

NASA JOHNSON SPACE CENTER ORAL HISTORY PROJECT

ORAL HISTORY TRANSCRIPT

ANNE L. ACCOLA
INTERVIEWED BY REBECCA WRIGHT
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The questions in this transcript were asked during an oral history session with Anne L. Accola. Ms. Accola has amended the answers for clarification purposes. As a result, this transcript does not exactly match the audio recording.

WRIGHT: Today is March 16th, 2005. This oral history with Anne Accola is being conducted for the NASA Johnson Space Center Oral History Project at NASA Headquarters in Washington, D.C. The interviewer is Rebecca Wright, assisted by Sandra Johnson.

We thank you for meeting us down here today and spending some time with us. We'd like to start with asking you how you first became employed with NASA and, if you'd like, provide us a little bit of your background that prepared you for your job.

ACCOLA: Okay. Well, I guess I was the right age to be caught up in the Sputnik [Russian satellite] craze. I was in seventh grade when Sputnik was launched. It was such a shock for the country, and President [Dwight D.] Eisenhower sort of told all of us school kids we needed to study math and science to catch up to the Russians. Then I started following all of the U.S. activities from a relatively small town in Colorado. Greeley is where I grew up, and it was about thirty-five or forty thousand people then.

Then in [19]'60 I got caught up with [President] John F. Kennedy and—you know, to the Moon by the end of this decade. So I just was fascinated by it and watched everything I could on TV [television]. I put my mother in charge of watching it when I was at school, which involved coming home at lunch and finding out that it hadn't launched or it had gone up and toppled into

the ocean or blown up or something back in those days. Then when they started the actual manned flights, I just really got excited and thought that that's where I wanted to work.

It was odd for a girl. In fact, the State Teachers College [Colorado State College, renamed University of Northern Colorado in 1970] was in Greeley, and I got tremendous pressure to go there and become a teacher, because all women could be was teachers or nurses. But I didn't. I went to Colorado State University [Fort Collins, Colorado] where my father had graduated. It was thirty miles away.

They didn't have an aeronautical engineering curriculum there, and I'm not sure I would have understood enough to even get into that, anyway, so I majored in mathematics. The department, though, was sort of the repository of a collection of things at the time. The head of the department had an interest in astronomy, so the astronomy classes at the university were taught in the math department. It also housed statistics and computer science, so it was broader than what you might think of as math.

I kept my interest up in space the whole time. I took all the astronomy classes that were offered and just applied, sent in an application for federal employment to the Johnson Space Center [Houston, Texas], and that was really—I think I applied to a few companies. Oh, I did. I applied to some contractors. But that was where I wanted to work, and I wanted to be around the action. I thought that was where being a government worker in Houston would be.

I got an offer from the Dispersion Analysis Section. Marlowe [D.] Cassetti was the branch chief. I talked to him on the phone. Frankly, I didn't understand what the job was, but it was where I wanted to work, and that was the offer I had, so I took it.

I started in June of 1967, which was an interesting time for the Center, because that summer they hired, I think, about three hundred new graduates. It was a lot, and over the course

of the summer as they came on, at some point they started training classes for us. Since what everybody was doing isn't taught or wasn't taught then in universities, they had these classes. So I think every morning for several weeks, we met in the big auditorium, and it was pretty filled, and people from all over the Center were coming and giving us classes on various things. So I was in an analysis division, but the operations people were there, all the engineering people were there. It was to sort of get us all up to some level of common knowledge about the space business.

At the same time, Mission Planning and Analysis Division had classes for all of their new hires. They had this elderly man, Ed Knoblauch, who taught orbital mechanics, and we did that every morning for I don't know how long. I followed it. It was good, but he was dry, and we all wondered if he was going to fall asleep in his own lectures. And I finally understood what dispersion analysis was, the section I was in. But at the time, like I said, they hired a lot of people, and in retrospect, they really overhired people. There wasn't, in some areas, a lot of work to do.

I was assigned to do a dispersion analysis for Apollo 9, and that was the flight that was supposed to be an in-Earth-orbit dress rehearsal for the Apollo 11 landing, where they would do all the maneuvers and activities still close to home before they left. Of course, the plan changed when they did Apollo 8 and went to the Moon first, so it sort of raised the question of whether the dispersion analysis I did was even needed, because what it was—it was concern that you don't know everything perfectly. There are unknowns in the actual level of thrust from an engine when they would do a maneuver; the cutoff, how precise was that? It's not precise out to ten decimal places. There were uncertainties in the measuring instruments, the Inertial Measurement Units.

So the question was, if you add all these uncertainties and unknowns together and then propagate them from Earth to the Moon, how far off are you going to be? Are you going to miss it altogether? So that was the sort of question that was in mind. Then they did midcourse corrections, too, on the way to the Moon, so what I was to do was to find out how large the positional errors of the spacecraft would be at each point after they'd used the engines for something, and then propagate that to find out how bad it was going to be later.

To do that, we had a contractor, TRW [Inc.], and I was sharing an office with five—or four other guys. My counterpart was a woman, Nancy Bedford, so I went over to her office at TRW every day for weeks, and we just sat and actually wrote out the equations for the physics of calculating these errors. We applied a random number to the errors, because what we were after in the end was a three-sigma probability, the dispersion that would encompass 99.95 percent of probability.

So we just sat there and did that, and I don't remember how long it took us. It was weeks, anyway, of doing that, and it wasn't full-time. She had a couple of other things to do, and I would go back to the office. Then it was turned over to a programmer. We did the standard thing, you know, flow chart and equations, and then they were turned over to a programmer to convert into a program, who then ran it.

So we used random numbers in a Monte Carlo simulation. I've forgotten the number of runs that were made on this to come up with the ultimate statistical numbers. It was hundreds. I was going to say four hundred something. That's another thing I could look up. And then I wrote a report, and in the Mission Planning and Analysis Division, MPAD, it was internal notes that we wrote. So I wrote the internal note on that, and I'm not sure whether we did anything except turn it over to the flight controllers. It was one of these things that there really wasn't

much of a customer for.

At any rate, I was then assigned to Apollo 11 to do the same thing. So by then the contractors were not a factor, so I just rewrote it myself and got the cards punched and ran it, had the deck run overnight. This is back in the days of overnight computing. And I wrote the internal note, and I do remember for that one Phil [Philip C.] Shaffer, who was in the Flight Dynamics Branch in Flight Control Division at the time, came and got my report and listened to me talk through it and thanked me. That was pretty much that, so that took me up to Apollo 11.

But in the meantime, it was a strange place to be. You mentioned in your prequestions that I appeared to be one of three women in the division at the time, which is true. One of them, I think, left after about a year, and the other one may still be there—I don't know—Cynthia [F.] Wells. Cynthia was in the Consumables Analysis Section, and as far as I know, that's what she did her whole career.

But the Dispersion Analysis Section really didn't have a lot of work to do. For one thing, we didn't have anybody telling us what needed to be done. There was some interoffice politics that went on in that first year which resulted in sort of a—I don't know—an invisible mutiny or something. But some people didn't want to be working for our section head and thought we could get better working conditions under somebody else.

While my section head was in the hospital and at home recovering from a bleeding ulcer, we were told that we now worked for another man. But then when the section head came back to work, they didn't tell him. So it was very awkward for a couple of weeks, because we had been told to work for this other man, which was difficult because he wasn't coming in to our office much because he would be seen by our former section head, who didn't know that he didn't have anybody working for him. So I finally told him things had happened while he was gone and he

needed to talk to his boss and find out. So he did, and he left shortly to go to the Apollo Program Office.

So now we were working for a completely different guy, who was publish or perish—in MPAD you were graded by how many internal notes you wrote in a year and how big and thick and impressive they were, and of course, we didn't have many, so we were supposed to go out and find work at the same time. So it was a very awkward time.

I wasn't having any fun with the missions, because I was just doing analysis in an office. If I wanted to find out what was happening with the flight, I had to rush home after work and turn on the radio. There was a radio station that was actually started by one of the public affairs people, I think, at MSC [Manned Spacecraft Center], it was then. It was a classical music radio station, except when there was a flight on, and then it had the air-to-ground of the flights, so then you'd hear all this. So I'd listen to the flights on the radio. I don't know what happened to the radio station.

So I was feeling like I wasn't really working—I could be working anywhere, doing this. It wasn't a great situation, being told to go find something to do. Then the politics of the office were awkward, so I actually was keeping track of the flights other ways. You asked about my impression of Apollo 9. Well, I wasn't—

WRIGHT: You really didn't get a chance to be much involved in that flight.

ACCOLA: No, it was TV and newspapers, and the same thing with Apollo 11. There were some interesting aspects to it. One of the things, in order to be able to put together the simulation of all the maneuvers on Apollo 9, I had to know what they were. So I had to go around and talk to a

lot of people to get the information and keep it up to date, and they would change their minds about what they were doing, what order, when, so a nice aspect of the job was getting out of the office and meeting and talking to other people. Another was, one of the places I was sent to figure out what was going on was something called Flight Techniques Meetings. I think they gave them that name. But these were the very first ones, as far as I know.

Bill [Howard W.] Tindall [Jr.], I think he was a Deputy Division Chief of MPAD at the time, but I could definitely be wrong on that, he held these meetings, and only six or seven people at the most would show up. They were in his office. The only other person I can remember going is [Charles] Pete Conrad [Jr.], the astronaut. He would go. Some people were too busy, so sometimes there would just be three or four of us. I went all the time, and I couldn't contribute anything to what they were trying to do, but it was fascinating to watch, and I got a really good perspective, because there were people from all over. And Bill was just an amazing, amazing guy.

WRIGHT: That's what we've heard.

ACCOLA: He would write everything on his blackboard. We're back in the blackboard-and-chalk days here. So he would write things on his blackboard, options or things they needed to decide or things that needed to be done or decisions they'd make. He would just write it on the blackboard, so by the end of the afternoon or into the evening when he quit, it would be full, and so he would have his secretary—he had a crackerjack secretary—go in and she would copy all that stuff down and type it up, and that would serve as the minutes of the meeting.

Well, it evolved and evolved, and by Shuttle, they were big meetings with a lot of people

going to them. But that was their Flight Techniques' humble little start.

WRIGHT: How often did that group meet?

ACCOLA: It could have been weekly. It wasn't more often than that.

WRIGHT: That was a good opportunity for you to learn.

ACCOLA: Yes, so that was another fun thing.

WRIGHT: Before we get off this time period, could you share with us—you mentioned something about overnight computing, and you came of this age also when computers were starting to be used. Can you give us kind of a look at how your experience grew, how you used your math and started doing these computer programs and, as you mentioned, stacking the decks and overrunning those at night?

ACCOLA: Well, when I was at Colorado State University, they had I think only two or three computer science classes. There was one that you could take when you were a sophomore that was basic, real basic, about computers and programming and flowcharting and learning how to punch a card deck and running it. We were on the quarter system, so it was just one quarter.

Then they had one or two classes that you couldn't take till you were a senior, and they were all taught by a math professor who had just sort of picked this up on her own. But by the time I became a senior, it was getting to be a better-defined field, and we were supposed to learn

assembly language. So the university had RCA [Radio Corporation of America]—this may surprise you, but RCA made computers in the sixties, and they were marketing them. So as part of CSU's [Colorado State University] getting RCA computers, some of their people from Denver [Colorado] drove up every day for, well, however many times we met a week during that quarter, two or three afternoons, they drove up and taught us assembly language and programming.

At the end of that fall quarter, they had hired a Ph.D. computer scientist, and he taught the second two quarters. But even then it was—you wrote out your instructions on paper, and then you could either turn it in and have somebody else punch it and you'd pick it up when they got around to it, or you sat at the cardpunch machine and punched your cards yourself, put them into a deck, rubber band around it, and then you turn it in, and odds are it would be the next day before you could pick it up and find out the results. So then if you made mistakes, you had to go through that—it was really slow, a slow way to do things. But that's just the way it was.

WRIGHT: Did you find that same system at MSC when you came, or was it a little more automated?

ACCOLA: No, no, it was the same thing, punching; either getting somebody to punch the cards for you or punching them yourself, and in this deck I was running—I think I kept it for a while; I don't know that I've got it anymore, but—it was that long, deck of cards. So your big fear was somebody would drop it, because you turn it in in one building, and then they would take it over to another building where the computer was to run it at MSC, and the big fear was it would get dumped in the rain or something, and you'd have to do it all over again.

But that was just the way computer science was back then. It was in its infancy. And

computers were giant. They took up entire rooms. It was noisy being in there, because they were reading all these cards, so it was just the clatter of all these cards being shuffled and read, or else being punched. And then the printers were noisy, mechanical printers, too.

WRIGHT: Was getting computer time for some of the work that you were doing at that time, was that pretty competitive, a lot of people looking to use the computer to run their programs?

ACCOLA: Well, not as much as it was later when I went to graduate school, just because there weren't a lot of students doing it. There probably were professors doing their own projects, but just because of the procedures you had to go through, it was slow.

WRIGHT: Soon after Apollo 11, you decided to leave to go work on that master's, wasn't it?

ACCOLA: No, actually, I had decided before, because I wasn't working close to the fun stuff and I wasn't happy with the situation there. I decided to go back and get a master's degree, and just get a real computer science job, since it wasn't happening in space. So I applied to universities. At that time there were only about ten universities in the United States that had graduate programs in computer science, so I ended up deciding to go to the University of Wisconsin [Madison, Wisconsin].

Just a few weeks before—these first four or five years of my career were not smooth. I had applied too late to get any financial aid, and a few weeks—I think it was really only two or three weeks—before the semester started there, I got a letter that they had doubled the out-of-state tuition; doubled the out-of-state tuition, and given me only that little notice. So I went

ahead and went and my section head at the time suggested that I take a leave of absence instead of quitting, because I was just going to quit. So that's what I did. I took a leave of absence, which had some advantages but some disadvantages, because I couldn't get my hands on all my money. But that's what I did.

That was also a strange time for women, because I'm now convinced I wouldn't have gotten in if I hadn't paid full tuition, because they had a quota system. Yes, it was about 10 percent women was all they'd allow for graduate students. Yes, it was pretty clear that was going on. So there I was at Wisconsin, eating beanie-weenie.

WRIGHT: All by yourself? Did you have any relatives or friends?

ACCOLA: I had a great-aunt who lived there in Madison.

Then when I applied for financial aid for the following year, I was turned down, and that spring was a real tough one on college campuses everywhere. That was the year of the riots over the Viet Nam war, so I was going to class in buildings where you could still smell the tear gas from the night before, and one class we left early to run out one side of the building before they all came in the other side. I had to duck down one street to avoid the National Guard, who were coming up another. I was sort of in-between the Guard and the protesters and had to get out of the way. I ended up dropping a class because they closed the computing center at night, and I had been used to working there in evenings, so I couldn't do all my work. I dropped one class.

So anyway, when summer came, I went back to JSC [Johnson Space Center] to my old job, because I'd just taken a leave of absence. By then, well, let's say during that summer I decided that I just couldn't afford—I had borrowed money from my parents to get through that

second semester, and I decided I wasn't going to save enough over the summer to be able to return. The third semester was all I needed to get my master's. And we were in an economic recession, which wasn't looking good for the job prospects. So I thought, "Well, I'll just stay here and get my master's at the University of Houston if they get a program going."

In the meantime I was still in this job without much to do and low morale in MPAD. But that summer they announced a RIF, reduction in force, and, well, it was an interesting day, because it was my birthday, for one thing, my twenty-fifth birthday. But John [P.] Mayer, the Division Chief, and the division personnel person were going from place to place around that part of Building 30, the floor we were on, giving people their notices. So the guys were all saying it was like an angel of death, you know. "Okay, they're in this office now, and then this one."

Well, they came to mine, and because I had been gone for part of that time, I had not got the three years in to get into the career position, so I was in career conditional. And then some of my time in grad [graduate] school actually counted, but not all of it. They hadn't hired anybody. They hired that huge wave the summer I was hired, and then they didn't hire anybody for ten years. Well, I shouldn't say that; there were a few hired, but basically nobody.

So all the people that had hired on later that summer after I had—I started early—had passed me in time. So I wasn't actually RIFed. My job wasn't eliminated, but a branch in another division was eliminated, and it was the branch chief who bumped me out, and I didn't have anybody to bump. He never did take the job. Never showed up, but he got to keep his job and went somewhere else. So then I had no job, but I had until a certain time to leave, so I left before the RIF actually took effect, but I resigned under notice of a RIF. So between my severance pay and my accumulated retirement and vacation, I had enough to scrimp through one

more semester at Wisconsin.

WRIGHT: Silver lining in that cloud, I guess.

ACCOLA: Yes. But then the recession was really bad, so while I interviewed for jobs, there were none. The IBM [International Business Machines Corporation] recruiter came. He said it was a waste of time, because they had no jobs. He said normally they would hire every single Wisconsin computer science grad, sight unseen, no interview. And this year they had no openings nationwide, and they weren't expecting any. So it was pretty bleak. I sent out I don't know how many letters, and nobody offered anything. And that was in a field that at the time was exploding, but the economy was just terrible.

So when I finished, I went home to my parents, who lived in Denver by then. The semester ended at the end of January. I had sent a Christmas card to my old section, so they knew I didn't have a job, and it turned out, unbelievably, NASA was hiring. They had some openings. This was only four months after I had been RIFed. They offered me to come back and have my old job, and I resisted for a while, because I hadn't really liked the work. But then I thought, "Well, it's better than sitting around," and there wasn't any other prospect. The economy was not improving.

So I took them up on it, but first I talked to the Personnel person and said, "You aren't going to have another RIF, are you? Because I don't want to drive all that way down there and then have to turn around and go back."

"Oh, no, no." Well, I went back to the office. Nothing much had changed, and I think I'd been there just a couple of weeks when they announced a RIF. And it was guaranteed that I

would have to go out, because I still had not gotten enough time. But they were going to work on it.

Well, it turned out that in Flight Control Division, Gene [Eugene F.] Kranz had a training program for new hires, and I can vouch it was an actual training program, but for some reason—I don't understand the personnel part of it—those people would be protected and couldn't be bumped out in a RIF. So Personnel's solution was to—and he was wanting to hire four people—Personnel's solution was to transfer me in there to keep it from happening a second time, especially since they'd promised me there wasn't going to be another RIF.

But he didn't want any women, and it was quite a while before I got transferred—ultimately he ended up taking me, but it was because I would have had the *Federal Register* for the entire Houston area blocked, so he couldn't have hired anybody that he wanted until somebody hired me, and he had the only hiring authority at JSC. I wasn't going to work for the post office or [United States] Customs Department. Anyway, I think this went on for a month before he finally took me. So that was the—

WRIGHT: Did that become an awkward situation?

ACCOLA: That was the most sort of unhappy, chaotic first four years of my NASA career.

I should say some things back at the beginning. That summer of [19]'67 was interesting, because the Vietnam War was going on at the time, and a lot of people, a lot of guys, were majoring in engineering in college and then going to work for NASA or for contractors to get draft deferments. So the first day when I went to work, the Personnel guy made note of the fact that he liked having me because he didn't have to do all that paperwork for a draft deferment. Of

course, I also heard comments that I shouldn't have taken the job, because I was keeping a man who could have got the job from getting a draft deferment.

Then he had a standard spiel he went through with all the new employees about various things, including the dress code of dress shirt and tie, and so he was sort of stuck at what to tell me. Finally he just told me, well, he thought probably I should wear nylons—this is before pantyhose, even. He thought I should wear nylons and a dress, and I was dressed fine, so if I just kept dressing that way, it would be okay.

WRIGHT: This was Gene Kranz told you this, or the Personnel guy?

ACCOLA: No, no, this is the Personnel guy back at the beginning, in '67. So that was sort of another aspect of being there at the time.

WRIGHT: You also got there right after, not too long after the fire [Apollo 1, AS-204]. How was the morale affected by it, or could you tell with people?

ACCOLA: Well, where I was, I was completely disconnected from engineering and the testing and the real planning for operations, but when I got there, it was actually about five months afterwards, they were recovering. They were pushing on, because we still had all the goals. In fact, looking at how long it takes to get anything done now, it's just amazing how quickly everything happened. The flights just happened one after another, and there wasn't any two-year downtime for that fire.

So, let's see. When I went to Flight Control Division, Gene Kranz was the head of it, and

he had a couple of deputies, Mel [Melvin F.] Brooks and Jones [W. “Joe”] Roach. I remember Joe got the job of having me come in earlier, even before I started there, maybe, and just talked to me. The thing I remember him asking me was, “How do you want to be treated? We haven’t had a female here before. How do you want to be treated?”

I thought that was a strange question. Seemed like I’d want to be treated like everybody else, if they were treating them fairly and with respect. Gene, when I went into his office—he met with the four of us—and gave us his tough and competent, discipline and morale talk; you know, here’s your marching orders. Everybody laughs about it, but it really is very impressive, and it inspires you to do good things; makes you feel like you’re part of a team.

I was assigned to the Simulation and Training Branch, because obviously that way I couldn’t be on a flight control team. Heaven forbid a woman would do that.

WRIGHT: You didn’t have any choice, right?

ACCOLA: No, no. They put me in the Training Branch—well, of course, news of my arrival—everybody knew I was coming by then. And, in fact, what I know about the difficulty of getting that transfer was all thirdhand. It was guys that I knew talking to other people and finding out what the status of things was. But the head of the Training Branch, Dick [Richard A.] Hoover, didn’t know where he wanted to put me; didn’t know which section he wanted to put me in. He just wanted to think about it before he made a decision, so he parked me in a chair in the secretary’s office outside his office. So I sort of looked like a secretary without a typewriter, but I did get started on the training program. But I think it was two weeks they had me sitting there without a desk, without an assignment.

I did get assigned to a section. I don't remember the name of it now. What I did mostly to start with was go through this actual training program, which consisted of a lot of workbooks that you had to go through and do exercises on. Also they had videos, like lectures, people talking on various aspects. Then also, going through the trainers. I had to take all the lessons that they taught the flight controllers on the trainers.

Then I also got to go into the simulator and have a familiarization in the command module simulator and the lunar module simulator. That was interesting, because to get into those things, you have to—the crew was basically laying on their backs in the simulator, and so in the trainer you did the same thing.

I was actually sort of fortunate that this was in [19]71—it was May when I was transferred—and the feminist movement was just getting started. Betty Friedan's book [*The Feminine Mystique*] had been out a little while, and pantsuits just came in, polyester, but pantsuits were in. So I was very lucky that I was able to switch my wardrobe over to pantsuits, which I then wore every day, because I never was certain if I would have to climb up a ladder and crawl into something. But I remember I went somewhere where I didn't have to do that, and one of the crusty old contractors who was running that one said, "Young lady, you'd better invest in some pants if you're going to stay around here." It was funny.

The reaction within the division was varied, but some guys just treated me like a curiosity. They would come by to take a look at me. Others were just friendly, as nice as could be. And a lot of men had daughters and they were thinking how they would want men to be around their daughters. Then there were a couple that went out of their way to be a problem. And some of it is just male behavior when they think there's no women around listening; you know, that they forget. It took them a while to realize I was on the other side of the wall.

But generally it was pretty good, and the secretary whose office I was parked in for a while was sort of a feisty woman. She told me that I'd better succeed; that if I didn't, he'd have an excuse never to hire another woman. She implied—I don't know if it's true—that there had been others who had worked for a while, and they just couldn't take it and ended up in the restroom in tears and left. So I don't know whether there's anything to that or not, but I was not to cry and go to the restroom in tears. It was interesting.

There had been a woman that worked for TRW, the contractor, and in some of the Apollo flights she had worked on a team that got called in to support in the Control Center at times. So some have thought of her as the first female to work in the Control Center, but she wasn't actually assigned to a team; didn't work shifts regularly. But her experiences were such, or her personality, that she became a very strident feminist and very outspoken in a public way. She quit and became a lawyer. I was the first one after that, so I was the first civil servant in the division.

The first assignment I think I had—they were coming up on Apollo 15. That was the first flight that had the lunar roving vehicle for the crew to drive, and it had a navigation system, or it had to be navigated, and it had heading and distance indicators. So the way the crew got around, to be told where to go, was they were told to go at this heading for this distance and then change heading to go to that heading at that distance. They had a readout of range and bearing back to the lunar module, so somebody could corroborate that they were where they were supposed to be. If the astronauts said what the range and bearing were, then they could pinpoint them and say, "Okay, they're in the right place."

So the person that was in the Control Center doing the navigation needed to be trained, like all the other people. Well, I should say—let's see; I'm trying to figure out—I've got about

three or four threads here. Well, they got trained in simulations, aside from just studying and learning, practicing, we ran simulations for the flight control teams. In that era, they were done two different ways. One was our branch actually had what they called math models of all the vehicle systems that could put out telemetry that looked like it came from the vehicle, and they would put in malfunctions. So they would actually go through a timeline for the crew.

Oh, and when they were using those math models, they had what they called astro sims [astronaut simulators], so they had training people who pretended to be astronauts, and they were pretending to be doing the procedures. But the astronauts also had simulators that they practiced in on their own; did a lot of training, and they also could connect the simulators to the Control Center so that then the flight controllers were training with the actual astronauts in the simulator.

For Apollo 15, for the lunar surface EVAs [Extravehicular Activities], we did some training with what we called astro sims, so there were two guys who pretended to be astronauts on the lunar surface, picking up rocks and driving around. The simulations with the real astronauts were in a parking lot or a desert somewhere, driving this fake thing around. So in terms of systems and geology, the real astronauts were doing that, and one of them was a geologist who could fake it.

But to train this navigation person for 15, they just thought that they would write the information on a piece of paper, stick it under a camera, and project it onto one of the channels in the Control Center, so that these guys would be talking about where they were going or whatever, and then we'd figure out, well, they should be here and write down numbers on a piece of paper. Obviously, that was not a very satisfying way to operate.

They did not travel as far from the lunar module on that flight as they were going to for later flights. The program was run out of [NASA] Headquarters, and Bellcomm [Inc.] had the

contract. Somebody up there decided that they needed to have a better system for training and came down with all the information. I read it. They assigned me to it, because the solution was to get a computer, write a program, and give them more representative information. So since I had just arrived with this master's in computer science, I got the assignment.

So I learned what needed to be done. The computer, unfortunately, didn't exist. Hewlett-Packard was making them, but hadn't produced any yet, and so we had to wait, and I got—I've forgotten now; it was either number five or number seven off the assembly line.

But in the meantime, Apollo 16 was coming up, so when they produced the operating manuals and the programming manuals, I read everything. I programmed it. I wrote the program, and then I had to wait for the computer to come, which was sort of an interesting experience. It held one hundred instructions, and mine took too many, and I had to work on it and work on it until I got it down to exactly one hundred.

You typed in the instructions on a keyboard. You saved it on a magnetic strip about nine inches long, about one and one half inches wide, and that's how you saved your program. So then after you saved it, you'd just take the strip in to read it. The only output method was a printer that used paper tape about the width of cash register tape so I could print out my program, and then I could run it and print things out. So that was a pretty interesting way to do things.

When we were going to have a simulation, I would load this computer up on a cart, put it in the elevator, take it down the office side of Building 30 over to the Control Center side and up. Then everybody else who was involved in the simulation, because of course the CSM [Command and Service Module] people were still there and the LM [Lunar Module] people were doing their part of the simulation. While we were doing the astronauts out on the EVA, they all had their regular consoles.

But it was just three of us and no real thing. It was me and my computer and these two guys who were pretending to be astronauts on the surface of the Moon. So we were in a separate room, on another floor by ourselves, away from everybody else. One of them was a contractor in the Training Branch, Hiram Baxter, and the other one was a Ph.D. geologist from Brown University [Providence, Rhode Island]; his name was Jim [James W.] Head [III]. I think he may still be there, although he could have retired like some of us. So he was the real geology knowledge, and Hiram was doing all the [Lunar] Rover stuff, and I had the computer setup.

The procedure was, at the beginning of the EVA, they would give the crew all of the heading and distance numbers to start with. So then they would periodically ask, or the crew would periodically report, the range and bearing, so that the Rover nav guy could plot them. I had set the program up so it was based on one-minute intervals. I could just punch in five times right in a row, so then I was five minutes ahead and I didn't have to literally do it every minute. But that's how we did it. When they would call and ask for range and bearing, I would read it out and tell the astrosims, and they would read it to the flight controllers, so that's how we trained them for those two flights.

The funniest anecdote with that is that one time—we'd try to make everything seem really real, but everybody knew that it was Anne and her computer, because I had a computer, and nobody else did that was doing it. Well, one time the thing just wasn't responding. I was hitting it and nothing was happening. I kept trying and trying, and I couldn't figure it out, and so I thought, "Well, I'll reload it."

So I reloaded the program; tried it again. Tried to catch up; couldn't. It just wasn't working. So meanwhile they were asking the guys next to me [astrosims] for the information, and I said, "I don't know what's the matter." We were trying to figure out what to do. I

unplugged it. I plugged it in again. I did just about everything.

Meanwhile an hour had gone by, and I thought, “Well.” They kept asking, and then the flight director, Pete Frank, came down to ask what the problem was. I think he had a break or something; I don’t know. Anyway, I decided, “Well, I’m just going to load everything up and take it back to the office. I’m wiped out.”

Then I noticed that I had this extra roll of paper, and I looked. It was out of paper. It didn’t have any way of telling me it was out of paper, and it had never happened before. [Laughs] So we all had a big laugh about that at the party afterwards. [Laughter]

WRIGHT: Celebration of discovery.

ACCOLA: Yes. So that was one of the funnier things that happened.

To continue on through Apollo instead of backing up to start on Skylab, during that time frame before and just after [Apollo] 16, a couple of people that worked on the lunar surface EVA team left. One died in a mountain-climbing accident in South America, and the other one transferred to [NASA] Langley [Research Center, Hampton, Virginia].

The way it worked, the people that worked on the CSM and the LM were on three teams, and worked through three shifts. The lunar surface group was split into two teams, two shifts, and there were four on each team. They were the planning team and what you would call the execution team or the EVA team. So one group was working in Lunar Surface EVA room in the Control Center when the astronauts were going out and doing the EVA, and then the other team was there when they were getting settled back into the LM, sleeping, and then getting ready to go out again. So the planning team actually worked about—I don’t know—fifteen or sixteen hours.

The execution team had a shorter shift, but they were on during the actual EVA.

So because of the shortages, on Apollo 16, my sidekick from the training team who was pretending to be an astronaut went and worked in that room on the LRV [Lunar Roving Vehicle] systems. Then for 17, when they had another hole to fill, I was the only one that had the background to fill it, so I did the navigation for the planning team, which amounted to, when they landed, trying to figure out quickly where they landed, so then the geologists could decide what they wanted to do in terms of sending them out on a traverse, as we called it.

This was a really low-tech job, too. There was a large map, photo-based map, of the landing area on an extremely large table at my end of the room, and I had some tape about that wide [indicates 1/4 inch]. So the geologists would just sort of rough out the direction around where they wanted them to go and where the stops were, and then I would take that tape and turn it into straight-line segments and then use a protractor and a ruler to figure out what heading that line segment on the map was headed and what distance it was according to scale. So that was my job, taking the outlines from the geologists and then doing these little segments and then figuring out to refine where they landed. And it was pretty much just the four of us in there overnight.

The geologists, of course, were in the Control Center while the crew was doing the EVA, sending up stuff about certain kinds of rocks or getting all the information, but then they would go home and sleep after they'd given me enough information to lay out the traverse. So I didn't get a lot of sleep, because I wanted to know what was happening on the EVA, and the only way to do that was to stay awake when the other guy was actually doing the navigation. But that's what I did, had that data read up to them and they called it out, and he would plot where they were, and everything worked fine.

There was one interesting thing, though, about the landing that never did seem right. Something was off. Either they weren't quite where everybody thought they were, or like the whole thing had gotten skewed a couple of degrees, like you needed to rotate the map around a couple of degrees. We worked and worked to figure out how that could be, and couldn't figure it out.

One morning Gene Kranz came through and asked how things were going, and I told him about that. So he went out and had the CapCom [Capsule Communicator] call up to the crew and ask them to describe it again, which I was sort of pleased with, that he took me seriously and passed it on. But "Jack" [Harrison H.] Schmitt got a little annoyed. He said, "Well, we know where we are. We already told you all this stuff," but then he did it again, which didn't change the location—that was the end of that as far as I was concerned, but it never solved the mystery.

I've seen things that Kranz has said which suggested I was not on a flight control team, so I don't know if he defines that as somebody who had to sit in front of a console seeing telemetry from a vehicle or not. We were considered to be part of the team when we were working during the flight in the Control Center, but we didn't have any real-time telemetry to look at in the position I was doing. But I was the first woman to work there in some aspect, so that's my claim on history.

At the same time that we were doing the Apollo flights, we were getting ready for Skylab. We had these trainers that were just mockups, so they looked like the panels in the actual spacecraft, but they weren't flight-type hardware, and they didn't have much of anything behind them. But they were good enough to train the flight controllers so they could see the types of actions the crew would have to take; they would get a feel for where things were located, what they were asking them to do, as familiarization.

They had them for Apollo, and we had to get them for Skylab. There were actually four people who, that was what they did, was run those trainers and get the new ones built. I don't know actually where they were built, but they were running into problems, that with the workload of the Apollo training, they weren't getting the Skylab ones done.

So we were told that we were going to have to do the wiring diagrams for these things to help the people downstairs out, because if they did them all, they'd never get them done in time. Well, I didn't know what a wiring diagram was. [Laughs] I hadn't seen one. So I had a lot of tutoring going on. I kept looking at books on electricity, trying to get a handle on it. I was assigned—I don't remember for sure now which ones. They were in the orbital workshop, I think, and I was assigned to do a familiarization of the orbital workshop, the multiple docking adapter, and the airlock. Others would be doing more detailed lessons on other things.

The way these things worked is that they loaded up the wiring thing for—I don't even know what to call it now—for whatever class was being taught, and then we taped it, and so they could start and stop the recorder, and it would operate according to the way it was wired. So we did the wiring diagrams, and then they were going to actually do the wiring, but they got behind on that. So then I found myself down there actually with these big boards and these long patch cables, figuring out, "Okay, this is this switch, and I need it to do this." So that was another novel experience for me. But I got that done and then wrote the familiarization for the actual class and then had to check it all out and record it. So that was interesting as another sort of low-tech approach compared to doing things now.

We were also preparing for Skylab simulations and models of the—well, I was assigned experiments, and the set that I was assigned included basically all but the astronomy. It included the Earth resources, biomedical, and then something that was called corollary, which was just a

grouping, a name for some that didn't have a better name. So I was to be the person in the Simulation Control Area training those three flight controllers on those sets of experiments.

There were a couple of contractors who actually were assigned the more specific experiments, and they would come up with the faults and put them in, and they would operate the models as if there actually were experiments there. They would operate the models, and I was just there to monitor the flight controllers, see how they did; watch if the malfunctions went in and looked okay.

I don't remember how long that training went on, but it was almost all with the first Skylab crew, as I recall. Then the plan for Skylab was to have four MCC teams for the first flight. And, obviously, we training people weren't going to have anything to do, much of anything to do, for quite a while, because of the missions. So they were going to use four teams for the first manned mission, and then expand to five for the second and third.

The way they were going to do that was the training people would be assigned positions all across the teams and positions, and we would do on-the-job training for the first one, since nobody was going to run simulations to train us how to do their jobs. There were a lot of aspects of their jobs that we didn't see in training, because we weren't there looking at it. So the idea was we would get on-the-job training, and then we would be scattered throughout the teams, and the teams would be rejiggered so that there would be five teams so that the schedule wouldn't be quite so bad, although it was bad enough with five.

For that, I was assigned to the biomedical experiments data. We got those assignments far enough in advance that we could actually be included in meetings, and the people could give us some background and help us get ready to go on the console. Well, the Skylab launch had problems, and the first mission was delayed. So it didn't go according to plan, and they didn't

get the biomedical experiments done as soon as they should have, because they were fiddling with that umbrella, or parasol they called it, outside.

But the whole plan had been for this big information system to be sort of the backbone of everybody's data analysis, and so all this telemetry data would get played back from the sites and get put in there, and you were supposed to be able to save the data to a computer. We were now up to a computer terminal information system, sort of.

But it just wasn't robust enough, and it was just completely overloaded. So what happened was nobody was getting any data out, and in the case of the biomedical experiments, after the first week, they had basically not gotten any, and this was supposed to be the first-look data. The experimenters would see enough results to continue the experiment and then they could go into where it was all being archived and request runs to be made, and that's where they would do their more detailed analysis. But it would be later.

Well what happened was they pulled people off to try to figure out what to do to solve this problem. My title was Med [medical] Data. From the Flight Control Division, we had three people. One was Biomed [Biomedical], and he was in the control room, the main room you're used to seeing on TV, and there were two of us in the support room, one looking at the systems, the experiment systems, and one responsible for the data. There was also a medical tech who would look at the EKGs [electrocardiograms], which we only got when they were over a tracking site. And there was somebody else from the Science Directorate in there.

Jack [R.] Knight was the Biomed that I was going to be working for on this team when we went on console the next mission. So he had surveyed the whole problem and figured out that we were asking for a lot more data than was really needed, and so as a result, we weren't getting any. So he talked to the investigators that understood exactly what they needed, so we

could narrow it down to smaller chunks of time, smaller pieces of data; got smarter about asking for which data to be played back.

So he pulled me off from my on-the-job training, and we spent full-time—overtime for a week or so, trying to get the new protocol straightened out, caught up on the data extraction and reports; so everybody else would understand how to do it. Then I got back to my OJT [on-the-job training], but everybody was falling behind again, and so I ended up going back and helping out pull the data. So I sort of got gypped on my OJT, but I think I learned everything. That was sort of fun.

The thing I hated the most about it was the hours, because we'd be usually five days on and then two, sometimes three, days off, and then we'd come back on and off. Except that we were rotating through all the shifts, so one set of five days, we'd work during the day; that was considered the execute shift, which was when the crew was up working. Then the next time we came on console, we'd work five days on, really, the swing shift, and that was sort of a little bit of execution; mostly winding down and starting to plan. Then the next time we came on for five days, we'd work the midnight, graveyard, shift, and that was catching up what hadn't gotten done during the other two shifts so that they'd have a clean slate to start with, and planning—overnight is when the crew's activity were planned, and the procedures, if any new procedures were needed, were developed.

WRIGHT: If I can, let me just ask you to stop for just a second, because we're going to break and change the tape out, so we don't miss anything you have to say.

ACCOLA: Okay.

WRIGHT: We've got the recorder back on.

Where we stopped, you were talking about Skylab and the team that worked the midnight, developed the plans for the next day.

ACCOLA: It was really hard to go through those transitions where you were having to stay awake all night and then go home and try to sleep. I know the guys with families, it was a problem, because then their wives were supposed to keep the kids quiet and not make any noise. Some of them just couldn't sleep. I know a couple of them did all kinds of projects, house projects and stuff, because they just basically couldn't get any sleep during the day. So that was the worst part of that.

Other than that, it was actually pretty fun and interesting, and the biomedical experiments were sort of interesting. The principal investigators, some of them came in initially, or they would come in when theirs was being done, but a lot of them, especially the ones from JSC, would just sort of not come after that. They'd just wait to get the data.

There was a sleep-monitoring experiment that required the guy to put on a beanie cap for his EEG [electroencephalogram], and the investigator for that was a man from Baylor College of Medicine [Houston, Texas]. I think it's Dr. Frost. He actually drove down every time his experiment was done, and he stayed there the whole night watching it. That was nice. It was at least somebody to talk to, because those nights like that got long otherwise.

But there were interesting things to do. One of the things was a mineral balance experiment, and so all the meals were laid out in menus in advance, and they knew exactly what minerals were in every one of them. So then at the end of the day, the crew had to report before

they went to bed what they'd had and any deviations. That was run on a separate little computer off to the side, so you had to come up with that report for the mineral balance.

The other thing on the subject of women is that I think at that time there was one other woman. Well, I know there was. I don't think there were more from Flight Control Division. That one was Angie Johnson, or Angienetta [R.] Johnson, and she had come in through the co-op program. If I'm not mistaken, I think she entered directly into the Biomed Section, but I'm not sure, so I think she just worked Skylab, as far as I can recall.

At that time the Center was organized so that there was a Flight Operations Directorate, which was the Flight Control Division, and an old Landing and Recovery Division, for when we landed in the water, and Mission Planning and Analysis Division, and I don't recall the name of the fourth. Then there was another directorate, Flight Crew Operations Directorate. They had the astronauts, the aircraft operations, and I don't know what the right name was, but they had a group that did all the crew procedures; they wrote the detailed procedures, and then they were the ones that planned the time lines.

When it came time for an actual flight, of course, the people that were going to work in the Control Center revising procedures or developing new procedures and then updating the crew's daily time line came out of that directorate. So in the Skylab time frame, there's one woman I know of that did that, and that was Diane Freeman [phonetic]. She worked on procedures. There may have been others, especially contractors that supported them. I don't know. She's the only one I remember.

WRIGHT: During this time when you were working in that area, did you have aspirations to move into the flight controller position? Is that something that you might have wanted to do?

Like sit on the consoles during the missions?

ACCOLA: I don't think I did then. But I think it was because I didn't think it was realistic. I didn't think they would let somebody from training, especially me, cross over into the MOCR. After that I didn't really think about it, because it was really a lot of fun just doing the training, because finally after having to watch TV and read newspapers, I was finally up close and seeing it all, so it was interesting and busy.

Then it suddenly wasn't, actually, because once Skylab was over, then Shuttle was a ways down the pike, and ASTP [Apollo Soyuz Test Project] was the next program up, and Hiram Baxter and I did write the requirements for the experiments that were going to be on that flight, for the models for training. That amounted to a few weeks' project, and then ASTP took so few people compared to what had been involved in Skylab, that they actually picked out who was going to work on ASTP, and that group went off and did their thing, and the rest of us were left to get ready for Shuttle, which was pretty slow, because the program just wasn't coming along, and we were going to be doing the same thing, training flight controllers.

But there were some changes at that time, and there was a reorganization at a couple of levels, and one was they rearranged the two directorates. So they had a Mission Support Directorate, which was going to build the simulator and operate the simulator; so they had divisions for the simulator and mission support. They also had a division for flight software, to get that developed, and they had MPAD, the old Mission and Planning Analysis Division. So they were all in the Support Directorate. The Operations Directorate then included Flight Control Division and the Training Division and the astronauts and the Aircraft Ops [Aircraft Operations].

The change that took place in the training world was that the Training Division in the Ops Directorate was going to actually do all of the training. So the group that had formerly worked with the astronauts in the simulators got split. Some of them came over to train, but most were left behind to develop the simulator and operate it. So we had to look at it from the point of view of training the astronauts in the simulators that were not developed yet, as well as training the flight controllers for their jobs in the Control Center.

In this early period when we were just trying to understand what the systems on the Shuttle were going to be like, and start thinking about writing up models for trainers, and learn everything we could and draw diagrams to teach ourselves, I was assigned Environmental Control System and something else, I think, which was a very odd assignment, considering my background.

But it didn't last for too long, because we reorganized within our branch, possibly even within the division, for this new assignment, and my branch chief gave me a choice. They were creating a data processing system section—well, I've forgotten what it was called originally; it had about three different names—but it was basically going to be covering the data processing system and navigation. He said I could stay where I was with this environmental control assignment and keep the section head that I had, or I could move into this new section that was being created.

They were bringing Bob Holkan in from outside who had worked on the LM during Apollo and he worked on the telescope stuff during Skylab. They were going to bring him in to be the section head, and I could work in that section if I wanted to. Everybody else was just assigned, reassigned, but I had my choice. So I thought, "Well, I'd like to try something different," and this was more down my alley than environmental control.

So I went into that section, and we were all just sitting around reading and learning everything we could about the flight software and the data processing system, which wasn't a huge amount at the time. But the flight software was just growing. The requirements were way too big so the software wouldn't fit the memory. The computers weren't all that—aren't—well, maybe they've changed—weren't all that big to start with, and they had displays. The way the crew interacted with the computers was they had three cathode ray tube displays, which they could call up different displays on.

The program had to go through a big software scrub in order to be able to fit it in and meet schedule, and the two crewmen who were involved in designing the displays and the flight software were Bob [Robert L.] Crippen and Dick [Richard H.] Truly. As a result of this scrub, they were busy in meetings to redesign all this stuff, and they needed somebody to write it down, so they asked Bob Holkan for someone to do it and he asked if I'd do it. He said he didn't know what it entailed—it didn't sound like much; I may not like it. If I didn't want to do it, I could opt out, but they needed somebody, so I agreed to do it.

It turned out that they were in these meetings deciding what got scrubbed, and they would design the display for that particular system for the crew to look at. They would come in early from the meeting the night before and rough it out, and then they would go off to that day's meeting. They were just doing it—by now we had advanced from blackboards to whiteboards, and so they were doing it in their office on a big whiteboard.

My job was to sit there at a table and read it all and read what other material I could, so that then I could lay it out and then write a description of everything that was on the display, so that then the software developers would know what they were supposed to be displaying and what controls the crew had over the system. So I'd do that, and when I finished I'd go back to

my office, and then the next morning I'd show up and do it again. So that went on for a couple of weeks until we got it all done and got that package done.

That was for the approach and landing test, which is where, out in California, they just took the Orbiter, the *Enterprise*, up on the back of the [Boeing] 747 and flew around with it and then landed. Then the later flights, they separated, and the Orbiter glided into the landing. So it was the approach and landing test displays and software that got scrubbed first, and then they had me do them for the orbital flight test, also, so I did the same thing.

Somewhere along in there, they decided they needed a flight software handbook, and because I had done the work on the displays, I already knew a little more about the software than others, so I got that assignment. So that started out with Dick Truly pulling out the [Northrop] T-38 [Talon - astronaut training aircraft] pilot's handbook and showing me how that was laid out and what it was like, and how he wanted it to be really user-friendly, not some dry, hard-to-find-what-you're-looking-for manual.

There were a few people that were assigned to help me with some sections, but I had overall responsibility for the book, and I did most of it. We did it user-friendly. I used the approach of the CRT [cathode ray tube] displays package—and for the keyboard, we had a foldout with a picture of the keyboard with arrows pointing to a description of what each key did.

It turned out to be a bestseller for flight software. IBM was supposed to be developing a handbook for the flight software, so I was supposed to be doing just a pared-down version for the crew. Well, it was mostly for the crew, because I think it was called the *Shuttle Flight Operations Manual*. It was in two or three volumes, and I did the volume on the flight software.

I don't know how many we printed and reprinted, and everybody got one, and then IBM plagiarized most of what I had done in their handbook. Everybody knew it. They thought it was

sort of ridiculous. IBM added some, but not a lot; at least not a lot that was really useful. If you wanted to find something, everybody went to my book instead of the official one.

In the meantime some other people were working on trainers for the data processing system and lessons, and we were gearing up for the simulator—requirements had been written for it. One complicating factor, and other people made the decision, but because the flight software on Shuttle is run in four computers at the same time, continually being synched up and voting against each other, and then there's one fifth computer that's a backup if those four fail, there was really no way to try to simulate the flight software. It was far too complicated. There was no way to run that software on other computers and have it work right and look right to the crew and the flight controllers.

So for that reason, we had to have the real flight computers in the simulator. We couldn't model them to train the flight controllers separately. The crew had training sessions that were standalone. I've jumped into the future now, but the flight controllers, all of their simulation training was with crews in the simulator since we didn't have that standalone MCC [Mission Control Center] capability for training anymore. A lot of people looked at trying to—and also, nobody would pay for another set of computers and flight software just for the Control Center training. We had to get early versions of the flight software for the simulator.

So anyway, as we were getting ready, there were two sets of instructors named for the Shuttle Mission Simulator, and one for the Simulation Control Area over in the Mission Control Center. It would be the first time in my experience that the crew instructors were from our group. They were at the simulator. The only people in the Simulation Control Area were watching the flight controllers, observing their performance and how the simulator was working. And then just telling people in the other building when it was okay to put in malfunctions or not,

because we didn't have this other whole batch of people pretending to be astronauts in simulating the simulator.

I was named the Lead Instructor on one of those two Shuttle Mission Simulator teams. Jerry [W.] Mill was the other, and Denny [John D.] Holt was named the Simulation Supervisor on the team that would work in the SCA [Simulation Control Area], in the Control Center. But not until later. The plan was we would go over, check out the simulator, learn how to work it and to be instructors, and then we'd start working with the two assigned crews, John [W.] Young and Bob Crippen and Joe [Joseph Henry] Engle and Dick Truly. Then it was going to be some months later after that we would start doing integrated simulations with the Control Center.

Well, the simulator was a basket case. It absolutely did not work. You'd turn on a switch and nothing would happen. Or you'd turn on a switch and instead of turning on what it should have turned on, it turned on something else. Or you could open the circuit breaker, and the switch would still work. It was absolutely unpredictable, and so we would write discrepancy reports. We had these procedures where we were going to check out that every switch worked right, that every system worked right, that our displays were reflecting the models of the electrical power system or the thermal control system, that they were reflecting what was happening. And it was really a mess.

We struggled through that. We wrote all those problems up. They worked on them. I'd have to go through a log I've got, I think, to figure out totally accurately the sequence. But I know that we went through the checkout; things didn't go well. The crew insisted. Oh, they had to come over and get in; they were losing training time. They came over, even though we knew they shouldn't; we needed to get the simulator ready. After a while they realized they were not getting any positive value out of it, and they weren't really helping us, and so we got them out

and worked on it, and we actually just tried to document everything, and then shut down for a while. I've forgotten how long, but we just walked away and told them, "Fix it."

We came back, and it was better, but we always carried a backlog of things that weren't right with it. But eventually the crew came back and we trained, and I think I did that for about a year. We kept putting off—well, the Shuttle itself kept slipping, so we were always a year from flight. Then three months later, we were still a year or more from flight. So we tried integrated simulations after the simulator was good enough to run with the crew, mostly just to find out how bad the telemetry was. So now we made it look mostly normal for the crew, but it was not what they were seeing in the Control Center. We had terrible problems, and so we did just enough to figure out what all the problems were, and then shut integrated sims down for a while so they could fix them.

I'm just thinking—okay, I want to remember to come back to this point, but in approach and landing tests, I wanted to go back to that, because I wrote the pilot's handbook for that, and that was actually done where the crew was in the simulator that was developed for it, and it worked relatively well. But it was very simple, because there were no systems, really. They hadn't developed those models, so it was mostly just getting off and flying.

It was a very small group, and I worked in the Simulation Control Area for the computer navigation systems for the approach and landing test simulations, and we did a number of simulations. But that was a very small group. I think there were only about five of us in the Simulation Control Area, and, of course, there were just the four astronauts, and there were just a handful of instructors at the simulator. And the flight control team was only about twelve people, so I think that everybody that worked operations and training in that probably didn't total forty. So everybody knew everybody, and we got together.

WRIGHT: Was there much turnover in that time period of personnel, or did you stay close together?

ACCOLA: Yes, we stayed close together. But we were sort of a tight-knit little group because there were so few of us working together. So we had some parties and that. That was a really fun time.

When they practiced separating and then landing in the simulator, it was Fred [W.] Haise [Jr.] and Gordo [C. Gordon Fullerton] were the crew on approach and landing tests, along with Joe and Dick. Of course, Fred and Gordo were very serious, took everything seriously, and Joe and Dick didn't take anything seriously. They were just a riot.

So Joe would do barrel rolls in the simulator after they separated, and this was when that song, "You Picked a Fine Time to Leave Me, Lucille," was popular. So when they separated, Joe would do barrel rolls, and they'd sing that song on the way down. Then when they actually did their first flight, they dedicated the song to me, and then sang "You Picked a Fine Time to Leave Me, Lucille," but it was before they took off. So that was ALT [Approach and Landing Test] fun things.

Then we got into the Shuttle Mission Simulator and all the difficulties there, and things got where we were able to do things fairly well, fairly routinely. Never got rid of having all the problems, though. It was interesting. The simulator was used like a tourist attraction for VIPs, so we would have various people come through and have to—some astronaut would come over and show them how to do it. I remember the son of the Shah of Iran was one, and some congressman.

It was after Skylab that there was hiring. People were moving onward and upward and being promoted, and so there was hiring, and that's when you saw more women come into positions.

WRIGHT: You had mentioned earlier that you had been moved into a lead. Were you now more into a management position?

ACCOLA: No, it was still—it was lead, which meant that there were other people on the team. I was responsible for a couple of things, I think, at the time, but there were four, maybe five other people on the team who were responsible for individual systems, training the crew, and then monitoring the simulator and putting in the malfunctions, and I was the overall instructor, watching them, saying, "Oh, no, you can't put that malfunction in, because they haven't figured out this previous one, and it's going to complicate things." And then telling the people that were running the simulator to get it started or stopped, and turn it around. I had the most interaction with the crew up in the simulator.

So about a year into this, I think, we were ready to go into more training at the simulator and more integrated simulations. Well, for one thing, other crews needed to be coming along, and the simulator was stable enough that we could start getting them some time, and it was used for things like procedures development, too. People that would write the procedures would then come over and try to check them out, which caused for some interesting things.

One—sorry it's a woman—but she wrote a power-down procedure, and because it assumed the loss of something or other, they had to go into a lower power mode. So she gave it to the crew to do, and the first thing she had them do was turn off all the lights. The next step

was get the flashlight, except they couldn't read that in the dark. [Laughs]

WRIGHT: That's funny.

ACCOLA: So that was why procedures had to be checked.

WRIGHT: That's a good reason.

ACCOLA: So they expanded and created a second SCA team, and I was the Sim Sup [Simulation Supervisor] on that SCA team. They added more simulator teams of instructors, and I've forgotten if we went to three or five. They ended up with five before we finished, I know.

So then I went over to start running simulations from the Control Center, which was interesting, because the SMS [Shuttle Mission Simulator], the mission simulator, still wasn't totally reliable, and sometimes it would just plain crash. Then you'd have to start over again, try to get it restored—if you were running launches, then that wasn't bad, because you'd start generally just a couple of minutes before launch, and then it only lasted eight minutes, so you could get through launches pretty well, okay, because they were only ten minutes. But then you had to turn around and then do it again, and then entries took longer depending on where we started.

We could do some that were just really short landings, or we could pick a point when they were still in orbit, do the deorbit burn and come down, and that took longer. So we had a variety. But then when we did the orbit sims [simulations] for eight hours all day, if you would get several hours into it, they would have changed. They would have accomplished some

procedures. They would have changed everything around, and so then we would have to get back to—if it crashed, we would have to bring it back up and then advance it up to where it needed to be, check everything, put in all the malfunctions, and then start again.

WRIGHT: Some days could be more tedious—

ACCOLA: It was sort of an ugly process if you couldn't do it out of sight. And that was before they had the tracking data relay satellite, so we had all these losses of signal from the tracking sites, and so sometimes we'd be out of sight for an hour.

Actually, this was later, but I actually could see things not looking right in the telemetry from the simulator, and I knew that it was going to crash. So I would look then to see when we were going to have a really long period of blackout, communications blackout, so that then I would tell them to take it down, restart it, and we'd bring it back up so it looked like it did when they last saw it. Because otherwise, if it crashed when they saw it, then everybody just had to sit around while we went through that mess.

This is an interesting thing about that simulator—that the operators of it had no insight into the health of it, so it actually was sort of a major annoyance—and I had a lot of arguing and blustering to do to get them to take the simulator down, because they'd say, "It's working." And I actually called a couple of heads above mine to get the message down to do it, and they finally figured out I was right, and then they were quite upset that I was sitting in another building and I could tell more about the health of their machine than they could. But we had something like thirty computers strung together to run those simulations.

We ran long-duration simulations, too. The first one we did was thirty hours. I don't

know how this came out, but we had five different shifts over that thirty hours, and I think my team took eighteen of them in three different periods, and Denny Holt's team had twelve in the other two periods. He was the lead of the two of us, because he had started a year earlier and had done a lot of work on it.

But that was a lot of malfunctions, when you go for thirty hours, because you have to put things in to keep every area in the Control Center occupied with something, so they're looking for something. They're learning how to analyze problems and develop workarounds or tell them what to do or figure out that they don't have a—they had malfunction procedures. If something happened, the crew was supposed to go to a malfunction procedure. Well, they might not have a procedure for something that could happen.

So over a period of time, to keep everybody interested, it turned into a whopping number of failures. At the end, we only did one thirty-hour, and then the rest were all fifty-six-hours. We originally just thought we'd do a couple of the fifty-six-hours, but the flight kept getting delayed, and they really could get better training, in some aspects, from the longer ones, just because they would have to carry things over. If we just did one day, they didn't really have to plan for the next day, because they weren't going to have to live with the consequences of not doing it or not doing it right. So with a long one, they had to do something that made sense, because they were going to be back the next day, living with it and carrying it on through. So we kept doing them.

They were getting better and better, and the crew was getting better—because we were training for so long that the crew could handle anything. So we were throwing ridiculous amounts of stuff at the crew to keep them from complaining they were bored. Then when we ran the long-duration simulations with the Control Center, there was a limit to how much we could

put in, because it all had to filter through one flight director. We still, I think, put in about a hundred and fifty malfunctions in those simulations. It was a lot to keep track of. By the end of the sim, boy, we didn't want that simulator to crash, because it was harder and harder to restore where it had been.

They were stressful for a lot of reasons. One thing is when we did the fifty-six-hour simulations, everybody who would be involved came to life, so we had the managers in the Mission Evaluation Room, who weren't necessarily there ordinarily—and the engineering guys who were on standby for support, and the Program Managers would come over and stick their two cents in, so there was a lot of outside help, or interference. I think they got written up in the Houston newspapers. It was a big deal. Things didn't necessarily go well, and there's a lot of stories I could tell about all those simulations.

WRIGHT: Is there a couple that really stand out that you feel happened and really for a good reason?

ACCOLA: Well, the simulator was so sensitive, and they had to go through all this checkout, and then the idea was that we would start at eight in the morning with the crew in there. Then if it was integrated, the Control Center had to be up. Well, what happened is the crew wasn't showing up on time to start, so then the simulator people got sloppier about getting it ready. So then when we'd do an integrated sim, the flight controllers would all be ready, and we'd be sitting there.

So one time, it was John and Crip [Robert L. Crippen], and it was a launch sim, ascent. Everybody was ready, and it was eight, and they weren't there. So I said, "Start it without

them.” So we did an ascent simulation without them. We picked out some—I can’t remember now what we did, if we put in some faults or we just made it in what we called the nominal with no faults.

But they came in and went, “Whoa, what’s going on? What’s going on?”

We said, “Oh, you missed the launch.” So they got in, frantic, and they got the message. They were on time every time afterwards. But they had a communications loop where they could talk to each other and the instructors could hear them and we training people could hear them, but flight controllers couldn’t, and we couldn’t talk to them. All we were doing was listening. So they knew that I could hear whatever they said, so they gave me an earful of it. So I just sent the message back, “Well, hey, you guys don’t need to do anything on launch, anyway. It’s all automatic.” [Laughter]

WRIGHT: That went over well, I’m sure.

ACCOLA: Yes. There were a lot of funny things. There was to be no food and drink in the simulator. Crippen took a cup of coffee up in a simulation that was with the Control Center and knocked the coffee down into the panels and shorted them out, and that was the end of the training for that day until they opened it up and dried it out. So the next time he showed up, they had a tablecloth for him, spread out on the control panel. [Laughter] We had a lot of funny things like that.

I don’t know. That’s probably enough. I’ve got too many.

WRIGHT: I guess by the time STS-1 launched, you felt like you had them trained pretty well.

ACCOLA: Oh, they were overtrained, really. Like I say, we had put in everything we could think of. We were having to put in more things.

WRIGHT: Where were you during the launch?

ACCOLA: That's an interesting story. I got a Manned Flight Awareness Award for STS-1, and this was a very big deal, because we hadn't flown for a long time, and I was the only one in FOD [Flight Operations Directorate] that got it. One of the reasons is because, once we quit training, I was available to do it, whereas all the flight controllers can't do it, because it was an expenses-paid trip to Kennedy Space Center [KSC, Florida] two days before the launch, and then you got tours the day before, and then you got to sit in the VIP bleachers for the launch. Great.

Of course, at the time, I was still really busy. We were still training, running simulations. At a party at J. O. [John O.] Creighton's house, the astronaut, George [W. S.] Abbey, who was the head of the directorate—and I've forgotten how we were organized at that moment—he said, "Anne, as long as you're going to KSC, how would you like to go down earlier and work? You could go down for a week and work down there."

I said, "Oh, I don't know."

He said, "Yeah, well, simulations will be over." Or I think there was still going to be one. The other Sim Sup, George said, could handle it.

So I said, "Well."

So he said, "It would be a great experience for you to go down there. You could see everything, learn stuff."

And I thought, “I don’t know about that.” So I said, “Oh, I don’t know.” Well, he, I think during the course of that party, he came up to me about three different times, on one side of the pool table or the other, trying to twist my arm into doing it. I finally said, “Well, I’ll have to talk to my boss.” Now, George was two levels above my boss. So I thought, “I’ll have to talk to him.”

He said, “Okay.”

Well, this was on a Friday or Saturday night. Monday morning before I hardly even got a chance to talk to my boss, George was on the phone. So they agreed that that’s what I would do. I would go down there and work, because there was a Vehicle Support Team, I think; Vehicle Integration Support Team—Rick [Richard W.] Nygren was the head of it, and it was a small group of guys who were assigned to support the crew down at the Kennedy Space Center and represent the flight controllers, too. So they were down there a lot. Mostly home on weekends, I think, but they were down there a lot with all the processing of the vehicle, keeping track of its status.

There were some astronauts that were assigned down there, too, and they were the ones that would go out into the vehicle if they were going to run some test on it and do the switch flipping. So my role would be to help them, because the week before, it was going to get really hectic, and they were going to go to round-the-clock operations and split themselves, the astronauts and the support people, into two groups and work twelve-hour shifts. So that’s what I had signed up for, was to work twelve-hour shifts in this office in the Launch Control Center, supporting them. They were nice and they gave me the day hours.

In order to be able to do what I needed to do to help them, I had to have some I think they called them walkdowns. The bennie was that I got this—it was for serious and safety reasons,

but I got this personal tour of the Vehicle Assembly Building and the Launch Control Center; met a lot of people there. Went out to the pad, went up, stood right outside the Orbiter. I've got a picture of me—you can see the Orbiter and the external tank up there. And also I worked, and they did find plenty for me to do.

So the plan was I would, the night before launch, after I finished my shift—and meanwhile, the guys who were going to support the landing were leaving to go to California to be there in time, -and checked out of the condo I had rented for a week, I went to the reception that they were having for the honorees. Then I went from there to check into the Howard Johnson's in Titusville [Florida], where I was supposed to stay, and they had no rooms. I said, "But the bus is picking me up at three-thirty in the morning here, so I'll just have to stay here."

Well, finally they found a place a couple of blocks up that was a real strange motel. I heard traffic all night long up and down the highway. There was too much light coming in from outside. So I didn't get too much sleep, and went down there to get on the bus to go out, and so I was totally conked out on the bus. There were a few people other than NASA employees, and I didn't know all the NASA employees, anyway, so I just kind of slept.

When I got off the bus, everybody came up to me and asked me if I had talked to him, what he said. Well, it turned out Steven Spielberg was sitting in the seat in front of me, and I didn't notice. [Laughter]

WRIGHT: Hard to see when you're asleep, huh?

ACCOLA: Yes. They were all just aghast that I had passed up the opportunity, but I didn't realize I had it. And then, I don't know, this is maybe a story worth telling, but one of the other

honorees was the guy who knew the most about the flight software and its development. It was [Walter] Sam Ankney. He had just come down. Anyway, I knew Sam, so we got in the bleachers, and he was down—I was up pretty high on the back, and he was down farther. So had this wait for launch.

I had the countdown handbook with me that I had picked up from working there, so I was trying to follow all the procedures that were being talked about on the loudspeakers, figuring out where they were, and every now and then, he'd yell at me, wanting to know where they were. The first launch is the one that a computer glitch happened, and everything stopped. Nobody knew why or what happened, and then when I had figured out at what point it had happened, then Sam knew pretty much what had happened.

So then we sat there for a while, and then the launch wasn't going to happen, and so they loaded us all up on the buses and took us back. The other Manned Flight Awareness people had to go back home, but I had flown there on a [NASA] Gulfstream, so I wasn't sure what to do. So I went to—well, I was out of that motel already, so I got in the car, and I thought, "Well, I'll try to go to the office and find out what's happening." Well, it turns out that the roads were outgoing only. They weren't letting anybody in. So all I did was get stuck in traffic, have to turn around and go back.

So I had some lunch, waited, and later in the afternoon I went back and went to the office. There was nobody there, and the phone was ringing off the hook, so I just started answering the phone, taking messages, and all I knew was that half—some of the guys had flown out to California and weren't going to get back to work, and the others were off doing whatever. The astronauts were out in the vehicle, going through the undoing of the launch. So I just started doing that and then finding out what happened.

Then they started coming back in, and it turned out Fred [Frederick D.] Gregory was one of the astronauts on that team for the first flight, and he needed to be in two places. He needed to represent the crew at a teleconference about the computer problem, because JSC had worked on it and they were going to have a status report and say what they found out and what happened, and he needed to be there so he could report back to the crew, who were going to be officially let in on it the next day. This was more of a working meeting. He also needed to be out in the Orbiter on the pad, doing the switch throwing.

So he said, well, could I do one and he'd do the other? We agreed that since he was experienced in the Orbiter cockpit and I wasn't, and I knew more about flight software than he wanted to know at the time, I went to the teleconference in the VAB. He had to take me over there, because I couldn't find my way, and nobody there knew who I was or why I was there. But anyway, I listened to the whole teleconference, and then I went back to the office to call the crew quarters to tell them what happened.

I should tell you, Crippen was really angry with George Abbey for having me work that week. He said, "That was an honor. She's supposed to be having days off, and you're making her work twelve-hour days."

So George had me tell Crip that it was okay. "I'm okay with it. I'm having fun. This is good experience."

So then they called and said, "Well, what are you doing there?"

I said, "Well, you know, the phone was ringing off the hook, and people were busy, and they needed me, so I went to the conference." So I told them what they had determined about the flight software, and I had taken notes.

I wasn't familiar with that part, but Crip was, so he understood immediately what the deal

was. He says, “Oh, no problem. We can go day after next when they get it ready again.” So they were going out to fly the Shuttle training aircraft for practice, both of them, the next morning. So they got George to give permission for me to fly with them, provided that I got there, was there on time and everything.

So I went back, and I can’t remember now where I stayed, but I went back and I got myself there. I think I stayed at—I may have stayed at the Howard Johnson’s. But anyway, I got myself there on time, walked up to the first plane. It turned out to not be the one that they thought I was getting on, so the other crew didn’t know that I had actually made it until we all got down.

But that was really an interesting experience, and that’s my memory of the first Shuttle flight. But I have to say that I don’t know what came over me when we were sitting on those bleachers, but I just thought, “This is wrong. They shouldn’t go. We don’t have to launch them. We can just go back and train, you know, have more fun.” Something about it was just not right, and I got so upset—like I am now—I got so upset that I was just in tears the whole time until—and then they didn’t launch. So then I got all involved.

The second time I watched the launch—I can’t remember where I watched it. Isn’t that horrible? I need to figure that out. It wasn’t the VIP bleachers, I know; at least, I don’t think it was. But I was fine with it. The second time, it was great. This is good. Everything is going to go. So it was really odd. But then I did go back and work some more that night, and then they launched, and I went home, and we went back for more of the same with the next crew, Joe and Dick.

So then I was running more simulations for STS-2. They sent me down for that, and then that launch was delayed a week, and I stayed the second week. By then I was section head, and

so that was the end of my actual operations or training experience working on a console in the Control Center or the simulator at JSC. Then I was a line manager.

That came about when they picked some new flight directors after the first flight. I think it was after the first flight, or in that time frame. There were going to be people moving around and upward, and the flights, at that time, there were supposedly going to be more of them coming more frequently. So they picked several new flight directors, and my section head, John [T.] Cox, was one of them, which left his section open. So I think that was actually not long after STS-1, and so I applied for the job. Others did, too, obviously.

Then nobody was named, and it went on and on, and it turned out that the branch chief had selected me, and the division chief had okayed it, and it was stuck up above, because somebody didn't want me to be section head. So it was either Abbey or Kranz, and I figured out it was Gene. So this went on for two months, where neither side would budge. My branch chief really wanted me. My former section head, who had moved up, really wanted me to have it, and Kranz really didn't, I guess. Finally he gave in, and I got it, but my branch chief, Bob [Robert K.] Holkan, said that he really had to go to the wall for that, and he couldn't do it again.

So anyway, I got the section, and I really enjoyed that. It was an interesting time, because we were getting into more of a routine, where we weren't just doing unique, one-of-a-kind things for the first time for the first crew or the second. It was starting to look more the same. We had a lot of flight crews named in the pipeline. We were having to get them through the curriculum. We needed to standardize the training, so we made sure everybody saw the same basic set of things.

So it was a time, really, to get better organized and also learn how to train our instructors, because we were having some turnover in them. As we increased the number of instructor teams

at the simulator, we needed more newer instructors to do the simpler training, and have somebody in the pipeline. So we developed the instructor manual for all the things we trained in our section, and that included not just the data processing system and navigation, but we also did the star identification training. We had the Spacelab computer system training, the remote manipulator arm, and rendezvous. I think I've remembered everything now.

So some of those we were just doing from—we had to put the Spacelab stuff together from scratch, because that was new, to get ready to train that crew for the first time. Same thing with the remote manipulator system. That was an unusual approach to training, because we actually did a lot of the training on higher fidelity, more engineering-type things, where they'd get a better response than we could from our simulator, although we had a Ph.D.—well, actually he was a postdoc at the time—from MIT [Massachusetts Institute of Technology, Cambridge, Massachusetts] come down and look at that and spent the summer advising on the best way to model that so it would provide the best training.

Then—interestingly enough, it was Ed [Edward F.] Crawley—and years later, when I was the Staff Director for the NASA Advisory Council, he became a member of it. [Laughs] Well, he became a member of the Space Station Advisory Committee, and I think he ended up on the Council. But at least I sort of had contact with him all those years later.

We had a lot of juggling to do, because we had a lot of places to train. We had two bases at the simulator, the fixed base and the motion base. Then we did some training at the engineering simulator, and we did training—oh, we even sent some of them up to Toronto [Canada] for a while for the training on the arm [remote manipulator system]. We had a lot of these little single-system trainer things that we did, and we also put together workbooks. But the scheduling was a mess for all of that.

While I was section head, which started towards the end of [19]'81 and went on until the end of '84, there would be changes. They would take something out of my section and give me something.

Well, one of the things—I don't remember what they took out, but what they gave me was the scheduling for all of the training and crew activities. It had been done by a group—they had one guy assigned to each crew, and then they had one assigned to various facilities. And they were just frantic, running around. You know, "Coordinate with this. Coordinate with that," little pieces of paper.

Then they had one master schedule for the crews, and they wanted to get it out on Friday afternoon so everybody could see what their schedule for next week was, but if one scheduler was having trouble getting something nailed down for his crew, it held up the whole schedule. So you had all these guys just standing around, about to have nervous breakdowns getting the schedule out.

So they gave the scheduling to me, because they said it was broken. They said they didn't know if it could be fixed or not, but if it could be fixed, I could fix it, so they told me to fix it. Which I did, but it caused some ruffled feathers or something at first, but it settled down.

I rearranged it so that each crew got their own schedule, because the only people who really cared about the crew schedule was that crew and the simulator team that was assigned to do all their training. Then all the rest of it we did by facility, so that you could see—well, the single-system training we did by facility, but then the rest we put together for everybody that wasn't assigned to a crew, we did it by day and then marked it out by facility. So if somebody only cared about this, they could just look at that part. So we separated it out into enough different schedules that everybody got it, what they needed in the format they needed it.

So it worked fine, except that the schedulers thought it was pretty revolutionary to do it this differently. So the first time we did it, they ran up to John Young and said, “She’s turned the schedule upside down, and you’re not going to like it.” So he called my boss’s boss or whatever, and it filtered down. Well, no, actually he called my division chief, who wandered down and said, “So what have you done with the schedules, Anne? I know it’s going to be a good story, but I need to know what it is.” [Laughs]

So I explained it all, and he said, oh, that sounds reasonable to him. So he went back, and we just had to make one modification, which was to give John Young a copy of all of the crew schedules, and it worked fine. The schedulers, all of a sudden they didn’t have to be this far from a nervous breakdown all the time every week, so it worked out.

WRIGHT: Yes, just change.

ACCOLA: Yes, so a change.

Then another story on training is rendezvous. We had to start that, and I don’t think we had PCs [personal computers] yet, so this was still back in the not very sophisticated computing days. We had gotten this system, a computer, to try to train rendezvous and put together workbooks and then do it.

We thought we’d done a pretty decent job, but Rick [Frederick H.] Hauck was the commander on the first rendezvous flight, and they had a crew debriefing afterwards, and he said, “Anne, I really wasn’t comfortable at all.” He said, “I just didn’t have a grasp, if I did something, how it was going to turn out later in the sequence.” He said, “You really need to do something about rendezvous,” because it was just purely a cookbook exercise for him. So we

did. I got somebody else to work on it, and we put something together that I think worked out better, far as I know.

WRIGHT: Well, if he didn't suggest any more, I guess it worked out.

ACCOLA: Yes. We had a lot of interesting times. Then at some point along there they advertised for flight directors. The previous time when they added, they'd just picked them. This time they did an open competition, and I applied. Everybody expected me to. A number of flight controllers did, too. So, filled out the paperwork, did all this, and then had an interview with Gene Kranz. He was determined he was going to be totally fair about this and objective, so he had some checklist he was going by, so then he rated us according to all these things.

Then when they made the announcement, I didn't get it, which surprised everybody, a lot of the flight controllers. In fact, a couple of flight directors that got it thought I would have gotten it before they did. The reason he gave me was communication. He didn't think I communicate well enough or something. That was it. So everybody thought, well, that was just his reason for not picking me.

So I knew that avenue of advancement through the actual operations was closed off, because if I didn't get it then, I never would, because I was no longer working on the console. I was at my peak, in those terms. Then it was sometime later that my branch chief was moved up to division chief, and a branch opened up, and I applied for that, because I was expected to. I knew then I had no chance, because by then things had split up, and Kranz was now at the top of the directorate, and so I knew that that wasn't going to happen. But I did it, because I was expected to, and I didn't get it. So I knew that that was foreclosed.

So later, sometime in [19]’84, they made a change in the way things were done at JSC to get ready for the Shuttle flights, because it was now more of a standardized process, with every flight being different. But there was one group that did the flight software. Another group did crew procedures. You couldn’t start simulations without them. You had to have the simulator load specific for that flight. There were things happening all over to get ready, and they were all being orchestrated out of the [National Space Transportation Systems] Program Office.

This was another time they reorganized the Center. They were trying to get everything associated with producing it in one organization, but not a literal organization, sort of a virtual one. They wanted to projectize operations, so that we would have a Project Office within the directorate that would coordinate all those schedules and do all that work, and then just tell the Program Office. Instead of having the Program Office sticking their tentacles into every single organization and pulling it together, we would have a Project Office. That was the plan. The Program Office agreed.

They wanted to switch to this new way of doing business immediately, so Denny Holt was being made head of an office [Production Integration Management Office] that had—I don’t know—a couple of aspects to it, although the main one was this schedules and flow management. So he had asked at lunch “What are you doing?” and I said “Oh, same old same old.”

And he said, “Well, I might have a deal for you.”

So it turned out that he wanted me to do that office. So I went over to Kranz’ office to hear about it. Gene described what he wanted done, which was he just wanted dramatic change in the way people worked and did it. They’d be doing the same work, but it would be reported through this office—and he didn’t want it gradual. He just wanted an overnight culture change.

And he said he wanted me because I was impatient, intolerant, tenacious, and those were my good qualities.

So I went off to do that, and as it turned out at the time, they were staffing the Space Station [Project Office]. The Program Office was already fairly well staffed, and the Project Office, for the part that JSC had, their Work Package 2 Project, was still being staffed. Someone who worked in the Program Office that I met at a management training class knew of an opening in the project for somebody with an operations background, and suggested me, so I was starting to be talked to about that.

So meanwhile I started up this Schedules and Flow Management [Office], and I just did it. I was maybe a little bit too “bull in the china closet” for some people, but I was supported by management, and they got the message, and so within three months, by the time I left—I only did it for about three months—everybody was accustomed to working that way, and the Program Office had gotten over the fact that they couldn’t just call people all over the Center and ask them to do this for us or look into that, because it was taking effort and coordination. We were putting together a system where this would all be integrated when I left.

I’m not sure whatever happened to that office. The guy that took it over seemed baffled by it. Then he later became an astronaut. [Laughs] So I wouldn’t be surprised if they dismantled it or put it together in some different form, but at least we got Ops operating as an integrated project, as far as I know.

WRIGHT: Let’s stop just a second, because we’re going to run out of tape here.

[End of interview]