



Oral History of Human Computers: Claire Bergrun and Jessie C. Gaspar

Interviewed by:
Dag Spicer

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Dag Spicer: Welcome Jessie. I'm really happy to have you here.

Jessie Gaspar: Thank you.

Spicer: Thanks for chatting with us. We're here with Jessie Gaspar at the Computer History Museum in Mountain View, California and Jessie was a computer when computers were humans. And so, we're going to talk to her a little bit about what that meant, excuse me, and where that might fit-- what it was like to be a human computer and how that changed as electronic computers came on the scene. So, is there anything you want to ask me before we start?

Gaspar: I can't think of anything quickly.

Spicer: Okay. So, first maybe we'll just take care of a couple of details, such as when you were employed as a computer.

Gaspar: Well I started in 1944.

Spicer: Okay.

Gaspar: And I don't think you want the month but anyhow and I worked until 1980. Actually I worked until 1981 but I officially retired in 1980. When I first went I worked in a wind tunnel where they recorded the measurements to compute lift, drag, pitch and all the aeronautical elements of flying on scales. So they had these little tapes that you had to read and they did averages and so forth. It was all, you know, set up but we had to use a desk computer at that time. Fridens were very popular.

Spicer: Now what you got maybe you can explain a little bit what these paper tapes came, you know, what they represented. This was for a wind tunnel right the results?

Gaspar: Well they, yeah, the pressure, I mean they, I don't know I think they had pressure holes in the planes. They had model planes, you know, and I worked in one that was called a 16-foot wind tunnel, which meant that the test section was 16 feet wide so they had models that, well scale models I should say yes.

Spicer: Yeah. And then they would blast the wind over these models?

Gaspar: Yes, uh huh. They changed the wind speed by propellers in the wind tunnel. They had-- the wind tunnels were curved. They weren't just straight, at least ours wasn't, some of the ones before they had. In later years they used, they tested different things.

Spicer: Right. Now this is at NASA Ames?

Gaspar: This was-- it was NACA in those days.

Spicer: NACA yeah.

Gaspar: No--

Spicer: They don't call it NACA, okay.

Gaspar: Anybody that worked for NACA gets very upset when you say NACA.

Spicer: Oh, I wonder why that is.

Gaspar: I don't know because they just didn't, they just never did.

Spicer: Okay.

Gaspar: They just said NACA all the time which was National Advisory Committee for Aeronautics, yeah.

Spicer: So let's just say it was at Moffett Field then.

Gaspar: It was at Moffett Field yes.

Spicer: Right.

Gaspar: And the reason I went there was because I lived there. I decided that would be a good place. It was during World War II and I didn't really know what I wanted to do with my history degree, but I liked math so I got a job doing math, using it.

Spicer: Great. That was a long career, 36 years wasn't it?

Gaspar: Uh huh.

Spicer: Yeah.

Gaspar: But I moved into doing computing really, I mean programming and so forth.

Spicer: Yeah, that's what I was--

Gaspar: After about 20 years.

Spicer: So, how long did the mechanical desktop calculator approach keep going?

Gaspar: I think about 1957 was when I first took a computer course on larger computers and that was for a computer which they had bought for the wind tunnels but that recorded data, well I guess directly to cards. I'm not sure. I think it came out on punch cards in those days which was the early form of recording data for a big computer or a large computer I'll say.

Spicer: Now did you work with a lot of other people all at once on the same problem or were you solitary?

Gaspar: No, because there were several, well let's see there were probably, I think there were about 20 people in my group of ladies and you were assigned to help a certain engineer, not maybe, maybe two on two to an engineer. They had their projects and their work and so you did the fine detail sort of, of that. We did everything. We did the drawings for their reports. They produced the reports but we, you know, and we did hand faring and things and did all the plots and so forth. So, it was fun because you got to start in the very beginning of a project and go to the very end. When I moved over to the computation division it wasn't that way because all you did was set up a program for somebody who was probably a mathematician, maybe an engineer but they didn't have to be in those days and they were going into higher math and using, you know, the computers because they were repetitive. They could do more work.

Spicer: Now were all the other computers women in your group?

Gaspar: I think they were in my wind tunnel. I can't remember that exactly.

Spicer: Was there a reason for that in your opinion?

Gaspar: I guess just because there were more available for one thing.

Spicer: Because of the war?

Gaspar: Yeah. We might have had one man. I can't remember that just because of the type of work and it wasn't the most exciting work in the world but, as I said, I like the fact you start out at the beginning and you knew what the engineer was going to produce so that was kind of fun to follow it through to the report.

Spicer: You knew where you were going?

Gaspar: Yeah, you knew where you were going.

Spicer: Right. What kind of machines did you use?

Gaspar: They used Fridens. We used them almost-- some people used Marshmans but my group didn't have any. They used Fridens.

Spicer: Right.

Gaspar: And I, you know, we were pretty good at doing square root on Fridens and different things, did have slide rules too.

Spicer: Oh, they used slide rules as well?

Gaspar: But most women weren't trained. If you weren't an engineer you weren't trained for a slide rule, so it was really faster to use the machines.

Spicer: Right. Now one of the other women computers that we interviewed said you have to hold a pencil in your hand or something at all times. Does that mean anything to you?

Gaspar: Not in my group.

Spicer: No, okay, that must be her group. I'm not sure. I didn't get to ask her what it was.

Gaspar: Oh, I don't know why that was because--

Spicer: The pencil was always in your right hand and the tapes were in your left.

Gaspar: Well, that's just because you were writing I guess. I mean that was just normal perhaps.

Spicer: Yeah.

Gaspar: I don't remember. There was no rule in ours.

Spicer: Okay.

Gaspar: Because if you were left handed you could do it the opposite way.

Spicer: Right. Now the Fridens are they, did they have handles on them? I don't think so.

Gaspar: No, they didn't have handles. Marshmans I guess did.

Spicer: So they were ambidextrous, so okay. Well, I'm just going to introduce a new guest who just arrived, Claire Bergrun. We're really delighted to have her here actually, along with Jessie. So, Claire, I'm just going to ask you a few questions that I already asked Jessie that are pretty routine and if you could just answer them as best you can that would be great.

Bergrun: Yes, I can.

Spicer: And maybe just get a conversation going between you two and some of the later questions.

Bergrun: All right.

Spicer: So, we started out just saying when and where you began as a computer.

Bergrun: Well, it was let's see at the college it was like '45 maybe, 1945. I can't remember if you came in 19-- I think you came in. Oh, no, I came before that. It was the war.

Gaspar: Oh, was it?

Bergrun: Oh, yeah.

Gaspar: Oh, okay.

Bergrun: Uh huh.

Gaspar: So, you must have come in '44 too.

Bergrun: Well let's see.

Gaspar: Also.

Bergrun: Did I come before you even?

Gaspar: No, I was there in February of '44 and you came after I did.

Bergrun: I think I came after you too.

Gaspar: I think you came in the summer because you didn't come to California I don't think until school was out.

Bergrun: Well, no, we lived in southern California until--

Gaspar: Oh, okay.

Bergrun: -- until my husband got drafted.

Gaspar: Yeah, you didn't come up here.

Bergrun: So then we came up here and that was, let's see what year did I get married even?

Spicer: Why don't we just say it's between.

Gaspar: I think it was '44.

Spicer: In 1944, that sounds about right.

Gaspar: Doesn't matter, yeah. Soon after I came.

Bergrun: Yes, it was before the war was over.

Spicer: And how did you hear about this job or what attracted you to it?

Bergrun: Oh, through my husband. He came here to work to be in the draft and be drafted to be in Ames and so he inquired about a job for me and this sounded like something I could do and so I did it.

Spicer: What did he do?

Bergrun: He's an engineer.

Spicer: He's an engineer.

Gaspar: And you see they needed to, they took the men to the Navy and they just, they trained at Moffett and stayed there and worked. They took the people that were already there and then they brought a few in too.

Spicer: I see, right, to--

Gaspar: The men engineers.

Spicer: And that's what they did.

Gaspar: That was to--

Spicer: To work on new planes.

Gaspar: -- for their military duty, yes. Yes.

Spicer: Okay.

Bergrun: We were with Lockheed a year and then we came up here because of the opportunities here and he got in the Navy pretty quick and he influenced me to come to work here.

Spicer: Right, that's fine.

Bergrun: I did.

Spicer: Moffett Field, just for our viewers, is a big naval air station or it was.

Bergrun: We were really interested in Ames.

Gaspar: Yes, the Ames part of it.

Bergrun: The Ames part of it not in the Navy part of it really at all.

Spicer: I see, okay, right. That's a good point. Thanks for correcting me. So do you remember your boss or who hired you and you can kick in a bit too.

Gaspar: You were there when Betty was there, so she must have hired, weren't you?

Bergrun: Oh, yeah.

Gaspar: Betty.

Bergrun: I was there when Betty was there.

Gaspar: Yeah, her name was Betty Brockman at the time and she hired me.

Spicer: Oh, she was your boss.

Gaspar: And she hired Claire also. That was at least the first time. You were there more than once weren't you?

Bergrun: Well--

Gaspar: Yeah.

Bergrun: Really just the once I think.

Gaspar: Just the once, okay.

Spicer: Was she a computer your boss as well?

Gaspar: Yes, and I don't remember if she had a math degree or not. I don't. Claire doesn't either but we learned how to do it pretty quickly.

Bergrun: No, I was interested in home economics, yes.

Spicer: Yeah, now you have an English degree right?

Gaspar: No, history.

Spicer: Oh, I'm sorry history and did you have any schooling before you came?

Bergrun: I was into home economics they called it then.

Spicer: Okay. And then so tell me a little bit about how they trained you because you brought up the fact that they trained you pretty aggressively.

Gaspar: Yes. Trained on the job.

Spicer: Yeah.

Gaspar: You worked with somebody that had already been working there usually.

Bergrun: Oh, yes. Did what I was told.

Gaspar: That's right.

Bergrun: Just did what I was told.

Gaspar: We had to learn how to use the calculator probably the Friden.

Bergrun: Oh, yes.

Spicer: Can you tell us a little bit about how long it took to get trained, was it a few weeks or a day?

Bergrun: Well you got to working.

Gaspar: You had to work right away.

Bergrun: Right away.

Gaspar: So it was really, you were working and getting trained at the same time.

Bergrun: Yeah, but you were being useful right from the beginning.

Spicer: Right.

Bergrun: There wasn't any training period.

Gaspar: You didn't work right directly with the engineer at first. That was part of the training.

Spicer: I see.

Gaspar: Because what we had to do was we had sheets of blank forms and we had to fill in according to equations and so forth, break everything down into a computation.

Spicer: Right.

Gaspar: So if and maybe the person that was there, you know, working directly with the engineer did that or even they did them sometimes, so it was pretty much already figured out for you.

Bergrun: Oh, yeah, you just did what you were told to do.

Gaspar: Yeah, right.

Spicer: Did they monitor your sort of, I'll just call it your output? I mean were there targets, so many calculations a day that you needed to do?

Gaspar: No.

Spicer: Some kind of quota maybe.

Gaspar: Not that definite I don't think.

Bergrun: No, it was pretty obvious what you did.

Gaspar: Yeah.

Spicer: Yeah.

Bergrun: You did what you were told to do.

Gaspar: If you were slow and there were people that were slower than other people, they just didn't get done as fast as the other ones did.

Spicer: Oh, okay.

Gaspar: Yeah. They'd have trouble learning the machine.

Spicer: Did you feel pressure to kind of grind through to produce a lot?

Gaspar: No, I didn't think it was pretty--

Bergrun: It was just--

Spicer: You wouldn't call it a high stress job particularly?

Gaspar: No.

Bergrun: No, just worked away at it put in your--

Gaspar: Sometimes and I don't remember if it was when Claire was there sometimes we had to come in and work swing shift because we had to read a lot of film in this because they took pictures and you read the film and measured things and things weren't available and if they were in a hurry to get something done they had to use it in the daytime and on a swing shift.

Spicer: Oh, yes.

Gaspar: We never did work graveyard. But the wind tunnels ran three shifts at this time.

Spicer: Tell us about this film that you're reading. That's interesting.

Gaspar: Well, and I don't even remember what we read it on. It had a name.

Spicer: Do you remember what it was?

Gaspar: It was, what was it, 70mm? Is that about 70mm?

Spicer: Yeah.

Gaspar: It was mostly pressure of the wind going across wings I mean in parts of the airplane and these were hooked up to a monitor. Don't ask me. And they took a board, it was a board of tubes and they--

Spicer: Oh, yes, okay.

Gaspar: Yeah.

Spicer: Now I think I get it. It's really an analog computer in a way.

Gaspar: Well it wasn't an analog computer though because I know what an analog is.

Spicer: They're little manometers [pressure measuring instrument].

Gaspar: They were manometer boards, thank you.

Spicer: Manometers.

Gaspar: That's the word I forgot, see I told you I didn't remember everything.

Spicer: That's right.

Gaspar: Yeah.

Spicer: Oh, okay, well that's good so you could extrapolate.

Gaspar: It had, yeah, you extrapolate exactly and the tapes were only on paper but we had to extrapolate those too. I mean they had little arrows or something.

Spicer: Oh, yeah, now was this regular paper tape that you used?

Gaspar: It was paper tape at first, yes.

Spicer: From a teletype?

Gaspar: Yeah and our wind tunnel had a pressure section. It was a pressurized wind tunnel so when I first went to work there the men, the engineers and if we went into the test section part when it was running you had to go through a pressure section, which wasn't too pleasant sometimes.

Spicer: Oh.

Gaspar: But after they redesigned the wind tunnel while I was still working there then they took the pressure tunnel out so it was not-- you could go in and out of the test section.

Spicer: It's hard on your ears or something?

Gaspar: Yes, it was.

Spicer: Oh, yeah, I see, so you were actually working in there while you-- they actually had you working.

Gaspar: Well, we didn't have to work in there too much but once in a while you had to go in.

Bergrun: No, we worked in just a room.

Gaspar: Yeah, we had an office, a large 30-foot sort of square. I always thought it was that anyhow.

Bergrun: Yeah, well it was a good size.

Gaspar: With, you know, tables like this and Fridens.

Bergrun: Uh huh.

Spicer: Was this right beside the wind tunnel pretty much?

Gaspar: It was just a building right under the--

Bergrun: Underneath, it was part of the--

Gaspar: Almost underneath, not quite. It was pretty noisy.

Spicer: Yes, I can imagine. I've heard the big wind tunnel.

Gaspar: Yes, well this was almost worse than the big one. The big one is low pitched, well used to be 40x80.

Spicer: I wanted to ask you something that another lady computer mentioned that she loved flying. She really wanted to be a pilot and she kind of realized she couldn't be a pilot. You couldn't be a female pilot really in that era.

Gaspar: So that's why she was motivated to come to work.

Spicer: She did the computer because it brought her near planes and you'll meet her. She's one of the other two ladies there.

Gaspar: Okay.

Spicer: But I'm sure you know her actually.

Gaspar: Could be.

Spicer: Did either one of you have any aspirations?

Gaspar: I still don't like to fly so I wasn't motivated by flying.

Spicer: So you don't care to fly.

Gaspar: I'm a white knuckle flyer still.

Spicer: Okay. How about your Claire?

Bergrun: Oh, I was just having a job. I mean I wanted to earn some money to get a start with my husband.

Gaspar: Newlywed, yes.

Bergrun: Uh huh, so we'd go someplace and get some money ahead.

Spicer: Can you describe a typical day when you showed up, you know, not in--

Bergrun: You try Claire.

Spicer: -- too much detail but the main highlights.

Bergrun: Oh, I don't know.

Spicer: So, let's say you show up in the morning.

Bergrun: We showed up in the morning and went to work. A man peeked in at us, I don't know.

Gaspar: Well, you probably had picked up your work the night before, you know.

Bergrun: Uh huh, just continued on with it the next day.

Gaspar: Where you just continued from where you had stopped the night before.

Spicer: Okay.

Gaspar: Unless you're the engineer you were working for came in and talked to you or something like that.

Bergrun: Uh huh.

Gaspar: And we were all in one room and we all had our own Friden.

Bergrun: That's right.

Gaspar: There wasn't much else.

Bergrun: There wasn't much else.

Gaspar: Got out for lunch.

Spicer: Yeah. So it sounds like you were given a lot of autonomy and they kind of just laid the problem out for you and left you alone.

Gaspar: They did and they left us alone and because we were doing this by hand a lot of the work involved double checking because it was easy, well I mean I'm sure you know that it's easy to transpose numbers and various things.

Spicer: Sure.

Gaspar: And when you're doing so much with numbers it's even easier, so we did a lot of the work and then somebody would either at the same time and then come out and check your answers or sometimes you went through and checked the sheet they had used.

Spicer: So, was the checking a formal thing or did you just check each other's work as a--

Gaspar: We just checked each other's work, yeah.

Spicer: Yeah, oh okay. And so calculating until lunch and then we'd come back and do some more.

Gaspar: Do some more that's right but a very lively group of ladies.

Bergrun: Oh, yes, group of ladies.

Gaspar: And we got along very well.

Bergrun: Uh huh.

Spicer: Now when did you leave? I'll ask each of you separately. You stayed a long time.

Bergrun: Oh, I left quite soon. I really only worked there about two years and left to go back, finish my home economics course and become a home ec teacher which I did. I only lasted about a year because by then it was time to have my children.

Spicer: Ah, yes.

Bergrun: So I did that.

Spicer: Right.

Bergrun: And then after I went back to work it was just nothing to do with that.

Spicer: Right that was kind of that.

Gaspar: She worked as a nutritionist in the hospital mostly didn't you?

Bergrun: I worked in a hospital when I went back to work after my children had grown up more.

Spicer: In terms of the opportunities for women at that time was this considered kind of a plumb job or just sort of average job. What do you think?

Gaspar: Well because you could work into something, I mean Claire didn't stay I did and I did go into actually doing programming then.

Spicer: Right.

Gaspar: But I went back to school also and took some more math courses.

Spicer: Um.

Gaspar: And went to Foothill when it started.

Spicer: Yes.

Gaspar: It was, you know, I had to be motivated and I was probably motivated because I wanted to be a mathematician but I didn't want to take all the math in college that you had to take.

Spicer: So, yeah.

Gaspar: So, I did it on the job and it was a very good opportunity. They were very-- they helped you, encouraged you to go.

Spicer: Now you were there, as we mentioned earlier for 36 years.

Gaspar: Yes.

Spicer: That's a great career and so why don't you tell us how you left, although maybe just that's it, you know.

Gaspar: Oh, how I left?

Spicer: Much easier to--

Gaspar: Well, I left because--

Spicer: You got tired of it.

Gaspar: -- I ended up not being able to do programming anymore because the government contracted so many things out that you didn't get to do any in-house so it really wasn't fun and the last job I had was monitoring contracts, million dollar computer contracts which involved the people that came in and wanted a small, you know, a job, an individual job, yes, and then it was all under one umbrella that's one contract. But it wasn't much fun I didn't think. I did not like that kind of desk work.

Spicer: Your heart was in computers, programming.

Gaspar: Yes, I liked the part, oh I liked the aeronautics at that time and I liked doing math and working with the engineers or the physicists or whoever you worked for when I got into the computer. We had IBMs mostly.

Spicer: Right with a mainframe.

Gaspar: Uh huh, mainframes, yeah and, you know, learning how to program in machine language even, so I kind of understand machines.

Spicer: Yeah. Now machine language is not very friendly.

Gaspar: No, it's not very friendly you're right.

Spicer: So out of all those years that you spent there is there any specific project that you really were excited about or that helped you grow a lot?

Gaspar: Well, it helped me to grow to transfer out of the wind tunnel and I could have still stayed there until they finally didn't much exist anymore.

Spicer: Which was pretty recently.

Gaspar: Well, it was a lot later than I moved over in 1964 but I enjoyed working doing the jobs because people would just come and bring you the equation and you did all the programming of it, you know, and you had to understand a little bit more. So, I think that I liked it because I grew too and then when I got this other one I didn't like it. So, somebody had to do it and I wasn't going to get a raise if I didn't do something else so I was motivated for that reason.

Spicer: So you provided this translation function between an engineer and a mathematician.

Gaspar: Yes.

Spicer: And the machine.

Gaspar: Yes, that's right.

Spicer: That's extremely important. Did you know Walter Vincenti by the way?

Gaspar: Did know him, yes.

Spicer: Ring a bell. I knew him at Stanford.

Gaspar: Yeah, I bet.

Spicer: Nice man.

Gaspar: Who else was at Stanford? Was Wilco Gasich [ph?] there?

Spicer: I don't know him.

Gaspar: You don't know him, okay, I'm trying to think.

Spicer: Yeah, let's see.

Gaspar: I rode in ride groups all the time and some of my ride groups left after the war, you know. They went to work for aircraft companies and it's fun to trace them.

Spicer: Oh, yeah. Just to wrap things up a couple more questions and you get to ask the last question or to make the last statement if there's anything you want to say. But electronic computers and how did this, how did you find out about them and then how did you move into them and you can both answer this however much you feel you can answer it?

Bergrun: Well, of course, I didn't stay long enough to have that happen. I just stayed about two years wasn't it?

Gaspar: Uh huh.

Bergrun: And just earned my money and went.

Gaspar: And I don't know.

Bergrun: And it was just a routine but there were nice people to work with and it was a nice job that way and certainly it was just do what you're told and it worked out very well.

Gaspar: Ames was a very good place to work because it was an engineering environment and most of the people were very interested in their work and they worked hard. It wasn't what you hear laughingly as a government goof off place.

Spicer: Right.

Gaspar: There were a few people that didn't work hard. There is always going to be some I guess but it was really, you know, it was good for all of us because to watch everyone work hard.

Bergrun: Oh, it was.

Spicer: Yeah it was exciting.

Bergrun: It was a good place to work.

Gaspar: Yeah, it was an exciting time. During the war certainly was exciting.

Bergrun: Uh huh.

Gaspar: And then when it became the Space Agency it was exciting too.

Spicer: Right.

Bergrun: Uh huh.

Spicer: Yeah that was a very fertile period in the aeronautics from the '40s to the '60s.

Gaspar: Yes.

Spicer: Yeah. So electronic computers I guess just got introduced at Ames.

Gaspar: Well they were getting desktops when I left. They were getting but they didn't call them PCs in those days or anything but they were the large--

Spicer: Like terminals?

Gaspar: -- terminals, yeah.

Spicer: Okay.

Gaspar: But I didn't ever use one because I was in this, didn't need to in this other job by then.

Spicer: But when you went from computer, from human computer to your first exposure on an electronic computer, what was that and when did it happen do you remember?

Gaspar: That was in 1964.

Spicer: Oh, okay.

Gaspar: I had already taken some programming courses in the wind tunnel because they offered them at Ames in house so I knew, you know, but then actually I went over to work with Marcy Smith in that group because they needed somebody and so I applied and got the job.

Spicer: Oh. Do you remember what computer they were using at the time when they were teaching you this programming course?

Gaspar: Oh, well the first one was at Datatron. It was in the wind tunnel. Then I guess they were working on 650s first I think.

Spicer: Okay, that makes sense.

Gaspar: Yeah, but I think the one, I can't remember whether it was still a 704 when I came over to the computation area. By that time they had built a new building for computation to house the machines. Before they sort of hid them wherever they could find some space.

Spicer: Yes. An IBM 704 that was a serious machine...

Gaspar: Yes that was a big one.

Spicer: ...scientific machine.

Gaspar: It was a large machine. It had a lot of tape, you know, or appendages onto it because you had card readers and tapes.

Spicer: Oh, yes.

Gaspar: That you had, that ran off of it, a lot of component parts.

Spicer: Right.

Gaspar: Not just the main frame.

Spicer: Well, is there anything that you'd like to say or chat?

Gaspar: No, just that I thought that it was a very interesting time.

Bergrun: It was an interesting time when I was there and, of course it was just a short time.

Gaspar: But I don't ever remember being called a computer, I'm sorry.

Spicer: That's a good point.

Gaspar: I was going to look up my old papers to see what it said but I don't know where they are since I moved four years ago. I used to have them all, all my raises, you know, and every little piece of paper that came through in my career. I thought we were math aides at first and I don't remember.

Spicer: That's a really good question.

Gaspar: Yeah, because somebody else that was in another group said, "Oh, no, I was called a computer," so.

Bergrun: So we all became computers then.

Spicer: But you were not called a computer.

Gaspar: We were human computers actually but I don't remember that the title was used by the government as a job title.

Spicer: Right, right.

Gaspar: And nobody, or no I might not have liked it so that's why I think I don't remember. But then again it was a long time ago.

Spicer: Right.

Bergrun: Yes, it really was a long time ago when you think back.

Gaspar: Fifty years, more than that.

Bergrun: About sixty years.

Gaspar: Sixty years, yeah, 61.

Spicer: And computers have come pretty far in 60 years.

Gaspar: Yeah, they have.

Bergrun: Oh, yes.

Spicer: So, although human computers will always have a place I think whenever you don't have power.

Gaspar: That's right.

Spicer: You need to have a good brain.

Gaspar: I can still divide and do things on a piece of paper.

Spicer: Yes.

Gaspar: I don't take my computer when I go out to dinner so my head is pretty good at doing figures but it's better if I do something. I come home and check my figures sometimes to make sure I didn't cheat anybody when we divide up.

Spicer: Oh, yes.

Gaspar: Tabs or something but it's sort of nice to be able to still do it in your head and not have to depend on a computer.

Spicer: Yeah, it's a skill that seems to be--

Gaspar: But I think it's wonderful because it was monotonous work.

Spicer: Right.

Gaspar: Doing the same thing over and over for, you know, I mean we had maybe 20 or 25 rows and columns of cheats that were this wide sometimes.

Spicer: I could see it would be very difficult to deal with that much information, even from collecting it to even presenting it, you know.

Gaspar: Yeah.

Spicer: Because you think today we usually have graphs or models.

Gaspar: Yes, right.

Spicer: To represent that much data.

Gaspar: That's right. We did a lot of work behind the scenes before they got up to doing graphs.

Bergrun: That's a good way of putting it.

Gaspar: And actually we got to do the graphs too so that was the part I liked about being just before I went over to go into main frame computers.

Spicer: Right.

Gaspar: Because that was pretty much everything was pretty, what do I want to say, automated or was wired by then.

Spicer: All right, I think we'll leave it at that. Thank you so much.

Gaspar: Thank you.

Bergrun: You're very welcome.

Spicer: Both of you for coming and sharing your human computing knowledge with me. It's great to hear that story.

Gaspar: A lot of the people worked there and then they left because the war did end and the girls were married or the women and so they wanted to raise families and so forth but some came back. Enid, the one that couldn't come, she came back several times because her husband went back into the Army and had to go somewhere and so she had experiences in different areas too. I'm sorry that you didn't get to talk to her.

Spicer: Yeah, we may be able to get in touch with her.

Gaspar: She was a-- I took this Betty's place after she left. She had gotten married and her husband left and so I was a head of all the women and she was in another branch at one time also.

END OF INTERVIEW