

NASA JOHNSON SPACE CENTER ORAL HISTORY PROJECT

ORAL HISTORY TRANSCRIPT

BRYAN D. O'CONNOR
INTERVIEWED BY SANDRA JOHNSON
WASHINGTON, D.C. – MARCH 17, 2004

JOHNSON: Today is March 17th, 2004. This oral history with Bryan O'Connor is being conducted for the Johnson Space Center Oral History Project at NASA Headquarters in Washington, D.C. Sandra Johnson is the interviewer and is assisted by Rebecca Wright.

I want to thank you again for joining us today and agreeing to be a part of our program. I'd like to start today by asking you to briefly describe how you first became interested in aviation and aerospace.

O'CONNOR: Sure. I grew up in a military family. My dad was a career Marine pilot and so, from my earliest days, I remember seeing him coming home in a flight suit, going to the flight line and looking at airplanes that he flew, and having an interest from my earliest days in that sort of thing.

When I went to the [United States] Naval Academy at Annapolis [Maryland], I felt like I had an open mind, that I was going to see what was available. Maybe I would get into submarines or ships or something, but the aviation bug was too deep in there, and so when it came time to select a service and an occupation, I went for Marine Corps aviation. The first step in being a Marine officer isn't to go to flight school; the first step is six months of training for what they call the basic school, which teaches you how to be an infantry officer. It's just one of the things about being a Marine officer. So having been through that, that didn't change my mind either, and I went from there to aviation training.

The early part of my career was in jets. I learned how to fly jets in [Naval Air Station] Kingsville, Texas, and went to a squadron on the West Coast of the United States. It's a famous squadron, and it was kind of an interesting thing to be in a squadron that was actually on television. It was the Black Sheep Squadron, and they had a TV show about the Black Sheep Squadron. This squadron had been in existence ever since World War II. I'll never forget the black sheep head that was mounted on the wall in the ready room. It was pretty grungy. I think it had been there since World War II. People would go by and put cigarettes in its mouth and so on, and it was a pretty ratty-looking mascot. At one time it had been an actual live sheep.

But I enjoyed flying jets and after a few years of flying in the A-4 Sky Hawk, which was a single-engine, single-seat aircraft, I was assigned to the first Harrier squadron. The Harrier was a brand-new airplane back then, and they were putting airplanes and people into that first squadron, and that was a real interesting experience for me, because it allowed me to touch elbows with some test pilots. It's fairly common in the military for the people who have flown a new airplane in the test environment to actually wind up being in the first squadron also, and we had nine test pilots in that first squadron, all of whom, of course, had more experience in this airplane than any of us new guys. But they taught us how to fly it and were our leaders in that squadron.

That's when I got bit by the test pilot bug. I had an engineering degree and I was curious about engineering matters and had been to the safety school, which had some engineering aspects to that, so it was natural for me to apply to the test pilot school. I guess it was in 1975, after I'd been a Marine aviator for about seven years, that I was assigned to the test pilot school up at [Navy Air Station] Patuxent River [Maryland].

After three and a half years of flight test, I was assigned to go to the Naval Air Systems Command, which at the time was in Washington, D.C., and that's where I got a chance to be in a program office. I was the Assistant Program Manager for Acquisition. That was the title they gave what now is called the Chief Engineer's Office. In that role, I got a chance to see some R&D [research and development] activities and acquisition experience, what it's like to bring a new system [into the fleet]. At the time, we were working the AV-8B, which was the advanced Harrier, the American version of the [British] Harrier. I mention it because later on, I called upon that kind of experience that I'd had in the Systems Command and in the flight test community for jobs that I had at NASA. They kind of came in handy later on.

In 1980, after a short tour at the Naval Air Systems Command, I was picked up by the astronaut selection process and went down to Houston [Texas] that summer. I'll never forget the drive to Houston. My wife drove one of our cars and I drove the other. They were both Volkswagens, a bus and a bug [Volkswagen Beetle]. Neither one had air conditioning, and it was July. Two kids, a dog, and a cat, and lots of stuff, driving down into one of the hottest summers on record, and that long drive from about thirty miles north of Houston on [U.S.] Highway 59, when you start getting into the strip malls and so on, all the way through Houston thirty miles south to where NASA is, I thought we would never get through that. Of course, that was just our introduction to what became home for eleven years.

So we raised our sons in Houston. One of them still lives there today. He considers himself to be a Texan, even though neither one was born there. They had their formative years and high school and lots of friends and so on, and a lot of good memories about our tour in Houston.

In 1980, we had yet to fly the Shuttle, and we still had quite a flavor of the Apollo Program [in Houston]. There were some astronauts in the corps who had been Apollo astronauts. John [W.] Young was the chief of the office and, of course, he was a Gemini and Apollo guy. We had lots of people in Engineering and in the Safety Office and throughout, in Operations. [Christopher C.] Chris Kraft was the Center Director. Gene [Eugene F.] Kranz was the head of Mission Operations, and George [W. S.] Abbey was the head of Flight Crew Operations.

All these guys had quite a history back through the Apollo Program, and it was difficult not to pick up some of that climate and the cultural aspects of that, the pride that they had in that program, the frustrations they were having as we went forward, and things not being the same as they had been before, where it seemed like there was plenty of money. Now the environment we were in was a little different, but a lot of the cultural aspects that had made the Apollo Program great were interesting to me to jump into and start learning about.

The first job that I got when I came to the Astronaut office, other than the training itself, was what they called the SMS [Shuttle Mission Simulator] Liaison Officer. When I got that job, I thought it was probably going to be the worst job in the Astronaut Office. I was very envious of my friends in our class. If I remember right, we had twenty-one astronaut candidates in my class, and all of them were getting jobs that sounded a lot neater than the one I got. Cape Crusaders, for examples. Several of them went down to [NASA] Kennedy Space Center [Florida] and they'd spend all week every week down there preparing for that first flight, getting the [Space Shuttle] *Columbia* ready and developing the processes and working with the [processing and launch] teams, getting into the cockpit of the real Orbiter and doing all those things that Cape Crusaders do.

We had some people that were assigned to support crew status for the first couple of crews. That looked like a lot of fun. They got to go and be in the simulations, work in the training, helping the crews to get through all the bureaucratic and technical things they had to do in their training, getting their flight suits ready to go and all that sort of thing. So the closeness to the crew really looked exciting.

We had some people who got to be what they called the SAIL [Shuttle Avionics Integration Lab] test pilots or SAIL commanders, where they'd go over to the lab and fly missions in that simulator, testing the software. And [there were] various other kinds of jobs, and here I got assigned to the SMS Liaison job, which was briefly explained to me by my direct report, a fellow named [T. K.] Ken Mattingly [II], who is a hero of mine from the early days. Mattingly told me that, "Okay, you're SMS Liaison. What that means is, you're the guy who represents the Astronaut Office in the activities that are going on across the street to certify that our crew training simulator—." In fact, the SMS stands for Shuttle Mission Simulator. "That that simulator is accurate and adequate and is what we call certifiable as a good simulator."

Now, even though we were within a year of the first flight of Shuttle, they still hadn't certified that simulation yet, and there were a lot of activities going on to make sure it was as accurate as they could get it. Of course, without ever having flown a real Shuttle mission, they were going on analysis and ground test data and other kinds of simulations to build this model and make it accurate. And part of what they were doing there was to try to make things like the visual cues and the oral cues that they have for the crew as accurate as they could so that the environment in that trainer would be as close to real as they could get it.

I mention that one because that was [a case] where we actually had quite a bit of fun. I would be in the third seat taking notes and we would have two Apollo guys like John Young and

T.K. Mattingly, or one of the other guys who'd been on an Apollo launch, trying to remember what it sounded like when the [engines on the] reaction control jets fired. The engineers would be outside the simulation putting in these models and turning up the volume and changing the pitch and the frequencies of these noises in the cockpit to make them sound spacelike. Nobody knew what it would sound like on Shuttle, but if they could make it sound something like what Apollo sounded like, they thought that was a good start. So it was fun to hear these guys arguing about whether some noise that was in there was accurate to the Apollo sounds when neither one of the two guys in the front had actually flown on the Apollo system for some years, because by now we hadn't flown for a while. So I thought that was interesting.

And it was nothing but sea stories. Between the runs, when they were charging up the simulator and turning it around to get it ready to go again, you would hear Jack [R.] Lousma and T.K. Mattingly, for example, arguing about certain aspects of the Apollo system or what a various launch environment might feel like or sound like. We were doing not just the noises, but also the visual cues out the front, both on orbit and in the landing environment.

The landing environment was a lot easier to try to simulate, because we had airplanes, what we call Shuttle Training Aircraft, to go and actually fly real approaches to the real runways, so it was real easy to make the visual cues accurate in the simulator. But the space environment and what the back of the Shuttle might look like with the star field in the background, or the Earth or the Moon, those things needed some advice from these experts who had done it before.

The vibrations was another one. There was a fellow named Roger [A.] Burke, who was the head engineer in charge of developing the Shuttle Mission Simulator, and Roger had a little bit of a diabolical streak in him. The way that showed up was one day when we were trying to simulate what the vibrations might feel like during launch. The Shuttle Mission Simulator

rotates up to ninety degrees, so you're laying on your back in there just like you would on a real launch. And when you ignite the engines, there's a vibration that comes in and shakes, through hydraulic system, the cabin, and gives you some idea of what that might feel like. Of course, there's noise that goes with it and everything else.

Roger was asking these pros—and I think John Young was in the commander's seat on this one—asking him and I can't remember who the co-pilot on that one was, but for advice on how much vibration seemed right. So we did several launches in a row and each time John would say, "No, you need some more. It's going to vibrate more than that." So you can picture Roger Burke out there, turning this potentiometer up to get more vibration in there. Then we would fly another launch and John would say, "Nope, nope. That old Saturn [launch vehicle], that had a lot more vibration than that. You're going to have to tweak it up a little more, Roger."

So after about three or four of these things, Roger decided he was going to turn it all the way to the max, and he did, and that was one hellacious ride. John and I both knew what he had done, and all we could do was just hold on. We were strapped in, but you still felt like you needed to hold on. You couldn't see any of the displays at all. It was just a big blur, and we were bouncing around like it must have been the case in the old days, when people were going down the rutted dirt highways in buckboard wagons or something.

Roger actually broke the system on that particular run. We had to get out. They had damaged some hardware. There were a couple of things that had been positioned up on top of the simulator with brackets that didn't hold, and there were some cables flying loose and so on, and so we actually broke it. That was the end of the day.

But it was that kind of thing that I found myself doing as the—quote—"SMS Liaison Officer." As I look back on it, I realize that what I thought was going to be a terrible job and not

very much fun and out of the mainstream, was just as important as any other job anybody else was doing, and that in the space program, it was kind of an early learning event for me, because I realized then, and it came back to me many times later on in my dealings with the Space Flight Awareness Program, that everybody's important, no matter what their job is in the space program. There aren't any non-important jobs, and as I've handed out [Space Flight Awareness Silver] Snoopy Awards to people who were in what you might think of as non-frontline jobs, jobs in the background, somebody that audits the books, for example, might never think of themselves as being all that important to the space program, and we have given awards to these people for excellent work and being the top 1 percent of the workforce. And every time I get involved with something like that, I think back to my first job at NASA. So that was my introduction to the Astronaut Office.

I remember being kind of in awe of all of this, because there was enough difference to it, from what I was used to. The space program had a lot of aspects that were very similar to what I was used to in my R&D and flight test background, but there were other things that were not that familiar to me. One example is the idea that we were only going to fly four test flights. Of course, I had just spent a tour in flight test jobs and working on programs that had thousands of test flights before they handed them over to the operators to fly in the fleet. And planning, when I was in my Naval Air Systems Command job, for the extensive flight test program that would be required of the new version of the Harrier, the AV-8B, and then to come to NASA and hear them talk about four flight tests and then we'd become operational and we'll be flying commercial payloads and we'll be taking people for rides. I mean non-astronauts for rides, what became later called the Space Flight Participant Program. That, to me, was foreign and a little bit uncomfortable.

I remember it may have been after STS-1, but it was in those early days, in 1981 and 1982, of the Shuttle Program, that I went to T.K. Mattingly and I told him I didn't feel comfortable with this. We were talking about taking the ejection seats out of the Space Shuttle after the fourth flight. It turned out it was after the fifth flight, but we were only going to [enable] them for the first four flights. I told him I just didn't feel comfortable with how we could possibly get to a confidence level after such a short test program, to be able to do that.

He said, "Well, don't worry about all the rhetoric." He says, "We all hear that stuff, and the people up there in [Washington] are talking about this and so on, but in reality," he said, "you and I both know that this it will take a hundred flights before this thing will be ready to even think of it as operational."

And when he told me that, I felt a lot more comfortable, like, "Okay, well, there's somebody else that has this same [concern] besides just me around here." And it was a little bit prophetic on his part, I thought, because as time went on, and then in later years after the [Space Shuttle] *Challenger* mishap and so on, I remember revisiting that conversation. And even after the *Columbia* accident, where we hear about some of the echoes of the *Challenger* thing and how we were calling the Space Shuttle operational when it really isn't and so on. Of course, it had flown more than a hundred missions by *Columbia*.

But I just wonder if we really are comfortable yet, as an agency, with the idea of development and flight tests versus operations. When we embark on our new systems and the new vision that we have to go to the Moon and Mars, my guess is we'll have a sustained program that will involve some flight hardware that gets either repetitively used or we use similar ones over and over again, even if they're throwaways, where we allow ourselves get to feeling

comfortable because we haven't had any failures, when really we shouldn't, and that it does take a long time and lots and lots of trials before you can get to that confidence level.

So, again, in the early 1980s, I remember thinking back on that discussion with T.K. Mattingly quite often.

JOHNSON: I'd like to go back and ask you a little more about your initial process of becoming an astronaut. When did you decide that that was something that you were interested in?

O'CONNOR: In 1977—well, it actually goes back further than that. In 1970, when I was going to graduate school, I was in a program that had a field trip to NASA Johnson Space Center, and when we went down there, Alan [L.] Bean was a fellow that I met. He was training for Apollo 12, and he met our group of graduate students and talked to us a little bit on his way into the simulator. The very same simulator facility that I was talking about in 1980, we had that same building with a similar type of setup. Of course, the cockpit displays and all that were Apollo, but that was the room that we went into. Then we watched him and the rest of his crew climb in and get ready to do their training that day.

At that time, by the way, when I was going to graduate school, I was also in flight training at the same time. They had a program for certain people with engineering bachelor's degrees to go through a master's degree program at the University of West Florida [Pensacola, Florida] while they were getting their wings. So it was a Navy-run program, and maybe that's why they had a closer tie to NASA, because it had a government sponsorship.

But I remember at that time thinking that that [would be] an interesting job to have. I really didn't connect myself to it, though. I just thought, "Wow, this is exciting and these guys

are doing some really neat stuff.” Apollo 11 had just landed. My class and I watched it at one of my buddies’ houses down in Florida, and here we were now, talking to the very next crew. And, of course, I don’t know if you remember, but Apollo 12 is the one that was hit by lightning on the way up. And, of course, because we had met the crew, we were watching that one, too, and I remember talking about all that later on. But I can’t say that’s when I connected myself personally to the astronaut business, but it was my first introduction to it.

It wasn’t really until 1977, after I’d been a couple of years in Patuxent River doing flight test work, when NASA asked for volunteers for the astronaut corps to be part of the Shuttle Program, that I really thought “Maybe I ought to try that out. After all, I think I have some of the qualifications here.” They were looking for a certain amount of flight experience. They were heavily biased towards test pilots. I don’t think that was a requirement, but just about all the test pilots that I knew were applying, and so I kind of just joined the wave and said, “Well, why not me?” I didn’t really think I had any special qualifications other than I was a test pilot and I had some interest in doing new things. And apparently NASA agreed [that] I didn’t have special qualifications. John Young called me on the phone and said, “You didn’t make it.”

This was for the 1978 class. I asked him, “Well, I understand you’re going to have another one of these in a couple of years. If you were I, would you apply again?”

And he said, “Absolutely.” And I took that as a hint that maybe I wasn’t too far off, and I figured a couple more years of flight test experience, and if I scored fairly high among this [1978] group, they’re all gone now, they got hired by NASA, so I don’t have all those people in front of me anymore, so maybe I’ll be [more] competitive next time. And, sure enough, I applied in 1980 and I was picked up that time.

I'm kind of glad I did it that way, because as much of an interesting job the '78 class had, the class having joined the NASA team two years earlier than myself, I still had a heck of a good job. Getting that other year of experience in flight test, it gave me the opportunity to be the first guy to fly the YAV-8B [Harrier] prototype airplane, which was my project down there. I wouldn't have been able to do that if I had come to NASA. And as much fun as it was to be the SMS Liaison Officer, believe me, flight test was a great job at Patuxent River.

Now, I did go for a desk job for my last year before coming to NASA. I was in Washington in the Naval Air Systems Command, but again, as I look back, I don't think I would have flown the Shuttle any sooner had I been picked up in that first class. It turns out that they had cut five people [from the 1978 selection]. They were going to hire forty and they cut five pilots out, because they didn't need them, right at the last minute. I found out much later that I was one of those five. The reason they didn't need them is because in that '78 time frame, the *Columbia* was having problems. All the tiles had fallen off on a flight across country. One of the main engines had blown up on a test stand and the whole Shuttle Program was slipping. So if they had picked me up in 1978 and I had joined the Astronaut Office, I probably would have eventually flown the same time anyway as I did. So having that other two years with the Marine Corps, I thought was beneficial later on for me, gave me that extra acquisition experience that I used in different [NASA] jobs.

JOHNSON: What was your family's reaction to your choice?

O'CONNOR: When I was picked up for NASA? Well, I guess it was about the same as everybody else. A lot of uncertainty. "Yeah, I guess it's time to move again. We are a military

family. We've been here in Washington area for four and a half years," in Maryland at that time, and then Washington. It was a little bit of a hassle for us personally in that we had just moved into a house at Bolling Air Force Base [Washington, DC], base housing, and we only were in that for about eight months when we had to pick up and move to Houston. It's just one of those hassles that military families sometimes go through when they get assignments.

But there was also a lot of excitement about going to a new place and getting away from some of the colder winter things. Little did we know how terrible the summers could be in Houston. I'd trade the winters here for the summers there anytime. But we heard that the schools were pretty good and the people in the Houston area were wonderful, so everything we heard said this was going to be a good assignment for the family.

JOHNSON: What was the reception when you did get here? You mentioned the Apollo heroes, and they were heroes to you. What do you feel the reception was to this new class of astronauts, or even the '78 class, coming in?

O'CONNOR: Well, it was probably fine, but I have to tell you, I remember a negative part of our reception, which it must have made an impression on me, because I still remember that meeting to this day. The [NASA] Administrator, [Dr. Robert A.] Frosch, and [Dr. Christopher C.] Chris Kraft, [Jr.] who was the [NASA Johnson Space] Center Director, apparently had had some issues with some of the members of the '78 class. I don't know if somebody had pushed the rules on airplane flying over the community or something, but there was some [incident] that had just happened before our introductory meeting and our welcome meeting at the Center down there, and those guys were in a bad mood about this, and it was reflected in their welcome aboard. I

remember Chris Kraft saying something to the effect of, "I don't want you people feeling like you're omnipotent." That was the word he used. "Remember, you're not omnipotent here."

And I thought, "Wow, we're getting some cautionary stuff here before we've had even one day." I found out later, of course, that he was sort of in a bad frame of mind because of something that one of the other astronauts had done, which gave him this omnipotent thing, I guess. Somebody thought they had more authority or permission to do something that they really didn't. Because they were—quote—"an astronaut," they had special privileges. So that's the dose we got of our welcome aboard, was a cautionary thing.

In fact, one of the first jobs we were given as a class was to create a patch, a class patch that we could wear on our flight suits. So several of us, just in a kidding way, created some sort of a legitimate patch design and then, in addition, a joking one. Of all the characteristics we had in our class, sense of humor was one of them, and that's where that showed up. My funny patch was a picture of Alfred E. Newman, the *Mad* [magazine] guy, in a space suit, close up of his head, just like you'd see on the cover of *Mad* magazine, and at the bottom was a logo that said, "What? Me omnipotent?" [Laughter] Of course, that got turned down. I mean, we didn't even turn that one in, but it was good for a joke.

But a couple of the other things about being the second new class in some years—the '78 class was the first one in nine years. Then we being two years right after that, I guess some of their sense of humor bled off a little bit, and there was an attempt to try to get the whole astronaut aura down a peg or so. The Apollo Program astronaut corps was very small. In fact, I think when the '78 class showed up, there were only 28 [or so] astronauts in the office, compared to what we have now is, what, 150 or something.

I think what they were trying to do was change a little bit of the perks. I'm not going to call them perks necessarily, but some of the things that went along with the notoriety of the astronaut corps, because what they did with us was they said, "Starting with your class, we're not going to have any lithographs anymore." You know, the picture that you would take to schools and sign. "We don't need to do that anymore; there's not enough interest in that. Starting with your class, that's the end of it."

And I thought, "Well, fine. I didn't even know we were supposed to have lithographs. I never had them in the Marines. No skin off my nose." Well, of course, the public was not ready for this, and we were just bombarded with requests from children and the public all over the country for autographed pictures from our new class. What we did was we made up a little standard letter to send back to them that said, "Sorry. Starting with our class, we don't do that anymore." I thought that would probably take care of that and would cut off the requests, but it didn't.

So the NASA hierarchy said, "Okay, I guess that's not going to work." So they went ahead and took pictures of us and made the lithographs, and then we just followed the old tradition of letter answering and that sort of thing, and signed pictures.

JOHNSON: So they were somewhat surprised that that interest was still out there in the public?

O'CONNOR: Yes, I think they must have been. They really didn't anticipate that there'd be such an overflow of requests. I personally didn't get that many, but there were some members of our class who just were overwhelmed with hundreds and hundreds of requests for pictures. Then there were some that just said they wanted pictures of everybody, so it was the same interest as

the '78 class had had. They had given them the lithographs, so they never had this question, I guess. Even to this day, they still issue the lithographs to all the astronauts in the new classes, and it's probably consistent with the NASA mission of inspiring the public. That's the astronaut part of that, is to get a little closer to the schoolkids and so on with that sort of personal [inspirational] touch.

JOHNSON: Let's talk some more about some of your first duties. You mentioned the SMS Liaison Officer. Was that what you did primarily through STS-1 and -2?

O'CONNOR: Yes, the first two flights, I was involved with that. Of course, the job changed a little bit. Instead of creating the simulation and certifying it for the first flight, once we got up and got to the certification point, then my job changed to more of a facilitator, of making sure that the Shuttle Mission Simulator was supporting the astronaut training needs properly and sometimes having to get into things like schedule problems, or occasionally, which is something I really enjoyed, actually taking somebody's place because they weren't able to show up. Because I knew what was going on in the simulator all the time, I was able to what I called "snivel" a lot of rides in the simulator, and that was a much more interesting simulator than some of the other ones that my other classmates had been assigned to, which weren't nearly as accurate a simulation.

JOHNSON: Did they become more accurate once the first flight came back?

O'CONNOR: Yes. Now, after the first flight came back, we went back to that other model that said, let's get these two guys, [Robert L.] Bob Crippen and John Young, in there, and let's tweak it and make it as good as we can while they can still remember all this, what it felt like, what it looked like, what it sounded like, and any physical features that might be off a little bit.

Of course, that was pretty accurate. The switches were all exactly where they ought to be because we knew the hardware. But some of the other aspects really turned out to be a little bit off. It didn't actually feel or sound or look like the Apollo in many respects, and so when they came back, there were quite a few changes, and I got to sit in that third seat and take notes for all of those [sessions], too, [and it] was a lot of fun. We did the same thing after [each of] the first four flights.

JOHNSON: Did they have recordings going on so that they would hear the sounds?

O'CONNOR: Yes. In fact, I forget which mission it was, but we actually put microphones in the cabin to pick up the real sound of the launch environment, without any muffling or anything, so that we could try to repeat it with the electronic sound makers in the simulator, and get it to the right decibel levels and the right tones.

Now, we didn't use that [feature] unless the crew had their helmets on. If they'd do a suited run in the simulator, then you'd run [it] up to the right noise levels. But most of the time in the trainer was spent just in shirtsleeve environment, so they would turn that noise way down to what it would sound like inside your helmet. Those were some of the subtle things that we were working in those days.

JOHNSON: What other duties did you have in those early flights?

O'CONNOR: On the third flight, I was assigned to the chase program and I got to be a chase pilot. [Ronald E.] Ron McNair and I were assigned as partners. He was the duty photographer and he learned all about how to operate a 16-mm camera. That was our job. We had two other chase planes with different kinds of cameras in them. One was a 70-mm still shots and then the other one was a videocamera. Ron and I were what we called the minimum [entry] point [MEP] chase, which means we were the third chase plane. I mention that because STS-3 was the only flight that landed at Northrup Strip out in [White Sands] New Mexico, and due to the positioning of the number three chase plane at what they called the minimum [entry] point, that meant you were a backup. In case the Shuttle didn't go to the normal runway, if they had an energy problem, they would go to the MEP runway, and they wanted one chase plane to be there just in case they had to do that.

It turns out that the minimum [entry] point was pretty close to the normal rendezvous place for chase planes. We're all up there circling around at 40,000 feet, two guys at the normal [entry] point, and me, with Ron in the back seat, at the minimum [entry] point. When we did that at KSC [NASA Kennedy Space Center, Florida] or at Edwards [Air Force Base, California], we were pretty far away from the other guys and, therefore, we would be out of the picture, wouldn't actually be able to fly chase on the Orbiter when it came in, wouldn't be able to make it that far in time to make it there.

But at Northrup Strip, the runways were close enough, the minimum [entry] and the nominal [entry] orbiting points were so close that we asked permission, once we knew where the Orbiter was coming in—and on STS-3, that was Jack Lousma and [C. Gordon] Gordo Fullerton,

and when they came in on actual landing day, I had asked permission to be relieved of my job over there on the MEP as soon as we knew the Orbiter was definitely going to [be] normal. So they gave me the go and then I lit my burners and went supersonic and joined up on those other two guys just as they were joining up with the Shuttle. That's the only flight where we've had three T-38 [Talon] chase planes, and it's the only flight that has a 16-mm film of a landing because of that, and we owe that to Ron McNair in the back seat; he took a great film.

In the film you can see the other two T-38 chase planes and the Orbiter, so when you look at chase films of those early landings, always look. You'll see one airplane over there, but not two, except for that one [landing at Northrup Strip].

JOHNSON: Is that the only flight you had that?

O'CONNOR: Yes, just one [chase] flight. There were a couple of guys who flew chase on all the flights, [Charles R.] Charlie Justiz and there may have been somebody later on, who were our instructor pilots, but the astronauts tended to rotate through that [job]. The only astronauts who would fly twice on a chase were people who would fly one of the backup slots for one flight and then be asked to be the leader for the next one, and I wasn't, so I just had that one flight.

Then from there, I was assigned to [Paul] P. J. Weitz's crew as part of his support crew and got a chance to see what goes on there when you're real close to a crew getting ready for training and in their training. Whatever they needed in the way of support, that's what we did. So that was a lot of fun, too.

JOHNSON: After STS-4, you did some CapCom [Capsule Communicator] experience for several flights?

O'CONNOR: Right. I was a CapCom for flights five through nine. A couple of things that I remember there of great interest were how that experience gave me such an awareness of what goes on with mission operations; the planning, the real-time operations themselves, the console work, the pyramid of support people that sit at places all over the country, behind them, and the tremendous training, certification, qualification, whatever you call it, program that they had that allowed people to be qualified to sit on those front consoles, and then to migrate up to and become qualified and trained to be a flight director.

I worked with some really great flight directors. One of them is still down there today, Jay [H.] Greene. I think I worked for [Brock] Randy Stone, was one of the flight directors, and if not, he was one of the console operators at the time. [Alan] Lee Briscoe was there. It was in watching this process and being a part of it and being part of the flight control team that I developed a real respect for the flight directors, watching them grow and move from place to place, watching them in action, looking at their decision process, seeing how knowledgeable they were of all the systems. That was very impressive to me. I hadn't seen anything like that in my military career.

JOHNSON: There were several firsts on those first flights that you were working as CapCom. Are there any anecdotes about any of those times?

O'CONNOR: Yes. The great deal of work we did on entry weather for flight seven. STS-7, I was the entry CapCom for that one, and it was supposed to be the first flight into the Kennedy Space Center. We practiced every day of that mission for the landing, using the real weather, and an actual pilot down there flying around, the real meteorologists at the Cape [Canaveral, Florida], simulating on console while the mission was going on, getting ready for a landing. That was a real interesting exercise. We didn't land at the Cape on STS-7, because the weather was bad, so another one got to be the first Cape landing later on.

The other thing I remember was the first Spacelab mission, where we had what came to be called the POCC, the Payload Operations Control Center, which was in another room somewhere. They had their own communications with the science crew onboard. We had a lot of coordination. I was the lead CapCom for STS-9, and so it was part of my responsibility to make sure that the CapComs and the equivalent, the folks that were in the POCC talking to the science crew, were all coordinated. We practiced what happens if there's an emergency or we have to use that communications loop to solve an Orbiter problem, and the protocols that are used for that; handing off back and forth between them; writing the rules for how we're going to do that. That was a lot of fun. I enjoyed it. A lot of planning and coordination.

I also remember some of the fun things that happened during those missions, where the crew might say something funny and we'd all get a kick out of it, or we'd send up a message to them with some humor in it. Bob [Robert F.] Overmyer—he was on STS-5....Well, I was an Orbit CapCom for STS-5, and I remember I was talking to Bob Overmyer while the Orbiter was flying over the Pacific Ocean, and he was looking out the window and he commented over the air-to-ground loop, he says, "We're flying over Hawaii and it looks just like the maps."

And my response to him was, “Bob, that’s very comforting.” [Laughter] I didn’t know what to say. “It looks just like the maps.” What do I say to that? “Very comforting.” He laughed and we laughed. We thought that was funny. It’s a minor thing, but in the day-to-day activities of trying to do all the science and the activities and so on, a little humor every now and then, from the crew or from us to them, was always appreciated. I think it’s a tradition even to this day. It’s part of the culture down there. So I look fondly on my CapCom days.

Being a CapCom is one of the really great jobs. It was one of the jobs that, when I first got assigned to the Astronaut Office, people were saying, “Oh, that’s the job you want. You want to be a CapCom. That’s where it’s at.” And I know why they said that. It’s so close to the action and the planning of the actual mission, working with the crew, working with the ground people, it really engages you right in the middle of the space program and you feel a real part of it.

JOHNSON: Did you have training for that?

O’CONNOR: All the training was on the job and it was in simulations. We didn’t have any ground school per se, but we did an awful lot of simulation before every flight, so we were very ready to go. We spent a lot of time in meetings discussing flight rules, developing flight rules. Sometimes the CapComs would go and run simulations to verify that those flight rules would actually work with the appropriate crew procedures and so on. So there was a lot of development-type activity going on. It’s not just operational. Especially back in those days, when we were kind of writing the book on how to do Space Shuttle operations, there was never a dull moment.

JOHNSON: There were also some other firsts during that time that I mentioned. Were you working when they did the first spacewalk?

O'CONNOR: Yes. I don't think I was on console for the spacewalk. I was a CapCom for that mission. I know they had a little bit of a problem with one of the suits and so on. I must have been on the planning team or something for that one.

JOHNSON: You mentioned some of the humor. Who decides the wakeup calls for the astronauts? Is that something that's a CapCom's duty?

O'CONNOR: Yes, the CapComs do that. The support crew concept went away after a while and the CapComs kind of took over that role, but in the early days, the support crews had what we thought of as morale jobs. One of the aspects of that was creating a notebook of pictures and funny sayings and mementos from the families and things like that, that the crew would find when they got up on orbit and they opened up their flight data file. There was a book in there of cartoons, jokes about the crew, pictures of them in their training, things that made them look silly and stuff like that, and that was kind of fun. I got involved with that on STS-5, with Vance's crew.

Then on STS-9 I was involved with it with John Young's crew. I remember we created a picture of him; we cut his head out of one picture and pasted it over a picture of Lou Gehrig [baseball player for the New York Yankees]. So you had John Young there in Lou Gehrig's uniform. We thought of him as the Lou Gehrig of the astronaut corps. I don't remember why.

But that kind of stuff we would do, and it was good for the crew. On the first day, they normally don't feel too well, and to pull that thing out and have a chuckle or two, that's good.

JOHNSON: On STS-9 they had the first payload specialists.

O'CONNOR: Yes.

JOHNSON: How were they received by the astronaut corps, and that relationship, not just those two specifically, but the whole payload specialists group.

O'CONNOR: We had two [European] payload specialists that were in my class—Wubbo [J.] Ockels from The Netherlands, and Claude Nicollier. So our class was the first one to have payload specialists go through the mission specialist training. Now, that was a little bit unique. The payload specialists that flew on STS-9 did not go through that training. They came from Europe and they trained in their payload specialist jobs for that mission. I don't know if that was just an experiment they were trying with these two guys or what, but there was a little bit of confusion in those days about who are these people and what's their real role? Are they astronauts or not? Are we going to see them again? Will they fly repetitively? And of course, we had one that did; [Charles D.] Charlie Walker flew three times.

So it was kind of a mixed bag and there was a controversy in some quarters. Never a big deal. The crews themselves latch onto their payload specialists and they're part of the crew; there's no big deal there. But in other areas there was always a question about, what are they? Exactly how do they fit in? Little things, like, do we invite them to the astronaut corps reunion?

It was obvious for Wubbo and Claude that, yes, because they went through the training with us and they were part of our class, so we had no doubt about that. But then are these other guys astronauts or not? A little what I think of, more or less, as petty questions that people would ask.

Some of them were asked for legitimate reasons for certain people, like, do we have to [provide funding] support this person in this event, or do they get [funding] support from their country for it? How do we factor that in? And so on.

But, yes, I remember in those early [Shuttle] days, the question about payload specialists did come up. It looked like there were a couple of varieties of them, and then we were told that eventually there will be another variety of them, which will be nontechnical people, book writers and reporters and teachers. Of course, the teacher part of that had a name. It was the Teacher in Space Program, but it was much broader than that. It was what became known as the Space Flight Participant Program.

And the same questions came up there. Who are these people? What kind of training do we need to give them? How long are they going to be here? How much do they need to know about the systems? And so on.

JOHNSON: In 1984, President [Ronald W.] Reagan announced the Space Station. How was that received by the astronauts? Was there excitement with the opportunity to do something, another Apollo-like announcement that within a decade we're going to do something?

O'CONNOR: Yes. The Skylab memories were fairly recent. Everybody thought it was a good thing to do. The Space Station had been on the drawing boards. There were people that had been working on that before his announcement, but it was kind of like the same feeling we get

when the President comes out and gives our “new vision” speech just last month. Wow, you know. It’s nice to have the administration talking for the nation [about] what we’re going to do here on the Space Station.

There was another piece to that announcement, and that was the thing that formally declared that the Space Shuttle was operational. That was part of the same deal. I remember having a different opinion about that part of it, going back to my early concerns about not enough test flights and so on. So for me, it was mixed emotions; excitement about a new program and concern that we’re going operational a little early [on Shuttle].

JOHNSON: When and how did you learn that you were assigned to your first flight?

O’CONNOR: You know, I don’t really remember exactly when I found out about it. The process, though, I remember, was that you’d get a call to go over to Flight Crew Operations Directorate [FCOD], which was at the time George Abbey, and he would tell you that you’d been assigned. Usually it was done in conjunction with the Chief of the Astronaut Office. To tell you the truth, I don’t remember whether they were together or Astronaut Office first, followed by a trip across the pond over there to talk to the FCOD.

But I remember being surprised, because I was the first pilot in my class to be assigned to a mission. I wasn’t the first one to fly on a mission, but the first one to be assigned to one. It was kind of a mixed bag in our class. We thought that that was a sign of how well you were thought of, is if you get picked early among your peers. Roy [D.] Bridges [Jr.] was the first fellow to be assigned, if I remember right, assigned to a crew, and [Ronald J.] Ron Grabe, I believe, was the first one to actually fly on a mission, in our class, because they shuffled the

missions around a little bit. So we had three of us who were thinking that somehow we were the first. But it really didn't matter very much, because the way they jumbled things around in those days, the way you wound up actually flying didn't seem to have a whole lot to do with when you were selected.

But I felt good about it. I had a good crew. I was assigned to work with Brewster [H.] Shaw [Jr.], who was going to be my commander, and I had great respect for Brewster. From what I had seen, he was one of the topnotch guys in his class. He was two years ahead of me and had been the pilot on the STS-9 mission, and as the senior CapCom on that mission, I got to know Brewster pretty well. He and John Young were a really good team together, and so I figured if he learned his trade from John Young and I get to learn mine from him, I'm in pretty good hands here.

I still consider Brewster to be one of the best pilots I've ever known, and also, as time went on, I consider him to be one of the best program managers I've ever known. We worked together on the Shuttle Program later. He's one of my heroes. Same age as I am, basically, maybe a year older, but I always look up to him. Of course, he's in industry now, so I have to put the "due diligent" words all around it, government-industry interfaces and all that stuff, but a class act and a very highly qualified guy. I learned so much from him when I was his pilot.

JOHNSON: Let's talk about training for that mission, if you can describe some of the preparations.

O'CONNOR: Yes, I remember lots and lots of simulation. We slipped for a year, so we basically trained full bore for two years for that flight. It was a very full, packed mission. Being in the

pre-*Challenger* era, we were doing a lot of commercial things on it. We had two very jam-packed EVAs [Extravehicular Activities], where Jerry [L.] Ross and [Sherwood C.] Woody Spring went out to build what we called tinkertoy [structures], but it was early developmental structural [prototypes] that might have application later when we were building a space station. It was called EASE [Experimental Assembly of Structures in Extravehicular Activity] ACCESS [Assembly Concept for Construction of Erectable Space Structures]. It was a [NASA] Marshall [Space Flight Center, Huntsville, Alabama] experiment, and I was the IVA [intravehicular activity] crewmember, which meant that I got to be the choreographer and sort of the stage manager. While they were outside, I was walking them through the procedures and keeping track of the EVA. So I got a chance as a pilot to get real close to [EVA].

I used to go diving with [the EVA crewmembers] when they would be in the big tank. There was a big tank at Marshall that we used, as well as the one we had at JSC, and I remember because I enjoyed scuba diving, I would jump in there and go down and watch them do their thing.

We had a full day of flight test work in between the two EVAs, which we called the OEX DAP [Orbiter Experiments Digital Autopilot]. It was Digital Autopilot, experimental software changes they made that would make the jets fire in different ways on orbit, so you'd have different flying qualities of the Orbiter. It was meant to look at ways of optimizing how the Orbiter flies when it's real close to another object, which we were concerned about for later on when we would be rendezvousing on a satellite or docking with a Space Station. We wanted to have our act together then, so we were demonstrating these techniques.

It was an interesting thing we did. On the first EVA, the last task was that Woody Spring would come into the airlock and take out a radar reflector, a ball about the size of a basketball,

and just release it into space. Then we would fly formation on [it] and use it to fly in proximity with—we were supposed to use the rendezvous radar, Ku-band radar system, but we didn't have one. It broke before we launched, so we didn't take it with us. So everything we did on that test was visual. But because it was proximity operations, it was supposed to be visual anyway, and I'll never forget flying up to and flying circles around that little aluminum ball up there [200 miles high].

We've said many times later that we were one of the few missions that ever deployed four satellites on one flight, because the other thing we did on that flight was three commercial satellites, one per day for the first three days of the mission; one for RCA [Americom], one for Australia, one for Mexico. So the fourth satellite was that little ball, that little \$1.95 radar-reflector ball that we put out, with a unique deploy system called Woody Spring. We had a "Spring" launch system with that one. That ball only lasted in orbit for about—it had a lot of drag to it and I heard that it only stayed up there about eighty days and then it reentered. Of course, we didn't worry about that. We only needed it for one day.

But those were pretty interesting things, the EVA and the rendezvous and flight test things we got to do. We also had an IMAX camera in the back, which Brewster learned how to use. It was a remote camera, taking pictures from the payload bay of the guys doing their spacewalk routine.

So it was a pretty full mission. It was seven days and never a dull moment. Enjoyed every bit of it. I didn't feel good at all on the first day. I'm one of those guys that got sick on the first day of space flights. I didn't want to take any medications at all. I wanted to see exactly what would happen to me when I went up there, because that was the time when we really didn't have any way to predict how people would react. So I wanted to know, okay, if I'm going to be

doing this for a living, I want to know exactly what my body does on the first day. Sure enough, after about eleven hours of that first day, I had gotten myself dizzy, moved my head too much, and I got space sick, is what we ended up calling it. Space sickness, or SAS, I guess is the science word for it, Space Adaptation Syndrome. On the second day I felt fine. I got over it. I was in sort of the typical not feeling so good the first day, feeling fine the second day model that so many people ended up getting into.

On my second mission, I wanted to do something different. Again, I didn't take anything ahead of time, but they had [this wonder drug called] Phenergan, which we didn't have on my first flight. By the second flight, they had already demonstrated this and people were saying it was really good. It's a shot; that's the bad news. But the good news is, within fifteen minutes, your symptoms go away. So as soon as I started feeling symptoms on that second flight, like I might get sick again—and the second flight, I actually got them much earlier, because it was so hot. On my second flight, we had those special suits that we started wearing after *Challenger*, and they didn't have cooling in [the early models], so that made it even worse. But that shot really took care of me.

JOHNSON: On your first flight, since you were in the SMS, and all the sounds and the feeling and everything, how did that compare with the actual launch?

O'CONNOR: Oh, it was good. I thought the simulator by that time was very good. There was one thing that we had not simulated, and surprised me and Brewster both. STS-61B was the second night launch. STS-8 had been the first one, and when the guys came back from STS-8, they talked about what it was like and what it looked like to fly at night and so on. By the time

we were assigned to our mission, which I guess would have been a year or two later, we went to Dick [Richard H.] Truly, [Daniel C. Brandenstein], and Guy [Guion S.] Bluford [Jr.] and the folks that were on that first night flight, and we asked them, “What was it like? What were the sights?” and so on, and was there anything unusual compared to a day flight. Of course, I hadn’t been on any flight yet, so it wouldn’t have mattered to me what any differences might be, but Brewster had. He’d been on that STS-9 day flight. So we got a full briefing, a very good briefing from Dick Truly on it.

But even with that, we were surprised by something which was highly unusual and quite a bit scary on our launch. When we got up on orbit, we, unlike STS-8, did what we called a main propulsion system dump, and we did not do orbital maneuvering system burn right away. So when we dumped the main propulsion system, which is all these ice crystals coming out of the back of the main engines, those things made this big cloud all around us and behind us, but a big cloud. We couldn’t see that, but that’s what was back there, a couple of thousand pounds of propellant from the lines that are going to the main propulsion system.

Now, everybody does these dumps. In the daytime, you wouldn’t notice it, and on STS-8, when they did the dump, they also were doing an orbital maneuvering system burn, which was moving them out of that cloud. With us, we dumped and we just stayed there, and the primary reaction control jets, back in the back and the front, were firing to hold attitude. And every time one of those jets would fire, we’d get this big flash of light come up and show up in the side windows, and there’s a lot of jet firings that go on back there when this is happening, and all these flashes of light looked just like what you would think would be going on if there were a big fire going on behind you, and we both thought we were on fire, and that the whole rear end of the vehicle was on fire.

We were looking at the instruments. We talked to the ground, asked them if everything was okay. We were talking to each other and, of course, scaring our crew, on the intercom, about this, “Boy, that looks like a fire, doesn’t it? What do you think that is?” And of course, you can’t get close enough to the window. These windows have three panes and they’re so thick that you can’t get your eye close enough to be able to look back, and we’re strapped into our seats anyway at this point. So it was a little bit nerve-wracking there for a couple minutes until we finally figured out what it must be, because it happened right after the dump, during the jet firings. I’m not even sure; maybe the ground might have said something about it.

But we were not prepared for that, and that was my second scariest moment of the launch, the first one having been the actual last few seconds of the countdown. That was scary to me. Here I am, sitting in there on my first launch. Now, I’ve been in the simulator and we’ve been through a dry countdown in that vehicle, on the launch pad, going through the countdown and so on. But it’s still my first one and I’m depending on Brewster for moral support. I want him to look confident over there, okay? Because he’s been through this before and he’ll know if something’s wrong, and I won’t. I mean, that was kind of the frame of mind I was in. Other than that, I was focusing on my procedures, my checklists, my cue cards, thinking about what ifs and so on, and trying to keep focused on all of that.

But a couple of times I looked over there to Brewster to see how he was doing, and I got the full confident business from him. He looked over at me and gives me a thumbs-up and this look like, “Hey, no sweat. This is working out fine.” The countdown’s going well, and when we got down to about, I’d say, the fifteen-second point, I took one [last] look over at him and I noticed he had his gloves off and he was wiping his hands on his pants.

Now, what he was doing was getting the sweat off of them so that when he put his hand around that stick, he would have a good control and so on. But I didn't want to see somebody whose hands are sweating at this point. That was not good for me, and I took a deep dive in the confidence zone there of, "Oh, my god. My commander, who's been through this before, his hands are sweating. Why aren't mine sweating? Maybe mine ought to be sweating. I think I need to be nervous now if he's nervous." And that was not a good thing to happen at fifteen seconds. It would have been better if he had done that at like three minutes and I could have got through all that, but fifteen seconds, by the time I'm thinking about this, the engines light off and I had to snap out of it and say, "Well, we're going anyway. I don't care if I'm nervous our not; here we go." So that was my first bout of scaredness.

Of course, I had been through things like this, sort of, in my pilot days and flying days and test piloting and so on, where you can really get out of that feeling fairly quickly by getting right back to what you're trained for, getting to your procedures, reading your instruments and so on, and those things kind of go away when you focus back onto what you're used to. So it was a fleeting thing, but I'll never forget it.

JOHNSON: You mentioned that Brewster Shaw, of course, was experienced, and Charlie Walker had had a flight before, but the rest of you were rookies. How did the crew get along, and what were those first experiences like, the weightlessness and that sort of thing?

O'CONNOR: Yes, we got along great. I remember, when I wasn't feeling so good, being mad at Jerry Ross, who was our third-seater, because he was breaking out some carrots and some chocolate balls or something. I don't know what it was. Some strange combination. He was

hungry, and of course, as we learned later from the flight docs, what goes on with some people, like me, when they get up there, Space Adaptation Syndrome, a big piece of that is that your stomach shuts down. It goes into some kind of shock or something because of the zero-G [gravity] environment, where the fluids shift. I don't know all the details of it, but the stomach shuts down and part of shutting down gives you that nauseous feeling, but certainly, when it shuts down, you're not hungry. So here's Jerry back here. I'm feeling terrible and he's [popping] chocolate balls, and that didn't help.

Of course, Mary [L.] Cleave was our arm operator and she had a very important job of hoisting these people back and forth on the end of the arm, and I enjoyed my training with Mary, because as a pilot, I was supposed to be watching out one window and she the other, and we did a lot of training together in the Building 9 mockups. We had this big cardboard Jerry Ross that would sit on the end of the arm, and I'd be in there with her, talking to this nonentity out there, pretending like we were doing EVAs.

So I don't know, we got very close as a crew. Even to this day, Mary and Woody, who are both local here in the Washington area, and I get together every now and then. It's one of those things that sticks with you. And of course, when I go down to Houston, Jerry's still in the crew office, and I give him a rough time about how many flights he's flown and all that stuff. What is it now? Seventeen flights or something? I don't know what it is. And looking for his next one. But we became pretty good friends through that experience. Working closely with a crew like that for two years is a great experience, especially when you like each other. Charlie Walker's local here, too. Most of our crew is right here in this area and we see each other a lot.

There was one story about Woody. Woody is a [United States Military Academy at] West Point [New York] graduate and I was an Annapolis graduate, and when we flew our

mission, it was during the Army-Navy game, so, the late November, early December time frame. So we had a tradition back then, and I don't know, maybe they might not do it anymore, but I think they probably do, where the crew gets to select some—at the time it was audiotapes, small audiotapes of your favorite music. Each person was allowed to carry six audios, and NASA would help you record records or whatever you wanted onto these space-qualified audiotapes. Then we would carry them and a [cassette] tape player onboard with our equipment. Usually what would happen is people would break those out when it was time for bed and listen to their favorite music at bedtime.

Well, it was on about day three. Maybe it was the day of the game; I don't remember, but it was on day three that we turned off the lights and, I don't know, it was about ten minutes after the lights were off, and I was borderline asleep, and I hear this loud cry from the other side of the mid deck, where Woody was hanging off the wall in his bed. He [yells out], "O'Connor, you S.O.B.!"

It woke me up with a start, and I had no idea what he was talking about. "What is it? What is it?"

He says, "You know what it is." And all of a sudden, it clicked with me. About a month before flight, when we were having the people transcribe music onto our tapes, I went over to the guy that was working on Woody's tapes and I gave him a record with the [Naval Academy] fight song on it and I said, "I want you to go right in the middle of his tape somewhere, just right in the middle, and superimpose the Navy fight song somewhere on his tape. Well, it turned out it was his Peter, Paul, and Mary album, and it was right in the middle of "I've Got A Hammer." He's listening to "I've Got A Hammer" on his way to sleep and suddenly up comes this really loud Navy fight song thing right in the middle of it. We still joke about that to this day. In fact,

sometimes we go to one or the other house and watch the Army-Navy game together, and we always remember that night on the [Space Shuttle] *Atlantis* in the mid deck, during the Army-Navy game.

JOHNSON: The day after you launched was Thanksgiving.

O'CONNOR: Right. We had Thanksgiving dinner, which was irradiated turkey, with no cranberry sauce, and I couldn't even eat it. I think they're doing a better job now of the food than they were back then, but the gravy didn't taste very good to me, but the mashed potatoes were great. The beans and potatoes, I thought were wonderful, but I didn't go for that turkey. But I really appreciated them doing [it for us], though. That was a nice touch. That was a real morale-builder up there. "Hey, they really thought of us. Thanksgiving. How about that?"

JOHNSON: What other experiments? You mentioned the one where you did the OEX and the autopilot. Were there any other experiments or any other duties that you had during that flight that you'd like to talk about?

O'CONNOR: I don't remember anything outstanding. There were a lot of things we did for locker experiments. There were some life science things we were doing. I think we were taking some air samples. Some of that stuff I can't remember anymore, but there were quite a few things.

The CFES experiment, the Continuous Flow Electrophoresis System, was on its second flight and, of course, that was Charlie Walker's bag, and we didn't really get involved with that

other than to support him. He had quite a bit of equipment there, and some of us got some training to back him up on some of that, mostly Mary, a little bit with me. I really don't remember too much of the other stuff that we did. Must have worked pretty well, because I don't remember any failures or anything.

JOHNSON: Was there much free time during this mission?

O'CONNOR: No, not too much free time. Whatever free time we had, we spent looking out the window, of course. On a seven-day flight, looking out the window is so great. My guess is that on these real long missions they're flying on [International] Space Station and so on, eventually that gets a little old and you look for something else, like videos from home or some other things that would be better for people that are up there a long time.

[But] I'll tell you what, on seven or nine days, just looking out the window was all I wanted to do, if I wasn't sleeping or working, looking at the oceans from space. We got some really good training in how to look at the oceans from space and take pictures of them.

Oh, of course, that's one of the major things we did was photography, and I'm proud of the pictures I took of the ocean from space. I think I listened pretty well in class, because some of my pictures were—at least they tell me they were of great benefit to the oceanographers. Some of the things you can see when you look into the sun glint in the oceans are just incredible. To this day, when I'm flying in an airplane over the ocean, I look in the sun glint and try to pick up things like ship wakes and circular eddies and things like that. You can see really neat things when you look close at them.

[Tape change]

JOHNSON: I want to ask you about landing at the end of the mission and what that experience was like.

O'CONNOR: Well, the landing isn't nearly as exciting as the launch, of course. It seems like it's dragged out quite a bit when you're doing the entry. As the co-pilot on my first flight, the thing I remember about landing was that we had to go through some clouds. When we rolled out on final, we could not see the runway until we got through about 6,000 feet because of a very small cloud that just happened to be right in the way. It was just one of those things. I always remember that as to why we need to pay close attention to our flight rules on weather, because the flight rules on weather are relatively conservative, but even when we met the flight rule for weather for landing that day, the tiny bit of clouds that happened to be around just happened to migrate right over the landing aim point. So Brewster had to fly instruments until we popped out of that cloud, just as if it had been totally overcast.

So it gave me great respect for the weather and the importance of having good weather. When you don't have engines on there and you're stuck with a glider that's not a very good glider, it's best to have a pretty good view of what's going on outside.

Brewster made a great landing, as always, and I did my part of putting the gear down and calling off altitudes and so on. The actual landing itself happened so fast compared to the entry, which was very slow.

The other part I remember about entry is the feeling of gravity coming back. We had G-suits, if I remember right. Yes, we had G-suits that we wore, and we were supposed to pump

those up so that the fluid wouldn't come out of your head and lose consciousness or awareness. I remember feeling gravity coming back, or the affects of gravity. Gravity is always there, of course, but feeling the effects of it when you slow down. It represented itself as greater and greater feeling of weight, getting a little lower in my seat. I remember taking my pencil, and as we began to feel it [early in the entry], let loose of my pencil and just watch it float down just the tiniest bit. Then just a few minutes later, let loose and it comes down a little faster. Just kind of being aware of that environment was really a lot of fun and interesting.

On my second flight, of course, I was in the commander's seat and that one was quite different. I felt a lot more responsibility on my shoulders. Everything was on me now, not just lowering the landing gear; it's actually making the landing. So it was a totally different feeling that I had about it. I remember thinking about it later, that it shouldn't have been that much different. If I had really been doing my job as the pilot on the first flight, I should have had that same feeling of accountability and responsibility, even though I wasn't supposed to make the landing, because if the commander got hit by a bird or something, and I would have had to take over, I don't think I was in the right frame of mind on that first flight. That's something that I remember integrating in my head after my second flight; that I should have done a better job as a pilot. Of course, I didn't have to take over and everything worked fine, but it was kind of lesson for me in retrospect.

The landing itself, I felt proud of my landing, because I landed within 1 knot of my speed that I was supposed to land. I landed right close to the centerline. I had like two feet per second sink rate. These were all things that we tried to do to make good landings. But then afterwards, they told me, "Boy, you came across the threshold really low. I mean, your wheels were only four or five feet above the end of the runway when you crossed over it." Now, of course, that

got my attention, because the threshold of the landing runway for me was out at Edwards Air Force Base, the concrete runway out there, and there's a lip on that thing. You wouldn't want to land short and then hit that lip with your wheels.

So that got my attention and told me that I don't think I was as cognizant of what was going on as I thought I was. If I really thought I was that low crossing the threshold, or was going to be that low, I would have done something about it and I didn't, didn't realize it. In fact, I remember talking to the Flight Crew Office about it and we all agreed that, yes, your cognizance level of where you are from visual cues and so on, may be impacted a little bit after a nine-day mission in space, and we have to allow for that and think about it.

Of course, later on, they put a trainer up there, a little computer that you can simulate and practice landings while you're up there on orbit. That was one of the reasons why we did that is for these longer missions, because I think nine days was as long as we had flown. When I flew that mission, I think it was one of the longer missions to date [at the time]. It was a Spacelab mission and we wanted as much science as we could get up there. So we were stepping up to the longer missions a little at a time, and that was one of the lessons that I passed on.

JOHNSON: Is there anything else about that first mission that we haven't talked about, that you'd like to mention?

O'CONNOR: No, I think that's it.

JOHNSON: Once you landed, within just a few weeks, the *Challenger* accident happened, and we probably don't have time to get into some of that today, but did you have any post-flight duties after your landing, as far as visits?

O'CONNOR: Yes, after landing, you do your debriefings, you write your flight report, and, of course, as a pilot, I had a big part to play in writing the flight report. It was Brewster's report, but he gave me quite a bit of work to do there to help put it together. Then we did some visits and made our video and got our photographs together, and all that post-flight stuff that is normal we went through.

Of course, the abnormal part of my post-flight was that I went on what they called a hometown, where crew members go to their hometown and they talk to the schools and the kids and the Rotary Clubs and the people in your hometown about your flight. It's a perk or an obligation or [a] mixture of the two, that they will let you go to your hometown. That's a nice thing, but on the other hand, it's part of our obligation to spread the word about what we're doing.

So I had put my pitch together and I was on my first leg to California, where my hometown was, landed in El Paso [Texas], and I had just landed, and the guy that came out to meet me had tears in his eyes. I shut down my engine and he said, "We've lost the *Challenger*." They were showing the replays on the TV. The launch had been during my flight to El Paso. Of course, I turned right around and went home, never did do my hometown. My whole life changed right there in many ways, so that was the one big difference between my post-flight and most other people's, was that interruption.

JOHNSON: I think it probably would be a good place to stop today. That will give you time to get to your next meeting.

O'CONNOR: Okay.

[End of interview]