NASA JOHNSON SPACE CENTER ORAL HISTORY PROJECT
EDITED ORAL HISTORY TRANSCRIPT

WILLIAM H. BOWERS
INTERVIEWED BY SANDRA JOHNSON
HOUSTON, TEXAS – FEBRUARY 20, 2020

JOHNSON: Today is February 20th, 2020. This interview with Bill Bowers is being conducted for the JSC Oral History Project in Houston, Texas. The interviewer is Sandra Johnson. I want to thank you for coming in today, I know it's nasty weather. Let's talk about your background and what first got you interested in wanting to work for NASA.

BOWERS: I followed the space program from the earliest days. A buddy of mine in elementary school, we drew rockets and gave them to my uncle, who worked for the Air Force, because we just knew he was getting those handed off to NASA and any day they were going to pick up one of our designs. He had us fooled for a long time. I just had an absolute fascination with the space program.

There was some guy named Willy [Otto Oskar] Ley. He put out periodicals on space and space travel. This is in the '50s when we weren't traveling in space yet. I read everything that he sent out, I read little fiction books on space travel and life on other planets where U.S. personnel had moved and created colonies, just from the very earliest time.

It wasn't until we followed Mercury and then Gemini, and then when we got to Apollo, it doesn't get much better than Apollo, that's when I decided I'd like to walk on the Moon in my lifetime. It's very possible. This was the '60s, sure, I'm in my teens, piece of cake. Little did I know.

But it was something that was there, and it caught my interest, and I loved aviation, I used to lay out in the yard and watch the occasional jet fly over back in the ’50s, and occasionally they were military jets, and they’d break the sound barrier. I just thought all that was pretty slick, I wanted to be part of that in some way, shape, or form. But the interest just seemed to always be there. There were a few things that helped nurture it, but it just started there and I went with it.

My friend I drew rockets with became a very very respected engineer in air-conditioning up at the Trane plant in Tyler [Texas] where I’m from. He has just been madly jealous over the years, because he was much smarter than I was—much smarter than I was—that I ended up working down here, and he ended up working on air-conditioning unit designs for 40 years.

JOHNSON: I read that you wanted to go to the Air Force Academy.

BOWERS: Oh, in the worst way. It was a little tunnel vision. The [United States] Air Force Academy was this brand-new beautiful campus they’d built there in Colorado Springs, [Colorado,] and it was the Air Force, and my dad had been Army Air Corps in the war [WWII]. We watched every war movie that was put on TV or at the theater. For me the Air Force, that’s what you had to do if you wanted to be an astronaut and fly. Or fly first, and then astronaut second. Yes, I set my sights on that. Unfortunately I didn’t set my work ethic on it. But certainly set my sights on it, and visited the campus once while I was up skiing with a youth group. Of course once I saw the campus I said, “Duh, this is my kind of place.”

That got turned upside down. My congressman tried to get me to go to Annapolis [United States Naval Academy, Maryland]. He was an old Navy man, [Herbert] Ray Roberts, and he said, "You sure you wouldn't like to do Annapolis?"

I said, "Oh, no, it's got to be Air Force Academy for me." He made me primary to the Air Force Academy and first alternate to Annapolis. When they found out my eyes were off, and I didn't get into the Air Force Academy, the primary for Annapolis did get in, and I was left holding a big bag of jack squat.

JOHNSON: Oh no.

BOWERS: Actually, I was left with a letter from the government saying I'd been drafted, because you had a draft deferment with a service academy nomination, or if you were in college. But I had dropped out of junior college because I'd spend four years at Air Force Academy anyway. I created a perfect storm for myself there, as I've often done in my life.

JOHNSON: What did you do at that point?

BOWERS: I went down to enlist in the marines. We were still in the thick of Vietnam, this is spring of 1970. I went down to enlist, and I figured just get that out of the way. I figured they were supposed to be the toughest, and I had a tendency to bite off things a little bit bigger than myself.

The day I went in there, an officer from Dallas [Texas] just happened to be in the office, and he happened to be an [McDonnell Douglas] F-4 [Phantom jet] back-seater. I told him my

story while I was there to enlist, and he said, "Well, you already got three semesters of college. Not stellar, but you got three semesters of college. You still want to fly?"

I said, "Well, yes."

He said, "You can fly with the marines in the back seat of the F-4."

I said, "I like the sound of that."

He said, "Get your butt back in school. Pick up your academic deferment, then you can sign with us. As soon as you finish your degree you come on active duty in the Marine Corps as a second lieutenant." Liking the sound of that.

I pretty much did it that way, except I changed my major from physics to history and along about 1973 the Marine Corps said, "When are you ever going to graduate?" I signed up for the Marine Corps in '71, the program, and went to boot camp six weeks that summer and six weeks the next summer. In '73 they said, "Really? If you want to get in this program, you need to accept your commission now. You don't even have to have a degree." This is post Vietnam, and they were accepting people with at least a two-year degree. I already had my associate's now. But they weren't requiring a bachelor's at the time. It's like anything else. When they had a shortage of people, you didn't have to be 20-20 [eyesight]. It's a sliding scale, and at the time 20-20 was still a requirement but a bachelor's degree wasn't. They went ahead and commissioned me and I was off to the races.

They asked me, "Do you want to go to infantry school?" Like I said, I tend to bite off stuff.

I said, "Well, sure, I'm going to be flying around supporting marine troops on the ground, I need to know what's going on."

They said, "We can send you directly to flight school."

I said, "I think I need to learn how to be a marine officer first."

I went to [Marine Corps Base] Quantico [Virginia] and endured seven months there. I don't think I'd take anything for it now, but that's the bastion of Marine Corps infantry training. They weren't real fond of guys that had aviation contracts. I had guys in my command who had Navy Crosses and Silver Stars and Purple Hearts. Some of them had all of those. They were some hard-charging dudes. They just weren't real fond of flyboys.

But anyway, I endured that, and then off to flight school in 1974 down in [Naval Air Station] Pensacola [Florida]. When I got to Pensacola I thought, "Yes."

JOHNSON: You were where you wanted to be.

BOWERS: This is where I want to be. Yes. It's not easy but this is where I want to be.

JOHNSON: Took you a little longer to get there, but it's worth it, right?

BOWERS: Little longer to get there. I felt more prepared. In the long run it was probably just as well. I hope I wouldn't make a different decision now, just because it was easier.

JOHNSON: Did you get interested in photography while you were still in those early years in the marines?

BOWERS: I had always had an interest in photography, but I never really did much with it. My grandmother shot a lot of pictures. She worked in a drugstore where she could get processing

done more inexpensively. She shot tons of pictures and slides. We in my family didn't shoot a ton of pictures, but any time she was around, there were pictures being taken.

JOHNSON: Do you remember what kind of camera she was using?

BOWERS: She had a waist-level finder, I want to say Yashica. I used it as a toy for many years when I was a kid. I thought the waist-level finder was really bizarre, but wish I still had that camera. Probably worth some money now.

JOHNSON: Yes, it probably is.

BOWERS: That's the only camera I remember her having prior to the Instamatic. She grew along with the camera technology. When she got an Instamatic that actually rolled the film to the next frame for you, wow. We are ready to walk on the Moon!

But I would piddle around with it. I had a little X-15 Instamatic, still have it, Kodak, and I went out one day. We had, at my high school, these beautiful redtop clover in the spring, and we had 3, 4, 5 acres in front of the school. It was just solid in this redtop clover. I had noticed when I wore my Polaroid sunglasses, which had just come out, when I looked at it through the Polaroids it looked so much richer and deeper. I thought well, I wonder if I can put my camera up there and shoot through that. I tried with and without, and ooh, that's pretty slick.

I had to move to Sherman [Texas] in summer of '70 because my parents moved there, and that's where I went to college, a four-year school. They had an Air Force base there, and they were flying [Convair] F-102s [Delta Dagger]. There wasn't a prettier jet in the Air Force at

the time. I didn't know about F-4s so much as the F-102. The delta wing, oh, they were just gorgeous.

There was this hill and they would fly right over the top of maybe 100 feet, 200 feet. I would park my car there, put a blanket on the back and a lawn chair, and then let them fly right over the top, because they were just doing approaches and landings so they'd come over me time after time. I decided to try putting my X-15 up to one lens of a binocular. My telephoto. I had always had an interest in it, but I'd just never pursued it. Never had a good camera. Just goofed around.

It wasn't till when we went overseas in '79 and I volunteered to do the cruise book. I knew I needed a good camera, needed a good 35-millimeter. I bought it months early and practiced and practiced. Boy, whatever lab I was using, they must have loved the heck out of me, because I would just shoot, this one is an f/8 [aperture setting], this one is an f/5.6, so I could tell the difference and have them print them all.

I'm sure they looked at those pictures and said, "This is the most boring photography we have ever seen in our lives." But I used it to help teach me.

JOHNSON: Bracketing.

BOWERS: Bracketing. What depth of field looked like. What shutter speed physically did.

JOHNSON: What kind of camera was that? Was that a Nikon?

BOWERS: No, I don't know how I got interested in Canon, but it was a Canon A-1. There was an AE-1 which was a little more consumer. I went ahead and got the A-1. The only thing above that really was the F-1 and it was for professionals. So I got the A-1. Still have it too.

It taught me a lot about photography all by itself, I used the booklet, but the display and all was just really helpful to me. I now had a reason to shoot lots. I tried all sorts of novel things. Time-lapse, with a jet going off the aircraft carrier at night. The afterburner comes out from under it in a streak. Just all sorts of fun stuff. I really enjoyed experimenting with it.

I hadn't taken any formal classes until I got off active duty and went back and finished my last year of bachelor's and started back over at Grayson County College [Denison, Texas] in their photography department, took all their courses, which included darkroom. I had an ace. I'd been working with some of our Korea vets [veterans], I was working with some historical stuff for the squadron, plus the cruise book. One of our Korea vets, God love him, he had a full-color darkroom in his garage. He would print a lot of stuff for me. He showed me how to do a lot of printing. Cibachrome prints from slides. Regular printing from negatives. I already had a little bit of education before I even got to Grayson College. Boy, he really gave me a jump start on my interest in darkroom. In fact I still have a color darkroom in my garage right now. Don't have any use for it. I stepped through the ceiling at Christmas, putting the Christmas stuff up, and dumped drywall and insulation. But I did a lot of printing out there in that garage. I digress easily.

JOHNSON: No, that's okay, no, that's good.

BOWERS: Every story is a spider to another story.

JOHNSON: It's interesting to know that background and how you got interested in photography, and what led to that, because then you had this career with NASA. Was it after that you went back and finished your degree, and then what were you doing after that, and what made you decide to apply here at NASA?

BOWERS: I still wanted to be in the space program. I think I still had astronaut on my mind. I was an aircrew, and I'd been through aviation safety school, and in '84 I went through Top Gun [United States Navy Strike Fighter Tactics Instructor program]. I felt like I had the aviation background. I just hadn't bothered to look carefully enough at the requirements.

Somewhere I'd got it in my head that, well, if you've done this and this and this they can waive you. With 5,000 and 10,000 and 15,000 people applying, no. I started over. They had basic engineering there at Grayson College, so I took engineering in conjunction with the photography, knowing I would have to transfer down to UT [University of Texas] Arlington to get an aerospace degree.

But we had two kids by then. My wife, our deal was she got to stay home and raise the kids. I was using my reserve flying to keep us alive. Then we were going to have to move to Arlington, closer to my squadron there at Dallas. My math skills were just—my calculus teacher nailed it. He said, "Bill, your understanding of calculus is excellent. Your math is terrible. It's just really hard to do good calculus when your math is so bad."

I actually started in a process of starting a business copying 8-millimeter film and slides and negatives and whatever over to videotape. It was called the Froehlich system [Froehlich FotoVideo], it was a turnkey little kiosk about the size of your bookshelf there, and had all the

equipment, everything there. I convinced a photographer there in Sherman to help bankroll it, and I would run it. Digress a little bit, '83, one of my pilots down at Dallas was an MOD [Mission Operations Directorate] instructor in ejection seats, when we still were flying them. When we'd stopped flying them by then he had just rolled into another role. In '83 Marty [R. Vandenbrook] said, "You got a strong photography background, don't you?"

I said, "Well, strong and getting stronger. Have my own darkroom, I'm doing some commercial work in Sherman, and I'm entering and winning in competitions. So I hope so."

He said, "Well, we have an astronaut photography instructor position open." I applied, didn't get hired, they hired a local guy, save a lot of moving expenses, one thing and another. That's when I went ahead and looked into this other business, and said, "Well, that's done, that dream is done, just move on to something else."

Then 1984, right before I headed for Top Gun, Marty contacted me and said, "Hey, you still interested in that job?"

I said, "You hired a guy last year."

He said, "Yes, but after we got him in the job we found out he'd lied about his education. We couldn't check into some of the stuff till after he was hired." He said, "He's no longer with us. We need somebody."

I said, "I'm all for it but I'm not skipping Top Gun."

He said, "Understood, we'll make it work."

I came down here and interviewed. I wish you could have talked to Jeff [Jeffrey M.] Bremer. Jeff was my NASA monitor. He had been through at least the Apollo, maybe Gemini. He made so many major significant contributions to the photography program, some of them I

didn't know about till after he died and I read his obit [obituary]. But I brought some of my proofs down, contest stuff. Jeff thumbed through it and he said, "I'm good, it's okay."

I came down summer of '84 and we were off to the races. I thought boy, I get to fly F-4s on the weekend. Commute was a little more challenging, but I had a little Cessna 150 so I could use that, and Southwest [Airlines] as a backup. Fly on the weekends and train the astronauts during the week. I was still officiating football. What's not to love?

JOHNSON: You got to get as close to your dream as you could.

BOWERS: Yes. After I'd been down here for a year or two I said, "That's as close as it's going to get."

JOHNSON: Talk about that position that he hired you for and when you first came in what they wanted you to do. Did you have any training or was this something that you had to figure out for yourself? That was early on in Shuttle so things had already started changing here, and things were changing in the technology with photography equipment. So talk about those early days and what you were doing those first few months.

BOWERS: Fortunately, maybe just because I should have been smarter, but I wasn't real intimidated. The astronauts were all people like I served with and flew with. Hoot [Robert L.] Gibson, El [Ellison S.] Onizuka, people I was just real familiar with talking to and joking around with, and talking technical stuff with. That part didn't intimidate me too much.

The people in Photo/TV [training] were not photographers, in their training, not like the Building 8 folks [Photographic and Television Technology Division], who were so very smart. But they knew the equipment from a technical standpoint, they'd read the books, and they could point to this is the shutter release, and this, this, this, this, this.

JOHNSON: That's interesting.

BOWERS: They weren't photographers. It was more of a dry recitation of stuff the crew needed to know. But, I went to a lot of OJT [on-the-job] sessions. I think Fernando Ramos was one of our instructors. Obviously Bremer was one of our instructors who was a photographer. I forget some of the other folks. It was a job they did, rather than an avocation. It didn't take long, plus you didn't really have long, and you were in the thick of it.

I'd always enjoyed teaching. I was an instructor in my squadron with aircraft systems. That's what you were expected to be, and they'd pick a system or more, and that would mean you were the guy to go to if somebody had questions about that system. I was real accustomed to getting up in front of people and teaching. The only challenge for me was to learn the specifics of the cameras, because now I was using Nikon.

I had had my hands on a Hasselblad before, but I'd never done a lot of shooting with one, particularly not the 500 EL/M that we had. They handed me the Arriflex motion picture camera, $20,000 professional motion picture camera. Back in the '80s, even into the '90s, any documentaries done out in the desert of Africa or here, there, you look at the end, it would always say, "Cameras and lenses by Arriflex." It was incredibly good stuff. I had quite a bit of learning to do with Arriflex. Plus just cinematography.

That was challenging, because there was no audio, and the crews would take this rather heavy camera home and film, because we checked out the cameras to them. Practice, practice, practice. I'm sure they took advantage of it, but the more practice they got, the better we felt that they would perform up on orbit. But they'd get the 16-millimeter [film] back, and there's no audio. We'd sit there and watch it with them, to comment, "Oh, you need to pan a little slower, or don't zoom in so fast, you're giving me vertigo." That wasn't a lot of fun for them, but it's what we had at the time.

Somehow or another they made me the Arriflex system go-to guy. I wrote the training workbook on the Arriflex. But that also gave me a reason to go fly on the Vomit Comet [modified KC-135 Stratotanker zero-gravity training aircraft] to practice our magazine loading technique, because that was the nice thing, now we could fly cans of film, and maybe four magazines, six magazines, whatever we flew, and then you could just reload them out of cans.

JOHNSON: Did your area have to adapt, or have the companies that were making the cameras adapt or modify, some of the cameras or film?

BOWERS: Not often. Yes. Not often. The Nikon was definitely the most modified because they had to take it EVA [extra-vehicular activity], so they had to use different lubricants. When we took it EVA, Kodak had to make a special thin base film for us, primarily so we could get about 70 exposures as opposed to 36. Arriflex, I don't remember many modifications to the Arriflex, because it was intended for difficult environments. Hasselblad, I was not as knowledgeable about what had been done on their commercial grade camera. But I think it was minimal,

because again we didn't take the Hasselblad outside Shuttle. Shuttle Hasselblads never went outside during my tenure of Shuttle, and I don't think ever did, to be honest with you.

JOHNSON: The Nikon was what went outside.

BOWERS: Yes. The Nikon was it. I'm trying to think. We didn't take the Arriflex outside. Yes. Nikon to my knowledge was the only film camera that ever went outside.

When you see the picture, Bruce McCandless or Bob [Robert L.] Stewart flying out there as a satellite on the MMU [Manned Maneuvering Unit], and you got the Nikon up there, it was very similar to the F3 commercial [camera]. But you could pick one up and look at it and immediately say, "Ooh, this is quite different." That's what led into that story. That time we had that one turn up missing.

JOHNSON: Yes. Why don't you tell that story? I found it was pretty interesting, because I noticed in reading your bio there were several times where you took it upon yourself to do more to help find something that would work or that sort of thing. This was one of those instances.

BOWERS: The doors for initiative were wide open if you just—there were too many people I saw that just wanted to come in and collect a paycheck and do the bare minimum. That just wasn't my cup of tea. But one of the astronauts went over to one of the TAL [Transoceanic Abort Landing] sites. I don't know if it was the one in Spain or Africa.

He took one of the flightlike [Nikon] F3s, it wasn't a flight F3 but it was flightlike, and put it in his checked luggage. Magically when he got back to Houston, no F3. He reported it to

us and I reported it to the inventory control folks. Ah, crap. I don't know what those things were worth, but they were pricey. It must have been just a few months later. I tried to always get home at night to watch the CBS News, which I'm sure my daughter says, "Oh, God, yes, you did." They did a special on baggage reclaim [Unclaimed Baggage Center] in Scottsboro, Alabama. I didn't know anybody did that. I watched it, and the guy was talking about all the stuff that they get in there. Nobody ever had anything returned. It was just a good place to come and get good buys on stuff.

Huh. I contacted the inventory control folks. I said, "You guys ever thought of checking into unclaimed baggage?"

They said, "No, we hadn't, but thank you." Okay.

Another month, I mean it's been at least a year now since camera turned up missing, maybe a little longer. I got a call from Marshall [Space Flight Center, Huntsville, Alabama] and IG [Inspector General] Office. He said, "Do I understand you-all are missing a flightlike F3?"

I said, "Yes, we are."

He said, "You got the serial number on it?"

I said, "Yes, right here on my Rolodex."

He said, "Okay, well, we got a call today from Peachtree Camera," or something, it was clearly Atlanta, [Georgia], one of the big places. He said, "They got a call from a guy in Scottsboro, identified himself, said he had this camera, wanted to know what the value was."

The guy said, "Well, we wouldn't have any idea, that's such a rare what the market will bear kind of thing." He hung up and promptly called us and said, "I think this guy is trying to sell a NASA camera. I know what it is. There's something wrong about that. I'm driving down to Scottsboro today, taking an FBI agent with me. I'll call you from there." Hour and a half, two

hours later, I get a call. "Mr. Bowers," he said, "is that serial number (he read off the actual number)?"

I said, "Yes, sir. That's it."

He said, "Well, I've got it; it's in my hand. The gentleman here is more than happy to let us have it and said he was actually just trying to figure out what camera it was and how to get it back to the owners." Yes.

But it got stranger when I think it was a *Smithsonian Magazine* article. He and I had been email pen pals a number of times. He'd been tolerant. They interviewed this guy from Scottsboro, and he said not a single thing has ever been returned to the rightful owner. I was a letter writer at the time, oh, Lordy. "Oh, really?" I type a letter to the editor of the *Smithsonian* and months later I'm walking out of Building 4, one of the astronauts walked by me, said, "Hey, loved your article."

I said, "Which one?"

He said, "To the *Smithsonian*."

I said, "Oh, they published it?"

He said, "Yes, come up to my office, you can have my copy." I think I still have one of those in my archives. They published it. Yeah. He lied. That was probably one of the most bizarre things, and I was glad it worked out.

The NASA IG here for many years, he's off looking for Moon rocks right now, he's had a bunch of articles published on him. His son and my son played baseball together. He is a junkyard dog on stuff like that. I thought boy, if I'd known he was in the IG Office at the time I would have had a friend at the factory.

JOHNSON: Yes, you would have.

Talk about those astronauts. You were an actual photographer and you were helping to train them on the different equipment. I would think that would have helped them a lot. But talk about that relationship with those astronaut crews, and also what did they bring to it? Were some of them already good photographers or were they starting from scratch or was it just a mix of everything on the different crews that you worked with?

BOWERS: Yes, it was a mix, because obviously, for NASA, that wasn't one of the first questions they asked people during the [astronaut] interviews. But we did have some excellent photographers. We had some who wanted to be excellent photographers. They were paying attention. There were probably a couple who fancied themselves, but no names come to mind right now. But Marsha [S.] Ivins was actually a pretty decent little photographer, particularly air-to-air stuff. She did a lot of flying biplanes and one thing and another. She ended up being a big help in the Photo/TV area with her CB [Astronaut Office] hammer when we needed stuff out of the photo working group that they didn't want to let go of.

The benefit for me was I could look at particularly their pictures with them. I'd say, "Okay. You realize if you'd done this, it's good now, but," I'd tell them little stuff like leading lines and depth of field. Although we couldn't get too wrapped up in depth of field because things are moving pretty quickly up there. But if you took it into account, you didn't shoot something in the payload bay with the iris wide open and then say, "Gee, everything else is out of focus." Duh.

I hoped I brought that knowledge, and I know with a lot of crews it made it easier for them because now they had confidence. He knows what he's talking about. He's not just telling

me that 1/1000 means 1/1000 of a second. Okay. I explained the interrelationships and what happens when I do the picture. I think it helped in the long run. Particularly those folks who didn't know me, didn't have a military aircrew background, or doctors and PhDs. Shannon [W.] Lucid, oh, God. Shannon was such a great gal.

Really didn't have personality problems with the crews. There were a few that were a little more standoffish, a little tougher to work with, but not obnoxious or objectionable. But you just took them the way they were and did what you could.

Silly Mary [L.] Cleave, oh, goodness, if she wasn't having fun then something needed to stop. Smart girl. Loved having fun. But I don't know if I fully answered your question. I think that helped me significantly, one, acclimating more quickly, and then having crews when I told them something they said, "Yes, remember, Bill told us this." Which helped on that one DoD [Department of Defense] mission when the equipment guys were giving us lenses that were not in focus. That was a downside of the Hasselblad.

We used what we called catadioptric lens. They have a calcium chromate material in the lenses and they're sensitive to temperature and pressure. The guys tell me pressure as much as temperature, but my experience has been definitely the temperature was certainly the one I was most concerned about.

The crews were always having to find infinity, you're just focusing. But when you're shooting the Earth going by at 4 miles per minute and the computer is telling you set it at f/5.6 or f/8 or whatever for this spot and shoot, you want to be able to rack the lens over to infinity and start shooting.

We were starting to get some film back that was soft out of the long lens. Only the long lens, because it was the only one we had, they actually put a hard stop in it at 75 degrees and

then put a new distance scale on the outside. Worked well for quite some time, until it drifted. We found out they weren't checking them. We didn't find out till somebody said, "Hey, wait a minute. All these lenses that have had this problem have all been the same serial numbers." Whatever reason, we'd keep turning around the same serial number and flying it again.

But we didn't know yet what it was. Jeff said, "Let's just tell them to put a piece of tape. Maybe they're letting it drift out. Just tell them put a piece of tape at it." About a third of the way through one of my DoD missions the guys were saying, "You know what, this is just not sharp when we're using the 150-millimeter lens." God love him, Mike [Richard Michael] Mullane said, "Well, didn't Bill tell us if it doesn't look sharp in the lens it isn't sharp on the film?" Yes. Okay. They adjusted it and said, "Oh, here's where it's sharp."

They shot the rest of the mission. But they still ended up with a lot of film with that lens that was unsharp. I never heard from the Air Force. I know the Air Force wasn't happy, but the crew was unhappy about the tape it thing. That had come from higher up. That's when we found out that when NASA turned over the equipment responsibility to Boeing—Boeing FEPC [Flight Equipment Processing Contract] had come along then, this is late '80s—they hadn't required that they check the hard stop. They checked it at 15 focal lengths, 18 focal lengths, some trivial distance for that lens. Not even remotely infinity. They were checking out okay there. Then they were getting on orbit and having problems with that particular type lens.

That was a real black eye for everybody once we figured out what was going on. NASA didn't want to transfer the big granite bench that they had to use and all the equipment. Just didn't figure they'd ever move. It did.

JOHNSON: It's interesting. You mentioned the DoD mission that that was happening on. Just talk about the difference as far as what you had to do when you're dealing with a regular crew for a normal mission—a science mission or something like that—compared to a DoD mission, and how you worked with those crews. Was it different? Did you have to train them differently?

BOWERS: Yes, I don't know that it was vastly different. It's hard to remember that far back now. But I already had a top secret clearance from the military, and I had secret access, and that was all I needed was secret access to do this stuff. I think the crews needed top secret. Everything I worked with was generic. The shapes I taught them to shoot in the payload bay were just generic shapes. I didn't need to see whatever they would really be shooting.

I'd been around classified material long enough to know not to purposely ask them something that they'd say, "We can't talk about that." It was a little weird because any time you went to Building 9 to train, they closed the building down. Because remember the building was open to the public at the time. They put Velcro covers over all the windows. The little slit windows at the end. They put Velcro covers and locked all the doors and they put a guard down by the Space Shuttle trainer.

All my training there was really generic. "On flight day three you're going to shoot this, and here's the recommended settings based on what way the Sun is going to be and your attitude is," yadda yadda yadda. But we knew the Air Force was telling them in their checklist—I don't think I did it—I think the Air Force put some of these generic shape things in the pictures. We had little pictures to guide you by what the field of view ought to look like, this ought to be in the field of view.

JOHNSON: Is that in a checklist, a manual?

BOWERS: Yes. Standard photo/TV checklist. Yes, that's how my older two kids ended up having their pictures fly on orbit. Because I got tired of these blank pictures. My picture flew. I was shooting pictures over there one day for my checklist and the PLT [Pilot] on *Challenger* [STS-51L], Mike [Michael J.] Smith, Mike Smith's wife brought her family in, and I said, "You know what, I got to shoot this picture, and need a crew. You-all be my crew." I kidded Mike. Not mercilessly, but I kidded Mike that I'd flown his wife's picture in space before he did. He was real good about it.

But mostly it was similar, you just had to be very careful. I had to keep my checklist and my notes, everything locked up. It allowed us to stay in a closed office because they'd started going to that durn dense-packed cube [cubicles] crap at the time. They couldn't cube us with talking classified stuff.

I ended up with several DoD missions. But it was again opportunity for some initiative. They wanted them to use long 35-millimeter lenses, and the camera guy said, "Can't do it. Optics through the Shuttle panes just won't be worth resolution."

They did the math and it was all real impressive and I said, "Okay, I can't do that math, but did we ever go and shoot any images with a resolution chart and just see?" Because the windows in that particular Shuttle were flightlike. Just to see. They grumbled and Building 9 guys put the vehicle 90 degrees for me so I could shoot out the top windows. We got an Air Force resolution chart and got in there and shot.

The resolution was not perfect but it was actually better than what the equipment guy said. The Air Force said, "For what we're trying to do now, the only problem we got is zero-g. As these lenses get longer it gets harder to be stable." I then read in a photo magazine, this guy was making little handheld stabilizers in his garage up in Maine, Massachusetts, Vermont, something, and they would just fit right in the palm, and it was nice and oval, and I found a number for him. I said, "If you had a chance to fly one of those on the Space Shuttle would you like to?"

He said, "Yeeaah."

I said, "Well, can you send me one as a sample?" He just sent me one sight unseen and I went out and shot with it and it was really impressive, particularly for 1989, 1990, whatever the year was. I reported to the Air Force. I said, "I think you're going to like this." Turned it over to them, and they ended up buying it from him and flew it.

JOHNSON: It just helped stabilize that lens?

BOWERS: Oh yes. It was weird. We already had stabilized binoculars that were part of the Shuttle, and those were weird, because you'd move and then the image would move, those were bizarre. But this thing was similar but it just had this little vibration in your hand, and it was a big improvement. What else? There was something else that they needed that I saw something in a magazine or had an idea.

They liked my act, and Rockwell Shuttle—it was still Rockwell Shuttle—made me employee of the month that month. I think the company was mad at me at the time but they couldn't resist that. It was a little bit of not vengeance but—

JOHNSON: Validation?

BOWERS: Yes, a little validation. Yes, that was fine.

JOHNSON: Let's talk about some of the other things that you did. You mentioned that your group was also responsible for being in the back room on console during the flights.

BOWERS: Yes, those were some great days. Unfortunately it changed after [Space Shuttle] *Challenger* [accident], so I only had about a year and a half of that. God, I loved that responsibility. It was a little daunting at first, but you did OJT with somebody else. After one or two missions' OJT you were Crew Systems rep [representative]. I liked having that responsibility. The hours were not all that good, because it depended on which shift you got. Then they would move the shift about an hour to the right every day, so you might have started coming in at 9:00 at night, and before the 5-day mission was over you were coming in at 2:00. It was weird.

But yes, sitting at that console and knowing the flight activities officer up front was counting on you for not just camera stuff but where stuff was stowed. We had some basic malfs, we called them, malfunctions for the galley and the WCS [Waste Collection System], the potty. Those are the only two that come to mind now. Of course any of the payloads. I liked that responsibility.

During [STS-] 51I, Joe [Henry] Engle—I was telling you about Joe and Bill [William F.] Fisher and Ox [James D.A.] van Hoften and they went out and caught up with and fixed and

launched a 15,000-pound satellite. In the middle of this, one of them goes downstairs to get a drink, and the galley won't shut off. The needle is still peeing water. He calls down, "Hey, Houston, got a problem. I put another drink container on it, but it's going to fill that up before too long, it's going to burst, and I'm going to have water all over the Shuttle middeck."

Mi-Mi [Cheevon] Lau was the FAO [Flight Activities Officer]. Real nice girl, very very smart girl. But of course that wasn't her expertise, that's why she had other people back behind her. I wish I had a recording of it. She came on the loop and she said, "Help me, Crew Systems, help me." Because the flight director and the CapCom [Capsule Communicator] are looking directly at her and wanting an answer.

I think Bill or whoever the IV [Intravehicular] crewman was said, "We pulled the QDs [quick disconnects] out of the floor." Okay, good. "But there's still a reservoir in there." If that little servo switch is still stuck open it's going to just keep peeing water till the sump is empty.

I don't know what pub [publication] I had there. I don't know that it flowed off the top of my head.But I said, "Okay, just reach over, turn the thing off, turn the electric switches off, one potato two potato three potato, and then turn it back on and see if it stops." They called that up. Great, thanks. This was in the middle of an important EVA. They had other things to worry about. That gave me a good feeling that I didn't do anything heroic, I just happened to know, I'd done galley training with Sharon [Monica] Jones who was our Crew Systems person. She was so good with that stuff. But she worked her own shifts by herself, and she didn't know much about camera stuff.

That worked, and the crew was happy, and I was good friends with that crew anyway. But I think I told you a couple times they actually called my name down from orbit, and I have audiotapes of that, and I love it, I love it, I love it.

JOHNSON: Yes, that's nice.

BOWERS: Particularly the one where it was a real slow night, it wasn't the phase three planning shift because the crew sleeps then, but it was late at night, there was not a lot going on. The crew was just doing experiments and stuff. I had slipped down in my chair, not sleeping. We had a TV on our console. We could actually put a TV channel on, because there wasn't a lot going on. Anything coming down from orbit, it was just one of the payload bay cameras, watching clouds go by.

Pinky [George D.] Nelson came up and Shannon Lucid was the CapCom. He said, "Shannon, would you ask Bill Bowers where he hid those window shrouds?" My name just came down from orbit. I inched up in my chair. Everybody in the back room had stood up to see if I was there, alive. That was a surreal moment. The word I was looking for earlier was serendipity.

Anyway, I knew right where the window shades were, I'd shown them, but there's just so much. It was over in the corner, a little nook. They had these little sleeves and you could reach into this sleeve and miss the one next to it. I said, "No, they're in there, trust me." They put them up over windows so they could shoot out without a lot of reflections off the glass and whatever. That was funny.

I may even be mixing it up with the other one. But on that one, one of the astronauts wanted to go down and shoot Andromeda [Galaxy]. I don't know if Jay [H.] Greene was the flight director or Milt [James Milton] Heflin. But he said, "Tell him not to get *Andromeda Strain* [1969 movie]." Oh, yukkety yuk yuk yuk yuk, which is probably what Shannon said.

I think one other time one of the crews called down and asked for Dr. Bowers.

JOHNSON: I was going to ask you about that, that's kind of a nice nickname.

BOWERS: It was one of the silly honorific things that a few of the crews did, and I appreciated it; I knew exactly what it meant. Their image intensifier wasn't working. When it was loaded, we didn't have anything to do with that sort of stuff, it was loaded with batteries in it, and the on-off switch wasn't taped in the off position, it got turned on, so it had run on the entire time until the batteries depleted.

Image intensifiers didn't need that kind of constant exposure. They changed the batteries out. I'm sorry, guys, your intensifier is just Tango Uniform, which is a vulgar aviation term. But they knew exactly what that meant. That experiment was dead for the whole rest of the mission. Hated that, but sure glad it wasn't my fault. I didn't want the responsibility for that one. But it taught us something about when to launch stuff with batteries in it, and when not to. If you have to launch for crew convenience, make dang sure that off switch is taped down. You don't have an "Oops."

One of the coolest things that happened, it only happened twice, maybe once, but seemed like twice. There was a door right behind me came in from—I don't know if it was the payload back room, because I never had need to go in there—we were the EVA Crew Systems and we only staffed it with EVA, if we had an EVA. One night I was sitting there and John [W.] Young walked out of the door and sat down and wanted to talk EVA. I knew a little bit about EVA, had been following it since the '60s, but I was not an EVA trainer. I'd gone to some of their classes. McDonnell Douglas made you take a whole slew of Shuttle-related classes on all the systems,

which helped me later on, so I knew something about EVA. But I couldn't talk on John Young's level. I'd watched him launch on Apollo 16. What a thrill to sit and hear him like this.

JOHNSON: Yes, and talk to him.

BOWERS: Talk to John Young. That Southern drawl of his is just basic. As basic people as you can get. I liked John. He knew I was from Photo/TV after that but we weren't on a first-name basis. If you could get his attention, he'd [gestures saying hello]. But he was always focused. Always had something going on. Good guy.

JOHNSON: You were training the crews. You mentioned earlier that they had so much to learn that they couldn't remember everything. That's one of the reasons you backed them up. About how much time did you spend training them on the different equipment for a mission? Was it daily or just once a week? I know some of them had more time to train before their missions than others.

BOWERS: Usually they'd name the crews close to a year before, and by then we were already doing generic training with them. "Here's how the 35-millimeter works." But we're not talking a checklist or specific stuff. Then as we got into—I'll say six months, I don't remember the exact number—six to eight months prior to their flight, then we'd start talking. They knew what they were doing for the most part, and we'd start getting flight-specific training.

There was a syllabus and you had your generic syllabus and that was dictated by MOD. You have an hour and a half or whatever it was to teach Arriflex or you have this much for the

70[-mm Hasselblad camera]. When you go over to Building 9 you have this long with the CCTV [Closed-Circuit Television] system, which was a little more complicated, lots of buttons. They dictated that for the most part.

But once we got into flight-specific training I think the crews' input—I don't recall if I ever got called and asked, "How much time do you need?" But I may have been and it was just another day at the office. But we got to orient a little more of our input to that. But again it had to work with the crew schedule. That's why we ended up doing some last-minute training. Not training we hadn't done before, but they hadn't done in a while, down in the quarantine quarters, because they were going to go to the Cape for 2 weeks, 10 days, whatever it was, for launch, and they wanted one last barrage of camera training in at least the Arriflex, Hasselblad, and Nikon. We couldn't do the CCTV other than just look at the checklist, but they generally had that down pretty good because it was so involved—it dealt with everything they did. Anything that happened in the cabin or in the payload bay, you had to have CCTV.

We didn't have camcorders yet, although I got to pioneer that. It was fun but it also came with baggage. I think I put in my other resume as we got into the latter part, '88, '89, '90 after we resumed flights in '88, some of the crews were launching in the middle of the night. They had to shift their circadian rhythms. We'd go over there to train them and they had lights on the walls and they had sheets, and it was extremely bright in there. I think they were daylight-balanced bulbs, 7000K I think, or near that, 5500K. We'd train with them. Sometimes I'd take somebody else with me because we could maximize the training, particularly if it was relatively generic. Just to refresh on the cameras.

I think I mentioned that we got through the one session, it was about 4:30, 5:00, and they said, "Bill, can you stay for lunch? Having hamburgers."

I said, "You know, as much as I'd love to—." I wish I had now because they fed them great down there. They never even came close to going hungry down there. But yes, we had to carry our training all the way through. I don't know that we suggested that, maybe Jeff did and I didn't know about it, or if the crews. In fact the first crew we did that with was 51L. I forget the building number. Nobody really knows about it anymore. It was an obscure building that had two mobile homes in it. Those mobile homes were their quarantine quarters. There was a mobile home out back where a woman—I can see her face, almost said her name—did their cooking. All they had to do was walk out the back door and walk up the steps, and say hi to George Abbey, because if she was serving he was going to be eating.

But they were the last crew to use that. When we didn't fly till '88, they built that really fancy quarantine quarters down there where the Astronaut Selection Office was. It had hotel type rooms. It was pretty basic. They had a satellite dish outside the old building to try to get some TV in there. That's actually when we started the quarantine training. We all had quarantine badges that allowed us to be around the crew when they were in quarantine.

But I never went to KSC [Kennedy Space Center, Florida]. Just wasn't an occasion to go KSC. At the time unfortunately KSC and JSC were like two spatting children. You didn't take your JSC badge and walk in KSC. They'd look at you like "When did you leave Red China?" It was terrible. I kept hearing about it and they kept taking astronauts to become the Director of KSC, and I thought, "What are you guys going to do about that?" It's much better now. But I would have gotten in trouble because somebody would have told me I couldn't bring a camera in here when I was doing my job or something and we'd have gone to "fist city" and that wouldn't have been good.

I never saw a Shuttle launch until I got to Boeing. I had lots of invitations from Wendy [B.] Lawrence, Jan Davis, I forget some of the other, Ken [Kenneth D.] Bowersox. Ken was one of my favorites. He was my tech rep [technical representative] on the Shuttle Crew Operations Manual. Any time I had a Shuttle systems-related question from the CB perspective even though I worked for Don [Donald E.] Williams, I could call Ken up and get his input.

All my kids were still young, and you couldn't take young children into the VIP viewing stands. We didn't have the money anyway, and if we did it would just be me. Never went till Boeing said, "You've been there five weeks and you haven't been to KSC yet? There's a lot of people you need to meet down there, people you're coordinating with. Oh, and there's a Shuttle launch during that timeframe if it goes on time."

I said, "Sign me up."

JOHNSON: It's impressive.

BOWERS: Yes, Boeing did me right in that regard.

JOHNSON: That's nice.

BOWERS: No complaint.

JOHNSON: You just made me think of something, because you did take those photos of the crews in their launch positions. But that was done here.

BOWERS: Right.

JOHNSON: I was assuming that was probably done at KSC.

BOWERS: No. In fact the girl in my office, Judy Alexander—the Shuttle stretches, would stretch during mission, and we had a DTO, detailed test objective, to try to get an idea how much, and so we took measurements before launch across the cabin, and the crew were to take another one on orbit, we had that in the checklist. Then they needed to do another one when they got on the ground. At the time we were still mostly landing at Edwards [Air Force Base, California]. The photo people out there kept taking pictures at an angle, when you needed to see the mark normal. After they did it wrong a couple times, Judy said, "I'm just going out there."

She got on the convoy, they took her off, and she got on the convoy, they took her off again, and it went back and forth, back and forth. She finally got on the convoy, went out to the vehicle after the crew had gotten off. She started up the ladder, and one of the union guys said, "You're not bringing that camera in here, that's my job." That's why it was good Judy was there because she was a fine Catholic girl. He and I would have had, well, "You got two choices here, bucko, which one do you want? You can eat this camera or you can let me take picture with it, because you guys ain't getting it done."

But anyway she did convince him what she absolutely needed, and we got the picture. I don't know if we did that DTO again, but oh, what a chore getting it. I was so disappointed with the system that we couldn't work together better than that. Somebody was more worried about their turf and their job because somebody took a picture in the Orbiter. No, we could have never done those at KSC, with all the clean issues.

Building 9 CCT [Crew Compartment Trainer] is where—I don't know if I did it in the FFT [Full Fuselage Trainer]; mostly the CCT. It was high-fidelity enough that unless you know what to look for, it wasn't a problem. Those were a lot of fun. I wish I'd known more about what I was doing on the first couple [of launch position photos]. But I finally got it right and cranked out some good ones.

JOHNSON: Yes. You mentioned in your bio that you finally got a good lens that you could actually get all of them in the photo without it distorting.

BOWERS: Yes. If you look hard enough, there was some distortion, because it was a 16-millimeter lens which had a 180 degrees diagonal field of view. You're going to get some curvature, and you're going to get some bending. But it was a Nikon lens. It was still excellent glass, Nikkor glass. We just had trouble getting it from the equipment guys. They didn't want to let us know they had it.

We had problems like that on a number of occasions. That's where Marsha helped—it's one of these things, if you have it then I don't. Or if you know I have it then—I just never understood it. But we got that and started flying it as a complement later on after I showed them the results we could get with it. Oh yes, that made it much easier to get that shot. You still have to be careful because you're putting the camera up and the best you can do is take the eyepiece off the top and use a dental mirror and look, "Yes, I got the pilot's right shoulder is in, the commander's left shoulder is in, okay, I think we're good there as long as it doesn't move."

We had two flashes that Don [Donald C.] Carico helped me with. In fact they were his flashes. We set those up as slaves so that they all went off together. It was a lot of fun. I really

liked it when Don Williams's crew said, "Hey, Bill, stick your head up here and get in one of these with us." That was 1989, I think it was August of '89. I treasure that picture with that crew.

JOHNSON: Definitely some neat opportunities, unusual things.

BOWERS: Yes. They were always there. High-speed films. Crews would come up and ask you, "Can we do this?"

"Well, you know, I don't know, but let's see." Or sometimes it was, "I don't think so, but—the equipment guy said we couldn't shoot with long lenses out of the upper window, so let's look into it."

JOHNSON: The type of photography they were doing was everything from Earth obs [observation] to experiments up close. There's quite a range there to try to train them on everything.

BOWERS: Some of it was—I won't call it microphotography, but it was getting down to that at the point in time we were doing protein crystal growth and some of those types of experiments. We had to figure out how to backlight them so they could take pictures of them. They actually built a bracket above the middeck lockers so we could take it out of the locker, attach it to it, and they could just slide it out on little roller balls, take pictures of it, slide it back in two days later, or whatever the experiment called for.

But yes, we did personal pictures, lots of Earth obs pictures, payload bay. We didn't do a lot of deploy stuff after *Challenger*. We really quit deploying major stuff. That was understood, and I kind of missed some of the challenge of that.

Yes, there was a real wide range of stuff that we had to cover. But the better we trained them, the better they were to be able to do what was in the checklist, or if the checklist didn't quite cover some event they'd run into, they could audible better. It was a good mission if you didn't get any calls down that we don't understand how to do this. But I did get one of those.

JOHNSON: One of the things I wanted to ask you about is you mentioned Jeff Bremer. You said you felt like you had a lot of freedom to pursue things when you needed to. Was that the general feeling with the management the whole time you were there in that area?

BOWERS: In our area of Crew Systems, which was primarily contractors, I think so. We had two NASA monitors. Jeff was our photo guy and Dave [David R.] Brooks, God love him, was our CCTV guy. I don't know that there was anything Dave Brooks didn't know about electronics. What a great guy.

Just aside, Dave was the only person that I know of who ever had an [cardiac] infarction on the flight deck of the CCT, and he had a young lady who hadn't been with us too long, but she had some CPR [Cardiopulmonary resuscitation] training.

She kept working on him and then running down and hollering and going back and working on him, running down and hollering, till somebody showed up. Somehow they got Dave down that narrow hatch and got him to Saint John [Hospital]. I got over there and his wife

was there. She said, "We know he was without oxygen for significant periods though they were doing the best they could."

I said, "You got to understand, if Dave has lost half of his brainpower, he's still twice as smart as the rest of us." She kind of smirked and she said, "I hadn't thought about that. Probably so." Dave survived and came back and worked.

About six months later had a heart attack out in the front yard where nobody was there to save him. God, he was a loss.

JOHNSON: That's a shame.

BOWERS: He could tell you how to fix your washing machine, your car, your TV. What a great guy. But those are really the only two NASA monitors. I don't remember MOD, NASA management, landing on them in any shape, form, or fashion, any kind of rigidized [requirements], just get the work done that's in the syllabus, and don't cost me a bunch of money for work we didn't anticipate.

Jeff would give you his two cents' worth on when he thought something would work. But not once did he say, "No, you can't do that or I don't want you to try that." Not once.

JOHNSON: How many people were working in your group?

BOWERS: Oh, Crew Systems, I don't remember with EVA, because there was a slew of EVA folks. Crew Systems, it boiled down to three of us in Photo/TV after *Challenger*. Don Carico, who died about three years ago, Judy Alexander, who disappeared after she retired, and Jeff. Jeff

scaled back his instructing. He had polio as a kid, and mobility was really really challenging for him. But technically we had three active and Jeff.

In the Crew Systems area—and I'm probably leaving somebody out—but we had about three or four there because we had so many crews in training, from generic training to flight-specific. Sharon [P.] Jones was kind of our—at least my go-to person. But I think we had Richard [S.] Honaker and we had a few others. But when I left there in '90 I think Sharon was still my go-to person.

JOHNSON: You were talking about the film camera that they were using, there was no audio. Then you had the little camcorder that came out. Was that a Kodak?

BOWERS: Yes and no. Kodak, we had a wonderful Kodak rep. Can see him to this day, and I'll think of his name here in a minute. Great guy. He and Jeff were very good friends. He watched what we were doing with that 16-millimeter film and you could record audiotape on the Shuttle and try to sync it with the video. If it was downlinked it would be, but if it was just stuff in the cabin and you didn't have a tape, then no.

We were using these old three-quarter-inch U-matic tapes which took up a lot of space and only had 20 or 30 minutes' record time on them. They were a beast for stowage and utilization. That's why the Arriflex seemed like such a great idea, we could shoot so much film now.

Pete Stadler—I think he'd been working with Jeff on it for a while, because by the time I heard about it it was kind of a fait accompli. He said, "We're going to give you guys 12 or 14 of our Kodak Hi8 camcorders [8 millimeter video cameras]." Now you have good quality on 8-

millimeter because it gets downlinkable and you have audio. It's lightweight. The crews can take that home, and they don't have to take the Arriflex home. They learn how to use the Arriflex because PAO [Public Affairs Office] still wanted all that film. But now they should be maybe better at how fast to pan, how zoom to zoom, no, not this, don't do that. We got those things in, and of course that got people thinking hmm, yes.

Some point in time the photo/TV Program may have said, "We want you to fly a camcorder as a DTO." They didn't choose Kodak. It was a little bit bigger camera. They picked a Sony Handycam. A good camera. But the equipment guys wouldn't give me one. I've got to train the crew—I think they only had one or two. They were just trickling in.

They didn't want one in our hands getting broken maybe or whatever. I'm trying to write the crew procedures, and I ended up with two weeks of active duty out in California, my old base out there. I went out there. One mistake, I forgot to tell my boss I still flew with that I was going on that deployment. He was none too pleased.

But while I was out there I went to my old camera store where they knew me. It had only been a number of years. I said, "Okay, guys, here's the deal, we're flying this camcorder on the Space Shuttle in X number of months, I've got to train the crew on how to use it. I can guess a lot of stuff, but I want to take Xerox of it."

They looked around and said, "That's got to be a true story, because that is so bizarre." They loaned me that booklet. That weekend I xeroxed it, probably at the squadron, probably military. But anyway xeroxed it. When I showed back up I was in trouble, but I had summited a very difficult situation that was going to get real political if I made too much of a complaint about it. When Marsha came on that wasn't a problem anymore. Marsha does not make something political at all.

JOHNSON: Was she just able to get them to do what she wanted them to do?

BOWERS: Yes, she'd walk into the meeting, and say, "We need this. You don't. You've got it over there. I don't want to hear any more about it."

JOHNSON: They listened to her.

BOWERS: Yes. You didn't mess with Marsha. The big bag we fly now, stowage bag? It's called the M bag. Marsha bag. I think partly because either one, she wanted it so badly, or two, somebody said, "You know, we could put her in there." Because she's a little bitty person. But she's a fiery person. I love Marsha, she's quite a gal.

JOHNSON: That's funny.

BOWERS: But anyway, I had to fight that battle by myself. Marsha either wasn't there yet or we weren't aware of her interest to it. We got the mission flown. During the mission, this is post *Challenger*, so I'm not working, I'm on call. Get a call at 2:00 in the morning, 3:00 in the morning. Crew is up, working. "You need to come in. The crew can't figure out how to use the camcorder." Lordy, Lordy, we sent them home with it, we brought it over to quarantine. The steps are—they may have been a little abbreviated because you're supposed to know something about it.

They sent me a young fellow over from the equipment area, really nice guy, Doug [Douglas] Holland. Doug was in a difficult position because he was relatively new. Very smart fellow. But had no crew training experience, didn't know this particular camcorder real well, or what we do to tell the crew.

He and I were tasked with drafting some new procedures to uplink. Of course Doug wanted to throw in the kitchen sink. I said, "We can't do this, we still got to try to keep it, figure out what they were doing wrong—because they couldn't get the camera turned on. It had a little power switch on the side—but whatever it is they're not doing right, and we'll make sure that that's covered."

He and I worked for a couple hours and took a set of procedures over. Most times we went into Mission Control, and they looked at our procedures and said, "Okay, we'll give this a try." That was my one call that I didn't want to get.

JOHNSON: Middle of the night.

BOWERS: I never was convinced that there was anything. But you didn't criticize the crew. I loved them, and they had a lot on their plates, but you did not criticize the crew. The crew didn't do this, the crew didn't do that. If you did that at all, you did it with very very closed circles. It was called the "Theorem of Crew Infallibility." Which I tried to use at home but it never worked with most of them.

JOHNSON: It's funny how that happens.

BOWERS: Yes. If I went back and looked at those original procedures today I might say, "Yes, I guess." But I had a level of expectation, like with the other equipment. The other procedures were written to the same level of detail.

JOHNSON: Writing those, the other people you worked with, did you all write the procedures? Or were you the one?

BOWERS: No, if it was my crew.

JOHNSON: You're the one that wrote them.

BOWERS: Yes. Once we started assigning a single instructor. That was after *Challenger*. Of course we had almost three years, '88, and Judy Alexander got STS-26, although I helped as much as I could. That was the first one of the crews that I got a better [launch position] shot of than the 51L crew. But after that you trained your own crew. Particularly once you got to the checklist level you didn't want anybody else coming in and saying something different, misconstruing something, "I would do it that way." We couldn't have that. Each person is supposed to have their own crew. Unfortunately they started doing this with the missions. I ended up with three or four in a row.

JOHNSON: Oh, goodness.

BOWERS: That was very very difficult, because I had to be careful and a couple of times I screwed up. Who was it? I think Hoot Gibson's wife Rhea Seddon looked at me one day. She said, "Bill, we don't have that payload on our flight." Oh, that's right. You didn't want anything that could damage your credibility.

JOHNSON: It was too much going on.

BOWERS: You had to be careful. She was real sweet about it, said, "I didn't think so." Judy [Judith A.] Resnik would have looked at me and said, "That's not our flight." Judy was a little more matter-of-fact.

JOHNSON: You've mentioned the *Challenger* crew or that flight a few times. Let's just talk about that time period, because you came in in '84, a couple years before that. Did you work with that crew? That wasn't your mission though, right?

BOWERS: We were still doing a little bit of a collaborative effort. It wasn't till after *Challenger* that we started segregating. Of course with Christa [McAuliffe] on the flight, she was so much fun. I was good friends with El and Mike Smith. Christa and Barbara [R. Morgan] were such a treat to work with. I just worked with them. I of course was working toward getting that shot and improving on the previous [STS-]51C version of it where I didn't really know where to put the camera properly or lights.

But yes, I made fast friends with Christa and Barbara you couldn't help but do that.

JOHNSON: She's a nice person.

BOWERS: I loved their enthusiasm. My younger sister is a career teacher, so I appreciated their perspective. They were just so bubbly over everything. Everything you showed them. Oh, that's really—they were just—it was just so much fun working with them.

El and I had been talking for about a year of opening a sushi bar. We started talking that on his last DoD mission. We were talking some for *Challenger* mission. He actually called me from KSC and he said, "Okay, let's cut the crap, cut the talk. When I get back from this mission let's do it. You find the place to get the financing, pick out the spot."

I said, "I already got that picked out, way ahead of you."

He said, "I can provide the sushi chefs." Because he wanted Japanese folks doing it, almost nonexistent around here. At the time there were no sushi bars, zero, on this side of town.

I said, "Okay, I'm with you."

Obviously losing El was the most important part, but that little dream of mine drifted away. A few years later I got in touch with Lorna [Onizuka]. I'd run into her here and there. I said, "You still have any interest, or do you have any interest in doing that?"

She said, "Bill, that was El's dream, not mine." She was in that *Challenger* [Center] program.

JOHNSON: Yes, she was very involved.

BOWERS: She was a very busy person. Both the girls to raise. One of whom is a dear friend of mine, works with us at Boeing. You know where Tokyo Bowl [restaurant] is?

JOHNSON: Yes.

BOWERS: Okay. The building right in front of it where that Cajun place was, that was vacant, had been vacant for some time. I said, "Perfect place. Easy to get to. NASA people. El's name will draw. This Bay Area. Can't go wrong." When Tokyo Bowl opened years later and then moved there even more years later I said, "I knew it was a good spot, I knew." But anyway, that was done. But yes, Mike Smith was such a pleasure to work with. The commander [Francis R. "Dick" Scobee], he wasn't a cutup, but he had a good sense of humor, but he could stay focused. Liked him real well.

Judy was all business. Between you and me, there was sometimes friction between her and El because El was a cutup and Judy didn't like that. Greg [Gregory B.] Jarvis. Only reason Greg Jarvis was on that mission is we'd flown a congressman [Bill Nelson] and had rolled him to another flight, which I was always angry about. It's the luck of the draw, but it still made me angry. Of course Barbara and Christa. Oh, and I didn't mention Ron [Ronald E.] McNair. Ron was a lot of fun. Smart guy, but he knew when to be serious and he knew when to cut up. He was a good guy, liked him real well.

I still have a 16-millimeter reel of film that he shot with his wife on a vacation in one of the ugliest honeymoon type suites I have ever seen in my life, with black-and-white wallpaper. You can't see where the wallpaper ends and the couch begins. They were throwing that stuff out and I stuck it in my closet. It's somewhere there. Again just 16-millimeter film, no audio. I gave Ron some flak about this. How could you sleep in there? "That was the loudest place I've ever been in my life."

JOHNSON: It was a difficult time for NASA when that accident happened. You mentioned it did change some things, the way you did things. But in that couple years, 32 months, before they flew again, just talk about the accident itself, and where you were when you heard about it, and then how you spent those next several months.

BOWERS: Yes, the mission was delayed, and I'd been sitting around there in the office and looking at the monitor and sitting around. I had an eye appointment with George Hall who was kind of the astronaut optician, very highly respected.

I was going to get my contacts updated. I just finally had to leave. That's when his office was—I don't think he's in business anymore. George was on El Camino Real very close to where the H-E-B [grocery store] is. I was sitting in their lobby waiting for them to call me back. I had the radio on because they liked the crews and put in glasses and contacts for some of them. But they were talking and I heard something and I jumped up and I said, "Be quiet." Everybody looked at me. Then they said "we've had a launch anomaly." I said, "Oh no."

Of course everybody instantly started talking about parachutes and ejection seats. No. We don't have any of that. I left there, didn't get my eyes checked, never went back in that building.

I went over to Building 9 where people were congregating around the monitors. Some media lady said, "Well, are they looking for their chutes?" I was hurt. I'd lost lots of people flying in the military, lots of people. I never lost seven people at once.

But I turned to her and I said, "If you don't know any more about the Shuttle Program than that you shouldn't be reporting on it."

She said, "Oh, excuse me." She knew better than to argue. But I was just devastated. One, because we knew we'd had burn-through. Even Photo/TV, we knew. I think we'd seen some of the images, that there'd been some burn-through. It hadn't gotten to the external tank, but burn-through is burn-through. They were already talking about a redesign of the field joint so that we could prevent that. We didn't know anything about the ice and the cold and that stuff going on behind the scenes. That wasn't on our radar at all.

Iust upset me more later that management allowed the launch. We got to launch. The President wants us to launch and NASA management wants us to launch. Some of the same issues popped up again after the [STS-107] *Columbia* [accident], which I was amazed at. But anyway, I started getting really angry because I felt like we had unnecessarily sacrificed Christa, because she didn't have—you could tell her how dangerous it was but she couldn't conceptualize that. Nor would I expect her to.

Of course Greg wouldn't even have been on that flight if he hadn't been pushed off by a congressman. Yes, I was really angry for a while. Sorry it took us two and a half years to get back, but we wanted everything right. We were all confident that it was right. The [STS-] 26 crew was confident it was right. I didn't worry about us losing another crew before the SRBs [Solid Rocket Boosters] were jettisoned. But I was sure watching closely. You can bet. I was watching so closely. We watched for the next bunch of missions.

JOHNSON: During the time when you didn't have crews to train, what were you doing during those two years?

BOWERS: That's dicey. Nobody ever came in and said, "You only got a couple more weeks if we don't fly." They knew this was a long-term thing. They also knew they didn't want to lose their experience like we did at KSC when we stopped the Shuttle and everybody went home. They didn't want that happening midprogram here. They kept us all on, we found things to do.

I started working on a video training tape to compare the camcorders to the 16-millimeter film to the CCTV system and put it on a quad screen so you could see the differences. Started working on that. I ended up leaving before that got completed, but you found stuff to work on.

I think it was during that time or shortly thereafter I started working on the high-speed film. I don't even remember all that we did. Of course nine months out from STS-26 we started training. That was Judy's crew but she had not trained a crew by herself yet, although I think she was backup on 51L. Jack Lew, who didn't really know much about photography, but real nice guy. Judy backed him up. That's probably the way I was on 51L. I worked with them. But by the time 26 came along Jack was out of the picture. Judy was her own instructor but hadn't really done a full crew yet.

I try to look back now, and I'm not really sure what all we did. But we found things to do because there was always something. I don't remember going to work and propping my feet up on the desk and going to sleep. Don't remember doing that. But that was quite a time.

Of course we kept moving. We were on the second floor of Building 4 when there was just Building 4. The crews were on the third floor, and they kept moving us around, particularly after the start of that damn cube [cubicle] stuff, so they could keep us in an enclosed office. I bet I moved five times in just a few short years.

One time though it paid dividends. We were down at the end of 4, which I guess is 4 North now. I think we were on the very corner office or near it. I could see what looked like a

professional photographer shooting down there in the high bay door of, I want to say Building 535 or T-5, there used to be a temporary designation, and there was one little concrete building, but I don't remember. This professional—you could tell by the equipment—I couldn't see who was shooting. I thought well, I got time, I'll go down there and learn something. You always learn something. I get down there and it's a photographer from New York with his assistant and he's shooting, and of course again here I go drawing a blank on names, our astronaut from Apollo 8 who read from the Bible.

JOHNSON: [Frank] Borman?

BOWERS: Yes, Frank Borman. I'd never seen Frank Borman except on TV and the Moon, or around the Moon. I introduced myself. Watching. He's shooting him in the corner of the door. You can see the track of the door. They said, "Well, we're shooting him for the cover of his book." [*Countdown: An Autobiography*] Really?

Then I heard him ask Borman, "Now where was it you guys launched around here?" Oh, I had to be polite.

Frank was very polite. Very polite. He said, "We didn't launch around here, we launched at KSC." Oh. Nice homework, photographer. You flew from New York with an assistant.

I said, "Are you interested with shooting any more with maybe some more interesting background?"

The photographer said, "Well, sure, what do you guys got?"

I said, "Out of the main gate, there's an Apollo [Saturn V] Rocket, and there's a vertical Apollo Command Module escape test vehicle [Little Joe II] and a Mercury [-Redstone Launch Vehicle]. I said, "Better than the track of that door." I don't think I said that. But he said, "Oh, well, thank you." I bid farewell to Frank and went back up to my desk.

When Frank's book came out they shot it over at Rocket Park. I wish I could talk to Frank. He probably wouldn't remember the circumstances. I'd say, "You're lucky you don't have the rails of a high bay door behind you."

They said Frank, when he was training, was a tough fellow. He didn't mind sailing a checklist down the table and say, "This is crap. Make this better." But he was so patient with that guy. Fortunately more patient than I would have been. But he got his picture. His book I think was a success. I still need to buy a copy of that. I've never bought it. I've been meaning to.

I just brought this [flight manual] because I didn't know how far we'd get. That was one of my projects. I would have brought the Shuttle one, which was my first out of Photo/TV project with Don Williams, God rest his soul. But it's 1,165 pages. I wasn't carrying that over here. It's at my desk at work.

JOHNSON: Actually I'd like to talk to you more about the flight manuals but we've been going couple of hours on tape. You want to just stop for today?

BOWERS: I think I'm done.

JOHNSON: We appreciate you coming in. We'll definitely talk again.

BOWERS: My pleasure. You don't know how honored I am looking at the people you've had in here. I'm sure you've had Milt Heflin in here.

JOHNSON: Yes, we've talked to him several times.

BOWERS: Milt is one of my dearest friends. When I was working console he knew he could call me up there and I'd shoot straight with him. A couple times I got to sit between Milt and the CapCom. I knew he had confidence in what I said. Still when I see him he treats me like an old friend. He may not be a perfect guy but I never ran afoul of him. Saw him any number of times over at the Chinese place that closed after the first big hurricane we had back around 2000, 2002. There was a little Chinese deli there and we walked there from Lockheed every day and Milt would eat there several times a week. If Milt needed a cup of coffee he'd go over, get the cup of coffee, would get the pot.

JOHNSON: Fill everybody up?

BOWERS: Then fill anybody, you guys need any coffee over there? That's just the kind of guy he is, and he knew probably some of them by sight. But they weren't all flight controllers. I don't think I ever saw an astronaut in there. But we loved eating at that place. Milt will always go down as my—Jay Greene may have had better sarcasm but Milt was smart and just fun.

JOHNSON: I think we got a good start today.

BOWERS: Okay.

[End of interview]