

# NASA JOHNSON SPACE CENTER ORAL HISTORY PROJECT

## ORAL HISTORY TRANSCRIPT

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INTERVIEWED BY SANDRA JOHNSON  
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JOHNSON: Today is February 28<sup>th</sup>, 2007. This interview with Larry Davis is being conducted for the Johnson Space Center Oral History Project in Houston, Texas. The interviewer is Sandra Johnson, assisted by Jennifer Ross-Nazzal. This is Mr. Davis' second interview.

I want to thank you again for joining us again today. I want to start by talking about where we left off after Apollo and the position you moved into getting ready for Shuttle.

DAVIS: As I mentioned the last time there was a real down time, so I may go back and reiterate a little bit on that. Especially, I would say, in the mid-seventies to the late seventies, there appeared not to be quite as much work as there had been in the Apollo era, so it was frustrating to go from a tremendous amount of work six or seven days a week to a more standard forty-hour week. Some of the jobs that I wound up doing in that time period felt a lot less meaningful, and it didn't feel to me like I was contributing as much.

So as the seventies wore on and the frustration built, I started looking for a job that was more in the mainstream. An opportunity came up to work on the Shuttle orbit design, and I transferred from an integration group at the division level back into what I would call an active orbit design branch. I got to start working on STS-1, and that was kind of good news and bad news. It was great to be back doing real orbit design work, but it was frustrating as the first Shuttle flight slipped and slipped and slipped. We had a joke that each time we did a new cycle

in the trajectory, we changed the number, and by the time we got there we were about design cycle seven or eight, because the flight had slipped so many.

Then as we got very, very close, there was a concern about the tiles falling off. We got into a situation where we wanted to use some ground resources that the Air Force had to verify that the tiles were indeed on. At that time it was somewhat secret, but it's come out since then, so it's no secret anymore. We were able to orient the vehicle such that some tracking stations, visual tracking stations on the island of Hawaii, could look at the tile and verify that they were still in good shape.

To do that, we had to modify the orbit that the Shuttle went into. Normally we would pick a nice, round number like 160 by 160 or 150 by 150. As I recall, we had to go into a rather strange orbit of something like  $142 \frac{1}{2}$  by  $142 \frac{1}{2}$ , and it wasn't clear to all of us at that time why we were doing that, but we knew there were people off in a secret room doing some attitude computations. So later on we found out we were designing an orbit such that we flew over Hawaii at the right time and the right lighting conditions. So that was interesting, and it was back then fun to work again, because you could see that what you did contributed and was useful.

After the success of STS-1 I started working on the fourth Shuttle flight, which was scheduled about, I guess, a year or so later. I worked on that flight, and it successfully flew. I would have to say at this time I was getting a little bit antsy about maybe moving up in management. I felt like I could influence at the group lead level if I got the opportunity, so I started looking for that. I started looking at flights downstream where nobody was working and volunteering to work them.

In that mode, I picked up STS—I believe it was 18. We had got a new Administrator, and he decided to designate the flights differently. Instead of numerical order, we were going to designate them as when they flew in a particular fiscal year. So it became STS 51-A, which was confusing to the public, to say the least.

That flight turned out to be really, really interesting. It started out to be deploying a couple of com [communications] satellites, but about six months previous to that we had deployed a couple of com satellites, and when they both were supposed to turn their engines on to go to a geosynchronous orbit, they both failed; had a partial burn, and they were left in a nonusable orbit. It turned out that Hughes Aircraft [Company] thought they could retrieve those satellites. If we would go rendezvous with them, they believed they could bring them down into orbit; that we could retrieve them. That meant we had to orchestrate what Hughes could do with their vehicles with what we could do with Shuttle, and it was not only a rendezvous with the two partially working satellites, but also deploy two.

So the orbital mechanics and the geometry of setting that up trajectory-wise was really fascinating and challenging, and I really got to work a lot with Hughes Aircraft and they determined when they would maneuver the spacecrafts down. They were in an orbit of 600 miles high, and we had to decide when the Shuttle was going to launch so that they could maneuver down. They didn't want to be in too low an orbit, because if they came low too quick, and the Shuttle didn't launch, they would decay into the atmosphere. Of course, they had to come down at the right time so that the Shuttle could get them to the right altitude.

The bottom line was Hughes was really, really good at doing that. We would tell them where to be, and they brought the satellites down, and it was a very satisfying mission to work on. We deployed two satellites and retrieved those two satellites, brought them back, and they

were refurbished, and at least one of them was launched on another occasion. So that was a real meaningful flight. That was kind of one of those that wasn't quite Apollo 8 or 11, but it was darn close because of the magnitude of the trajectory work and getting to work with a new customer that we'd never done before.

About in that same time frame—as I recall that was in the fall of 1985—my supervisor or Section Head had decided that he was going to retire and go work on the contract bid that became USA [United Space Alliance] eventually. So he left and I got the job of being the Orbit Design Section Head, or what they call the Group Lead now. That was in 1986.

The job was challenging in several ways. I had half a dozen people working civil service, and then I had a group of MACDAC [McDonnell Douglas Corporation] contractors. We were really pushing to get the flight rate up, and we were working hard to go towards eight or nine flights a year. The challenge to our guys was to get out the products in time to do things like train the crews and train the flight control team. Experience has said we needed to have some of our products out like twelve, fourteen weeks before a launch so that you gave adequate time to train the Flight Controllers and train the crews. I can recall a couple of times in the fall before [Space Shuttle] *Challenger* [STS 51-L accident] happened, we were down to four or five weeks.

I bring that up just to indicate I think there was a growing—I won't call it crisis, but a growing situation where we as a team probably could not meet all the challenges we had. In fact, we were looking at bringing in extra resources. But I remember very well that the *Challenger* was really tough. People were working long hours again. I was supposed to be a supervisor, but at the same time I was working on specific flights as an orbit designer.

JOHNSON: How is that organized? Going back to where you were talking about earlier, you worked on the fourth Shuttle, and then you mentioned 51-A because of the satellites and everything. In your areas that you were working in, did you get assigned, or were you assigning people to a specific flight and that's what they would work on for that four, five, six weeks, whatever, getting the crew ready and everything, and then they would go to another one down the line? Or was everyone working on each flight as it came along?

DAVIS: We designated people to be the Lead, I would say, on a particular flight, and you really started working it months before. Some of our end products had to be out on the street about twelve or fourteen weeks in order to start the training cycle for the crew and the Flight Controllers.

We really had a multicycle design. We would start back at twelve to fifteen months with a conceptual design, and that would be more or less taking the requirements as we knew it and put out a trajectory design. It obviously was seldom very correct, because the launch dates would change; the requirements would change; what satellites we would carry. Whenever you change when you launch, all that went up in the air, and you started over. Then after we did the conceptual, we'd do an engineering cycle that would put out products, five or six months, and then what we call a flight cycle, which was more oriented toward products you would use on a real flight versus products you would use for training, which was the previous cycle.

There was really three groups. There was the ascent orbit and descent groups working that. My primary responsibility was straddling those groups. The orbit design had to orchestrate the ascent orbit and the entry, because they had to work together; obviously, you'd hand off from one to the other.

One of the more interesting things was the launch window. The launch window took into consideration when you would deploy satellites. They had a limited time that they could be deployed, based on where they wanted to wind up. You had constraints about if you wanted to launch a Shuttle in daylight, if possible; you wanted to land in daylight. You wanted to have landing opportunities at the Cape [Canaveral, Florida] and Edwards [Air Force Base, California] in daylight. So there was a multitude of requirements that came in from the entry folks and the ascent folks and the deployables. So the launch window which the orbit people did was a key; it was overreaching for all of those.

Back to your specific question, there were people assigned to each of the flights. They had people working for them that were responsible to coordinate with several people in the division in different branches. I mentioned 51-A; no one was working that, and I thought it was going to be interesting, so I volunteered, and they said, "Fine." They seldom turned you down if you volunteered for more work.

JOHNSON: How many normally were in a team working on these? Did it vary depending on the flight?

DAVIS: Good question. Probably in the orbit area there were four, five, six, according to the complexity. If you had a rendezvous, you added a couple more people. If you didn't have a rendezvous, you probably got by with three or four. Usually you had one civil servant, and it wasn't unusual to have three or four or five contractors; that was kind of the ratio. Then the team in the ascent and descent area would probably add another half a dozen each, six, so you're looking at about twenty on a trajectory design team.

JOHNSON: And the payloads themselves, depending on the payloads and how they shifted around during those flights, in those early flights, especially, that always affected what you were doing?

DAVIS: Correct.

JOHNSON: So it was all real time. You were constantly having to update your calculations?

DAVIS: Yes. In fact, it was extremely unusual if we started out at fifteen months, and you had the same launch date and the same payload. Even sometimes the crews changed, because they were more adept at certain things. So there was a lot coming and going.

We chased the center of gravity a lot in the orbit design, because if you put a particular payload, a heavy payload, in or took it out, the center of gravity moved significantly, and the Orbiter had a very tight envelope that you wanted to fly for center of gravity. You were always trading off offloading propellant versus—of course, you wanted to go to orbit with as much propellant as you could, but if you had a center-of-gravity problem, sometimes you would offload propellant to fix that problem, because a lot of it was in the rear. It had propellant in the front, which was really neat, but you could only offload so much of it, and you had to maintain so much of it for entry. So that was another interesting thing we had to chase as you changed payloads.

I guess the next thing, I was talking about how stressed we were getting, and what we called our templates were shrinking, because we were trying to get seven, eight, or more flights a year. Just a personal input there, we always usually stopped what we were doing and went and

watched the launches. Everybody just kind of stopped. But I can remember the morning of the *Challenger*. We had to have a meeting about a flight that was going to go on later that year. So I was having a meeting in my office, and people went and gravitated away from watching it at launch, because they were getting so busy, and this was all coming together so tightly. So it was kind of a personal thing. You thought, “Gee, this is the first time I haven’t watched a launch, and then this happens.” It was, of course, a sad feeling.

I think I would say there was a lot of reaching out for people you worked with on that in the immediate aftermath of it. I can remember some of us went to lunch, and you talked about it and you didn’t talk about it. It was a difficult time. But I can remember by the afternoon some of the ascent people were already reviewing data that indicated the first, I would say, fingerprints of what had happened. They were already seeing that the vehicle had had an attitude excursion, which turned out to be that the hole had burnt in the side of the SRB [Solid Rocket Booster] and the Orbiter was having to adjust its attitude, because there was a thrust coming out the side. That was kind of the first clue.

I bring that up to say it was very sad, but it was a good feeling that people were already beginning to track the problem and find a solution.

JOHNSON: What were your duties immediately following the accident? Were you involved in that tracking to figure out exactly what happened or any of the investigation?

DAVIS: No, not really. I will just tell you that for some reason—I’m not quite sure even to this day—several of us from the design area were put on the witness list to go up and testify. It turned out that we went up and said—never really testified, and had to listen to some of the



committee work that was at JSC. As I recall, they moved around to different Centers, and they convened at JSC and had several days' worth of people coming in and talking about what was going on. I think the stress of our workload might have been something that they wanted to hear about, but then I never had anything to testify.

I do remember reporters being on-site and grabbing people and wanting to know what we were doing. They had the list of people who were supposed to go to this committee and testify, and they would grab you and want to know what you saw or what you said and what you were talking about, which was controlled quite differently after [Space Shuttle] *Columbia* [STS-107 accident].

One of the things that I would mention, and this is in contrast between *Challenger* and *Columbia* and the Apollo fire, there was a lot more psychological help by the time we got to the *Columbia* accident. In the Control Center after *Challenger*, there was no psychological help that I was aware of.

Sally [P. Davis], my wife, happened to be on console as the [International Space] Station Flight Director when the *Columbia* happened, so there was a lot of psychological help before the team left that day, they were allowed to listen to some ideas about how they should deal with it the rest of the day; how they would feel in dealing and talking with their family. There were sessions set up immediately for one-on-ones and group sessions, so that, to me, was a tremendous step forward as far as helping the people through the trauma. It was probably a lesson we learned sometime after the *Challenger*.

JOHNSON: What was the atmosphere like on-site during those months after *Challenger*, and knowing that it was going to be a while before we flew again?

DAVIS: I would say it was a lot of disbelief, shock, to start with. A lot of feeling the responsibility, when people stepped back, that there was probably multiple opportunities to have caught it. Obviously, the people at the Cape had direct possibilities of averting it, but I think all of us at JSC thought we could have contributed or did contribute; we could have done better. I think that was one of the feelings that came out of it. Although maybe you didn't make a call or answer a question that directly led to it, just randomness that happened, we could have been involved. So I think there was a lot of accepting responsibility and wanting to do better.

I think after that, having gone again from a flight rate where we were trying to do six, seven, eight flights a year or so, "Okay. When will we fly again? How serious is this? Have we missed something else?"

I think I would give upper management a good grade in our particular area, Mission Ops [Operations], because they established a couple of what I would call quasi flights for us to work on as if they were real, one a non-DoD [Department of Defense] flight and one a DoD payload. The difference is you had to have so many secret facilities, and you had to have secret products, so the dealing with the DoD was significantly different. So we had what we called a "black flight"—black was assumed to be secret—and then we had a regular in-the-clear flight, which was going to do again what *Challenger* had been scheduled to do, which was to deploy a large TDRS [Tracking and Data Relay] satellite. So the teams designed those profiles, and we simulated them to death for a couple of years until we could fly again.

JOHNSON: Why don't you, just for a second if you don't mind, talk about working with the DoD and when you did have to do the trajectory and the payloads were, as you said it was a black flight, and it was somewhat secret, how did your teams do that?

DAVIS: The trajectory design, obviously, we used a lot of computer simulations. What we had to do, we had a special facility behind two locked doors that we had to go into to have meetings or run computer simulations. We had files in there. We could not take any information out of there. It had its own storage. If you wanted to do any work, you had to go sit at office areas within that facility. The communication had to be on secret—what they called STU [Secure Telephone Unit] phones, which were scrambled phones. You had a lot more face-to-face meetings with the customers than you might with a payload that was not secret.

There was a lot more paperwork. If you wanted to send a product to the DoD customer, it was not just put something in the mail and send it to them. It was a lengthy process. That was why you had a lot more face-to-face meetings. Either you would go to their facility or they would come to yours, and you would use secret carriers to bring the data in. They would take care of it and get it to the meeting, or they would bring theirs to the meeting, and you would meet, and then everybody would go home with no paperwork, which was very unusual.

It had to be expensive to set up the DoD facilities within JSC, and, I'm sure, at KSC [NASA Kennedy Space Center, Florida] and the other Centers that worked directly with payloads.

But what else could I say? I can go into considerable more details when I talk about STS-36, or I can do that now.

JOHNSON: That's fine.

DAVIS: What I've been talking about in orbit design was strictly a responsibility for the orbit part of the trajectory. The division decided that they needed a group of people who did more of an oversight integration speaking for the division for all aspects of the trajectory design: ascent, rendezvous, orbit, and entry. They designated these people as Flight Design Managers, and while I was in orbit design, I transitioned into I was wearing two hats. I was Flight Design Manager for some of the flights, and I was still managing people doing the orbit design.

I did that for a while, and that was a—well, I would have to say it was an okay, fun situation for me, because as I related earlier, I was still getting to do the technical, but I had moved into managing people, too. But over time it became clear that I probably was not giving my people enough time. They were wanting everything from face-to-face time to technical mentoring or technical answering of questions. They went as far as they put a little take-a-number thing over my door, because they wanted to take a number, and when their number came up, they wanted to talk to me.

As part of that, we established the Flight Design Manager Office, and that was kind of a dream job. I wanted to be head of that. So I applied for it and got to be head of that. But because we were understaffed, I still got to do an occasional flight. There was never enough people and never enough people with skills. You needed a good technical background in one of the phases, but you also needed to be able to deal with people inside and outside the division. It was more of a people job than a technical job, but obviously, you had to know enough technical to be able to go speak for the division. It had transitioned from a group job to now you're speaking for the division for your particular flight.

I worked several flights, though, but the last one was STS-36. It was a DoD payload, and in fact, while I was working that, I got selected as a Branch Chief, and the last six months or so was pulling me two different ways. I was trying to assume the new responsibilities of the branch job and finish my last Flight Design Manager job.

Without going into details, the secrecy level of the STS-36 payload was such that not only did you have the secret, but you had some of what they call compartmented levels of secrecy. I got brought into a couple of those, and I found out there was a whole building on-site that had a different level of secrecy. It was interesting. The top security guy at JSC was not allowed to be privileged to what was going on down there. It upset him greatly.

But it was kind of cool that you got to go to a place that not many went, and it was a totally different level of secrecy. The people you met, obviously, were at a different level of secrecy, and I got to know enough about that payload to say, “Wow, there’s a whole different level of understanding what might be going on in the world outside that we in the space business just didn’t know anything about.”

It was fun working with the crew. It was fun working with a small group of people who was privileged to what was going on in that flight. I can remember going to Sunnyvale, California, several times, and you would run into people from JSC out there that was out there for another reason, and you couldn’t talk about why you were there, and you couldn’t talk about why they were there. You might run into them and have breakfast at the motel, but it was kind of interesting; you just sat and talked about the weather, but you couldn’t talk about what you were doing, which was really very unusual, because most of the time you wanted to talk about work. “Oh, you’re here for this. You’re here for that.”

Well, this is probably the neatest part; I worked the real time, too. I was allowed to go into some of the rooms here at JSC when the flight was flying. It was obvious from the trajectory design there was a lot of critical things that had to happen in a very timely manner, so it was nice to listen on some of the com loops and hear those events get checked off.

About six months later they came back and told us the results of what had happened on that flight and gave us a debrief of the positive things that happened as a result of that. So that was really cool. It was really neat. It was one of those things where you got to be able to tell people what was going on, but, you know, there's a standing joke, "I'll tell you, and I've got to kill you." [Laughter]

But that was really an insight into an area that I had never been into before. I was exposed to some other DoD flights at a compartmented level, but they weren't near as interesting, and I was consumed by management, so I didn't get into the technical area as much. But that was a sidelight that was really neat that I enjoyed very much.

JOHNSON: A unique experience, I imagine. It's something that you never really thought as you were growing up you'd be privileged to.

DAVIS: Yes, and it kind of gave you a snapshot of, "Wow, I wonder what else is out there that the public is not privileged to understand and know about." So it was neat.

Let's see. What's next?

JOHNSON: You mentioned that during that flight you were moving into that position as the Chief of a Flight Analysis Branch. Was that that position?

DAVIS: Yes, and I was selected as the Branch Chief job, and that was essentially the ascent design branch. The name for it was whatever we picked, Flight Analysis Branch. That was a stretch for me technically, although I'd been aware, and if you remember, back on Gemini I had done launch aborts, and I certainly understood at one level what they were doing. It was a lot of detail, technical details that I had to understand and to be able to make good decisions on. I was only in that branch, Chief of that branch, for about a year, and we reorganized.

Part of the reason for our reorganization was the STSOC [Space Transportation System Operations] contract had been let, and we were in the era where we were trying to hand over more responsibility to the contractor team, so essentially our division reorganized into three areas, people who did the flight control only; they sat on consoles; they did simulations.

The second group was an analysis group, which was supposed to look to the future, whether it was future development of the Shuttle. You probably remember they were talking about Shuttle-Cs and how you might use unmanned Shuttles to put large payloads into orbit, so there was potential analysis for Shuttle-derived vehicles.

Then there was the day-to-day designing every Shuttle flight ascent, orbit, rendezvous, descent, and that was a job where not only the Flight Design Managers but other groups of people who had the technical ability and management ability to manage the contractors. So that's why I became Chief of the Space Shuttle Design Integration Office, which was, by any other name, a branch, but its chief responsibility was just leading the Flight Design Managers and the other oversight people for the contractor. I was happy with that move, because I felt like that was what I was good at, and I was very up to speed on what it would require to get that

done. So that was a happy transition, and I was real, real pleased with that opportunity. I would have to say.

JOHNSON: How did those relationships worked between the contractors and between the NASA people?

DAVIS: You know, that's still going on today. I won't get off on this. We're reorganizing the MOD [Mission Operations Directorate] today, and one of the aspects of it is that kind of relationship. So it's been around from '93 to 2007. I would have to say, in a nutshell, it's a function of the people, I think, because I have worked with contractor supervisors, and the ones who saw their prime responsibility as getting the job done or creating the trajectory designs and not worrying as much about which badge was doing what, it worked superbly.

I also would have to say I've come across two or three where they really felt like they were more—I felt like they were more intensely working for what was best for the company instead of getting the job done. How that showed itself was they tried to throw out black-and-white rules. “Well, a civil servant can't do this, a contractor can,” or vice versa. In the spirit of one team NASA, all that, it put sand in the machinery some.

As I said, those were probably exceptions, but I would have to say the personalities and the people's approach to the job was very important to get that done, because there weren't black-and-white rules where you could say, “He can't go to this meeting,” or, “He can't make that decision.” It had to be give and take, such that there was leeway.

There was no book you could open up to page seven and get the answer for a relationship with people. I think overall it works well.



I would say within MOD one of the divisions, the division that was responsible for training crewmen, the best I understand it, a contractor went to [NASA] Headquarters [Washington, D.C.] and said, “We can save you a bunch of money if you let us take that job over totally.” So it leaves us having nothing to do with it except maybe contract management. That happened in a very brief time period. There was a division full of civil servant people that was involved in doing that job, and within a year or six months, they all had to go find other jobs at JSC.

That was a painful situation. So things like that leave scars. Those fifty or so civil servants, several of them had scars that they had to deal with the rest of their career. A few of them were young enough or motivated enough, they went out and started new careers and they’re doing quite well. But some of the ones who had been doing that fifteen or twenty years, it was very difficult to say, “Okay, the contractor is going to do totally all that job, and you guys are very valuable, but why don’t you look around.”

I was on a committee that Randy [Brock R.] Stone put together to try to figure out how to soften that blow [for these folks], and it was a tough job. Obviously they had done nothing wrong. They had been doing a super job, but, “Oh, by the way, we don’t need you to do that anymore.” So I was involved semidirectly in trying to help some of those people find jobs.

JOHNSON: Did they have the option of moving to work for the contractor if they chose to leave civil service?

DAVIS: Most of them were so vested in the civil service that it didn’t make sense. Like I say, some of them I think were young and pliable enough that they essentially started their career

over, and that's tough even if you're five years into it or ten years into it, because the way JSC and especially Mission Ops works, you build your career and your reputation on moving from technical competency into first-level management and so on and so on. So if you're throwing away the years you've invested in developing that reputation, it was tough.

So those kind of major things not only affect the people directly, but other people see that, and I know after that there was a lot of feeling of insecurity. "Okay, is our function the next one to be handed totally over?" You went from fifty people doing it to two or three or four monitoring the contract, which really wasn't even technical work; it was contract monitoring.

I guess I got off on that, but that was an answer to your question. I've seen it work real well, and I have struggled with some of the contractor supervisors at times.

JOHNSON: And that was during the time when you were the Chief of the Space Shuttle Design and Integration Office, as you mentioned before, around '93 or so?

DAVIS: Yes, ma'am, and that was when we were really in the trajectory design area handing more and more responsibility over to them. We still had sufficient civil servants that we had technical oversight and insight into it. About three years later, two or three years later, they were given more responsibility, in fact, essentially all, and that trajectory design went very similar to what the training function did. The flight control function within the division stayed a mix of civil servants and contractors, but the trajectory design, ascent through entry, became, I'd say, 98 percent contractor-done.

I might comment a little bit on that. I felt personally that the civil servants should at least maintain their skills at some level, and I had recommended to the Division Chief that civil

servants do one flight a year maybe just to demonstrate and keep up their skills. As it turned out, that division is suffering today because they don't have enough people to do trajectory design for the CEV [Crew Exploration Vehicle], and the fact that contractors can't work on it yet is somewhat of a stumbling block.

So I guess I feel like a lesson learned there is you need to keep some civil servant skills in some of these areas. But there was a lot of push from, I guess, Headquarters to contract out as much as we could. The general feeling, I guess, in the mid-nineties was contractors will do it cheaper, because they had sold the story that civil servants impede us. They ask too many questions, blah, blah, blah. So there was that competition going on, I guess, in the mid-nineties.

JOHNSON: Was that during the time also that you were Chairman of the Flight Operations Panel?

DAVIS: Yes, it was.

JOHNSON: Could you talk about that?

DAVIS: Back when I was doing the orbit design in STS-1 and STS-4. One of the people that I really had a lot of respect for was chairman of that board, and his name was Rod [Rodney G.] Rose. He was one of the British guys who was working in Canada on, I believe it was, a bomber. Canada had invested quite a bit of money in it, and one day they decided they couldn't afford to continue to develop it, so they shut it down overnight. A couple of those people found their way to JSC, and as you might expect, they called some of their buddies and said, "Hey, we need more people here."

So Rod was one of those people that came from the aircraft design in Canada and wound up at JSC and did significant work on Apollo. So Rod was the chairman of that when I was kind of growing up in the area, so I felt very pleased to be able to do that for a couple or three years. It was fun, and it was like, "Oh, wow, one of my heroes. I hope I can do as good a job as he did."

JOHNSON: What did that position involve? What were you responsible for?

DAVIS: Basically, it was a control board of such, and it was approving the design, essentially saying, "Has the design, ascent through entry, met all the requirements of the payload, the crew, any other customers?" It was a designated board to say that all the Shuttle requirements levied by the Shuttle Program has been successfully met in this trajectory design.

The way it worked, the trajectory design people would come in with a set of ground rules that they were going to apply based on the requirements, and they would also bring in the results of those set of ground rules. "Here's our trajectory design. Here's our launch window. Here's the way we'll fly ascent. Here's how much propellant we'll load. Here's where we'll land. Here's the kind of CG [center of gravity] envelope we'll fly in."

They would tell the customers, "Okay, the crew will have a long day on the second day because we've got a rendezvous. Is that okay? We may need a waiver on that."

"Payloads, you'll only get two opportunities to deploy your satellite instead of three, and that's because this other payload wants to do something that's in conflict. Is that okay?"

So it was a control board in a sense. It was checking off trajectory design meets the requirements of everybody from the crew to the payloads to what the Orbiter vehicle can really

do. So it was kind of a neat job, a lot of people interfacing and getting your ducks lined up before the real meeting, because if you had done your job correctly, the real meeting was smooth. It was only non-smooth if there was warts out there somewhere on the design that you hadn't figured out. So, yes, that was the same time period.

While I was head of that office, there was a vacancy, a Deputy job. The Deputy retired. So I guess I related this to other people. I think you do a job, move into a new area or level of responsibility, and typically you're a little bit nervous, can you really pull this off, and for a year or so you get your feet on the ground. Then maybe for two or three years you're able to do a good job and contribute, and towards the end of that you may even feel you've progressed to the point where you want to make some changes in the process and the way the job is done, maybe the way you train people, the way you deal with your customers.

Then maybe the fifth, sixth, seventh year you approach burnout. You've gone from "Can I do this job? Okay, I can do this job. Okay, maybe I can improve this job," to "Hey, I've been there and done that, and I'd like to do something else." So that's kind of the way I felt. I felt like, "Well, Deputy would be a good steppingstone. I believe I've got some good ideas for the division as a whole and not just the branch."

The Division Chief at that time was extremely technically oriented. He was the designer of the Shuttle entry software, how the Shuttle flew the entry; very, very technically astute man. I would say his strength was the technical part. His weaknesses was dealing with people, in the sense that he would have people in the division for years and maybe not know their names, and he struggled to just interrelate with people and share responsibilities. I felt like I could be a good—maybe the other pole of the magnet. I felt like I had strength in dealing with people, so

being his Deputy kind of would help that. I believe when I applied for the job that was my intent.

I did get the job. What I found out was that being a Deputy is kind of in charge of everything and in charge of nothing. People had told me the best job at JSC was the Branch Chief job, and it's kind of true. I kind of believe that. You still have a limited span of responsibility and a limited number of people working for you, usually in the thirty to fifty range, so you know everybody, and you pretty well know everybody's capabilities and limitations. You get to interface with them. You still get to make technical decisions. The business part of it is not overwhelming. Yes, you've got to do budgets, but it's not but 10 percent of your job or something.

When you get to the division level, that probably jumps up to 50 percent or more. You get to play with technical 25 percent, and you've got 25 percent people and 50 percent all this other business responsibility.

This particular Division Chief only felt comfortable doing everything himself, and that was from making decisions to doing the budget. I remember typically you POP [Program Operation Plan] cycle, your budget; it happens in January through March or January through April or May. He would more than once over Christmas holidays would come in and do all the budget work and would have it done, and say, "Okay, what do you guys think?"

Well, us guys figured out after a while that we might as well just say, "It looks great," and go back and do some other work. I struggled, because going from a Branch Chief to a Deputy job, like I said, you had a similar responsibility to a division, but with a boss with his approach to the job, it was less work to do. I don't know in how much detail you want to get into this.

JOHNSON: That's fine.

DAVIS: I tried several approaches. I even wrote a memo for him to sign saying, "Hey, here's some things I can go work on."

He said, "That's great. They all look great. Go work on them." But when push come to shove, it was hard to get him to support some of those things.

To give you one example, the division was segmented between people that were doing design, this oversight responsibility; people who were doing analysis; and people who were doing flight control. When you grew up in either of these areas, your view of the world and your possible advancement was frozen into that particular vertical "stove pipe."

I thought it would be good if we did some cross-training. You know, don't cross-train everybody, but if Joe would like to go try something else, why, let him do that for a couple of years. I think there was a cultural roadblock in the people with flight control. They didn't want to do that, and my boss didn't want to push them that little bit. We had one or two successes, but it was very frustrating, because the fact that we had one or two successes said it was a good thing, but there was a lot of other people that I think could have benefited for it. I'm talking about career development, people growth, things that I saw managers not doing when I was growing up that I thought, "Hey, this would be a neat idea." So that was one example.

To say I got frustrated after a time was probably an understatement. I didn't have a branch to management and some of what I thought were good ideas were kind of falling on rocky ground, to be Biblical. So it was another frustrating year or so.

What I did, I went and talked to my boss, who was Randy Stone, and said, “What can you do for me?” I think in my immature approach, I was saying, “Go fix my boss.” [Laughter] “Randy, go tell him to do better.”

What Randy did was kind of scary. He gave me an opportunity to go be a Deputy Chief in another division. Now, you can imagine, when I’ve done trajectory design for thirty years, and he says, “Okay, why don’t you go swap with this guy?” I was very hesitant to do that. In fact, I remember he said, “Just call this Division Chief. The Deputy over there is retiring, and it would be a good opportunity to go do something else.” I was hesitant to call that Division Chief and say, “Okay, when do I come over, or what do you want me to do?” I put that off for a couple of weeks; I can remember thinking about that.

When I finally moved over there, it was somewhat scary. It turned out I knew probably 30 percent of the people, because they worked in an area that overlapped with the trajectory, so it wasn’t like, “Well, I don’t know anybody here.” But I didn’t know them in the way I knew people in the division. I didn’t know their capabilities or limitations, how they dealt with people, what were their warts, what were their strong points.

But the budget cycle came up about three months after I got there, so I told the boss, “Hey, I’ll go do that for you.”

He said, “That’s a great idea, so you can learn about the division.”

So in doing the budget cycle in the six months or so after I got there, I found out that their problems was very similar to the ones that I’ve seen before, and at the division level it was not that much different. I don’t know if Randy Stone had it in his mind or not, but about six months later he had the Division Chief come up on his staff and do some things for him, so I became Acting Division Chief.



That went on for probably over a year. There was a lot of politics going on at the Center level that I think I got caught up in, and it was difficult being the Acting for that long. But it finally got to be official, which was nice. Having been there a year and a half or so, I then felt like I could start influencing some of their processes and dealing with some of the problems they had.

One major problem the Ops Division had—I have to give a little history of MOD here. Back in the early nineties MOD decided they needed two sets of divisions, one to work Station, one to work Shuttle. So they established separate divisions with Division Chiefs to work Shuttle and Station. Over time they decided that wasn't a good idea, so, I don't know, three or four years later, before I became Chief of the Ops Division, they put them back together. Instead of two Systems Divisions, you had one; instead of two Ops Divisions, you now had one.

Well, what I found out was that the two divisions had never been integrated. They still were functioning like two divisions, really. It was made worse; part of the people were in Building 17, and part of the people were in Building 4 [North], which is about a quarter of a mile apart. It's kind of one side of JSC to the other side of JSC. It turned out the guy who had been Division Chief before me happened to have been the Station Division Chief, and it happened to be that the Shuttle people were in Building 17, and his office, my office, was in Building 4, and they had all the meetings in Building 4.

There was a stepchild feeling. The Shuttle people were off flying Shuttle flights, and the poor Station people had been waiting six, seven, eight years to ever get a piece of hardware in orbit and do something with it. There was an obvious "us guys" and "them guys." There was just no coming together.

So I tried several approaches. I tried taking people from each of the Shuttle and Station and assigning them lead responsibilities. “Okay, Shuttle, leads one. The next flight, the next Station flight, the Station guy will lead.” It just never worked out, and some of the Station people essentially thought, “When we start flying Station hardware, the Shuttle people should go away. They’ve had their time in the sun. Let us have our time in the sun.” Understandable, but you had all this fifteen years of Shuttle experience that you certainly weren’t going to throw away, and I was sure that Flight Directors and my boss didn’t want to throw away that experience.

So it was a big challenge for probably a year and a half to get that resolved. Getting it resolved involved some reorganization and putting those people in the same branch. It involved probably two or three of the people on the Station side leaving the division, because they felt like they couldn’t share responsibility with the Shuttle people. It was probably a therapeutic thing in the long run, but it was a difficult thing to [execute].

I think, as the years went by, I see it was a positive decision to try to fix that rather than let it fester. But it was a challenge, because it involved at times essentially removing people from responsibility they had had, having to do with Station. But they couldn’t work with key customers, because they thought everything had been invented by them.

One particular instance, a guy had been working the Station planning to work a certain way. He couldn’t alter his beliefs to see that the early Station was going to be more like Shuttle and the later Station would be more the way he perceived it. He moved on, but if he was there today, he would say Station is working pretty much the way he had perceived. He just couldn’t be patient enough to get to that point. That happened to be somebody I had known for thirty years, but he was really causing problems with key customers, to the point of I was getting calls

from them. So it was something that had to be changed. It was unfortunate he was not patient enough to wait a year or so and see how things would work out.

How are we doing?

JOHNSON: I think we're doing great. One of the questions I want to ask is since you— you mentioned in the first interview about some of your supervisors and how you felt like when your time for your review came up, you were just told, "Hey, you're doing great. Keep doing that." You felt that as a manager you needed to give more feedback and that sort of thing. That has been a theme as you've gone through. You've developed that ability to work with people and try to support them and deal with the different personalities, not only with your employees but with contractors. Is there anyone that you saw when you were coming up as a mentor or as someone that you've patterned some of your management skills after, or that you feel like you really learned some significant points from?

DAVIS: Yes, I'd mention two or three people. I would have to say, first, the first part of my career, I was so down and in, I probably didn't pay much attention to the management style or how people did evaluations. You come right out of college, and evaluation, you don't know what that is, and nobody explains it to you. Having a card thrown at you and say, "Sign here. You do great work," it was not a big deal. I think as I moved into the mid-seventies and realized that you have to worry about your career, and worrying about your career is about evaluations and job progressions, I started looking around and noting that.

I had a Branch Chief named Carl [R.] Huss who wasn't directly involved in evaluations, but he had a good style of explaining technical decisions and dealing with people as people. He

would always have on his blackboard, “Okay, two years in the future, I’m going to get a fun job if this is not a fun job,” and he would talk about openly, “I’m going to change. I’m not going to do this.” And you could see him following up on that, that if he got in a dead-end job, or if he’d got in a job where he wasn’t having fun—it might not have been dead-end—you could see him making changes and do that.

So that gave me insight into people taking care of their career. Not so much he was evaluating me, but that, “Hey, you’ve got to take care of your career.”

I have to talk about two people. Rod Rose is one of them; I mentioned him, the Chairman of that board. I was also a member of another control board called the MICB [Mission Integration Control Board], and Leonard [S.] Nicholson was the Chairman of that.

Leonard was excellent at making decisions. I happened to see him a couple of weeks ago, and I was reminding him how much I appreciated what I learned from him in making decisions. What I mean by making decisions was information would come in, and the first thing, it was obvious that Leonard had reviewed the [presentation] the night before and had understood what was being said to him.

He was very good at saying, “This is immature. You don’t have all the data yet. Come back in two weeks, and here’s what I need to see.” Or he would say, “Sometimes you have all the data, but I don’t need to make that decision yet. I will make it in a month,” or, “I will make it in two months. Come back and we’ll talk about it.” That led me to understand time is a factor in making decisions. I really learned a lot about how you run meetings and what you do and you don’t do; how you treat people in meetings.

Leonard Nicholson and Rod Rose, those kind of people. Okay, good bosses and my evaluation. Gee, I’m going to sound negative here. I think I learned more from the negative

side. I can't say I really had more than one or two fair, good, insightful evaluations in forty-some years. Most of them have been—well, from, “Here's a card. Sign.” It's not unusual for your supervisor even today to say, “Hey, send me up ten things you accomplished this year.” Okay, and you come and you get your evaluation, and you'll have a little paragraph in front, “You did really good, and here's things you did well.” And it will be some of those things, and then there will be a closing paragraph.

You know, none of us are perfect, and when I do evaluations I try to think hard, “Okay, what does this person [need to] do to improve?” Even if it's my top performer, there's always something they could do a little bit better, and I try to make those part of my evaluations. So I guess what I'm saying is I can't put out a good role model and say, “Hey, they did good evaluations.”

But I think I learned from that, and in doing evaluations I always tell my people when we do our performance planning, I say, “Look, if you're doing anything well, I'm going to try to tell you the instant I see it, that day, that week. If I see something I think you can improve on, same thing.” I'm not going to wait till mid-term. I'm not going to wait till the evaluation and say, “Hey, back there in January you blew this. Why don't you do it better?” I've tried real hard to practice that.

Maybe it's self-serving; I think one of the weaknesses in the technical community is they don't develop those skills. They don't see that as a need as much as they say we've got to develop the technical skills. I think in early history JSC was very much you promote the best technical person to be a Group Lead, and then you promote the most technical Group Lead to be a Branch Chief. Sometimes you got a good manager and sometimes you did not. So if I was going to change something at JSC, I probably would improve the management, the people

management side of it to some extent. I think the people coming out of school the last five or ten years expect that. They worry about their career paths, etc.

JOHNSON: Another thing I'd like to touch on, and you mentioned it in your first interview, also, using the mathematicians or, as they were called then, the women computers, early on, and then, of course, to the point of actually using digital computers. Technology has changed quite a bit, especially in the trajectory area, from when you started to what it is today. I just wanted you to comment on that and maybe some of the changes and how it affected the different positions that you've held.

DAVIS: I think it's truly amazing. In probably the first ten years I was here NASA, JSC, was pushing the limits of trajectory design. There was nowhere in the industry could you go get trajectory design capability. We were years ahead of everybody, or anybody. I think if you contrast that with today, on the market you can go buy capabilities for trajectory design that is far better than what we had in the sixties. It has to do with the schools have stepped up. There's aerospace courses and aerospace degrees you can get. There are customers for trajectory design outside of the NASA community. Obviously, there's computer capability that's hundreds of times superior to what we had.

I've seen that evolution, and I think more astounding than that is what people do in the first thirty minutes at work anymore, or at home, heaven forbid. Up until Blackberries [wireless handheld device] were everywhere, the first thing everybody did at work is they come in and they check their e-mail, you know; "What was sent to me overnight?" or whatever. And contrast that with what we did before we had PCs [personal computers] on our desks. I think people

interfaced with people more. They might talk to the guy in the next cubicle, or they might talk to their boss. You know, “What meetings are we worried about? What are we going to do this week?” I think it’s decreased the interrelationship with people.

E-mail scares me. I think people will put things in e-mails that they would never say to people face to face. I’ve seen situations where people who work for me will send the guy down the hall an e-mail instead of stepping out in the hall and going down there and talking to him. I think that’s a real downside. I think it’s allowed people not to communicate face to face, which we need a balance between that and the electronics.

I don’t know what else to say. The technology is out in the industry. You can go buy a trajectory design software application that can do rendezvous; it can do orbit design; it can do launch windows. It’s amazing what you can buy. I think that will be different as we go back to the Moon. I think the big challenge for Apollo was probably 95 percent technical. I think this time when we go back to the Moon, it may be 75 percent political. Will the political financial support be there? There’s not a real technical show stopper.

JOHNSON: Is there any thought on your side of going back into that trajectory area, since we are moving toward going back to the Moon again?

DAVIS: You know—this is kind of an aside. There’s a guy at JSC that keeps the list of the people who were around during Gemini and Apollo. I think I mentioned that to you. It’s dwindling down, and the kind of information that we carry around in our head or our experience is not technical as much as—they don’t have to relearn a lot of technical stuff. The trajectory

design and the capability to go to the Moon is a piece of cake compared to what we had in the sixties.

I think how you make decisions, the processes, the organizations is going to be the challenge. We were talking just this week. When you needed a decision made during the Apollo era, you'd go to one board, one person, and if he said yes, you forgot about it and you went on. It had been decided. There seems to be a tremendous layer of decision-making apparatus that's been put in place, and that can really slow down the process. There may be good reasons for some of it, but that was a contrast we had.

You really got decisions made crisply, and you knew they were made, and you had respect for them. If you were told no, there must have been a good reason, and you went on and did alternate B. So I think the challenge for going back to the Moon is not going to be technical. It's going to be the people, politics, organizations. I think overlooked a lot is the organizational structures and the system design of the things that were put in place for Apollo. I've never seen that happen again. It was pretty crisp.

JOHNSON: Well, if we could just for a second, let's talk about the *Columbia* accident and your role at that time and immediately following that accident and your memory of that day.

DAVIS: Well, I have to be a little bit personal to start with. My wife was a Flight Director. She was on the Station Flight Director console, that morning. My stepson, her son, had a school project. He had to be on the other side of town; this was Saturday morning. So I took him over there, and as I normally do, I gave her a call and said, "Hey, we're here. Everything's fine." She



related she couldn't talk; something serious was going on. I turned on the radio, and it was obvious what had happened.

I remember having no direct responsibility, but a tremendous number of people gathered on-site. It was a Saturday, but all the buildings were full. Nobody could do anything, but it was a feeling of—I would relate it to a death in the family. Everybody gathers at the home, so that's what they were doing.

It was probably the last time that the management structure that I had grown up with was together, in a sense, because people started attriting away in the months and years after that. So I kind of take it as a snapshot, my boss and the people that worked for me and the other peers that were all there. Over the next year or so that group dispersed, over the next two or three years, so I have this snapshot in my mind of all those people being there on a Saturday and not really being able to do anything.

The psychological support, the emotional support, was immediate and good. I think I told you the people at JSC were very active. They talked to the flight control team; before they left the console, they set up opportunities for them to talk one on one. They had group sessions, one-on-one sessions. I participated in several of those. There were very few of us who had been there for the [Apollo 1] fire and the *Challenger* and *Columbia*, also.

I got involved in the effort afterwards about changing the culture. I thought there was, as you probably can tell from where I've been with some of the previous discussions, that there were some people things that could be improved. So I was real active in that, and in fact, went to several of the sessions and shared my feeling about the three tragedies and I certainly didn't want to see another one. So it was bittersweet. It was horrible to see all the details, and when the video was retrieved that showed them, the crew, very happy during the entry. That was a

positive thing. The instant happened very quick, and their last few minutes were happy. They had accomplished something.

There was people that I knew well in my division that was real good personal friends with two or three of those people. So it was good talking to them, but it was hard talking with them, because they had done things with their family. Their kids had played together. A couple of them were women, so they, in my perspective, they're more open in talking about feelings and that sort of thing. So that was some of the things I remember.

I guess from a JSC perspective, the initiative about changing culture was really a big thing for a year and a half or two years until we got a new Administrator. That suffered some, because at one time our directorate wanted us to take a whole day and just focus on coming up with ideas to change culture. We took it very seriously in our division. We came up with some ideas, and we sent them up.

We never got much feedback back from those sort of things. It was kind of disappointing. In that situation what you want to hear is, "We've got them, and maybe there's some good ideas. We can't do anything right now." But the feedback was pretty much nil. In fact, I asked about them a couple of times, and the answer was, "We're working on them. We're going to do something."

I think when a new Administrator came in, he chose to go in a different direction. I applaud a lot of his things, but it was quite obvious that some of the things that was being done as far as change of culture became less important to him. Some of the culture was changed, but some was not. What I mean by that is there are still people who make it very difficult to bring problems to them versus being open and easy.

An example of a person that's very open is [N.] Wayne Hale, [Jr.]. Wayne truly worked hard to train the culture, everything from putting a round table in instead of a long rectangular table for his meetings, to putting out letters and being very responsive if you talked or sent him any ideas. So to me he's the prototype good example of the way to approach that.

JOHNSON: Your career, and you've been in the same position for several years now, but looking back over your entire career, is there anything that stands out as something or a moment or a time period or an accomplishment that, personally for you, that you're most proud of?

DAVIS: I thought about that a lot. Let me say one thing. Your paperwork didn't quite catch up with me, because in 2005 I went from being a Division Chief in the Ops Division to Division Chief in the Training Division. We got a new boss in MOD, and one of the things that he was big on was rotations, which I thought was a good idea. So when he said, "Hey, you want to go do this? We're going to rotate some people," I said, "Sure. I'd like to go try that."

So I did that for about a year, and it was challenging because it was something different, totally different. The Training Division trains crews. That's their thing. They don't have Flight Controllers. They don't design anything but training lessons. It's very flight-crew-centric. So you had the same budget problems; you had the same people challenges. But training the crew was a whole different ball game, and it took me a little while to figure out what the issues were.

One of the things I came across was that dealing with the Russians in training the crews was really a big challenge. There is a Training Control Board that we run with the Russians, and it's very, very challenging. It meets once every six months. In dealing with the Russians, you have to establish a reputation. They're very big on what your technical knowledge is; how you

approach your job; do you go out and eat with them; do you develop a personal relationship. If you check all those squares, you can work with them pretty darn well.

Why I'm relating this to you is it became obvious that the Deputy in this division had that responsibility, and he was doing a bang-up job, but since I knew I was going to retire in a year or two, and assuming he was going to be selected as the Division Chief, there was going to have to be a new person put in that role to deal with the Russians on a regular basis. So I talked to my boss and I talked to my Deputy, and I volunteered to move to a different job to allow him to make that selection so he could take the person with him for a couple of get-acquainted meetings so the Russians could start knowing who this person is.

So this fall we pulled the trigger on that, and he was selected as Division Chief, and he selected a Deputy. So they're in the process of integrating her in with the Russians. So I've been on staff for three or four months now, and we're working on a big directorate reorganization, so I'm trying to follow the ins and outs of that for the directorate, and I'm planning to retire in a couple of months. So that's what I've been doing since the Ops Division.

JOHNSON: Well, you mentioned the Russians, and I was going to ask you about this and I got sidetracked, but during that time in the mid-nineties, during the Shuttle-Mir time, what interaction did you have during that time, or in your duties? Did you have any with the Shuttle-Mir Program at all?

DAVIS: No. No, the only interactions I had is what I mentioned earlier, when we got information from the Air Force about what they were doing and we tried to figure out what it meant, but that was in the Apollo era.

Now, the people who worked for me in the Ops Division had a tremendous challenge working with the Russians, so I got involved with them in that way. Just backtracking there, their job was planning what the crew does every day on Station, so you can imagine that that involves a lot of give and take with the Russians. That was one of the big challenges early on is how to renegotiate with the Russians, because the Russians had been flying the Mir Space Station for God knows how many years, and they had their own way of doing business, and we had the way we thought we wanted to do business. So there was a huge lot of compromising that had to go on.

In fact, we had learned a lot from the Russians. I'll give you an example. Our space program has grown up such that if we have a failure on the vehicle, we work it to death right away. The Russians on a Space Station if they have a failure, they're just as likely to say, "We'll go home tonight, and we'll work on that tomorrow," because the crew will take care of the vehicle, and the vehicle has fail-safes. It was really hard for our Flight Directors and our Flight Controllers to realize everything doesn't have to be worked to death today. Likewise, getting a plan perfect doesn't have to happen today.

So there was a lot of give and take, and we've iterated into the middle of the road with them, but it was painful, because we went in sure we knew the way to do it, and they went in, "Eh, we've been doing this for fifteen years. We think we know how to do it." So, very, very challenging. Some of the people that have succeeded have had to have a good personality, attitude, characteristics to deal with the Russians. They've had to go out of their way to build relationships such that they can negotiate with them.

I think, back to the question about what were some of the challenges, what were some of the experiences, what was I proud of, this kind of question, the questions are on here, so I

thought about them some. I think “proud” was being part of a successful team accomplishing some firsts. I can’t overemphasize that. I think if you talk to a hundred people at JSC, you’re going to have ninety-nine of them talk about being part of a team. It just is.

I think that doing that you realize you’re doing something that’s bigger than just you as an individual. And I guess they get older—I put that in perspective, and I can say that more. I think that doing it, sometimes you don’t realize that, but as you get time perspective on it, being part of the team and accomplishing something bigger than one individual could do is pretty meaningful. I rate that right up there with my family and my good friends.

Experience, I think I had to deal with doing a job that I loved, doing the Gemini and Apollo, to the experience of Apollo 8 and 11 and all the Gemini flights, was just wonderful. I can’t probably put into words how significant that feels even today. So those are right at the top of the list. Right behind that was the DoD flight, and the [STS] 51-A. Those were special because I got insight into working with Hughes Aircraft. Here was a bunch of people that do similar stuff but do different things. Working with DoD, wow, this was a whole new world. It’s kind of revitalizing again.

The other experience I really, really enjoyed was mentoring people. I think as I got in the last quarter of my career, being able to mentor people and kind of guide them in the right direction and tell them they need to take this course; they need to talk less, or they need to talk more; or, “You’ve been doing that job too long. Go try something else.” Seeing several of those people succeed or having them come back and tell me, “Hey, that was really neat that you told me that,” that was a good experience. So that’s not the big flight experience, but it’s a great people experience.

You mentioned “challenging.” The most challenging, I think, was getting from Apollo 12 to STS-1, that seven, eight years in there when the work was different and not as challenging; and getting back to Shuttle when it was challenging again.

I think another challenge was, as I moved up in management, was letting go of the thing I was good at that I had just accomplished, and moving on to something I wasn’t quite sure that I could do. I think I see a lot of people who are really good at being a Group Lead, and when they become a Branch Chief, they still want to be a Group Lead, because that’s what they’re comfortable with. I try to do a lot of mentoring when I see people doing that, to say, “Hey, okay, you’ve accepted new responsibility. The people that work for you can do that. You’ve got to let them go do it. They may do it differently, but it will get done.”

And the last challenge is how is retirement going to be? [Laughter] I think the job I have today, where I’m working for the directorate and looking at reorg [reorganization], is a good opportunity to do some transition. I told my boss I went from getting 150 e-mails a day to getting 15. It’s entirely different. If you’re a Division Chief, you’ve got people knocking on your door every day wanting you to make decisions. When you’re doing a directorate-level job, you’ve kind of got to go out and beat the bushes and find out what people are doing about this reorg plan. So that’s kind of the last challenge.

JOHNSON: Well, hopefully, something you’ll enjoy, moving into that retirement period, and make lots of plans for that.

DAVIS: Hope so. See grandkids, travel some.

JOHNSON: And enjoy yourself.

DAVIS: Yes.

JOHNSON: Is there anything we haven't talked about over these last two sessions that you wanted to mention that we just didn't get around to?

DAVIS: I guess I would have to emphasize one last time I think I have some scars that could have been prevented if management had been a little more into people management. I'd like to see JSC and the future space program do a little bit more about managing people. I think there's been some efforts there, but I think they get gobbled up by the next technical problem you've got to wrestle with. I think there should be some balancing of selecting people in the management chain based on their people management and mentoring skills versus strictly their technical skills. If I could leave one message for JSC, that's probably what I would talk about.

JOHNSON: Okay. All right. Well, we thank you for joining us.

DAVIS: It's been fun.

JOHNSON: Well, good.

[End of interview]