

NASA JOHNSON SPACE CENTER FACILITIES ORAL HISTORY PROJECT

IRVIN J. BURTZLAFF
INTERVIEWED BY JENNIFER ROSS-NAZZAL
HOUSTON, TEXAS – 14 OCTOBER 2009

This transcript has been amended for clarification purposes. As a result, this transcript does not exactly match the audio recording.

ROSS-NAZZAL: Today is October 14th, 2009. This interview with Irv Burtzloff is being conducted in Houston for the JSC Facilities Oral History Project. The interviewer is Jennifer Ross-Nazzal, assisted by Rebecca Wright. Thanks again for joining us this afternoon.

BURTZLAFF: You're welcome.

ROSS-NAZZAL: We certainly appreciate it. Would you share with us how you came to work for NASA and give us an overview of your career?

BURTZLAFF: I was working for the Martin Company on the Titan program. On one of my trips to Cape Canaveral [Florida], it was called that at that time, I decided to go for an interview with Cliff [William C.] Bradford. I will say this while I'm thinking of it. Cliff Bradford is the best boss I ever had. He taught me to give your people assignments, delegate, and trust. If they run into trouble, help them, don't chew them out. I lived with that philosophy through my whole NASA career, and it really helped me.

I interviewed with Cliff, when I was at KSC for a Titan launch. In the middle of the interview, my launch went off, and I heard it. I said, "I'm sorry, I've got to leave, that's my

launch, I've got to get that data back to Martin Company and the Air Force by tomorrow morning." So I walked out of the interview. Later he told me that anybody that had the guts to walk out on him during an interview, he had to have that guy.

Right after that, he sent me a job offer. It was a \$5 a month more than another job offer I had received from California, but it didn't matter, because I wanted to go work for NASA. I went down to the Cape to work for Cliff. Six months after I got there, I was notified that we had to transfer to the Johnson Space Center. At that time I think it was Manned Spacecraft Center. I thought I had a choice. He later told me no, I didn't have a choice. We moved out to Houston. As it turns out, they didn't have a place for us so we ended up moving around. We ended up in the building back by the back gate for a while. Then we moved to Building 4 with the astronauts. Well, then as the building got more astronauts they kicked us out, so we moved to the General Electric building off site from NASA, where we spent several years. That's where we developed the acceptance checkout equipment (ACE equipment) and developed the software, computer programs, that checked out all the vehicles.

By doing that we were keeping the software standardized that was used at Grumman, at Downey, California [North American Aviation], and KSC [Kennedy Space Center, Florida] and being developed and tested with real avionics in the avionics facility. We had the real avionics, the real computers—four computers with a backup computer—all the electronics, all the displays and controls.

After a while, we didn't move around as much. I was an individual that was hired at the GS [General Schedule]-8 level. Cliff evidently had an eye for where he wanted me to go in the computer programming area so he put me in all these different sections for a period of time and then he'd take me out. I thought the section chief must not like me, because he kept moving me

around. Finally he put me alone in charge of all of the ACE flight software, reporting directly to him.

It was nerve-racking to have that responsibility for all those areas that were being developed. In the early days, I would go in to see Cliff too often. I'd tell Cliff something, and he'd go through his file. He wouldn't pay any attention to what I was saying. I said, "Cliff, you're not listening to me." I said, "I am not going to be coming back in here to tell you any of the problems. I'm just going to take care of them. If I come in and tell you something you better listen, because the next call is going to be from Chris [Christopher C.] Kraft." He looked at me, said "Okay." He totally delegated all decisions about the software to me that day.

The job got bigger and bigger, and he added more people under me. We ended up building it to a section, and I became a section head. We were trying to get on site, and eventually got over into Building 16. Cliff went over as assistant division chief, I think. I may be wrong about that. We finally got ACE group in Building 16 where we could work directly with the flight systems and the ground systems. That's how we got into Building 16.

As the years went by, we developed the software for all of the factories and all of the launch sites. I remember one day one of the guys from Kennedy Space Center called. They wanted to take over ACE software and do their own thing, develop their own system, and not have to keep it standardized. Cliff got me on a phone conference. KSC gave him their reasons. I didn't say anything. Finally Cliff said, "Well, Irv, what do you think?" I said, "Well, I don't think we ought to do it, because our standardization is going to go down the tubes. We're not going to be able to keep track with the SAIL [Shuttle Avionics and Integration Lab] compared with what's going on in the flight system at the Cape. I don't think we should do it." He says, "Okay, that's what Irv says, that's what we'll do." I'll never forget that day.

Later on I became a branch chief over the Checkout Systems Branch in Building 16. At one point, I don't know if it was John [F.] Hanaway or Cliff, but one of them. Anyway, Bob [Robert W.] Moorehead was heading up the computer systems in the avionics integration area. He had moved on up. They needed somebody to fill that job, so they put me in that job for a year or two. I don't remember how long it was.

I did that for a while. Then they had a problem in the ACE Branch again so they transferred me back. I fixed that one then John Hanaway left. Sometime after that, Cliff took over and moved up to the directorate level. I guess they made me a deputy division chief at some point there. I was a deputy division chief for several years. It was at that point along there where we integrated all of the flight software into that division. The group that was responsible for the flight software moved over into that division so that we now had the total integration of flight hardware and software.

I was made a division chief about two or three years before I left. I was responsible for all that for two or three years.

JANET BURTZLAFF: When did the astronauts come over to that building?

BURTZLAFF: The astronauts were over there all along. The astronauts would participate in the testing. When they had a problem, believe me, we would listen to what they had to say, and address those concerns. They were very conscientious people.

ROSS-NAZZAL: Would you tell us about or give an example of some of those simulations that you would run over in the SAIL?

BURTZLAFF: The SAIL was not really a simulation, it was testing the real flight software that was going to fly. As new software would come out, we would test that new software to see if we could find any problems, which we certainly did. We went on through that testing. Then also we would be online when a mission was going to fly. We were there with the flight software loaded. If they had any problems, we would be there to help resolve it, because we had the same software running that they had on the computer.

I remember one time Cliff had me go up to brief Chris Kraft. I got up to give the presentation, and I was talking about the different software for the Orbiter. He was sitting there looking down, and I didn't know if he was listening or not. I was talking about the automation of the cryo [cryogenic] detanking process. When I finished, he said, "Cliff, that's interesting. How long is it going to take us to get that ready to go?" Cliff sat forward and said, "Well, we've used it for the last three missions." Mr. Kraft seemed surprised.

ROSS-NAZZAL: Was the SAIL or the Avionics Systems Lab supporting real-time missions?

BURTZLAFF: It was running and online when the mission was going. If there were any problems, we were able to jump in and sort them out.

JANET BURTZLAFF: Were you ever called on to solve any problems when the Shuttle was in orbit?

BURTZLAFF: Oh yes. I don't remember what they were, but when they'd have a problem at Kennedy, we'd stop and try to recreate it to see if it was a problem in the avionics or a problem elsewhere. In my opinion, there were very few problems with the flight avionics software because of all that integrated testing and the commonality between all the test areas. We would check out the Lunar Modules at Grumman and the Command and Service Module [CSM] in Downey, California. We would check out the flight system at Kennedy Space Center, which would be the integrated Command and Service Module and the Lunar Modules. A lot of people fought it, but that was the right way to go in my opinion. Rather than having everybody have something different. You couldn't trace it and follow it and support it.

ROSS-NAZZAL: Would you tell us about some of the tests that you did before the Shuttle flew?

BURTZLAFF: Oh yes. We would run the tests of the launch and show how the software worked through the launch period. We would check the backup computer in case there was a failure in one of the computers. Did the backup computer take over? If they had a problem down at the Kennedy Space Center, then we would get the information and try to reproduce that problem to see if it was an avionics problem or what it was. I think it was a magnificent experience. I'm glad I was there.

ROSS-NAZZAL: It's an amazing facility as you walk through and see all of the wiring for the Orbiter.

BURTZLAFF: I haven't been there for years, but somebody wanted to move SAIL so they could do something else there. I won't say who. I sat and listened to the engineering director and what all they wanted to do. Got through and the engineering director turned to me, and he said, "Well, what do you think Irv?" I said, "Can't do it. If you move all those cables, it will take years to get it back up. We won't be able to support the program." He said, "Okay. I guess that settles that."

ROSS-NAZZAL: How long did it take to build this facility that was used for STS-1 and also the ALT [Approach and Landing] Program?

BURTZLAFF: I don't remember how long. As things would come along, and they were building the computers for the flight system, we would get copies of the latest updates and integrate them into the lab. We would keep up the testing of that to see before they flew it that it worked all right. SAIL evolved as the Shuttle evolved.

ROSS-NAZZAL: How early were you testing flight software for Apollo and Shuttle?

BURTZLAFF: From the beginning we were testing whatever the flight software was. We were starting it at Downey on the CSM. They were testing the Lunar Modules at Grumman. We were putting together SAIL to do an integrated test of the Orbiter. As that evolved, we were keeping up with the flight testing as it went along and keeping the SAIL up to date with the latest changes. It was modifications all the time, depending on what we had to do to keep up with the flight system. We were always using the latest software and testing it before they flew it.

ROSS-NAZZAL: How closely were you working with North American Rockwell?

BURTZLAFF: Very close. I don't know if I should tell this story. Well, it was nip and tuck at Downey. Getting ready to test the Command and Service Module, Rockwell said, "The ACE software is not ready to go, so we can't test." I was out at Downey for two, three weeks along with Norris Lambert [phonetic], who was the head of the software for GE [General Electric], and his people were there. We were working trying to get it all done. I remember one day we went in at like 6:00 or 7:00 in the morning, and we were in this enclosed building. No windows at all. I walked out the door with Norris Lambert, and he just stopped dead, and he was shocked. Looked at his watch and said, "What time is it?" I said, "It's 9:00." He said, "In the morning?" He'd lost 12 hours. He thought it was 9:00 at night, and we'd worked all the way through, all day and all night.

As it turned out, we turned everybody loose to get everything done. We tested it and walked into the meeting where Rockwell was deciding what they were going to do. I said, "Well, ACE is ready. It's completed and it's tested. It's ready to go." The Rockwell guy said, "Well, we're not ready, we have to have six more months." We did the same thing at Grumman. I was traveling all over the country, not spending much time at home.

ROSS-NAZZAL: Tell us about the challenges you faced during your career.

BURTZLAFF: There were some challenges. I was working over in the high bay area on the ACE when I heard about the first three astronauts in the Apollo capsule that got killed, and I was

really nervous. Was it caused by something we had to do with? I called someone in the Florida control room, and he was talking to me, and he said, “Oh, sorry, they’re cutting me off. Everything is shut down.”

The other one that I remember is the *Challenger* accident [STS 51-L]. When it blew up I had just come out of the division office; I was the deputy then. I came out of the division office, and people were in looking at the TV in the meeting room. It was packed in there. I just looked in the door. I was watching it when it blew up. I was standing next to this guy from IBM [International Business Machines], and he looked at me, and I looked at him, and he said, “I can’t stand to watch this anymore.” I went back to the office to tell my division chief, Pat [M.] Kurten. As I walked in the door, Barbara [G.] Shock, who’s been the secretary for years, I still see her occasionally, she said, “What’s the matter with you? You’re white as a sheet.” I told her what happened.

Pat Kurten called a meeting with all of the branch chiefs and contractors. I remember we sat there for a long time. Nobody said a word. It was quiet. You could have heard a pin drop. People were all in shock. After a while I spoke up, and said, “Pat, we should freeze that software and make sure nothing is touched or changed, just so we can use it to verify if anything was related to the flight software.” Of course it wasn’t. It was like all of them woke up. They were just totally in a daze.

Then after that, later Pat Kurten retired and made me the division chief. That’s when we got the flight avionics software in the division. I think everything was going pretty well. I retired and later came back and worked a year or so for John [W.] Aaron as a consultant on a task that he had.

JANET BURTZLAFF: Is that when you went to Canada to work on the Remote Manipulator System (RMS)?

BURTZLAFF: Yes. I went to [Marshall Space Flight Center] Huntsville [Alabama] once, and I went to Canada once. Each time I had a detached retina right after those two flights. It slowed me up a bit.

ROSS-NAZZAL: Sounds painful. One of the questions that I wanted to ask you—it's been circulating around quite a bit in the Space Shuttle Program—is how the SAIL actually got an OV [Orbiting Vehicle] number, and why it was given the number 95. Do you know?

BURTZLAFF: I saw that on your list of questions, and I don't know the answer. When did it happen, do you know?

ROSS-NAZZAL: No. I sure don't, but they keep asking us.

JANET BURTZLAFF: Cliff would probably know.

ROSS-NAZZAL: Cliff who?

JANET BURTZLAFF: Cliff Bradford. He lives in Alabama now, but we see him every year.

BURTZLAFF: Yes, we have an ACE reunion every year.

JANET BURTZLAFF: Every year we all get together for a run three-day reunion. This year it was held at our house, the day after the 40th reunion held at the Space Center. The group has stayed together all these years and has met in many different states.

ROSS-NAZZAL: Isn't that nice? How large is the group?

BURTZLAFF: Some of them were not able to attend every year. There are approximately 20 to 30.

ROSS-NAZZAL: That's a good size group. Would you tell us how your facility changed when you started working with the Department of Defense and classified flights?

BURTZLAFF: I don't know whether I remember that it changed except we tightened up the security to make sure that nobody got in there and nobody got any data. Any data that was recorded was classified and stored appropriately. I don't remember it really affecting us that much, except for us having to keep classified data and making sure that no one was there that should not have been.

ROSS-NAZZAL: Now one of the things that Greg [C. Blackburn] told us that I thought was interesting was that the facility could be used as a backup for the Mission Control Center. Do you recall that decision?

BURTZLAFF: I remember it being talked about, but I don't remember. I couldn't comment.

ROSS-NAZZAL: That's fine. Did you have to reconfigure the facility at all as you accepted new Orbiters into the fleet? First you had the *Enterprise*, and then *Columbia*, and then the rest of the fleet came on board. Did that affect you and your facility?

BURTZLAFF: No, unless the avionics in it changed. The avionics was all standardized. If there was anything that did change, we would test that. But the computer systems, we stuck with the fact that we wanted them all to be standardized so that you didn't have to worry about all these different configurations coming in to be tested. You'd have to redo everything so the flight data systems and the software was all pretty well standardized. Now there were some subprograms in there that were utilized for the specific mission that you would test, but the basic computer and the computer programs that run it were all standard, unless they did something after I left.

ROSS-NAZZAL: Did things change after *Challenger* in any way before you had STS-26 and the Return to Flight?

BURTZLAFF: Anything changed after *Challenger*? Only that there was a lot of additional testing going on to make sure that we hadn't missed something and it wasn't the avionics that caused it.

ROSS-NAZZAL: Can you tell us about testing? How long might a test take? How many people might work a test? Do you recall from those days?

BURTZLAFF: It would just be a guess, because it varied. It varied depending on the testing, and the complexity of what they were doing, and who they had to get in there. Sometimes we'd have astronauts and sometimes we wouldn't. We'd have subsystem managers there. It was a place where everybody could participate and was listened to, that includes astronauts, engineers, software people. Their representatives were asked to participate and did participate.

ROSS-NAZZAL: What do you think was the importance of the SAIL to the Shuttle program?

BURTZLAFF: It was utilized to test the integrated software and to find any problems before they flew. As far as I know, it was extremely successful in doing that. Without the SAIL, I don't know how they'd have found these problems. It was a magnificent lab and magnificent people worked there. Of course, that's an opinion. They might say, "Well, all except Irv."

ROSS-NAZZAL: We heard Doc Pepper. He gave a presentation a few weeks ago on the SAIL. Does his name ring a bell? It's a very unique name, I thought.

BURTZLAFF: Yes.

ROSS-NAZZAL: You had a patch or some sort of emblem for the facility. Is that correct?

BURTZLAFF: Yes, we have got them at home. Did you bring one?

JANET BURTZLAFF: I can bring a patch that you can copy, I'll be glad to.

ROSS-NAZZAL: Great! Is there anybody you think we should talk to who might be good to get some more information about the facility itself and its history?

BURTZLAFF: Well, whether you can get him to do it or not—of course he comes up here working other jobs sometimes—but Cliff Bradford is my hero.

ROSS-NAZZAL: Do you have any questions, Rebecca?

WRIGHT: Mr. Burtzloff, when you first started you were talking about how you worked for Martin and you were at the Cape. What year was that? When did you start with Martin, and what were you doing for them?

BURTZLAFF: Let's see. I left in late '64. Graduated college and then worked for them from '56 to '64.

WRIGHT: Were you doing software programming for them as well?

BURTZLAFF: I was doing just about everything. Really I was a liaison going to each one of the flights or tests, calling the data back, getting it reduced overnight, and then the next morning presenting it to the Air Force.

WRIGHT: You had two bosses then: Martin and the Air Force. Was the Air Force your main customer?

BURTZLAFF: The Air Force was the customer, yes. I just did whatever I had to do. My boss said, "What are you doing today?"

WRIGHT: When you came to Houston was your facility ready to use? You mentioned that you were in the building for a while with the astronauts till they kicked you out. Were the buildings still being constructed during that time?

BURTZLAFF: We didn't have the SAIL built up by then. We built it up as we went along. We'd get flight hardware from wherever we could get it and put it together, and finally integrated it over a period of time. It was a very complex process.

WRIGHT: What were your thoughts when you first heard about the Shuttle being developed? It was such a different spacecraft than what you had worked with.

BURTZLAFF: Well, bring it on.

ROSS-NAZZAL: Ready for the challenge, right?

BURTZLAFF: Yes. Well, that's what we were there for. To meet the challenge and do the testing and make sure it worked.

WRIGHT: It did. That's all I had, Jennifer.

ROSS-NAZZAL: Is there anything else that you wanted to share with us? Or would you like to share anything with us, Mrs. Burtzloff? Recollections from the period?

JANET BURTZLAFF: I think it was a great time, because there were several big parties. Some formals and everything was really nice. I can remember once going down to a dinner and dance at big hotel by the Astrodome. There had big ice sculptures on the tables. It was all for the NASA people. I can remember going outside seeing the champion grand steers in our formals. It was just so much fun at the Gilruth Center. There were many picnics and get-togethers. When Irvin retired, they had a huge party. He just got all kinds of memorabilia.

BURTZLAFF: I received several pictures with signatures from the astronauts and engineers. Over on our wall is a bookcase. I can look from left to right, and I can see our picture and my parents' picture and move right and see all the kids. As I look over, I can see several awards and medals that I received from NASA.

ROSS-NAZZAL: Well, we thank you very much for coming in today and bringing the bag of goodies: books, research materials, and photos. We look forward to going through all that.

[End of interview]