

RUTGERS, THE STATE UNIVERSITY OF NEW JERSEY

NEW BRUNSWICK

AN INTERVIEW WITH CANDY TORRES

FOR THE

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INTERVIEW CONDUCTED BY

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TRANSCRIPT BY

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Kathryn Tracy Rizzi: This begins an oral history interview with Candy Torres, on April 8, 2020, with Kate Rizzi. Thank you very much for doing this second session with me.

Candy Torres: Oh, you're quite welcome. I thank you.

KR: Last time, we left off talking about your high school years.

CT: Right.

KR: What were your family's college expectations for you?

CT: Well, I assume college was important. My father definitely wanted college, but, basically, for all three of his girls, it was by the age of eighteen, you're married and out of the house. But he knew for me it was going to be different. [laughter] I should get a job, but I didn't have to move out of the house. College was open and education was important, and my father did follow up on that. My mother took an interest, but my father had a more active interest in that sense, a personal interest.

KR: What type of guidance did you get in high school?

CT: Counseling? None. I went there, they didn't have anything to say about working in the space industry in 1970-'71. What did they know about other jobs, other than astronauts? I was already in Civil Air Patrol, so I had already thought, "Okay, fine. I'll figure it out."

KR: What was your college application process like?

CT: I was a little late, because I dragged my feet. My father was the one that said, "You'd better fill out the application, because you're going to turn eighteen, you've got to be out of the house," which actually wasn't true. I just remember, I did apply to Princeton University and they were interested, but my father said we didn't have the financial resources to go there. I applied to Douglass in the aerospace engineering, I knew at least engineering would work, but it was aerospace for me. Then, I got accepted into that, so I don't remember a big deal about filling out the paperwork, except for the fact that I had to get myself to do it.

KR: Did you apply to any other schools?

CT: No, we didn't know anything about doing extensive college searches.

KR: How difficult was it for you and your family to pay for college?

CT: Oh, well, we didn't have to pay for it. Tuition was low. I got a scholarship, so that took care of everything. I took out a small loan for textbooks. I was commuting. I wasn't living on campus, so I didn't have those costs. See, I wasn't out of the house by eighteen. [laughter] I was living at home as a commuter. I had no interest in dorm life.

KR: What was your first semester like at Douglass?

CT: I remember being all excited. It was a new environment, new people. I hadn't met anybody yet, made any friends, but I just remember the beauty of the commuter center, the sunlight, the happiness, excitement. I had to take the bus because I didn't have a car. My parents had the car, so I took the bus. Douglass was only six miles. I think I told you the story about the bus driver. Did I tell you the story about the bus driver?

KR: No, you did not. Please, go ahead.

CT: Okay. I took the bus, picking it up in South River, and I get on the bus. I said I need to go to Douglass College because I didn't know the route. The bus driver said, "Well, what are you studying?" I gave him the fare for the bus. I said, "Engineering." He immediately threw the change down on the floor. He was angry and said, "Girls don't belong in engineering!" I had to pick up the change off the floor. He was humiliating me right there in front of everybody else who was on the bus. That was really hard to deal with. That started the day off bad, but at the end of the day, I told my father about the incident. During the bus ride, the driver was talking to some friends and I heard them call him by name. So, I told my father what had happened. My father called the bus company, and he had a name to tell them. That driver never bothered me again. He wasn't that friendly, but I didn't have to deal with that issue again.

KR: That was the public bus that went from South River to New Brunswick.

CT: Yes, right. So, I took that into the second semester, freshman year.

KR: Had you visited Douglass before you went there?

CT: I don't remember. [laughter] I just remember filling out the form. So, I wasn't into, at the time, visiting different schools. I just knew I was going to college, and here's Douglass. It's close enough. I don't remember anything about that. I don't even remember much about New Brunswick before I started going to college there. Maybe they had orientation, but, at that point, I was already in.

KR: What was your course of study like in engineering?

CT: We had drafting and an engineering class at Livingston. I took math over at Douglass and physics at Douglass. I don't remember all the specific classes that I took because I was still adjusting to going to college. Also, there were seven women who had been admitted to Engineering, but I didn't know any of them. I never had any of them in my classes. I was always by myself, and the male students made it clear they did not want me there. They ignored me. That isolation was very difficult, especially since I had been bullied in school, in junior high and high school for six years, and this was not something that made it easy for me. After a while, I realized, this is not working out. I could understand the material, but I was project oriented rather than theoretical. I have to have a different way of learning. It just was clear I wasn't going to make it through that process, and I was already miserable. This was February 1972.

I found out through Douglass that they had the individual major option, and from there, I could take classes from any of the colleges. I went through course catalogs to put together my own major, anything related to space. So, it wasn't very big list because there were two semesters of "Astronomy," half a semester of "Astrophysics," "Geology of the Moon and Planets," and everything else was basic science classes and math. I studied a little bit more in geology, not that I was interested in being a geologist, but to fill out my major. I did this in the second semester, so that caused some problems at registration. The Douglass College registrar was not happy with me, but I was adamant at changing this because I just knew I had to do this for my own self. I was scared, so I succeeded in persuading her. The Douglass counselors were supportive, but it was the registrar who had to make the changes. She remembered me for quite a while after that.

Then, not long after that, March 1972, my father committed suicide. I was away campaigning for George McGovern. It was a Rutgers trip, and I was all excited. I was going to be gone for the weekend. I had been away from home before. This was the first time with a college group and learning political campaigns, so I had a great weekend in New Hampshire. It turned out my older sister and her two children lived in Maine right across the border from our campaign headquarters, so they came to visit. I learned to go door to door canvassing, talking to people, doing the surveys and all that. We went to hear the debate at the University of New Hampshire and see all the major candidates up there. It was really a great experience, a lot of fun. [Editor's Note: George McGovern (1922-2012) served in the U.S. Senate from South Dakota from 1963 to 1981. McGovern came in second to Edwin Muskie in the Democratic primary in New Hampshire, which took place on March 7, 1972. McGovern went on to win the Democratic nomination but lost in a landslide in the general election to incumbent Richard Nixon.]

I came back on Monday morning about three o'clock in the morning, and this is coming back to New Jersey, South River, into the house, trying not to disturb my family. I opened the door and there's my older sister, who I had just seen in New Hampshire that Saturday before. I was completely puzzled because she hadn't said anything about coming to New Jersey. She brought me into the house quietly, and she took me downstairs to the basement. I saw my mother sleeping on the sofa, which I thought was strange too. Anyway, my sister took me downstairs, and she told me what had happened. That Saturday night, my father was in his den downstairs and he shot himself in the head. My mother had been home by herself. She heard the sound and saw the horrible sight. My younger sister had been out at the movies. I didn't couldn't process my older sister's words. I didn't try to process it that night. I just went to bed, and the next morning, it hit me. It was devastating because I was very close to my father. I knew he had had a lot of problems at work. He had never gotten the college education that he had dreamed of. He didn't even get to complete his high school degree, so he couldn't get jobs other than being a salesperson. Yet he was always reading history. We were always visiting historic places. Being humiliated at work, teased, and just whatever it was, I knew he was trying to get a job where he'd get more respect, but he hadn't had a lot of options.

I thought for the longest time I was the only one that knew he committed suicide, but I found out decades later, people had guessed. His death was ruled as accidental, that he was cleaning a loaded gun. It gets pretty grim. I found out much later, my older sister was the one that had to deal with all the funeral arrangements and things like that. At that time, there were no crews to come in and clean up the mess, so my sister had to do that. I was totally unaware of all that stuff,

but I was in my own set of grief because I was very close to my father. He had taken me to flying lessons through Civil Air Patrol and helped me when I was going to college, picking me up. If the bus didn't come, he'd come and pick me up at school, even though he'd been home and he wasn't in a good mood.

My father and I had a conversation just a few weeks before his death, and now I don't remember what the words were. As we were driving home, he'd had a bad day and he was trying to tell me. I couldn't deal with it. I remember looking away and tuning out what he had said. My impression was that he didn't say suicide, but the words he was saying were clear enough to me that he was really not happy. I never told anybody about that, so that was hard.

I almost flunked out of college because my grades went down. I wasn't in my new classes yet, I was in some of them, but my grades dropped. It was the counselors at Douglass that kept me going. Of course, having changed to an individual major, by the fall, I had a better chance, because now I was away from the isolating Engineering environment completely. I had made good friends at Douglass, in the second semester of my freshman year. They were commuters, and so that was great too.

KR: I am very sorry about your father, and thank you for sharing that.

CT: Yes, every four years when we have the presidential primaries, I'm reminded of his death, so this is the forty-eighth year.

KR: Tell me about the counselors at Douglass and the support that they gave you.

CT: Well, they got me involved in different things, such as the Student Council and, eventually, I became president. I got involved in all these leadership things, and it's just really great that they were trying to help me in a lot of ways to keep me going. Of course, my friends at college were a supportive group. We had very different personalities. We got really close, not just at college, but visiting each other's families. We'd go to our homes because we all lived at home. So, that really kept me going. I know there were particular counselors, but I don't remember their names at this point and I was able to thank them much, much later on, face to face. I'm sure I thanked them then, but it still meant a lot later on.

KR: What was the camaraderie like with the commuters, and who were some of the friends that you made?

CT: Oh, goodness gracious, we were a crazy, noisy group. We loved hanging out in the corner of the commuter lounge, and we would just always talk. We didn't share classes. We had different majors. We would just talk about what classes were like, home, whatever it was, just always having a fun time. I remember, one of my friends, Judy, was at Cook College actually. She was talking about some of the things she was learning about cows and the interior of cows and what you had to do to examine them intimately, [laughter] the rear end where the cow didn't want to be poked. So, anyway, Judy was describing the physical exam very animatedly, when she said, "Moo-ooo!" as a surprised cow. [laughter] We were always talking, making noises. The commuter lounge was not a study lounge. It's a place to relax and socialize. One day,

somebody else in the lounge went up to Carolyn at the desk in charge as a facilitator of the commuter lounge. They complained to her that this group in the corner were making noises, that it was like an animal corner. Her response was, "Well, this is not a study lounge." [laughter] They didn't know that she was also part of the group, too. That's how we got the name "Animal Corner," which we still use.

KR: Where was the commuter lounge?

CT: Oh, it was at the main building at Douglass College upstairs, with floor to ceiling windows and the fireplace. It used to be open, where we had dances and parties. There were a bunch of round tables that would be moved aside for these different events. For Halloween, we would paint the windows with different themes. Our group always did something *Star Trek* related. [laughter] We just enjoyed doing that. I have a lot of pictures of us in costumes. We would party there, we'd meet at each other's homes, we'd go visiting places, traveling. Especially after we graduated, we still got together and traveled different places. It was a great, supportive group because we each accepted as we were. Everyone had their different issues that they had to deal with too. I know there were three sisters who lost their parents when they were in their twenties, both their parents. I don't know the whole story. That was hard for them. We didn't get the details. All the things that older adults have to deal with, with their parents, they had to deal with in their twenties, about house, about finances, funeral arrangements. We shared our highs and lows.

KR: What do you remember about Douglass traditions?

CT: Well, first semester, I had a big sister. I don't remember what they call them now. She was supposed to help you through your freshman year, and I think because she was a dorm person and I was commuter, for whatever reason, it never really worked out. One tradition was to receive panties with humorous words stitched on them. I think I still have it somewhere, and that was a part of the tradition. I don't remember that much else. I know there was Yule Log. Most of what we did, the traditions that stand out in my mind, were in the commuter lounge. I don't remember all the specific ones. [Editor's Note: Yule Log is a Douglass College tradition that first took place in College Hall in 1918. Douglass College students burn a yule log, hold candles, and sing carols. The event is now held in Voorhees Chapel and is inclusive of all religions and cultures.]

KR: I am curious if you had a meal plan.

CT: A meal plan?

KR: Did you eat lunch in the dining hall?

CT: I didn't have a meal plan. I ate in the Student Hall cafeteria. In fact, that was one of the early memories that I had, pretty much my first day or so at Douglass College. Rod Stewart's "Maggie May" was playing. The sunlight was coming through the window, as I was entering the dining area downstairs, and that has stuck with me. Every time I hear that song, I'm brought

back to Douglass College in that moment. I'm walking through the doorway with this sunlight coming through, and I'm feeling very happy to be there.

KR: The early 1970s at Douglass was a time of increasing diversity. What do you remember about the student body at Douglass?

CT: Well, basically, I hung out with the Animal Corner at the Student Center, our common meeting place. I attended African-American events, such as performances and literature readings. I had classmates with diverse ethnic backgrounds. There were others that came through depending on schedules. I didn't know people in the dorms. I didn't know anything about residential houses. The classes were always diverse, whether I went to Douglass or Rutgers. I didn't know there was a Puerto Rican group, except when my sister (three years later) received an award from the Puerto Rican group, even though we didn't really know anything about it. I had not been contacted by them when I had arrived, so I didn't know they existed for decades.

KR: What was the campus climate like in terms of student activism?

CT: I don't remember student activism. I had my own set of issues I had to deal with, just trying to survive. First of all, college and the engineering and switching courses, and then my father's death and I was trying to stabilize myself, get established and be involved in the student activities, Student Council. So, I don't remember anything at all about student activism, except for going to the McGovern campaign in New Hampshire. Of course, Douglass had a lot of speakers and I would go to that, but I don't remember any activism that I was involved in.

KR: Are there any speakers that stick out in your mind?

CT: I got to see Shirley Chisholm. I was really, really pleased to hear her. Isaac Asimov was an outstanding speaker and my favorite science-fiction author. Those are the two that stick out in my mind right now. It was great that Douglass had those kind of speakers and different events. That really was real exciting. We didn't realize it at the time how important it was to get to hear these speakers. [Editor's Note: Shirley Chisholm (1924-2005) was the first African American woman elected to the U.S. Congress, representing the 12th District of New York from 1969 to 1983. She sought the Democratic nomination for president in 1972. Isaac Asimov (1920-1992) was a prolific science fiction author and biochemistry professor at Boston University.]

KR: What did you do on Student Council?

CT: Well, I was in charge of different activities, arranging pizza parties, conducting meetings. It's been so long. I was president for a year. I have a vague recollection of a museum trip. I wasn't writing in a journal at that time either, so I don't have any of the details. But it was important for me. It gave me a reason to keep working, aside from just going to classes and being with my friends.

KR: I would like to ask about your course of study for the major that you designed. What did you call your major?

CT: I called it Space Science, but I couldn't capitalize that because people would then think, on a résumé, that it was a sanctioned or regular set of classes. So, I put, "Individual Major-space science."

KR: What were your astronomy classes like?

CT: Oh, those were over at Rutgers and it was really great because the first semester, the Director of the Hayden Planetarium in New York, Dr. Kenneth Franklin, was the instructor. I think he had been doing it for years, because that was his last semester. It was a lecture hall, about two hundred students, the big, traditional lecture halls. The second semester, I had Dr. John Caldwell, who was actually from Princeton University, in the Astrophysics Department. I would talk to him sometimes and tell him what I was interested in, which came in handy three years later when I was ready to graduate. [laughter] At that time, I was just talking about wanting to work in the space program, not knowing that this was a major networking connection that I had just made. So, let's see, I took the class "Geology of the Moon and the Planets" at Rutgers. It was the early 1970s. I remember the textbook had the fresh Apollo information. Years later, in Houston, I got to meet some of the men who actually landed on the Moon. I actually got to meet Harrison Schmitt, the Apollo 17 geologist. At the time I took my Geology, Astronomy, Astrophysics classes, I had no idea how my life would turn out. Now, I think, "I'm so glad I did X, Y, or Z. I had no idea that it was going to lead to this or that this was going to happen."

I had a physics class. Unfortunately, I don't remember the professor's name, but he was at Douglass College, an excellent professor. A few years later, I was working at Princeton and attending a social event. I saw him there and I thanked him so much for his physics class because most people don't think of physics as the most exciting. He just made it so enjoyable, understandable, and I just had to let him know how much it meant to me.

At Douglass, I took mythology because I always loved Greek mythology. I read it before science-fiction. The myths are relevant, and NASA names many programs after Greek and Roman characters. Even sci-fi makes a lot of references to classic mythology. I took art classes too, so it wasn't just all science. I learned printing processes, such as wood cuts, etchings, linoleum block. I still have that artwork. I also had drawing. I remember the day the art teacher told us ahead of time that we were going to have a nude to sketch from, a male nude to sketch from. I had totally forgotten. When I came into the class, I thought, "Oh, my God." I was going to burst out laughing, and I had to hide it. I just thought, "There's nothing funny about him." It was just this nudity concept. [laughter] It took a while for me to get my composure, so that I wouldn't embarrass myself or anybody else, and I could get to work in drawing.

I studied painting, ceramics, sculpture, so I had a lot of those different classes. For the most part, those were at Douglass. Since we had access to the ceramics studio, my friends and I would also do things between classes or in the evenings and make some things. I made an astronaut from clay. In sculpture class, I was sculpting a horse from wood, and I wasn't working from any image. There was no instruction other than sculpt something from wood. I could just do it. I was just very good at visualizing and making it into three dimensions. I had a lot of really

wonderful experiences at Douglass in understanding different art techniques, hands-on and tools, because I love making things. That continued on for the rest of my life, doing a variety of artwork. I like to analyze how things are made, like a linoleum block image, because it's several colors, you have to think ahead. How do I start? What color? What parts am I going to remove next and what color so that they layer up to have this whole picture? That was great. I enjoyed that a lot.

Douglass offered fencing. I took fencing classes. I only had some basics in high school. Actually, we didn't have any equipment then. We just had to learn stances, but when I had it in Douglass, I took two semesters. The first semester had twelve students, and then the second semester, there were just four of us. Then, we were offered the opportunity to be in a competition. I had never been in a competition. I signed up for it. So, I had my first competition. It was at Trenton State College. I still have the photograph. It's the only photograph I have of me as a fencer. It had a cutout for my head with the body as a cartoon. It was the 1973 National Intercollegiate Women's Fencing Association (NIWFA). I would do rather well in the competition. I was short and I had a very low squat, so they had trouble poking down at me. I'd be ahead in a bout by three or four points, but I'd tense up and then I'd lose because I tensed up. [laughter] I lost every single one. Even though I could have won quite a few of these bouts, I just lost every one. They called me the la belle kid. (The deciding touch or sudden death playoff between two fencers who are tied at the end of their bout.) After two semesters, if the gym was open, we had access to the fencing equipment. I also took a karate class and I practiced for a couple years after I took classes. I signed up for a dance class and did well in that. The instructor liked my tree dance. We didn't have any intramural sports, other than that one competition with fencing. We didn't have any other competitions in sports and the same thing was in high school. That was not something that we had yet

KR: What do you remember about Rutgers College going coed?

CT: I was at Douglass because Rutgers was the men's college. Then, the following year, when Rutgers became coed, I had so many friends at Douglass, I didn't feel any need to switch over to Rutgers, even though a lot of my classes were there. I just stuck with Douglass. I had what I needed at Douglass. So, there was no advantage to switching over.

KR: The classes that you took over on Rutgers College that were in the sciences, were there many women in those classes?

CT: There were none in my engineering classes. Geology was at Rutgers. I took several there. Astronomy was a large lecture hall. Except for talking to the professor, I was in class and out afterwards. I didn't feel isolated. I, generally, didn't socialize before or after class. There probably weren't very many women, but I was just focused on taking the classes. Physics, Math, Computer programming were at Douglass. When I was not with my Douglass friends, when I was in classes, I just focused on learning and making sure that I got good grades so that I could graduate. So, I had a lot to focus on there and not so much what was going on around me.

There were different events at Rutgers. I usually went with some of my Douglass College friends. We went to see *Metropolis* on the big screen in the Student Center, and the reason why I

bring this up was because it was funny. Because it was a silent film, there wasn't soundtrack music to go with it. What they did was turn on the radio, just a random station. I remember the scene where all the workers were marching very seriously in a big mass. At that moment, the radio said, "Have a hamburger today," and we just broke down laughing. [laughter] It just didn't fit. After that, they realized that having the radio was not helpful, and they turned that off. But it would have been nice if they had been playing instrumental music or something like that. I think we saw *2001* there. I probably saw it in the theaters too, but I remember going over to Rutgers for some of those events and sometimes eating over there. [Editor's Note: *Metropolis* is a German science fiction film made in 1927. The film was written by Thea von Harbou and directed by Fritz Lang. *2001: A Space Odyssey* is a 1968 science fiction film directed by Stanley Kubrick.]

KR: How about concerts?

CT: Yes, yes, we did, yes, thank you. We went to a lot of classical concerts [and] types of music I had never heard before, medieval, and the different instruments and things like that. So, that was really great, I had those opportunities.

KR: You said you took classes on Livingston College campus. Those were the early years of Livingston College. What do you remember about it?

CT: Well, that was the engineering, so I was only there for two semesters maybe. It was the freshman year, and that was a miserable experience, as I said. One engineering class was in a lecture hall. Only one guy spoke to me. I did well, especially in the graphics design class. I could design something and then draw it out and I did well with that. I got a good grade. It was a small class, but the students wouldn't talk to me--all males. That's all I remember about Livingston College. The professor who signed off on my individual major was over there. I don't know why. I don't know how I found him or why it wasn't through Douglass, where I created this individual major. I never went to see him again because what could he advise me on? [laughter] I just took the classes. Later on, after I graduated and I think I was working, I either sent him a letter or called to let him know that I had achieved my goal. But I couldn't tell you what his name was right now.

KR: Do you remember what building your engineering classes were in on Livingston?

CT: No, I just remember a mass of buildings.

KR: How much contact did you have with administrators at Douglass, perhaps the dean?

CT: Most of the time, I spoke with counselors. Those are the ones that I remember. I could remember their faces, but I don't remember the names. I thanked one in person when I was at Douglass for the Distinguished Alumnae ceremony.

KR: Margery Somers Foster was the dean during most of your years, and then Jewel Plummer Cobb came on in 1975. [Editor's Note: Margery Somers Foster served as the dean of Douglass

College from 1967 to 1975. Jewel Plummer Cobb held the post of dean of Douglass College from 1976 to 1981.]

CT: Yes, I remember that name because I didn't graduate until '76. I had an extra semester. But I guess I didn't really pay that much attention to who was the dean. I took more of those counselors. Their offices were right in the Student Center, and I could just go from the commuter lounge down the hall.

KR: Did you have part-time jobs when you were at Douglass?

CT: My first semester, I started a job at a retail store. It lasted a month because I could not understand why they did the things they did. [laughter] I'm a very logical thinker. I thought, "I don't understand why we have to ..." and, "I do not belong here. I will just leave." Laying out clothes and things like that, it just didn't make sense to me. After a month, I quit. I had my parents and then I had the scholarship, so I just thought, "This is not going to help any one of us (store and me), so I'm leaving now."

I started work again after I finished my last semester of college in the fall of 1975. It was spring semester before the graduation in '76 and I did some part-time work, two weeks here and there. I could deal with that. I can't deal with being bored. These jobs were not important; they were just physical, loading up some containers for shipping overseas, and so things like that, through Manpower temp.

In 1974, I had a friend Grace, who was at Douglass, someone who really didn't follow authority. She had told me about a program for women to become officers in the U.S. Army. She said she was going to join this, and I said, "I'll do it just to see you do this." [laughter] I wasn't interested in going into the military. That was not my goal. I had done Civil Air Patrol, and that was not because it was military. It's because that was my aerospace education. So, I wasn't interested in this program by itself, but I signed up for a silly reason.

I did the physical and the written and passed the test. I remember swearing in, so I was actually sworn into the U.S. Army. But Grace never did follow up on that. I didn't follow up and say, "Grace, are you doing this? Grace, are you doing that?" I went ahead and did it with the assumption that she was doing it too. [laughter] She never did.

I was accepted into the program. This was a summer program, and it was supposed to be before your senior year, so it was '74. My original graduation was to be 1975. It was at Fort McClellan, Alabama. We had college women from all across the country that were accepted. We were put into the officers' barracks, which had two people to a room and two rooms to a bathroom. We didn't have a curfew. Our weekends were free, our evenings were free. We had classes during the day. The program was about a month, five weeks. [Editor's Note: The Women's Army Corps School operated at Fort McClellan. It was closed in 1978 after women were fully integrated into the Army. Fort McClellan closed in 1999.]

For me, it was a breeze. [laughter] I had already done military for three-and-a-half years, Civil Air Patrol, even though that was the U.S. Air Force protocol. I knew how to march, and a lot of

these women, about a hundred-something women, didn't know how to march. They had never been through anything like that. So, they had to start from scratch, and that was not going to be very helpful for me. The officers recognized that, so I didn't have to do the practicing. I could go off and do whatever I wanted. The physical training, we had to do involved push-ups and more. I had done it in Civil Air Patrol, I had to do everything the guys did. So, I could do regular push-ups and other exercises. I looked the women and thought, "Wow, this is different." Because they were doing modified push-ups, I had never seen women's push-ups, where they're on their knees and push up from there. I was used to doing regular push-ups. All that was too easy for me. For the uniform inspections, we had to be up at five o'clock in the morning. Shoes had to be laid out a specific way, and the bed had to be made a certain way--tight. The officers went through every area of each room. When we were outside in formation, our uniforms and positions were inspected.

We had survival training as well, though this was just an introduction. It was not meant to be the whole thing, where we had the backpacks and we march into the woods. We were given tents to set up. In Civil Air Patrol, we were not given tents. We had to make our own shelter from branches and leaves. For the Army, our meals were catered in the woods. I could not believe they had these tables with these silver trays and people serving us out in the woods. In Civil Air Patrol, we were supposed to look for our own food, even though we didn't know what we were looking for. We had to figure it out. I thought it was hilarious.

In case of chemical warfare, we had to learn how to use gas masks. That was something new to me. We had to put on our gas masks, go into a building and, then after a while, take the gas masks off to experience what it was like. We were supposed to breathe in and say something as we're exiting. It was only a few seconds, but it was difficult. I couldn't do it. The officers could tell when I was leaving that I had held my breath. It was just instinct. I couldn't make myself inhale, but that was it. In class, we also learned the basics of injecting yourself with whatever it was, the antidote. We just went through the motions to understand. It was really an interesting adventure.

We had the class where they talked about the different types of jobs in the Army. If accepted, we would finish up our senior year, as normal, at college. We wouldn't dress up in uniform, we wouldn't meet, but we would be paid by the Army each month. As soon as we graduated, we would go into the Army full time as a second lieutenant for at least two years. When the officers talked about the different careers, they were kind of dancing around the issue, and we all caught that. We finally had to press the point and say, "Look, what is the most likely job we're to get?" They said, "Military intelligence." Now, I had no interest in military intelligence.

When I had done the research, the only type of science job that the Army had was Geology, and it was unlikely that I would get that job. During the month, I had shown some leadership skills in certain circumstances. There was an emergency, not a big emergency, but somebody got bit by a spider and I was there helping her and doing what I could to calm her. So, I had demonstrated leadership, as well being able to do all the military stuff very well. The Army wanted me to be an officer, and here it is, a job in hand, guaranteed after college, and I turned it down. I had no idea what I was going to do when I graduated. I had another semester as well. I didn't tell them that I was going to take an extra semester, but it doesn't matter. I was not

interested. There was nothing there that appealed to me. Most students would take it and say, "Hey, I know I'm going to have a job, a really good job for two years." I was like, "Hm," and I didn't take the offer.

It actually worked out better. [laughter] My way of doing things worked out better. The timing was right and everything. By the time I was ready to graduate, I had heard about the job at Princeton, and my astronomy professor, from three years earlier, remembered me. He said, "You were always talking about how you wanted to work in the space program." Now, I didn't even remember doing that, but obviously that was in my nature as I was doing it. He said, "I know the guy doing the hiring for that job. I'll be your reference." I didn't have a résumé. I hadn't even started job searching. I didn't even know how to do a job search. I didn't have to!

I graduated on a Thursday evening, and the next morning, Friday morning, I had the job interview at Princeton University, Astrophysics Department. It was a two-hour interview. My eyes were big; I felt as if my mouth was wide open. It was a satellite project, helping the astrophysicists with the data from the satellite project. Obviously, this is my thing. [laughter] This is really cool! I could never have imagined this. On Friday afternoon, I was offered the position at Princeton. Of course, I accepted. Less than twenty-four hours after graduating from Douglass College in this individual major called space science, I had a job in the space industry at Princeton University's Astrophysics Department.

It turns out the Orbiting Astronomical Observatory was the first successful space observatory, a historic satellite project. The satellite had been up for four years. I was told that I'd have maybe a year, year and a half of work, because they didn't expect the satellite to last beyond five years. Well, it lasted several more years. It lasted through '81, and mine was the last job to go. By that time, I had taken advantage of all the things at Princeton, computing, free classes. By the end, I had just learned so much. Networking and opportunities, take advantage of them because you never know what they'll lead to. [Editor's Note: From 1976 to 1981, Ms. Torres worked on the Orbiting Astronomical Observatory (OAO-3) *Copernicus* satellite project at Princeton University.]

KR: I definitely want to ask you a lot about your time working at Princeton. First, can I ask you about the Army program you were in?

CT: I lost you there. Hold on. Go ahead.

KR: Before we talk about your job at Princeton, I want to ask you a few follow-up questions about the Army.

CT: Okay, all right.

KR: This was a Women's Army Corps program.

CT: Yes, it was a unique program, the U.S. Women's Army, and they wanted women officers. I don't remember how long it lasted because a few years later, it was shut down and I think even Fort McClellan was shut down. It was a very unique experience.

KR: What type of weapons training did you partake in?

CT: That's an interesting question. There was no weapons training. The Army was just trying to get the women used to the idea of being in the Army, being in the military, the kind of life it will be. We were taken to Fort Benning, Georgia to see parachute training. It's U.S. Army Airborne School.

KR: Were the people training you women?

CT: Yes, yes. That's all I remember, I'm sure there were men in there, but, now that you mention it, I only remember women.

KR: What was it like being with women who were from all different parts of the United States?

CT: Douglass had women from different parts of the United States. Actually, I had already traveled quite a bit with my family and friends, so it was not anything that stood out to me. Then, we were usually pretty much in our own little room clusters, even though we could spread out. We could go to the officers' club. We were free to do what we wanted to. By the end of the day, we were pretty much in our rooms or lounge. On the weekend, we'd go to different places. Usually, I had only one or two women that I would hang out with who would have an interest in going places with me, because I would want to go off the base. I went to Huntsville one weekend with one of the women. Another weekend, we went to an amusement park. The rest of the time was just studying or relaxing. There was a television room on each floor. Maybe I went over to the officers' club once. It just wasn't my thing.

KR: How strict was the discipline?

CT: Well, they weren't super strict. I mean, it was military training, but, for me, they were relaxed. They didn't want to come down too hard because they didn't want to discourage women from joining the military. We had room inspections. I remember I had put out some sweets, not part of the inspection process, and they went along with that. That was okay. We were officially in the military, but they also knew we were not all going to join. They didn't want to turn off women by coming down too hard and thinking, "Man, this is going to be a miserable experience." They wanted to make it as pleasant as possible, yet getting a sense that these are some of the things that they'd have to deal with as an officer. It was different from being in boot camp down below. We were the elite, up on the hill. So, there was a big difference. Down below was where the real strict discipline was. We were in an introductory program, not actual duty.

KR: Did you stay in touch with anybody that you went through training with at Fort McClellan?

CT: Actually, unfortunately, no. I don't even remember their names. We were close then, and it was like we just kind of disappeared.

KR: Is there anything else that you would like to add about your time in the Army program?

CT: I can't think of anything offhand. We had our military formal uniforms, and we had our fatigues. We had to march for graduation. I've got some cool pictures of those. People have trouble thinking of me in the military. I was really good in the military and I could do all required stuff: follow orders, give orders. I spent one month active duty in the Army versus three-and-a-half years in CAP, so there was more time and diversity of activities in the latter. In addition, it provided all the experiences that made the Army easy for me. In daily life, I have certain expectations of people. If you have a job, this is your job. I can be flexible, but there are certain things, if your job is to do X, do X. You have a responsibility. You represent yourself. You're representing other people. You're responsible to other people. So, there was this sense of really abiding by, not all the rules, there's flexibility, but really there's reasons why there are rules and sometimes a hierarchy. In real life, you just find that balance. But it was a good experience, self-discipline, confidence, and being tough, learning how to be tough. I had that throughout my life, and so did my parents.

KR: You graduated from Douglass in 1976.

CT: Yes, I wanted to graduate in the bicentennial year.

KR: Right.

CT: I added another semester. There were classes I wanted to take, like the art classes. I didn't have to take those. I could've finished sooner, but it worked out. If I had finished sooner, I wouldn't have ended up at Princeton. It turns out that there was a job available at the time I was graduating. Who knew?

KR: What was your graduation like?

CT: Joyous. There were a lot of my Animal Corner friends, my Douglass College friends, and I just remember us all being happy. We didn't all graduate at the same time. We were in different years, but just partying for everyone. Yes, excitement, having made it, especially since there was so much going on before that, in the early years, the struggles, but I stuck with it. I was determined, I'm going to graduate and I'm going to end up in the space program one way or the other.

KR: What do you remember about your interview at Princeton?

CT: Dr. Ted Snow was really nice and showed me around the building, Peyton Hall, which was pretty awesome. I had a wonderful two-hour interview. I was introduced to the technical team that managed the equipment that received the satellite data from NASA Goddard Space Center. It was printed out and organized into books. Honestly, my memory was more emotions than details; I was walking into a dream space job on a satellite project! Peyton Hall has two telescopes on top, two domes, a nine-inch and a four-inch telescope. Most astrophysicists didn't use them because the work was different. Astronomy is different than astrophysics, but there were some graduate students who knew how to use the telescopes. We only used the larger one. It was really cool. To use the telescope, we had to crank the dome and go out the slit and get out

onto the roof to find the direction of the star. Then, we rotated the dome to point it in that direction. I didn't have permission to go up and use the dome myself, but the graduate students did. So, we would do that sometimes. [Editor's Note: Since 1966, Peyton Hall has been the home of the Department of Astrophysical Sciences at Princeton University. The Peyton Observatory is located on the roof. There are two telescopes, a nine-inch and a four-inch telescope. In addition, the department's facilities include a 36-inch reflecting telescope in the FitzRandolph Observatory. Peyton Hall also housed the Astronomy Library, which was moved to Lewis Library in 2008.]

The library was beautiful with celestial globes and art. I spent time in the library to research articles. The stairways had these big murals, black and white murals of stars, which would pale in comparison with the kinds of photographs you can have now, but they were entrancing. I always liked going in the stairwells and seeing these celestial pictures. The upstairs windows were long and narrow. I had an office there for a little while, but most of the time, I was down in the basement, where the other people were that worked on the project. The computer was down there. The technicians were down there. The graduate students were down there. So, upstairs was mostly the astrophysicists, and they were great. They didn't interact as much with the graduate students. They were just focused, somewhat elitist. There were a couple that I was able to spend some time with, do some sports, whatever, go to the graduate dining hall.

We had our annual ping pong tournament. Anybody who wanted to could be in that competition. There was a ping-pong table at Peyton Hall. I had my own style. I had my sandpaper paddle, whatever. So, that was a lot of fun. Every lunchtime, people would be playing ping pong throughout the year. I was in the final competition a couple times, but I never did win. The prize was a ladle, a beaten-up aluminum ladle, but you'd only get to keep it for the year. So, I never got to get the ladle, but I was in there. Everybody attended the tournament: the graduate students, the technical support, the astrophysicists.

KR: You were at Princeton working on the OAO-3 *Copernicus* satellite project. Give me a sense of what the overall mission was. [Editor's Note: OAO refers to Orbiting Astronomical Observatory. Between 1966 and 1972, the National Aeronautics and Space Administration (NASA) launched four OAO space observatories. The OAO-3 *Copernicus* satellite was launched into orbit on August 21, 1972. It carried an ultraviolet telescope built by Princeton University and a cosmic x-ray detector built by University College London. It was operational until 1981.]

CT: Well, there were two parts to that satellite. There was the Princeton Experiment Package, called PEP, that was ultraviolet. Then, there was the x-ray portion. That was the University College of London. We had nothing to do with the x-ray portion. *Copernicus* observed the UV spectra of stars, galaxies, a nova, and the interstellar realm. It provided new information about how stars form and evolve. Astrophysicists from around the world would write programs of what star, how long, what wavelength, that they wanted to study. They had to fill out a form, submit it. It had to be accepted, and then it would be scheduled to be observed. After the observation, the data was downlinked and put into books. Technical staff did that. To verify, I would go through these books before the particular astrophysicist and make sure that the data matched what they had proposed. Then, I would tell my boss that it's good for the astrophysicist.

He or she would either come to Princeton and I would work with them to put the data in whatever format they wanted, whether it was punch cards or tape or printouts. Or I would do that for them and ship it to them.

Another task would be with my boss, for his research work, I would sometimes create graphs. So, I learned to use this big plotter. These things were not initially on my job description, so he gave me more responsibility.

An important part of my job was to do a quarterly report for NASA. I had to go through pages of the scattered data for each astrophysicist, all one-line codes. The first code represented the particular astrophysicist, followed by the number of the experiment. He/she might have had more than one. Then, there was the ultraviolet wavelength range, followed by a lot of other data, all on the printouts, and they were not in order. So, I would have to manually go through each one of these lines, parse them, and type them in order. We didn't have word processors in the traditional sense. [laughter] There were just terminals where I could enter the data. It was just a step above a typewriter. This was the way it had been done for four years.

I said earlier, I don't like being bored, and it was terribly boring. I couldn't do it all the time. I'd take breaks. So, it might take three weeks for me to complete. One day, I said to myself, "I can't handle this. This is boring." [laughter] I don't like being bored. I knew it was on a computer, so there must be some way of accessing the data and writing a program. I had only had one computer class at Douglass, but I didn't understand programming. We were given a project to program. This was about leap years and calculating leap years. Leap years are every four years, so what more do we need than look at the calendar? I had no idea how to figure that out. Somehow, I made it through the class, but I hated computers. I didn't want to see them for the rest of my life. I didn't get it then, but now I had this boring task. I thought, "Well, I had this computer class, so if I work with one of my coworkers, maybe I can write a program that could organize this data."

Fortunately, the course was in FORTRAN and that's what we had at Princeton. Once I started writing, it made sense, because I had done this manually. Then, all of a sudden, if I see this code, then I do this action. Else, I do that. All I had to do was think through what I did and translate into FORTRAN. So, I wrote my first program. I got my box of punch cards and went over to the Computer Center because they didn't have computers in individual buildings. It was huge, with the IBM 360. I'd put my program in and have the data with it, and then within, bing, seconds, I'd have this nice printout with all the data organized. I thought, "Wow. So, that's what computers can do!" Now, I could do this task very easily. However, I had another part to the NASA report I could not computerize. I had to go to Peyton Hall Library and look through journals for names of astrophysicists I was familiar with from their experiments and check to see if any articles referred to our satellite. That information also had to go into the report to demonstrate satellite usage. I had to write down the citations of each article and then go downstairs to enter into the computer terminal. Then, I had a complete report that was printed out and mailed to NASA.

After my success with the NASA reports, I wondered, "Ah, so what else can I do?" Then, I started looking around and seeing other things I could do with computers. We had only one

terminal in the building connected to the computer building, and nobody else was really using it except me. In fact, there was talk about getting rid of it. There was no computational capability in it. Eventually, we started getting the midsize computers in departments.

In the meantime, I had a coworker in her forties who wanted to be a reporter. She wrote occasional investigative articles on the side but no opportunities came up. In our group, her job was taking the satellite data printouts and cutting the pages and putting them into books. These were the ones I verified for experiment accuracy. There was no real thinking involved in the process, and her future job prospects really bothered me. I knew what she really wanted to do--be a reporter. She would be the first to go once the satellite project ended.

Because I had to do that quarterly report, I thought, "Well, it would be good if she got some experience with computers." However, she wanted nothing to do with it, but I really felt strongly about this. So, I talked to somebody and made it part of her job description [laughter], and then she really was not happy with me. I said, "Okay, take this data and the different article citations and type them into the terminal." She did under protest.

When her job ended, she had to go looking for a job. Of course, the first thing she did was go looking for a job with a newspaper. She told me that during the interview, they asked her if she knew anything about computers. We're talking about 1981. Well, her face lit up and she said, "Yes." Finally, she understood what I had been trying to do for her. She was able to get a job as a reporter, which is what she needed to be doing. For years, she would tell me all these things going on in the world, about politics and different situations and writing articles, but they were not as an official reporter. She finally got her job as a reporter because she knew something about computers at a time when it was a rare skill. [laughter]

KR: Within the Princeton part of the *Copernicus* satellite project, how many people were working on it?

CT: Well, not everybody was at Princeton. We also had people at Goddard. That was where computers communicated with the satellite. That was another team, and I only met a few of them. They were astrophysicists. So, I don't know exactly what they did, but that's where the data came down and they probably did some pre-analysis and equipment tweaking. The Peyton Hall computer was only for retrieving data from Goddard already processed. It's hard to say how many since there were people all around the world too that were also part of it. There was astrophysicists internationally. It was a major project. It was historical. [Editor's Note: Goddard Space Flight Center is a NASA research facility in Greenbelt, Maryland. It is named for Robert Goddard, who is credited for building the first liquid-fueled rocket.]

In the early 1980s, I went to the National Air and Space Museum in Washington, D.C., and there was an exhibit on the *Copernicus* satellite. I have pictures of the posters that describe the satellite. There's a prototype piece, because all you could see was of a cylinder of the internal element of the satellite. So, it was very important. When I visited a few years ago, near the Hubble display, there was still a little component in the exhibit about OAO *Copernicus*. They had some little piece there, and I was excited, "Oh, yes!" It was the number one satellite. [Editor's Note: The Smithsonian National Air and Space Museum is located in Washington, D.C.]

The museum also operates the Steven F. Udvar-Hazy Center in Chantilly, Virginia, where it houses historical aircraft.]

Dr. Lyman Spitzer was chairman of the department for the first several years I was in the Astrophysics Department. I heard talk about the Large Space Telescope, which later became known as Hubble Space Telescope. I knew the technicians and engineers who were not involved with *Copernicus* but working on several projects. I would hang out with them a lot and I'd ask them questions about what they were doing. They were trying to design an image capturing system, a camera, to put on Hubble, using the charge coupled device, CCD. They explained the principle behind it, but they were having trouble getting it to work. It was advanced technology. Recently, I saw on television a background on Hubble and CCDs. Princeton didn't get any cameras on Hubble because they couldn't resolve that problem. It was actually resolved by a group in California who eventually came to Princeton while I was still there--James Gunn. [Editor's Note: Lyman Spitzer (1914-1997) was an astrophysicist who chaired the Department of Astrophysical Sciences at Princeton and served as the director of Princeton's Observatory. In 1946, he proposed the benefits of having a telescope in space. After the success of the Orbiting Astronomical Observatories (OAOs), the industry shifted to designing a telescope for the Large Space Telescope (LST) project. In 1990, the Hubble Space Telescope was launched into orbit. It remains operational today and has far exceeded its expected life span of fifteen years. Invented in the late 1960s, charge coupled devices, or CCDs, are sensitive detectors of photons that can be used in telescopes instead of film or photographic plates to produce images. In 1977, Princeton, Goddard and Caltech/JPL submitted proposals to NASA for the construction of a Large Space Telescope camera system, and the Caltech/JPL proposal was chosen because it was based completely on CCDs. The system became known as the Wide Field/Planetary Camera (WF/PC), designed and constructed by James Gunn and others. (James R. Janesick, *Scientific Charge-Coupled Devices*, p. 15)]

So, now I had a little bit more history to write. By the way, there isn't much written about the OAO project, so I've written a little book comparing OAO with Hubble. Also, Princeton wanted to be the Hubble center for data collection, like it was for OAO. We didn't get that either; Johns Hopkins got that. But it was people from Princeton who were hired to run the Johns Hopkins operation. So, I have all these little history tidbits, "Oh, yes, I know this person. I knew that person." In history, the human element is what I like to talk about, the little background things. [Editor's Note: In 1983, the Space Telescope Science Institute (STScI) was established at The Johns Hopkins University in Baltimore, Maryland to evaluate proposals for telescope time and manage the resulting telescope observations.]

KR: Did you have any interaction with Lyman Spitzer?

CT: Yes, we had department parties and we went to people's houses, so, yes, we were all part of the group. I didn't have any work-related stuff, but I would see him because it was not a big department. There was just the basement and then one floor, so, yes, I got to know all of them. I had to interact with them, but I liked to socialize.

I kept working on learning about computers. Even though it was not part of my job, I would take advantage of opportunities. I took some classes at Princeton through continuing ed. I did take a

couple of undergraduate classes. I even got down as far as Assembly language and machine code, which is the numeric language of computers. I played around with PL/I, COBOL and other languages. Although *Copernicus* was turned off in 1981, I still had some work because I'd still get requests for data from different astrophysicists. In the early 1980s, the midsize computers were coming in. Our department got a VAX computer, and they hired a System Administrator. However, there wasn't enough work to keep him busy. [Editor's Note: PL/I is a programming language developed by IBM and introduced in 1964. VAX was a line of computers developed by Digital Equipment Corporation and first introduced in 1977.]

So, the department decided since I had learned so much on my own, I could do the job. I replaced someone with a Systems Administration master's degree, poor guy. I had both the job working on the OAO data but also being a system administrator. I didn't take any classes to do it. I learned on the job by asking questions. The computer was new to graduate students too, so they didn't know everything. I wrote a description on how to use the computer. If they had problems, they'd come to me, sometimes with phony problems to test me. Or sometimes, I don't know phony or not, but I'd get questions like, "Oh, the computers were acting funny." I would ask, "Can you describe funny for me?" I knew if I was going to call a technician, he is going to ask me questions. I had better have some kind of intelligent response so we can actually get to work on it. I would go over to the student's workstation and see the terminal. Sometimes, I'd ask, "Did you turn the terminal on?" "No." "Flip the switch on the back." I would think, "Come on, you're not that dumb. You're a graduate student." [laughter] One time, I saw a student's data being deleted on the screen, so I had to stop that process immediately. I said, "No, no, you don't want to do that. You almost lost everything." [laughter] There were other things that I had to answer, where I couldn't figure out the answer, but I could tell it was a real question. I'd go through everything I could think of to resolve the issue. Then, I would call the technician up. He could tell right away that he could get down to business with me. He didn't ask me, "Well, was it turned on?" I could say, "This is what happened. This is what's going on. This is what I tried." We could resolve the issue over the phone, so we didn't have somebody coming in to fix anything like that. I did that. We had a teenage visiting genius, who was not part of the department, but he would come in and work on the computer system. That's a totally different issue and that was not a pleasant experience. He was mean, but I had to work with him to learn my job.

Anyway, I succeeded. I had learned all these different languages and got my FORTRAN down and was the system administrator. When my job ended with OAO in 1983, I started looking around for different jobs. At the university, they did give you a lot of time to look for work. I had several months. I could've just taken the money and left, but I didn't do that. I stayed on until December because I had not found a job. I was going to Goddard and places like that, looking for some space work.

Instead, in my last month, I found an article in the *Aviation and Space Week* magazine about a job in Houston related to NASA-Johnson Space Center. I called, and the first time, I got a receptionist. I told her what my background was and she said, "Oh, well, you ought to talk to so and so." She gave me a name of a person, but the person was busy. The next three days, I called this person, and he was at a meeting, or it was something different all the time. It didn't dawn on me that maybe this person really wasn't interested and was trying to avoid me, hoping I would

give up, because I was persistent. [laughter] I was going to keep calling until I got to speak to this person. Finally, when I talked to this person, he said, "Oh, well, send your résumé." I had gotten the man interested in me. I sent a package immediately.

Before Christmas, I was flown down to Houston for a job interview, and it was clear to me, I didn't fit the work. I didn't have the background at all, from what they were talking about. I had no clue what the job was. [laughter] However, I realized, "Wow, this is where I need to be, at Johnson Space Center. This is where the action is." I was told they would call me back in a week, but I didn't hear from them. I called back and they said, "We got someone." I didn't get the job, and I was really disappointed. I said, "Well, please pass my résumé around," which they did. [Editor's Note: The Lyndon B. Johnson Space Center is a NASA facility in Houston, Texas that conducts human spaceflight training and operations. The Christopher C. Kraft, Jr. Mission Control Center is located at the center.]

Not long after that, I got a phone call from Houston, from the same company. I really wanted to work there--I was willing to do just about anything to get down there. It just seemed like the perfect place for me to be. I had a phone interview, and I was hired to work in Mission Control. The company worked fast. It was January, and they paid for my move to Houston.

I became part of the team that helped computerize Mission Control operations. The flight controllers had monitors in front of them, not computers, that showed data coming down from the shuttle. So, if there was a problem, they had to get these big, old green-and-white printed pages of dot matrix diagrams and find the problem. They, literally, with their fingers, would trace through and find the problem and how to solve it. Now, our software did that. We had two pieces: the Failure Analysis Program (FAP) and the Shuttle Configuration Analysis Program (SCAP).

I had to go through training for the flight controllers to understand what their work was, which of course I had no problem. I'd do anything. [laughter] I had a great boss, who asked, "Hey, you want to take training in this?" Yes, I wanted extra training. Some of the training material was really primitive videotapes, but that's all they had. That's how the flight controllers trained. I even took the same kind of training as the astronauts: sit in a Space Shuttle simulator and go through a checklist. I learned all of the basics on that, and that would help make me understand the flight controllers' work better. That program was started by John Muratore, with Gene Kranz as the Mission Operations director. [Editor's Note: Gene Kranz worked for NASA from 1960 to 1994. He served as the flight director for the Gemini and Apollo programs, including the first lunar landing of Apollo 11. He went on to serve as deputy director of Flight Operations and then director of Mission Operations. In popular culture, Kranz is portrayed by Ed Harris in the film *Apollo 13*, which delves into the successful efforts of NASA to return the Apollo 13 crew safely to Earth, after an oxygen tank blew in space and the crew had to abort their mission to the Moon.]

KR: You can tell for the record who Gene Kranz is.

CT: Gene Kranz, everybody knows as the Apollo 11 and Apollo 13 Flight Director, the big man with the crew cut and the different vests his wife made for him, a real team player, very much

into team. I have a picture of him looking at our software. People take computers for granted, but I was there in the Apollo-style Mission Control Center. That was the equipment we used in the early shuttle days. That's what we had to work with. Now, you see all these other modern computers. I worked on those later on with the shuttle and Space Station, but I was part of the team that made that possible.

KR: Candy, what company were you working for?

CT: At that point, it was McDonnell-Douglas who hired me, and it was a really great company.

KR: What years were you working in that job?

CT: Well, I moved down to Houston in January of 1984. I worked for them for a couple of years. I was starting to look at both a master's degree and also trying to develop some independent work, like an entrepreneur. Unfortunately, the *Challenger* accident happened. I was on site watching when the *Challenger* launched. I saw the accident live. I was not in Mission Control but another building for my independent job. I was at NASA the entire day. At that point, I was writing a journal as an eyewitness to history. Even days before the accident happened, I was writing about the issues the mission encountered, "Oh, yes, there's a problem here." I didn't know that in a few days there would be a tragedy. So, I have historic primary documents of what it was like at that time. I wrote about the memorial service and how we had to deal with the fallout of the event. [Editor's Note: On January 28, 1986, the Space Shuttle *Challenger* exploded seventy-three seconds after launch, killing all seven astronauts aboard.]

KR: I want to ask you about the *Challenger* and I want to ask you about the other shuttle missions, but first let me check in on your battery.

CT: Yes, I was looking at it.

KR: Okay.

CT: It's getting low. We have a few more minutes.

KR: Okay. What was the first shuttle mission that you remember when you were working on the computers at McDonnell-Douglas?

CT: If you let me backtrack just a moment, it just occurred to me, when I was at Princeton, I was a space activist. I was involved in a lot of activities, conferences. There were important people in the space industry, such as astronauts, scientists, researchers, policy-makers. A person I remember is Gerard O'Neill, who had a space colony idea using Lagrange points (positions in space where objects sent there tend to stay put. At Lagrange points, the gravitational pull of two large masses precisely equals the centripetal force required for a small object to move with them. These points in space can be used by spacecraft to reduce fuel consumption needed to remain in position). He was in the next building in the Physics Department. I was always going meeting people. I went over, met with him, and Brian O'Leary was working with him and had applied to be an astronaut. As a space activist, I worked with a lot of students on campus. I was a

cofounder of a L5 Society. [Editor's Note: Gerard O'Neill (1927-1997) was a physics professor at Princeton University who also worked at NASA and advocated for space exploration. Brian O'Leary was a scientist and astronaut applicant who lived from 1940 to 2011. Named for mathematician Joseph-Louis Lagrange, the Lagrange Points are positions where the gravitational pull of two large masses equals the centripetal force required for a small object to move with them. There are five special points (L1, L2, L3, L4, L5) where a small mass can orbit in a constant pattern with two larger masses.]

In 1983, I started my own TV show in South River because my town had started getting cable equipment. It occurred to me, "Hey, they're going to need programming." What I did was get some students together and ordered NASA videos from shuttle missions. We provided a fifteen-minute introduction and then we'd show the video--that simple. We had nine episodes on television.

I went to see two launches when I was still in New Jersey. STS-1, I drove with some coworkers down to Florida to see the very first Space Shuttle launch. Then, STS-7 was Sally Ride's launch in June 1983. I drove there by myself. I got in as press because I had the television show. It was a lot easier getting in as press at that point. I have video as well as still images of the launch. Our show "Wings in Space" was only nine episodes because then that's when I got the job at NASA. In January of '84, I worked in the same building as Sally Ride! [laughter] [Editor's Note: NASA conducted the Space Shuttle program, officially called the Space Transportation System (STS), from 1972 to 2011. In the first Space Shuttle mission, STS-1, the *Columbia* launched from Kennedy Space Center in Florida on April 12, 1981. On June 18, 1983, in STS-7, the *Challenger* launched with a crew of five, including Sally Ride, the first American woman in space. Sally Ride again ascended to space, as a part of the first seven-person shuttle crew, when the *Challenger* launched in STS-41-G on October 5, 1984.]

KR: What do you remember about the first shuttle mission that you participated in?

CT: [Editor's Note: Ms. Torres added to the transcript that the first shuttle mission in which she was involved was STS-41B, which launched on February 3, 1984. The mission lasted for seven days, twenty-three hours. The crew consisted of Commander Vance D. Brand, Pilot Robert L. Gibson, and Mission Specialists Bruce McCandless II, Ronald E. McNair and Robert L. Stewart.] I arrived at the end of January, so I had only been on the job about a week. Our work didn't differentiate between missions. We modified the software after each mission because it was an ongoing developmental process.

KR: What was it like moving to Houston?

CT: Oh, it was awesome. I drove down, stopped along the way visiting relatives. It was all exciting because I had lived in South River from age nine to age thirty. This was the first time I lived on my own, and here I was, sixteen hundred miles away and finding an apartment and all that. It was just great! Everything was new, exciting, driving around the city, getting to know the place. I knew more events than a lot of people who had been living here for a long time because I would explore sections of the city, go to events, and pore through event magazines. It

was really, really fun getting to know my new environment. I had a great group of people who would come along on my adventures.

KR: What was it like on a daily basis working for McDonnell-Douglas?

CT: We weren't all McDonnell-Douglas employees. We had NASA civil servants and a couple Air Force people. Our software was also slightly mixed in that sense because we had to support Department of Defense missions.

KR: How are you on time?

CT: I've got a few minutes.

KR: I was just asking you about day-to-day life.

CT: Yes, it was just great. It was just fun. We respected each other. We had a lot of fun working together. Everybody had totally different personalities, different backgrounds. We'd do events together. We'd get together for lunch. Our NASA boss was superb. He would have us meet at a restaurant in the morning to have breakfast before we all went to work. When we finished doing our updates to the software before a mission and the shuttle launched, our work was done for that. We would go to a nearby park for a couple hours on work time because a lot of times we'd be working in the evenings and weekends. We worked different hours. It was just great. We had this wonderful camaraderie. Our NASA boss wanted us to get to know Texas. We'd go on day trips on weekends to different parts of Texas. He and I liked photography, so we were out there taking pictures of flowers, not that we always knew the names of them, [laughter] but we'd make up names. It was really, really a great group of people to work with.

KR: Which building were you working at, at Johnson Space Center?

CT: That was Building 4. Now, it's North and South, but I still refer to it as Building 4. That was where the flight controllers and the astronauts and technical support were all located. It was a three-story building. The astronauts were on the top floor. The flight controllers were on the first and second floors. My group, the software engineers, and the technical people were on the first floor.

KR: Do you want to stop for today and we will pick up again next week?

CT: Yes, I think that's a good stopping point.

KR: Okay, that sounds great.

CT: I know there was some other stuff I meant to cover last time, but I'd have to email you, just some minor things that came up. I forgotten what they were now.

KR: Sure, that is okay. If there are any stories that you want to talk about that you forgot to talk about today, you can bring them up in our next session.

CT: Okay, sounds great.

KR: Thank you so much.

CT: All right, I enjoyed it. It gets my days off to a good start.

KR: Excellent.

CT: All right, well, take care.

KR: Okay, you too. I will be in touch through email.

CT: All right, thanks.

KR: Okay, have a great rest of the day.

CT: All right, bye.

KR: Bye.

-----END OF TRANSCRIPT-----

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