Kassar's Atari was. Very professional, second level of management; Debbie Coleman, _____, attorneys, people like that really focused on making product and then the next level down, Eric Harslem [ph?] and people like that in product development were very smart and very professional, very serious. However, they lacked the strong leadership. Sculely was a much smarter, sharper version of Ray Kassar. He came from an east coast bottling business. He understood the bigger marketing picture very, very well and he understood the nature of Silicon Valley. He learned from Steve, he listened and learned, but still he was technically unable to evaluate serious products, because we were at the leading edge of technology. Under Sculley the first big product was the Mac Plus but then I guess the real one was the Mac II. I think it was the Mac II that had the slots and color. That was big and that was really put out under Jean-Louis Gassée, and that was a major innovation in the sense that it was a Mac but it was color and a lot of innovations in there. But that's kind of where it ended if you think about it. There were just variations on that incrementally and all these bright people I described--all really great--kind of lapsed, in my opinion, into a very protected cautious approach that was incremental innovation on existing products. So it kind of ceased. Meanwhile, under Larry Tesler, you had a vibrant Advanced Technology Group, ATG, really vibrant, some really, really great people, doing some really great things. For example, Bill Atkinson, Hypercard. That wasn't going to get released and we sneaked it out when Jean-Louis Gassée was on vacation. That sort of stuff. There was frustration--really, a lot; I was quite angry. I was so angry at what they did to my Trojan Horse, the way they killed it behind my back and lied to me. My marketing guy went around un-selling it behind my back and when it was all dead, he called me over and said it's dead. I was stunned and about a day later, I realized what had happened to me. I'm waiting in the lobby of the Mariani Building and Larry Tesler comes in and says "What are you doing standing here?" I said I'm waiting for -- I don't know the name of the guy, thank god. I'm waiting for Bob to show up. I'm going to punch him out. "What?" Yeah, the bastard. He said "Come in to my office. Let's talk for a minute. Al, if you did that, I'd have to fire you. Let's do it another way." He calmed me down, God bless him. So I ranted at their staff meeting. We were making a lot of money. The new product was doing very well. Apple had great margins and all that and there was a lot of interesting stuff going on that really appeased me. I was in this wonderland of Advanced Technology Group. Things like Firewire were being [developed] with and a bunch of other things -- Hypercard -- and it was really exciting. Getting it into product development was very tough; not impossible, but very tough because of the stuff I described earlier that happened at Atari. And again, we lacked a strong leader because here under Atari that succeeded, innovated, you had the strong leader in Nolan Bushnell. Ray Kasaar was not a strong leader, was not technical. In a way, Sculley was the same. He took over and he was a great manager, very professional, but he didn't have the fire in the gut, didn't have understanding. I remember there was a very poignant time when I think _____ was the Chief Technology Officer and there was a weird meeting with the Newton Group where he sat down to have a good heart-to-heart and it was silence. He's not an engineer. He's not a nerd, as much as he might want to be at that point in time. It was fun for me to see

that up front, but it was illustrative to see that kind of a constipation in the corporation. Then I went off and did this with Ivan Sutherland, Bob Sproul, Tom Stockham, and had a lot of fun playing with the Cray and indeed changing the industry, creating something like QuickTime.

Lowood: The fellows were within the ATG so that's how you would be moved from this kind of vague idea of what a fellow was to specific projects that were--

Alcorn: Yeah. In fact, the vague idea of what a fellow was, that description, I stumbled across it. No one knew it. That was a great description. We were just guys that they couldn't pigeon hole, individual contributors who could do great things and somehow that would affect the product and we were given a lot of freedom to do that, a very wise approach I think.

Lowood: What was the Aquarius Project and what was your role there?

Alcorn: Very good point, very good question. Aquarius Project was conceived of after Jobs had left and it was a bold project. I'm blanking on the names. Sam was the guy's name who was the--

Lowood: Sam Holland.

Alcorn: Right. Sam Holland was the guy who had this project. It was a big project. The big idea was let's build our own new microprocessor that was based on fine-grain parallelism and used untried tools from AT&T that had to be ported to UNIX, the first UNIX/Cray machine ever built. There were so many Catch-33s as we said at Interval [Interval Research] in this thing, our success depended on somebody else succeeding, that it kind of wound down. But it was a big project in the building with the Cray, just off of Valley Green Drive and it was ugly. It was getting ugly. It was going nowhere, budgets. And I was asked by the troops, would I take over the project? It was considered career suicide. This was awful and they realized that in my position as an Apple Fellow, I had nothing to prove, so I could take on a case like this. I was intrigued by very bright people and tried to salvage the project. The more I unraveled it, the worse it got and eventually we had to fold it. It was not a pleasant thing for me to have to do. There were some very, very bright people there. So that's how I wound up in that building with that group.

Lowood: You mentioned the Cray and Ivan Sutherland and Bob Sproul. What were the circumstances of all of those guys coming to ATG?

Alcorn: That was a very interesting time, again, in technology, in business, in America. A lot of things were all converging. Remember Pioneer had come up with this thing called the laser disc which was a big disc that was analog FM recording on an optical disc, the triumph of engineering over science. And there was this idea of multimedia that was coming out that Jean-Louis disliked, probably correctly. Those

products were pretty ugly but they were really the thing at the time, the leading edge. The idea was go make a custom laser disc. That was not easy to do, shoot the video footage and put it on a laser disc and then have that disc controlled by your computer. So you had a TV monitor, a raster scan TV, you had a computer display, you had this laser disc, this huge thing and you had a computer. So you had two displays and two big pieces of hardware minimum and you could then do some interesting things where you could jump around and do that stuff. So that was where that was at. Jean-Louis Gassée had gone to corporate meetings about multimedia and declared it was a bad idea to our customers, which is fine. At the same time, the compact disc had come out, had just emerged, and it was a very interesting product. Of course, it was meant for music but there was now this thing called a CD-ROM that was out there so you could put data on it, so it was all digital, no analog stuff. Very interesting. RCA, the venerable old Radio Corporation of America, was dying and they had come up with a weak competitor to the video laser disc. I forget what it was called but it was capacitive stylus analog thing that looked very similar to the laser disc but used a physical stylus in measuring capacity, and it failed. It was the publishing business of movies on discs from one publisher to many people, like book publishing or record publishing. And RCA had shown early secret looks at this thing to Larry Tesler. I wasn't even involved in the first one. I left a part out. The people at the Sarnoff Labs, the research lab at RCA, stung by this failure of the capacitive disc, came up with this interesting idea of digitizing video, compressing it, and putting it on a CD-ROM. Like whoa, this is interesting. It was still the publishing business. It was still publishing from one to many but the concept now was you had the CD. The data rate on the CD was about a megabit per second. Very interesting and it was cheap, really, really cheap. So now, people with stories today, hah, what's that, but that was a big deal. So now you could get 500 megabytes on a platter for 50 cents. Wow! Now what can you do with this? They had come up with this weird compression scheme using a super parallel computer-- again, publishing. It was very, very heavy front end compression that required hours to compress a one hour movie, and then they would publish it. Until we saw this and we kind of rushed it at that time and then RCA went poof. About the same time, a group called SSA -- Sutherland, Sproul, and Associates -- a consulting group with Ivan Sutherland, Bob Sproul, and Burt Sutherland and associates, basically were going around the world every year. I think they worked in Australia--wherever they wanted to work--and they'd go to find the big companies in the area and say we'll work for you for a million bucks for the year but we'll peck if we want and there's no negotiation. We only get to see this the other way. We'll decide if we'll work for you. So I went to Larry and said wow, we're in the running for this. I think because we had this Cray they were intrigued. "We'll play with this thing." So all of a sudden, they came to work for Apple. I went to Larry and said great, I've always wanted to meet Ivan. He's a hero of mine and Larry said "Oh, you'll have no problem. I'm going to have him report to you." Oh my God, I was so nervous, petrified. But we made friends. So the idea was let's find a way to somehow integrate the media into the computer. Ivan's contributions and Bob Sproul's contributions were spectacular. Allen Kay warned me. He said, "Oh, you'll love working with Ivan because he'll be making fundamental contributions to a new field within six months," and he did: the idea of the almond shaped region in sixth dimensional space. At the same time we just started this meeting with the media lab at MIT. We were funding, as all the big corporations did, the media lab at MIT and I guess every year or every six months, Nicholas Negroponte and Andy Lippman came by and would give a talk to their sponsors, tell them what's going on. So here was this wonderful meeting in Larry's office with Andy Lipmann, Nicholas Negroponte, Ivan Sutherland, and Bob Sproul and I'm sitting there. Andy is talking about how they were working on a form of video compression on their own called pyramid coding. Ivan and Bob decided that it would be fun to go

work on something called vector quantization. That approach, fine. We had to create a play list and basically Andy was giving an explanation of how he was doing his stuff and Ivan in his professorial fashion just asked the one question that's the most interesting. He said "What kind of a sensor are you using for your camera?" What do you mean, I'm using a TV camera. Well, is it linear, square, logarithmic? Andy said "Why would you ask?" I think Ivan said "Forget about it. Don't worry." I get a call a few days later and Andy wants to come to work on the project and he's allowed to do a consulting job while he's there as a professor at the media lab. So I said okay, that'd be great, I got him. So we had Tom Stockham, University of Utah, Andy Lippman, Bob Sproul, Ivan Sutherland, we had this Cray, and we had a great time. But Burt Sutherland was the most key to this whole thing because he's set way back. We had these meeting obviously and we really defined the space, because at that time, there was teleconferencing going on. People could talk, from my days at Widcomm, real time one-to-one using video compression. The stuff wasn't stored; it was real live one-to-one. There was now this thing from RCA that had failed. The idea of publishing, compression, putting it on a disc but it was one to many. But what about the idea that you could do your own compression on your computer of video and audio and send it to somebody else, personal, without having to save $100,000 on a compressor and store it on your hard disk, which was never done. So that was really fun for me, to be able to go to some of these other people that were doing video compression. For example, the French and the phone company were doing teleconferencing because that was where their focus was, telephones, and they had this brilliant machine using discrete cosign transform compression similar to Widcomm for an h.261 coder which was really meant for 64 kilobit lines, but it would scale up to a megabit. But they never considered that and my engineer, Paul Gavarini, French, went there, found these guys and said run it up at a megabit. Why would you want to do that? 64 kilobits, it works great for teleconferencing. Take a cartoon off of television and run it through that to see how it handles scene changes. Why would you want to do that and store it on a disk? They just didn't see that. It was really this insight that Burt really brought to us. There were all these aspects. There was from one to many, from many to one, from publishing to real time to delay in time and we really saw this. We were the first guys to really see this. Meanwhile, Jean-Louis Gassée is over there pissing in multimedia so it was really great because in retrospect, had Jean-Louis realized how important this technology was going to be -- it led to DVDs, to Quick Time, to stuff that's ubiquitous now, satellite distribution, all this stuff -- they would have supported it. They would have taken it seriously and probably ruined it, because some of the stuff we did was that we realized we didn't even want to get into this argument about should it be proprietary or not. Because if it was a proprietary technology, it would never work. How could you send a letter to somebody if nobody could read it? You had to <inaudible>. At the same time Andy Lippmann made us aware of this group called MPEG [Moving Picture Experts Group], which had been going on. It was an ISO standards group, Motion Picture Experts Group, and it was really kind of going just around, I don't think [they were] doing much. They were arguing over should it be discrete cosine transform, should it be vector quantization, should it be pyramid coding and they were having this never-ending argument that was really going nowhere. So at the end of the tenure of Sutherland, Sproul and Associates, Andy suggested we have a party, a consortium where we had a one-day event. I picked Rickey's Hyatt off campus because I think it's just a great place to do things. It doesn't exist anymore but a lot of companies were funded there. So we rented a space and we had all the top compression groups in the world. They all happened to be involved with MPEG and Andy said, "I'm going to give you the same footage from the Cybill Shepherd Moonlighting sequence and you all have to compress this at 1 megabit rate and show us how good it looks. You can do everything else you want,"

and it was the first time. Because I was able to leverage this big lie because I was from Apple, this was the first time that a big company appeared to be interested in this technology. None of the corporations got how important this technology was, so it was just research, go futz around with it, no impact. So all of a sudden, hey, we can sell this stuff to Apple--not realizing I'm a fellow. I can buy two of anything. That's it. Everybody came to this event thinking that we're going to sell this to Apple and fine, whatever gets them going. And Andy Lippmann had actually brought out -- this was so important, a very seminal meeting -- he brought out all the people in the Media Lab involved with their project to see this stuff. So we got to see everybody else's work at the same time and about the same time Intel had just bought the remains of the RCA thing. They called it DVI and again, they didn't see the big picture because it was the publishing business. We tried to tell them and they wouldn't listen to us and they in fact wanted to show early in the morning because they didn't want to stay around to see the rest of the stuff. Big mistake. Had they stayed the rest of the day and seen the competition, they might have said "Wait a second. We've got problems here," but they didn't.

Lowood: Why was the Cray there?

Alcorn: Remember, I did tell you. The secret project was the Aquarius Project. Aquarius was the reason for the Cray but we couldn't tell anybody that because it was this big secret. By the way, anybody listening to this, secrets are very, very destructive. People have secrets really to keep people from telling them how stupid they are. I've seen it [become] more and more destructive. Because this was a secret project, it could've been killed a lot earlier and saved a lot of money. But anyway, we had the Cray for that reason. The public reason was that we're creating the next generation of Macintosh computers using a Cray. The fact was nobody was using the damned thing because it was very hard to program. It was the first Unix Cray and cost a lot of money to run. But we played with it and we had a great time.

Lowood: So the idea was it would be for some sort of computer-aided design.

Alcorn: Yeah. For the Aquarius, we actually had to port these weird design tools from AT&T over to the Cray, which was a task that was never accomplished. It was also in dispute.

Lowood: What was the state of MPEG at that time?

Alcorn: Academic. You had people from AT&T, Bell Labs, which was kind of industry academic, you had the French phone company involved. It was really academic but they were associated with some corporations. The French, SGS Thomson, we became partners with. They had some people there. It was your high-end academic research people and the first corporation that got an inkling of how important this was, was Philips in the Netherlands. They had this product come out called CD-i (Compact Disc Interactive), I think it was. Itt was a kind of game player that used a CD. They were going to put movies on it. They realized this MPEG technology and they actually wanted to ship it at a time they had to ship it.

But they wanted to cut the standard off and ship it and the engineers protested it wasn't done yet, it wasn't fully baked. In a way, Philips tried to hijack it and they came to me and the engineer said "Al, you need to host an MPEG meeting," because the meetings were hosted around the world. They go to Portugal, Philips had one in Eindhoven and they said "Al, we want you to host the next meeting after Philips. Get it away from Philips so we can continue this thing." So being an Apple Fellow, I actually hosted an MPEG meeting on Apple's dime and nobody from Apple management thought it was important to attend or even talk about it or advertise it or whatever.

Lowood: Did Apple become a member of MPEG?

Alcorn: Yeah, from an engineering standpoint through Mark Cutter. A great graphics guy who had a really great graphics group and he had a small team working on this and they were actually part of the MPEG technical group. I wasn't technically qualified enough to get down to the details of what was going on.

Lowood: What was the state of digital signal processing at that point?

Alcorn: We built at Apple, that team under Mark Cutter, actually built the first real-time MPEG decoder ever in hardware. The state of technology at that time was you certainly couldn't do this in software. It had to be dedicated hardware to decode or encode MPEG. So they actually used very complex DSP boards in a Mac -- we had to use a Mac because we're at Apple -- but it took like three high-powered cards with a high-speed bus across the top. It was certainly not product development. It could never be a product that way. So that was the state. It really was something that could not be done under CPU software. Fascinating story of how this evolved. So two things we did: One was we got SGS Thomson interested in making this chip because they already had a couple of DCT [Discrete Cosine Transform] cores, parts of the company, and it was kind of a castaway little team of very bright engineers that didn't fit the traditional mold of Thomson. They were using high level languages, VHDL [VHSIC hardware description language], to do chips, which was new. It was coming off of polygons on physical stuff. We actually worked with them cooperatively with no agreement, nothing, and co-worked with this to help them make a real MPEG decoder chip. They were driven by the idea that that hey, I'm Apple, we're going to buy a million of these things. And _____ Vergon was the guy at Thomson SGS to do this. I worked with him and they finally built the chip, got it to work. How many am I going to buy? I'll buy two. Uh-oh, no, you're kidding. No, I can't buy any of these. I'm research. "Al, I'm going to get clobbered, I'm going to get fired. I did all this stuff and you promised. Oh, come on." He was in trouble, but then there was this little project. Hughes Satellite had this idea of beaming digital signals to the home for movies and stuff. Guess who had the only chip that would do this decoded in the set? Now, he was a hero, but there were two months when he was in trouble, but he became a hero. So we co-opted them. What was the other one? Well, I'll think of it.

Lowood: We should stop there.

Lowood: Okay. From this point in the project, how did this lead to the idea of the software codec and then eventually, of course, to QuickTime.

Alcorn: Yeah, well, QuickTime and MPEG were really separate things. And in the early days, in the beginning of QuickTime, people really misunderstood what QuickTime was. QuickTime originally came out of a project in Advanced Technology-- I'm trying to think of her name-- again, in the graphics group. We were doing a SIGGRAPH [ACM Special Interest Group on Graphics] movie. We decided to do a SIGGRAPH movie and then use the Mac. And the fun was we were going to do the rendering as a desk accessory in the background at night on all these computers and the Internet-- the network had just come out in engineering. Under Steve Jobs, there was no network. Now we actually had an Ethernet network emerging in the lab, and so everybody could put this program called NetSlave that would do the rendering at night. But [after] all this work, [we] realized that, wait a second, the Mac operating system is a terrible platform for video, for media, just terrible, terrible. And so, a group was formed called "The Time Lords" in engineering that basically was an interest group that would meet every week. They would talk about "what do we do to fix the operating system of the Mac to allow for media to get in there?" That evolved into, that infected product development, and that became QuickTime. QuickTime, by its nature, to allow video, had to have codecs. And so the very first codecs were crude software codecs that worked on very small pictures, but the concept was there. So people then, all of a sudden, somehow, QuickTime was defined as the codec, but it really wasn't. It was really the bigger picture of the hacks to the operating system. So under that, you could run, arguably, any kind of codec. And that's the way it was architected. Now, MPEG was far too compute-intensive to work as a software codec at that time with those processors. And so the way that happened was I was an attendee at the computer elements workshop in Vail, Colorado, the top computer architects in the world. And they're always interested in these things called benchmarks to see how fast your computer is running. Benchmarks are funny. Benchmarks are the old job; how well does this do the last year's work? But as the job changes, those benchmarks are not appropriate. And so, what they were really interested in, the reason they invited me from this toy computer company, was they wanted to know if maybe there's a new job out there. And indeed there was. It was called compressing video. So I gave talks at that conference about MPEG. It's going to be the big thing, it's going to be important. And a few guys took it and ran with it. And one of the guys from IBM, I forget his name, wound up as the head of the MPEG-2 committee. And they actually, then you started seeing the processors have multimedia instructions and hardware support for some of the stuff. But originally, it had to be a custom chip, a separate module to do it in the hardware, and eventually MPEG could be done. But QuickTime was really architecture and modifications to the operating system to allow a non-fair arbitration scheme so you could handle audio in continuous streams while you did other stuff at the same time.

Lowood: So QuickTime was outside ATG?

Alcorn: Again, yeah. It started in ATG as Time Lords, and then we infected-- that was the way you got things out-- one way to get things out was to infect product development. And QuickTime was not going

to get released even in product development. And that was another story about how Dave Nagel caused it to be released at the risk of his own job.

Lowood: Why don't you...

Alcorn: Well, we saw how important this was at ATG and the guys in product development, or at least in the QuickTime group, but it wasn't going to get out because, remember, ATG, Advanced Technology Group, doesn't do releases. This is product development's purview and thoughts come down from on high. They don't come up from the bottom like this. Right? Just like Hypercard, the same way, wasn't going to get out. So, it was a fascinating time, because Dave Nagel had taken over from Larry Tesler. Larry Tesler went off to run Newton. Dave got how important this was, QuickTime was, to Apple's future. There was another marketing guy that we had hired from IBM who was really quite good. I wish I could remember his name. He and a product manager whose name I don't remember, the three of them conspired, unbeknownst to me, to release QuickTime. And at the next Worldwide Developer Conference, Dave Nagel was supposed to give a talk, a usual, a pablum talk about how wonderful Advanced Technology Group is and how much wonderful things are going to be, and all this stuff. He hijacked his own talk and actually announced QuickTime. He had the demo and announced the product and forced Apple to release it. Product development was hopping mad. He knew he could get fired for doing this but felt it was important enough. And these three guys did it and got out. And that's how Apple QuickTime got released in spite of management. So when people talk about how companies can be creative, it was in spite of the corporation. And it's funny, at the same time Apple would run around saying, "Oh, these engineers, they won't listen to me. You know, we can't control them. They did their own…" Well, thank God they did, because stuff never would have happened if they didn't.

Lowood: So, you left Apple in '91. Was this the project that you pretty much closed out your time at Apple with or were there other projects there as well?

Alcorn: No, no, no, no. Oh, no. At that time, there was actually a little subterfuge going on. There was a lot of tension between a lot of the bright people in product development, or some in product development, and a lot of them in ATG management. Some people felt that there was a real problem in engineering at Apple, in management, leadership from the top down, how new products got out. It was not right. And the proposal was for Ivan Sutherland and Bob Sproul to have some position that could kind of replace some of what Larry Tesler did--not Larry Tesler; excuse me, Jean-Louis Gassée--on making technical product decisions. And I, being a reckless and carefree fellow was nominated to form this idea and actually pitch it to John Sculley. This could be a real career-limiting move suggesting that these guys be elevated. And I went right past my boss and Larry Tesler and everything. I had a meeting with Sculley, and he said, "Sounds interesting. Talk to Jean-Louis." And it's like, you don't get it; you don't get it. So it died and Sutherland and Sproul went off to Sun [Sun Microsystems], and that's, you know, history. And then eventually Sculley fired Jean-Louis--God bless him, very bright guy, released a lot of product-- because [there was] a lot of politics going on and he [Gassee] wanted to run manufacturing. He

was more interested, I think, in grabbing more power that making some interesting, hard decisions about the products.

Lowood: What did you then close out your time at Apple with?

Alcorn: Ah! Oh, there were some harebrained ideas. One, there was quietly killing the Apple II. And some of us who loved the Apple II, there was no real reason to do it other than the Macintosh was making the money. We felt that the Apple II had a special place in society and science. The Apple II was the last, only personal computer [from which] you could actually learn about real computers as opposed to using it to do recipes and stuff. In college and high school, you could actually watch it work in a way. The tools were there. It was very, very open, and [we thought] that it shouldn't die. There was still profit in the thing. And so we actually proposed, instead of killing it, to find a manufacturer. I also worked on a remarkable microprocessor: a semiconductor device that would run Macintosh, emulate a 68000 or 68020. The chip itself would emulate an MS-DOS computer, and it would emulate a 6502. So you put a disk in. The idea was it was cheaper than a Mac, and it would run Mac. We actually built one or a prototype, sort of. You put the disk in and it would, ah, it would be an Apple II, it would be this, it would be that. And the idea, ooh, that was, you know, nasty and scared a lot of people. That was, product development just basically formed a scab around me and stopped that. And then one of the other projects I proposed at the end, based on this emulation technology, and we had semiconductor companies lined up and what-not to do this, we were making the transition. Remember the shift to the RISC [Reduced Instruction Set Computer], the shift to the power PC? We realized that when this happens, emulation usually suffers a huge hit in performance. And so what's going to happen-- we predicted what did happen-- you'd have a loss in performance. And so why are you just walking away completely from the 68000? Motorola had decided to stop building it, and the whole thing just died, and that's very dangerous. We proposed a make-our-own, next generation, scale it up just in case we had problems with this thing. And we saw Hugh Martin doing his Tesseract product, which eventually failed. We thought it was going to fail and Apple would be in big trouble. So we tried to do that. That got killed. And after a few failures realized that I really wasn't a research guy, you know. I wasn't comfortable just doing papers. Stuff I did, I had to affect to be a product, and I realized that it was not going to happen, so I left and on good terms with everybody.

Lowood: Then, well after that, you were involved with a number of different startups?

Alcorn: Well, I went to work at Digital FX with Steve Mayer, and it was a salvage job. I was the last VP of engineering there, and I learned back to video, professional video editing and authoring. And then after that, the slot machine company, Silicon Gaming. Yes, that was fun.

Lowood: Yeah. So what was it like to go into that market? I mean, I imagine now you're dealing with gambling and things like that. You're dealing with a whole different ball game as far as the legal environment goes? How did you learn about that and what was the product that you were doing?

Alcorn: Ah, well, again, that's, I guess, my quirk in life, that if I had to recreate video games, I'd be very, very bad at it. I mean, there's people. Most engineers get into building a better computer, a better video game and extend stuff. And I'm not good at that. I found my niche is to go take a technology and put it in a marketplace that exists but create a disruptive technology that changes that marketplace. And so, that's sort of what I like to do. And now, for the first time-- not for the first time-- but the first time in a while, I was back. It was an Ab Initio startup, complete real startup, clean, and Dave Morse, who founded Amiga and designed the 3DO [3DO Interactive Multiplayer], called me up and said, "Al, how about doing this?" That's the nature of what a disruptive technology's going to be. It's going to be foreign. That's the whole point. The first thing I did was went to the trade show for the gambling industry that was happening at that time in Vegas and looked around at all the products and said, "Gee whiz, these are 1970s" -- this was in '95, '94, '95-- "1970s-based technology, like video games from the old days." And here they're selling entertainment and everything is stored on a ROM chip. I mean, this is ridiculous. Let's put multimedia, let's put, you know, video and make it exciting and entertaining on a slot machine. And it was like, why aren't these guys doing this? I mean, this is so obvious. And so that's what that was about. And that was a lot of fun. It was just great. It was the most-- the purest startup company I'd ever worked in before or since. We had a million dollars seed round from the angels [angel investors], good angels. Within a year, we had Kleiner Perkins as our lead venture capitalist on our B round. We did a mezzanine round, the public offering, you know, went into production, and it scared the entire industry, just shook up that whole slot machine business. It was great. It was wonderful.

Lowood: What was the elevator pitch of what you would deliver?

Alcorn: Ah, well, it was that Steve Winn had changed the industry from gambling to entertainment. The biggest money earners in the casinos were the slot machines. Let's make entertainment on the slot machines with multimedia.

Lowood: And so once you had that, what were some of the problems that you had to solve in this arena?

Alcorn: Oh, well, a huge array of problems. I mean, let's just focus on the technical problems. The regulations in Nevada, the Nevada Gaming Control Board, are built to protect their industry, in a way, from foreigners coming in. Oh, yeah, they're very good ideas, by the way, when you look at voting machines. They have regulations about who can make these machines and how they're tested and stuff like that. But the regulations specifically said that the program had to be stored on a read-only memory chip, on a ROM chip, and that somehow made it more secure. And we wanted to store on a hard disk with a PC motherboard and actually use a big 4-gigabyte hard disk in those, a huge card disk for those days. And that was not allowed by the regs. And so we had to change the regulations to allow this kind of stuff and create a technology that made it more secure doing it this way than the ROM chips. And that was a lot of fun to go do that. That was the technical thing to change. We also used a 16 x 9 CRT in a portrait mode. We had to solve that problem. Now, the business problems were even tougher because

to do a slot machine for Nevada, you had to be licensed by the Nevada Gaming Control Board. To do that, all the executives and board members had to be investigated by the Nevada Gaming Control-- and we're talking about a one-year-long investigation into every negotiation ordeal you've ever been in. It's really, really extensive. And then once that one-year process is done, you then can submit a prototype to the Nevada Gaming Control Board for inspection, and they take a year to do that. And then once that's done, and you get approval, now you can sell a machine. So those were very hard things. And one of the funnier things was they wanted to investigate every member of Kleiner Perkins, all the partners at Kleiner Perkins and every deal they'd ever done. This was like a 4 million dollars round, which was peanuts, you know. And I was told, they said, "Al, you don't understand. Prior to you guys, the main source of venture funding for Nevada was the Teamsters Central States Pension Fund." So, I said, "Well, Kleiner Perkins isn't those kind of guys. And this is, you know...." So we worked something out. It was a lot of interesting business challenges to get by the barriers that they had to keep us from getting in. But the engineering challenges were even more fun to go do that.

Lowood: And you were able to solve those problems and penetrate Nevada gaming with your machines?

Alcorn: In fact, I remember talking to Ed, I wish I could remember his name-- wonderful guy-- the head of the technical branch of the Nevada game control board. When I first went back there to that first trade show, I stopped in and talked to him, and he met with me, and I explained what we were going to do from Silicon Valley, and he said he would support it. He said, "Look, Nevada makes revenue from these machines, so anything you can do to make the machines better." And he admitted the machines are like toasters. They're very boring and we could use a shot of technology. So I said, "What is your familiarity with modern cryptography, specifically public key cryptography and RSA [Rivest, Shamir, Adelman algorithm]?" And they'd never heard of it. And so I said, "Okay." So we then paid RSA [RSA Laboratories] to consult with the Nevada Gaming Control Board so we could be independent and educate them about it, and they got it. I mean, they got it and they were enthusiastic. And we hired the best attorneys to help rewrite the regs, so we were able to change the regs. It was very funny and very disruptive, because there was this funny meeting when they had to announce the change in regs, and it was up in Carson City, where the state capitol of Nevada is, and they had all the VPs of engineering from all the different companies that were licensed or going to be licensed, and they announced this change. One old guy got up in the back and said, "Can we postpone these changes until we can catch up?" You know, and I said, "You can't say that." You can't actually-- here they are blatantly trying to use this process to keep out new technology, and Ed said, "Look, things happen, changes." And indeed, I have been told recently that-- well, IGT [International Game Technology], the dominant manufacturer of slot machines in the world now, bought the remains of Silicon Gaming. Basically, for the patents that we have. And because my name starts with an A, Alcorn, it's called the Alcorn patent that really defines the way how to make a very, very secure gaming machine on a hard disk with a media. So now they're using it to keep out other people.

Lowood: So, was it at the same time as this was going on that you became involved with Interval or was that after you left?

Alcorn: No. Once I left, once my time was up. When any company gets a little too big and successful, it's my time to move on, and I was asked to join Interval Research, which was wonderful. I was going to be a senior business management advisor. That was the title. And it was basically let's have some people who are good at business and technology and actually exporting technology into a product work for us. This was a new kind of a position at Interval, because Interval's thesis was, "We're going to be a corporate industrial research arm that no longer exists in America and we're going to try to create new products and form new companies around them as opposed to licensing technology. We're going to actually try to create a spin-out company." And that would give more return for Paul Allen's investments. But it wasn't going as well as they'd thought, so they brought me and a few other guys like me in to help that process to bring products out. I was eventually asked to take a company out, called Zowie, and make a product that shipped.

Lowood: Yeah. Interestingly enough, two of my sons were play testers or involved in focus groups for Zowie early on. There was a psychologist at Stanford who was running those tests. And so we found out about it. My boys were involved in that. So I know a little bit about Zowie. And tell me about that, because Zowie got involved with Lego eventually, right?

Alcorn: Yeah.

Lowood: And there were a lot of issues there around understanding electronic toys and trying to move into an area where toys could somehow be merged with computer-based entertainment. How did that all work out?

Alcorn: It was all, in my opinion, in retrospect, very naïve. The idea was to create a great toy. I think we really had done that, an innovative toy that provided more than just play value. In a way to describe it briefly, the idea was a children's play set. We're talking about a 5-year-old to 10-year-old, that kind of a young age group. They liked manipulating objects. Yes, they could use a mouse and a keyboard, but they prefer to manipulate objects. So, can we create a kid's play set where they can manipulate figures and actually have a video game associated with that? So you had the physical, real world of the play set and a virtual game world connected, actually merged. That was really an exciting effect. The task I had was figure out how to make a very low-cost device that would track these objects. And we did that. The problem is that, that's not how the toy company works. It was a very naïve assumption about the toy business. It's kind of sad. I think the toy industry is one of the most uncompetitive, un-capitalistic industries in the world. The way it works, it's really based on advertising, television advertising. And so, toys are bought, in my cynical opinion, by aunts and uncles and grandparents running down the aisle of ToysRUs or Wal-Mart, you know, in December, looking at something that attracts them and they throw it in the thing and give it to the kids. The fact that you have a great toy that has value beyond just a Star

Wars name or Mickey Mouse or Barbie doesn't affect. It's bought by what the box looks like and if it says Star Wars. That's what it's bought by. So it was kind of a waste of foolish effort to do this. And this is why Lego eventually picked the pieces up, because it was really a very fundamental technology that could be applied to a lot of other areas, especially Lego, where you construct stuff. The idea was to make a good, valuable toy, but it was doomed from the start, in my opinion, because trying to spend money on developing a great toy is a fool's errand. Perhaps I'm too cynical, forgive me.

Lowood: Well, I want to finish up by asking you a few questions about the kind of recognition you've been getting in the last few years. I mean, just looking around on the web at various events, just recently at the game developers' conference, there was this event with you and Ralph Baer with hundreds of people. It was very interesting to see how-- I'm reluctant to say that you've gone into the role of being kind of an elder statesman, because that's not really fair to you-- but definitely there's recognition now of the contribution that you've made to the industry. I just saw last night that the Game On exhibit in Australia has a video of you being interviewed there. I know you got a big award in Germany last year. So clearly, there's a lot of recognition for what you have done. From the way you talk about it, it's kind of going from one project to the next and following what interested you. How do you feel about this sort of recognition that you've been receiving.

Alcorn: Well, it's wonderful. It makes you feel good when people say nice things about you and what you've done in the past. And so I really enjoy it. I've really been honored by it. It certainly feels good when people who don't know you like you and they're interested in what you have to say. It's a little disconcerting because there's a misconception that people see me as this video game guy and that I'm the world's expert on video games because, hell, I invented them, right? I didn't really, but, you know … And that's not what I'm about, because I said, you know, it's about disruptive technologies and exciting things. And it would be sad to be stuck doing nothing but video games for me. So, it's wonderful to do that, and it's been great. I get to travel a little bit and talk about it, but I have more fun talking about issues like managing creativity in a corporate setting. Those issues are more interesting and exciting. But God bless people who like the old video games and that stuff. And I'm just so honored and lucky to have been there and been at the right place at the right time to have been part of that and be crazy enough and risky enough to have done that. But as you know, I really enjoy doing the new disruptive technologies.

Lowood: Just the last thing, then, what's the disruptive technology that you're working on now?

Alcorn: Well, I just finished my tenure at a company called Integrated Media Measurements. I was, again, kind of brought out of retirement, because the idea was let's change the way people measure media consumption. The old methodologies like Nielson and Arbitron were people filling out diaries, and people lie, or they wire the TV set up and assume everybody's watching the one TV. So the idea was to hijack a cell phone, a modern cell phone so it listens to the sound in the background using a new technology called Acoustic Matching, which is very, very well developed now and very effective. We can

measure, we can find out what people are listening to exactly every 30 seconds, so fine grain that we can actually see if you went to see a movie, we know you went to see that movie. We can go back in time and see what commercials you were exposed to and actually tell if a commercial worked or not. So it was a great technical challenge to build an application on the cell phone that would do this, to create a back-end system that would do matching, match one ten-second sample against a thousand hours of content and get all the matches and do that 80 times a second on one little thin PC. I mean, that was just wonderful. And so to create this technology, the people in the industry just, oh, my God, you've changed everything. And by the way, oh, he happened to have invented video games. Like, it gets me in the door, you know. So, that was what was exciting to me. And now that company's big and successful and it doesn't need me anymore, and I've become more of an irritant than a help like all the other places. And so I'm off looking for the next challenge.

Lowood: Great. Well, Al thanks a lot for your time. I've really enjoyed this interview.

Alcorn: Thank you, Henry. I really enjoyed it. Thank you.

END OF SESSION 2

END OF INTERVIEW

