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	Audio File "Roesch Interview 3 of 4" 44 minutes and 59 seconds
0:00 Introduction and educational background	MA: The first thing that I'd like to do is…um… just get confirmation that you're okay with me recording this- BR: Yeah, no problem. MA: Okay BR: No problem at all. MA: Okay. Great. I just want to just start with sort of a uh.. a basic chronological question. Have you always been attracted to technology? Is that something you were interested in as a child? Or something that sort of came… BR: Yeah I liked to tinker around with electronic stuff. And then one day when I was in a high school chemistry class, we had a guy come in from a semiconductor company and talk. And I thought that sounded like something that I wanted to do. So, probably- And before that, like I said, just playing around with electronic stuff, you know, go to Radio Shack and buy things and put them together. And make stuff, so, yeah. MA: Do you remember what company he was with? BR: No I don't. I do not know.

	MA: All right, and so why did you choose Oregon State for your undergraduate? Did they have a good reputation for electrical engineering at that time? BR: Yeah, so Oregon State was a good school. I actually, I went my first year to a private school in Indiana. MA: Oh.
Rose-Hulman Institute of Technology	BR: So my freshman year I spent at a college called Rose-Hulman Institute of Technology. And it was, what I thought was one of the best schools for undergraduates. So it was really focused on undergraduate teaching and they had an engineering specific curriculum. And it was hard to get into that school but I did. And I went there and it was a great school. But it was very expensive and it was also an all male school. And so I, I went there, I did work-study and, you know, I saved all my life. And all my life savings was gone in the first year. And so I kind of had to make a decision about what I was going to do. I could've continued there but I didn't… really particularly like living in Indiana.
Oregon State University	So I decided to come back to Oregon. And I had a Oregon State scholarship that I could come here and go for really cheap. And so I did. And then I became a resident assistant so I got room and board paid for for my junior and senior years. And I was able to work during the summer and make enough money to pay for tuition and books. And so I came out okay and I didn't' really have to take out any loans or anything. So I blew all of my money in the first year and then ended up at OSU anyway. And so I was, it was okay. I mean I didn't change majors or anything. It just turned out that it worked out really good for me, but I split my education that way.

	MA: Mhmm. Do you remember any teachers at Oregon State that were particularly inspiring? Acted as a mentor? BR: Um… no so much, really. I means it may sound strange but I just- Because I didn't spend my first year there I didn't feel like I really got to know teachers like I would have if I would have been my freshman year. So I, I pretty much just kept my head down and focused on my education. I didn't really, I didn't really get involved that much, as much as I should have, with the different professors and stuff like that there. Of course the classes were much bigger, you know you were taught a lot by TAs and graduate students and things like that. So of course the professors were available, but I just really didn't do that much with them. My loss [smiles].
Interviewing with companies, the recruiting process	MA: So how did it come about that you got your job at Tektronix? Were you recruited? Or did you apply? BR: Well. That was- that's the good thing about semiconductors, at least back in the early 80's, was a really good time for semiconductors. And so that was kind of the allure that I saw, you know, from the guy who came to the high school chemistry class
Intel, National Semiconductor	was, you know, it was a really booming type of an industry. You could get jobs, you know, with companies like Intel and National Semiconductor and you know… And so it turns out that the recruiting program at OSU is really good. So most of the graduates in electrical engineering pretty much had their choice. You could pick like maybe the top five places you would want to go and they would recruit you and, you know, fly you around the country and you could go visit the places and get a experience.
Silicon Valley	And so I did that, you know, I didn't want to work in Silicon Valley. I knew that that wasn't for me because I was from

	Pendleton. I didn't really want to go there. But I did go down there and interview for a couple of jobs. And where I really wanted to go
Micron AMI	was to Micron or to actually, another small company called AMI that's in Pocatello, Idaho. Because it was close to Pendleton. And so I thought, well you know, it's going to be a smaller town atmosphere and maybe that would be a place where I wanted to go.
AMT	But in turned out that after interviewing with them and I interviewed with AMD, and I forget, some other… I didn't interview with Intel. But I interviewed with about three companies
Hewlett Packard vs. Tektronix	in the Bay area. And then I went and I interviewed at HP [Hewlett Packard] in Corvallis. And Tektronix. And so it came down to HP and Tektronix, because those seemed to be more of what I was after. And I thought I wanted the HP job and it was actually more money, but I liked the Tektronix job for what I would be doing. Because the HP job seemed like there was a lot more training and you didn't get to do stuff for a few years. You know they kind of like put you through this new graduate mill to get you to be what they wanted then you would start working on parts after a few years. And if I wanted to – Tektronix, I felt like I could have a bigger impact sooner. And so I picked them. I picked them instead. Never regretted it.
	MA: Had you heard of Tektronix before that?
	BR: Yes.
	MA: So their reputation preceded them in the industry?
	BR: Yeah. Everybody knew about Tektronix. And I picked up a… I'd actually picked up brochures on Tektronix when I was in Indiana my freshman year. Because they recruited at that school

	pretty heavily. And so I knew that that was a company that I was going to look into. But I thought I wanted to be more in semiconductors. Of course Tek did build semiconductors but I didn't know that. So I… my job wasn't building semiconductors. My first job with Tek was… evaluating semiconductors that they bought from other companies. And so it was a, it was a very fun job that really liked. MA: Why is it that you wanted to work with semiconductors specifically, was it just a preference? BR: It's just really techy stuff MA: [Laughs] Okay.
OSU hands-on experience	BR: And that's part of the nice thing about OSU. I think nowadays most colleges that offer electrical engineering have some type of fabrication. But at that time not many did. But OSU did. So even as an undergraduate we actually got to do what we saw here. They had a fab you could take wafers, you could deposit metal on them. You could build things out of them and do that kind of thing. You could design circuits and stuff. And so that was, you know, once I'd done that I knew that that was kind of the thing that I wanted to do. Or be around at least. That kind of technology.
9:34 Working at Tektronix	MA: And your first job at Tektronix was evaluating semiconductors that they had purchased? So they didn't do the fabrication- BR: That's right. MA: -at Tektronix?

Reliability Testing	BR: So yeah, in their instrumentation, of course, they would, they would build some of their own components. But they'd also buy them. Especially like microprocessors, memories, you know, those kind of things that they used a lot of. And so they needed to make sure that they would work. And that they were reliable. And so that was my job, was to really assess the reliability of different types of components. And at that time the components, the outward appearance of components were changing. They used to make components that looked like little caterpillars that had little leads that you would stick into holes and circuit boards and solder them.
Surface mount technology	And at that time in the early 80's, they were going to what they call surface mount, which is everything now. And so they didn't know if those were going to be good for their instrumentation or not. So we did all kinds of different evaluations. We would beat up, beat them up, and bake them, and spray water on them and all different kinds of things just to make sure that they would really work well for the instruments. Because that's what Tek did, they built instruments that were very expensive that people used to measure circuits and things like that. So they had to be a little bit better than what people were going to use them to measure. So they were- we basically called them Cadillacs; everything they build was a Cadillac And so we had to make sure it was going to be good. And so that was my job. And so I had a lot of fun at that.
Typical Workday	MA: And just a sort of a basic question, what was your typical work day like? Were you like the people we saw downstairs? Surrounding by the big machinery? BR: No, not so much, not really at all. Because it was more engineering. So my interfaces were with people who were

	designing instruments and with the people who were supplying the parts. And so that was the fun thing for me about working in reliability is it was never the same. I mean every day was different. I mean we would- we would have some test that was would do that would take long times. Like sometimes three months, you know, the test would be torturing parts for that long. But we could always be working on something else in the meantime. And then if the parts broke, we would also try to figure out why. What happened or what was wrong. Now, a lot of times we would use the supplier, we'd send them the bad parts and say "this broke". But sometimes we would try to figure it out ourselves too. And so it was constantly doing that and… And we also interfaced with what they k- what was their purchasing people, so the people that actually bought the parts. So we would make an approved supplier list and so we'd be involved with the specifications and things like that and as far as purchasing. So I really got a lot of interface with different people. And like I said this surface mount thing was new and so all the engineers at Tektronix were interested in that. They were saying "well this could make our instruments smaller but we don't what to do that if it's not going to be better," Right? It's- it's going to make them less quality, we don't want to do it. So it gave me a position where I go to talk with a lot of people because they were interested in the evaluations that we were doing on those circuits. But, yeah, it was nothing like production, it's just constantly different every single day. MA: How many people were at Tektronix, just roughly, was it… was it about this size? BR: No, much bigger. Much bigger. I don't know exactly but I

	believe that the peak was… the year I started was '81. And I think that was right around their peak in people. And now that you mention it I can't think of what, I think it was like 18,000 or so people… that they had. So it was, it was huge. It was a huge company. And that was the part I didn't like about Tektronix. Was it was just a really big company. So even though I felt like I had an important job it was hard to see how it fit in such a large company like that. MA: Right. And how many people were you working with, did you have a team of a certain-? BR: Yeah. We had… I think there was about six of us. There was a manager, a secretary, and four engineers, about four of us. MA: Were there any women? Just out of curiosity.
Women in technology	BR: The secretary was a woman. [smiles] MA: [laughs] Yeah, I figured. BR: But in, no, no a lot. MA: Right. BR: Not a lot in technology especially back in those days. I think in my class at OSU there was 400 people, I think and probably, I think there were two women. MA: Wow [laughs]. So not many at all.

	BR: Not many. There were women at Tektronix though. I mean they tried really hard to hire women. But there just wasn't that many that were interested in that kind of stuff. There were a few around but there weren't any in my group. MA: I know that Tektronix offered courses; did you take any classes through Tek?
Classes offered by Tektronix	BR: Um, I took; I took just about any class that I could. I don't remember that many that were really Tektronix classes. I mean they would hire people to come in and teach various things and I took all of those that I could. So I had different classes on like statistics, you know, management training classes, those kind of things. So just everything that I could get, I tried to take advantage of. So they were good about that and they did offer educational reimbursement and stuff like that. But I don't remember taking Tektronix-specific classes. I know that they had them but it was – it didn't seem like that they were applicable for what I needed, so I didn't really avail myself too much to those.
Challenges at Tek	MA: What was, I mean, what was the morale? You were kind of the peak, you were working there at the peak of Tektronix, what did, I mean, what did that feel like, how, how was the morale around the workplace? BR: Well, it was maybe not as good as you'd think. Because the thing about a company when it gets large like that, at least what I think, my, of course my experience is only with them so I don't know about other companies. But my perception is that when companies grow o a certain size, they have a hard time figuring out how to be organized. And Tektronix was a company that was

	constantly re-organizing.
Divisional-ization and centralization	And so they had a phase that they called divisionalization, where they would try to make divisions that would run the thing. And then they would have a phase called centralization and it seemed like it was like a five to seven year cycle. So they would, in one year they would be going this way and then after a few years they'd be going back. And it just seemed like that they were struggling with how to do that. And so at the time that I went, the divisions were really strong. And they were trying to divisionalize a lot of things. But that kind of hurt their economy of scale. So it, you know, being vertically integrated they could do a lot of things. But as they divisionalized then they ended up duplicating so many things. And so it was just, people were having a hard time figuring out exactly what the company was trying to make of itself. Because it had gotten to such a size that it just needed to do that. So there divisions that were doing really well and divisions that weren't doing very well. And right at that time they were in very strong competition with Hewlett-Packard. Was really just Tektronix or Hewlett-Packard and that's where you would buy instrumentation.
Tektronix computers	And Tektronix also fooled around with computers. They had their version of a personal computer that most of the people in the company used. And… but they did things a certain way and it turned out that the way they picked never really went commercial. And the way that HP picked did. Of course HP still makes computers now. Tektronix never really made computers. They made computer terminals. And back in those days, you know, computer terminals were really expensive and they, you know, paid a lot of money and stuff like that. So they had a huge business in that but eventually that all went away, right? When big computers went away then the terminal business went away and so they… you

Profit sharing	know it was a struggle. And that was also evident in their profit sharing. That was another thing I really liked about Tek was they had profit sharing. But the years before I started there, they shared a lot of profits. But while I was there, profit sharing was almost nothing. I mean we- they would have these big announcements that they would make throughout all the buildings. And, you know, 50 different buildings on the campus. And there'd be this one announcement and a lady would come on and, you know, "profit sharing for this quarter is…" And she would announcement what it was. But so many- all I remember is hearing "zero point zero percent" [laughs]. And so I don't remember getting very much profit share while I was there. And that was kind of a disappointment for a lot of people who had been there for many years. Because they had years, I know that were as high as like 20% so, 20% of their salary, you know, in addition. A 20% addition to their salary just in profit sharing. And so it was a good thing but while I was there they didn't have a lot of profits. Because they were doing this divisionalization thing and they were still expanding. I mean they built a lot of manufacturing across the river in Vancouver. And that was the latest thing. But there was also a lot of competition, lot of competition from Japan and other companies, you know, that would build cheaper instruments that people would buy just because they were cheaper, right? And so Tek was, kind of had the identity again of making the best, but that's a small market. Right? MA: Right BR: Military and people like that. They would give lots of equipment to colleges and labs and so kids were used to using Tektronix stuff. It's kind of like Apple, right? Where they would

	give computers to classrooms so people would be used to using them. Tek did the same thing but it still, you know it was just at the peak and things started to slow down and there were lay offs and, you know, again they were struggling with divisionalization and centralization. So a lot of that stuff going on.
22:05 Spin-Offs	MA: And is that why there were a lot of people spinning off to form their own-? BR: Um…I kind of think of it maybe as happening the other way around. I think people that were spinning off kind of created that situation. I don't think people spun off to get away from Tek. They just spun off because they had different business ideas and then a lot of the best people were those spin-off people, right? And so the people that were left, you know, that kind of, I think, helped with the slow down. That's just my perception but there was a lot of, you know, lot of interest in the spin-offs, people wanted to maybe get involved with those. And that was kind of my choice at the- at the end with Tektronix is I got a, I got the job offer to come to TriQuint. But at the same time, one of my friends was at… a different division and they were, they were being spun off and he invited me to go there. So I had to make a decision. And it was a really hard decision and I almost picked the wrong one because of my friend, you know, I wanted to go work with my friend, somebody I knew. But I had a
TriQuint	friend here at TriQuint also, so I just, I liked the job at TriQuint better and so I picked that one. But the job I could've got at… staying at TriQuint [means Tek] is what they called the semiconductor test systems, STS. Again a division, right, that it got spun out and eventually turned into

Credence Test Systems	Credence. If you drove on the freeway you might have noticed this big empty building that said Credence on it? [Smiles]. So they built systems, and in fact some of those systems that we saw on the test floor are Credence systems that we buy to test semiconductors. And so that sounded really interesting but it didn't ever, I mean it pretty much collapsed at least in this area. I mean that's not an on- really an ongoing business in Washington County anymore, is semiconductor test systems. But it was big for a while. But that just made me really glad that I came to TriQuint instead of going there. MA: I bet that happened with a lot of the spin-offs, that they were real big for a couple years and then just- BR: Yeah, I lot of spin offs never amounted to anything, right? I mean they just struggled and got venture capital and struggled some more and then eventually died out. But, you know, there's probably two or thereof those for every one that made it. MA: Right.
Tektronix encouraging innovation	BR: I'm guessing. But that was the cool thing about Tektronix is they really encourage that. They just, they encouraged people to do anything that they could think of. I think I told you on the phone that they, they actually had stock rooms that were like Radio Shacks, right? Where they encouraged people to just go in and get components and try to put them together and make whatever it is they needed to do their job. Or to make their instruments better, or to just investigate something that they had an idea about.
Howard Vollum	And the president of the company, I know I would see him once and a while, Howard Vollum. He would just walk around, and, especially at night. He'd find people doing stuff and he'd say,

	"What are you doing?" He would just encourage people to keep during it, right? And just play. Basically play with ideas and things.
Tektronix products	And so Tek had a lot of those. They had a lot of things that they built in the company that never made it as products but they experimented in a lot of different things. They made printers and copiers, they scanning electron microscopes. They made satellite TV systems. You know, they had all these kind of things that they built one or two of and tested them out, then decided not to do it. And sometimes those would spin off and sometimes they would just die. So they had a lot of that going on. A lot of it. That was one of the funner aspects of Tektronix. I think that's why there are so many spin offs from them. Just that was what they encouraged.
	MA: And you had a friend who had spun off to TriQuint?
Formation of TriQuint	BR: Yeah, one of the guys, one of the four guys that was in my reliability group. He didn't like working in that group and eventually found his way to this other group at Tektronix that was building gallium arsenide devices. So it started out as a research group. I think way back, like in the 70's. So they had these guys that were just basically tinkering and playing around because, again they had to be able to measure the best that people were building. And so it had to be that much better. So Tektronix thought that they needed the performance from gallium arsenide enabled to so they had this research group that was playing around. And they did build some components that were used in some of their oscilloscopes and equipment and stuff. But not a lot, right? It was just they didn't sell a lot of those things because they were so expensive. But, so they had that research group and he somehow, he took like a leave of absence and before I knew it he was working with them. And then they spun off out of the research area in
Wholly-owned	

subsidiary	Tektronix. They didn't leave the campus [chuckles], they just came up with a name and basically they were a subsidiary, a wholly owned subsidiary of Tek. And that's, that started in '85. MA: And then how long after they had formed TriQuint did you join them? Was it- BR: Just months. They spun out in April and I started in October. MA: Did it take convincing to get you over there or were you just really excited? BR: No, like I said it was a tough decision but just because I had two, what I thought were good choices. You know, I had two friends. The one guy at the semiconductor test systems was actually my boss for a time while I was working at Tek. And then the guy at TriQuint was my coworker. And so, you know. And I thought both of them were excellent and I just had to make this big list of pros and cons, you know and I agonized for a couple of weeks. Just trying to figure out what to do. Because I knew I wasn't going to stay where I was. I was either going to go with one or the other of my friends. And it just seemed like being number 36 at a brand new start-up was a little bit more enticing than building semiconductor test systems, which even though I liked that guy as my boss, it just didn't seem like as an exciting type of a job. Because they would sell maybe 3 a year. [chuckles] MA: Oh. BR: They would build these big things and sell them for like a million dollars, which was a lot more money back then. But that's

	what they did, you know. It was less than a dozen a year that they would build. And so I picked semiconductors. MA: What was the name of your friend at TriQuint?
Art Fraser, friend who worked for TriQuint	BR: Um, his name was Art Fraser. And he really liked TriQuint because he, he wanted to do marketing type things. So even though we worked together in the reliability group at Tektronix, he didn't want to do that. He'd had enough. I don't know how long he's been there but he was there years before I was there. And so he'd kind of gotten tired of that. He wanted to try something different and he was really enticed by the marketing. Even though he was doing the marketing, he was also doing the rel., the reliability stuff also. Because it was such a small group, right? MA: Right. BR: So they had multiple hats, right, but he thought if he could get me to come over, then I would do the reliability part and he could focus more on the marketing, which is what he wanted to do. MA: So when you first started there, you were doing reliability testing of the products?
Description of job at TriQuint	BR: Yes. I just basically flipped my job. Right? So for 5 years at Tektronix I was buying components from outside companies. And now I was going to be one of those companies that was trying to sell components to people who would use them. So I thought that that experience was really good. I knew what my customers were feeling and wanting. And the guy who was running the fabrication part of TriQuint was the person who hired me.

	And I think I told you this already on the phone but, the main thing that they wanted to do was to just tell people this fancy stuff is okay. Its new-fangled and you know, there's always a lot of risk with that but they just wanted to say, you know it's okay. It has high performance but it has reliability and so that was my job. And that was another really plus for me because it was a management job. There was four other guys who were doing, you know, the shake rattle and roll, and bake, bust and rust, or whatever you want to call it. You know, on the components, and I was going to be the manager. I'd never been a manager before. So that was really, that was kind of the tipping point for me was I could be the manager. But of course it's still hands on, but it was mostly to just be the mouthpiece to tell the world that gallium arsenide is okay. And that was my job. I didn't have to say that it was better or anything, just you know, it's just a higher performance but the reliability and quality is just as good. So that was my job. MA: How long had gallium arsenide been around, was it brand-new as a concept, or-? BR: Well, it had been around for quite a long time but mostly as a novelty. And so here were a lot of laboratories that were building it. And a lot of colleges and universities that were dabbling with it. So there, there had been devices for quite a while. But none of them have been commercial. And so it was a lot of government interest in gallium arsenide. Especially for digital things.
Seymour Cray computers	They wanted make computers out of it. And so did Seymour Cray, they wanted to make Cray computers, I don't know if you've heard of Cray? Cray was the big, the big super computers that they built back in those days and so, like the weather predictions were all done on Cray computers. You know, they were, everybody wanted

	a Cray computer, right? But that was a whole different era of computing where people shared a big computer. So they wanted to, they just wanted to make faster, better computers. But gallium arsenide was faster, but it wasn't really, in my opinion, ever going to work for what they wanted. Because for one this it would run hotter. So they actually built a Cray computer out gallium arsenide parts but ran in liquid. MA: Wow BR: -to keep it cool. So they couldn't just trust air, you know, they couldn't just put a fan on it, they had to put in liquid to make sure that it didn't get too hot. So they had these computers that were in liquid just to get the speed. So they could be faster and do more computations than anything else back in those days, right? And that's the way they built computers. It's not like today, right? I mean today an Intel microprocessor is more powerful than one of those Cray computers. But, you know that's the nature of that
Gallium nitride	business, right? It's just- it's fleeting. But anyway the government wanted to use these things in defense applications and stuff so they were pumping a lot of money into gallium arsenide. And today they're pumping a lot of money into gallium nitride, which is the new fancy thing. So everybody's doing that. We're not doing that here but we're doing that in Texas. So, you know, it's the next material, right? So we up get performance by changing the materials, not by shrinking like everybody else. So we just, we just find the next best materials so instead of… we started with gallium arsenide, which was pretty good. And then after that came indium phosphide, which was better. And now it's gallium nitride, that's the best. I don't know if there's anything else that can come up [smiles]. But that is…

AT&T, Nortel	basically the, what they call wide band gap materials. So you can make devices that run at a hundred gigahertz and a hundred volts. MA: Wow BR: So silicon devices are because they're shrinking the voltage is going down. So most devices run at like a volt now. So gallium nitride runs at a hundred volts so it can do things that silicon devices, again, can't do. So it's just… so gallium arsenide had been around but it wasn't a commercial thing. And that's what we were trying to do at TriQuint, we were trying to go to companies like AT&T, Nortel, all these companies that were building fiber optics systems, right? So when you put the electrical or the phone calls into a fiber, you're cramming a whole lot of channels, right? It's like 30,000 phone calls on one fiber. And they took a lot of digital… power to do that. And we built those chips. And so we were trying to convince those guys that it's okay to use gallium arsenide. And that was kind of our big job and so those were our, for ten years, our biggest customer was Nortel. Which doesn't even really exist as a company today. But they're the ones that put in most of the fiber optics system around the world. And they just put in too many. And then the business basically went away. People said well we got enough now and they kind of… crumbled under their own weight. The same thing happened to AT&T, right? I mean, they used to be the only phone company and now they don't really exist anymore. MA: Right BR: They just grew so big and so rich and then they just kind of

	crumbled under their own weight. It happened to AT&T, to Nortel and so now all that business is in China. Companies like Culta, WaVE and CTE are doing the same thing. And so we're selling parts to them. But it's just a few thousand parts a year for a hundred dollars a part kind of business. And in the 80's, that was great business for TriQuint. I mean that was the kind of thing that kept us going.
39:15 First Years at TriQuint Challenges at TriQuint	MA: You mentioned on the phone that the first couple of years at TriQuint were kind of a challenge, and I wanted you to elaborate on what sort of challenges you faced in those first, first couple years. BR: Yeah, everything, everything was a challenge. But mostly it was making the money, right? Because we kind of had it very easy in the first 5 years because we were a subsidiary of Tektronix. And they kind of coddled us. So we didn't necessarily have to make a profit. We were, we got to, you know, use their infrastructure, we lived in their building. You know we were tenets of theirs. And so they kind of made life easy as a start-up, right? Because we had deep pockets [chuckles]. But then when that, when they decided that they really didn't want us anymore, that they wanted to make their money out of, you know, their investment. And they weren't going to use very many of our parts. It wasn't essential for their instrumentation. So when that went away, that was kind of the struggle, was well, who's going to be our deep pockets? Who's going to- where are we going to find people that want to give us money? And so that was kind of the overarching problem was for any start-up company, right, is how do you find your killer application where you can make your money. And so that's, that was like I said the overarching, but of course

	underneath that, we had the technology itself. So gallium arsenide… was okay, but it was hard. It was hard to make it. You know, everything we did was invented here. The way we processed, we invented it. The way we tested, we invented it. So it's like everything that we did we kind of had to invent because we were doing stuff that nobody else had done before. And so, everybody was challenged. I mean, from the designers to the people that developed the test to the marketing people, to the sales force, you know. Everybody was kind of challenged and trying to figure out how do we make good stuff and how do we deliver and how do we find customers who are willing to give us money. So everybody was challenged. And it was small, you know, it was- we only had the people that we had to have, you know. We didn't, we lost all that kind of infrastructure when we moved away from Tektronix. We didn't have… we just had the bare essentials. So people usually had two or three jobs, kind of.
Government contracts	MA: And in those early years, you were contracting with the government a lot? Were they kind of your new deep pockets? BR: We were and they were good for, for not just TriQuint, but for the industry. There was a government program where they pumped in millions of dollars. And there was a DARPA, you know, program where they also gave us a lot of money. And, you know, for… defense applications gallium arsenide was an especially good material, in terms of things like radiation. So when we put our devices in space, they would last much longer than silicon parts. So there's a certain type of radiation that is in space that wears out semiconductors pretty fast. But gallium arsenide, for example, is like a hundred times better for that type of radiation. So they did have some really specific interest in, in it. And so those government

Alternate forms of income	deals were really good for us. But it's a whole… different business model. You spend a lot of time with paperwork. I mean you have to, you get the request for proposal, then you have to write the proposal, and then you have to get it, you know, pass it through. And they modify it. It's a whole lot of work for… you know, what you're doing. And the output is, we might just build one wafer. [Laughs] Right? So it's not getting the fab filled up, but it is getting money. So we, we did that because we also had a kind of a joke internally that we would do anything for a buck. And so we, we taught classes and we charged people. Because gallium arsenide was interesting, so we had people from all over the world come and take a class. And they'd spend $2,500 a week. And then if they wanted for another… $5,000 we would actually fabricate a wafer of their design and give them like 20 parts. So they could get that. And so we, that was the foundry business that I mentioned before. And so we, we made that a business, of just doing that, right? So we gave it away to colleges but we charged other people to do it. And we made a little of money there. We made a little bit of money from Nortel, and little bit of money from the government and just every lace we could get it, we would do it. And so we tried to, that's helped us be that diverse company. Because we had our fingers in- [battery on recorder runs out]