NASA ORAL HISTORY PROJECT
EDITED ORAL HISTORY TRANSCRIPT

JAMES A. HARTSFIELD
INTERVIEWED BY JENNIFER M. ROSS-NAZZAL
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ROSS-NAZZAL: Today is May 13, 2025. This interview with James Hartsfield is being conducted for the NASA Oral History Project at the Johnson Space Center in Houston, Texas. The interviewer is Jennifer Ross-Nazzal. Thanks for taking time out of your relaxed schedule.

HARTSFIELD: It's a lot more relaxed than it was.

ROSS-NAZZAL: I bet.

HARTSFIELD: Yes, it's a pleasure. I hope that I can be helpful with what I have to say. It was a lot of time here and all very precious and privileged. I don't know, you don't know if there's history when you're living it, so I'll leave it to you to decide what is of value or not.

ROSS-NAZZAL: I think everyone's story is of value, and we definitely like capturing these details. We don't have a lot on public affairs, so I think that's one of the benefits of doing this interview and capturing some of that history.

HARTSFIELD: It's very unique among offices at JSC.

ROSS-NAZZAL: Yes.

HARTSFIELD: Unique because in public affairs, and we've all talked about this who've been in there before. From the day one we have the opportunity to see 360 degrees what's going on at the center, both up and down and all around, all angles because we have people fanned out covering all areas. We all meet together, and every day or week, we're talking about what's going on at the center. We're also talking to the top level of the center and also to the lowest level the center, and so you get the big picture, which, I think, it's very privileged to have a picture like that of the center because you see all the cylinders firing, everything at work across the center. So many people are so busy, an engineer working on their one part, and they don't get to hear about it. So that's one of the things that's incumbent upon us, is to try to tell everybody else's story and get everybody that picture. I don't think we can ever do it as fully as you get if you're engaged in public affairs, but it is a great position to be in in that regard.

ROSS-NAZZAL: Yes, I think that's a good point to emphasize about public affairs, yes, you're right, people are laser-focused.

HARTSFIELD: Yes, and we have to be omnipresent just to know what might be newsworthy, and what's going on, or what we need to work with people on, and to be able to put all the pieces together, like I said, for the workforce. Because they don't see all the parts, so we're their eyes and ears sometimes.

ROSS-NAZZAL: Yes, so I wanted to go back before your NASA years because I think it's helpful for people reading these because they don't know who you are. Can you give me some background, your interest in journalism ,and time at Baylor [University, Waco, Texas]?

HARTSFIELD: Okay, well, this can get long, but I'll try to give a more condensed version. I grew up in a small town in Texas, Waxahachie. It was a very idyllic place to grow up. My dad was the county judge and then state judge, so I was in politics early on. I was handing out pencils when I was eight years old, telling people, "Please vote for my dad, he needs a job," which was a very effective campaign strategy, I think, because he was only contested once in 30 years. My mom was a stay-at-home mom, but she had been an English teacher before she started staying at home with the kids.

But a small town at that time and just a really great place. You could ride your bike 3 blocks and be out at the fishing pond and the barbershop on the square, the courthouse square was everything. I lived on the same street there for 18 years and then left there to go to college at Baylor, which was also where my mom and dad had gone. They had met at Baylor, so they leaned all the kids toward Baylor to try to get us there, and they didn't want us too far from home. It was only 60 miles away in Waco. I went off to college. Now, I will say that for reasons that I can't even really understand when I look back on it now, academics were not my focus once I left Waxahachie. I guess, let's see, the old adage, the kid leaves home and just cuts loose, and, boy, I did cut loose. I got to Baylor, and I was a pretty shameful student in terms of not attending classes. I was very social, I made excellent friends who really have been high achievers, all of them. Joined a fraternity, which was a half hippie commune, half motorcycle gang fraternity. It wasn't really liked by Baylor much. It was a crazy place.

ROSS-NAZZAL: That's pretty interesting.

HARTSFIELD: Anyway, to cut it short is after three semesters, I had flunked out of Baylor, and Baylor asked me to leave. Didn't ask really, they told me to leave, and it was very disappointing to my parents, as it should be. They were upset because they knew I had the ability to achieve there, but I just didn't go to class ever. Really, that's what it was, I didn't go to—I will be honest with you, there were some semesters I almost forgot where the classes were. I tried to get better right at the end, but it didn't work, and so I had a lesson to learn, and my parents figured that out because they said, "Don't come home and we don't want to hear from you," especially my dad—he was a judge.

ROSS-NAZZAL: Wow, that's pretty harsh.

HARTSFIELD: Well, my dad was a judge; when you do the crime, you're going to do the time. My mom, she kept like a covert operation going with me to stay in touch some, and I didn't care actually. I stayed in Waco, I had all these friends, and I lived there in Waco by their good graces, but I also had a ton of odd jobs. It seemed like I couldn't keep a job for a long period of time because probably, my same attitude of not paying attention enough, but I worked as a night motel clerk, I worked at a gas station, I ran a concession stand, I worked at a pawnshop. I did a ton of things like that, and that went on for about a year almost.

Then my friends, I guess one day, it wasn't planned, but I woke up on a couch like I always did and happened to be several of my friends there between classes. My friends were not

upstanding students either, right? They actually were brilliant, some of them, so they could live a crazy life and still make a 4.0 GPA.

ROSS-NAZZAL: Wow.

HARTSFIELD: My roommate, my best friend through college, got a doctorate in physics at Stony Brook [University, New York] and would do Quantum Mechanics IV, hung over, and make a 4.0, an A in it. Not me, that's not me. But they started laying into me saying I was throwing away my life. It's one thing for your parents to tell you that, it's another thing for your friends to do that, right?

ROSS-NAZZAL: Yes.

HARTSFIELD: And saying I should do more with it, and I can't work at a pawnshop for the rest of my life. I actually had just been fired from the pawnshop, which was a low. They were saying, "You shouldn't do this." It was kind of like an intervention before interventions were a thing, and it was an impromptu deal. But it didn't convert me immediately to go be a different person, but it started me down a row of thinking, and within a few weeks, I decided I wanted to try to change. I went back to Baylor, which I think is a very unusual thing, it doesn't happen now. I know in experience with colleges for my kids, there are so much more students and more people trying to get into college now, I don't think there's as much flexibility for them to give second chances. But I went to the Dean of Student Affairs, and I forget exactly what I said to him, and he had no reason. There was nothing in my record of any kind for him to believe that I would change because I'd

been pretty consistent for everything that they knew about me, but he let me. He said, "We'll let you back in if you can find a way to fund it and to be able to do it."

Then the next thing was I hitchhiked home. I didn't even tell my parents I was coming, and I had no vehicle or anything, so I went out on Interstate 35, and stuck my thumb out, and hitchhiked to Waxahachie. It wasn't far, 60 miles, but I had actually done some hitchhiking around that time, which was bad too. But I hitchhiked home, I showed up, just knocked on the back door. Parents, of course, they welcomed me in. I don't know if they were happy to see me, but then I told them my story, that I wanted to go back. I guess, my dad being a judge, he did agree that you could reform people, they had enough punishment. My mom, of course, was very—like I said, she was always the covert support for me all the time. She always believed in me. For some reason, she thought I could be a writer all the time—she says that now, but I don't think she did then. But she goes back to look at my stuff from kindergarten and says, "Oh, you wrote great in kindergarten." I don't know, maybe. But at any rate, they said they would help me go back to school, not as much help as the year before. They said I had to always get a job and work and help pay my living expenses and all of that, and they would help. But they would give me a semester-by-semester chance, and if I didn't keep my grades up and do well, it would be over forever.

So I went back, and I focused, but I think a big thing then that helped me turn around, too, was I did go crazy just leaving Waxahachie and having the freedom and all that stuff and abused that aspect, but I also wasn't inspired by it. I did go to class when I first got to Baylor. I went to class every day for the first semester, or half a semester, or something before I started getting—but I wasn't interested in a lot of stuff. What I was planning to do was prelaw because that's what Dad had done, and I'd been around the law a lot. I'd been around the courthouse. I grew up around

the courthouse because he was a judge, but I didn't want to be a lawyer, and I didn't know what else I wanted to do, so I had nothing that was inspiring me.

But when I went back to Baylor, very soon that first semester back, I had a friend of mine who said, "Hey, you should try journalism, you should go do journalism." I guess he just saw me conversing with people or something, he thought it would be something that I would be good at and I might like, so I did. It was like an immediate love at first write, I guess, is what you call it.

ROSS-NAZZAL: A little pun there.

HARTSFIELD: I really loved it right away, and I loved everything about it. I loved interviewing people because journalism specifically, not just writing in an English paper fashion, right?

ROSS-NAZZAL: Yes.

HARTSFIELD: It was really journalism because I liked interviewing people. That's your first step in a story, to talk to them, and ask the right questions, and edit as you're listening. Then to find out in that interview, real time if you have to, where is the story here, what is going to be the most interesting aspect? Every person is a story, as you said before, I think every single person is a story, I firmly believe that, and I've never found that not to be true. I think everyone has a great story. They don't know it, they all don't know it, and it takes a talent to go find it, and finding it is what really inspires me to do that, and then sitting there with a blank sheet of paper and coming up with a compelling way to tell that story. Those things, I found that they were what fully flipped my adrenaline switches. Everybody has things that flip their switches and gives them the highest

feeling they can feel of just feeling great about what you're doing, and excited, and just tingling all over and thrilled. Writing a great story, having a great interview, that did that for me.

I'm lucky, right, some people have to go do crazy things like go to space to get that feeling, I didn't have to do that. I just have to do communications, and I guarantee you if I launched into orbit, I could feel no more excited than I feel from doing communications. It's just the way God designed me; it's just the way I'm designed. I found that, and that really enabled me to do better in school. I had a double major though. It was Latin American studies too because I did love language. I took Spanish every year for 10 years, I was fluent when I graduated college, but I'm not anything anymore because I never use it. But I found it improved my ability to write because it's not just a different language, it's a different way of thinking too.

So I did a double major in journalism and Latin American studies and did well, and I got out of Baylor, graduated from Baylor in 1985, but it was still a hard time to find a job. I did great in my majors, but overall, I still had that on my record from early on, so it wasn't the best. But I did send out tons of resumes and applied, and I couldn't find a job. No Internet, it's hard to explain to people these days what it was like then, there's no internet, there's no anything. You're going to the placement center, you're looking up stuff in papers, classified ads, you're sending out resumes by snail mail, waiting a month to see if it comes back. They don't even send you rejection letters, a few did.

In the meanwhile, I'm out of money, I'm not going to depend on my parents anymore, I'd said that. I had a part-time job sampling grain. Actually, I would drive out to railroad cars, climb up on top of them, and sample the grain, and send it off to the lab, and they would base the prices on that, so I was making okay doing that. It was an interesting job. I ended up subleasing my apartment because it was a great apartment next to school, an envied location by some of my

friends, and with the caveat that I could sleep on the couch until I found a job and use one closet to store all my stuff in. I didn't intend for that to last very long, but it dragged on all summer. I graduated in May, in August, I'm still on that couch, and my stuff is still there, and I still have nowhere to go, and I wasn't going to go home.

Like I said, my parents had done plenty for me, I needed to go on my own, I was not going to go back there. So I just said, well, I may not find a job in my field in communications, the thing that really excites me. Maybe I won't be able to do that right now, but at least, I want to live somewhere that I'll enjoy being broke. I've always loved the beach. My parents came to Galveston a lot, that's where their honeymoon was; they brought the kids there a lot during vacations. So I decided I wanted to stay in Texas. I'm born in Texas, going to live in Texas, and if it works out right, I'll die in Texas. I'm a Texan, there's no two ways about that.

So I said I'll drive down to Galveston, and I'll start looking for a job there, and if I don't find a job in Galveston in communications, I'll work my way down to Brownsville. By the time I get to Brownsville, the Mexican border, and I don't have a job in communications, I'll just start waiting tables or do something. I'll make a living there, and I'll just live there, and I'll be on the beach at least. Drove into Galveston, and I checked into the cheapest motel in Galveston, not a good place, and got a newspaper. In the classified ads, there was an ad for a reporter at one of the weekly newspapers in La Marque that Galveston [Newspapers Inc.] owned. Galveston owned all the newspapers [in Galveston County], Texas City, La Marque, Hitchcock, Santa Fe, as well as, oddly, several papers in Michigan. It was all a big chain, yes. They had an ad for a reporter at the *La Marque Times*, the weekly paper there in La Marque, in the classified ads. So I called them, and they set up an interview the next day. I applied, and they said, "You're hired, you've got five

days to come down here." I was barely living, but I had a job in communications, and that's how I ended up in this area. That's my school-to-first-job story.

ROSS-NAZZAL: I had read on your resume that you ended up working your way up to managing editor and editor over a three-year period?

HARTSFIELD: You have to understand, the paper only had four employees plus the publisher.

ROSS-NAZZAL: Got you.

HARTSFIELD: But there was a reporter, photographer, which was the position I was hired into. There was a city editor that was part time, a managing editor that was full time, and then a typist, writers, and the publisher, so it was not a big paper. It was a weekly paper. But, yes, I started out as a reporter, photographer working for a great editor who I also learned way more there, or additional there than I had at Baylor. I left Baylor, and I thought I was a great writer, I thought I was going to be the next great writer in the world, and very quickly that was corrected. He was an excellent writer and an excellent journalist, and so I was a reporter, photographer working there, living in Galveston on the Seawall. I found an apartment there right in Galveston. Actually, it was on Offatts Bayou, the first one that I had and cheap, it was a very cheap place, but it was nice for me, I could see the water down the street.

ROSS-NAZZAL: Yes, that is nice.

HARTSFIELD: It was a very busy job. I took pictures. Again, this is a world that people don't understand today with the single-lens reflex cameras and the auto drives. I would shoot probably 1,000 pictures a week and develop them, plus write the stories, plus help lay out the paper on a piece of paper with a pencil and an eraser and proportion wheels and pica poles, stuff people don't know now. You worked all the time, 100 hours a week. You had Sundays off maybe sometimes, but a lot of times, there were things that happened on Sunday you had to go cover, and I was the one that covered almost everything. I did that for a while, and I loved it because I did love it. I wrote a column; I'll send you the column about what it was like to be at the paper.

ROSS-NAZZAL: Yes, I'd like to see that.

HARTSFIELD: But I loved doing it, it was exciting. Like I said, it flips my adrenaline switches. A lot of times, you're covering a council meeting, or a police beat meeting, or a drainage district board meeting, or what have you, that is not so exciting. So I did learn that there's things you do to pay your rent, and then once in a while, you find the barber in town who has been cutting hair for 50 years, and now, the flat top is back in style with the young kids, and so they're all going to him. You go do a big feature story on him, and it's just a treasure trove for you. His story is just one that you go home and you're tingling because you wrote it and it's great. But you have those moments in your job, you're very lucky right?

Because some people never have those kind of moments in their job, so yes. I did work my way up, and within a year, I was the city editor and then the managing editor that I talked about before went to the *Corpus Christi Caller-Times* to be an editor there, and I took his position. In the meantime, several, big, national things happened in the area, which was odd, this small town.

But hurricane, of course, there's always hurricanes in Galveston, so big hurricane stories that we would cover. Then there was a really tragic incident where the high school coach in La Marque, they were about to win, they were on their way to the state championship, and he had accepted coach of the year in Galveston at a banquet. He was on the way back and was killed that night in a car accident right before their state game, and it was a huge story. Actually, international, they all came into town because it was so tragic and everything. We were right in the middle of it, and it was a terrible thing, but you're challenged to cover it correctly for the hometown paper, and we did, and that won an award. It won the best in the state for what we did there. My columns had won a couple of awards for writing.

Then dog racing, you remember the dog track in La Marque, you know there's a big to do about dog racing to legalize it or not, and that attracted a lot of national attention, so I got exposed to some national news coverage. The network, people would come by our office because we're the local story, the local newspaper to try to find stuff out, so I got exposed to a little bit there. Nothing like I was going to encounter at NASA, but enough that it helped my career, I think, advance. That's what had happened in La Marque basically. At one point, I went to Michigan for a month and a half to work for *Galveston News* there on a special edition, which was crazy.

ROSS-NAZZAL: Oh, really?

HARTSFIELD: Yes.

ROSS-NAZZAL: Oh, great, what were you covering up in Michigan?

HARTSFIELD: They sent me up there to do a special edition for the paper up there. It was an annual special edition, and they needed some help. So the publisher, I loved the old publisher at *Galveston Daily News*, who had been there forever, Les [Leslie P.] Daughtry, Sr., and he sent me to Michigan in February. I was living on the beach in Galveston, I had no clothing, you know?

ROSS-NAZZAL: Oh yes.

HARTSFIELD: I get off the plane in Michigan, and the snow is up to my knees, and I have tennis shoes and light jeans. The first trip was to the Walmart store to try to get as much, but, yes, so I did the same thing that I loved doing there. I went all over that town and wrote stories about people that were part of the community and for the special edition for a month and a half, and it was fantastic.

ROSS-NAZZAL: Yes, sounds like it.

HARTSFIELD: I loved doing that, the *Niles Daily Star*.

ROSS-NAZZAL: Okay, so I was reading the *Houston We Have a Podcast*, and you decided to come to JSC and pitch yourself as a possibility.

HARTSFIELD: I did.

ROSS-NAZZAL: Why at that point?

HARTSFIELD: I loved journalism, and I loved—I'll send you this column that lays out why I loved journalism in a little bit, but I loved it. However, at that time, newspapers were going through a change now, and you got to remember, this was no Internet, no digital media of any—nobody knew what digital was even then. There were newspapers, there were television stations, there were radio stations. Newspapers were the preferred part of advertising because television was too expensive for a lot of the towns. So you used to have the *Houston Post* and the *Houston Chronicle*, you used to have two newspapers in every town, right?

But at that point in time in the '80s, that was going away. All the newspapers were becoming part of the big chains to be profitable, and the competition was fading, and so you would have one-newspaper towns. Galveston was a one-newspaper town, it owned all the papers around. Fine, but the only commitment to quality, for editorial quality, one of the drivers was to be competitive. Galveston had these reporters that I looked up to as a young, 20-year-old or 20-something reporter. They had been there for a long time, they knew that city backwards and forwards, they had sources in the police department, sources in the city. If anything happened there, it was like a television show, they would go get the scoop, they would get the source. I looked up to that. I said, "Man, this is what it's all about, this is what the constitution intended with the free press to go do this kind of thing." Then a new management came in, and they laid off all of those people, and it was just very stunning to me to see that because they had the highest salaries because they had been there the longest. I was safe because I had no salary.

ROSS-NAZZAL: Right, you were a newbie.

HARTSFIELD: But it was just young like folks me and all the people that experienced it. I looked at that, and I said, "Maybe this isn't really the best thing I want to do forever, but I do like living here." Almost at the same time that that occurred, the [Space Shuttle] *Challenger* [STS-51L] accident happened, and I still vividly remember. I must admit like so many people at NASA were enthralled with space from day one, I certainly was enthralled with space in 1968, '69, not by 1970 probably. But for Apollo, the lunar landings and the precursors to the lunar land, I remember those as an eight-, nine-year-old kid lying on the floor, oddly, didn't know it at the time, listening to Doug Ward, and Jack [John E.] Riley, and others, who I would end up working with. There's a great picture my mom always kept of me where I did a lunar module on the back of a cereal box, put it together, and lowered it down on a string on the day Apollo 11 landed from my mimosa tree to recreate my own landing.

And I had studied all about space and things then, but I moved on in a year or two and so I didn't know about the Space Shuttle [Program] that much, it was during my dark years in school when the first shuttle launched, in '81, and I think I'd seen news coverage of it before, but I didn't keep up with it at all. I knew what it was, but when *Challenger* happened, I still remember vividly, I was on a story assignment to go out to do a pollution story. A lot of people that lived on the bayou had called in a fish kill and were complaining that the bayou was polluted, and I was going to go out and do a story on it. So I'm driving out there, and it was a long ways out, so I was driving through Nowheresville to get there. They interrupted on the radio and said the Space Shuttle *Challenger* just exploded, and I'm, wow, okay, that's different, that doesn't happen, like everybody in the world.

Then within a couple of days, I'm going to cover [President] Ronald Reagan's memorial service here at the center for the paper. Two of us went, one to write the story, and I did the

photography, and so we came here, and the quad was—it was such an amazing, tragic moment, right?

ROSS-NAZZAL: Yes.

HARTSFIELD: But we came on-site, and I came through the public affairs office and did that. Then a little later when I got this feeling about trying to look around, I remembered, well, there's a public affairs office there at NASA, and that's not too far, I could still live in Galveston, yes. Because the main thing was the beach, I got to be honest with you.

ROSS-NAZZAL: And that was the main draw.

ROSS-NAZZAL: It was the beach, so I didn't want to leave the place. NASA seemed okay, but I do think that whole attitude worked in my favor in terms of succeeding that first year, and I'll tell you that later. I said, well, I'm going to call them up, and I was just scheming a little bit. I said, I'm going to tell them I want to interview somebody there to do a profile for our paper on what it's like to work at NASA, maybe somebody who lives in Galveston County if I can get that, and I'll do that.

So I called up public affairs, and I said that, and they set me up with an interview and said, "Okay, yes, you can come in and interview them," and that kind of thing. I come in, and I walk in, and it's Jack and Doug that are there. Jack lived in La Porte, so I don't know, but still anyway, we didn't even get to that at that time when I first met them. I walked in, and I had a big book that had all my pictures, and my stories that I'd written, and the awards that I won. I just put it on the

table, and I said, "Okay, I have to tell you, I'm not here to interview you, I'm here looking for a job, and I want to show you what I can do and tell you I'd like to work here." I tell that story to interns while I've been here, and they seem to like it as inspirational. I don't know that today in the digital world, it's as easy to put your foot in the door like that, but you should certainly try. You have to go try to do that kind of thing.

So they were very gracious, and they listened to me, they were very interested. I didn't know who they were from Adam, even that day, I didn't know who they were. I didn't know they were the people I listened to when I was nine years old.

ROSS-NAZZAL: Yes, it'd be hard to know that and research it at that point.

HARTSFIELD: Well, yes, and I didn't care, to be honest with you, Jennifer. I just was looking for jobs, so I could stay on the beach.

ROSS-NAZZAL: Sure, yes.

HARTSFIELD: I'm showing them everything, and they said, "Okay, well, we're very interested, but we don't have any positions open right now. So if you will go over to this building, Building 45, and talk to human resources, and fill out a form, you can get in our system. If we have an opening, we'll look at you possibly," and I said, "Okay, well, thank you." I was really gracious, left the interview, and I went over to 45, and I got this form, and I was a cynical person, very cynical newspaper person. You're that way when you're in newspaper, but you can't really help it sometimes, you just get that way, but you shouldn't be that way. I don't forgive media for being

that way now, but I was that way then. But I will say that this form, the SF-75 everybody's had it back then. It was an accordion-style form, it was like 5 feet long as I recall on both sides, and I'd never seen anything like that, never seen a form of that kind. Of course I had said, "Well, I got to take this home, I can't fill it out here." I jump in my car, I had a $400 car then with no air-conditioning or anything, so I always had all the windows down, and it's sitting on the passenger seat, I'm driving back to Galveston. Cynical me, it's flapping around in the breeze on the passenger seat, and I'm going, "Yes, yes, that was nice, okay, you're going to put me in your system, blah, blah, of course you will, of course you will," and I said, "Forget you," and I threw it out the window.

ROSS-NAZZAL: You threw it out the window?

HARTSFIELD: Yes.

ROSS-NAZZAL: Oh.

HARTSFIELD: Interstate 45, and I go through, I littered, I messed with Texas, which I feel bad about that too. Then two months later, I get this call from Jack, and he says, "Hey, we've got an opening now," because he still had a resume with my phone number, "and we wanted to think about you, but you never filled out that form, so we can't even consider you." Another thing that I got second chance—I said this in the podcast, second chances, they permeate my life. Every single one of them is not deserved, but I got them, and I did take advantage of them when I got

them, but I have been very grateful for the second chances, and that was the second chance that I got.

I came, and I filled out the form, and they hired me, and that's how I ended up here at NASA, which I guess it's a different origin story at NASA than most of the people here. I was amazed when I got here that so many people didn't actually love Texas. They came here because NASA was in Texas from wherever, and they were sold on space, which was exciting, and I got it, right, I got it as I got into it.

But I will say, I think it served me well on my attitude because I did tell Jack and again in the interview with them, I said, "Look, I write about a lot of things, I write about pollution in the bayou, I write about tragedies, I write about barbers, I'll write about city councils, police beats, murders, whatever, crimes, burglaries. I've never written anything about science, really, or space, and I don't even really follow space that much." I was just very honest with them because when I told them that, I thought they'd say, "I appreciate you telling us that, and thank you for your time." But what they said was, "When we want somebody to come in here, that's exactly what we want, because when you go to write about it, you'll write about it from the perspective of someone who knows nothing about it, and the people that really need to know about space are those that know nothing about it. We want them to be able to understand what we're doing," and they were absolutely right, that was a big benefit to me, I think. That was very insightful on their part.

ROSS-NAZZAL: Yes, yes, well, there are so many people who work here at NASA that you don't associate with the space program, right, that play an important role?

HARTSFIELD: Oh, absolutely. At Mission Control [Center], I always thought it takes a village thing. I didn't know there were doctors in mission control. I didn't know that you probably need a business degree to be a flight activities officer, better than anything else, and there's journalists in there. Of course, there's physics, and there's electrical engineers, and mechanical engineers, but it does take everyone. Because you're basically taking a little piece of the planet and putting it elsewhere, and so you have to have an all-inclusive support structure .

ROSS-NAZZAL: Yes, yes, and so what was your understanding of what you would be doing? You're a public affairs officer, so for people reading this, what does public affairs officer do?

HARTSFIELD: It was very specific what they hired me for though. They hired me because the Rogers Commission [Presidential Commission On the Space Shuttle Challenger Accident] that studied *Challenger* and made recommendations. One of their big recommendations that Aaron Cohen, who was the center director at the time, had taken to heart and tasked public affairs to work to increase internal communications. Because internal communications, better communications among the team was cited as something critical to keep safety high. Unfortunately, I think almost anything comes down to a lack of communications among people, all problems get that usually.

But the only ways then—there was no email to increase communication, websites, it was the *Space News Roundup* newspaper, at the time a biweekly newspaper, and Kelly [O.] Humphries was the editor, and he did it pretty much single-handed; he did a fantastic job. They wanted to make it a weekly paper to increase communications among the workforce. They needed someone who had fresh skills from a weekly newspaper, which I was the perfect ticket for, right, I just stumbled into being the perfect thing for that. Kelly couldn't do this thing single-handed, so I was

going to be his assistant to help him. That's what I was hired specifically to do, which was a wonderful thing for me because I got here and working with Kelly, I was one of the main writers. I did most of the writing, he did a lot of the editor stuff, he did writing, too, but I got some free rein. I could go out and if I found something that I thought was a good story, I could go pursue that story.

To come into a place like JSC, into that world, which is not just engineering or science, it's everything, it's all the parts that make up society, basically, but focused on one endeavor. And to be given free rein to go find stories, and interview people, and find out more about it, it was a golden ticket for me. Like I said, it's flipped my adrenaline switches. I got so many switches flipped in those early days with the *Roundup* writing stories. I remember writing some super memorable ones. Well, I did one on lost and found, which I loved, the lost and found at JSC. I looked for that story, I can't find it, but lost and found at JSC was just crazy.

ROSS-NAZZAL: I'm sure I can find it for you.

HARTSFIELD: They would find 45 backpacks a week. If you found one lying right now, you would shut down the center, that's just because it was a walking tour, and I did one on that, and I just interviewed the lost-and-found guy, and it was just a fun story. After STS-26, I was walking through Building 31 for some reason, and I noticed the Earth images on the wall. There had not been much talked about there about the Earth Observations Office then, and I just wandered in, and I just said, "Hey, what do you guys do?" I did that a lot, and I started talking to them, and then it turned out, they were telling me that the imagery they got back from STS-26 after that gap of flying for three years, there were so many dramatic changes that had been imaged on STS-26 from

the shuttle missions previously that were evident in those images. I wrote a whole story about that, it turned it into a press release as well, and it was fantastic and got tons of readership and tons of other stories printed about it too. Just to find people that had an interesting—everyone is a story, right, and everybody has an interesting backstory. I didn't even remember it until I saw it, but they pulled it up here recently, my colleagues, that there was a guy who did roller skating, and, yes, with the animals. There were just all kinds of stories, and so I love that period.

Like I said, even the stories like the Earth Observations, which were science, about Earth, I always pulled in the human aspect because that was my background and that's where I'd come from.

ROSS-NAZZAL: Yes, and so you were also doing a lot of coverage of Return to Flight.

HARTSFIELD: I was. I did a story every paper on the progress for STS-26, and that's getting ready for STS-26, which I was really up on—well, I should tell you this, too. Jack and Doug, when they hired me, when they called me back, and I filled out the form, and they said, "Okay, we're going to hire you," and they officially said they're hiring me, it was the kind of thing with the government that happens sometimes; I couldn't start for two months. They said, "You can't start for two months, there was some kind of a delay. You're hired, but you won't start until this date." I asked them, "Well, can I do anything to help be ready to hit the ground running when I get here?" They handed me the Space Shuttle Reference Book, the 800-page Space Shuttle Reference Book and said, "You should read this."

ROSS-NAZZAL: Oh, I've seen that. It's a real page turner.

HARTSFIELD: Yes, so I did. I actually took it back to Galveston, and I spent a lot of time, all my off time from the newspaper, I was sitting on the beach or on Seawall reading this 800-page shuttle book. Didn't understand some of it, some of it I did, but it definitely did give me a head start.

I say that because I was covering Return to Flight, so I was learning more about the shuttle then during, all the systems and things. It was a very educational thing to do, so covering return-to-flight stories. Then, of course, everything was geared toward Return to Flight, and everybody was so excited to get back to flying because we were down so long. Again, my first lesson, I think, in what the public wants from NASA, one of NASA's purpose is to discover and to expand human capability. But from my perspective, in many ways, whether they even know it or not, one of the purposes the public wants from NASA is to demonstrate how to persevere, how to not quit, how to go learn from a problem and do your best, and then do your best again if you need to.

Certainly, STS-26 was the first because there was so much support. *Challenger* had been very difficult. I don't think it was because of the communications department necessarily, I was not here for that, it was really management that shut down communications. Communications wanted to do the right thing. When you go back and look at the public affairs contingency plans from that period, they all said do the right thing, we're not allowed to do the thing, so it was very difficult. Time had passed through the Rogers Commission and a good job had been done to get credibility back for us. Then I think we were totally supported by the nation for STS-26 to Return to Flight, and that showed. There were so much support, so much excitement about us returning to flight, so much. Even the crowds at KSC [Kennedy Space Center, Florida] when you saw the images of them, just the thrill, and it was pervasive through the whole center here. That drove home to me right away that what the public loves is people who—I'd had second chances all

through my history too—so people like you to go try again, they don't like quitters. I told my colleagues sometimes, the guy who walks up to the plate on his fourth at bat after he struck out three times and then hits a home run, I think the crowd loves him maybe more than the guy that hits when he's first at bat. So NASA is that guy a lot of times.

STS-26, I was super excited for it. When a mission comes, it's always been this way, it takes the whole team in public affairs no matter what your job is. You might be the writer for the *Roundup*, but you're going to work on the mission support because in those days, too, STS-26 and even the subsequent missions for quite a while, the media onslaught here was amazing. I can't fully explain it well enough, but our whole auditorium, Teague Auditorium, all sides around it, card tables out everywhere, television screens on them, media brought in their own phones, we had phone lines. So you had really hundreds of media here, they couldn't really cover it remotely, right?

ROSS-NAZZAL: Oh, yes.

HARTSFIELD: We had NASA television. A lot of it was closed circuit though, and it wasn't even where it would go too far out, and you could cover it. Your channel might pick it up somewhere or not, but there was no national network necessarily. So they came here, and they needed the byline to be here anyway, right, and they couldn't cover the press conferences very well. We didn't have even phone-ins, and it was all just in person. So the media onslaught was tremendous.

We were open 24/7 during the missions. We had a press conference every 9 hours. Every change of shift in mission control, we would come back and have a press conference, they were always well attended, there were always tons of questions at them. I was assigned to work in the

newsroom on the overnight shift. You'd go, "Oh, wow, the graveyard shift." But it was super exciting then, and the crew was asleep, but the media are still here, the media are still doing stuff and everything. Of course, I was a newbie, and I could not be more thrilled; I was so excited. I told this story in the podcast. They gave us a day off to adjust our circadian rhythms, which I've never done for my team when I was a leader, and they never did that much anymore after that either. It turns out that doesn't really help, I don't think, it didn't help me then.

ROSS-NAZZAL: I don't think one day makes a difference.

HARTSFIELD: But I did try, I tried to be ready, and I was going to stay up all night the night before, and then sleep all day, and then come in for my shift. I couldn't figure out how am I going to stay up all night because I started getting tired at 2:00 a.m., and I said, "Okay, I was living in Galveston, I'm going to go ride the [Galveston-Port] Bolivar Ferry back and forth all night long." Because every 45 minutes or every 25 minutes, the ferry stops, and if you've fallen asleep in your car, the guy's going to come knock on your window and wake you up because you got to drive off and turn back around. So I did that, and I watched the sunrise on the Bolivar Ferry, and I went home, and I slept maybe 2 hours, and I had to come in for my shift. I only say that story as an example of the excitement I felt, and I think I honestly—maybe other people expressed it in more sensible ways than I did, but I think the whole center felt that excitement at STS-26. Everyone had that kind of a feeling.

ROSS-NAZZAL: Yes, it had been so long since flight.

HARTSFIELD: It had been so long and also, we want to persevere, right?

ROSS-NAZZAL: Yes.

HARTSFIELD: These people, the last thing that anyone at this agency ever wants to do is quit.

ROSS-NAZZAL: So you mentioned things like press conferences, writing news releases, so how does that work? Were you involved early on helping with press conferences and writing news releases?

HARTSFIELD: So I was doing the *Roundup*, mostly just writing stories for the first year and a half—somewhere between a year and a half to two and a half years—and they switched me to being a public affairs officer, covering engineering at first in the Orbiter Project Office. Then I spent a lot of time covering shuttle or [International Space] Station, switching back and forth sometimes over the years.

But, yes, in those days, I remember that the first press release I ever wrote, and it was different. The Apollo guys that were here then, that were towards the end of their career, but they were imparting a lot of their experience and knowledge to us. Of course, it was a different era for media, different era for the country, but there was not a lot of outreach. The outreach that was done was more education and we had space mobiles that went out to schools and did the engagements at the schools, and those guys were cool, they were great. But there was not a lot of outreach you see going on these days, not that that's a bad thing, it just was a different era.

I distinctly remember some of the first advice I got from the management, then in public affairs, was the press release should be just the facts. You don't spin them one way, you don't spin them another way, you just get the facts, and when you run it through the program and the engineers, their input back to you should be fact checking. They don't tell you how to characterize it or how to—they could tell you that you didn't describe it correctly because it's not factual—but they don't tell you how to spin it, and they didn't believe in spinning. They were very transparent. Apollo, I really respect that the things that happened during Apollo and just the atmosphere then really promoted the agency to be transparent. Apollo 13, you look at Apollo, there were many instances of near catastrophes or catastrophes, and there were many astronaut fatalities in training and in T-38s, and so they were all business.

They were factual. Transparency is the right policy. So that was my first lesson on press releases was to be factual. Explain it in a way that people understand. Don't come in and write it in engineering terms. That's where the thing came in, factual accuracy. You will write something, and then there is always maybe a bargaining to say, "Well, I can talk about it in an engineering terminology, and people won't understand it. Or I can try to take your engineering terminology and put it into language that someone will understand, and is it still accurate?" Sometimes, there's debate like that that happens in a press release, but it's usually able to be overcome.

I do recall from the *Roundup*, it was so great, I would find people that were a story, the engineer, and I would write about what they do and write a story about them. Many times people would come back in to see me and say, "I've tried to tell my family what I do here and never really had them be able to understand. I took your story home, and they read it, and they get it now, they understand what I do." It was such a great feeling for me for doing that.

ROSS-NAZZAL: Yes, I bet.

HARTSFIELD: It also educated the engineers sometimes. Yes, they should teach, and maybe they have changed it some, I don't know, because—not really because engineers are still engineers, and they're brilliant, but they can't explain to people what they do sometimes. But I will say to be in senior management at NASA both, you end up having to have that quality too. Most of the people there in senior management end up with that quality, but you have to write to what people understand, and it still has to be accurate, so it's always a bargain in that regard.

Press releases, generally, we would identify what is newsworthy and what is not. Now, we'll have people come and tell us , "This contract is going to be awarded," or "This is going to happen," and give us an indication that this is something that is going to be something that I think is newsworthy. Sometimes we say, "No, that's not really newsworthy, we're not going to do a press release about it." Sometimes we say it is, or sometimes we find something that we hear. We would all go to staff meetings, all the staff meetings were covered by a public affairs person on your beat, your assigned area, and you listen to what's going on. If you hear something that sounds newsworthy, then you go follow up on it and then come back, and you run it through the news chief and through management in public affairs to see if they agree that it's newsworthy, then you'll develop a press release about it. That's the way a lot of them originate. Sometimes, they originate with people coming to us and saying, "We think this is newsworthy," and sometimes, we don't think it's newsworthy, so we wouldn't do it. There's a back and forth that occurs.

ROSS-NAZZAL: Can you clarify just for someone who is wondering, what makes something newsworthy? I guess it depends on one's perspective.

HARTSFIELD: I think you would have to have worked in the media to understand that to actually agree. Newsworthy is a pretty specific term that's understood if you're in the media what is or isn't. I think is it going to be of mass interest, is there a mass interest in it? There are too many things that are very niche, that are, no doubt, great accomplishments, but they're niche, so they're not going to really generate mass interest to have a press release yet, or maybe they're not ready for it yet. Maybe they need a while longer to conclude to that.

I think that's the best explanation I can give you. It's not a precise science because, certainly there's a subjectivity to it, and you can say something you think is newsworthy, you can write a news release about it, and it doesn't get any coverage. Then also, you can miss things. In those days, it was much less, that NASA was an open organization and it was a leaky organization, it's always been leaky, it's always been a fishbowl, but it was harder to leak then.

An engineer, a person, a NASA person was not going to carry papers from a meeting out to McDonald's and hand it to a reporter. It's much easier to just send them an email or slip them something digitally, right?

ROSS-NAZZAL: Right, yes.

HARTSFIELD: Now, what would happen all the time was they used walkie-talkies at KSC for launch preparations. So there were walkie-talkies from the people working at the pad on the shuttle, back to management in the buildings at KSC, and the media all monitored every word that went on those walkie-talkies. So, more times than I can remember when I was supporting shuttle at various times, I would get a phone call from a reporter in Florida saying, "Hey, I hear that this

has happened in processing for the shuttle. This system has a problem," or worse yet, "this beam has fallen, and there's an issue." I would go, "Well, okay." And they wanted to know what the impact was going to be. I would go upstairs, and I would go right into the shuttle manager's office and say, "Hey, I'm getting a question about this, do you know yet what it's going to be, how should we respond?" And they would go, "What?" They would get on the phone to KSC to call them to find out what's going on.

ROSS-NAZZAL: Oh, jeez.

HARTSFIELD: Because news traveled that fast, the walkie-talkie thing. So that was the leakiest part of things at that time. Since then, in the digital age, somehow, that's come 360 degrees to everywhere in some senses. It's a pendulum, it goes back and forth, I don't think things are as leaky right now as they have been at times. Sometimes, they get more leaky.

ROSS-NAZZAL: So how did you drop these press releases? How did you alert people like, "Hey, this is important"? We've got hundreds of them in the history office, so how do you make people aware?

HARTSFIELD: You mean the media aware?

ROSS-NAZZAL: The media or the public?

HARTSFIELD: Well, I will say it's changed. Everything has changed so much over the years. When I walked into the newsroom at NASA, the huge innovation was the fax machine. They had just gotten a fax machine, it was in the center of the newsroom like it was a throne, well, it was revered, it was such an awesome thing. They learned how to program it, they had just learned how to program it to put in 30 fax machines at once, so they could push a button, and it would send it to 30 fax machines, which were basically all the most major national news outlets in the United States. Previously, you had Teletype you could use, which was the old AP [Associated Press] kind of system, and they had runners that would take them down to the outlets in Houston. I wasn't here then, the fax machine had started when I got here, but the fax machine had everybody amazed, and I was amazed by it.

ROSS-NAZZAL: Oh, yes.

HARTSFIELD: You could send something through thin air, and it went to all—New York, Washington, LA [Los Angeles], to all the outlets immediately, and they got it, and they saw it. So for me, news release distribution was that to begin with. That's how you did it, you came up with a news release and you sent it to them, and NASA was respected, right? So when it came through on the NASA letterhead, and they also didn't give their fax numbers to everybody, the media outlets. I think they tried to limit their junk faxes, so it certainly did get attention then, and you would get calls.

That evolved over time to a distribution list as we began digital where people could subscribe to a NASA news distribution list so that then you would get the news releases, and we could find their email addresses too. There's reference guides that you get where you can find the

editor's email address and add them to the distribution list. We didn't have to do that as much because most people wanted our things. That still can be used today to the email.

Then there's wire services you can purchase too. You can use the AP wire press release distribution, which we purchased and have used. But it started with the fax machine, and the fax machine was there for a few years. I can't tell you the timeline exactly when you started moving to the different steps, but they just started evolving.

ROSS-NAZZAL: Yes, things moved fairly quickly it seems like.

HARTSFIELD: They did. If we look back at it, it probably doesn't seem as quick as it seemed at the time. The rise of the Internet, we didn't really know what it would end up at. I mean, if we did, we'd all be billionaires, too, right?

ROSS-NAZZAL: Right.

HARTSFIELD: We had NASA mail, I think, shortly after I got here, which was a very confined system, to send things back and forth among centers, but only a couple of people had access to it because it wasn't around for everyone. I could write my stories on a word processor, but even the *Roundup*, there was no—pagination is what the big word was then where you could lay out a paper digitally and then print it that way. We would write the stories, we would send them to a contractor we had that helped us with the layout and composition of the paper, just like it had been in Galveston, the composing room, where they basically took the stories and printed out type. Then they had a razor blade and hot wax and big, big easels, and we would have drawn the page up on

a sheet where you used a pencil and drew what you wanted the page to look at. You proportioned the sizes and everything and made sure the headlines would fit. They printed it all out. They started putting it together with hot wax and razor blade until they had a proof made, which then got imaged, and then created the press print, so a very different world. Hard to explain to people today. I would go over there every day, I would go over there every week, Kelly and I both, for that final composition because, inevitably, you end up doing some editing with a razor blade.

ROSS-NAZZAL: Oh, really?

HARTSFIELD: Yes, because it doesn't fit.

ROSS-NAZZAL: Oh, wow, so was there a big difference between writing for a paper in La Marque versus writing for NASA? Was that a huge change?

HARTSFIELD: Surprisingly, to me, that was not necessarily. One of the big differences, of course, would be that I let the people that I wrote about review it. But then the management there didn't want you to accept many changes. Your changes were only supposed to be for factual accuracy. So it was actually a benefit to have them review it because I was still a very non-knowledgeable person about science and engineering, and it was transparent to the point that I worried a lot about in the industry. You move from media to public relations, then it was called jumping the fence, because there's supposedly a fence between that, the paid media and the media that is working on the other side, but I think it's very different in other places.

At NASA, it didn't turn out to be that different. I don't know that I would have wanted to do that anywhere except NASA because NASA felt so—I never was the spin or anything. I was never told not to tell it in plain English and tell the truth and tell it factually. I've always been of the opinion very early on that, if I can explain things—I guess it's because I was so awed as I learned about NASA, and learned about spaceflight, and learned about what it takes to go to space, and to survive in space, and to come back home and survive, and to accomplish things in space. That if I could just explain that accurately to people—because even in talking to friends and my own parents or my own family, as I learned these things and I could explain them to them, and they were awestruck. They understood maybe why it's expensive. Everybody always overestimates how much NASA costs, that's just a perennial, constant thing. But if I could explain it to the people accurately enough, they would understand why it is expensive.

Science fiction, science fiction, it's our friend, and it's our visionary because, yes, how many things have happened in science fiction that we go look at and we've then made real and are reality now? There's also things in science fiction that will never be reality, and science fiction inevitably makes it all look easier. I guarantee you that the general public out there has issues sometimes discerning what is fiction and what is reality in terms of space, and human capabilities, and technology right now. They generally tend to think that it's a lot easier to do things than it is. It's not a bunch of pumps and pipes and switches and turbines. There's something, magic, warp that can happen, that can make things go. They don't think about it in those terms, and they don't understand the temperatures that metal will face 250 degrees plus or 200 degrees below zero in a split second. That metal expands and contracts while it's doing that. It has to contain the most permeable substances on Earth while it's doing that, and liquid hydrogen and liquid oxygen at super cold temperatures.

That you have to accelerate from 0 to 12 times the speed of a bullet to get into space, which I think that was the most common misconceptions when I would talk to people is that they thought to go to space, you just go up. I think people think that now still because we have a lot of people that do ballistic flights and they think—it is space, okay, by the definition. It's not orbit, it's not going to stay in space, and we wouldn't go up if we could be at ground level and go 12 times as fast as a bullet and not burn up in the atmosphere, we wouldn't need to go up. And an engineer would not want to go up because it just makes it harder. But we go up just to get out of the atmosphere and get clear of any obstructions and accelerate to 12 times a bullet so that we can reach orbit.

Then I always thought this from early on my days here is it is just as difficult, if not more difficult than to decelerate from 12 times as fast as a bullet. Especially the shuttle, amazing vehicle to decelerate and really in part forces more gentle than a roller coaster to the crew and keep them in a cocoon of perfect temperature and deceleration that is less than 3gs [force of gravity] that they feel. To do those things, if you can accurately explain that kind of thing to people, the difficulty in cooling a spacecraft, the difficulty in generating electricity, the difficulty in just maintaining a leak-proof system. If you can explain those things to people, they'll understand all of the things that come with that, of expense, and delays, and this kind of thing.

ROSS-NAZZAL: I think it might be a good place for us to talk about working mission commentary because you're touching on a lot of those things. What did that require of you and what did you learn from the old-timers when you were first told, "Hey, you're going to go on console and this is what this means"?

HARTSFIELD: So old-timers, I learned a little bit from them, they weren't my main trainers. I mean, I don't know if I'd call Brian [D.] Welch an old-timer. I don't know if you know who Brian was.

ROSS-NAZZAL: I recognize the name.

HARTSFIELD: He passed away very early on and very young, but he had been a key public affairs individual. He had started here before shuttle, along with around Steve [Stephen W.] Nesbitt's time, so when the shuttle was just in its first flight or two. He was our main lead trainer for commentary; he was very good, very good with commentary. We would go do sims, you did countless number of simulations in mission control, doing commentary on a loop that nobody heard. Brian would come listen to your tape sometimes and give you input. Your challenge was to explain things in real time. You don't have time.

I will say this, so there's an element of trust that the public has had in NASA, and the public may say they don't trust us that much. Maybe they do and they don't, depending on the time. But I've been so amazed, I almost hate to say it in interviews, I've always been amazed that the public trusts me and others trust me to sit in mission control and decipher for them what is happening with the spacecraft versus someone external to NASA doing it themselves. That they trust me as a spokesperson to tell them that is remarkable, and I don't think it's replicated very many places.

That the trust that they place in NASA, that we're going to relay accurate information to them in that regard, but to do that, you don't have time to go ask. If there's things going on, that's when the control room is the busiest. And you don't have time to go ask a flight controller, "What does this mean, what's going on, how do I explain this?" You can't do that, you can't go bother

them, you have to be on a non-interference basis. You can go talk to them at other times; you can't talk to them when it's probably the most critical. So you have to know enough to be able to explain it yourself and explain it accurately. You do that by sims, so the simulations, practices.

Brian would train us. We also found other people that we wanted to emulate. One of the people that was key to me, and she would always be surprised by this, I've told her before, though, is Billie [A.] Deason. I think she was the first female commentator in Houston, and she never thought she did a great job with commentary, but I sat with her a lot on her commentary runs and on the sims, and I've singled her out to go sit with her a lot because she was good. She would explain it plainly, and she was always calm. She turned off the mic, and she would be feeling like she's going to have a heart attack and nervous, but when she turned the mic on, she was dead calm, and that's required as well. You should be nervous; you shouldn't be comfortable.

I've always told everybody that I have trained in commentary and stuff is, "It's okay to be comfortable or confident, it's okay to be confident. If you're totally comfortable and just, "Oh, it's commentary again, I'm just going to relax here and do it," then you're not situationally aware of what you're doing. You're not situationally aware of the challenges that are happening every second in space and what can occur and how complicated it could be. You're also not aware of the trust that is being placed in you by all those people that are listening to you that you're going to be accurate. You're just not self-aware if you're that comfortable, you shouldn't be that comfortable, you should be confident, not super comfortable.

We were lucky, too, in a way that we—well, the first time I ever went to mission control, it's still remarkable to me, was I had not been here very long, maybe a month, maybe a few weeks, and Steve Nesbitt invited me to go to the control center with him. He was going to do launch for

STS-26 because he had done the launch for *Challenger* and he wanted to do that launch to persevere, again, you know?

ROSS-NAZZAL: Oh sure, yes.

HARTSFIELD: He invited me to go with him, sit with him for a set of ascent sims, and they did them at the same time. They always tried to do these sims at the same time that launch would be, so that we had to go over there at 3:00 a.m. to start the shift, which the launch was going to be at 8:00 a.m. or something, 7:00 a.m. at sunrise in Florida. So I went over with him and gained a lot from him, and I tried to listen to him. Well, he didn't do a lot of commentary, though, after that, so he was not a great trainer, and he was in management, too. But that was remarkable going over there with him, and that experience, from that moment on, I was hooked on the control room. Going over there in the early morning to do that, it's very vivid, I'll not forget that.

But then another great training mechanism that we had as I've been there a couple of years and was moving into commentary was Department of Defense Missions. We were flying those out of what is now the Historic Apollo [Control] Room, right?

ROSS-NAZZAL: Right, yes.

HARTSFIELD: A public affairs officer had to be there around the clock, 24/7, so we staffed them fully up. We only covered launch and landing on a broadcast, but all the rest of the mission, you had to have supported because our agreement with Department of Defense was that if there was a situation that arose that endangered the safety of the crew or the orbiter, we could come up

immediately with a full, open broadcast. That was part of the public trust, that we wanted to preserve. We were not going to stay in a classified condition if there was a significant safety issue occurring. But in order to have that capability, you had to have somebody there who understood what was going on at the moment and could do it.

So you ended up working these missions for two weeks or a week and a half, and you didn't ever have to talk. You talked once a day, you would do a prepared statement that said, "The orbiter and crew are doing fine," that really was the total statement. But the rest of the time, you just have to listen to the control room work, you got to think about how you would explain things if you needed to explain them about what's going on. You listen to the shuttle work, you listen to each position because you need to understand each position and what they're looking at. It was a wonderful way to learn, it was a wonderful way to train. So that plus the sims, plus emulating people that we picked out Billie and Brian's insight into critiques, constant critiques. He was not really ever satisfied, which is good.

ROSS-NAZZAL: What were some of his critiques?

HARTSFIELD: Just that you could explain this better, or is that really accurate, or do you really know what you're talking about here because it sounds like you're just trying to bluff your way through? Maybe you better go read up this section, and maybe you should go talk to a propulsion officer now to understand how the steering jets work. Of course, the hardest for me ever was flight control computers because the modes for them and this kind of thing were just very difficult to get down. But mainly, it was he would find you things like that and then say—if you don't understand the system, you should go do homework and go find a flight controller and talk to them outside of

a sim and outside of a mission or anything and explain this to me. This happened during the sim, what did that mean, what happened, and then figure out how you would explain it accurately. They love it when you do that because they all want the world to understand what they do.

This is what I was saying about engineers. Most of them have had the experience of trying to explain to a layperson something like that and not being successful at getting the message across. So they welcome an interpreter to come in and do that for them who can do a good job at it. You have to earn the respect, and they hear you do that, and you have to talk to them and want to find it out, but they're more than willing to do that with you.

ROSS-NAZZAL: How much did you have to know about the missions themselves, the crew, the flight control team? How immersed were you in the payloads and everything that was going to happen?

HARTSFIELD: Over the evolution of shuttle, and this occurred with STS-26 and STS-114, early on, the media were focused just on the fact of completing the mission, the crew coming back safe. But as the program continued in both circumstances, the really news-making aspects of the shuttle became what it was going to do in orbit, and so that's what we did focus on. We focused on the Astrolab, we would study what that was. I have some favorite missions we can get into later.

ROSS-NAZZAL: Yes, absolutely.

HARTSFIELD: Do you want me to do that?

ROSS-NAZZAL: Sure, sure enough.

HARTSFIELD: I will say just a couple of things on shuttle, as an overall program, is obviously my first mission that I did ascent and entry on was a big one for me. It was STS-44, it was a Department of Defense flight, so we only covered ascent and landing, and I did both of those. That was the first ones I did. I did go in on that one, and so in the control room then, the old control room, you got your information from the cathode-ray tube screens that were there, the CRT screens, and they were just digitals that the flight dynamics used, and they were in engineering terms, an engineering term, obviously, for space velocity is feet per second. That's what they used a lot then was just feet per second. I never knew what a foot per second was. I never heard the term until I got to NASA. You could tell me 30 feet per second was 80 miles an hour, or you could tell me 30 feet per second was riding my bike down the street, I wouldn't know, and I felt that the world didn't really know that either. What people knew is what 80 miles an hour was, or 100 miles an hour, or 12,000 miles an hour. Although I don't think you can even comprehend that, but I don't think they knew that better than feet per second.

So I didn't want to call out the feet per second during the launch, where you're talking about *Discovery* is now traveling 2,000 feet per second. You did get nautical miles downrange, so you could say 12 nautical miles altitude, or 12 nautical miles downrange from Kennedy, altitude 35,000 feet or 100,000 feet, or what have you. That was the thing that I said, but the feet per second didn't.

On my first launch, I wanted to say it in miles per hour. No way to do that, except—and I meant to bring in the folder that I was going to show you. I still have my folders from then. I did a big sheet that was like 25 pages long because I set and calculated for every 100 feet per second

what that was in miles per hour. I started practicing, as I was practicing at launch to go through, and I would look at the feet per second, and then I would call out what it was in miles per hour instead of feet per second. I got some grief among the office because they said, "Well, by the time you've done that, you're not accurate on what you're saying." But I told them, "Well, the shuttle's going so fast that by the time you say anything, it's not exactly what it is anymore, so it's negligible whatever the error value is." Actually, there were some complaints about whether I should be allowed to do it, and I went all the way to Doug Ward with it, who said, "Go, you can do it, go ahead." Of course, he sat with you when you did launches then, and so I did that. I will tell you, the shuttle launches were never called in feet per second again, everybody emulated it after that.

I did have a time—I mentioned this in the podcast—where I was driving home from a launch, and I don't know which one it was, it wasn't too many after that, I don't think it was that one. But I'm driving home, and the DJ on the radio while he's changing songs, he comes on, and he goes, "Hey, listen to this," and it's my voice, and it's going, "*Discovery* is now traveling 10,500 miles per hour," and he's going, "That's moving," like he had never really thought about how fast it was, and I'm going, "Yes, that's right." Because I got that from talking to people who are not at NASA and friends that they need to understand the speeds involved because that's the difficulty, and the energy that's being imparted. That was a memorable time, and I did more of that as I went into more content.

You'll hear me on a lot of them, where I would talk about the shuttle weighs 2.5 million pounds at launch, and within 60 seconds, it weighs half of that. It's burned that much fuel because that's what it takes because that's talking about the complexity of what's involved. Then the last three minutes before main engine cutoff, it's going to triple its speed because it's above the atmosphere then, and it's just moving downrange. I would try to paint that word picture. It wasn't

all my idea because people would say you should paint a word picture, but I did go through the trajectory numbers and came up with those things to do. Then a lot of people started doing that, so I guess imitation is the form of flattery, right?

ROSS-NAZZAL: Right, yes.

HARTSFIELD: I do think it helped paint that picture of what launches were. I did impart that to my team later on for Artemis and for other things to try to do that. I did have the chance when we moved, and this is a milestone for JSC probably that marks a lot of what occurred over these years, is moving from the old control room to the new Mission Control Center when the new wing was built, and we went really from analog to digital in our MCC operations. Because the old room, I was the PAO [public affairs officer] for MOD [Mission Operations Directorate] for that one, and John [F.] Muratore was heading that thing up to the switch, and I wrote the press—great release, I loved that one—it said, "Mission Control Houston is Moving," and it got everybody's attention. Then the next line was, "Albeit it's just down the hall, but it's the first move it's ever made, and it's moving from the analog age to the digital age."

But I had the chance in that too. They offered to let me write my own displays, we never had the chance to do that before, so I wrote displays that had the shuttle then from that time on, from 1996, '95 on in miles per hour, kilometers. I still include feet per second and everything, so I had it all in all the units, so you could just look at it. Yes, I didn't have to use my cheat sheet anymore, nobody did, you could just call it out back then.

Objectives at missions, from my personal perspective, one, of course, Hubble [Space Telescope], the launch of Hubble was a huge mission. We would all have been looking to that so

long since *Challenger.* It had been planned pre-*Challenger* for it to happen. Then, of course, the things that subsequently occurred with Hubble [spherical aberration flaw], a huge crush, and then turned into the epitome of perseverance and succeeding, and so all of those missions. Everything to do with Hubble is everybody's highlight who has been during that time frame, I think. I didn't work the launch of Hubble, not on console, but I did work the first servicing mission, I think, in the second shift or so, and I worked some of the other servicing missions, and those were fantastic.

One of the biggest missions I remember, and it shaped a lot of what I did for communications for the agency was Intelsat, STS-49, Intelsat retrieval.

ROSS-NAZZAL: Yes, I remember that mission, that was a big one.

HARTSFIELD: It was a big one, and—well, I'll go back one thing. So my first mission that I ever worked in, this was before I did launch and entry was a gamma ray observatory, STS-37, and it did get me off to an interesting start. I was the lead commentator for it, even though I wasn't doing ascent, entry. But during the deploy, we were going to do the first spacewalk after, and so much went into that first spacewalk of it. It was a whole different attitude toward safety and caution on the agency's part than it was pre-*Challenger* where we had people in Manned Maneuvering Units sticking things up rocket nozzles, which always amazed me. I wasn't here then, I was going, "Man, they did that?" I think everybody that came in with me, there was such a big turnover came in after *Challenger*. They looked back at those things and said, "What?"

Gamma Ray Observatory was the first EVA (since *Challenger*), and Jerry [L.] Ross was going to do it, and so much went into preparing it. When I contrast that with later in my career in the wall of EVA [extravehicular activity] and how much we did EVA just for utilitarian purposes,

for station, it's amazing. Something the public still doesn't understand of where we were and where we got to in space, to normalize some kind of operations in space and do the things we did. But in that one, we were going to do a planned spacewalk, but then the Gamma Ray Observatory's antenna didn't deploy correctly, so they had to do an unplanned spacewalk contingency one right away. That was an eye-opener because one of the first big things I was in was this unplanned real-time activity in mission control, which was very exciting. So Gamma Ray was a big one.

Intelsat retrieval, while I was not on console for that, but the thing I was going to tell you that shaped me in communications that I did use a lot later, I think it was Jeff Carr or Brian Welch, one of those were the lead for that. But what they did, because it was so complicated with the capture bar that they were going to use to capture the satellite with. They actually brought media in when we did the preflight press conferences. They set a day side and set it up in Building 9 where the media could go up on the same kind of cherry picker that the crew had been using with the same kind of mock-ups and the capture bar mock-up and attempt to do it themselves. The media got a chance to hold the capture bar and try to capture the satellite. So they all went and did that, and they were filming them and doing interviews with the trainers while they did it, and it's hard. It was hard to get up there, and they do that. They succeeded most of them, some of them didn't, but it was hard.

It really explained to them what it was going to be, and I saw that, and I said, "Okay, that's great, it really got the media." The media all came, they loved it, too, because if you give media something they can do hands-on, they're going to be here. But the big benefit was it also had them understand that complexity, understand the challenge, and then that flight didn't go as it was supposed to go. We went out there three times, and they tried to capture it with a capture bar, and it didn't work, the satellite would move away. You can't imitate everything on Earth that you're

trying to do. But the fact that we had the media come in and try it themselves and get that in-depth understanding paid off so much for us in communications during that flight. Then, of course, the crew, in spectacular fashion, much on their own, came up with grabbing it by hand and persevered and achieved that flight. It was just a total hero story, but letting the media come in and do things hands-on, that really stuck with me. I saw that then and I used that much later, both for Return to Flight and for ISS [International Space Station] first element launch preparations and STS-88.

Other big missions I would mention are Tethered Satellite. I love that flight, and it's an epitome of perseverance too, where we had the first flight. That was a science-fiction flight. I read the book about space tethers before it—everybody on that control team did because we were all enthralled. We were thinking we were going to start up space elevators.

ROSS-NAZZAL: Yes, yes, I remember talking with Jeff [Jeffrey A.] Hoffman about that.

HARTSFIELD: Yes, yes, and it was exciting. Then to have it get stuck and not be able to deploy the first time and try all the different things we tried to try to make it happen and then have to come home. It was such a deflating thing and a letdown with the crew. Then we get to re-fly it, and we get to go back up and do it again, and just the amazing science of the Tethered Satellite and the audacity of letting something out on a string 20 miles from the shuttle, and then reeling it back in, it was just so great. Second one, it's all going great, and I'm sitting on console, we're all on console, it's feeding out the tether, and then out of nowhere, it's gone. But I still consider that one a success because we got a lot of science as it was going out. It was an unplanned thing, it was a little dicey right then when it got a little bit—the forces were such that—and I pointed this out in the commentary. Within 30 seconds, they were separating at 100 miles an hour from the shuttle,

so there was no chance it was going to recontact anything, but I loved that flight, it was an exciting flight.

God, there's so many. STS-88, of course, was a huge flight for me because I was the primary person for station. The first Shuttle-Mir flight, and then STS-114 was a huge flight, STS-135, a huge flight, I think. I can elaborate on all those, and we can as you go on, if you want.

ROSS-NAZZAL: Yes.

HARTSFIELD: The years are going by fast there.

ROSS-NAZZAL: Right, well, you worked, what, 80 missions I had read?

HARTSFIELD: I did, yes, 80 to somewhere more maybe than 80, I don't know, and I think it was somewhere close to 20 launches and landings.

ROSS-NAZZAL: Yes.

HARTSFIELD: I had found a place on-site where somebody counted them up and then I tried to count them up myself. I think it was close to 20 launches and landings because I know it was 80, maybe 90 missions. I don't know that I worked the most of any commentator. It would be either me or Kyle Herring. Kyle or I are the ones that did the most of anyone, so probably a close tie.

ROSS-NAZZAL: It seems like a lot. Okay, yes, I was quite surprised when I read that.

HARTSFIELD: Well, it was life, life was that, and it was a little grueling. For the first part of it, I was not married and didn't have a family. Then the latter part of it, I was married and had young kids, and so did all flight controllers, this is the story of everybody in a flight control position. But you work any time of the day or night. I've gone in to work at every hour of the clock. You go in and you're on a shift that goes from 2:00 a.m. to 11:00 a.m. for 12 days, sometimes for 18 days, or I think the longest was 20 days at one point. Because of wave offs and things like extended duration or other stuff. At some hours of the shift, you're at Denny's eating breakfast at 6:00 p.m., it's a vacant feeling in that regard.

I always felt like I fell off the Earth when I did a mission because I would be sequestered sleeping like that, it's no luxury, they're shift work, I guess, right? But it was different in the fact that you would be going in, and you would be full up, and have to be fully alert, and everything with the team that is all going through that.

I'm not going to say that I didn't get bored in mission control, I did. There were times where the mission is still going on, and it's 10 days that you've been working from 2:00 a.m. to 11:00 a.m., and you're going, "Hmm, I sure hope the weather is good for landing." There's nobody in the world that will not tell you that, and if they're telling the truth, that they didn't get bored now and then during a shuttle mission. But I certainly know, and I knew then, that to have the privilege of being able to get bored at being in such a unique place and doing such a unique job is absolutely amazing.

ROSS-NAZZAL: Yes, well, it's also good for the crew if things are boring, right?

HARTSFIELD: Oh, it's the best, it's the best, you want it to be boring. They'll work any little thing to pieces, right? You'll go in, and you'll hear about—and this would happen with media. When you have a boring mission, and especially in the earlier stages of Shuttle Program, all of the wires in the networks assigned reporters to cover NASA full time, and so they would be covering the shuttle full time. They had to write about the mission every day, they had to have a story about it. If the mission's going perfect and there's really not much happening, they still have to find something to write about, and it really vexes you sometimes. Because there's an icicle forming on the waist nozzle, and the control room knows that when they reorient the shuttle, it'll sublimate and it'll go away. But the media are going to make a big deal out of it, and so here's this urinesicle being written about with headlines because they got nothing else to write about. It's the curse of getting a lot of attention sometimes.

But, yes, boring was always very good. Boring, not always good for the media coverage, and it worked in our favor a lot of times too. I cannot tell you how many shuttle missions even in a small way—I can't tell you the exact ones, but I can give you some anecdotal things. There's a problem, and mission control works it over a day or two, and maybe it's a problem with a system for the payload that's not working exactly right. I remember one in particular, it was something to do with the payload control, and they came up with a thing that it was a wiring issue, and it was within the cabin of the shuttle, and they came up with a way for the crew to basically take the wires and splice them in a different way together with some butt connectors. The same thing again to almost every human being who has a garage has done on something. Not really rocket science, but it was in weightlessness, which is trickier, and it's with a shuttle that is a billion-dollar piece of equipment, and then your life depends on not messing it up. But the media would write a story about that, that the crew were the absolute heroes of the universe for being able to do that, and

that's great. It's a symptom, too, of the fact that the mission was going so perfect. I didn't have problems with it because it was true. The crew, it wasn't a situation where you can afford to make mistakes.

ROSS-NAZZAL: Yes.

HARTSFIELD: But what was done was not necessarily Earth-shattering, rocket science sometimes. I think the crew would tell you that a lot of times too.

ROSS-NAZZAL: Were you following the media as you were doing commentaries?

HARTSFIELD: Oh, yes, well, so that evolved because first on, without a digital world in the analog world, there's not good ways. In fact what we did with the media early on, we—and I had this assignment at times—we would come in early at 6:00 a.m., and you gather up all the newspapers. We had subscriptions to all the newspapers *New York Times*, *Los Angeles Times*, Houston papers, several others. You sit there and you go through them, page by page, find any NASA story there is. You cut it out with scissors, you paste it on a piece of copy paper, and you create a 10-page thing of stories from that day. You copy them, you make 20 copies of it, and you would bring it over here to Building 1 and put it on every senior manager's desk each morning. That's what we did with clippings.

ROSS-NAZZAL: I didn't know that.

HARTSFIELD: We did it, yes, until that became something you could do electronically, which was quite a while. So we would keep abreast of things that way because we would, obviously, get copies of it, and whoever was doing that, we would get that copy. Then from that, and from the *Houston Chronicle,* and from other sources that we had in hardcopy form before it was electronic, we would have to write the news for the crew each day, that went up, an execute package, the news of the day, which was important, I think, because the crew wanted to hear what was going on at home. They had no other way to do it then. It's evolved where they can see the internet, and there's a lot of things now, that's not necessary, but we did that at that time for them.

In fact I had an opportunity to go to Russia in 1996 on Shuttle-Mir, as did almost all of the communications folks, the PAOs at that time during Shuttle-Mir, to go support at the Houston Support Group and support the crews, communications for the agency and communications. One of the jobs was for the crew onboard. It was Shannon [W.] Lucid when I was over there. I don't know how effective it was, but they didn't have much link to home, to news from home. Mir didn't have a way to send up a hardcopy thing like we were sending up to shuttles the news from home that you'd see in the old execute packages. You'll see it a page 2 thing with a blurb each time, that we would pull together and condense and write. So what we would do is we would go, and in the Russian control room, there was a setup where we could go each day. We had to be there at a certain time that it was broadcast in the U.S., and we would record on a cassette tape. I don't want to even say what network it was, but there was a world news. It was a world news roundup that was like 25 minutes long. We would record it on the cassette tape each day, take it over to the control room, where it would get sent up to the crew in audio form for them to listen to. That was the news of the day for Mir to help keep them in touch, that was one of the jobs. You did know how the stories were going, and it's important to know what the media the way they are.

Honestly, and one saying, that went around for commentary a lot is that if the newsroom is getting a ton of calls asking them questions about something that's going on in the control room, you're not doing a really good job on commentary. Because you should be giving them the information that they can understand in a way they can understand it, and what they need to know. If the newsroom is getting no calls about an issue, then you're doing a great job.

ROSS-NAZZAL: Were you doing press conferences, would you do change-of-shifts briefings?

HARTSFIELD: We did, yes, we would come back, and your normal thing on the early days on those was that no matter what shift you had, you would go over with your flight director after your shift was over. Nine hours on console, you'd come over to the shifts who worked as mission control, an hour is a handover at first, then 8 hours of you working, and then an hour handover at the end.

Then you would come over to the newsroom with your flight director, hold a briefing, a press briefing, no matter what hour, day or night, take questions. You would talk to your flight director on the way over and tell them what you'd heard from the newsroom too. Because you have people in the newsroom sitting on the phone, so if they're getting calls from media, they're telling you what they feel is going to come up as topics in the press conference. So you alert the flight director to that so they can do some study, and you tell them that ahead of time before they leave the control room. So if they need to know more information, they can proactively get it from some flight controllers about what they need to know. Then you come over, and you moderate the briefing, and then that's the end of your day, and that briefing is over with.

ROSS-NAZZAL: Long day.

HARTSFIELD: Yes, yes, but like I say I was bored sometimes. It was never while the press conference is going on or something like that, but it's probably in the in-between times, but yes. There's a difference being a little bored and being comfortable. I don't say I was ever comfortable necessarily. I always had a little bit of adrenaline spike going.

ROSS-NAZZAL: Yes, I can see that because it's a mission, something could happen. Were you trained for those contingency situations when something would suddenly just out of nowhere flare up?

HARTSFIELD: That's what you practiced the most. Certainly for launch and landing, you would go in like the whole control team. The control team, as you know probably already, they practice anomaly procedures for all things. So everything you're practicing, mostly, you rarely ever—in fact, I loved it from a communications standpoint when you're the last ascent, entry sim, really the last run before launch of the last sim. They would do something like five or six sessions of sims over the months leading up to launch, and it's five or six actual ascent, entries in those sessions, at least that many, and you would be at all of those. The last run of the last session, they would make it nominal, and that was great practice for communications because you'd actually speak, and the thing wasn't trying to explain stuff crazily all day on what's going on and a return-to-launch site, abort, and all that stuff. Because really all you did most of the time on the other stuff was to practice off-nominal situations and practice how to explain that. A lot of then afterward homework, going and talking to FDO [flight dynamics officer], or going to talk to another systems position to understand what happened during it. You hear it on the AFD [assistant flight director]

loop, the background briefing, but that's still in an engineering term, so there's questions you'll have, and you'll take notes, and you go find that out to listen to. So, yes, a lot of off-normal situations.

On orbit sims, they also would have things, the orbiter having problems, the payload having problems. Actually they rarely did ones that were problem free on that, so you didn't get the break that you got on that last sim to really practice what you might say in most circumstances.

Now there were real problems sometimes, and sometimes there were problems that you had absolutely been in there for a sim for and practiced. Sometimes they weren't. Rarely are they perfect. Rarely is it going to be something that you practiced exactly like what really happens, but it's a kinship to it, and so it's hugely helpful.

ROSS-NAZZAL: Did you ever feel wrung out? A lot of flight controllers say they felt like the SimSup [simulation supervisor] was trying a lot of got yous.

HARTSFIELD: This certainly paid off in my career in the things I went through, I think one of the reasons they throw in all the anomalies is—because I interviewed some sups for stories. I got a chance to go into this SimSup and grill them and ask them why they do these kind of things. Other people won't get that. Perk of public affairs, when you do a feature story on somebody, you can go do it. But it creates a tension, you want to feel wrung out, because in real life, it's going to be tense. There's going to be pressures that you can't imitate, and so piling on a number of failures at a time is a way to try to create that tension artificially in a practice situation. So I feel wrung out, I felt it was beneficial though, and I think it helped me when I faced real issues, it helped me stay calm, it helped me react appropriately.

ROSS-NAZZAL: I'm just looking at my watch because I'm usually pretty good about time.

HARTSFIELD: It goes fast, right?

ROSS-NAZZAL: It might take us a while to get through *Columbia* and Return to Flight and obviously STS—.

HARTSFIELD: This is taking longer than I thought so, yes. There's a lot of good stuff on *Columbia* and on ISS and STS-135.

ROSS-NAZZAL: There is.

HARTSFIELD: And then honestly the thing that we didn't get to touch on the podcast is the rise of commercial space from COTS, Commercial Cargo, to the Commercial Crew, and even Artemis. That's certainly an evolution worth discussing, the communications especially.

ROSS-NAZZAL: Yes, absolutely.

HARTSFIELD: It's very akin to ISS. ISS was a great communications preparations. I'll just get in a nutshell, the working out of the partnership communications in ISS with space agencies was very beneficial, in my mind, for me, anyway, as I started to work through communications partnerships with industry and commercial crew. We had some of that in the shuttle, we flew international

astronauts, and we flew payload specialists even that were in industry, but it wasn't nearly the same at all in either respect, it's not like ISS. We controlled all the cards in shuttle. And then in ISS and in Commercial Crew, we didn't. I mean ISS maybe a little bit more so, but not really, so because they had all significantly contributed.

ROSS-NAZZAL: Yes, yes, well, we were partners.

HARTSFIELD: Yes.

ROSS-NAZZAL: It wasn't our program.

HARTSFIELD: We've always been the world leader in human spaceflight. We were that in a—I wouldn't say symbolic fashion—but we were that in a fashion where we have evolved into much more hands-on world leader in human spaceflight. During Shuttle and Apollo we led the world in what was going on in human spaceflight, but not in an interactive way like we do now, in a partnership way.

ROSS-NAZZAL: I think maybe then this might be a good place for us to stop, and we can figure out another time to get together and talk about some of these issues. Because I think I told you I have nine pages of material.

HARTSFIELD: Well, if you think it's worthwhile the stuff I'm talking about, it's good.

ROSS-NAZZAL: I do, I do.

HARTSFIELD: Okay.

[End of interview]