

NASA JOHNSON SPACE CENTER ORAL HISTORY PROJECT

ORAL HISTORY TRANSCRIPT 2

MICHELE BREKKE
INTERVIEWED BY JENNIFER ROSS-NAZZAL
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ROSS-NAZZAL: Today is July 20th, 2017. This interview with Michele Brekke is being conducted at the Johnson Space Center for the JSC Oral History Project. The interviewer is Jennifer Ross-Nazzal, assisted by Sandra Johnson. Thanks again for joining us on this historic day, this forty-eighth anniversary [of the first lunar landing].

BREKKE: Yes, you're very welcome. My pleasure.

ROSS-NAZZAL: You remembered that there were a couple of things we didn't get a chance to discuss last time. Would you like to bring up some of the things [we didn't talk about]?

BREKKE: Right, or I forgot about them and remembered them as I was driving home.

ROSS-NAZZAL: It happens to all of us.

BREKKE: They're random, so I'll set the stage where it fits into the big picture. You had been asking for little anecdotes in the early years of training, particularly in STS-1 and 2. They trained for so long. We ran out of scripts. I remember Dick [Richard H.] Truly, he had quite a sense of humor. It was a training session. He probably knew the script before we even plugged in any of the malfunctions, and he says, "Okay, guys, going to do something here; we're going to

do role reversal.” He said, “I’m going to throw a switch and then you the instructors down at the instructor station have to try to figure out what I did.”

ROSS-NAZZAL: He was really bored, huh?

BREKKE: Yes. He would shut down a fuel cell, and we would all be watching our screens, because we wanted to be the first to find out what he did and to catch him at it. Somebody would say, “Oh, looks like you shut down fuel cell one.” “Yes, that’s what I did.” Then we’d reconfigure that. Then he’d do something else. We called that the role reversal, because they were so bored.

Going back to college, I talked about this professor, Helmut Heinrich, that I had that took me under his wing and was quite a mentor throughout my years in Minnesota. I attribute something that he did to my training to be able to think on my feet, which comes in real handy in Mission Control. I described how I would sew these model parachutes, then they would get tested in the wind tunnel, and then eventually I got promoted to actually running the wind tunnel and testing the parachutes and documenting results.

One day we were testing one of the chutes, and Heinrich gave me a hypothetical. He said, “Hypothetically, if we were to change this configuration or that configuration what do you think would happen?” My response was, “Let me go plug it into the computer, and we’ll see what the results are,” and he stopped me dead in my tracks. He said, “No. I don’t want you to go back to the computer. I want you to stand right here and tell me what you think would happen if we did this.” It’s like whoa, okay. I thought through it. I don’t even remember if what I said was right or wrong. It was the idea of having the confidence to think through the

topic right then and there and not have to run back to safe haven at the computer, which in those days was the punch cards. I attribute his leadership and mentoring and helping me gain the confidence to think on my feet, which clearly came in handy when I worked in Mission Control.

ROSS-NAZZAL: I imagine.

BREKKE: The other thing I remembered is a little anecdote on Sally's [Sally K. Ride] second flight. It was [STS]-41G, I think that was her second flight.

ROSS-NAZZAL: Yes, that was her second flight.

BREKKE: She was the robot arm operator for deploying the ERBS [Earth Radiation Budget] Satellite. I had talked about the interaction of the crew throughout the deployment sequence. The crew had to throw some switches; the Payload Control Center at Goddard [Space Flight Center, Greenbelt, Maryland] in this case had to send some commands then crew switches and commands. It was a choreography that had to happen. There was a panel on the Shuttle that was configured for the hardwired switches that went out to the ERBS through the robot arm, and I remember it was two layers of switches, maybe seven switches on each layer. Some of the switches worked under certain situations, and some of the switches worked under different situations. It was somewhat confusing and complex to just think of that panel and to remember what works when.

We were in a meeting one time, and we're sitting next to each other. I open up my notebook. I had made a hard copy picture of that panel, and I had highlighted in colors: yellow

for when the switch works through the RMS [Remote Manipulator System], pink for when it works through a different [system], so I used color highlights to designate what the switches were. She looks over at my notes, she opens up her checklist, and she had highlighted the switch panel exactly the way I had.

She blessed me after the mission with this beautiful collage that had pictures taken during the flight. It has that [very] page, [not a picture], out of her checklist of that switch panel. I've [still have] that. It's a page out of the checklist with her highlights on it. That was really cool [to receive that from her].

ROSS-NAZZAL: That's a nice memento.

BREKKE: That one is a keeper. Those were my I forgots.

ROSS-NAZZAL: I wanted to ask you about [STS]-51A, which according to your resume you worked on. That was an interesting flight because that was a deploy and then a retrieval. I was curious about that, if you worked at all on that retrieval aspect.

BREKKE: I wasn't front room for any of the com [communication] sat [satellite] retrievals. I don't remember which retrieval that was.

ROSS-NAZZAL: I think that was WESTAR and PALAPA.

BREKKE: I did work the mission where we deployed both of those. I did one of the com sats, and somebody else did one of the others. I had no involvement in the decision on whether to continue deploying the other one; we talked about that last time.

I don't remember working the retrieval of either one of them. I don't remember. Even if I did work it, it just wasn't memorable. I do remember seeing, I think it was PALAPA after we brought it home. They had it in one of the hangars at KSC [Kennedy Space Center, Florida]. I didn't go there just to see it, but I was there on a business trip. I said, "Hey, I'd like to look at it." It looked like [it had] a severe case of acne. It had been pitted with micrometeoroid and debris. It looked like somebody's face that had the extreme case of acne with all these pits. Clearly it could never fly again. I don't know that anybody thought it would.

ROSS-NAZZAL: It was a big deal for them to bring that back.

BREKKE: Yes, it was more the event of setting up the rendezvous and capturing it and bringing it back than it was to actually get it back. It's not like they could really do anything with it other than study it for the effects of microgravity impacts and MMOD [micrometeoroids and orbital debris] impacts.

ROSS-NAZZAL: Did you work at all on—was it [STS]-51I? That was the deployment of three satellites, and then they did that repair of the LEASAT.

BREKKE: I [may have].

ROSS-NAZZAL: No, that's okay, I know that there are so many missions you work on, so I never know what makes a memorably flight for you.

BREKKE: [STS]-51A, we deployed ANIK and SYNCOM, and I did work the ANIK deployment. ANIK was a Canadian com sat. Just a little side note on that, somewhere in the late '80s I went on a wonderful vacation to the Canadian Rockies. We went to Banff and Jasper National Parks.

ROSS-NAZZAL: That's pretty.

BREKKE: Just gorgeous. We did day hikes. We were on this one hike up in the middle of absolutely nowhere in one of those parks up in the mountains. We come across this communication station that involved some sort of a phone service, obviously for emergency purposes. There was a sticker on it, and the sticker said in so many words, "This communication station is brought to you by the services of ANIK that was deployed from the Space Shuttle."

ROSS-NAZZAL: That's cool. Did you get a picture of it?

BREKKE: I didn't. I almost wanted to make a call on it. That was 51A. Then 51I was AUSSAT, ASC [American Satellite Company], and SYNCOM. I worked AUSSAT. That was the Australian com sat. To us they all looked identical. It was a PAM, a payload assist module, upper stage, with the communication satellite mounted on it. It sat in the bay with a clamshell over it. You made the point in your notes that all these satellites were owned by different companies, different countries, and what was that like.

These were the Australians, and they were the most polite, humble, soft-spoken people that I'd ever worked with. I think that was the mission; I think Mike [John M.] Lounge was on it. If I get my wires connected right, it was called a sunshield. Think of it as a clamshell. When they opened the sunshield, somehow it snagged one of the antennas on the communication satellite, and it jammed that side of the sunshield from opening. The other one opened, and the other one was like this. [Demonstrates] We couldn't deploy the satellite like that.

The communication on the loop was, "What are we going to do?" I remember the flight director comes to me as the payload officer and said, "Well, payloads, what do you want to do?" I was actually standing up. I just remember I didn't even think. I just said, "I want to get a video of what this looks like." At that time, we only had four ground stations that you could downlink video to because we didn't have TDRS [Tracking Data and Relay Satellite]. I remembered what they were. I said, "Flight, I'll work with the payload customer to make sure we got the payload configured if you'll work with INCO [Instrumentation and Communications Officer] to set up the ground stations to receive the video." I think I have the right mission, I might not. It was Milt [J. Milton] Heflin that was the flight director, and I just remember he said, "Okay."

We got a video to look at it, and sure enough, it snagged on an antenna. The next question was, "What do you want to do?" I just offered, "Can we use the RMS, the robot arm, to push that shade out of the way?" Long story short, that's what we ended up doing. The RMS people were saying, "We've never done something like this where you purposely created a back force on the arm, so this is going to take some time to figure out what the back force effect will have on the arm. Is it going to cause the arm to just go crazy?" Obviously they did their homework, and it probably took the better part of a day to do all that analysis and determination. Ultimately it was decided that yes, we could push on it with the arm, so they did. It worked.

A few missions later, I didn't work the mission, but an icicle grew out of one of the water dump sites. I don't know if you remember that.

ROSS-NAZZAL: The ice busters.

BREKKE: We grew a big icicle, and the way I look at it is because they had this precedent of having pushed on something with the arm, they actually used the arm to knock that icicle off.

ROSS-NAZZAL: That's interesting. I hadn't heard that about that mission.

BREKKE: Yes, that was 51I, if I got my background right.

ROSS-NAZZAL: I believe that's correct because Mike Lounge was on that mission. I remember talking to him about that.

BREKKE: That led to me—and I know you got questions on this—taking the position in the Payload Specialist Liaison Office.

ROSS-NAZZAL: I did want to ask one more question though because you did have a role in [STS]-51G, and you were the lead payload officer on that. What's the role of the lead payload officer? I was curious what differentiated you from the other.

BREKKE: I think 51G had the ARABSAT.

ROSS-NAZZAL: Yes, the Saudi prince [was] on that mission.

BREKKE: I can't remember which came first, I or G. G came first. G came in June of '85 and then I came in August. So 51G was a negotiated flight for me.

ROSS-NAZZAL: How's that?

BREKKE: I think I told you last time that in 1983 I told my boss I was pregnant, and he said, "Oh. Can we do that?" I said, "Well, it's already been done." I was assigned to work a mission that clearly would have not been possible with my personal timeline, so I offered him a trade deal. I was supposed to be lead on a flight, [and I needed to swap to a later flight], I just don't remember the details. I said, "Look, how about if somebody else takes the lead on such and such a flight, and then I could take the lead on 51G because I know I'll be back from maternity leave." Long story short, he said, "Yes, okay, that'll work." That's how I became lead of 51G.

So what does a lead payload officer do? It's similar to other positions. There's a lead flight director position. That is the person who's responsible for making sure all of the flight activities get integrated, from the point of view of that position; [they are the team lead for that position.] Payload officer, I was responsible for making sure that whoever the payload officers were on the other shifts, things were moving along for them, whatever integration had to happen on that payload was happening. I think for that mission anyway, for me, there was more involvement during the mission than there really was before the mission, because all the payload

officers had supervisors, and they supported teams. As a lead, I don't remember having much extra work in the premission prep.

I do remember during the mission, I forget the guy's name, but there was a gentleman who was the payload officer for one of the other [payloads]. I don't remember which one it was, and things weren't going real well. I don't even remember the nature of what the problems were. I think he was not one of our more "A" payload officers, maybe he was a B or a C. I don't remember the details. I just remember being on console, and the flight director pulling me aside and over the airwaves whispering in my ear, "Hey, you need to help this guy out." Things weren't going well. As the lead payload officer I remember coaching him on what questions to ask, what calls to make. As far as I know everything ended up working out okay, but clearly something wasn't going just right. That was the lead payload officer.

ROSS-NAZZAL: After the mission you were asked to hang that plaque again. Would you talk about what that involved?

BREKKE: I think it was along the same lines as the other mission where it was the leadership to know what to do. For example, with this other guy obviously things worked out fine. They must have given me some credit for helping that move along and the integration work that I did do as the lead. I was just very humbled to be selected to hang it. Same with the other one, I'm just doing my job. They don't really tell you. They didn't pull me aside and tell me [why, they just said], "You're being selected to hang the plaque."

ROSS-NAZZAL: Really?

BREKKE: They didn't really, not then, maybe they do now. There was no paperwork associated with it, so there was no citation. It was left up to my own interpretation.

ROSS-NAZZAL: That's too bad because whenever I go into the MOCR [Mission Operations Control Room], and I see those plaques, I always wonder, "I wonder who put that up and why."

BREKKE: I know they have a list of all the people because I'm pretty sure the Flight Director Office keeps that list.

ROSS-NAZZAL: Yes, I think I've contacted them a couple of times for different ones.

BREKKE: I don't remember ever seeing any explanation of why a person was selected. I do know the selection was made by the flight directors working that flight. They all got together and compared notes, because they work different shifts, so they saw different things. It was an honor; it was an honor.

ROSS-NAZZAL: Big honor, twice. I did want to ask you, just because I noticed it was a pattern. You were working on several of the missions that were first missions for some of those women, not all of them. I wondered, was that just coincidence?

BREKKE: I think so. I think just complete coincidence. Fortunately, the way I look at it for me, I left the Training Office at a perfect time, because I got over to payloads right around STS-5,

which was the first real orbital flight. I don't remember much about it because I was in the back room, so I got my training on that flight. I think I was back room on STS-7, I didn't work [STS]-6. I don't remember what 6 was. After that, I got put in the front room. So timingwise I think it just had to do with when I entered the payloads position. Obviously NASA wanted to fly. What were there, seven women in the first group? I can't remember.

ROSS-NAZZAL: Six women.

BREKKE: So you had 6 out of 35. NASA wanted to make sure they flew the women equally, and since there was only six of them, they got to fly when they did. It was just complete coincidence.

ROSS-NAZZAL: I just thought it was interesting as I was looking at the different schedules.

BREKKE: I'm glad for it. I just was so humbled to work with those women, because I just thought they were the creme de la creme. Just all very humble and pleasant to work with. I thought, "Wow, this is really cool."

ROSS-NAZZAL: You've had a very cool career yourself though. What made you want to transfer from flight control to working with payload specialists? That's a big change.

BREKKE: That was an interesting thing. I got a call from Bob [Robert L.] Crippen. He kept saying we this and we that and we think you'd be good for this position. I was so naive back

then. I thought the “we” meant JSC leadership. I never asked him, “Who’s we?” He described what [the job] would be.

I had just had some great successful missions as a payload officer. I had given some thought to being a flight director, but I wasn’t completely sold on the idea yet. So he calls and said, “We want you to do this.” I told him, I said, “Well, I’m really having fun as the payload officer. Can I do both?” He chuckled, and he said, “I don’t think you can do both.” Forget the fact that you’d be in a completely different organization. I was just so naive. Can I do both? I had a vacation just right around the corner, two-week vacation, so he said, “You know what, why don’t you go on your vacation, take a couple weeks, think about it, and when you come back let me know.”

I thought they’ve decided that this is where they really need me. That was one of my needs. I want to work where I’m needed. It’s not only about having fun. I want to work where I’m having fun, but I also want to fill a need. I want to make a contribution where there is a need. So I said, “Yes, I’ll take it. That’s where I’m needed, so that’s what I’ll do.”

Of course when the word got out that I’d done that, I started getting calls from people within MOD [Mission Operations Directorate]. “What are you doing?” That’s when I’m realizing, “Oh, you weren’t a part of the we.” But I’d already done it; I’d already accepted the position.

I remember John [W.] O’Neill called me in. He said, “I can understand how you’d want to do this.” [Well, I told him]—I had two young kids at the time. It’d be a little bit more low-key position, easier for the kids, [and I wasn’t ready to be a flight director]. “If you leave MOD now, the likelihood of you being to come back and be a flight director is kind of nil.” I said, “Well, I’m not sold on being a flight director; I’m just really not sold on it.” A few other people

talked to me, “What are you doing? You look like you got all the right stuff to move up into the flight director position.”

It started sinking in, “Wow! They’re seeing something in me that maybe I just quite haven’t seen yet completely.” So I go over to this position, and the announcement for the flight director selection comes out. It came out within days, maybe weeks of when I took that position. This was the fall of ’85.

The announcement comes out, and I’m like, “Oh, geez, what am I going to do now? If I don’t apply, it’s probably over. If I do apply, I might not get it. I got a nice job. I might get it. Okay, am I ready? Yes.” I just didn’t want to miss the opportunity. You can tell it was a lot of soul-searching. It was a lot of soul-searching, talking with people, going to church, praying. [So I applied for the flight director position.]

I applied, and the heart is beating a million miles an hour. [I was called in for an interview with Thomas W. “Tommy” Holloway. I think it went well]. I think during the process I got called in by [Clifford E. Charlesworth]. ... He was a higher-up in the Shuttle Program in Building 1. He sat me down. He said, “Now tell me what’s going on here. You left MOD. Now you apply [for the position of flight director].” I basically spilled my guts, and I told him, “It’s been quite an emotional roller coaster for me for the last few months, and this is the reason.” I just basically said what I’ve told you. “Okay.” I think [Eugene F.] Kranz might have even called me in.

ROSS-NAZZAL: I was curious about that.

BREKKE: Yes, “What’s going on here?” I just remember saying, “I want to make a contribution.” I remember he said, “Well, you can make a contribution in any position.” But it was more maybe it’s fulfilling my internal need to feel like I’ve really made a difference. So I get the call from Holloway, and I’m thinking I don’t know which way this is going.

I go over to his office, and he made some small talk and said this and that and the other thing. He’s sitting there, and he says, “Well, you got it.” It was like a frozen in time moment. He went on to say that there’s going to be something unique about this. “You need to go think about how you’re going to handle this.” I remember him telling me I need to go think about how I’m going to handle it. He said that there was one other person that was selected. So my obvious question was, “Well, can you tell me who?” He had not talked to him yet. He told me who, but he told me I could not say anything. It was [Ronald D.] Dittemore. I knew Ron remotely. He was PROP [Propulsion]. Being payloads, we didn’t really interact that much, but I was aware of him.

So that’s how that day went down. I remember an announcement came out that Brekke and Dittemore were selected, and please give them your full support, so then I went through the transition to move out of the position that I was only in for a couple months. I can tell you things that happened during those couple months in that position, because it was very interesting.

ROSS-NAZZAL: Yes, I’d be interested in hearing about that, because I don’t think we’ve talked with anyone about that. Other than Charlie [Charles D.] Walker, who was a payload specialist, we’ve interviewed him. He’s given us some good information.

BREKKE: Even though I was only there, I don't know, it couldn't have been more than three months, a lot happened. I accepted the flight director position, and I moved back.

ROSS-NAZZAL: I just have to ask because you mentioned John O'Neill had called you in. Had you expressed outwardly to anyone that you were thinking about maybe becoming a flight director; that you had an interest?

BREKKE: No.

ROSS-NAZZAL: They had a sense that you would be a good fit?

BREKKE: Yes, when I was ready to move on to something new—over the course of 37 years, that happened maybe a half a dozen times—I usually went about gathering my information very subtly and quietly. I remember when I wanted to leave the Training Office I talked just one on one with some people that I had come to know in payloads and gathered data, and then I called up Gene Kranz's office. I think I told you this. "Can I have a meeting with Gene Kranz?" "Okay." Went over and I basically said, "I'm pretty much firing the Training Office. It's getting monotonous."

No I really hadn't talked to anyone, because I was struggling internally as to whether I was really ready. People pulled me aside and said, "Yes, you've got this and that and the other thing and look how well you did here and did there."

I had listened to them, and remember I have these two young kids—but I'm tough and competent, I can do it—[but it was family that] ultimately led me to choose to leave the Flight

Director Office. I was there two and a half years. It was pretty much all during the downtime after *Challenger* [STS-51L], doing simulations and all the training and the meetings [that I started seeing] the handwriting on the wall. At the time I had two boys. [I'm thinking], "My boys are going to grow up, and I'm not even going to remember what they did when they were age 8; what was life like when they were age 10." That's ultimately why I left. I couldn't see myself not remembering their childhood.

ROSS-NAZZAL: That's important. It really is. You want to spend time with your kids.

BREKKE: I have no regrets. I have no regrets. I had another child shortly after I left the office. I had my daughter. She and I are like a pretzel, my finger. [Demonstrates] We are just so connected. She just became a doctor.

ROSS-NAZZAL: Oh, wow, congratulations.

BREKKE: She's an OB/GYN [obstetrician/gynecologist]; she just started her residency. She lives up in Dallas. She calls me two, three times a day. She's 27. There were times when she'd call me five times a day. I just remember thinking, "Wow, probably would not have been able to have her had I stayed in the Flight Director Office." [And I would like to tell you about my sons a little latter; I am equally as proud of them.]

I have no regrets on the things that happened, the circuitous route I took to get there and then the falling short of bringing it to fruition. I just don't have any regrets, because the ultimate

outcome I'm just so happy with. I did go on to have some really great positions. We can talk a few more hours about those.

ROSS-NAZZAL: I think it'll take us a while to get through your whole career, honestly. Do you want to talk some about that payload specialist liaison? That's an interesting position because there's so many different types of payload specialists.

BREKKE: I got to say when Crippen called me and he described it, he also painted the picture of how I was the perfect person because of my background. One of their biggest challenges was to create a generic training program for these payload specialists that could be anything from a senator to a congressman to an Arab sheikh to a company's engineer, Charlie Walker, to a teacher. They were interviewing for the teachers in space. Maybe they had selected her by then, I can't remember. He was saying, "We need someone with your background to develop training programs." That's what I did when I was an instructor, I developed training programs for the different disciplines.

He said, "We need someone who appreciates the payload activity," because these are payload specialists. He just made it sound like, "Oh, you're right [person]." I got the right background, got the right stuff. I love working with people. To be working with these payload specialists, it wasn't hard to see that this was going to be a fun job.

I get over there. [S.] Christa [C. McAuliffe] and Barbara [R. Morgan] had been selected. I met the payload specialists who were in the flow I'll say, I met all of them. So I met Christa and Barbara, both of them. They were cut from the same fabric. One of my first days on the job

Christa was having her professional portrait done, where they're in the space suit and they have the flag in the background.

I remember she came back with six or seven proofs of different positions. Barbara and Christa and Erlinda [L.] Stevenson—have you heard that name?

ROSS-NAZZAL: No, it's a name I haven't heard.

BREKKE: Erlinda recently retired a couple years ago, maybe. She's one that you should interview. She was an admin person that grew to pretty much manage the Astronaut Office. So back in the timeframe we're talking, late '85, she was the admin person for this Payload Specialist Liaison Office. So Erlinda, Christa, Barbara, and I. I remember standing around the table, and Christa laid out the proofs. We all said, "We like that one. We like that one." We helped her pick out what was going to be her official NASA photograph.

He was a congressman at the time, he's now a senator, but Bill Nelson, he had recently been assigned. So met him, and I have a very interesting story to tell about him. Might do that off the record.

ROSS-NAZZAL: That's fine.

BREKKE: The prince, Sultan [Salman Abdulaziz Al-Saud], he was recently assigned, so met him. I probably met Charlie Walker. Then another guy, and this is a sad story. He was the Hughes payload specialist. If we had a mission patch for *Challenger* I'd remember his name.

ROSS-NAZZAL: Greg [Gregory B.] Jarvis?

BREKKE: Yes. He and Bill Nelson were assigned other flights. Nelson was actually I believe assigned to fly on *Challenger*.

ROSS-NAZZAL: I believe you're correct.

BREKKE: Jarvis was the mission before. For whatever reason, it was nothing I had to do with. It was some politic reason. They got swapped. Jarvis flew on *Challenger*, and Nelson flew the flight before.

It gives me the chills to think about [it]. Things happen. Things happen for a reason. You just can't help but wonder, "What if they didn't switch. Would we have continued had we lost a congressman? How would that have affected [the Space Shuttle Program]?" It wasn't that way, it was the other way, and we lost Jarvis and the rest of the crew. I had met Jarvis.

I can't think of any other specific names that are memorable that I have any little anecdotes about. What was my job with regards to these people? I had to write my job description. It was developing a training program. That's what I focused on first. I worked for [George W.S.] Abbey, because Abbey was the head of [Flight] Crew Ops. Abbey was boss and Crippen was either the deputy or somewhere in there. They were very happy with the training program I developed because that's exactly what they needed. I felt good that I could help, that I could make a contribution to help get this training program going. Most of it was getting the training going.

I did not get involved in scheduling their time. There was a scheduler who handled all that, much like it's done with the astronauts. There's a scheduler in the Crew Office, because I was a separate office from the Astronaut Office. So they scheduled their time. I was not involved in getting suit fit checks. That was scheduled by the scheduler. This was more getting them trained and onboarded so that they could integrate in with the crew and become one with their assigned crew.

ROSS-NAZZAL: Can you talk about that training program? Was it generic, or was it specific depending upon their focus or field?

BREKKE: As a rule, the payload specialists who weren't employed by the company associated with the payload really didn't take on a lot of technical scientific tasks in orbit. Obviously the guys like Charlie Walker, he ran the crystal growth facility, he was an exception. Jarvis, I can't remember if that satellite was a PAM or what kind it was. I don't remember that he had a real technical role in the activity, because it was a deployable payload.

The generic training, it was a foundation. It was Space Shuttle 101. This is the Space Shuttle. This is where the crew lives. These are the three main engines, and it's bolted to this external tank. It was really basic training for them. That's what I structured. I used training classes that had already been prepared for first-time astronauts. I didn't write any new training classes. It was more researching what's out there and then pulling what would be appropriate for a training regimen for a payload specialist.

When it came to their flight-specific duties, that was handled probably by the payload training people back in the Training Division, because I don't remember establishing any

training. Like for Christa, she was going to do science experiments for the children. Other than listening to her talk about what it was like working with some of the [NASA] Headquarters education people, other than being a sounding board for her, I really didn't get involved in what experiments she did, how she trained for them. Once it got into a real payload activity then it was the Training Division.

ROSS-NAZZAL: How many people were in the office? You mentioned another person.

BREKKE: Erlinda and me, and I think there was one other guy. He might have been an intern, or he might have been a military detailee. I think he was a military detailee. I don't even remember his name. He was very good. He was a real go-getter. If I said, "Go find out XYZ," he did it. I just don't even remember anything more about him. I think that was it. The payload specialists, they didn't administratively report to me. I had no administrative authority over them. We did keep track of when they were in town and when they weren't here, just to have situational awareness of where they are. But their schedule was maintained by the scheduler out of the Astronaut Office.

ROSS-NAZZAL: It sounds like a much more low-key position, like you said.

BREKKE: Yes.

ROSS-NAZZAL: Did you find that position a little boring after a while?

BREKKE: I was getting there. Once I got my arms around the training, which didn't take long, because I knew exactly where to go and pretty much what they needed, I just had to organize it and put it together. I built a little tree: the prerequisites, you got to have this before you can have that. That probably contributed to my overall mental process of when the flight director announcement came out, the solicitation for applications, that probably contributed. "Am I really going to be challenged in this position for a long time?"

ROSS-NAZZAL: Yes, you just seem like a person who likes that challenge.

BREKKE: Yes, so maybe it was all meant to be. It was just all meant to be. I did an about-face and went back. I actually was in the Flight Director Office—I think my first day was late November of '85, or it might have been right after Thanksgiving. You know what happened on January 26th [1986, STS-51L]. So less than two months after I had gotten into the Flight Director Office, and then with the holidays I'd probably only been on the job for four weeks, we lost the *Challenger*. That was devastating. I'm sure I wasn't the only one that did a lot of soul-searching after that, because we'd never had an accident before. We'd never lost astronauts in space. We'd only had the Apollo 1 fire. "Wait a minute, what's going on here?"

It took about three years before we returned to flight. Like I was saying, they kept us busy. Holloway was the head of the office. I'll jump to the day it happened because I know that was one of your questions, unless you had more questions on the payload specialist side.

ROSS-NAZZAL: No, I didn't realize it was short.

BREKKE: Yes, it was just so short. I was in a meeting on January 26th, 1986. John O'Neill was running the meeting, and I don't remember what it was about. Back in those days, you had a TV in just about every meeting. It was very common to pause the meeting when the Shuttle was getting ready to launch and watch the launch. So, just like everybody else on the Center, we paused the meeting and watched the launch. When the accident happened, just like anybody looking at it, "Whoa, that doesn't look normal." But you didn't want to say anything out loud. I just remember we all watched it, and then finally the announcer, whoever the PAO [Public Affairs Office] announcer was, broke the ice by saying, "Clearly a serious malfunction," or something to that effect. It was silent. Then he broke that ice and said, "Clearly a very serious malfunction."

That's when okay, now we can all breathe and say out loud, "Yes, wow," and then we started saying what we saw. That might have gone on for maybe a half an hour. We never started the meeting up. I remember John O'Neill saying, maybe after about a half an hour, he said, "Well, I think we're done here. We're done." Then we left.

I think I went back to the office. Holloway called us all in. There were maybe about a dozen flight directors at the time. He called us all in. He had this round table in his office, and I'm sure he said some things about the accident. I don't know that he tried to guess what happened. What I do remember him saying is, "Okay, you-all go home. You-all go home, be with your families, and take the time you need. And when you're ready to get back to work, I want you to come back to work." That's what he said. He left it up to each of us to do our own grieving and whatever it takes. Every single one of us was in the office the next morning.

ROSS-NAZZAL: I'm sure you're all type-A personalities, right?

BREKKE: Yes, every single one of us. “Okay, we’re here. What are we going to do?” Over the course of a few weeks, I know that the leadership had meetings on [the accident]. Obviously the investigation had to continue. I was not involved at all in the investigation. Probably somebody from the Flight Director Office was somehow, on a tangent, involved, but I was oblivious to the investigation. I only heard what people heard on the news or in reports that came out in NASA—there wasn’t e-mail then, I don’t think, however, we got communicated to.

My focus was on the tasks that the leadership decided—this is what MOD is going to work on during this downtime. It probably took a few weeks to really meld this together, but it was very crisp, very deliberate, and on target. “What we’re going to do is we’re going to review all of our procedures and our malfunction procedures. Go through every single one of them. We’re going to go through the flight rules. We’re going to identify rationale for why that rule exists.”

We were all given different assignments as flight directors. We were assigned to lead the teams doing whatever the project was under that list of tasks. I remember I got assigned ECLSS, that’s the environmental [control and] life support system, and it was a great opportunity to meet and get to know the ECLSS flight controllers. When you’re doing simulations, you don’t get to know the people. You learn names and faces; you’re there on console doing simulated real-time operations. This activity allowed me time to meet with these people, get to know them. I actually became friends with one lady. We ended up staying connected even long after I left the Flight Director Office, and she was a good friend. I did ECLSS. [I ran Flight Techniques meetings, ran simulations and took training lessons.] I probably did some other things, but I don’t remember the details.

ROSS-NAZZAL: Yes, it was a long time ago.

BREKKE: Yes. Dittmore and I went through the new flight director training. So there were some briefings that we were given. We were given the media training. You've probably had the media training.

ROSS-NAZZAL: I actually haven't. You want to talk about it a little bit?

BREKKE: Yes, we'll just go on a little tangent on the media training. They actually hired a professional contractor that does this for highfalutin people, so it was probably very expensive. I remember at least one of the men was a retired news anchor. They gave us classroom discussion on how to do interviews: the dos and don'ts of interviews. What to wear, what not to wear, what to do with your hands, all the mechanical stuff, then also the content.

I remember them saying, "Don't get trapped into giving a hypothetical. Basically if you get asked, 'Well, this happened in the past, what would you have done if it had happened?' Don't get trapped into that." One of the culminations of this training was actually going into a studio and getting miked up and getting a camera and being interviewed by this guy. There was a one-on-one interview, sitting. There was an interview standing behind a podium. Then there was crossfire. Do you know what that is?

ROSS-NAZZAL: I don't think so.

BREKKE: It's actually a term that's used on some of the talk shows. The person being interviewed sits here, and then you have an interviewer here, and an interviewer there, and they intentionally batter you back and forth because they're trying to get you upset and to fumble and to stumble and to say something wrong. So you're sitting in this cross fire seat. Oh my gosh, I did not like that. I did not like that at all.

Sure enough, one guy asked me, "Would you have launched? Would you have given the go for launch for the *Challenger*? Would you have given the go for launch for 51L if you had been the flight director?" That's the classic don't get trapped into the hypothetical. I completely blew whatever I said. I don't remember what I said. I just remember thinking I don't ever want to do a crossfire interview. I could handle the one-on-ones. That was media training. We had that.

Then we had all the core Shuttle. This was my only exposure to single system trainers, the SSTs.

ROSS-NAZZAL: That's right, you said you didn't do those in training.

BREKKE: Yes, because my role, when I was an instructor, was guidance, nav [navigation], and flight control, which was not really simulated. The SSTs were system, like the power system, the environmental system. So I didn't ever do any SSTs. I was aware of them. So now I'm the student in the SSTs.

As a matter of fact, I work with a guy now. I work for Special Aerospace Services. One of the guys I work with has a boat out at the marina in Clear Lake. He took us out two years ago. We climb on the boat, and his wife says, "Hi, Michele, you probably don't remember me, but I

was one of your SST trainers when you were a flight director.” This is just two years ago. I thought, “Oh my gosh, how did I do?” She said I did fine, and I had good questions.

ROSS-NAZZAL: Oh, yes, I’m sure.

BREKKE: Ron Dittmore and I did SSTs and then gradually we got assigned to lead simulations in Mission Control. It went pretty fast. I think within maybe four months we were put in the saddle over there. Even a simulation is intense, as it should be. It was very stressful to do the sims and to realize how much I didn’t know, and how much I needed to learn—not that I had to learn everything, but I obviously had to learn enough to know where to go if I had a question and to know when to trust, and trust but verify. So that whole process of learning that was stressful. I had good days, and I had some not so good days. That went on for two and a half years. After probably about a year—my boys were a year or two older now. I think they were two and four when I was hired as a flight director, so now my oldest is in school. I wanted to work with him on schoolwork, and the younger one wanted to get into sports, so we did the sports stuff.

After about a year I’m just thinking, “Wow, this is a heavy load.” Tough and competent, [I] muddled through. At some point I just finally had to be true to myself, and as much as I was trying to convince myself I could do this, I wasn’t convincing myself. So that’s when I talked to Holloway. He was very concerned, like a father. “Oh, man, what’s going on? Why don’t you think about this some more?” I think we had three sessions. I’d talk with him and he’d say, “Okay, go think about it some more for two weeks,” and I did. I think by the third time I just said, “My heart is not in it.”

In the meantime, I had contacted Hal [Cheever H.] Lambert, who was an office chief in the [Space Shuttle] Program Office in Building 1 who was the head of the payload integration managers, who I'd gotten to know because in my role as a payload officer I had done some road shows [with him]. We used to do road shows, that's the term we used when you took a team of NASA from the different disciplines and you went to the company's facility or the national facility. For example, we went to India one time. We went to their Indian Space Agency. We briefed them on Shuttle operations, because India wanted to build a satellite to fly in the Shuttle.

So I got to know Hal Lambert through these road shows. I called him and told him that I was considering leaving the Flight Director Office, and I'd sure like to be a payload integration manager, get back into that payload thing, because I really enjoyed being a payload officer so much. Of course he was blown away that I would want to do that. "Isn't that a step down?" "I don't see it as a step down, I see it as a moving on, a step over," into a track that I felt I could handle better.

ROSS-NAZZAL: A little more suitable for your family life.

BREKKE: Right. So long story short, I made the move, and I think I started there in mid to late '88.

ROSS-NAZZAL: I did want to go back and ask you a couple questions. You mentioned when Holloway had told you, "Hey, you got the job," that he said he wanted you to go and think about what this meant. Did you think that meant, "This is going to be a lot of scheduling and a lot of

wear and tear on my family?” Or did you think he meant because you’re going to be the first female flight director?

BREKKE: Be the first, yes. It was because I’d be the first female. He never even said that, but I just knew that’s what he meant.

ROSS-NAZZAL: Why do you think it took so long for MOD compared to some of the other directorates here at JSC to have a female flight director?

BREKKE: That’s a hypothetical question.

ROSS-NAZZAL: Not to put you on the spot or anything. But you’d been working there for so long. I’m just curious about that.

BREKKE: Obviously women had applied—and I don’t even know. I think I heard Anne [L.] Accola had applied.

ROSS-NAZZAL: Yes, she told us she applied.

BREKKE: Whoever had applied, they weren’t selected for whatever reasons the selection group had. That was never communicated to me. The only thing that was communicated to me was the elements of my application and my resume satisfied the needs. So I don’t have an answer to your question why it took so long. It just took the time it took.

ROSS-NAZZAL: Was it a big deal at JSC, having that first female flight director? Was it big news? Or was it just kind of, “It was coming; we knew it was going to happen?”

BREKKE: It was something in between. I didn’t want it to be big news. I was—I was going to say not naïve—I knew it was going to be something. I’d be naïve to not realize all right, there’s going to be something here.

I didn’t want it to be about being a woman. I just wanted it to be—this person, Michele Brekke, has been selected as a flight director. I accepted that I was the first, somebody has to be first. I accepted that this would likely put me in a role model type of position, which I didn’t ever really think of myself as a role model. But I accepted that if young girls, little girls, or big girls young or old want to look at my accomplishments and use that as a role model, then I’d be proud to be that for them. I wanted it to be a balance of just being one of the guys but also a little bit more than just one of the guys.

They didn’t make a real super big deal. I did get interviewed by PAO here shortly after. It was just a casual kind of interview. I got some speaking engagements. I did some public speaking anyway, and actually I’ll real quick tell you. You asked me about the *Good Housekeeping* [honor].

ROSS-NAZZAL: I was going to go back to that as well.

BREKKE: I’ll just tell you. When I was in college I won the Amelia Earhart Fellowship. The Amelia Earhart Fellowship is sponsored by Zonta International. Zonta is a women’s service

organization, much like Kiwanis Club and Rotary and the men's service organizations. Zonta International is an international service organization for women, and they sponsor this Amelia Earhart Fellowship. They do fundraisers through the year, and through donations they gather money to give to qualifying women in aerospace engineering, flight-related fields, and so on.

I applied for it when I was probably a junior and I was selected, so I received fellowship money to help offset the cost of college. I applied again as a graduate and received another award, so Zonta got to know me. I forget the lady's name at the time that was the head of the U.S. coalition of Zonta. She communicated with me and arranged for me to do some public speaking at some of the Zonta organizations around the country.

I didn't know that I was put in for any award. So I get this magazine in the mail, and I obviously see the article on me and the picture that they used. I knew it was Zonta, because the picture that was used in the magazine was the same picture I had put on my application for the fellowship.

ROSS-NAZZAL: So it was very old photo.

BREKKE: No, it was a current photo, but I think I took a selfie. Back in those days you put it on a tripod and sent it in. It was the only place I ever shared that photo, and when it showed up in this magazine as being one of the *Good Housekeeping* 100 Women of Promise I think is what it was, I knew that it was Zonta that put me in for that award. You had asked.

ROSS-NAZZAL: Yes, I was curious about that.

BREKKE: Zonta, that's a whole 'nother great story. I did a lot of public speaking and got to meet lots of women and young girls and hopefully give them that inspiration that wow, if Michele can do it then I can do it. I've had women tell me that they were thinking of going into aeronautical or aerospace engineering and now they are, because they heard me say that I'm just a normal person. It took a lot of hard work, so you could do it, if you really want to do it. So that was a tangent.

ROSS-NAZZAL: Did you feel a lot of pressure being the first and only woman flight director? That you didn't want to screw up?

BREKKE: I did, yes, I would be lying if I didn't—I felt pressure in that position. As opposed to in the payload officer position, I didn't feel any pressure because I was a woman. It turns out there were other women. As a matter of fact, Linda [M.] Godwin, who went on to become an astronaut, was a payload officer. There are probably a couple others. I can't think of the names. There were some guys that were in there. So I just felt like one of the gang in the payload officer group.

Flight director, clearly I was the only woman, the first woman. There was a little bit of extra pressure, you know don't screw up.

ROSS-NAZZAL: Clearly they were interested. I find it interesting, the timing when that announcement came out so soon after you left. If they were scrambling, thinking we've got to get her to come back and apply. I wonder if that went into their decision.

BREKKE: I don't know. Nobody called me. So I took the job to the Payload Specialist Liaison Office, and nobody called me to tell me the solicitation is out there. Nobody called me to tell me. I saw it on my own. I saw it on my own, because we got mail. Unless somebody purposely sent it to me. I just don't remember ever getting any special treatment to apply. It was just me.

ROSS-NAZZAL: Let's talk, we got about 30 minutes, about moving over back and working payload integration. What does a payload integration manager do?

BREKKE: Whatever it is, it's a lot of fun. If you have a payload, just any payload, most of my assignments were cargo bay payloads, so they were big. They were expensive, and they were heavy. I did have one middeck assignment, and I think management did that just so that somebody didn't get so channeled into one area. So I had one middeck, and then the rest were mostly RMS deployables.

You have the owner of that payload, it could be a company, it could be another NASA field center, it could be JSC, it could be a country, it could be the space agency of a country, it could be a company in another country. We call them the customer, so they're the ones that owned the payload. They're the ones that had gone to NASA Headquarters [Washington, DC], filled out a Form 100, it was a one-page form where you put on there your name, your address, what the payload is, roughly when you want to fly, how much does it weigh, is it a cargo bay payload, just some very basic information. They fill out this Form 100 and send it to Headquarters.

Then obviously there's talk that happens. There's pricing. It's all done at Headquarters. Somebody's got to determine what's the compensation. If it's a NASA payload I'm sure there

was no financial compensation. If it's a commercial payload, I don't know. I think money did change hands. We did get paid, but that was all done at Headquarters. So I'm telling you what I didn't do.

ROSS-NAZZAL: That's good information too.

BREKKE: By the time the Level 1 agreement gets established up at Headquarters to fly that payload, then a letter comes down to the Shuttle Program. I'm talking like it's happening today. Letter comes down to the Shuttle Program. "You are authorized to commence integration activity for this payload. Attached is the Form 100."

Then a payload integration manager would get assigned, so from that point forward the PIM, the payload integration manager, they're the point person to orchestrate all the activity necessary to fly that payload. They're not responsible for all the elements, but they're responsible for integrating. That's why it's not a payload manager, it's a payload integration manager. So you got to line up getting it officially manifested. There was a group that did the official manifesting. You had to develop a payload integration plan, which was the contractual document between NASA and the customer that identified all the customer requirements and constraints. There was a boilerplate document that we used. It identifies constraints that the Shuttle has. There's a statement in there that says the flight director has the final authority.

It's a legal document. It didn't read like a legal document though. It didn't have all the wherefores. I've read some legal documents; I can't even understand them, but the payload integration plan was a very readable, user-friendly technical document.

The PIM was responsible for negotiating that document, getting all those requirements. Laying out the schedule. When do we have to have all the requirements by so that all the disciplines around the Center can do the work they need to do to get ready to support the mission?

If it's a deployable payload, typically they would fly off. After you deploy them, they'd fly off to another altitude. So the trajectory people needed to get involved to orchestrate development of the trajectory. If there were communications necessary, then you had to involve the communications people. If it's a robot arm deploy you had to involve the RMS people. The PIM, the payload integration manager, was responsible for making it all happen: schedule, technical. But we didn't do anything on cost. We didn't have to deal with funding. That was all done at Headquarters. So [just] schedule and technical.

Then there's always little hiccups and hitches, always, always, always, always. You got to run those to the ground. You got to herd the cats. You got to manhandle, nip at the toes, get people to do what they need to do on time. Because everybody's busy, nobody just had one assignment, even a PIM. A PIM had maybe five or six payloads they were integrating. It was a balance of priorities.

When it came time to fly, we had a room over in Mission Control called the Customer Support Center, CSR. The PIM would sit over there during the mission. We didn't have official shifts, but during key times during the mission based on what the payload activity was [we would go over and sit at the CSR]. We also had a customer representative sitting there because we had a requirement to have a customer representative physically here. That was so if you ran into some real problems that needed face-to-face communication we wanted to have somebody here that could speak for the payload, even if they were from Germany or Saudi Arabia. The

Saudis wondered why do we have to be in Houston, our control center is over in—wherever it was.

ROSS-NAZZAL: Riyadh?

BREKKE: Riyadh, Saudi Arabia. Why do we have to be here? I actually had to explain to them. That was another role of the payload integration manager, to explain the rationale for our requirements.

I remember back when I was a payload officer, and I did have the ARABSAT payload. I think that was on 51G, the one that had Prince Sultan. So I was explaining to the Saudi mission director how things were going to work during the mission. We launch, get the payload bay doors open, the crew would get all comfortable, and then they would prepare to deploy your satellite, ARABSAT.

The payload officer would be communicating with you on the voice loops letting you know what's happening and then asking you to give your "go" for deploy shortly before the time to deploy the satellite. I remember he asked me in a very heavy Saudi accent, "Well, who will be this person?" I said, "Well, that would be me." He said, "You?" "Yes, that would be me." I tried to be very polite and very respectful. I always am.

So I'll tell you a little anecdote. When it came time to deploy ARABSAT—I'm thinking John [M.] Fabian was on that mission. Isn't that funny.

ROSS-NAZZAL: He was, yes.

BREKKE: It's funny how you make these connections. He was prime for deploying ARABSAT. We get to within like five minutes of deploy and that's when—I'm back being a payload officer now, so I left the PIM, I'm back to payload officer.

ROSS-NAZZAL: It happens.

BREKKE: One of the roles is to poll everybody for their go for deploy and then pass that go on to the flight director and then CapCom [Capsule Communicator] passes the go up to the crew. So I polled the team, and the ARABSAT director was the last one. I said, "ARABSAT director, I'm standing by for your 'go' for deploy." Silence. "ARABSAT director, this is payloads, I'm standing by for your 'go' for deploy." I heard some clicking. He was probably fumbling with his [unit]—you have to push to talk. Maybe a third time, "ARABSAT director, I'm standing by for your 'go' for deploy." I hear him come back, he says, "ARABSAT is 'not no go.'" "Not no go." So I passed on to Flight, I said, "Flight, we're go for deploy."

In Saudi Arabia and the Middle East it's a bad thing to make mistakes, and bad things happen to people that make mistakes. I could only surmise that this guy didn't want to say, "We're 'go' for deploy," because if something were to happen then he would be questioned, "Well, why did you give the 'go'?" I'm just surmising that. So by saying, "We are 'not no go,'" I guess that was his way of being safe. He didn't say, "We're 'go,'" but he said, "we're 'not no go.'"

ROSS-NAZZAL: Double negative cancels each other out.

BREKKE: Yes, wasn't expecting that one.

ROSS-NAZZAL: So you worked with a lot of cultures, I imagine.

BREKKE: I did.

ROSS-NAZZAL: As a PIM. Were you involved at all in some cultural training before you went to these other countries?

BREKKE: The only time I had cultural training was before I went to Russia, but that was when I was over in the Space Station Program in the mid '90s. I don't recall getting cultural training as a payload officer, as a flight director, or as a PIM. I don't recall it. I never did work with the Japanese. I believe that they did have cultural training for the people that worked with the Japanese, because there's definitely some cultural elements there that you need to be aware of. I think the Russian cultural training was the only one I had.

ROSS-NAZZAL: You mentioned working in the MOCR. But before you get to the MOCR you have to have all those reviews. Were there payload reviews and then the flight readiness reviews? Were you part of that as well?

BREKKE: Yes, I forget the name for our regular working reviews. Usually the customer would fly in. If they were coming from another country we didn't have a lot of them, because that would be a lot of travel. A lot of them were done on the phone. So we had payload integration

meetings, there was a term for it. Then we had the flight ops review, the FOR. That's where all the flight ops products got reviewed and baselined and everything squared away to proceed with integrated training.

Integrated training is when you've got Mission Control all staffed and the crew is in the simulator. That's integrated training, and that started after FOR. We usually had half a dozen or so integrated sims with the customer. Then we had the FRR [Flight Readiness Review]. As a payload officer, as a PIM, I did not present at the FRR. As a flight manager, which I became in the late '90s, I did present at the FRR. Yes, a lot of experience with FRR.

ROSS-NAZZAL: A lot of bureaucracy I'm sure.

BREKKE: Yes. The way I look at the Shuttle Program and the process, it was a 30-year program, and we learned along the way. We streamlined along the way. I was very confident and comfortable with the process that evolved out of those years and years of practice. I hope that it has become somewhat of a role model or template to consider. Obviously you got a baby, and you got some bathwater. You don't want to throw the baby out with the bathwater, so look for the baby. There definitely is a baby in the whole Shuttle process.

ROSS-NAZZAL: I think that is the case. I get a lot of calls from people looking for Shuttle documents. We closed Shuttle, and then people didn't think that they were going to need this stuff. Now as we're moving forward on Orion, "Oh, can I have this document; oh, I need this document," or "We need to know how this was supported by Engineering," or how this. I think there is some of that recognition that Shuttle was important.

BREKKE: Good.

ROSS-NAZZAL: I think Anna [L.] Fisher made that point when we interviewed her as well about Station. “This is what we did for Shuttle, you might want to look at Shuttle.”

BREKKE: That’s a whole 'nother discussion. There was a culture. There was some culture going on there. That’s good. It’s nice to know that you are a conduit to get some information. There have been two times in my Boeing career where I’ve wanted to get some information and I would only ask for FOIA [Freedom of Information Act]-able stuff, so if I need something in the future I might give you a shout.

ROSS-NAZZAL: Yes, give me a holler, we’ll see what we can find. So we’ve just got a few minutes. I was going to ask you about a couple of the payloads that you managed that were on your resume. One was the EURECA [European Retrievable Carrier].

BREKKE: Yes, that was actually the first payload I was assigned when I went over to the Shuttle Program Office as a PIM. I was very fortunate to have been assigned that payload. It was a cargo bay payload. It was a quarter bay. I think Leonard [S.] Nicholson devised the concept of splitting the cargo bay into four segments and then providing services to those four segments so you could fit four payloads.

It was a quarter bay payload. It was a deployable. Deploy it on one mission, leave it out there for a year or so, and pick it up on a return mission. So that payload had all the challenges

to make for one heck of an assignment. It had to be deployed, it had a year of free flight, and then you had to manifest to go retrieve it on another mission.

It was a [European Space Agency] payload. So I got to work with some of the most wonderful [European folks]. ... So I was working with these gentlemen. It was mostly gentlemen, I think there might have been one woman, for probably a good five years. I was assigned it in late '88, and I think it didn't fly until '91 or '92.

ROSS-NAZZAL: I think it was '92.

BREKKE: It was four to five years. So I got to work with these people and work out all the technical challenges. They all spoke English, thank goodness. I think that was a requirement, they had to speak English. There were a lot of technical challenges. I went to [the Netherlands and] Germany probably four or five times. So I had some really great trips and had a few spare hours to go do some sightseeing in [the Netherlands and] Bavaria, which has become one of my favorite European places.

EURECA—it was supposed to fly five times. That was the plan. We launch it. I think it was supposed to only stay up for six months. We retrieve it. It was laden with experiments. It was a platform; it was a robotically deployed platform that was laden with 15 to 20 experiments.

The strategy or the concept was to bring it back, it would go back to [the Netherlands], be outfitted with new experiments, and fly five times. It only flew once. I can only surmise that funding probably killed it. The other thing is because of the Shuttle launch sequence, we couldn't guarantee an exact six-month free flight, because it was subject to slips. That probably impacted their strategy. If we can't guarantee it's going to be six months, it might be a year, do

we really want to fund it? I'd guess the funding dried up for it. So it just flew that once. We launched it and retrieved it.

There was one technical issue on the deploy mission that had us all shaking in our boots. It's just unbelievable that it wasn't caught through all the testing that's done. It had to do with the antenna communication system from the EURECA back to the Shuttle. Once we deployed it there was still a communication link between it and the Shuttle. Ultimately there was a communication link from it to its ground station, but in the deployment timeframe it could communicate back to the Shuttle.

We deployed it, and we lost communication. As soon as we switched off hardline com through the arm, once we released it, now you switch over to RF com, and we lost the signal. Long story short, there was some problem somewhere in the bowels of the communication system with that antenna that it was either polarized wrong or it was synchronized wrong or something. Fortunately, after we called in the experts, I remember working into the wee hours of the morning back in the Customer Support Room with our technical guys. They had all the drawings out and the books out. One guy said, "That's the problem." So they figured out what it was, and they were able to correct it, and we regained com. For a while there we thought we're not going to be able to retrieve it, because you got to be able to communicate to be able to.

ROSS-NAZZAL: Wow, what a relief!

BREKKE: Yes, I had a lot of those what a relief moments. When we pushed that sunshade off of the ARABSAT, when we were able to get the ERBS arrays deployed. There were a lot of those oh my gosh moments, but that added to the thrill of the job. It's like a roller coaster that has

these huge dips and valleys and loops. It's scary, but that's the thrill and the adrenaline rush. The fulfillment when it all does end up fine, it's cool.

ROSS-NAZZAL: That's probably a good note for us to end on today. Thanks for coming in again.

BREKKE: Okay. We made it through a few more years.

ROSS-NAZZAL: Yes.

[End of interview]