

**VINCE GULDEN**

An Interview Conducted by

Frederik Nebeker

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Interviewer: Frederik Nebeker  
Location: Dayton, Ohio

Nebeker: This is the 16th of September 1995. I'm talking with Vince Gulden in Dayton, Ohio. This is Rik Nebeker. Could we start by your saying just a little bit about where and when you were born, and your family?

Gulden: My childhood was all spent in central Pennsylvania. Carlisle, Pennsylvania was the approximate center of it. I went to Dickinson College, graduated there in 1937, with majors in both Chemistry and Physics. And there were no jobs available in '37, so I didn't know whether I'd be stuck on the farm the rest of my life--

Nebeker: Your father was a farmer?

Gulden: Yes, really a part-time farmer. He also worked as office manager for our county commissioners, and later as a farm appraiser for a Federal Land Bank. Commencement Day, 1937, I went home--took off my cap and gown, went home and changed to my regular clothes, and got a phone call from the professor of Physics who said that, just by chance, Dr. Gordon from Lafayette College saw the Academic Procession going down the street. He stopped to get acquainted, and said he's looking for an assistant in Physics. "Are you interested? Come back and talk to him." Which I did, and the rest is history. So I spent two years at Lafayette as a lab instructor, and got a master's degree in Physics from there.

Nebeker: I see.

Gulden: And then I had been, during the summer before, working for a small company in Carlisle, Pennsylvania which made quartz crystals.

Nebeker: For what purpose?

Gulden: For radio frequency control purposes.

Nebeker: I see.

Gulden: When I finished at Lafayette then, there still weren't too many jobs available. And of course, what does a physicist do anyway? But they asked me to come back to the crystal place.

Nebeker: What was the name of that company?

Gulden: Standard Piezo Company. I think it's not named that anymore. Somebody bought them out. I was in charge of production, quote, unquote, and this meant deciding who did the finishing on the various orders of crystals that we had. Also, I worked on processing improvements: the way we cut the crystals, the way we lapped them, ground them, and finished them, and so on.

Nebeker: Was that pretty much a new art at the time?

Gulden: Well, no, there were several companies making the crystals, but at that time they were not using synthetic quartz. They were buying quartz from Brazil, which would come in chunks that didn't have all its faces, and there were problems in locating the axes...

Nebeker: So you had to get good [crystals]--were they single crystals that you had?

Gulden: Yes, great big ones. Five or ten pounds.

Nebeker: What size was used typically for the radio?

Gulden: We had two sizes normally, an inch square, or three-quarter inch square. Today they're much smaller. They don't waste the quartz like we did then. The thickness depended on the frequency (and determined it) and was typically 0.01 to 0.10 inches.

Nebeker: So you were put in charge of the production?

Gulden: Well, it was a very loose little company, and the boss liked to take off and go down and spend his afternoons in the barroom, and he wanted somebody there to be in charge. That's the way it worked. [Laughter] So then I got this letter--which I have a copy of--from Joe Desch, saying we got your name from the scientific roster or some such thing. And we're looking for--if you're interested here--

Nebeker: Yes, certainly.

Gulden: I think it's this one--

Nebeker: For the record, it's the 28th of November 1940, a letter from Joe Desch. "We acquired through the American Institute of Physics information concerning yourself, with the advice that you are available for employment." I see. And this came out of the blue, as far as you were concerned?

Gulden: Yes. I hadn't put anything out.

Nebeker: And what was your reaction when you got this letter?

Gulden: I was interested enough to make arrangements with him to come out and talk to him. It was my first airplane ride, by the way. On the one hand, here, I was working for a little family-owned business that I didn't see any great future in, although my Dad wanted me to pull out and start a company of my own, so he could get in on the action too.

Nebeker: Also a crystal company?

Gulden: Yes. I didn't do it, of course. I came out here instead. But a number of the other guys did that. Standard Piezo spawned at least three or four other companies.

Nebeker: Was there that much of a market for--

Gulden: Well, the war came along, you see, and that's what gave it the impetus, because this was all in 1940, roughly, after 1939. So, at the time I came to NCR, Joe Desch was an active ham or amateur radio operator, and so was Bob Mumma, and I was, of course, and so we could talk--we talked the same language. That was the first thing that clicked. And then they explained that here was this big company making all these fancy machines, all with mechanical arithmetic-counters punched out of steel. And Joe's idea was that electronic counters could be made to take the place of those mechanical ones, and they'd be faster and there wouldn't be mechanical problems with them, and so on. That intrigued me, right off the bat.

Nebeker: So you flew out in late 1940?

Gulden: February the 1st, '41, I came out here.

Nebeker: Was that after you'd accepted employment, or to consider the job?

Gulden: That was when I started to work. I'd been out a month earlier, or something like that. I don't know when it was. My letter of January 21, 1941, accepted Joe's offer of a job.

Nebeker: I see. And it looked like you were interested in electronics already.

Gulden: Well, you know, we hams, in those days at least, were building our own equipment, and making experimental circuitry, and doing all kinds of stuff of that sort, which may not be true exactly today. But in any case, you know it felt like a natural thing to get into other electronic circuits of a new kind that I hadn't heard of before.

Nebeker: Were you told when you first came out what project or projects you'd be working on?

Gulden: No.

Nebeker: Just that this was an electronics group at NCR.

Gulden: Whatever came up at the time.

Nebeker: Do you remember your first assignment?

Gulden: Yes, because when I got here, instead of working on the projects that they intended to work on, they were putting together--getting ready to put on a big show for the Salesmen's Convention. They had an annual CPC Salesmen's Convention and we--

Nebeker: CPC?

Gulden: Century Point Club, I believe it was called.

Nebeker: Oh I see, the top NCR salesmen.

Gulden: Yes, hundred percent quotas or something of that sort. And so the first thing that I did was help Larry Kilheffer, who's now dead, but he's on your list, build a high

powered, high frequency radio transmitter for the purpose of lighting fluorescent bulbs across the stage out of thin air. Can you picture a show like that?

Nebeker: Oh, I see.

Gulden: That was just one of the things in the show. But when I think back on it, we could have cooked ourselves something fierce.

Nebeker: These are high frequency radio waves?

Gulden: Yes, a hundred megacycles or something of that order, and as I remember, we generated a half a kilowatt of energy. Had a beam antenna pointed across the stage so a guy could walk all the way, twenty or thirty feet away, and still light the bulb.

Nebeker: So what lit this thing up?

Gulden: Well, there was a lot of RF on that stage up there. I'm surprised that nobody got hurt, now.

Nebeker: And this was just a stunt?

Gulden: Yes, it was just one of the series of, well, Science was the key word, you see. And of course salesmen didn't have much of an understanding of scientific things so they thought they'd put on a razzle-dazzle--

Nebeker: Mr. Wizard sort of show!

Gulden: Right, right, this was the deal. So that's the first thing I did.

Nebeker: Do you remember--Ed De Laet was telling me about that-- probably that same convention that you worked on--on a couple of telephones that were supposed to be wireless telephones. Do you recall that?

Gulden: No, I don't remember that but I wouldn't be surprised. It was that sort of thing.

Nebeker: And the sound system, I take it, in the auditorium--

Gulden: Yes, the sound system I knew very well, because Louis DeRosa who was a fanatic on high fidelity, real or synthetic--he had some patents on generating frequencies that weren't really there--this was way back when, you see. But

anyway, they had him build a very fancy sound system to put in the auditorium just for this occasion. And--

Nebeker: O.K. So that was your first assignment when you arrived.

Gulden: That was my first month or couple of months work. Then we went back into the electronic counter business. Our purpose at the time was to cook up new things and to get patents on them. They had an extensive patent department here, and I have a book of some patents here if you want to see just what they looked like.

Nebeker: Yes.

Gulden: We worked on speeding up these counters. In the beginning they were using gas tubes--thyratrons. Bob Mumma probably told you about those. We had our own tube lab with a couple of girls and a fellow to make tubes. And then we tried branching out into vacuum tubes, which you could buy on the market. That's where my work was mostly done--in the vacuum tube area.

Nebeker: I heard that with this device to measure muzzle velocity you had to use vacuum tubes for the lowest order.

Gulden: I don't remember but that would be probably true.

Nebeker: The thyratrons weren't fast enough.

Gulden: Yes that was one of the problems with them.

Nebeker: A megacycle?

Gulden: They were small--as small as you could make them practically--but still they were limited in speed.

Nebeker: Bob Mumma was showing me that--the first, pictures of the first order counters were vacuum tubes and then the higher order could be the thyratrons.

Gulden: Then later on down the road, I guess this must have been after the war, one of the things that I did was to design an electronic multiplier for one of our accounting machines. Everything was done mechanically before we got into this, but one of the accounting machines, the Class 31 line, had been cooked up to multiply

mechanically, with mechanical controls. Crank the wheels and they would notch over, crank them some more and on and on. I did build a model of an electronic multiplier that had, as you said, the vacuum tube at the front end and then some gas tubes at the slower stages.

Nebeker: And that hadn't been done before in Joe's group?

Gulden: Not that I knew of. Also then, following that, we did one in the Sterling System for our English friends overseas, because you remember--pounds, shillings, pence.

Nebeker: So NCR was selling these accounting machines in England?

Gulden: We had a factory in Scotland, in Dundee, Scotland. We were, of course, feeding them information. We were the central research outfit. But that's all after the war.

Nebeker: Yes. But you did do some work on the counting circuits in 1941, I guess--

Gulden: The company had some contracts with--I think I mentioned yesterday--with the National Defense Research Council, I think was the name of it, and they were interested in higher speed counting and that was mainly what we were doing--that would be cook up new circuits that would go faster, and then write reports, and send them to the NDRC.

Nebeker: Do you know what application they were particularly interested in?

Gulden: No, I don't think they had an application. I really think they were just--would fan the information out among the defense agencies and see if anybody--

Nebeker: Well any kind of very fast timing device could use such circuits.

Gulden: Yes, among other things, of course, you had to also be able to generate controlled pulses--

Nebeker: I thought earlier that maybe your experience with crystals helped there.

Gulden: Well, no, I don't think the crystals ever entered into it. I don't remember that they did.

Nebeker: I thought with this muzzle velocity device there was a very high frequency pulse

generated or controlled by a crystal that then was counted.

Gulden: Well, they could be crystal controlled. If you want real precision you would do that rather than have a self-excited oscillator. But I don't remember that much about measuring.

Nebeker: So you were working just on some of these counting circuits, very high speed--

Gulden: When the war broke out.

Nebeker: And then, very soon--what's your recollection of this learning of the Navy contract and moving to Building 26?

Gulden: I don't remember much of anything about it except that there were negotiations going on and suddenly, as far as I can remember, we were told we were going to move from our lab over to Building 26. And that we were going to be in a building that had Marine Guards on the doors, and we were not to ask questions.

Nebeker: And you had to get a security clearance.

Gulden: Well I guess they had already had that all arranged. We had the top security clearance of that day. I understood that this project was next to the Manhattan project in priorities as far as getting materials goes.

Nebeker: And so, suddenly you were taken off--do you remember what you were working on at the time?

Gulden: No--this counter speedup business. And no, I didn't change though--they just moved the project and me over there for a while.

Nebeker: I see, you continued to work on the project?

Gulden: Yes. And so I was not in on the original Bombe design or production or anything, but I was over there among them.

Nebeker: Were there other groups like yours that were continuing earlier work in Building 26?

Gulden: I imagine so, but really, I can't remember.

Nebeker: So how long did that go on?

Gulden: Well again I'm not sure when it happened that they called me into the office and gave me the lecture about how serious this was--"Are you sure you want to be a part of it? You run the risks of--"

Nebeker: Did they give you a choice?

Gulden: Did they what? A choice?

Nebeker: Did they give you a choice?

Gulden: Well, it sounded like there was a choice, but I really think-- [Laughter]

Nebeker: You don't know anybody who decided not to--

Gulden: No, I didn't. And then they asked me--I have to admit to all this--they asked me, "Well, before we tell you what we're doing, do you want to guess what we're up to?" And, what they didn't know was that I'd been a member of the Army Amateur Radio System, and one of our exercises was to decode the weekly cryptogram that they put on the air.

Nebeker: This was?

Gulden: And this came along with that membership. Well, it's an antique, but I thought I'd bring it along.

Nebeker: This is--for the tape I'll say that this is a booklet called "Cryptogram Solving" by M. E. Ohaver, and this is put out by the Stillmen Press of Columbus, Ohio. I guess it's taken from Detective Fiction Weekly, or maybe that it's just that this person is editor of that column in Detective Fiction Weekly. So this is a booklet on solving cryptograms. And you had made a hobby of this?

Gulden: Not very much of one, just enough to recognize what was going on. The messages they sent out were very simple and we had decoding disks, celluloid disks, and you would set the thing to the key word and go ahead and decode. So it really wasn't analysis, it was just copying the stuff and translating it. So they asked me, "Do you want to guess what we're doing?" And I said, "Yeah, cryptography!" And that sort of blew Meader's mind! [Laughter] Well, he acted

like it did.

Nebeker: You weren't told what it was?

Gulden: Well, they never really explained any more than they had to about any part of it, but they said, yes, "We're building machines to decode messages."

Nebeker: Oh, they did admit it.

Gulden: Yes, once we got that far.

Nebeker: I was surprised that some people told me that even within Building 26 you were not to talk with others about what you were doing.

Gulden: That was the general feeling because, you know, they lectured us about this secrecy business so much--in fact it still affects our memories, I'm sure. Somebody else mentioned yesterday evening that he had just turned it off when the thing ended, and I find that that's what happened to me too. When this author, Joe Wenger's son, interviewed me, I had the same problem, and he couldn't understand how I could go through all this and not remember anything. But I really couldn't--just a few little anecdotes like the ones I told Debbie about and, well, a little more of it has come back. A few names, but I can't remember many of the names.

Nebeker: Well I think probably so much of our memory requires rehearsing now and then and you weren't--

Gulden: At the end of the war we were ordered to change and went off to something else which also was very interesting to us. We had accomplished what we set out to do; the war was won.

Nebeker: Do you know of anybody who wrote, you know, kept a diary or at the time wrote some kind of record of what went on.

Gulden: No, I sure don't. In fact, I would have been very suspicious of anybody who did that.

Nebeker: Were you told not to do that?

Gulden: I don't remember being told, but I wouldn't be surprised.

Nebeker: That would be one way of getting a record, if someone had done that.

Gulden: See, things were different then. It isn't like today when you can write a book, get on a talk show--well, you know the story.

Nebeker: So you all understood the need for secrecy and didn't--

Gulden: I never told my wife. She had no idea what we were doing.

Nebeker: You never told your wife what it was all about. Do you recall when you started work on the Bombe itself?

Gulden: No, the only part of the Bombe operation that I remember at all was when they asked to me to try to cook up a better hit detector circuit than the one they had in the machine.

Nebeker: That was an electronic device?

Gulden: Yes. And I remember we finally got something that worked but I don't think it was much better than the one they'd been using all along.

Nebeker: Was the technical problem that you were getting from this electromechanical--all these rotors moving--that you're getting some signal that you were looking for some match with another?

Gulden: Well, as I remember--a hit occurred when a bunch of inputs all went in one direction enough to trigger--to go over a threshold. And so there were different levels of voltages going along as the thing progressed and then suddenly it went, let's say, up, and when it got above a threshold that would be the hit.

Nebeker: O.K. And then you had to make a record of that.

Gulden: And so the fact that that threshold was sort of delicate--I mean the hit voltage wasn't much different from the other voltages. We needed some way to expand the range. That's what I was trying to accomplish, but I don't remember that it was ever used.

Nebeker: You never worked on the rotors themselves, or the brushes?

Gulden: Not that I can remember. I seem to think that somewhere along the line there was a piece of test equipment that maybe I had a hand in but I can't remember.

Nebeker: What's your recollection of the spirit in Building 26 at the time?

Gulden: Well, everybody was working hard, long hours, no overtime pay.

Nebeker: Oh you weren't paid overtime? Were you putting in much more than 40 hours?

Gulden: Yes, I remember 90-hour weeks, a couple of them. You see, Meader was on the quarterdeck with a whip and he was giving us stories about the Coral Sea--it wouldn't have happened if you guys had been there and finished earlier. We heard that more than once.

Nebeker: Is that right?

Gulden: Yes. And besides--I shouldn't mention it--well, I'll be careful what I say. I didn't mean to speak ill of the dead--but he was a thorn in everybody's flesh. And then, somewhere along the line, I do remember working on a thing called Rattler. And this Phil Bochicchio brought that up. He says, "You worked on Rattler." I didn't know anybody knew that. Anyway, we built a--this was the Japanese code.

Nebeker: That was against the Japanese code, right.

Gulden: I vaguely remember it. In fact I saw something that looked like it in the PBS program, The Code breakers, with the stepping switches and so on.

Nebeker: Do you remember--was it an electronic device?

Gulden: There was probably some electronics in it but it was--what I remember of it was the stepping switches, an electronic typewriter with Katakana font on it and another one--one for input, one for output--and what else was in there I don't remember.

Nebeker: But you remember working on that?

Gulden: Yes, we finished it and they took it off someplace. Phil said, "Yeah, it worked."

Nebeker: You weren't told at the time whether it was successful?

Gulden: No that's the--well, I guess the fact that they took it and didn't bring it back. I

guess that was pretty good.

Nebeker: But you knew it was for Japanese I gather?

Gulden: Yes, we couldn't help it because of the font. [Laughter]

Nebeker: Did you--I assume you took all of this work seriously. I mean, you believed that it helped win the war?

Gulden: Yes, that was the other part--you asked about the mood and so on. Everybody really did take it very seriously, and if--even though Meader was a pain in the way he lectured us, everybody did what we were told, the Navy and the civilians got along fine together--I don't remember any problems that way--in fact, I really would like to see that same kind of an attitude again in the workplace. Maybe it took a war to do it, I don't know.

Nebeker: I heard a complaint or two that the Navy enlisted people who weren't maybe as responsive to orders from civilians or directions from civilians as other people would be.

Gulden: Well, they were in the driver's seat. They used us as a kind of model shop, a low production factory, and they came in with the requirements--in fact, the scheme that was being followed came from outside, we didn't do it--so we did what we were told.

Nebeker: Did you work on this paper tape system? Copperhead, I think it was called?

Gulden: I remember that name but I can't come up with any--

Nebeker: That was also, I think, against the Japanese code.

Gulden: Yes, I may have had something to do with it, but I don't remember.

Nebeker: Anything else you can recall of the war years.

Gulden: No, little odds and ends like the stories I told Debbie, like the Marine guard who had his buddies in jail. [Laughter]

Nebeker: That was a nice story.

Gulden: I was standing there by the desk when this happened.

Nebeker: Well, a couple of your stories are quite incredible [Laughter] but--I believe them, I mean.

Gulden: There's one other story I forgot to tell her. When the war ended, and we still hadn't moved back into civilian work, but people were fooling around, trying to kill time, waiting for instructions on what to do, one of the technicians took one of the stepping switches that were left over, and built a "horn-blower" for a car. Every tenth time you stepped on the foot pedal--the brake--the horn would blow. And then when you would let it up, it would quit and it wouldn't do it for nine more brakes. [Laughter] Well, they put it on one of the fellow's cars. They used to go out to lunch, a car pool deal, and it drove him nuts. Finally, it blew just as he was about to park it. He turned it off, got out, looked under the hood and all up and down, and there was a box with some wires coming out of it that didn't belong there. So he took this thing, and some years later, he had moved to a different company, and the Big Man had a brand new Cadillac. He put this horn blower on this brand new Cadillac the guy's got, and the thing blew, of course, at some odd moment. He took it back to the Cadillac garage where he bought it, and it blew right out there in front as he got ready to stop--and he left it sit in the middle of the drive, and charged in there and said, "Take this blankety-blank thing back. There's something wrong with it!" [Laughter] Anyway, that's just a story.

Nebeker: Oh, that's funny. That's taking advantage of that stepping switch. So when the war ended you said you continued for a while on Navy projects. Was it the same?

Gulden: No, I think everybody was at loose ends. One of the things that happened--the Company said, "We are getting out of the business," even though they'd been asked to stay in it, and ERA was formed--you know about that, of course, and we were interviewed--some of us, to go up to ERA, and a couple of them went, but I declined to go.

Nebeker: You didn't want to go.

Gulden: And then we got back into counter research, into application of these things. Now two products, like this multiplier that I described--

Nebeker: For the accounting machines?

Gulden: Also along came the invention of the transistor, and the Company had taken out a license--they didn't know really what it was all about--but they sent me up to Bell Labs to find out what transistors were, and so on. And when I came back we got some and built our first counter with transistors.

Nebeker: The same kind of a counting circuit with transistors?

Gulden: A transistorized multiplier. And, of course you could add, subtract and multiply. In those days we were not dividing, but a little later on, of course, we did.

Gulden: So that was the first experience we had with what's coming up: a big revolution.

Nebeker: In those immediate postwar years do you remember other projects besides this multiplier for the accounting machines?

Gulden: Well, I can't remember the sequence either, but the--we also were trying to capture data in a form that could be analyzed. So we had punched paper tape attachments to cash register machines--I was involved in doing that.

Nebeker: Were those tapes read photo-electrically?

Gulden: Yes, that's right, photo-electrically. Oh, I was going to say, we punched the tapes. That was one part of the project--and then what to do with them after you had them punched. We did build some kinds of analyzing equipment and I don't remember too much about the simple forms that we started with. The name "sequence analyzer" comes to mind. Oh, another thing too. We took off on what is check-sorting, bank check-sorting, and one of my engineers (I was a department head by this time) and one of my engineers did build--not the kind of a bar code that we use today, or the alphabetic codes--but a simple printed code on a check with magnetic ink that we could read magnetically--and we did

actually get to sorting checks in sequence by means of their account numbers. So that--you know, you used do it by hand, but now you could zip, zip. Now that was not a product, this was all in the development stage. That's what we--we had a two-step deal in those days, where we did R&D, and then we handed it over to somebody to make a production design out of it, which took too long.

Nebeker: I've heard it said that NCR didn't really have an interest in electronic techniques, that they liked your electronic group to get as many patents as possible to keep other people from exploiting them.

Gulden: Well, let's just say that there was no great pressure to make products out of this stuff. [Laughter] Of course, looking back on it, the Company was all mechanical when we got there. There was Joe Desch out on a limb with a handful of people, trying to introduce electronics to them. "Yeah, that's interesting," they'd say, "but we know how to make these things. We've got a thousand--"

Nebeker: I can understand that--they had a fantastic business in mechanical machines--

Gulden: If you'd look down the aisle in the factory, there'd be a hundred automatic screw machines, all lined up, all turning out metal parts. And they knew how to do that.

Nebeker: --but what is surprising, is that they would support an electronics R & D effort, essentially to get--if it's true--to get patents to sort of get some control over it, but not to exploit it themselves. Is that a fair characterization?

Gulden: Well--the head of the Chemical Research Department, Bob Chollar--he's been dead for quite a while--was a pretty good salesman--and his chemists had cooked up some very good patents. One of them was this no-carbon-required paper, you heard of that?

Nebeker: I've read about that.

Gulden: So they had some prestige, and here we were, maybe benefiting from the afterglow, if you would, and the Vice-President in charge of both the Chemical and the Mechanical apparently [did] listen to Joe and to Bob Chollar, and he'd

support it. And money was not tight like it is today. They could afford to do things.

Nebeker: So the Company was content to have an electronics research group getting patents and not--

Gulden: "Maybe someday we'll use them, but we're not in a hurry." That was the impression.

Nebeker: Did this bother you, or Joe, or others that you know of in that group?

Gulden: Well, Joe, at the end of the war, was a physical wreck. You see, Meader lived with him, in the same house, and pressured him 24 hours a day. So Joe used to be a very pushy kind of a guy-- "Let's get in there and let's do this!" But at the end of the war he lost that, and so things got kind of fractured. And then Chuck Keenoy, who was a salesman, became our vice-president in charge of R & D. And he had a great urge to get new products out to the field, because he came from the field and knew the problems out there. And that's when we got really going on work that I considered to be worthwhile and interesting.

Nebeker: You would rather yourself be working on things that were going to be produced?

Gulden: Yes. In fact, eventually, because they still had this two step thing where you handed it over to another outfit that reinvented it, I told them I wanted to put something into production, and so I got out of the research development business, and I actually, with a small group of people, made a couple of products.

Nebeker: What products were those?

Gulden: Well, the "399" was the number of one of them. I have a picture here.

Nebeker: What kind of machine was it?

Gulden: It was an electronic accounting machine. In the meantime, the Company had bought a computer company, and so there was supposedly a division. "You don't tramp on them and they won't tramp on you." So everything we did we called electronic accounting machines. [Laughter]. Well that's another story I was going

to tell you, but then [picture found], isn't that pretty?

Nebeker: "The NCR 399." And does it have a year on here? I don't see it, but O.K. "With magnetic tape cassettes, modular core memory, magnetic ledgers."

Gulden: Well, that's the other point I was going to make. We had, back along the line, come up with this so-called "old balance pickup" which was first applied to the Bank Proof machine, where they had a bunch of checks to add or subtract from your account, they'd pick up the old balance from a ledger card carrying a magnetic stripe and it would add or subtract, and come up with a new balance, which would be recorded on the stripe. We then extended that, and time-wise, this preceded that. But this was an R & D kind of a project. This was our first personal computer, if you will, which was based on using magnetic stripes on these ledger cards--as mass memory.

Nebeker: With the idea that the information would both be printed and encoded magnetically?

Gulden: Right. And then it could be picked up again, and you could do more than just one balance, and this machine was a general-purpose, internally programmed computer.

Nebeker: What was this called?

Gulden: Well, it was X-18 because it was not a product.

Nebeker: Right. What year was this roughly?

Gulden: Well, in 1957, we took one of our two prototypes, like this, over to Mitchell Air Force Base and used it for a couple of months. The military used it to do military pay. So it was a completely operational system.

Nebeker: Did it lead to a production model?

Gulden: Yes, and then they produced it and, let's see--what did they call it? But again, we didn't get to do it, another outfit did it, but R & D invented it.

Nebeker: Did CRC do it?

Gulden: No, I mean another department in the company. But it wasn't a howling success. This was in the days when the computer industry was just born. But this was the most fun I've ever had, I think. I had about 40 people. And we had some systems people, some programmers (Of course we didn't hardly know what to call them in those days). We had punch card input; we had punched tape input from these cash register tapes.

Nebeker: Oh, that's punched tape.

Gulden: Yes, punched paper tape. We had our ledger cards, magnetic cards. Of course, the operator had a keyboard and could put stuff in that way. And the electronics was in here, and it had one hundred words, 10 digit words, of memory.

Nebeker: Impressive. [Laughter]

Gulden: I thought you'd be impressed!

Nebeker: So it sounds like you really continued with these electronic counting circuits and that sort of work. How long did you stay at NCR?

Gulden: Well, in 1973 then, after they'd taken a serious strike here at the Company, they started to spread the operations around the country. and I was scheduled to move to Wichita, and I said, "Thanks, but no thanks."

Nebeker: And Joe Desch's group that started in '38, I guess--that was the source of the electronics in the company?

Gulden: Yes.

Nebeker: Of course they acquired this computer company later on.

Gulden: Yes. Eventually we did start to talk to them, incidentally. One of these, I guess, the 399, had in it a box that they furnished, a central processor unit--you can call it that.

Nebeker: What is your--do you have anything you'd like to say about Joe Desch, as an engineer, or a manager.

Gulden: Well, when I first knew him, up until the end of the war, at least, he was a great

guy, I mean both as a person and as far as being a manager goes. You could talk to him, and he was a pusher, a go-getter--go get things done. But I think the war wrecked him so bad that after the war he kind of let go and then he finally went off into a corner someplace where he had a little lab of his own, just tinkering around.

Nebeker: So he was pretty much out of management?

Gulden: He got completely out of the picture.

Nebeker: Was he doing innovative work in his lab there?

Gulden: Well, I thought so. Of course, I came in with no understanding of how the accounting machine business worked, and here he was with the concept of substituting counters for mechanical counters, and all the rest of it.

Nebeker: How long did you continue to work with Joe?

Gulden: Well, let's see. Well it must have been several years after the war, but things were getting more confusing--he was not pushing any longer, and then--wait a second, I have a letter here maybe in this stack that gives a date. 1955. Joe was the boss, Bob had Products Engineering, I had what they called Research in those days, and Carl had Electronic Engineering, and he was supposed to produce--no it wasn't this machine, it was something earlier. \*

Nebeker: That was in 1955.

Gulden: It seems to me that it wasn't more than a few more years, because in 1957 we had completed our prototype, and my recollection was that Joe may have still been there officially, but I was talking to Keenoy more than I was to Joe.

Nebeker: I see. . . . filed in '42 by Desch, Mumma and you, this was a Communications system. What was this?

Gulden: I don't remember much about it, to be honest with you. One of the things that I do remember doing--this might have been it, but I don't think so, was a kind of a IFF identification code-thing where you send a special burst of pulses, and then

received it, and if it was the right combination you say “He’s a friend.” I don’t know if that was it or not. But here’s more, another part of the same thing, apparently. It was our practice in those days, too, that everybody that worked on it--technicians or anybody, got his name put on the patent because they were afraid that somebody, somewhere down the line, if he were left off, might cause some trouble. So they got everybody on it and made all of us sign releases.

Nebeker: You mean more than the three inventors listed here?

Gulden: Well, apparently, we were the only three that actually did any work on that But the patent for our X-18 has about 20 or 30 people on it.

Nebeker: And I think we didn’t get on tape what you said just before that this was--that the Patent Department at NCR was very active and--

Gulden: Yes, it was a big department and very pushy on getting results.

Nebeker: Were they sort of looking over your shoulder and suggesting that things be patented or it was just expected?

Gulden: I don’t think they ever tried to steer us. They wouldn’t do that.

Nebeker: So you have quite a few patents in this electronic counting area.

Gulden: Yes. I don’t know what that was any more--but it was one of the efforts to analyze the tapes that came out of the cash register--sort of collect the data and make some sense out of it.

Nebeker: Was this system put into production?

Gulden: I don’t think so. And that’s more of the same. But you see, it’s still very mechanical. Well then here’s--this is the X-18.

Nebeker: Wow. What a patent application. Wow, hundreds of pages--so many diagrams here--

Gulden: See all the circuits that were involved in it.

Nebeker: 260 or so columns following all the diagrams. Do you remember this job of writing this up?

Gulden: Oh, we didn't write it.

Nebeker: The Patent Office wrote it?

Gulden: We had notebooks and they analyzed the notebooks and they wrote it up.

Nebeker: They wrote it up from your notebooks?

Gulden: They wrote it up. Of course, they had to come back and ask us every now and then about it.

Nebeker: So the people in the Patent Office really understood then what--

Gulden: Well, they could translate it. Yes.

Nebeker: I see. Of course you had to get all these drawings done.

Gulden: They made the drawings too, the ones that went into the application, because they were particular about how they had to be done.

Nebeker: That's very interesting. Well, thank you very much.

Gulden: I think I've bent your ear more than you deserved.